Carbon Free Power Project

Application for Limited Work Authorization

Enclosure 3 - Environmental Report

Revision 0
July 2023

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ACRONYMS

Acronym or Abbreviation	Description
ac	acre
ACCS	air cooled condenser systems
ACEC	areas of critical environmental concern
ACS	American Community Survey
AHRQ	Agency for Healthcare Research and Quality
ALARA	as low as reasonably achievable
AMWTP	Advanced Mixed Waste Treatment Project
APE	Area of Potential Effects
AQCR	air quality control region
ASER	annual site environmental report
AST	above-ground storage tank
ATR	Advanced Test Reactor
ATRx	Advanced Reactor Technology Complex
BEA	U.S. Bureau of Economic Analysis
BESS	battery energy storage systems
bgs	below ground surface
BLM	U.S. Bureau of Land Management
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BOS	balance of site
BP	before present
BYU-Idaho	Brigham Young University-Idaho
C&D	construction and demolition
ca.	circa; around
CAA	Clean Air Act
CAP	criteria air pollutant
CBG	Census Block Group
CCA	Candidate Conservation Agreement
CCNPP	Calvert Cliffs Nuclear Power Plant
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	Central Facilities Area Building Designation
CFA	Central Facilities Area
CFPP	Carbon Free Power Project
CFR	Code of Federal Regulations
CGP	construction general permit
CITRC	Central Infrastructure Test Range Complex
cm	centimeter
CO	carbon monoxide
CO_2	carbon dioxide

ACRONYMS

Acronym or Abbreviation	Description
COD	commercial operation date
COL	combined license
COLA	combined license application
CPP	Chemical Processing Plant
CRB	Control Building
CRMO	Cultural Resource Management Office
CRMP	Cultural Resource Management Plan
CRR	Cultural Resource Review
CTF	Contained Test Facility
cu yd	cubic yard
CUB	Central Utility Building
CWA	Clean Water Act
D&D	decontamination and demolition
DART	days away, restricted, or transferred
DART-L	days away, restricted, or transferred - lost time incidence rate
DART-R	days away, restricted, or transferred - restricted workday case rate
dB	decibels
dBA	A-weighted decibels
DBA	design-based accident
DEQ	Idaho Department of Environmental Quality
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DWT1	Treatment Class I
E&S	erosion and sedimentation
e.g.	*exempli grata;* for example
EBR	Experimental Breeder Reactor
EFS	Experimental Field Station
EICAP	Eastern Idaho Community Action Partnership
EIS	environmental impact statement
EJ	environmental justice
EMF	electromagnetic field
EO	element occurrence
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPP	Environmental Protection Plan
EQ	equivalency
ER	environmental report
ESA	Endangered Species Act
ESER	Environmental Surveillance, Education, and Research
ESL	Energy Systems Laboratory
ESP	early site permit

ACRONYMS

Acronym or Abbreviation	Description
ESRI	Environmental Systems Research Institute
ESRP	Eastern Snake River Plain
FEIS	final environmental impact statement
ft	feet
ft^2	square feet
ft^3	cubic feet
g/m^3	grams per cubic meter
GCR	General Conformity Rule
GHG	greenhouse gas
GHGRP	Greenhouse Gas Reporting Program
GIS	geographic information system
gpd	gallons per day
gpm	gallons per minute
GPS	Global Positioning System
GW	groundwater
HALEU	high assay low-enriched uranium
HAP	hazardous air pollutant
HeTO	Heritage Tribal Office
HGR	Admiral Hyman G Rickover
HOA	homeowners association
HSE	health, safety, and environmental
HVAC	heating, ventilation, and air conditioning
Hwy	highway
Hz	hertz
i.e.	*id est;* that is
ICDF	Idaho CERCLA Disposal Facility
ID	Idaho
IDAPA	Idaho Administrative Procedures Act
IDFG	Idaho Fish and Game
IDWR	Idaho Department of Water Resources
IFWIS	Idaho Fish and Wildlife Information System
IMPLAN	Impact Analysis for Planning
in	inch
INL	Idaho National Laboratory
INPO	Institute of Nuclear Power Operations
INTEC	Idaho Nuclear Technology and Engineering Center
IPCC	Intergovernmental Panel on Climate Change
IPDES	Idaho Pollutant Discharge Elimination System
ISG	interim staff guidance
ISU	Idaho State University

ACRONYMS

Acronym or Abbreviation	Description
ITD	Idaho Transportation Department
Kcmil	thousand circular mil
KG	kindergarten
kV	kilovolt
kV/m	kilovolts per meter
kW	kilowatt
lb	pound
LDS	Latter-Day Saints
LLC	limited liability company
LOS	level of service
LTV	long-term vegetation
LWA	limited work authorization
m	meter
m/s	meters per second
MAGNET	Microreactor Agile Non-Nuclear Experimental Testbed
MARVEL	Microreactor Applications Research, Validation and Evaluation
MCL	maximum contaminant level
MCRE	Molten Chloride Reactor Experiment
MEI	maximally exposed individual
MFC	Materials and Fuels Complex
Mgal	million gallons
mi	mile
microns	micrometers
$MJ/m^2/d$	megajoules per square meter per day
ml	milliliter
MOU	memorandum of understanding
mrem	millirem
mrem/yr	millirem per year
MSWLF	municipal solid waste landfill
MT	metric tons
MT CO_2	metric tons of carbon dioxide
MT CO_2 (eq)	metric tons of carbon dioxide equivalent
MW	megawatts
MWe	megawatts electric
MWt	megawatts thermal
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
NCES	National Center for Education Statistics
nCi/m^2	nanocuries per square meter

ACRONYMS

Acronym or Abbreviation	Description
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NI	nuclear island
NIOSH	National Institute for Occupational Safety and Health
NO_2	nitrogen dioxide
NODA	Naval Ordnance Disposal Area
NOI	notice of intent
NOx	nitrous oxide
NPDES	National Pollutant Discharge Elimination System
NPM	NuScale Power Module
NPS	U.S. National Park Service
NRC	U.S. Nuclear Regulatory Commission
NRF	Naval Reactors Facility
NSR	new source review
NW-AIRQUEST	Northwest International Air Quality Environmental Science and Technology Consortium
NWI	National Wetlands Inventory
NWPA	Nuclear Waste Policy Act
O_3	ozone
OMB	Office of Management and Budget
OP	operational activities
OSHA	Occupational Safety and Health Administration
PAM	primary amebic meningoencephalitis
Pb	lead
pCi/L	picocuries per liter
pCOL	pre-combined license
pH	potential hydrogen
PK	prekindergarten
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
POL	petroleum, oils, and lubricants
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PRE	preconstruction
Pre-COL	pre-combined license

ACRONYMS

Acronym or Abbreviation	Description
PW	pump well
pwr	power
PWS	public water system
QA	quality assurance
RadNet	Radiation Monitoring Network
RCP	representative concentration pathways
RCRA	Resource Conservation and Recovery Act
REDI	Regional Economic Development for Eastern Idaho
RHLLW	Remote-Handled Low Level Waste Disposal Facility
RNA	research natural areas
RRTR	Radioactive Response Training Range
RV	recreational vehicle
RWB	Radioactive Waste Building
RWMC	Radioactive Waste Management Complex
RXB	Reactor Building
S/T	sewer/treatment
SC	steel composite
SCWS	site cooling water system
SDWA	Safe Drinking Water Act
SGCN	species of greatest conservation need
SHPO	State Historic Preservation Office
SICOG	Southeast Idaho Council of Governments
SIP	state implementation plan
SMC	Specific Manufacturing Capability
SO_2	sulfur dioxide
SOCA	security owner controlled area
SPCC	spill prevention, control, and countermeasure
sq	square
SSA	U.S. Social Security Administration
STP	sewer treatment plant
SWAP	state wildlife action plan
SWPPP	stormwater pollution prevention plan
TAN	Test Area North
TBD	to be determined
TCIR	total case incident rate
TGB	Turbine Generator Building
TI	turbine island
TLD	thermoluminescent dosimeter
TREAT	Transient Reactor and Test Facility
TSCA	Toxic Substance Control Act
U.S.	United States

ACRONYMS

Acronym or Abbreviation	Description
U.S.C.	United States Code
UAMPS	Utah Associated Municipal Power Systems
UHS	ultimate heat sink
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
V/m	volts per meter
VOC	volatile organic compound
VSWS	very small water system
VTR	Versatile Test Reactor
W/m^2	watts per square meter
WAG	Waste Area Group
WHO	World Health Organization
WMA	wildlife management area
WMF	Waste Management Facility
WSA	wilderness study area
WWTF	wastewater treatment facilities
yd	yard
yd^3	cubic yards
yr	year
ZIRCEX	zirconium removal prior to extraction
µCi/mL	microcuries per milliliter
$\mu Ci/mL_{air}$	microcuries per milliliter of air
$\mu g/m^3$	micrograms per cubic meter
µm	micrometer

Carbon Free Power Project

Application for Limited Work Authorization

Enclosure 3 - Chapter One

Introduction

Revision 0
July 2023

Chapter 1 Introduction

1.0 Introduction

As the combined license (COL) applicant for the Carbon Free Power Project (CFPP), CFPP LLC is applying for a limited work authorization (LWA) as the first part of a partial (also termed a “two-part” or “phased”) CFPP COL application (COLA) in accordance with 10 CFR 50.10(d)(2) and 10 CFR 2.101(a)(9). The requested LWA would authorize specific pre-COL construction activities at the CFPP site for which either a construction permit or combined license would otherwise be required under 10 CFR 50.10(c). As required by 10 CFR 2.101(a)(9)(ii), the second part of the CFPP COLA will contain the remaining information required by 10 CFR 52, Subpart C, and other applicable NRC regulations to be included in a COLA. The CFPP LLC COLA is to construct, own, possess, use, and operate a new nuclear power facility, consisting of six NuScale Power Modules (NPM) and associated common facilities, designated as the Carbon Free Power Project (CFPP) at the proposed location in Butte County, Idaho.

In accordance with NRC regulations, CFPP LLC includes in this application Enclosure 3-Environmental Report (ER). The LWA ER analyzes impacts to the environment from pre-construction, construction, operation, and decommissioning a nuclear power facility at this site. The NRC uses the LWA and COL ER as input to meet the National Environmental Policy Act of 1969 (42 United States Code [U.S.C.] 4321-4347, January 1, 1970, as amended) requirement that federal agencies consider the impacts that their actions, such as license issuance, might have on the environment.

As specified in 10 CFR Part 51.45(b) and consistent with the guidance in Regulatory Guide 4.2, Revision 3, this chapter presents an introduction of the proposed CFPP. A brief description of the applicant, reactor type, proposed action, purpose and need, planned activities, and status of compliance, including proposed permits and other entitlements, is provided. These topics are presented in the following sections:

- Plant Owners and Reactor Type - Section 1.1
    - Plant Owners - Section 1.1.1
    - Reactor Type - Section 1.1.2
- Description of the Proposed Action and the Purpose and Need - Section 1.2
- Planned Activities and Schedules - Section 1.3
- Planned Activities - Section 1.3.1
- Planned Activities and Schedules - Section 1.3.2
- Status of Compliance - Section 1.4
    - Permits, Licenses, and Approvals - Section 1.4.1

1.1 Plant Owners and Reactor Type

1.1.1 Plant Owners

The proposed LWA and COL is for CFPP LLC, a Utah-based limited liability company pursuant to and in accordance with the Utah Revised Uniform Limited Liability Company Act, Title 48, Chapter 3a, Utah Code Annotated 1953, as amended, and a wholly owned special purpose entity of Utah Associated Municipal Power Systems (UAMPS) (Reference 1.1-1).

The UAMPS is a political subdivision of the State of Utah that provides comprehensive wholesale electric-energy, transmission, and other energy services, on a nonprofit basis, to community-owned power systems throughout the Intermountain West. UAMPS members are located within Utah, Arizona, California, Idaho, Nevada, New Mexico, and Wyoming. Electricity generated by the CFPP must be sold to CFPP LLC's sole member UAMPS.

The CFPP LLC and UAMPS are both located at 155 North 400 West, Suite 480, Salt Lake City, UT 84103.

Enclosure 1 of the CFPP LWA application provides details on CFPP LLC as the applicant for the CFPP and its sole member UAMPS.

1.1.2 Reactor Type

The CFPP LLC is seeking an LWA and COL to site, construct, and operate a new nuclear power plant consisting of six 250 MWt (77 MWe) NuScale Power Modules utilizing the NuScale Power Plant US460 design. The NuScale US460 design is a natural circulation light water reactor with the reactor core and helical coil steam generators located in a common reactor vessel in a cylindrical steel containment module. The reactor vessel containment module is partially submerged in water in the reactor building safety related pool, which is also the ultimate heat sink for the reactor. The pool portion of the reactor building is located below grade.

The design features of the NuScale US460 plant provide safe, reliable, scalable, flexible, and cost competitive electrical power. As summarized within the CFPP Site Selection Study Report (Reference 1.1-2), the NuScale US460 design is selected for the following reasons:

- includes passive safety features that provide a safe certified design
- involves a relatively small physical footprint that minimizes impacts to the human and natural environment
- incorporates technology that provides zero carbon emissions
- is economically feasible compared to other baseload resource options

Further details on the reactor and support systems are provided in COL ER Section 3.2.

1.1.3 References

1.1-1 “About CFPP LLC". Access date November 20, 2022, https://CFPPLLC.com/cfppllc.

1.1-2 Enercon Services, Inc., "CFPP Site Selection Study Report, Rev. 1", Oklahoma City, OK, June 28, 2019.

1.2 Description of the Proposed Action and the Purpose and Need

The proposed federal action is NRC issuance of a LWA, under the provisions of 10 CFR 50.10(d) and 10 CFR 2.101(a)(9), to CFPP LLC for pre-combined license (pre-COL) construction activities for the CFPP, a new nuclear power plant consisting of six NuScale Power Modules utilizing the NuScale Power Plant US460 design at a location in Butte County, Idaho. The pre-COL construction activities are consistent with 10 CFR 50.10, and include

- remediation of soft or fractured rock in the subgrade underlying the Reactor Building (RXB) and Radioactive Waste Building (RWB) excavations, to include appropriate over-excavation and placement of one or more of the following:
  - granular backfill
  - interstitial grouting of rock fractures
  - low strength concrete (i.e., flowable fill)
- installation of RXB mud mat, including reinforcing wire mesh, and vapor barrier.
- installation of RXB permanent base mat components (e.g., reinforcing steel and associated supports, spacers, etc.; SpeedCore steel-plate composite (SC) wall module assemblies; sumps and drain lines; piping and conduit; grounding; concrete placement forms; and other embedded items) up to but not including concrete placement.

The need for the NRC LWA review and approval is so that CFPP LLC can meet the overall construction and operational schedule as defined in LWA ER Section 1.3. Nuclear Regulatory Commission regulations require review of safety and environmental considerations as part of this federal action.

The purpose and need of the CFPP are to

- produce electricity to meet expected baseload electrical generating capacity and growth demand to maintain system reliability.
- provide a carbon-free baseload resource to replace the expected retirement of fossil fuel generating assets.
- develop, demonstrate, commercialize, and establish an advanced nuclear energy baseload resource involving the NuScale Power Plant US460 design in cooperation with the U.S. Department of Energy, Office of Nuclear Energy.

The CFPP provides a carbon-free baseload resource to meet the projected CFPP baseload needs. By providing this baseload resource, the CFPP indirectly enables UAMPS and its members to add greater amounts of intermittent renewable energy, especially wind and solar, to its energy portfolio. The CFPP, combined with renewables, enable UAMPS members to further decarbonize their energy portfolios.

By serving as a collaborative platform for the first of a kind demonstration, deployment, and commercialization of the NuScale Power Plant US460 design, CFPP also supports national (i.e., Department of Energy) economic and energy security objectives and enables further development and demonstration of new energy system processes and technologies, such as next-generation nuclear (i.e., small modular reactors).

1.3 Planned Activities and Schedules

1.3.1 Planned Activities

The proposed action involves CFPP preconstruction, pre-COL construction, COL construction, and operational activities.

1.3.1.1 Preconstruction Activities

"Preconstruction" refers to site activities that per 10 CFR 50.10(a)(2) are not considered to be "construction" as defined in 10 CFR 50.10(a)(1). As such, preconstruction activities are undertaken without a COL or other NRC licensing action that otherwise would be required under 10 CFR 50.10(c).

The CFPP preconstruction activities include activities such as:

- site security provisions (e.g., access controls, construction fencing)
- storm water mitigation measures, including ponds, manholes and piping
- excavation, grading, ripping, and blasting for site leveling, ditches and utility trenches, site access, haul roads, and install underground piping and electrical
- temporary utilities and services for the site (e.g., electrical power, communications, water supply, sanitary)
- excavation for Turbine Island structures, RXB, RWB, and Control Building (not including RXB/RWB tieback installation)
- stripping, stockpiling, and grading of excavated overburden and aggregates
- establishing rock crushing facilities
- establishing concrete batch plant
- establishing temporary mud mats and pre-tie base mat rebar for construction
- construction of structures and facilities for badging, training, administration, and warehouse use

The proposed CFPP site is located on federal land managed by the DOE. Before commencing preconstruction activities, the DOE is anticipated to consider environmental impacts consistent with 40 CFR 1500, National Environmental Policy Act (NEPA) of 1969, as amended. The CFPP LLC is coordinating the NEPA review of preconstruction activities with the DOE.

1.3.1.2 Pre-Combined License Construction Activities

Pre-COL construction refers to activities that meet the 10 CFR 50.10(a)(1) definition of "construction" and are needed to start before the projected issuance of the CFPP COL(s). The impetus for pre-COL construction is to maintain the first reactor module commercial operation date (1st COD) milestone (Table 1.3-1). Pre-COL construction activities require NRC approval in the form of a LWA or other mechanism per 10 CFR 50.10(c), or an approved exemption from 10 CFR 50.10(c).

The CFPP LLC is seeking NRC authorization for pre-COL construction using a combination of: (1) an LWA requested as the first part of a "phased COLA" in accordance with 10 CFR 50.10(d) and 10 CFR 2.101(a)(9); and (2) an exemption from 10 CFR 50.10(c) as allowed under 10 CFR 50.12. Pursuant to 10 CFR 51.49(b) the LWA ER is limited to the activities proposed to be conducted under the LWA. The ER submitted as part of the second part of the phased COLA includes the information required by 10 CFR 51.50. In addition, the LWA application includes a site redress plan as required by 10 CFR 50.10(d)(3).

The CFPP pre-COL construction activities are conducted and summarized as follows:

- Limited Work Authorization Scope
    - remediation of soft or fractured rock in the subgrade underlying the RXB and RWB excavations, to include appropriate over-excavation and placement of one or more of the following:
        - granular backfill
        - interstitial grouting of rock fractures
        - low strength concrete (i.e., flowable fill)
    - installation of RXB mud mat, including reinforcing wire mesh and vapor barrier
    - installation of RXB permanent base mat components (e.g., reinforcing steel and associated supports, spacers, etc.; SpeedCore steel-plate composite (SC) wall module assemblies; sumps and drain lines; piping and conduit; grounding; concrete placement forms; and other embedded items) up to but not including concrete placement
- Exemption Scope
    - permanent RXB and RWB excavation wall shoring system (for worker safety)
        - installation of structural tiebacks (i.e., rock bolts)
        - installation of fibermesh/shotcrete

1.3.1.3 Combined License Construction Activities

The CFPP combined license construction refers to site activities that meet the 10 CFR 50.10(a)(1) definition of "construction" but are not projected to be started prior to COL issuance (Table 1.3-1). As such, the COL construction activities are conducted as licensed activities under the COL(s), as required by 10 CFR 50.10(c). These activities include the remaining CFPP construction not previously conducted under the LWA or exemption request, including installation, assembly, erection, fabrication, and testing of safety-related and associated support structures, systems, and components of the CFPP nuclear island, turbine island, and balance of site.

1.3.1.4 Operational Activities

The CFPP operational activities are consistent with 10 CFR 52, 10 CFR 50, 10 CFR 30, 10 CFR 40 and 10 CFR 70 and include commissioning, testing, startup, operations, maintenance, fuel handling and storage, waste management and disposal, inspections, physical security, environmental protection, emergency preparedness, and plant shutdown.

1.3.2 Schedule

Table 1.3-1 highlights key milestones for the planned activities summarized in Section 1.3.1. The activities and associated milestones shown in Table 1.3-1 are based on a CFPP construction schedule that includes the major site construction-related activities starting with site mobilization and continuing through the 1st COD of each NuScale Power Module (NPM).

Table 1.3-1: Planned Activities and Key Milestones for the Carbon Free Power Project

Activity/Milestone	Date
LWA submittal	7/31/2023
Exemption request	7/31/2023
Preconstruction NEPA input submittal to DOE	12/8/2023
COLA submittal	1/10/2024
Preconstruction NEPA determination	12/20/2024
Exemption Request NEPA determination	12/20/2024
Preconstruction start	1/3/2025
Pre-COL Construction Start	4/1/2025
LWA Approval	8/5/2025
COLA approval	7/10/2026
COL construction start	7/10/2026
NPM-1 1st COD	Q4/2029
NPM-2 through -6 COD	Q1- Q2/2030

1.4 Status of Compliance

1.4.1 Permits, Licenses, and Approvals

Permits, licenses, and approvals, collectively referred to as authorizations, for the proposed action are obtained in accordance with applicable federal and state statutes and regulations. Authorizations align with the planned activities and associated schedule highlighted in LWA ER Section 1.3. Certain authorizations are applicable to multiple phases; thus, the earliest phase the authorization is required has been identified. Additionally, certain authorizations require future modifications for subsequent phases; therefore, multiple phases are identified. Table 1.4-1 identifies the following information for each authorization:

- jurisdictional agency
- authority, law, or regulation that dictates the requirement
- name of the required authorization
- applicable activity
- required prior to start
- status of compliance

Table 1.4-1: Authorizations Required and Status of Compliance for the Proposed Action

Jurisdictional Agency	Authority	Name of Authorization	Applicable Activity	Required Prior to Start *	Status of Compliance
Idaho Department of Environmental Quality (DEQ)	Clean Air Act (CAA) (state authority for Federal Program) / Idaho Administrative Procedures Act (IDAPA) 58.01.01.213	Concrete Batch Plant General Permit	Construction and operation of a portable concrete batch plant	PRE	Permit application not yet submitted
Idaho DEQ	CAA (state authority for Federal Program) / IDAPA 58.01.01.213	Construction Air Permit	Construction of an air pollution emission source	PRE	Permit application not yet submitted
Idaho DEQ	CAA (state authority for Federal Program) / IDAPA 58.01.01.213	Operating Air Permit	Operation of an air pollution emission source	OP	Permit application not yet submitted
Idaho DEQ	CAA (state authority for Federal Program) / IDAPA 58.01.01	Nonmetallic Mineral Processing Plant Air Permit	Air permit to construct and operate rock crusher (air emission source)	PRE	Permit application not yet submitted
Idaho DEQ	Clean Water Act (CWA) (state authority Idaho Pollutant Discharge Elimination System Program (IPDES) for federal (NPDES) program) / IDAPA 58.01.02	IPDES Individual Permit to Discharge Treated Industrial Wastewater	Discharge of treated wastewater	OP	Permit application not yet submitted
Idaho DEQ	CWA (state authority (IPDES) for federal (NPDES) program) / IDAPA 58.01.25	IPDES Construction General Permit for Stormwater Discharge Activities (IDR100000)	Storm water discharges from construction projects >5 acres [Stormwater Pollution Prevention Plan (SWPPP)]	PRE	Permit application not yet submitted

Table 1.4-1: Authorizations Required and Status of Compliance for the Proposed Action

Jurisdictional Agency	Authority	Name of Authorization	Applicable Activity	Required Prior to Start *	Status of Compliance
Idaho DEQ	CWA (state authority (IPDES) for federal (NPDES) program) / IDAPA 58.01.25	IPDES Multi-sector General Stormwater Permit for Industrial Activity (IDR050000)	Storm water discharges from industrial activities	OP	Permit application not yet submitted
Idaho DEQ	CWA (state authority (IPDES) for federal (NPDES) program) / IDAPA 58.01.03, IDAPA 58.01.16	Public Wastewater Treatment Permit	Generation, collection, treatment, and disposal of wastewater	OP	Permit application not yet submitted
Idaho DEQ	CWA / 40 CFR Part 112 / IPDES	Spill Prevention, Control and Countermeasures Plan (Construction/ Operation)	Spill control plan for petroleum products	PRE / OP	Plan not yet prepared
Idaho DEQ	IDAPA 58.01.07	Underground Storage Tank registration	Underground storage tank installation and operation	OP	Registration application not yet submitted
Idaho DEQ	Safe Drinking Water Act (state authority) IDAPA 58.01.08	Public Drinking Water System Permit	Design, construction, operation, maintenance, and quality control of public drinking water system	OP	Permit application not yet submitted
Idaho DEQ / Idaho Department of Insurance - State Fire Marshal	40 CFR Part 112 / IDAPA 58.01.02.851 & .852 / NFPA 30	Above Ground Storage Tank registration	Above ground storage tank installation and operation	COL / OP	Registration application not yet submitted
Idaho DEQ / U.S. Environmental Protection Agency (EPA)	Resource Conservation and Recovery Act (State Authority - IAC Title 33, Part V Subpart 1) / IDAPA 58.01.05	Hazardous Waste Generator License (Obtain ID number)	Generation and management of hazardous waste	OP	Application not yet submitted
Idaho DEQ / EPA	Resource Conservation and Recovery Act Subtitle D / Idaho Solid Waste Facilities Act (IDAPA 58.01.06)	Solid Waste Generator License (Obtain ID number)	Generation of solid waste	OP	Application not yet submitted

Table 1.4-1: Authorizations Required and Status of Compliance for the Proposed Action

Jurisdictional Agency	Authority	Name of Authorization	Applicable Activity	Required Prior to Start *	Status of Compliance
Idaho Department of Water Resources (IDWR)	Idaho Code § 42-201(2), § 42-229 / IDAPA 37.01	IDWR Water Rights Allocation	Use of public water resources of the State of Idaho	PRE	Application not yet submitted
IDWR	Idaho Code § 42-235 / IDAPA 37.01	IDWR Well Drilling Permit	Groundwater well construction and drilling	PRE	CFPP groundwater monitoring wells permitted and installed. Production well permit application not yet submitted
Idaho Fish and Game	Endangered Species Act / Candidate Conservation Agreement for Greater Sage-Grouse	Consultation regarding potential to adversely impact protected species	Potential adverse impacts to protected species	PRE / pCOL / COL	CFPP LLC and Idaho Fish and Game have held information exchanges. Formal Federal consultation pending
Idaho State Historic Preservation Office	National Historical Preservation Act	Consultation regarding potential to adversely affect historic resources	Potential adverse effects to historic resources	PRE / pCOL / COL	U.S. Department of Energy (DOE) and Idaho State Historic Preservation Office have held information exchanges. Formal Federal Consultation pending
Idaho Transportation Department (ITD)	IDAPA 39.03.42 / ITD 2018 Standard Specifications	ITD Right of Way Encroachment Permit	Potential encroachment within ITD Right of Way	PRE	Permit application not yet submitted

Table 1.4-1: Authorizations Required and Status of Compliance for the Proposed Action

Jurisdictional Agency	Authority	Name of Authorization	Applicable Activity	Required Prior to Start *	Status of Compliance
Shoshone-Bannock Tribes	National Historical Preservation Act / Agreement in Principle between Shoshone-Bannock Tribes and U.S. DOE	Consultation regarding potential to adversely affect historic resources	Potential adverse effects to historic resources	PRE / pCOL / COL	Representatives of the Shoshone-Bannock Tribes participated in all CFPP Cultural surveys. CFPP LLC, DOE, NRC and Tribes have held information exchanges. Formal Federal consultation pending
U.S. Army Corps of Engineers	Clean Water Act, Section 404	Consultation regarding discharges to waters of the U.S. and Jurisdictional Wetland determinations	Potential discharges to waters of the U.S., wetland area crossings, Jurisdictional Wetland determinations	PRE / pCOL / COL	Formal Federal consultation pending
U.S. Bureau of Land Management	Federal Land Policy and Management Act	Consultation regarding action, land access and land use	Site access, site land use and redress	PRE / pCOL / COL	Formal Federal consultation pending
DOE	Atomic Energy Act of 1954, as amended	Consultation regarding proposed action, Cooperating Agency on National Environmental Policy Act (NEPA), landowner	Site access, site use, redress, NEPA determinations	PRE / pCOL / COL	CFPP LLC and DOE have several Agreements in place including: DOE Assistance Agreement and Use Permit. NRC and DOE have ongoing Federal interactions
DOE	Atomic Energy Act of 1954, as amended	DOE Use Permit	Grants access to occupy, use, and enjoy a portion of the INL site as the CFPP Site	PRE / pCOL / COL	Use Permit (NO. DE-NE700065) obtained February 17, 2016; amendment pending

Table 1.4-1: Authorizations Required and Status of Compliance for the Proposed Action

Jurisdictional Agency	Authority	Name of Authorization	Applicable Activity	Required Prior to Start *	Status of Compliance
DOE	Atomic Energy Act of 1954, as amended	Environmental Compliance Permit	Covers DOE review and NEPA determination of Phase 1 Site Investigation activities	PRE	Environmental Compliance Permit #INL-19-067 and NEPA Categorical Exclusion obtained for Site Investigation work.
DOE	Nuclear Waste Policy Act (NWPA) of 1982	Spent Fuel Contract	Disposal of spent nuclear fuel	COL	Application not yet submitted
U.S. Department of Transportation	49 CFR 107	Certificate of Registration	Transportation of hazardous material	OP	Registration application not yet submitted
EPA	Clean Water Act (CWA), Section 401	Consultation regarding CWA and discharges to Waters of the U.S.	CWA and discharges to Waters of the U.S.	PRE / pCOL / COL	Formal Federal consultation pending
U.S. Federal Aviation Administration	14 CFR Part 77 (pursuant to 49 U.S.C., Section 44718)	Construction Notice	Notice of erection of structures that may potentially impact air navigation	pCOL / COL	Notice not yet submitted
U.S. Federal Communication Commission	Title 47 Chapter 1, Subpart D	FCC License	Licensing of electromagnetic spectrum for commercial users	OP	License application not yet submitted
U.S. Federal Energy Regulatory Commission	18 CFR 35	Large Generator Interconnection Agreement	Interconnection pertaining to a Standard Large Generating Facility.	OP	CFPP LLC and Pacificorp have held information exchanges. Interconnection request not yet submitted

Table 1.4-1: Authorizations Required and Status of Compliance for the Proposed Action

Jurisdictional Agency	Authority	Name of Authorization	Applicable Activity	Required Prior to Start *	Status of Compliance
U.S. Fish and Wildlife Service	Endangered Species Act / Migratory Bird Treaty Act / Candidate Conservation Agreement for Greater Sage-Grouse	Consultation regarding potential to adversely impact protected species	Potential adverse impacts to protected species	PRE / pCOL / COL	DOE and U.S. Fish and Wildlife Service have held information exchanges. Formal Federal consultation pending

* [PRE - preconstruction activities; pCOL - pre-combined license construction activities; COL - combined license construction activities; OP - operational activities]

Carbon Free Power Project

Application for Limited Work Authorization

Enclosure 3 - Chapter Two

The Proposed Site and the Affected Environment

Revision 0
July 2023

Chapter 2 The Proposed Site and the Affected Environment

2.0 The Proposed Site and the Affected Environment

Utah Associated Municipal Power Systems (UAMPS), through its wholly-owned subsidiary CFPP LLC, proposes to construct and operate the Carbon Free Power Project (CFPP), a six-module 462 MWe NuScale Power Plant (US460 design) to be located on the U.S. Department of Energy (DOE) Idaho National Laboratory (INL) site in southeastern Idaho. In 2016, DOE authorized UAMPS to use an approximate 2325-acre parcel on the INL site through a DOE Use Permit (Reference 2.0-1). CFPP LLC conducted a series of site investigations at this location, called the CFPP site, from 2021 to 2023. CFPP LLC proposes to deploy the NuScale US460 nuclear power plant to support the UAMPS mission of producing reliable, cost-efficient baseload electric energy while meeting its low carbon environmental goals. The CFPP mutually supports DOE's mission of advancing nuclear power by providing information to help resolve technical, cost, safety, proliferation resistance, and security barriers related to advanced reactor technology.

This chapter describes the proposed CFPP site and the baseline conditions of the human population, environmental media, and historic and cultural resources that could be potentially impacted by CFPP construction and operation. Figure 2.0-1 depicts the proposed CFPP site location relative to the State of Idaho and the INL site. The CFPP site is located in Butte County, Idaho, on the western side of the INL site, near Idaho State Highway 33 and south of Stage Road, an INL secondary road. The INL site secondary road T-11 intersects State Highway 33 and provides the primary access route to the CFPP site.

Consistent with Regulatory Guide 4.2, Revision 3, this chapter provides detailed information or refers to supporting data sources with detailed information for each of the following Regulatory Guide 4.2 topical areas:

- Land Use – Section 2.1
- Water Resources – Section 2.2
- Ecological Resources – Section 2.3
- Socioeconomics – Section 2.4
- Environmental Justice – Section 2.5
- Historic and Cultural Resources – Section 2.6
- Air Resources – Section 2.7
- Nonradiological Health – Section 2.8
- Radiological Environment and Radiological Monitoring – Section 2.9

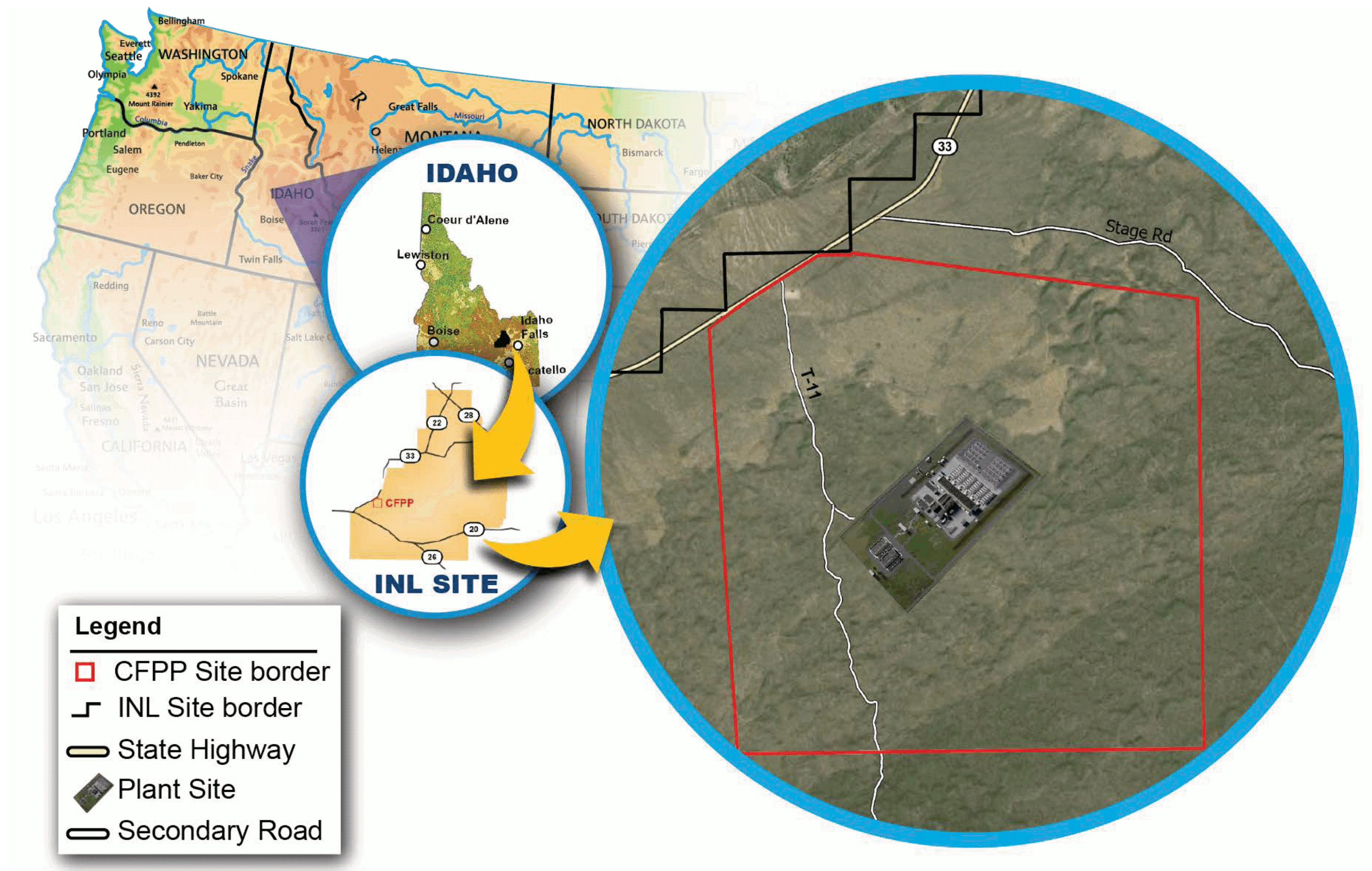
This chapter compiles information from site-specific studies and existing INL data sources, Geographic Information System data, and reports. Additional information obtained through research of online agency resources, including the Bureau of Land Management, U.S. Fish and Wildlife Service, Idaho Department of Fish and Game, U.S.

Department of Agriculture, U.S. Department of Labor, 2020 Census, and other publicly available data sources is referenced within individual sections. Information prepared for the Combined License Application Safety Analysis Report that supports the Environmental Report is incorporated by reference as appropriate.

2.0.1 Reference

2.0-1 U.S. Department of Energy, *Use Permit No. DE-NE700065*, February 17, 2016.

Figure 2.0-1: CFPP Site Location within the State of Idaho and Idaho National Laboratory



2.1 Land Use

This section describes the present and planned land use in the area within and around the CFPP site and is divided into the following sections:

- Site, Vicinity, and Region - Section 2.1.1
- Transmission-Line Corridors and Other Offsite Areas - Section 2.1.2

2.1.1 Site, Vicinity, and Region

The CFPP proposed site is located in Butte County in southeastern Idaho, within the boundary of the U.S. Department of Energy (DOE) Idaho National Laboratory (INL) site as shown in Figure 2.0-1. The CFPP site is situated on the Eastern Snake River Plain (ESRP) and lies above the Snake River Plain Aquifer.

The CFPP site encompasses a total of about 2325 acres. In addition, the CFPP includes about 400 transmission-related acres that extend from the CFPP site southeast to the Antelope Substation or a new Pronghorn Substation at the INL site Central Facilities Area (CFA). The CFPP site is located on an INL site parcel authorized by DOE to be used for CFPP site investigations. The DOE Use Permit (Reference 2.1-1) also establishes a pathway to obtaining DOE authorization for construction and operation of the CFPP in coordination with the U.S. Nuclear Regulatory Commission (NRC) license approval. The CFPP site is located on the western edge of the INL site adjacent to State Highway 33, north of combined U.S. Routes 20 and 26, and south of Stage Road, a secondary road on the INL site. The CFPP site (not including the entire transmission corridor) is defined by coordinates in Table 2.1-1 and shown on Figure 2.1-1.

The CFPP site encompasses the reactor plant, support facilities, and construction support areas. The CFPP vicinity is an area encompassed within a 6-mile (mi) radius from the CFPP site perimeter. The CFPP region is an area encompassed within a 50-mi radius from the CFPP site perimeter. Figure 2.1-2 provides both 6-mi and 50-mi radii relative to the CFPP site.

The CFPP site, vicinity, and region are within the State of Idaho. The CFPP site is located entirely on the INL site. The 6-mi vicinity includes both INL site land and land outside of the INL site to the west towards Butte City and into the foothills of the Lost River Range. Both the CFPP site and the 6-mi vicinity are located completely within Butte County. The 50-mi region extends eastward to the western side of Idaho Falls, Idaho; south just past Aberdeen, Idaho; north into Lemhi County near the Idaho and Montana border; and west into Custer County to the city of Carey, Idaho, and near Hailey and Bellevue, Idaho. The 50-mi region includes all or parts of Bannock, Bingham, Blaine, Bonneville, Butte, Clark, Custer, Jefferson, Lemhi, Lincoln, Minidoka, and Power Counties, as shown on Figure 2.1-2. The 50-mi regional boundary includes 12 counties with comprehensive plans for development. Additionally, the largest regional city of Idaho Falls, located in Bonneville County, has a zoning and development plan that guides city growth (Idaho Falls Community Development Services, Image IF [Reference 2.1-2]).

2.1.1.1 Site Area Map

Figure 2.1-1 depicts the CFPP site location and plant footprint. LWA Environmental Report (ER) Chapter 3 Figure 3.1-6 shows the CFPP temporary construction facilities and layout, and Figure 3.1-7 shows the plant layout with key buildings and station components layout. Figure 2.1-3 provides general location information for the CFPP site relative to select regional landmarks. The CFPP site is located about 49 mi west of Idaho Falls, Idaho, the largest city within the CFPP region (as measured from the center point of the CFPP site to the closest city limit). The site is located about 9.3 mi northeast of Butte City, Idaho; 10.4 mi from Howe, Idaho; and 12.3 mi from Arco, Idaho, the closest towns to the CFPP location. The site is also located about 22.9 mi north of the Craters of the Moon National Monument and Preserve; 44.5 mi northwest of the Fort Hall Reservation; 16.3 mi from the nearest Bureau of Land Management (BLM) wilderness study area (WSA); 6.3 mi from the Big Lost River (at the closest point); 10.9 mi from the Big Lost River Sinks, a National Wetland Inventory potential wetland area on the INL site; and 41.5 mi from the Camas National Wildlife Refuge.

2.1.1.2 Zoning

Zoning and land use for the CFPP site are defined by the DOE Use Permit (Reference 2.1-1) and the Comprehensive Land Use and Environmental Stewardship Report (Reference 2.1-3).

The INL site has tailored the land use planning process based on DOE Order 430.1C, “Real Property Asset Management” (Reference 2.1-4). Projects planned at the INL site are considered through a formal planning process. Stakeholder involvement in the land use planning process is encouraged through INL and DOE policy and guidance (Reference 2.1-3).

Zoning and land use for the CFPP vicinity and region are mainly defined by DOE, the BLM, the U.S. Forest Service (USFS), the U.S. Fish and Wildlife Service (USFWS), the Idaho Fish and Game (IDFG), and county-specific comprehensive plans (Reference 2.1-5 through Reference 2.1-16 for Bannock, Bingham, Blaine, Bonneville, Butte, Clark, Custer, Jefferson, Lemhi, Lincoln, Minidoka, and Power Counties, respectively). Table 2.1-2 summarizes the comprehensive plans for each county within the CFPP region. The comprehensive plans are required by Idaho Statutes, Title 67, State Government and State Affairs, Chapter 65, Local Land Use Planning (Reference 2.1-17) and are precursors to individual county and city zoning ordinances. The BLM administers public land use for recreation, grazing, mining, and WSAs. The USFS administers the national forests. And the USFWS and IDFG administer hunting and game management units.

The CFPP vicinity is completely within Butte County. Per Reference 2.1-9, about 86 percent of the land area in Butte County is Federally owned with about 13 percent privately owned and less than one percent State owned. Reference 2.1-9 is summarized in Table 2.1-2. No towns or cities are within the

CFPP vicinity. Butte City (about 9.7 mi from the CFPP center point), Howe (about 10.4 mi), and Arco (about 12.3 mi) are the nearest towns to the CFPP site.

In general, the counties that occur in the CFPP region have localized population centers associated with incorporated cities, smaller populations associated with unincorporated communities, and large areas devoted to agricultural, recreational, and natural resource preservation. In the region, the Federal government is responsible for a significant portion of the land and the related uses.

The INL site lands were withdrawn from the public domain by way of Public Land Orders No. 318, 545, 637, and 1770 (Reference 2.1-18 through Reference 2.1-21, respectively). These public land orders have no specific time limitations. As such, DOE retains the authority to administer INL lands for the foreseeable future (Final Versatile Test Reactor Environmental Impact Statement, Reference 2.1-22). In August 2019, the INL was designated as the National Reactor Innovation Center to provide the opportunity for private sector technology developers to access strategic infrastructure and assets of the laboratory. The INL provides an important leadership role in the development and deployment of current and next-generation nuclear reactors. (Reference 2.1-3)

In summary, zoning on the CFPP site is controlled by DOE land use requirements and the DOE-issued use permit. Grazing, mining, and public land use are administered by BLM; forest use is administered by USFS. Hunting and game management are administered by USFWS and IDFG. Butte County and other counties within the region have little to no zoning influence on the INL or CFPP sites. Zoning requirements in these counties have potential influence on the housing, recreation, and other services for the construction and operations work forces for the CFPP as discussed in LWA ER Section 2.4 and the combined license application. The construction and operation of the CFPP is not expected to impact zoning because of the distance from the CFPP site to population centers.

2.1.1.3 Principal Land Uses

This section describes the principal land uses for the CFPP site, vicinity, and region, as highlighted in Figure 2.1-4. Table 2.1-3 summarizes the land use areas and percentages within the site, vicinity, and region based on land ownership and activities.

2.1.1.3.1 Carbon Free Power Project Site Land Use

The CFPP site is located on the INL site. Current land use is defined by the DOE through Reference 2.1-3 and Reference 2.1-4. In 2016, DOE granted Utah Associated Municipal Power Systems a use permit (Reference 2.1-1) for an approximate 2325-acre parcel on the INL site. This two-phased use permit allows CFPP LLC to conduct site characterization activities in support of siting and licensing the CFPP under Phase I. In Phase II, pending the final NRC National Environmental Policy Act decision, DOE decides on and authorizes CFPP LLC to occupy the CFPP site and to construct, operate, and decommission the CFPP reactor in accordance with NRC requirements and Reference 2.1-1.

The CFPP site lies within the Howe Peak and Deadman grazing allotments administered by the BLM (Bureau of Land Management, Livestock Grazing on Public Lands, Reference 2.1-23). These active grazing allotments provide controlled grazing access in accordance with grazing permit requirements. While the grazing allotments are in force, actual grazing on the CFPP site is influenced by BLM relative to allotment usage control, annual forage abundance, wildfires and associated forage damage, and other controlling factors. The BLM frequently modifies allotments to meet evolving conditions, including activities such as new facilities on the INL site.

Public access to the CFPP site is currently managed by INL site access controls implemented by DOE, including fences, signage, badging requirements, and security patrols, per the 2020 INL Annual Site Environmental Report (Reference 2.1-24). The CFPP implements access controls for the CFPP site consistent with licensing requirements and in alignment with DOE access controls.

2.1.1.3.2 Vicinity Land Use

As shown in Figure 2.1-2, the vicinity (as defined by the 6-mi radius from the CFPP site boundary), encompasses areas of both the INL site and federal and state lands outside the INL site. U.S. Routes 20 and 26 cut across the INL site, exiting south of the CFPP site.

Approximately 94 percent of the INL site remains open and undeveloped, including the proposed CFPP location (Reference 2.1-24). Two INL facilities are located within but at the outer edge of the CFPP vicinity: Advanced Test Reactor (ATR) Complex (about 5.6 mi from the CFPP center point) and the Remote-Handled Low-Level Waste Disposal Facility (about 5.8 mi from CFPP) (Figure 2.1-5). The ATR is used to study the effects of radiation on materials and produces rare and valuable medical and industrial isotopes. The Remote-Handled Low-Level Waste Disposal Facility is a Hazard Category II nuclear facility that provides below grade, permanent radioactive waste disposal capability.

Outside the INL site, the foothills of the Lost River mountain range begin northwest of the CFPP site. This mountain range is used for recreational activities (e.g., hunting, camping, hiking, wildlife viewing) and livestock grazing; mining occurred in these mountains in the past.

The INL site is an administratively controlled area and, in general, access to the INL site and its facilities is permitted only on an official business basis. Public access is only allowed in rights-of-way associated with highways, the Big Lost River rest area, and at the Experimental Breeder Reactor-I visitor center. No residential dwellings are located on INL property. (Reference 2.1-22)

The INL site is included within a large territory once inhabited by and still important to the Shoshone-Bannock Tribes. However, the INL site does not lie within land boundaries established by the Fort Bridger Treaty of 1868 (Shoshone-Bannock Tribes [Reference 2.1-25]).

2.1.1.3.3 Regional Land Use

Figure 2.1-4 depicts the regional location of the CFPP site with land ownership and land use of surrounding areas. The CFPP site is surrounded by a mixture of public and private land, with the majority being managed by the Federal government through DOE on the INL site; U.S. Department of the Interior through the BLM, National Park Service, and Bureau of Indian Affairs; USFS; and Bureau of Reclamation for areas outside the DOE-controlled site. Land uses in the BLM-administered areas include mineral and energy production, livestock grazing, and recreation. (Reference 2.1-22) Additionally, the BLM administers WSAs within the CFPP region that provide opportunities for recreation, ecological and wildlife habitat preservation and viewing, science and education, and hunting and fishing. A small percentage of the regional land area outside INL is owned by the State of Idaho through endowments and is used for the same purposes as the BLM land (Reference 2.1-22). The Bureau of Reclamation operates the American Falls Dam within the region (Bureau of Reclamation, Projects & Facilities, American Falls Dam [Reference 2.1-26]).

The Craters of the Moon National Monument and Preserve, managed jointly by the BLM and National Park Service, is a unique 750,000-acre geologic area with the Great Rift, a 52-mi long crack in the earth's crust, exposed fissures; lava fields; craters; and cinder cones. Craters of the Moon offers hiking, camping, cross-country skiing, wildlife viewing, and backcountry travel, including four wheeling. (BLM, Craters of the Moon National Monument [Reference 2.1-27])

The USFS manages the Salmon-Challis, Sawtooth, and Caribou-Targhee National Forests within the CFPP region. The forests provide hunting, grazing, wildlife, and recreational land uses with limited timber harvest. The Fort Hall Reservation, administered by the Bureau of Indian Affairs, lies partially within the CFPP region. The remaining regional land outside the INL site is privately owned and primarily used for grazing and crop production. In 2017, about 1,005,921 acres of total cropland was available for use, with 825,165 acres harvested within the 12-county area within the 50-mi regional radius (Reference 2.1-28).

On the INL site about 11,400 acres of the total land area have been developed at eight primary facility areas, as described in Table 2.1-5. The facilities are surrounded by an approximate 45,000-acre security and safety buffer area within about 230,000-acres of the central core area of the INL site. Another 34,000 INL acres have been developed for utility rights-of-way and public roads (Reference 2.1-22). Other land uses on the INL site include the 73,260-acre Sagebrush-Steppe Ecosystem Reserve in the northwestern corner of the INL site (more than 10 mi from the CFPP site); up to 340,000 acres leased to cattle and sheep grazing; and a small section on the western border, north of CFPP, available for controlled elk and antelope hunting (Reference 2.1-22).

Populated areas in the CFPP region are relatively sparse, with the largest population centers of Idaho Falls (U.S. Census Bureau [USCB] 2020 Census population of 64,818 persons [Reference 2.1-29]), located approximately 49 mi east of the CFPP site, and Pocatello (population of 58,320 persons), located approximately 61 mi southeast of the CFPP site. Total population of the 12-county area within the 50-mi regional radius is 364,368 with only 2574 of those residing in Butte County (Reference 2.1-29). The nearest towns of Butte City, Howe, and Arco, Idaho have 2020 census populations of 78, 281, and 879, respectively (Reference 2.1-29). Outside of population centers, the remaining regional population resides in small towns and rural communities. No permanent residents are located on the INL site.

2.1.1.4 Existing Topography

The CFPP site is relatively flat to mildly undulating, with surface elevations ranging from 5020 feet (ft) to 5180 ft (Figure 2.1-6). The topography transitions to the foothills and mountains of the Lost River Range to the west of the CFPP site and the INL site (Figure 2.1-7), rising from about 5200 ft to more than 8700 ft elevation at Howe Peak, the highest mountain in the vicinity radius.

Based on information provided by DOE through the INL Standardized Safety Analysis Report, Chapter 1, Site Characteristics (Reference 2.1-30), the CFPP site is located on the eastern edge of the Snake River Plain in southeastern Idaho at the foot of the Lost River Range. The Snake River Plain, which extends across southern Idaho, is a broad, low-relief, sagebrush-covered basin floored with basaltic lava flows and terrestrial sediments, contrasting sharply with mountainous terrain to the north and south. The Snake River Plain is approximately 50 to 60 mi wide and 375 mi long, extending in a broad arc from the Idaho-Oregon border in the west and to the Yellowstone Plateau in the east. Surface elevations on the Snake River Plain decrease gradually, from more than 6500 ft near the Yellowstone Plateau to approximately 2100 ft near the Idaho-Oregon border.

The ESRP covers approximately 10,800 square miles (mi^2) of southern Idaho. The land surface contains little topographic relief, except for a number of buttes and volcanic scablands. Overall, the surface of the area slopes westwardly to approximately 3200 ft, where the eastern and western parts of the Snake River Plain meet. (Reference 2.1-30)

The CFPP regional elevations range from a low of 4780 ft at the Big Lost River sinks on the INL site, to approximately 6410 ft at the summit of Middle Butte, to Borah Peak in the Lost River Range at about 12,657 ft, approximately 49 mi west of the CFPP site (Figure 2.1-8). A northeast trending axial ridge of the ESRP lies along the eastern edge of the INL site. It extends from the Craters of the Moon National Monument along the southern edge and northeastward through the eastern portion of the INL site to the south and east of the Mud Lake area. The ridge constrains the Snake River to the southeastern edge of the Snake River Plain and causes rivers draining the mountains to the north of the plain to drain into closed basins (sinks). Four buttes are located along the axial ridge. Big Southern Butte (7550 ft), Cedar Butte (5825 ft), Middle Butte (6410 ft), and East Butte (6265 ft) extend 400 to 2100 ft above the axial ridge. Summits of mountains surrounding the ESRP range to more than 12,000 ft. (Reference 2.1-30) These buttes provide the most conspicuous evidence of the volcanic origin of the Snake River Plain, although numerous smaller buttes, cinder cones, lava outcrops, and lava tubes may be found in the area (Reference 2.1-3).

2.1.1.5 Highways, Railroad Lines, Waterways, and Utility Corridors

2.1.1.5.1 Highways

The CFPP site is bound on the northwest corner by State Highway 33. Access to the CFPP site is via INL site secondary road T-11 that runs between State Highway 33 and the CFPP site (Figure 2.1-9).

The CFPP regional transportation infrastructure includes one interstate freeway, (Interstate15), four U.S. routes (20, 26, 91, and 93), four state highways (22, 28, 33, and 39), and the INL on-site road systems (Figure 2.1-10). In addition to about 90 mi of these public roads that cross the INL site, the INL site has about 87 mi of nonpublic paved roads within its boundary, approximately 18 mi of which are considered service roads. Finally, an additional 100 mi of unpaved roads and trails (known as T Roads) provide additional access for emergency, security, monitoring, compliance, research, and service vehicles (Reference 2.1-3). Security personnel, fencing, and signage control access to INL site properties from these highways. Most of the roads are adequate for the current level of normal transportation activity and could handle an increase in traffic volume. (Reference 2.1-22)

As shown in Figure 2.1-10, Interstate 15 is the main artery into Idaho from larger U.S. cities and west coast ports. Interstate15 extends north from Salt Lake City through Idaho and Montana and southwest to southern California. While located outside the CFPP region, U.S. Interstate 86 extends west and southwest from its intersection with Interstate 15 near Pocatello, connecting to Twin Falls and Boise, Idaho. Interstate 86 provides an artery into southeastern Idaho and may be a potential road for materials and supplies coming into the CFPP.

The U.S. Routes 20 and 26 are the main access routes to the southern portion of the INL site and to the area of the CFPP site. The main CFPP site access is from the intersection of combined U.S. Route 20 and 26 with State Highway 33 northeast to T-11. State Highway 33 also provides access to northern portions of the INL site. U.S. Route 20 intersects Interstate 15 near Idaho Falls. U.S. Route 20 connects Idaho Falls with Butte City and Arco, running south of the CFPP site. U.S. Route 26 runs from Blackfoot to northwest of Atomic City, where it merges with U.S. Route 20. The combined U.S. Route 20 and 26 crosses the INL site, turning southwest at Arco. The two routes diverge at Carey, Idaho, near the outer edge of the CFPP region. U.S. Route 93 begins at Arco and proceeds northwest through Moore and MacKay up the Big Lost River valley. State Highway 22 runs from State Highway 33 near INL Test Area North (TAN) north and northwest to Dubois, Idaho, where it intersects Interstate 15. State Highway 28 joins Rexburg to Mud Lake, then proceeds north up the Birch Creek valley west to Leadore, located outside the CFPP region. U.S. Route 91 parallels Interstate 15 from the Pocatello area to the Idaho Falls area. Interstate 15, U.S. Routes 20 and 26, and State Highway 33 are expected to be the main service roads for the CFPP construction activities and operations.

2.1.1.5.2 Railroad Lines

The CFPP region has several railways (Figure 2.1-10). The Union Pacific Railroad Mackay Branch Line services the southern portion of the INL site through the Scoville Spur. The 14 mi of the Mackay Branch Line, which terminates in the southern part of the INL site, service the Union Pacific Railroad’s main lines, which run from Blackfoot north to Butte, Montana, and south to Pocatello, Idaho, and Salt Lake City, Utah. These main lines run generally parallel with Interstate 15 in the CFPP region. Interconnections are made from these locations throughout the United States. (Reference 2.1-30)

A DOE-owned railroad track also passes north at Scoville Siding from Mackay Branch through CFA past the east side of the Idaho Nuclear Technology and Engineering Center (INTEC) and terminates within the Naval Reactors Facility. A spur line runs west to connect this track through the south end of the INTEC Fuel Storage Facility and to the coal-fired plant. A portion of this line is presently out of service. (Reference 2.1-30)

2.1.1.5.3 Waterways

Figure 2.1-11 presents waterways in the CFPP region. The American Falls Reservoir and portions of the Snake River are identified as navigable waters within the CFPP region per the Idaho Department of Lands Idaho Navigable Water (Reference 2.1-31). These waterways are used for irrigation and recreational purposes, such as boating, fishing, and swimming.

No waterways are located on the CFPP site or in the CFPP vicinity. Other rivers, reservoirs, and lakes are located in the region. Three other streams are located in the CFPP region: the Big Lost River, the Little Lost River, and Birch Creek (Figure 2.1-11). The Big Lost and Little Lost rivers and Birch Creek drain mountain watersheds located to the west and northwest of the CFPP site.

The Big Lost River flows southeast between the Lost River Range and the Pioneer Mountains. The Mackay Dam, located approximately 29 mi upstream of Arco, Idaho, and approximately 42 mi upstream of the INL diversion dam, impounds and regulates the Big Lost River flow for irrigation. After being discharged from the Mackay Dam, water flows southeastward past Arco. The river flows onto the INL site at the southern part of its western boundary, curves to the northeast past the Radioactive Waste Management Complex, and flows northeast to the Big Lost River Sinks (four terminal playas) near Howe, Idaho, where it disappears into the Snake River Aquifer. (Reference 2.1-30) Normally the riverbed is dry because of upstream irrigation and rapid infiltration into desert soil and underlying basalt. The river rarely flows onto the INL site. Good carry over of water in the Mackay Reservoir allowed the river to flow onto the INL for a couple days in March and May 2020 and flow only reached to near INTEC (Reference 2.1-24).

The Little Lost River drains the slopes of the Lemhi and Lost River mountain ranges. The Little Lost River stream is diverted for irrigation north of Howe, Idaho and does not normally flow onto the INL site. Birch Creek flows southeastward between the Lemhi and Bitterroot mountain ranges. Water in the creek is diverted northeast of INL for irrigation and hydropower during the summer months. In the winter months, water is returned to an artificial channel 4 mi north of TAN, where it infiltrates into channel gravel. (Reference 2.1-30)

Four reservoirs - American Falls, Fish Creek, Mackay, and Little Wood River Reservoirs - and Mud Lake with its associated WSA are located within the region. These waters are used for boating, fishing, water skiing, hunting, and bird and wildlife viewing.

2.1.1.5.4 Utility Corridors

Figure 2.1-10 presents existing utility corridors for the CFPP region. Commercial electric power is delivered to the CFPP vicinity and the operating areas at the INL site by an extensive power transmission and distribution system originating to the south at the American Falls Dam. Regional power includes an Idaho Power 230 kV line running between the American Falls Dam and the Antelope Substation located on the INL site at CFA. PacifiCorp and Bonneville Power 230 kV lines run through Arco and along the southern portion of the CFPP region to the Antelope Substation. The Antelope Substation supplies the Scoville Substation, which is the dedicated power supply for the INL site facilities. A 230 kV Bonneville Power line, located south of the CFPP site, runs between Arco and the Scoville Substation. (Reference 2.1-3) A PacifiCorp 69 kV line crosses the northeast corner of the

CFPP site; this line connects the Antelope Substation to the Howe area in the Little Lost River valley, running parallel to State Highway 33.

The existing INL distribution system ranges in voltage from 138 to 230 kV and is composed of approximately 60 mi of overhead lines and several miles of underground lines. Future fiber transmission lines are proposed to utilize the existing rights-of-way. No gas or oil lines are located on the INL site; individual INL facilities may have propane or fuel storage tanks. (Reference 2.1-3)

2.1.1.6 Special Land Uses

Figure 2.1-3 and Figure 2.1-4 depict special land use areas within the region as follows:

- Fort Hall Reservation - home to the Shoshone-Bannock Tribes, the reservation is located in Bannock, Bingham, and Power Counties. As a sovereign nation, the Shoshone-Bannock Tribes have their own governments, health and education services, police forces, judicial systems, economic development projects, gaming casinos and resorts, agricultural operations, retail trade and service businesses, cultural and social functions, and other important regulatory activities on the reservation. (Impacts of the Five Tribes to Idaho’s Economy [Reference 2.1-32]).
- Craters of the Moon National Monument and Preserve - 410,000-acre national monument and preserve located approximately 23 mi southwest of the CFPP site; includes the Craters of the Moon Wilderness Area and the Great Rift WSA (Reference 2.1-27).
- Wildlife Management Areas (WMAs) - parcels of land managed by the IDFG to help wildlife thrive and provide protection when they are most vulnerable, such as mule deer in winter. The following WMAs are within the CFPP region:
    - Market Lake - 6062-acre open water, wetlands, sagebrush steppe, and agriculture area that provides waterfowl production, wildlife habitat, and wildlife-based recreation, including hunting and fishing, hiking, and wildlife viewing (IDFG, Market Lake WMA [Reference 2.1-33]).
    - Mud Lake -11,468 acres surrounding Mud Lake that provides stop-over habitat and nesting habitat for waterfowl and shorebirds. (Reference 2.1-34).
    - Carey Lake - 750 acres with a shallow lake and high-quality wetlands for waterfowl production and migration (IDFG, Carey Lake WMA [Reference 2.1-35]).
    - Sterling - 4106 acres associated with the American Falls Reservoir; provides waterfowl and ring-necked pheasant production; consists of open water, wetlands, wet meadows, Russian olive woodlands, and agriculture habitats. Sterling is the most intensely used WMA in the Southeast Region. The public largely uses the WMA for ring-necked pheasant and waterfowl hunting and some trapping. Wildlife viewing, particularly birding, is popular year-round. (IDFG, Sterling WMA [Reference 2.1-36)]

- Additional WMAs and wildlife management units in Southeast Idaho include Cartier Slough, Sand Creek, and Tex Creek WMAs and Deer Park Wildlife Management Unit. These areas are located more than 50 miles from the CFPP site and are not expected to experience impacts from the CFPP.

- Wilderness Area
  - Craters of the Moon National Wilderness Area - designated by Congress in 1970, the wilderness area is within the Craters of the Moon National Monument and Preserve. The wilderness area totals 43,243 acres and features lava fields, lava tubes, cones, and other volcanic eruption landscapes. The area is home to hardy plants and animals, such as mule deer, coyotes, porcupines, rabbits, songbirds, raptors, rodents, and reptiles. (University of Montana, Wilderness Connect [Reference 2.1-37])
- WSAs - Managed by BLM, WSAs are places that have wilderness characteristics of minimum size, naturalness, and outstanding opportunities (e.g., camping, hunting cross-country skiing and snowshoeing, rock climbing, hiking, horseback riding, and wildlife viewing) for recreation that make them eligible for designation as wilderness:
  - Appendicitis Hill - nearly 22,000 acres of mountainous area that provide a range of recreational opportunities (BLM, Appendicitis Hill Wilderness Study Area [Reference 2.1-38]).
  - Bear Den Butte - nearly 10,000 acres of rugged volcanic features and desert environment providing recreational opportunities. (BLM, Dear Den Butte Wilderness Study Area [Reference 2.1-39]).
  - Black Canyon - more than 10,000 acres of rocky canyons, massive cliffs, and faults located at the southern toe of the Lemhi Range. Provides low-moisture high desert environment characterized by sagebrush forbes and grasses combined with juniper trees and small Douglas fir stands at higher elevations. Provides primitive recreational opportunities. (BLM, Black Canyon Wilderness Study Area [Reference 2.1-40]).
  - Borah Peak - more than 3000 acres of steep west-sloping terrain with sagebrush-grass and scattered mountain mahogany vegetation (BLM, Borah Peak Wilderness Study Area [Reference 2.1-41]).
  - Burnt Creek - about 24,980 acres designated as having wilderness characteristics. Includes open sloping sagebrush and grass-covered hills in the north and east and steep terrain with scattered pockets of Douglas fir and juniper in the south and west. Several large rock outcroppings dominate the center, and a small lake is nestled in the trees of the southwestern portion of the WSA (BLM, Burnt Creek Wilderness Study Area [Reference 2.1-42]).
  - Cedar Butte - nearly 36,000 acres featuring lava flows that serve as home to rodents, mule deer, antelope, coyotes, rabbits, and more than 100 species of birds, including sage grouse and mourning doves (BLM, Cedar Butte Wilderness Study Area [Reference 2.1-43]).
  - China Cup Butte - nearly 36,000 acres featuring an almost perfectly circular cone 1260 ft in diameter with a 100-foot deep crater located south

of Big Southern Butte (BLM, China Cup Butte Wilderness Study Area [Reference 2.1-44]).

- Friedman Creek - nearly 10,000 acres characterized by steep mountainous terrain popular for hiking. Home to a small trout fishery (BLM, Friedman Creek Wilderness Study Area [Reference 2.1-45]).
- Great Rift - located within the Craters of the Moon National Monument and Preserve, the WMA is home to antelope, mule deer, coyotes, rabbits, and 22 other types of mammals. Sage grouse, mourning doves, and raptors are among 140 bird species in the area (BLM, Great Rift ISA Wilderness Study Area [Reference 2.1-46]).
- Hawley Mountain - more than 15,000 acres providing home to deer, antelope, elk, and sage grouse (BLM, Hawley Mountain Wilderness Study Area [Reference 2.1-47]).
- Hell's Half Acre - more than 66,000 acres of 5200-year old lava flow with deep crevices and sparse vegetation. Home to mule deer, antelope, coyotes, rabbits, sage grouse, and mourning doves (Wilderness Study Area [Reference 2.1-48]).
- Little Deer - more than 33,000 acres of rugged volcanic features and desert environment located in the Craters of the Moon National Monument and Preserve (BLM, Little Deer Wilderness Study Area [Reference 2.1-49]).
- Little Wood River - more than 4000 acres characterized by mountainous terrain cut by steep, cottonwood and willow-lined drainages. The area supports year-round populations of mule deer, blue grouse, and sage grouse while raptors use cottonwoods in the canyon bottoms for nest sites (BLM, Little Wood River Wilderness Study Area [Reference 2.1-50]).
- Raven's Eye - more than 67,000 acres that includes three prominent volcanic cones - Spud Butte Broken, Top Butte, and unnamed cone. Craters of the Moon lava flow covers over half of the WMA. Provides outstanding wilderness values, geological features of special interest, and opportunities for a variety of recreation activities, including hiking, camping, hunting, caving, photography, and nature study (BLM, Raven's Eye Wilderness Study Area [Reference 2.1-51]).
- White Knob Mountains - approximately 10,000 acres of foothill and mountainous terrain that provides important area for wintering deer and elk herds (BLM, White Knob Mountains Wilderness Study Area [Reference 2.1-52]).

● Camas National Wildlife Refuge - a protected site of approximately 11,000 acres. The refuge provides vital habitat for a variety of migratory birds. Large and small mammals and several non-migratory bird species depend on the refuge for habitat (USFWS, Camas National Wildlife Refuge [Reference 2.1-53]).

● Areas of Critical Environmental Concern (ACEC) and Research Natural Areas (RNA) - Areas of Critical Environmental Concern are areas where special management attention is needed to protect important historical, cultural, and scenic values; fish and wildlife; or other natural resources; ACECs can also be designated to protect human life and safety from natural hazards. The ACECs can only be designated during the land-use planning process. Research Natural Areas are areas where natural processes are allowed to predominate and are preserved for the primary purposes of research and education. Under current BLM policy, RNAs must meet the relevance and importance criteria of ACECs and are designated as ACECs. (U.S. Geological Survey [USGS], Areas of Critical Environmental Concern, Research Natural Areas, and Outstanding Natural Areas of Idaho [Reference 2.1-54]). Under the USFS, an RNA is a tract of land or water that supports high quality examples of terrestrial or aquatic ecosystems, habitats, and populations of rare or endangered plant or animal species, or unique geological study of the features, and is managed in a way that allows natural processes to predominate, with minimal human intervention (USFS, Research Natural Areas [Reference 2.1-55]). The following ACECs and RNAs are within the CFPP region (Reference 2.1-54):

- China Cup Butte RNA and ACEC
- Donkey Hills ACEC
- Elk Mountain ACEC
- Snake River ACEC
- Summit Creek ACEC and RNA
- Thousand Springs ACEC and RNA

2.1.1.7 Raw Material Sources

No raw material resources are known or expected on the CFPP site. Mineral resources inside the INL boundary are limited to several quarries, or borrow sources, that supply sand, gravel, pumice, silt, clay, and aggregate for road construction and maintenance; new facility construction and maintenance; waste burial activities; and ornamental landscaping cinders used on-site. On-site topsoil is a limited commodity. Historically, INL has been a source of borrow materials that were used on-site. Many abandoned pits and excavations are found adjacent to roads and near older structures and facilities throughout the site. Currently, six borrow sources are in use on INL, and one inactive source has a high potential as a source material if production were resumed. (DOE, Naval Spent Nuclear Fuel Environmental Impact Statement [Reference 2.1-56]). The subsurface mineral rights associated with the INL site are managed by BLM (Reference 2.1-3). The CFPP does not anticipate using INL site mineral resources for construction activities.

Figure 2.1-12 provides mineral locations within the CFPP region from the USGS Mineral Resources Data System (Reference 2.1-57). The CFPP region includes 26 active and historical producing mines (being mined to obtain mineral resource) and one processing plant. The closest mine is the Hamilton District in Butte County, approximately 14 mi from the CFPP site in the Little Lost River valley. Silver, gold, zinc, lead, and copper were the main commodities of the mine.

Within the 12 counties in the CFPP region, the Mine Safety and Health Administration (Reference 2.1-59) lists 12 active mining endeavors. Table 2.1-5 identifies the mines and plants, their commodities, and the mine types. Most of these mines relate to construction with seven producing construction sand and gravel and two plants and a mine producing crushed stone. In Clark County, the Termocal Minerals mine produces dimensional limestone in a surface mining operation. In Custer County, the Thompson Creek Mine produces molybdenum ore in a surface mining operation. The Champagne Mine near Arco, a former gold producer, is being evaluated expansion and restart.

The geologic history of the ESRP makes the potential for petroleum production in the CFPP region very low. However, interest in petroleum exploration in the Tertiary basin sediments in the far western portion of the Snake River Plain is noted. A 13-megawatt geothermal plant, the Raft River Site, is located approximately 200 mi southeast of Boise. (Reference 2.1-56)

2.1.1.8 Principal Agricultural and Forest Products

Agriculture is an important industry in Idaho. Agriculture, especially grazing, is prevalent in the CFPP vicinity and region. As shown in Figure 2.1-12, the CFPP site is within the Deadman and Howe Peak grazing allotments with some period grazing on the site. Approximately 60 percent of the INL site is open to livestock grazing. Ten grazing allotments encompass an area of approximately 337,746 acres within the boundary of the INL site. These allotments are administered by BLM Upper Snake Field Office and are supervised as required by the Federal Land Policy Management Act. The BLM and DOE coordinate for management of grazing operations, including relevant pertinent information regarding active sage-grouse leks in active sheep allotments. The BLM and DOE have a Memorandum of Understanding outlining stipulations for grazing on lands within the INL site. Grazing is not permitted within 0.5 mi of a primary facility boundary or within 2 mi of a nuclear facility. In addition, the U.S. Sheep Experiment Station uses 900 acres as a winter feedlot for sheep. This area is located at the junction of Idaho State Highways 28 and 33. (Reference 2.1-3)

Crops are not grown on the CFPP site or vicinity, as shown in Figure 2.1-14. Within the region, crops are grown in the Big Lost River and Little Lost River valleys; to the northeast of the INL site; west and southwest of the INL site along the Snake River and its tributaries; and along Interstate 15 corridor (Figure 2.1-15). Within Butte County, forage (hay/haylage), barley, and wheat are the main crops (Reference 2.1-28). Table 2.1-6 presents information on agricultural lands and crops within the 12 counties of the CFPP region.

As shown in Figure 2.1-15, timber is not harvested within the CFPP site or vicinity. Commercial timber is harvested at one location within the CFPP region in the Caribou-Targhee National forest in the Lemhi Range south of Leadore.

2.1.1.9 Prime and Unique Farmlands

As shown in Figure 2.1-16 depicting prime and unique farmlands in the region, the CFPP site is not considered prime or unique farmland. Farming is conducted in all counties in the CFPP region. The closest prime farmland is near Butte City and Arco with a small area approximately 2 mi from the CFPP. This area is not currently being farmed. The Big Lost River, Little Lost River, and Birch Creek valleys have concentrations of prime farmland and are agricultural areas within the region. Land areas around the Snake River have areas of prime farmland. (U.S. Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey [Reference 2.1-61]).

2.1.1.10 Major Public and Trust Land Areas

When Idaho became a state, Congress granted Idaho endowment trust land for the sole purpose of funding specified beneficiaries, which are largely public schools. At statehood Idaho received sections 16 and 36 of each 36-mi^2 township to support public schools, plus additional sections for the other beneficiaries. This resulted in the ownership pattern initially being scattered across a checkerboard pattern. Idaho's public schools, Idaho School for the Deaf and Blind, University of Idaho, Idaho State University, Lewis-Clark State College, state hospitals for the mentally ill, state veterans, homes, Capitol Commission, and the state correctional system are the current beneficiary of the trust lands. Figure 2.1-4 identifies the Idaho trust lands in the CFPP region. (Idaho Department of Lands, Understanding Endowment Land [Reference 2.1-62]). Endowment lands located closest to the CFPP site are near the toe of the Lost River Range to the northwest and near Arco.

2.1.1.11 Coastal Zone Management Act Lands

The CFPP site is not located in a Coastal Zone Management Act regulated state. Therefore, the proposed CFPP site is not subject to the Act.

2.1.1.12 Floodplains and Wetlands

Figure 2.1-17 provides location information on lakes, rivers, wetland areas, and flood zones relative to the CFPP region. No wetlands or floodplains are located on the CFPP site based on information from the USFWS National Wetlands Inventory (NWI) (Reference 2.1-63), the Federal Emergency Management Agency floodplain maps (Reference 2.1-64), and a 2005 flood study conducted for the INL site that evaluates flood response relative to a failure of the Mackay dam on the Big Lost River (Reference 2.1-65).

2.1.1.12.1 Floodplains

Under the USGS surface water classification scheme, the CFPP region stretches across portions of six (possibly seven) watersheds. Of these watersheds, only four contain significant surface water bodies that flow onto or near the CFPP and INL sites, including the Big Lost River, Birch Creek, Little Lost River, and Mud Lake watersheds. The Big Lost River, Little Lost River, and Birch Creek are intermittent on the INL site. During the summer months, flow from these streams is diverted for irrigation before it reaches the INL site boundaries. During fall and winter, seasonal changes in climate (e.g., precipitation and temperature) reduce stream flow enough that streams do not generally reach the INL site. The Big Lost River, Little Lost River, and Birch Creek channels flow year-round off the INL site and drain the mountain areas to the north and west of the site. Flow that reaches the INL site, generally only in rare high precipitation years, seeps into the ground surface along the length of the streambeds and in the Big Lost River spreading areas and sinks. The spreading areas are natural, low elevation, closed basins associated with the INL site diversion dam. The sinks are the lowest elevation in the closed drainage basin where the Big Lost River terminates in a series of playas where seasonal wetland areas have formed. Surface water on the INL site that does not infiltrate the ground surface is lost from the system through evapotranspiration processes. No surface water flows off the INL Site. (DOE, Draft Environmental Impact Statement for the Proposed Consolidation of Nuclear Operations Related to Production of Radioisotope Power Systems [Reference 2.1-66]).

As shown in Figure 2.1-17, the Snake River and American Falls Reservoir are located at the outer edge of the 50-mi regional boundary; the CFPP site does not impact and is not impacted by the floodplains associated with these water bodies.

The Big Lost River is the most prevalent surface water body on the INL site and near the CFPP site. Several flood studies have been conducted to calculate the potential magnitude of a 100-year flood for the Big Lost River at the Arco gauging station, located 14 mi upstream from the INL site diversion dam and about 40 mi from the CFPP site center point. (Reference 2.1-3) The newest estimate of the 100-year flood magnitude is 3070 ft^3/s (Reference 2.1-65). Flooding at the INL site is further influenced by construction of the INL site diversion dam. This dam was built to control flow onto the INL site, protecting the downstream facilities from flooding. Gates placed on two large, corrugated steel culverts control flow onto the INL site and limit the flow of the Big Lost River to less than 900 ft^3/s downstream of the diversion dam. A field investigation of the structural integrity of the INL Site diversion dam conducted by the Army Corps of Engineers concluded that the safe holding flowrate of the diversion dam is about 7300 ft^3/s. The diversion dam control of the flow of the Big Lost River and mean value of the most recent estimate of the 100-year flood (3070 ft^3/s) on the Big Lost River suggest that the 100-year flood would be contained by the diversion dam, posing no flood threat to INL site facilities or to the CFPP site, based on its proposed location. (Reference 2.1-3) Figure 2.1-18, taken from Reference 2.1-66 (Appendix F, Preliminary Floodplain/Wetland Assessment, of Reference 2.1-66), depicts the flood area for the probable maximum flood-induced overtopping failure of the Mackay Dam. As shown in this figure, the CFPP location would not be impacted under this scenario.

Assessment of Potential Flood Events and Impacts at INL's Proposed Remote-Handled Low-Level Waste Disposal Facility Sites (Reference 2.1-67) describes flooding studies on the Big Lost River to evaluate the potential impact on INL facilities. Reference 2.1-67 summarizes studies that examined the flooding potential due to the failure of Mackay Dam from a probable maximum flood and other flood scenarios associated with natural river flows, extreme precipitation events, extreme precipitation with dam failure, and 100-year and 500-year precipitation events combined with hydraulic piping of the MacKay Dam. The probable maximum flood was assumed to result from the overtopping and rapid failure of Mackay Dam and included the effects of systematic (non-instantaneous) failure of the diversion dam. This flood would result in a peak surface water elevation at INTEC of 4917 ft, with a peak flow of 66,830 ft^3 per second in the Big Lost River measured near INTEC (Reference 2.1-66). For comparison, the CFPP site elevation ranges from approximately 5020 ft to 5180 ft and would not be impacted under this scenario.

Riverine flooding has occurred along Birch Creek near TAN as a result of ice jams. In 1969, because of concerns about the potential for this flooding, the INL site constructed channels and began diverting the water to several gravel pits east of TAN. Most of the flows are lost to seepage in the lower portions of the Birch Creek valley before flowing onto the INL site. However, Birch Creek does flow onto the INL site during high water years and can negatively impact several TAN facilities if not diverted, especially when severe icing occurs in the channel. (Reference 2.1-3)

2.1.1.12.2 Wetlands

Under Executive Order 11990, Protection of Wetlands and the Clean Water Act Section 404, wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions.

Water bodies within the CFPP region were identified using Reference 2.1-63. The NWI is administered by the USFWS and provides an interactive mapping system for wetlands information. Based on Reference 2.1-63, the following water bodies are identified as potential wetland areas within the CFPP region:

- Big Lost River - The Big Lost River on the INL site flows northeast, ending in a playa area on the northwestern portion of the INL site, called the Big Lost River sinks. Here, the river evaporates or infiltrates to the subsurface, with no surface water moving off the INL site. The Big Lost River sinks are about 11 mi north and east of the CFPP site center point. Normally the riverbed is dry because of upstream irrigation and rapid infiltration into desert soil and underlying basalt. Good carry over of water in the Mackay Reservoir allowed the river to flow onto the INL for a couple days in March and May 2020. Flow did not go as far as the Lincoln Boulevard bridge. Wetlands associated with the Big Lost River are classified as riverine/intermittent, indicating a defined stream channel with flowing water during only part of the year. The Big Lost River sinks are the only potential jurisdictional wetland on the INL site (Reference 2.1-3).

- The USFWS, as part of a 1992 preliminary survey, conducted an evaluation of aquatic habitats at the INL site for the NWI (Reference 2.1-68). This preliminary survey identified and mapped approximately 135 areas within the boundaries of the INL site. Of these areas, 121 INL site wetlands were surveyed and grouped into five wetland categories (i.e., palustrine and lacustrine, riverine, manmade, unmapped, and unclassified). Jurisdictional wetlands, governed by the Clean Water Act (33 USC 1251-1376), are those wetlands that exhibit: (1) a prevalence of hydrophytic plants, (2) hydrological conditions suited to such plants, and (3) the presence of hydric soils. The only area of the INL site identified as potential jurisdictional wetlands is the Big Lost River Sinks (Reference 2.1-68).
- Big Lost River spreading areas - located about 9.3 mi from the CFPP site center point, the spreading areas provide flood control on the Big Lost River.
- Mud Lake WMA - located about 34 mi from the CFPP site center point, the WMA includes two deep marsh units and numerous shallow flooded wetlands that provide vital stopover habitat and nesting habitat for waterfowl and shorebirds.
- Camas National Wildlife Refuge - located about 41 mi from the CFPP site, the refuge contains wetlands, ponds, and wet meadows that are essential resting and feeding habitat for migratory birds and nesting habitat for waterfowl (Reference 2.1-53).
- Market Lake WMA - located about 45 mi from the CFPP site, the WMA comprises 1700 acres of bulrush/cattail marshes and wetland meadows, surrounded by sagebrush/grassland desert with approximately 200 acres of agricultural fields and 0.75 mi of Snake River riparian area. Water to the wetlands comes from springs, seeps, and artesian wells. (Audubon Important Bird Areas [Reference 2.1-69])

Other wetland areas are associated with the Snake River; however, the river runs along the eastern extent of the 50-mi regional radius. Because of the distance from the CFPP site, no wetlands impacts are anticipated for the Snake River wetland areas within the CFPP region.

2.1.1.13 Additional Land

Beyond the 2325 acre CFPP site, the only additional land proposed for the CFPP is associated with a power transmission and water supply pipeline corridor. The operational power transmission corridor is proposed to run from the CFPP site to the Antelope Substation as discussed in Section 2.1.2. A construction and operational backup power transmission line is also being proposed to run from the CFPP plant to a new Pronghorn Substation near the Antelope Substation. Both transmission lines share the same corridor, which parallels the existing 69 kV PacifiCorp line that runs through the CFPP site to the Antelope Substation. The transmission corridor uses the existing PacifiCorp roadway and Big Lost River crossing. The water supply pipeline is planned within the same corridor as the power transmission lines, running from the CFPP plant for a maximum distance of 5 mi along the existing 69 kV line. Well locations are being assessed. The water pipeline and well locations are designed consistent with plant needs and aquifer properties. The CFPP does not anticipate the need for additional land beyond the corridor to expand the proposed site. Details for this additional land is coordinated among PacifiCorp, DOE, and CFPP LLC, including right-of-way changes or additions through BLM and appropriate updates and approvals to the DOE use permit.

2.1.1.14 Geographic Information System Coverages

This section describes the geographic information system (GIS) coverages used to produce maps, distances, areas, and other information. In preparing the land-use section maps and information, CFPP drew heavily on the capability and resources of the Environmental Systems Research Institute (ESRI) ArcGIS software (Reference 2.1-70). The CFPP used ArcGIS to build the initial base map with counties, cities, backgrounds (e.g., mountains, forests), and general information. Additional details on specific topic layers were obtained from government agencies on public online websites with mapping applications. Table 2.1-7 describes the online GIS sources used for the land-use section topics.

The DOE provided support through the INL site management and operations contractor, Battelle Energy Alliance, effectively leveraging the INL site’s long history of mapping in support of DOE National Environmental Policy Act activities. The CFPP used the provided data to initially generate a base map, expanding in the areas outside the INL site through ESRI, BLM, USGS, USFS, National Park Service, the State of Idaho, and other GIS sources. Specific information was obtained from GIS applications as noted in Table 2.1-7.

In general, distances and area measurements were derived from the center-point location of the CFPP plant site and GIS descriptions of the counties from available ESRI information based in U.S. Census data. The 6-mi vicinity and 50-mi region boundaries were used to develop constraints for ArcGIS calculations of areas.

2.1.1.15 Major Geologic Aspects

This section presents a summary of geologic information from the Final Safety Analysis Report Chapter 2, Section 2.5, with focus on major geologic aspects, as depicted in Figure 2.1-19.

2.1.1.15.1 Geologic Summary

The CPFF site and INL site are located on the ESRP, the eastern part of the Snake River Plain physiographic province (Figure 2.1-20). The ESRP is bound on the north by the East-Central Basin & Range, part of the Northern Basin and Range physiographic province, and on the south by the South-East Basin & Range, part of the Southern Basin and Range physiographic province (Idaho State University Digital Atlas of Idaho [Reference 2.1-71]). The Snake River Plain, a broad low-relief basin floored with basaltic lava flows and terrigenous sediments, is approximately 50 to 62 mi wide and more than 348 mi long, extending in a broad arc from the Idaho-Oregon border on the west to the Yellowstone Plateau on the east. It transects and sharply contrasts with the mountainous country of the Basin and Range province. Surface elevations on the Snake River Plain decrease continually and gradually from approximately 6562 ft near Yellowstone, to approximately 2132 ft near the Idaho-Oregon border. Summits of mountains surrounding the plain range reach more than 12,000 ft in elevation, producing a maximum elevation contrast of about 7050 ft. (Reference 2.1-30)

The Northern Basin and Range Province, which bounds the Snake River Plain on the north, is composed of north to northwest trending mountain ranges of the Lost River, Lemhi, and Beaverhead Ranges (with the highest peak at about 12,600 ft high). Intervening basins, the Lost River, Little Lost River, and Birch Creek Valleys (Figure 2.1-19), separate the mountain ranges. These basins range from about 4593 to 5741 ft in elevation and are filled with terrestrial sediments and volcanic rocks. Individual mountain ranges in the vicinity of the Snake River Plain are up to 124 mi long and 19 mi wide. They are sharply separated from the intervening basins by late Tertiary to Quaternary normal faults. The basins are 3 to 12 mi wide and grade onto the ESRP. (Reference 2.1-30)

The mountains northwest of the ESRP and near the CFPP and INL sites are composed of thick sequences of late Precambrian through Pennsylvanian sedimentary strata, mostly limestones. They occur within westward-dipping thrust sheets that formed during eastward-directed Mesozoic compressional tectonism. (Reference 2.1-30)

The ESRP formed as a result of interaction of the North American tectonic plate with a rising plume of anomalously hot mantle rocks, the so-called Yellowstone Hotspot. As the North American plate moved southwestward, its interaction with the hotspot produced the low-elevation, low-relief volcanic ESRP province. The crust of the INL area was located directly above the hotspot approximately 4.3 to 6.5 million years ago. Since that time, as the area moved off the hotspot approximately 4 million years ago, the crust subsided to form an elongated northeast-trending basin with accumulation of two types of materials with a total thickness of 0.6 to 1.2 mi: (1) basaltic lava flows generated by residual heat in the upper mantle beneath the ESRP that rose to the surface to erupt into the subsiding basin; and (2) deposits of sedimentary material that formed interbeds between lava flows. (Reference 2.1-30)

The sediments are composed of fine-grained silts that were deposited by wind action; silt, sand, and gravel deposited by streams such as the Big Lost River; and clay, silt, and sand deposited in lakes such as Mud Lake and its much larger Ice Age predecessor, Lake Terreton. The accumulation of these two types of rocks in the ESRP resulted in the observed sequence of interlayered basaltic lava flows and sedimentary interbeds. Basaltic volcanism on the ESRP is a sporadic process. During the long periods of quiescence between volcanic periods, sediments accumulated to thicknesses of less than 3.3 to more than 197 ft. During short periods of volcanic activity, several lava flows commonly accumulated to thicknesses reaching more than 100 ft. Basaltic lava flows were erupted from vents concentrated in volcanic rift zones and along the central axis of the ESRP (the Axial Volcanic Zone). The basalts, along with intercalated sediments, are underlain by a great thickness of rhyolitic volcanic rocks that were erupted when the area was over the Yellowstone Hotspot, before 4 million years ago. Surface rocks on and near the INL site today are mostly lava flows in the upper (youngest) part of the basaltic sequence, ranging in age from <15,000 to approximately 1.4 million years. (Reference 2.1-30)

Several Quaternary rhyolite domes occur along the Axial Volcanic Zone near the south and southeast borders of INL:

1. Big Southern Butte (age 300,000 years)
2. a rhyolite dome near Cedar Butte (age 400,000 years)
3. East Butte (age 600,000 years)
4. Middle Butte (age unknown)
5. an unnamed butte near East Butte (age 1.2 million years)

Paleozoic carbonate rocks (limestones), Late-Tertiary rhyolitic volcanic rocks, and large alluvial fans occur in limited areas along the northwest margin of INL. (Reference 2.1-30)

A wide band of Quaternary mainstream alluvium (unconsolidated gravels and sands) extends along the course of the Big Lost River from the southwestern corner of INL to the Big Lost River sinks area in north-central INL near Howe, Idaho. Lacustrine (lake) deposits of clays and sands deposited in Lake Terreton occur in the northern part of INL. Recent analysis of several soil and stratigraphic sites near the Birch Creek Playa and TAN indicate that the crescent-shaped ridges (lunettes) that nearly encircle the Birch Creek Playa are not depositional features of Lake Terreton, as previously described, but are features formed by fine-grained eolian deposition around the playa. These lunettes are composed of sand-sized aggregates of clay particles and mark the extent of the Birch Creek playa during the Holocene. The unique nature of these eolian features indicates a long Holocene history of alternating wetting and drying and suggests that the Lake Terreton high stand was lower (up to 20 ft) and older (2000 years rather than 400 years) than previously thought. Elsewhere on the INL site, the basaltic lava flows are variably covered with a veneer of eolian silt (loess), which can be more than 10 ft thick, but mostly range from 0 to more than 6 ft thick. (Reference 2.1-30)

2.1.1.15.2 Unique Geologic Features

Unique geologic features in the CFPP region include the Craters of the Moon National Monument and Preserve, the Great Rift, and Hell's Half Acre. The Craters of the Moon National Monument, established in 1924, contains the products of basaltic volcanic activity between 15,000 and 2100 years ago. The monument contains Quaternary and Recent basalt eruptive complex. The vents and fissures follow Basin and Range fault zones, which strike northwest across the area. The last eruption occurred only 2000 years ago. The monument contains examples of pahoehoe and aa type basalt lava flows, cinder cones, lava tubes, spatter cones, and tree molds. (Reference 2.1-71)

The Great Rift is one of only two such features in the world. At 635 mi^2, the Great Rift is considered to be the largest, deepest, and most recent volcanic rift system in the continental United States. A tremendous fissure extending 65 mi opened up to emit successive lava flows some 15,000 years ago. This volcanic landscape includes spatter caves, ice tubes, caves, and cinder cones. (BLM, Great Rift Backcountry Area [Reference 2.1-72])

Hell's Half Acre contains a broad, low shield volcano dominantly formed from basaltic pahoehoe lava flows that erupted from an approximately 1.9-mi-long northwest to southeast trending vent system at the northwest part of the lava field during a brief eruptive episode about 5200 years ago. The summit vent area contains an irregular, elongate approximately 0.5-by-0.2-mi wide central depression that was the site of a former lava lake that fed late-stage flows. About 10 circular pit craters truncate the surface of the lava lake, and two prominent lava tube systems are located near the summit vent complex. Two major lava flow lobes, each about 3 mi wide and 6 mi long, extend to the south and southwest to the flood plain of the Snake River. (USGS, Hell's Half Acre Lava Field [Reference 2.1-72])

These lava flows surround Morgan's Pasture, a large kipuka, an area of land where existing rock was completely surrounded, but not covered, by later lava flows (Reference 2.1-72).

2.1.1.15.3 Soils

Four basic soilscapes exist at the INL site: river-transported sediments deposited on alluvial plains, fine-grained sediments deposited into lake or playa basins, colluvial sediments originating from bordering mountains, and windblown sediments (silt and sand) over lava flows. The alluvial deposits follow the courses of the modern Big Lost River and Birch Creek. The playa soils are found in the north-central part of the site; the colluvial sediments, along the western edge of the site; and the windblown sediments, throughout the rest of the site. (Reference 2.1-22)

Despite the fact that the subsurface geology of the INL site is dominated by basalt, most soils found on the INL site are derived from older silicic volcanic and Paleozoic rocks from the surrounding mountains. These materials are deposited as sediment transported to the area by wind, water, or gravity. A thin layer of eolian, or wind-borne sediment, covers most of the INL site area. The soils formed by this sediment ranges in texture from the fine-grained, wind-blown glacial loess left behind by retreating glaciers during the Pleistocene to sand believed to have originated from the Big Lost and Snake Rivers and from the shorelines of the ancient Lake Terreton. Because of the uneven, broken surface of the basalt base, the depths of eolian deposits vary from a few inches to more than 6.5 ft. (Reference 2.1-3)

In addition to this long-term eolian deposition, the INL site and surrounding areas have been subject to at least two distinct episodes of major loess deposition during the past 200,000 years, with the most recent episode occurring some 10,000 years ago. Soils derived from these two major depositional events are markedly distinct; subsoils in the younger deposits contain high amounts of carbonates accumulated over many years of low rainfall and high evaporation rates, whereas soils from the older loess deposits developed during periods of higher precipitation. In these soils, salts have been leached out of the subsoil and fine particles (clays) have been deposited from the surface to the subsoil. Subsoil horizons of the older soil have relatively high amounts of clay rather than carbonates. (Reference 2.1-3)

Alluvial soils are the result of deposition of waterborne sediment. Most alluvial soils are found on the western and northern portions of the site, specifically near the Big Lost River floodplain, on the small alluvial fans below the bordering mountains, and within the large alluvial fan of Birch Creek. The Big Lost and Little Lost Rivers and Birch Creek were originally fed by the ancient Lake Terreton, which occupied much of the northern part of the INL site. Because the area is a closed basin, water cannot flow out of the area. Water loss occurs through downward percolation into the aquifer or via evaporation, both of which leave sediment in place. (Reference 2.1-3)

These sink and playa areas associated with the Big Lost River contain substantial alluvial deposits, including bars, spits, and hooks from the ancient Lake Terreton that are well preserved on the modern landscape near TAN. These alluvial deposits are generally quite saline and support a variety of salt-tolerant plant species. Sediment in the playas and lakebeds of the ancient Lake Terreton generally is fine-textured loams or clay loams with relatively high clay content. Playa or desert lake basins are characteristic of another major surface soil type at the INL site. Playas, in general, are attractive for development because of the deep silty deposits. Soils from the playas may be easily excavated for fill materials, but care must be taken to determine the shrink-swell capacity. (Reference 2.1-3)

Colluvial soils formed from sediment originating from bordering mountains are found along the base of the mountain slopes on west and north of the CFPP site and surrounding the East and Middle Buttes. Generally, the colluvial soils in these deposits are gravelly. Very little information is available regarding the soils within these deposits; the total area within the INL site that is dominated by colluvial soils is small. Although a comprehensive survey of the soils at the INL site has not been conducted, information from county surveys and numerous other sources has been compiled recently. This compendium indicates that most INL site soils are Aridisols, with Calciorthids being the most common great group; Entisols, namely Torriorthents and Torrifluvents; and Mollisols, including Calcixerolls and Haploxerolls. (Reference 2.1-3)

Figure 2.1-21 presents the soils associated with the CFPP site as identified through Reference 2.1-61. Soil characteristic information was obtained from Reference 2.1-61, The Status of Soil Mapping for The Idaho National Engineering Laboratory by G. L. Olson (Reference 2.1-74), and the USDA Soil Survey of Butte County Area, Idaho, Parts of Butte and Bingham Counties (Reference 2.1-75). The following soil types and their characteristics are found on the CFPP site:

- **Coffee-Nargon-Atom.** The Coffee-Nargon-Atom complex, 2 to 12 percent slopes, is described as a moderate to very deep, typically well drained soil that formed in alluvium from loess that are deposited on basalt. The typical profile is a combination of silt or clay loam to bedrock. This soil is typically found at elevations from 4500 ft to 5500 ft and receives an average of 10 in. of precipitation a year. These soils are generally found on lava plains and are dominated by sagebrush. (Reference 2.1-74)
- **Deuce-Nargon-Lava Flows Complex.** The Deuce-Nargon-Lava Flows complex, 2 to 12 percent slopes, is described as a moderately deep, well-drained soil that formed in mixed alluvium, loess, or both over basalt. The typical profile is a combination of stony silt or silt and clay loam to unweathered bedrock with barren basalt associated with lava flows. This soil is typically found at elevations between 4700 ft and 5500 ft and receives an average of 10 in. of precipitation a year. These soils are generally found on lava plains and are dominated by sagebrush and wheatgrass. (Reference 2.1-75)
- **Ike-Rock Outcrop-Jimbee Association**. The Ike-Rock Outcrop-Jimbee Association is described as a moderately deep, well-drained soil that formed in colluvium or slope alluvium derived from limestone. The typical profile is a combination of gravelly, very gravelly, an extremely cobbly silt loam to unweathered bedrock areas or bands of exposed bedrock of varying geologic origin. This soil is typically found at elevations between 5000 ft and 8500 ft and receives 8 to 13 in. of precipitation a year. These soils are generally found on foothills and mountain slopes or depressions

of ridges and are dominated by sagebrush and wheatgrass with some mountain mahogany. (Reference 2.1-75)

- **Malm-Bondfarm-Matheson**. The Malm-Bondfarm-Matheson complex is typical for basalt plains with elevations ranging from 4700 to 5500 ft. They are moderately to well drained sandy loam over bedrock. This soil complex has a high hazard of soil blowing (wind erosion). The high hazard of soil blowing imparts certain limitations to use of these soils (Reference 2.1-74). They are not suited to mechanical rangeland management treatments including seeding. These soils are classified as Land Capability Class VIIe and have very severe limitations that make them unsuitable for cultivation because of erosion. This becomes an important consideration for restoration or long-term erosion control measures. (Halfa, et al., Ecological Report for the Environmental Assessment for Expanding Capabilities at the Power Grid Test Bed at Idaho National Laboratory [Reference 2.1-76])
- **Nargon-Deuce-Lava Flows Complex**. The Nargon-Deuce-Lava Flows Complex is described as a moderately deep, well-drained soil that formed in mixed alluvium over basalt. The typical profile is a combination of stony silt or silt and clay loam to unweathered bedrock with barren basalt commonly lobate in shape. This soil is typically found at elevations between 4500 ft and 5800 ft and receives 9 in. to 11 in. of precipitation a year. These soils are generally found on lava plains and are dominated by sagebrush and wheatgrass. (Reference 2.1-75)
- **Simeroi Complex**. The Simeroi Complex, 5 to 30 percent slopes, is described as a very deep, well-drained soil that formed in alluvium derived from limestone. The typical profile is a combination of silt and gravelly, very gravelly, and very gravelly sandy loam. This soil is typically found at elevations from 5400 ft to 6200 ft and receives about 8 in. to 10 in. of precipitation a year. These soils are generally found on fan remnants and are dominated by sagebrush and wheatgrass. (Reference 2.1-75)
- **Simeroi-Sparmo Complex**. The Simeroi-Sparmo Complex, 4 to 12 percent slopes, is described as very deep, well drained soils that formed in mixed alluvium derived dominantly from limestone. The typical profile is a combination of silt, gravelly, and sandy loam. This soil is typically found at elevations from 5400 ft to 6000 ft and receives about 9 to 12 in. of precipitation a year. These soils are generally found on fan remnants and are dominated by sagebrush and wheatgrass. (Reference 2.1-75)

2.1.2 Transmission-Line Corridors and Other Offsite Areas

This section provides available information on transmission-line corridors and other offsite areas for construction and operation of the CFPP. A new 34.5 kV construction CFPP transmission line is planned to connect from the northeast side of the CFPP plant to the new Idaho Power Company Pronghorn Substation being built next to the existing Antelope Substation at the CFA on INL property. The new 34.5kV construction line parallels the existing PacifiCorp 69 kV line that crosses the northeast corner of the CFPP site. The construction line may be maintained post construction as a backup operational power line.

A permanent 230 kV CFPP operational line extends from the northeast side of the CFPP plant and run northeast past the existing PacifiCorp 69 kV line. The CFPP operational line runs southeast parallel with and within 250 ft of the existing PacifiCorp 69 kV line, delivering power to the Antelope Substation. The 34.5 kV construction line and the 230 kV operational line use the same transmission corridor and right-of-way. This approach maximizes use of existing rights-of-way and roads and minimizes disturbances to ecological and cultural resources related to transmission of CFPP power.

Additional details on the design of the construction and operational transmission lines are provided in LWA ER Section 3.1.

2.1.2.1 New Transmission Related Facilities

Transmission-related facilities are expected to include the following:

- power transmission line and corridor for construction power and backup operational power
- operations power transmission line and corridor, located within the same corridor as the construction power line
- supply water wells, pipeline, and pipeline corridor, located within the same corridor as the transmission lines

2.1.2.2 Potential or Planned Transmission Corridor(s)

The planned CFPP power transmission corridor is located completely within the INL site. The corridor is planned for construction and backup operational power and for CFPP operational power transmission. Power is transmitted from the CFPP plant to the Antelope and Pronghorn Substations located east of CFA.

Options for a water supply pipeline are being evaluated among CFPP LLC; DOE; BLM; Idaho State; and private land owners near the CFPP site for water rights consistent with CFPP plant needs. While the exact location of supply wells is being assessed, the wells are located within 5 mi of the CFPP site adjacent to the power transmission corridor. The water pipeline corridor is within the proposed power transmission corridor. Figure 2.1-22 provides the locations of the pipeline extent and associated wells.

2.1.2.3 Affected Transmission Corridors

Table 2.1-8 describes each segment of the proposed transmission corridor for the CFPP on the INL site. Figure 2.1-22 graphically shows these segments.

The water supply pipeline corridor is a single pipe segment from the well location to the CFPP plant within the transmission corridor. The pipeline diameter and length is determined following aquifer testing at the wells and is designed consistent with aquifer properties and plant needs. Table 2.1-9 describes the current known information on the pipeline.

2.1.2.4 Transmission Corridor Existing Land Use and Land Cover

The transmission and water supply pipeline corridor existing land use is consistent with current INL site land use and with existing PacifiCorp right-of-way use as administered by BLM. The DOE maintains operational control of the INL site; BLM has land management control for land uses such as grazing and utility rights-of-way and administers the CFPP right-of-way for the transmission and water supply pipeline corridor. The DOE retains the authority to administer INL lands for the foreseeable future and is responsible for ensuring that future use and management of these lands are undertaken in accordance with the Public Land Orders that established the INL site. Access to the INL site is controlled by administrative and physical methods, limiting non-mission related activities. Land use continues to be DOE-mission focused for the foreseeable future.

As shown in Figure 2.1-22, the transmission and water supply pipeline corridor follows the existing 69 kV transmission corridor and uses the existing transmission corridor road for access. Part of the transmission and water pipeline corridor passes through the Howe Peak and Deadman grazing allotments. The transmission line and water supply pipeline corridors are mainly in an area of undeveloped land and pass close to INL facilities that represent DOE-mission-focused land use. Additionally, because of the controlled human access to the INL site, the transmission and water supply pipeline corridor continues to provide habitat for the plants and wildlife found on the INL site.

Within the INL site, the transmission and water supply pipeline corridor land cover is consistent with the land cover near the CFPP site and other areas of INL. Land cover consists mainly of sagebrush and grasses typical of the Eastern Snake River Basalt Plains ecoregion (LWA ER Section 2.3 for additional information on ecoregions associated with the CFPP site). Figure 2.1-23a and Figure 2.1-23b highlight the land cover associated with the corridor. Table 2.1-8 summarizes the characteristics and common plant species of the vegetation blocks crossed by the transmission and water pipeline corridor. The corridor also crosses the disturbed areas associated with the CFA. This area is a combination of paved areas, concrete areas, and barren or graveled ground.

2.1.2.5 Transmission Impacted Highways, Railroad Lines, Waterways, and Utility Corridors

The construction and permanent CFPP transmission corridor crosses the PacifiCorp overhead 69 kV line corridor in the northeast corner of the CFPP site (Figure 2.1-22). The CFPP transmission corridor is routed around the CFA; this segment crosses the PacifiCorp overhead 115 kV line corridor north and west of

CFA and a PacifiCorp overhead 230 kV line corridor north of Antelope Substation. The corridor crosses an abandoned rail line north of the CFA. The transmission corridor does not cross highways. The water supply pipeline corridor follows the permanent CFPP transmission corridor for a distance of up to 5 mi from the CFPP site, as shown in Figure 2.1-22.

2.1.2.6 Special-Use Land Area Constraints

No special-use land areas are located in or near the transmission and water supply pipeline corridor planned to follow the existing power line and right-of-way on the INL site. A construction and demolition landfill is located near the CFA. The CFPP transmission corridor is routed to avoid the landfill area, including expected future expansion areas. The proposed transmission and water supply pipeline corridor crosses BLM Deadman and Howe Peak grazing allotments and game management unit 63 administered by IDFG. Hunting is not currently allowed on the INL site in the area of the proposed transmission and water supply pipeline corridor.

2.1.2.7 Transmission-Related Floodplains, Wetlands, or Waterbodies

The CFPP power transmission and water supply pipeline corridor and related facilities are not expected to impact floodplains, wetlands, or major waterbodies. The existing PacifiCorp 69 kV line and right-of-way, which the CFPP transmission corridor parallels, crosses the Big Lost River northwest of the INL Central Facilities Area and the Scoville Substation that supplies power to the INL site. The CFPP transmission corridor crosses the Big Lost River, parallel to the PacifiCorp line, near the same location, before turning east to avoid a landfill area at the CFA. The access road for the existing PacifiCorp 69 kV line ends at the northwest edge of the dry river bed and restarts on the southeast edge. The limited flow potential and the presence of an existing power line and right-of-way over the river show small potential impact from or to the proposed CFPP transmission facilities. The water supply pipeline corridor does not cross the Big Lost River.

2.1.2.8 Transmission-Related Coastal Zone Management Act Requirements

The proposed power transmission and water supply pipeline corridor is not located near coastal zones.

2.1.2.9 Transmission-Related Prime or Unique Farmlands

As shown in Figure 2.1-16, the CFPP power transmission corridor and facilities are not located on or near prime or unique farmlands (Reference 2.1-61). The water supply pipeline corridor, as shown in Figure 2.1-22, is not located on or near the prime or unique farmlands shown in Figure 2.1-16.

2.1.2.10 Private Land Access

The power transmission and water supply pipeline corridor is within the boundaries of the INL site. No private land is accessed for the CFPP transmission and water supply pipeline corridor or facilities.

2.1.2.11 Proposed Routes of Access Corridors and Restrictions/Plans

Land use on the INL site is controlled and managed by DOE as described in Reference 2.1-3. In addition, the BLM controls the grazing allotments on the INL site. The proposed land use for construction and operation of the CFPP is consistent with the DOE land use designation for continued mission support, including development of energy and nuclear technology. The CFPP site and portions of the transmission and water supply pipeline corridor are within existing BLM grazing allotments. The BLM indicated willingness and capability to modify grazing allotments as necessary to support the CFPP.

2.1.2.12 Transmission-Related Geographic Information System Information

The GIS information used for the transmission- and water pipeline-related corridors is consistent with the GIS sources described in Section 2.1.1. Table 2.1-6 provides the GIS information and sources used to develop transmission maps.

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Table 2.1-1: CFPP Site Coordinates

Location Identification on Figure 2.1-1	Latitude[1]	Longitude[1]
1	43.64853700	-113.07236600
2	43.65255726	-113.06359255
3	43.65256285	-113.05924347
4	43.64994583	-113.03472120
5	43.62417233	-113.03472120
6	43.62417233	-113.07063050
Center of Plant	43.637779	-113.054512

[1] North American Datum 1983

Table 2.1-2: Comprehensive Plan Summaries by County in CFPP Region

County	Size (Mi^2)[13]	% In Vicinity / % In Region[14]	Zoning And Land Use Summary From Comprehensive Plan
Bannock[1]	1,149	0% / 2%	• About 75% federal lands, 6.5% state, and 40% farmland. • Contains portion of Fort Hall Reservation. • Farmland mainly devoted to raising wheat; 11% of lands meet requirements for prime farmland. • Traversed by Interstate 15 (expected main access corridor to CFPP) and Interstate 86. • Limited or no expected zoning or land use relevance to CFPP construction or operation.
Bingham[2]	2,121	0% / 61%	• About 29% federal land, 11.7% state, 58% private; remainder county and municipal. • 78% agricultural and rangeland; barren land 15%; forests 3.8%; remainder urban, water, and wetland. • Interstate 15 runs through the largest city of Blackfoot. • Contains portion of the Fort Hall Reservation. • Limited or no expected zoning or land use relevance to CFPP construction or operation.
Blaine[3]	2,655	0% / 38%	• Rural agricultural, recreational, and tourism county. • Contains portion of Craters of the Moon National Monument. • Limited road availability between cities and CFPP site. • Limited or no expected zoning or land use relevance to CFPP construction or operations.
Bonneville[4]	1,902	0% / 16%	• Agricultural county; 96% of private lands in farmsteads, agricultural processing, crop or range land. • Nearly 71% of population lives in 7 main cities; remaining land devoted to agriculture. • Significant potential source of workers, materials, and supplies for CFPP construction and operations. • Includes State Highway 20/26, expected CFPP transportation route for CFPP activities. • Population areas likely sources of CFPP labor force.
Butte[5]	2,239	100% / 100%	• High mountain desert rural county; includes portion of INL site; about 86% federally owned land; 13% private; < 0.1% state; • About 45% of residents in Arco, Butte City, and Moore; no communities in CFPP vicinity. • Watershed, grazing, wildlife, habitat, recreation, minor mining, and timber production main uses. • INL site accounts for about 24% total land area; BLM, USFS, and National Park Service 69%. • Limited or no expected zoning or land use relevance to CFPP construction or operations.
Clark[6]	1,765	0% / 31%	• Sparsely populated rural county about 75% federal and state; 25% private. • Rangeland constitutes about 76% with remainder in farming, forests, and recreation. • Only two incorporated cities with < 1,000 total residents, both outside 50-mi radius. • Limited or no expected zoning or land use relevance to CFPP construction or operations.
Custer[7]	4,938	0% / 20%	• High mountain desert; approximately 97% state, USFS, and BLM lands. • Ranching, mining, and tourism are primary land uses. • Land area within CFPP region dominated by mountains and forests. • Limited or no expected zoning or land use relevance to CFPP construction or operations.

Table 2.1-2: Comprehensive Plan Summaries by County in CFPP Region (Continued)

Jefferson[8]	1,106	0% / 79%	• Agricultural county with farm and ranch economy with large population of INL workers. • Limited or no expected zoning or land use relevance to CFPP construction or operations.
Lemhi[9]	4,569	0% / 5%	• About 90% federal land, 1.3% state, 8% private, and 0.1% county and city land. • Forest, rangeland, and agriculture represent nearly 98% of land use. • No towns or significant populations within CFPP region. • Limited or no expected zoning or land use relevance to CFPP construction or operations.
Lincoln[10]	1,206	0% / 2%	• About 75% federal land (BLM), 22% private, 2.8% state. • Agricultural county with 211 mi2 of farmland (Reference 2.1-29). • Dominant basaltic lava flows, low rainfall, and thin soils limit land use to dry rangeland grazing. • Limited or no expected zoning or land use relevance to CFPP construction or operations.
Minidoka[11]	762	0% / 25%	• High mountain desert; about 38% federal, state, and local land with remainder private; 55% of lands in farms. • Limited or no expected zoning or land use relevance to CFPP construction or operations.
Power[12]	1,442	0% / 11%	• About 6% covered in waters of American Fall Reservoir and Snake River. • Fort Hall Reservation partially located in county. • Limited or no expected zoning or land use relevance to CFPP construction or operations.

Sources:

[1] Reference 2.1-5
[2] Reference 2.1-6
[3] Reference 2.1-7
[4] Reference 2.1-8
[5] Reference 2.1-9
[6] Reference 2.1-10
[7] Reference 2.1-11
[8] Reference 2.1-12
[9] Reference 2.1-13
[10] Reference 2.1-14
[11] Reference 2.1-15
[12] Reference 2.1-16
[13] Distances are measured using the GIS in Reference 2.1-3.
[14] Areas are measured using the GIS system in Reference 2.1-3.

Table 2.1-3: Tabulation of Principal Land Uses at the CFPP Site, Vicinity, and Region

Principal Land Use	Site (Acres)[1]	Site (%)[1]	Vicinity (Acres)[1]	Vicinity (%)[1]	Region (Acres)[1]	Region (%)[1]
Total Area	2325	N/A	72,320	N/A	5,026,548	N/A
Land Use by Ownership/Control						
Federal Lands	2325	100	71,744	98	3,859,073	77
National Parks	0	0	0	0	580,046	12
National Forests	0	0	5969	8	855,366	17
Recreation	0	0	16,304	22	1,853,997	37
Bureau of Reclamation	0	0	0	0	7492	0
INL Site Lands	2325	100	49,472	67	562,173	11
State Lands	0	0	638	1	178,037	4
Private Lands	0	0	0	0	604,163	12
Tribal Lands	0	0	0	0	55762	1
Land Use by Activity						
Undeveloped Land	2325	100	22,027	30	861,549	17
Agriculture	0	0	0	0	644,923	13
Livestock Grazing	2325	95	49,718	68	2,285,269	45
Utility Rights-of-Way and Roads	728	33	14,493	20	380,494	8
Sagebrush Steppe Ecosystem Reserve	0	0	0	0	73,260	1
Candidate Conservation Area for Sage-Grouse	2325	100	37,710	52	252,108	5
Hunting	0[2]	0[2]	72,3202	100	5,026,5483	100

Sources:

1. Values are rounded to the nearest whole number.
2. The CFPP site is located within game management unit 63; however, only a small area of the INL site allows hunting; hunting is not permitted at the CFPP site.
3. The lands of the vicinity and region are divided into game management units; permitted hunting is implemented on an annual basis consistent with IDFG rules (Idaho Big Game 2022 Seasons & Rules [Reference 2.1-77], Idaho Migratory Game Bird 2022-2023 Seasons & Rules [Reference 2.1-78], Idaho Moose, Bighorn Sheep & Mountain Goat 2021 & 2022 Seasons & Rules, Reference 2.1-79], and Idaho Upland Game, Turkey & Furbearer 2022 & 2023 Seasons and Rules, [Reference 2.1-80])

Table 2.1-4: Idaho National Laboratory Site Facilities

INL Facility[1]	Primary Purpose and Use
Advanced Test Reactor Complex	• Test reactor provides unique irradiation capabilities for nuclear technology research and development. • Production of rare and valuable medical and industrial isotopes. • Houses ATR Critical Facility, Test Train Assembly Facility, Radiation Measurements Laboratory, Radiochemistry Laboratory, and the Safety and Tritium Applied Research Facility.
Central Facilities Area	• Main service and support center for INL facilities. • Supports transportation, maintenance, medical, construction, radiological monitoring, security, fire protection, warehousing, and instrument calibration activities.
Critical Infrastructure Test Range Complex	• Provides specialized open landscape, technical employees, and specialized facilities, such as test beds and training complexes. • Government agencies, utility companies, and military customers collaborate to find solutions for national security issues in physical security, contraband detection, and infrastructure testing.
Experimental Breeder Reactor-I	• Designated National Historic Landmark. • First power plant to produce electricity using atomic energy. • Currently operates as a museum.
Idaho CERCLA Disposal Facility	• Permitted disposal facility for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remediation waste.
Idaho Nuclear Technology and Engineering Center	• Originally established in the 1950s to recover usable uranium from spent nuclear fuel. • Current operations include: - Startup and operation of the Integrated Waste Treatment Unit to treat approximately 900,000 gallons of sodium-bearing liquid waste. - Closure of the remaining liquid waste storage tank. - Spent nuclear fuel storage. - Environmental remediation. - Disposition of excess facilities. - Management of the ICDF.
Materials and Fuels Complex	• Prime testing center for advanced technologies associated with nuclear power systems. • Nexus of research and development for new reactor fuels and related materials. • Contributes to increasingly efficient reactor fuels and nonproliferation to harness more energy with less risk. • Supports manufacturing and assembling components for use in space applications.
Radioactive Response Training Range	• Provides secure, isolated locations to train personnel, test aerial and ground-based sensors and develop detection capabilities with radioactive materials under controlled conditions.
Radioactive Waste Management Complex	• Used to manage, store, and dispose of radioactively contaminated waste generated in national defense and research programs since the 1950s. • Provides treatment, temporary storage, and transportation of transuranic waste destined for the Waste Isolation Pilot Plant in New Mexico. • Consists of Subsurface Disposal Area, 96-acre radioactive waste landfill with about 35 acres containing radioactive elements, organic solvents, acids, metals, and nitrates from historical INL site and other DOE facility operations. • Subsurface Disposal Area is undergoing targeted exhumation and off-site disposal of certain wastes under a CERCLA Record of Decision.

Table 2.1-4: Idaho National Laboratory Site Facilities (Continued)

INL Facility[1]	Primary Purpose and Use
Remote-Handled Low-Level Waste Disposal Facility	• Hazard Category 2 nuclear facility provides below-grade, permanent radioactive waste disposal capability for INL nuclear research and Naval Reactors missions • Waste disposal operations began in 2018 with an anticipated 20-year disposal period and expansion capability for 50 years • Comprises administration and maintenance buildings; 175,000-ft^2 vault yard; monitoring wells; drainage system; and 446 below-grade concrete waste disposal vaults sized to accommodate 939 stainless steel waste containers
TAN and Specific Manufacturing Capability	• Established in 1950s to support the government's Aircraft Nuclear Propulsion program until 1961 • Loss-of-Fluid Test reactor, constructed between 1965 and 1975, scaled-down version of a commercial pressurized water reactor used to create/recreate loss-of-fluid accidents under controlled conditions; decontaminated, decommissioned, and demolished in 2006. • Demolition of 44 excess facilities completed in 2008 • Environmental monitoring and groundwater cleanup are currently ongoing TAN • Specific Manufacturing Capability Project operated at TAN for the Department of Defense; the project manufactured protective armor for Army M1-A1 and M1-A2 Abrams tanks.
Transient Reactor Test Facility	• Air-cooled, graphite moderated, thermal spectrum nuclear test reactor • Used to test reactor fuels and structural materials
Naval Reactors Facility[2]	• Department of Navy facility; part of the U.S. Naval Nuclear Propulsion Program and the Naval Nuclear Laboratory • Provides design, development, testing, and operational follow of nuclear reactor propulsion plant for naval surface and submarine vessels. • Supports U.S. nuclear fleet operations and development needs by providing the Naval Nuclear Propulsion Program with unique fuel processing capabilities and accurate and timely nuclear examination data. • Naval Reactors Facility includes three former naval reactor prototypes, which were shut down by 1995, and the Expanded Core Facility used to examine developmental nuclear fuel material supplies, naval spent fuel, and irradiated reactor plant components and materials to improve current designs and monitor performance of existing reactors. • Prepares spent naval nuclear fuel for dry storage. • Construction of new Naval Spent Fuel Handling Facility is underway consisting of a 213,000 ft^2, three-story structure to support management operations of spent nuclear fuel before transfer to a permanent repository. • Future projects may include other support buildings and infrastructure.

Sources:

[1] Reference 2.1-24

[2] Naval Reactors Facility Environmental Monitoring Report Calendar Year 2020 (Reference 2.1-81)

Table 2.1-5: Mines in the CFPP Region

Mine ID	Mine Name	County	Commodity	Mine Status	Status Date	Type of Mine
1000373	Pocatello Wash Plant	Bannock	Construction Sand and Gravel	Intermittent	8/8/2022	Surface
1000531	Thompson Creek Mine	Custer	Molybdenum Ore	Active	8/23/1994	Surface
1000772	Walker Sand & Gravel	Blaine	Construction Sand and Gravel	Intermittent	5/10/1993	Surface
1000886	Portable Crushing Plant	Bonneville	Construction Sand and Gravel	Intermittent	10/19/1993	Surface
1001050	Yankee Fork Pit	Custer	Construction Sand and Gravel	Intermittent	10/10/2018	Surface
1001234	Glendale Pit and Plant	Blaine	Construction Sand and Gravel	Intermittent	8/24/2009	Surface
1001326	133 Portable Crusher	Bonneville	Crushed, Broken Sandstone	Active	8/5/2015	Surface
1001328	Thermocal Minerals of Idaho LLC	Clark	Dimension Limestone	Active	11/4/2020	Surface
1001529	Valley Ready Mix Inc	Bonneville	Construction Sand and Gravel	Intermittent	2/8/2016	Surface
1001700	Horrocks Ready	Bingham	Construction Sand and Gravel	Intermittent	9/8/2016	Surface
1001713	Glendale Portable Plant	Blaine	Construction Sand and Gravel	Intermittent	2/23/2009	Surface
1001731	Portable Plant	Bingham	Construction Sand and Gravel	Intermittent	4/25/2022	Surface
1001767	Dahle’s Red-E-Mix Crusher	Lemhi	Construction Sand and Gravel	Intermittent	8/22/1989	Surface
1001772	Kloepfer PP No 1	Minidoka	Construction Sand and Gravel	Intermittent	11/13/1997	Surface
1001808	Bingham County Portable Plant	Bingham	Construction Sand and Gravel	Active	5/8/2014	Surface
1001827	Plant 1	Power	Construction Sand and Gravel	Active	8/5/2015	Surface
1001840	Plant 3	Minidoka	Sand, Industrial NEC	Intermittent	7/31/1996	Surface
1001878	River City Red E Mix LLC	Lemhi	Construction Sand and Gravel	Intermittent	5/13/1992	Surface
1001888	C R M PIT #1	Custer	Construction Sand and Gravel	Intermittent	6/15/1993	Surface
1001892	134 Crusher H-K Portable Plant	Bonneville	Crushed, Broken Stone NEC	Active	10/21/2019	Surface
1001895	Kirtley Creek Mine	Lemhi	Gold Ore	Intermittent	7/18/2013	Surface
1001937	Bateman Bros. Construction Inc	Bingham	Construction Sand and Gravel	Active	2/16/2017	Surface
1001979	Portable Plant #3	Bingham	Construction Sand and Gravel	Active	11/4/2020	Surface
1002030	Glendale Portable Plant #2	Blaine	Construction Sand and Gravel	Intermittent	11/5/2018	Surface
1002081	Plant 2	Minidoka	Construction Sand and Gravel	Intermittent	11/2/2005	Surface
1002106	Landon Excavating Plant #1	Bonneville	Construction Sand and Gravel	Intermittent	5/11/2016	Surface
1002114	Rockin’ T Portable	Bonneville	Construction Sand and Gravel	Intermittent	8/9/2018	Surface
1002116	Portable Wash Plant	Lemhi	Construction Sand and Gravel	Intermittent	2/19/2013	Surface
1002142	Portable Plant 44	Bonneville	Construction Sand and Gravel	Intermittent	5/3/2022	Surface
1002145	3848 Cedar Rapids RC2	Bonneville	Construction Sand and Gravel	Intermittent	5/11/2017	Surface
1002183	KPI/JCI P181944	Power	Crushed, Broken Stone NEC	Intermittent	8/15/2022	Surface
1002185	Cedarrapids 10 X 24	Lemhi	Construction Sand and Gravel	Intermittent	5/17/2018	Surface

Table 2.1-5: Mines in the CFPP Region (Continued)

1002187	Plant 4	Bonneville	Sand, Industrial NEC	Intermittent	2/1/2016	Surface
1002189	Plant 4	Minidoka	Construction Sand and Gravel	Intermittent	1/12/2015	Surface
1002194	East River	Jefferson	Construction Sand and Gravel	Intermittent	10/1/2009	Surface
1002195	Golden Valley	Jefferson	Construction Sand and Gravel	Temporarily Idle	9/7/2022	Surface
1002198	Screen Plant	Bannock	Sand, Industrial NEC	Temporarily Idle	6/2/2022	Surface
1002200	Shelley Pit	Bonneville	Sand, Industrial NEC	Intermittent	8/8/2022	Surface
1002206	Portable Plant #5	Bingham	Construction Sand and Gravel	Active	8/8/2022	Surface
1002213	Portable Plant 130	Bonneville	Construction Sand and Gravel	Temporarily Idle	10/23/2019	Surface
1002221	Idaho Cobalt Operation	Lemhi	Cobalt Ore	Nonproductive Active	4/5/2021	Underground
1002228	3805 Cone Crushing Plant	Bonneville	Construction Sand and Gravel	Active	8/8/2022	Surface
1002243	Wash Plant	Bannock	Construction Sand and Gravel	Intermittent	5/27/2015	Surface
1002246	Lish Pit	Bannock	Construction Sand and Gravel	Intermittent	10/15/2014	Surface
1002247	TMC Contractors, Inc.	Bonneville	Construction Sand and Gravel	Active	6/2/2022	Surface
1002277	Darlington Mine	Custer	Crushed, Broken Limestone NEC	Active	10/12/2018	Surface
1002290	FB Mine	Bannock	Construction Sand and Gravel	Intermittent	7/26/2017	Surface
1002313	Cole Ranch Gravel Pit	Lemhi	Construction Sand and Gravel	Intermittent	11/5/2019	Surface
1002322	IMC Pocatello Portable Screening Plant	Bannock	Construction Sand and Gravel	Intermittent	11/4/2020	Surface

Source: Reference 2.1-59

Table 2.1-6: Agricultural Lands and Crops by Regional County

County	Land Total / Land in Farms (acres)	Total Cropland (acres)	Major Crops	Harvested Acres
Bingham	1,688,152 / 932,944	397,718	Wheat for grain	135,883
			Forage (hay/haylage)	92,724
			Vegetables	68,113
			Potatoes	67,297
			Sugarbeets for sugar	21,872
Bonneville	1,194,230 / 418,881	260,589	Barley for grain	68,414
			Wheat for grain	49,387
			Forage (hay/haylage)	28,922
			Vegetables	16,732
			Potatoes	16,708
Butte	1,431,361 / 130,366	78,610	Forage (hay/haylage)	47,224
			Barley for grain	11,726
			Wheat for grain	9060
			Vegetables	1068
			Potatoes	1068
Clark	1,128,413 / 149,411	40,726	Forage (hay/haylage)	23,190
			Wheat for grain	7273
			Barley for grain	2615
			Corn (silage/greenchop)	1460
			Vegetables	195
Jefferson	699,955 / 333,522	228,278	Forage (hay/haylage)	81,980
			Wheat for grain	43,318
			Barley for grain	40,084
			Vegetables	31,062
			Potatoes	30,961

Source: Reference 2.1-28

Table 2.1-7: Geographic Information System Coverages

Mapping Element	Source
Base map	ESRI ArcGIS downloadable data
State borders and titles	ESRI ArcGIS downloadable data
County borders and titles	ESRI ArcGIS downloadable data
City locations, boundaries, and titles	ESRI ArcGIS downloadable data
Background information (e.g., mountains, forests)	ESRI ArcGIS downloadable data
Rivers, lakes	• ArcGIS dataset from Idaho Department of Water Resources showing rivers, lakes, reservoirs, and other water features. • URL- https-//data-idwr.opendata.arcgis.com/pages/gis-data
Roads	• USGS National Transportation Dataset for Idaho (published 20221015) Shapefile. URL- https-//www.sciencebase.gov/catalog/item/5a5f36bfe4b06e28e9bfc1be • Idaho Transportation Department, Roadway Characteristics. URL- https-//data-iplan.opendata.arcgis.com/datasets/IPLAN--roadway-characteristics/about
Railroads	• ArcGIS North_American_Rail_Lines_v1. URL- https-//services2.arcgis.com/FiaPA4ga0iQKduv3/arcgis/rest/services/North_American_Rail_Lines_v1/FeatureServer • USGS National Transportation Dataset for Idaho (published 20221015) Shapefile. URL- https-//www.sciencebase.gov/catalog/item/5a5f36bfe4b06e28e9bfc1be • U.S. Department of Transportation, Bureau of Transportation Statistics, North American Rail Network Lines. URL- https-//data-usdot.opendata.arcgis.com/datasets/usdot--north-american-rail-network-lines/about
Utilities	• ArcGIS US_Electric_Power_Transmission_Lines (FeatureServer). URL- https-//services2.arcgis.com/FiaPA4ga0iQKduv3/arcgis/rest/services/US_Electric_Power_Transmission_Lines/FeatureServer • ArcGIS BLM_National_Rights_of_Way_Public_Display_Polygons (FeatureServer). URL- https-//services1.arcgis.com/KbxwQRRfWyEYLgp4/arcgis/rest/services/BLM_National_Rights_of_Way_Public_Display_Polygons/FeatureServer
Distances and areas	• ESRI ArcGIS downloadable data through U.S Census
Idaho National Laboratory boundary	• DOE mapping information from Battelle Energy Alliance; provided as ArcGIS database
CFPP site boundary and center point	• ArcGIS using coordinates for site corner points and distance/measurement feature
6-mi vicinity and 50-mi region	• ArcGIS distance/measurement feature
Land ownership	• Bureau of Land Management Geospatial Business Platform; Surface Management Agency (Surface Ownership). • URL- https-//gbp-blm-egis.hub.arcgis.com/search?groupIds=fdb8bc7d2f65458f83db6edaee68cf18
INL facilities	• Location data points provided by Battelle Energy Alliance
BLM grazing allotments	• Bureau of Land Management Geospatial Business Platform, BLM Idaho Grazing Allotments Poly. • URL- https-//gbp-blm-egis.hub.arcgis.com/search?categories=range&groupIds=fdb8bc7d2f65458f83db6edaee68cf18

Table 2.1-7: Geographic Information System Coverages (Continued)

Mapping Element	Source
Hunting areas	• ArcGIS dataset from Idaho Fish and Game, GameManagementUnits (FeatureServer). • URL- https-//services.arcgis.com/FjJI5xHF2dUPVrgK/arcgis/rest/services/GameManagementUnits/FeatureServer
National park boundaries	• ArcGIS dataset from the National Park Service showing tract and boundary data; created by the Land Resources Division. • URL- https-//public-nps.opendata.arcgis.com/datasets/nps--nps-boundary-1/explore?location=4.276013%2C-12.497900%2C2.79
Topography	• USGS, University of Idaho, National Elevation Dataset (NED) for Idaho. URL- https-//data.nkn.uidaho.edu/dataset/national-elevation-dataset-ned-idaho • InsideIdaho.org elevation explorer. URL- https-//insideidaho.org/apps/elevation-explorer/
WMAs	• ArcGIS dataset from Idaho Fish and Game land ownership/ management mapping projects. • URL- https-//services.arcgis.com/FjJI5xHF2dUPVrgK/arcgis/rest/services/WildlifeManagementAreas/FeatureServer
Wilderness Areas	• Bureau of Land Management Geospatial Business Platform, BLM Idaho NLCS Wilderness Poly. • URL- https-//gbp-blm-egis.hub.arcgis.com/datasets/BLM-EGIS--blm-idaho-nlcs-wilderness-poly/explore?location=45.402149%2C-114.093558%2C7.46
WSAs	• Bureau of Land Management Geospatial Business Platform, BLM Idaho NLCS Wilderness Study Area Poly. • URL- https-//gbp-blm-egis.hub.arcgis.com/search?categories=national%20conservation%20lands&groupIds=fdb8bc7d2f65458f83db6edaee68cf18
National wildlife refuge	• Bureau of Land Management Geospatial Business Platform; Surface Management Agency (Surface Ownership). • URL- https-//gbp-blm-egis.hub.arcgis.com/search?groupIds=fdb8bc7d2f65458f83db6edaee68cf18
ACECs, Research Natural Areas	• BLM National Designated Areas of Critical Environmental Concern Polygons. • URL- https-//data.cnra.ca.gov/dataset/blm-national-designated-areas-of-critical-environmental-concern-polygons
Mineral resources	• USGS, Mineral Resources Data System (MRDS). • URL- https-//mrdata.usgs.gov/#mineral-resources
Agriculture	• ArcGIS dataset from Idaho Department of Water Resources showing irrigated lands on the Snake River Plain 2015. URL- ArcGIS dataset from Idaho Department of Water Resources showing • U.S. Department of Agriculture, National Agricultural Service, Cropland Data Layer. URL- https-//www.nass.usda.gov/Research_and_Science/Cropland/Release/
Forest products	• U.S. Department of Agriculture, Forest Service, FSGeodata Clearinghouse. • URL- https-//data.fs.usda.gov/geodata/edw/datasets.php
Prime and unique farmlands	• U.S. Department of Agriculture, Natural Resources Conservation Service, RCA Data Viewer, Prime Farmland. • URL- https-//www.nrcs.usda.gov/resources/data-and-reports/rca-data-viewer
Trust land areas	• Idaho Department of Land Endowments. • URL- https-//gis1.idl.idaho.gov/portal/apps/MapSeries/index.html?appid=377174ba142b4cc58e63b340617de76f

Table 2.1-7: Geographic Information System Coverages (Continued)

Mapping Element	Source
Floodplains	• ArcGIS dataset from Idaho Department of Water Resources, download of Federal Emergency Management Agency Flood Insurance Rate Map data. • URL- https-//data-idwr.opendata.arcgis.com/pages/gis-data#DamsAndFlooding
Wetlands	• USGS National Wetlands Inventory, surface waters and wetlands. • URL- https-//fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/
Soils	• U.S. Department of Agriculture, Natural Resources Conservation Service Web Soil Survey. • URL- https-//websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Table 2.1-8: Power Transmission Corridor Information

Corridor Segment / Right-of-Way	Segment Length (mi)[1]	Segment Width (ft)[1]	Description
1	1.0	250	Construction power 34.5 kV line from northeast from CFPP plant area to the northeastern side of CFPP facility northeastward to the east side of the existing PacifiCorp 69 kV line in the CFPP transmission corridor (~~see~~ Figure 2.1-22)
2	0.5	250	Main power transmission 230 kV line from CFPP northeastward to the northeastern side of the existing PacifiCorp 69 kV in the CFPP transmission corridor
3	8.0	250	Transmission corridor for 34.5 kV construction line and 230 kV operational line from corridor segments 1 and 2 running parallel to the existing PacifiCorp 69 kV line. The construction line runs to a new Pronghorn Substation at CFA; the operational line that runs to the Antelope Substation at CFA. This segment stops northwest of CFA
4	2.7	250	Transmission corridor for 34.5 kV construction line and 230 kV operational line from the southern end of CFPP corridor segment 3 to the Pronghorn or Antelope Substations

[1] Length and width based on proposed location of transmission powerline; actual location and associated segment lengths and widths may vary. The proposed segment 4 location length and width ~~will~~ depend on the specific route required to bypass the landfill.

Table 2.1-9: Water Supply Pipeline Corridor Information

Corridor Segment / Right-of-Way[1]	Segment Length (Miles)	Description
Water Pipeline	Up to 5	Water supply system designed to meet plant water needs, aquifer properties, and regulatory requirements running from the CFPP plant to source wells
Well Location 1	Within CFPP property	Four or more wells depending on aquifer properties and plant needs; only one location is expected to have wells
Well Location 2	Up to 1	
Well Location 3	Up to 2	
Well Location 4	Up to 3	
Well Location 5	Up to 4	
Well Location 6	Up to 5	

[1] Figure 2.1-22 shows well locations.

Table 2.1-10: Vegetative Land Cover Associated with Proposed Power Transmission Corridors

#	Land Cover Type	Characteristics	Species
1	Green Rabbitbrush / Sandberg Bluegrass - Bluebunch Wheatgrass Shrub Grassland	• Characterized by shrub canopy ranging from moderately open to nearly closed with an abundant medium-tall herbaceous layer • Tends to occur in rolling upland topography; often associated with wildland fire scars or areas of sagebrush decline • Generally loamy soils with moderate depth to bedrock and slightly higher moisture holding capacity	• Dominated by Green rabbitbrush (*Chrysothamnus viscidiflorus*) (shrub stratum); Sandberg bluegrass (*Poa secunda*) (herbaceous stratum with typically abundant/co-dominate Bluebunch wheatgrass [*Pseudoroegneria spicata*]); and Shaggy fleabane (*Erigeron pumilus*), tapertip hawksbeard (*Crepis acuminata*), and Hood's phlox (*Phlox hoodii*) (perennial forbs occurring with greatest cover and constancy). • Sporadic other shrubs such as big sagebrush (*Artemisia tridentata*) and gray horsebrush (*Tetradymia canescens*) • Locally abundant bottlebrush squirreltail (*Elymus elymoides*) • Indian ricegrass (*Achnatherum hymenoides*) and thickspike wheatgrass (*Elymus lanceolatus*) are often present but contribute little total cover. • Cheatgrass (*Bromus tectorum*) is present in most communities; cover ranges from very low to quite abundant.
3/5	Green Rabbitbrush / Thickspike Wheatgrass Shrub Grassland and Needle and Thread Grassland	• Characterized by an abundance of native, perennial rhizomatous grasses. Very common in post-fire recovering plant communities; may occur in low sagebrush cover • Generally associated with rolling upland sites. • Soils are moderate to relatively deep and trend towards coarse-textured loams. • Needle and thread may occur in a variety of substrates, from loams to very sandy soils; tends to dominate where soils are moderately deep and well-drained; occurs in small to medium-sized patches, often in scars of recent wildland fires; patch size is directly influenced by the scale and abruptness of soil depth and texture changes	• Dominated by thickspike wheatgrass (*Elymus lanceolatus*) (*herbaceous stratum*). Native bunchgrasses are also present with Indian ricegrass (*Achnatherum hymenoides*) and needle and thread (*Hesperostipa comata*), which forms a moderate to dense herbaceous layer, being most abundant. • Western wheatgrass (*Pascopyrum smithii*) and bottlebrush squirreltail (*Elymus elymoides*) may be common but not constant. • Green rabbitbrush (*Chrysothamnus viscidiflorus*) occurs with high constancy and low to moderate cover. • Additional shrubs, such as big sagebrush (*Artemisia tridentata*), spiny hopsage (*Grayia spinosa*), and winterfat (*Krascheninnikovia lanata*) may also occur sporadically and with minimal cover. • A variety of forb species may be present with low to moderate cover: western tansymustard (*Descurainia pinnata*), flatspine stickseed (*Lappula occidentalis*), and Hood's phlox (*Phlox hoodii*). • Non-native species include cheatgrass (*Bromus tectorum*) and desert alyssum (*Alyssum desertorum*).

Table 2.1-10: Vegetative Land Cover Associated with Proposed Power Transmission Corridors (Continued)

#	Land Cover Type	Characteristics	Species
4	Green Rabbitbrush / Desert Alyssum (Cheatgrass) Ruderal Shrubland	• Characterized by green rabbitbrush (Chrysothamnus viscidiflorus) comminated shrub stratum with an herbaceous understory dominated by non-native annuals. • Distribution not tightly constrained by soil texture or depth. • Generally occurs in areas that have experienced relatively recent wildland fire (especially in the last 25 years in lands with sufficient recovery time for the green rabbitbush (Chrysothamnus viscidiflorus) to reach abundance) and occasionally appears to be associated with locations that have experienced greater than average livestock use.	• Dominated by green rabbitbrush (*Chrysothamnus viscidiflorus*) in an open to moderately dense canopy with few other shrub species • Big sagebrush (*Artemisia tridentata*) individuals may occur sporadically. • Dense and diverse herbaceous layer dominated by Desert alyssum (*Alyssum desertorum*); several non-native annual species may be abundant or even dominate localized stands. • Additional non-native species may include: cheatgrass (*Bromus tectorum*), saltlover (*Halogeton glomeratus*), Russian thistle (*Salsola kali*), tall tumblemustard (*Sisymbrium altissimum*), and herb Sophia (*Descurainia sophia*). • Native herbaceous species are common but combined contribute less than half of the total herbaceous cover. • Native bunchgrasses such as needle and thread (*Hesperostipa comata*), Indian ricegrass (*Achnatherum hymenoides*), bottlebrush squirreltail (*Elymus elymoides*), and Sandberg bluegrass (*Poa secunda*) are present but are not highly abundant. • Associated native forbs generally contribute very little cover, but the most frequently occurring species is Hood's phlox (*Phlox hoodii*).

Table 2.1-10: Vegetative Land Cover Associated with Proposed Power Transmission Corridors (Continued)

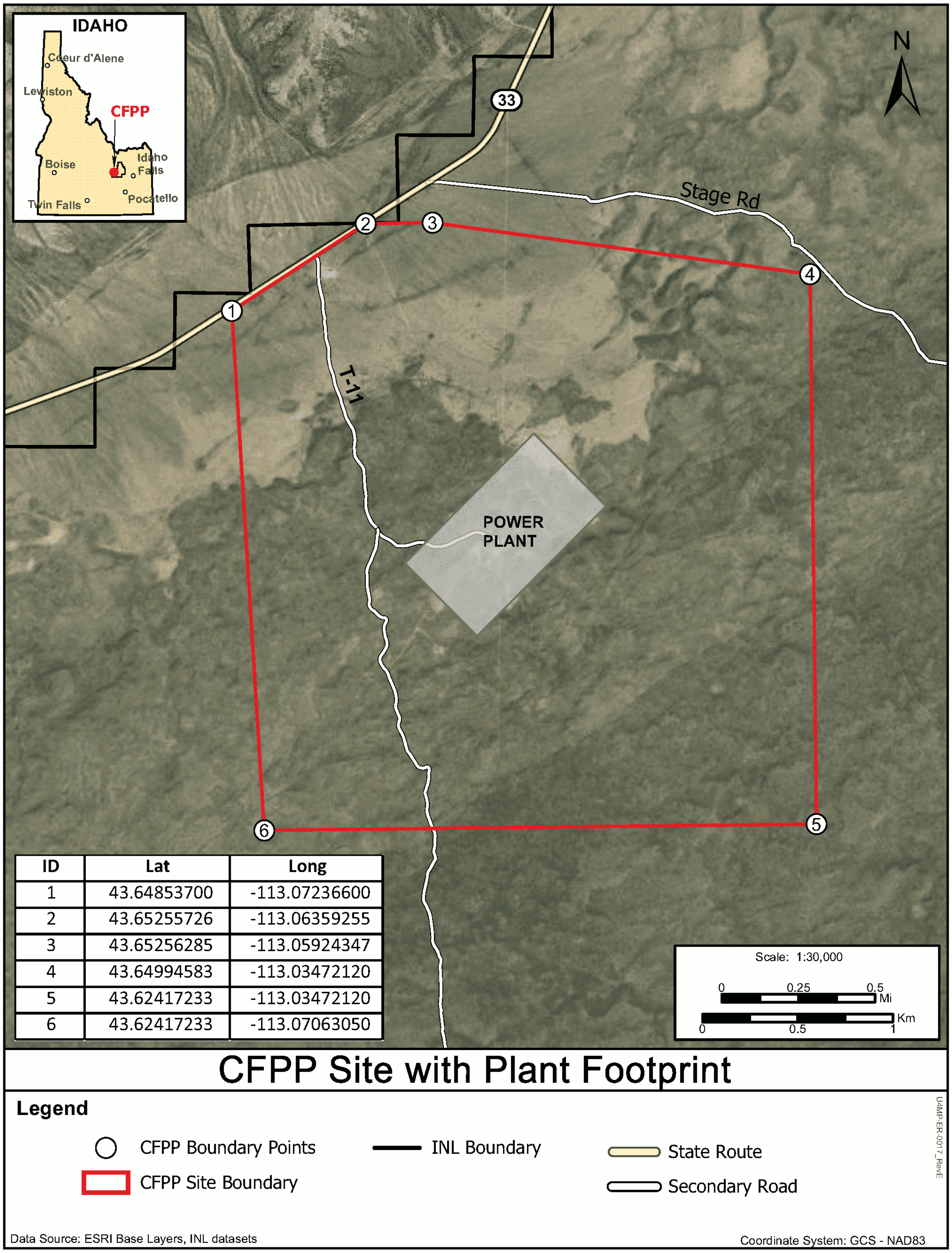
#	Land Cover Type	Characteristics	Species
6	Big Sagebrush - Green Rabbitbrush (Threetip Sagebrush) Shrubland	• Characterized by an open to moderately dense shrub layer. • Big sagebrush (*Artemisia tridentata)* always abundant; other shrubs range from abundant to co-dominant. • Heterogenous communities characterized by mix of shrub species in the overstory often occur in areas with moderately complex topography where soil textures and depths change abruptly and at fine spatial scales, such as on rolling hills created by soil accumulation over basalt flows. • Often associated with linear sand dunes and distributed amongst dry braided stream channels. • Highly variable substrates ranging from very fine to coarse-textured; may have low salinity and high sand content, gravel, and/or rocks	• Dominated by abundant Big sagebrush (*Artemisia tridentata*) • Green rabbitbrush (*Chrysothamnus viscidiflorus*) is always abundant and can be dominant in some stands. • Also encompasses threetip sagebrush stands (*Artemisia tripartita*) in some communities where it ranges from abundant to co-dominant. • Other shrubs occur sporadically: spineless horsebrush (*Tetradymia canescens*), winterfat (*Krascheninnikovia lanata*), and spiny hopsage (*Grayia spinosa*) are more commonly occurring. • Herbaceous stratum cover ranges from sparse to moderate. • Species composition of native grasses may be quite variable from one stand to another; however, bottlebrush squirreltail (*Elymus elymoides*), Sandberg bluegrass (*Poa secunda*), thickspike wheatgrass (*Elymus lanceolatus*), Bluebunch wheatgrass (*Pseudoroegneria spicata*), and Indian ricegrass (*Achnatherum hymenoides*) are among the most abundant grass species. • Forbs present on more diverse sites include Hood's phlox (*Phlox hoodii*), Chenopodium spp., Eriogonum spp., western tansymustard (*Descurainia pinnata*), and flatspine stickseed (*Lappula occidentalis*). • Cover from exotic species ranges from absent to moderate, the most abundant of which are cheatgrass (*Bromus tectorum*), crested wheatgrass (*Agropyron cristatum*), and desert alyssum (*Alyssum desertorum*).
7	Crested Wheatgrass Ruderal Grassland	• Characterized by moderate to dense crested wheatgrass (*Agropyron cristatum*)-dominated herbaceous layer • Forms nearly monotypic stands with very little species diversity. • Occur in wide variety of anthropogenically-disturbed habitats, including highway rights-of-way, revegetation projects, and fire scars. • Distribution is not tightly constrained by soil texture/depth, topography, or moisture availability.	• Dominated by crested wheatgrass (*Agropyron cristatum*). Crested wheatgrass is a perennial bunchgrass from the plains of Siberia, and it is often considered to be a naturalized species. • Native species may be present sporadically with very low cover values and include shrubs, particularly green rabbitbrush (*Chrysothamnus viscidiflorus*), big sagebrush (*Artemesia tridentata*), and grasses such as Indian ricegrass (*Achnatherum hymenoides*), Sandberg bluegrass (*Poa secunda*), and bottlebrush squirreltail (*Elymus elymoides*). • Other non-native herbaceous species may occur in this community, especially in areas with soil disturbance, but contribute very little total cover.

Table 2.1-10: Vegetative Land Cover Associated with Proposed Power Transmission Corridors (Continued)

#	Land Cover Type	Characteristics	Species
9	Western Wheatgrass Grassland	• Characterized by an abundance of native, perennial rhizomatous grasses, mainly western wheatgrass (*Pascopyrum smithii*). • Tends to occur in areas traditionally in close proximity to surficial water features, such as ephemeral stream channels (e.g., Big Lost River), low playa areas, within some distance of runoff corridors, or other localized features that may have greater water accumulation and availability on a seasonal basis. • Soils are relatively deep, ranging from fine-textured silt or clay loams to fairly coarse-textured loams. • Unvegetated interspace surfaces have moderate to high exposure of bare soil, are relatively free of rock, with low to moderate cover of litter.	• Dominated by western wheatgrass (*Pascopyrum smithii*) with stands typically occurring as patchwork mosaic. • Several native bunchgrasses are generally present, often with much lower cover: Indian ricegrass (*Achnatherum hymenoides*) and bottlebrush squirreltail (*Elymus elymoides*). • Green rabbitbrush (*Chrysothamnus viscidiflorus*) occurs with moderate constancy and low to moderate cover. • Additional shrubs, such as big sagebrush (*Artemisia tridentata*), spiny hopsage (*Grayia spinosa*), and winterfat (*Krascheninnikovia lanata*) may also occur sporadically with minimal cover. • A variety of forb species may be present with low to moderate cover. Some of the more consistently occurring perennial species include flaxleaf plainsmustard (*Schoenocrambe linifolia*) and povertyweed (*Iva axillaris*), while annuals are highly variable from year to year. • Cover from non-native herbaceous species ranges from absent to moderate. In stands where they occur, the most abundant non-native species are usually cheatgrass (*Bromus tectorum*); desert alyssum (*Alyssum desertorum*), tall tumblemustard (*Sisymbrium altissimum*), and saltlover (*Halogeton glomeratus*) may also occur occasionally.

Source: Shive et al., Vegetation Community Classification and Mapping of the Idaho National Laboratory Site 2019 (Reference 2.1-82)

Figure 2.1-1: CFPP Site with Plant Footprint



ID	Lat	Long
1	43.64853700	-113.07236600
2	43.65255726	-113.06359255
3	43.65256285	-113.05924347
4	43.64994583	-113.03472120
5	43.62417233	-113.03472120
6	43.62417233	-113.07063050

Figure 2.1-2: CFPP Site, Vicinity, and Region

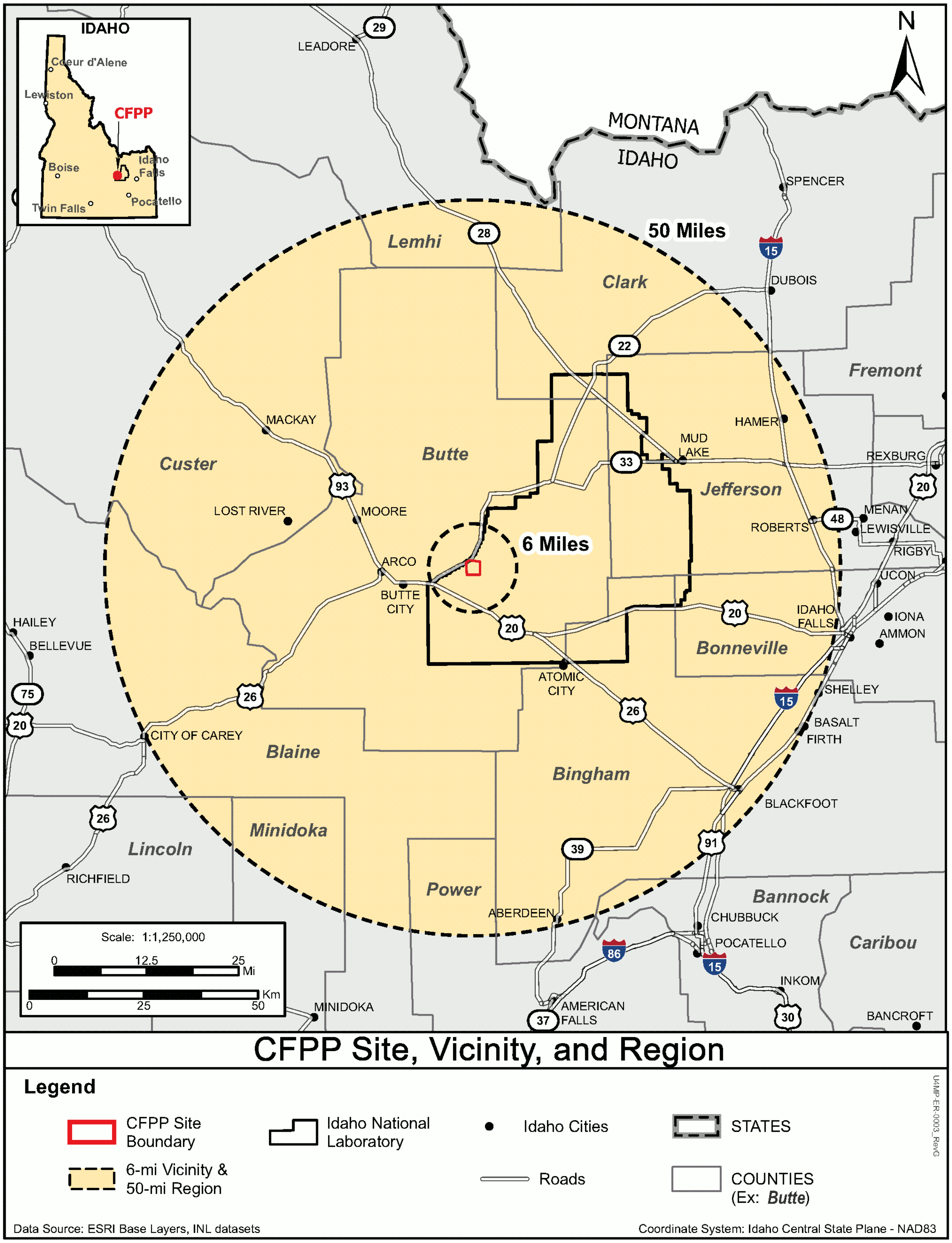


Figure 2.1-3: CFPP Regional Landmarks

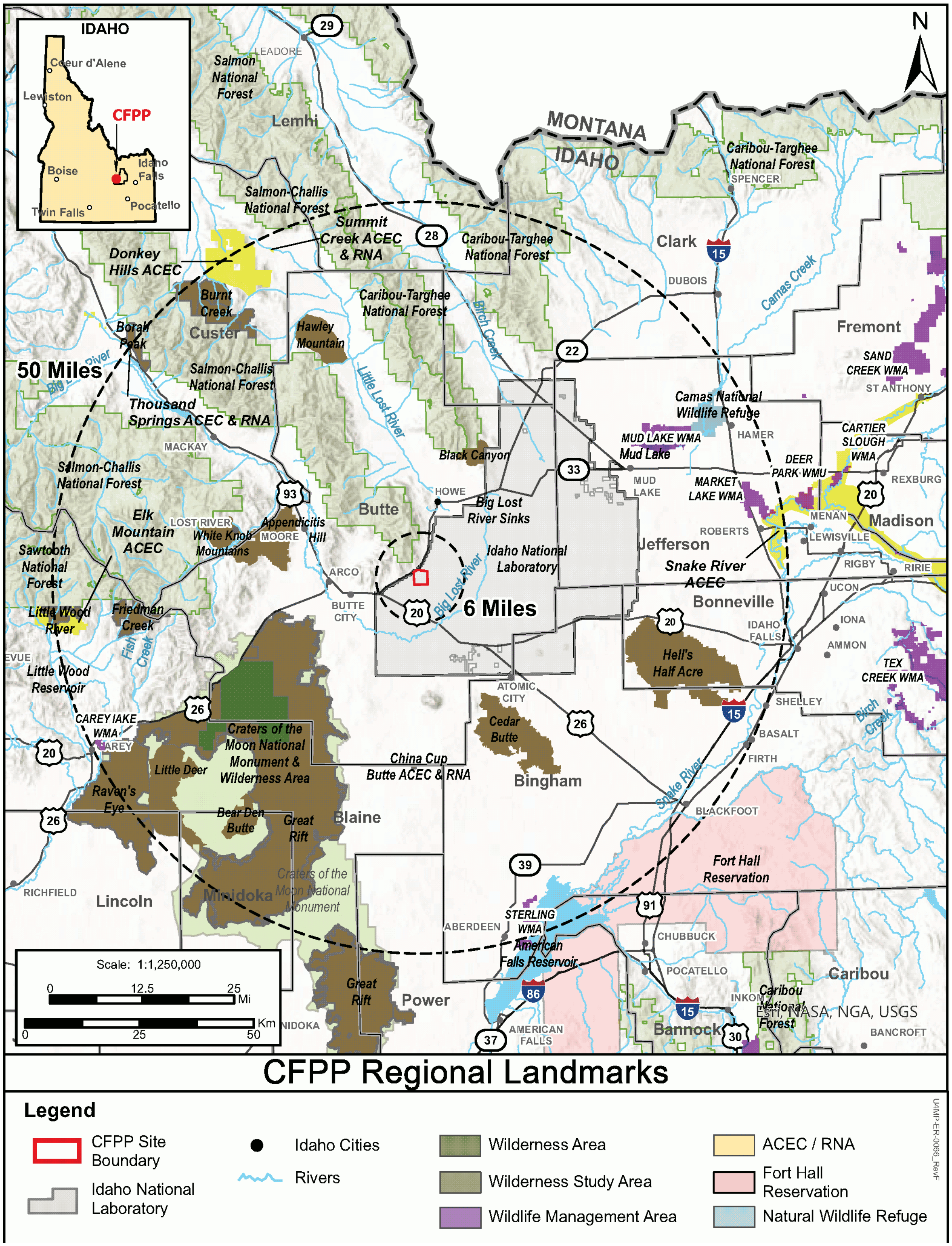


Figure 2.1-4: CFPP Principal Land Uses

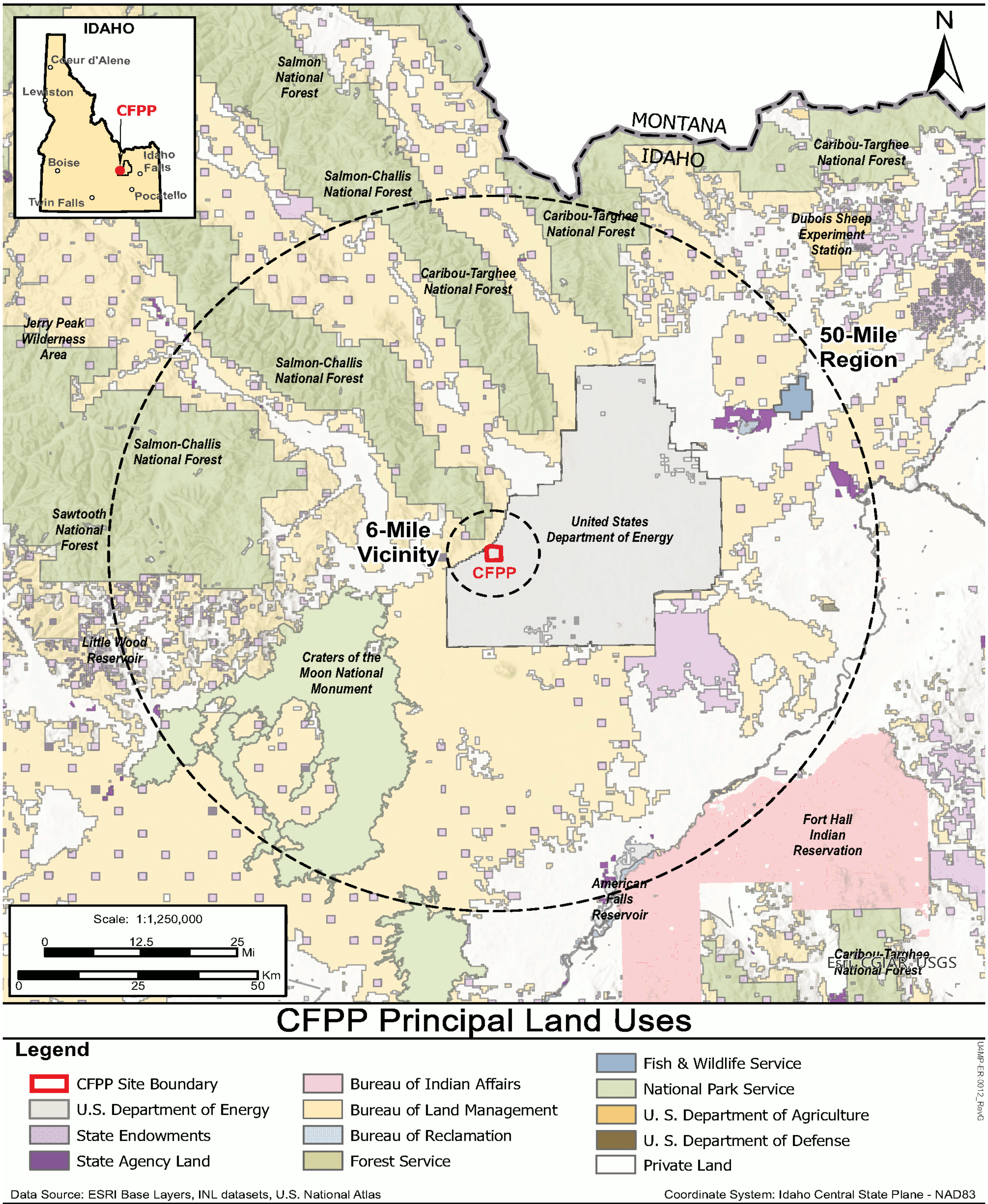


Figure 2.1-5: INL Facilities

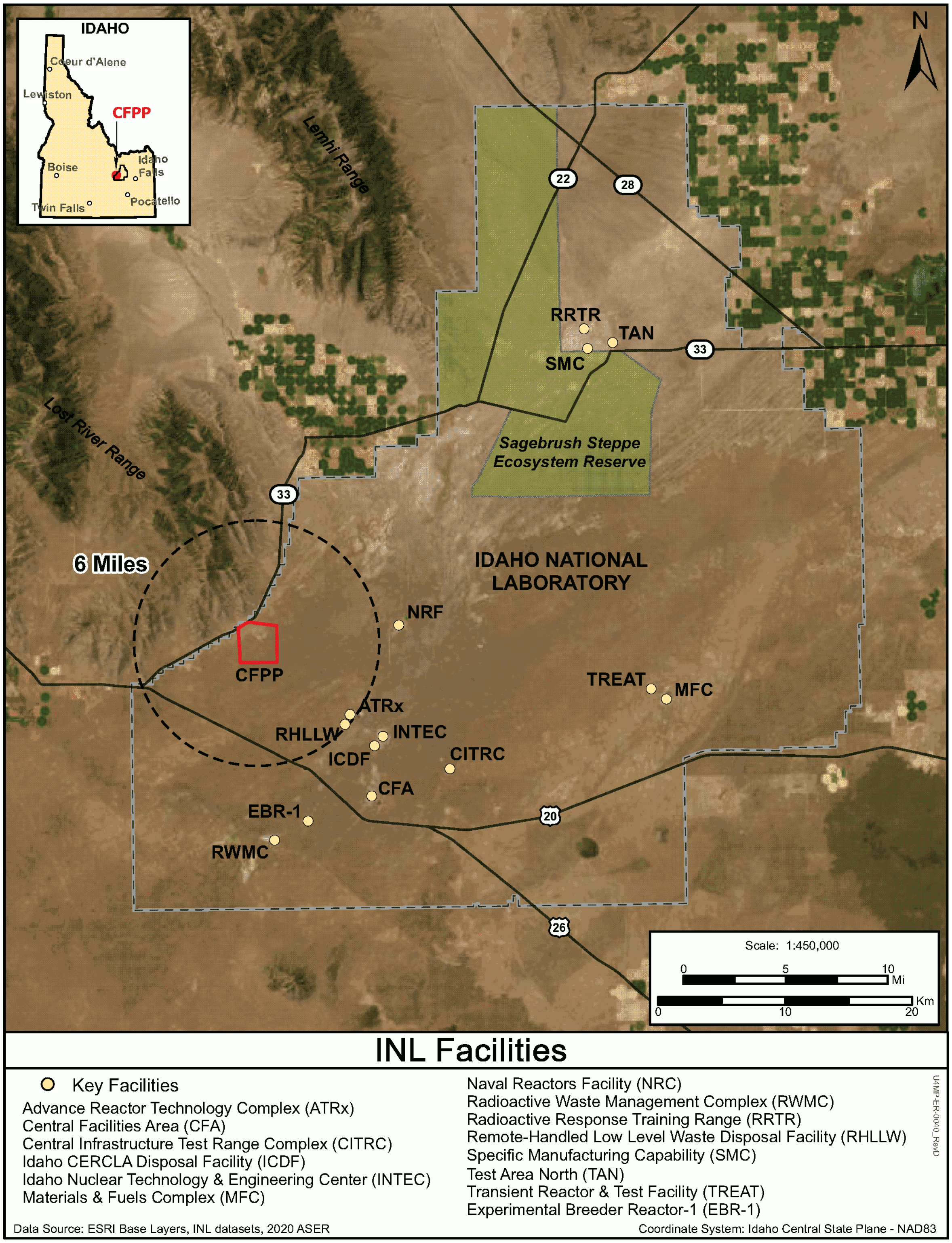


Figure 2.1-6: CFPP Site Topography

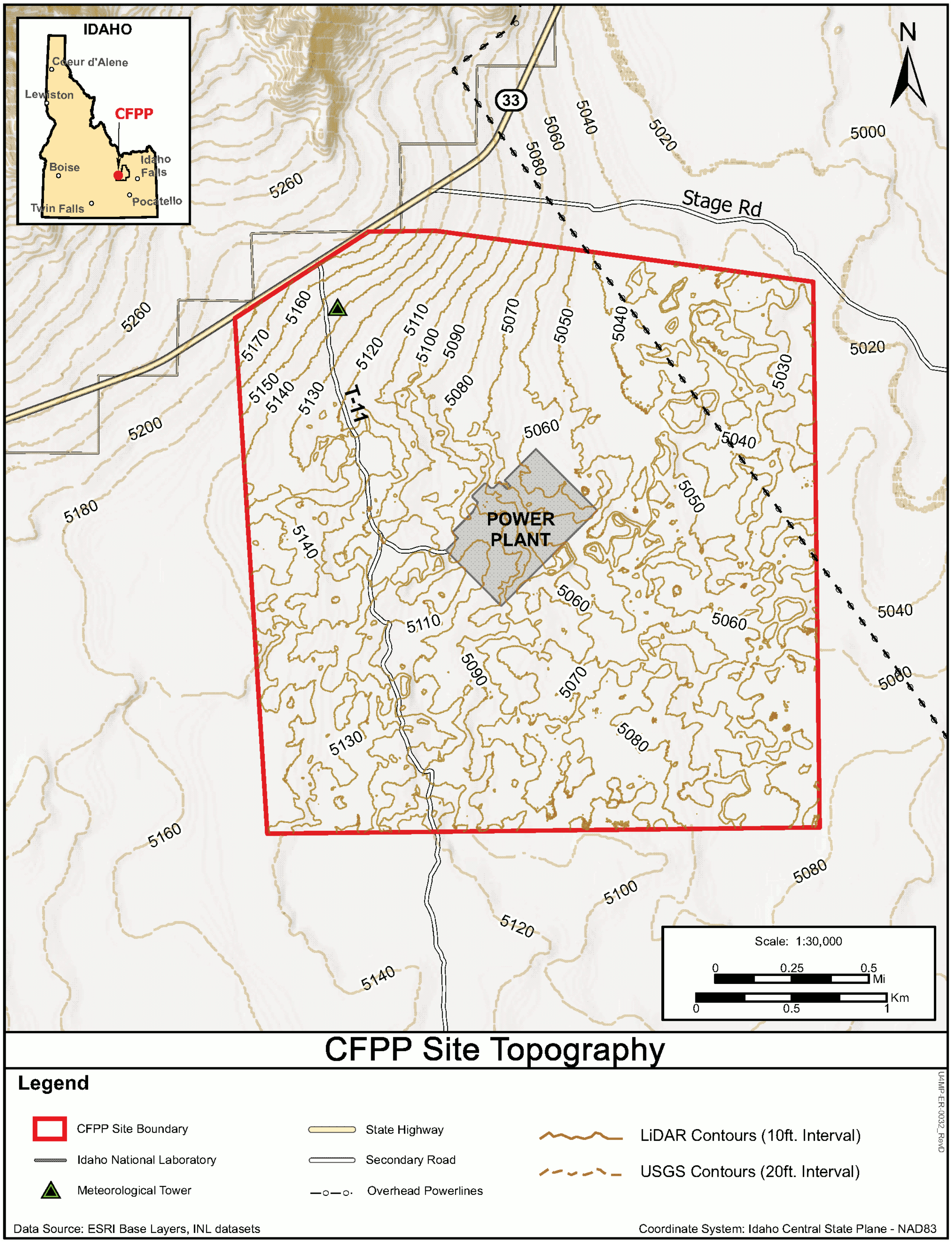


Figure 2.1-7: CFPP Vicinity Topography

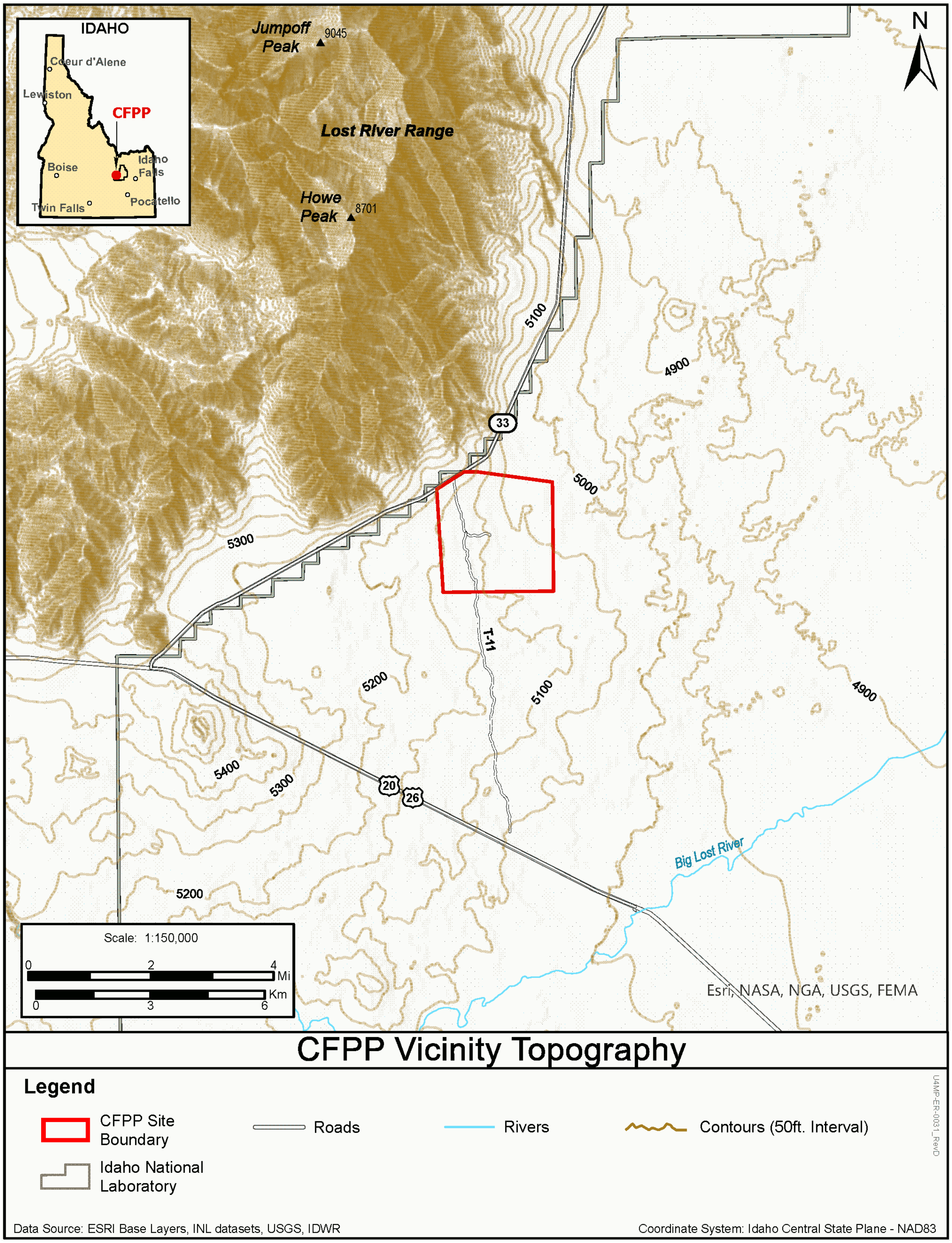


Figure 2.1-8: CFPP Regional Topography

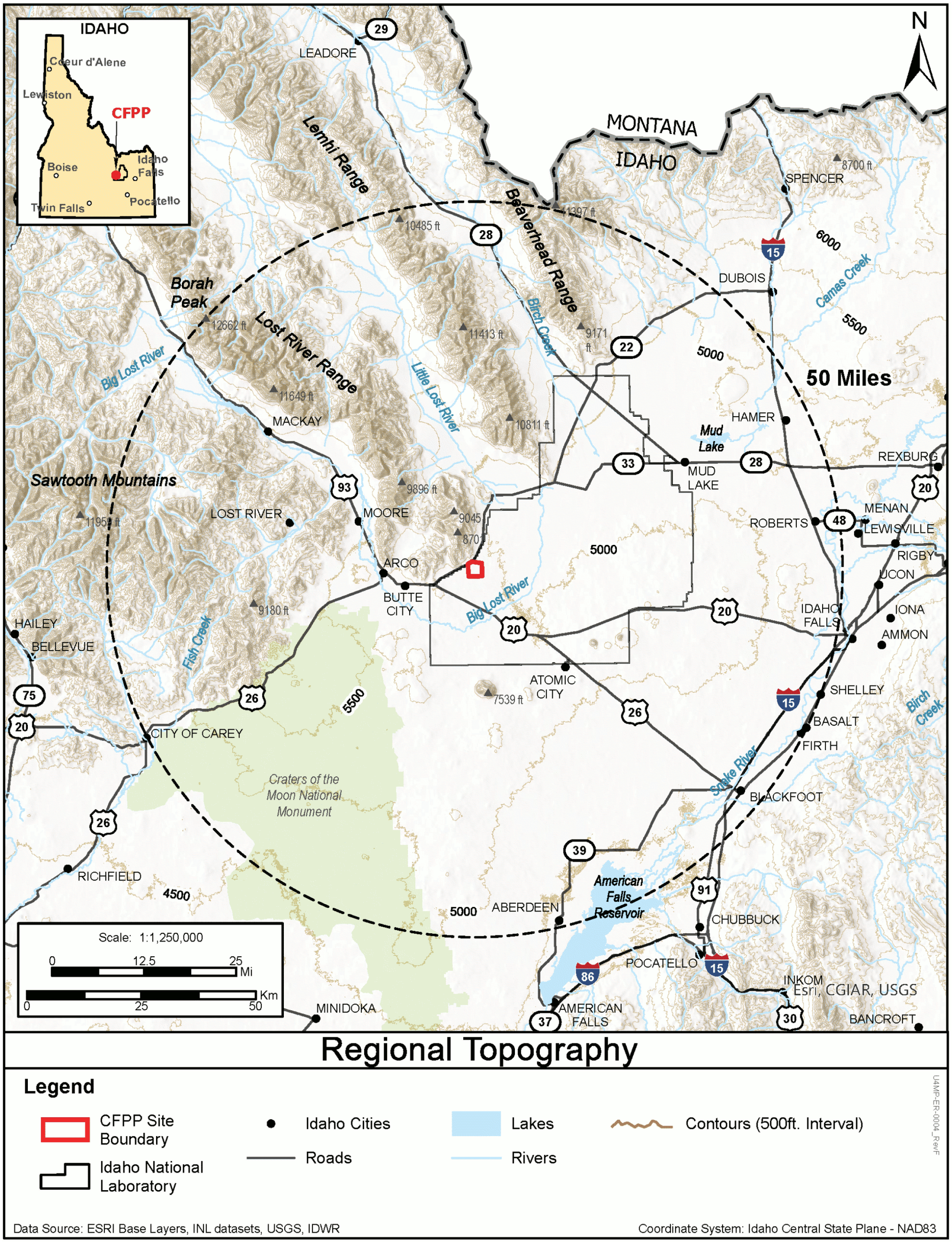


Figure 2.1-9: CFPP Site Infrastructure

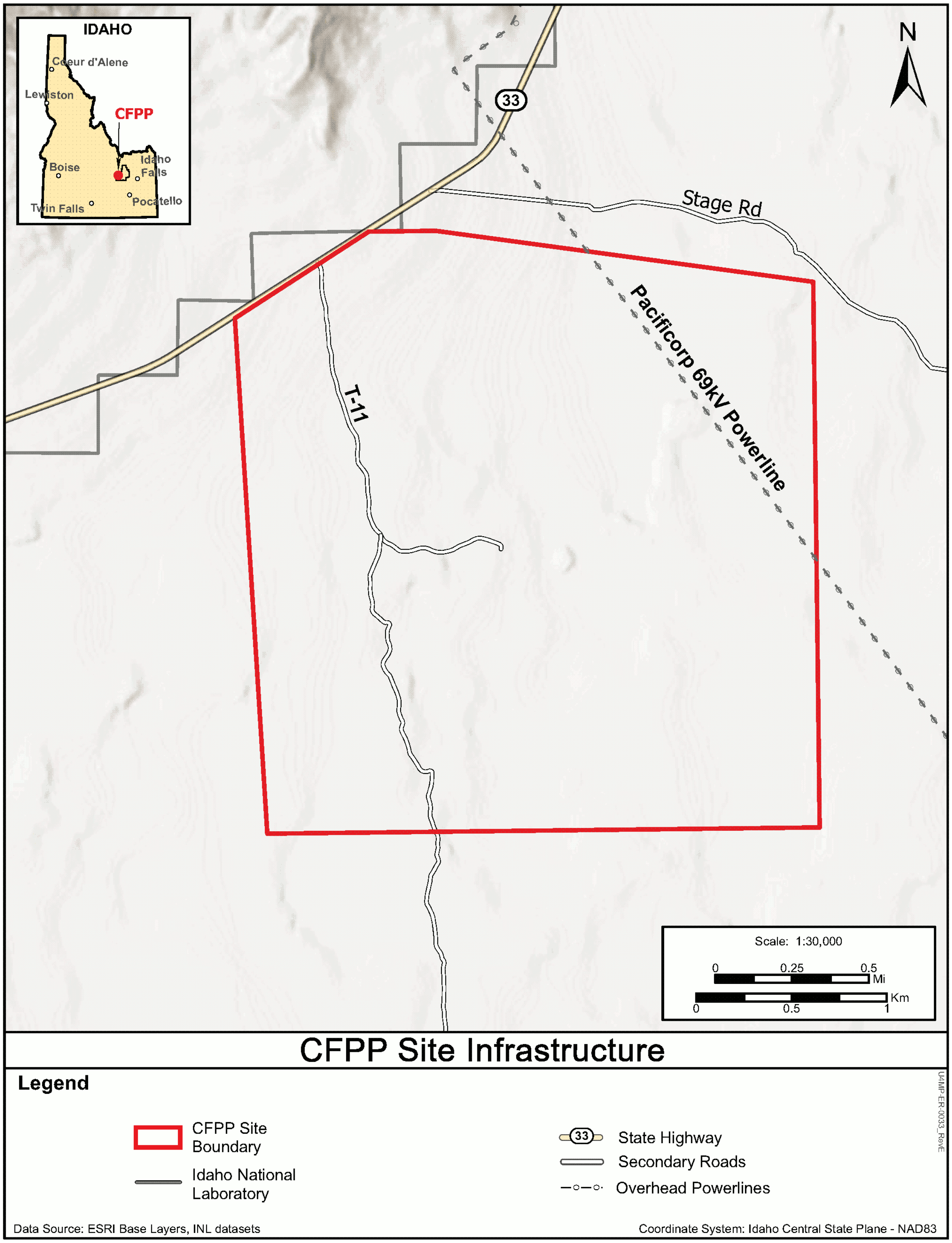


Figure 2.1-10: CFPP Vicinity and Regional Infrastructure

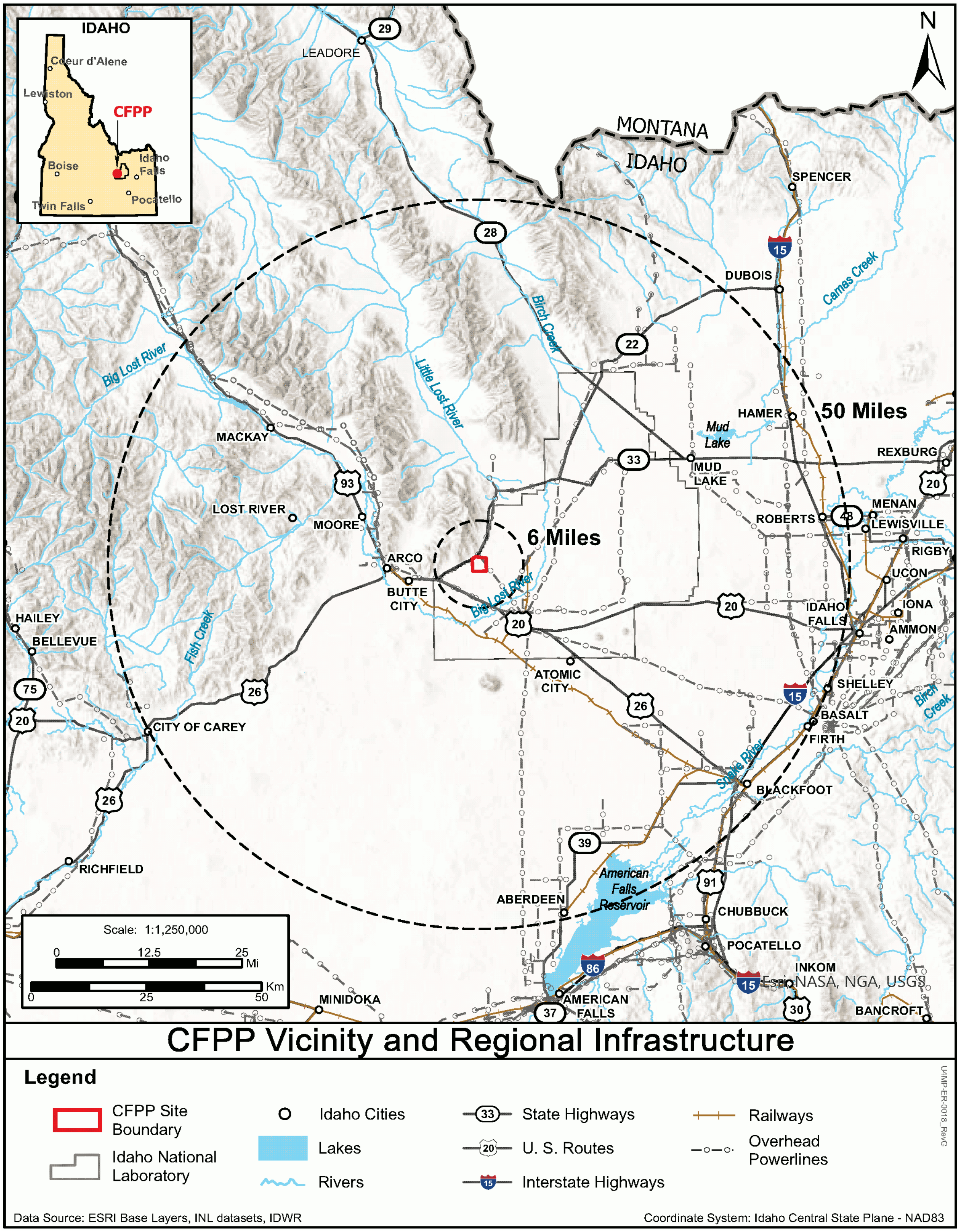


Figure 2.1-11: CFPP Regional Waterbodies

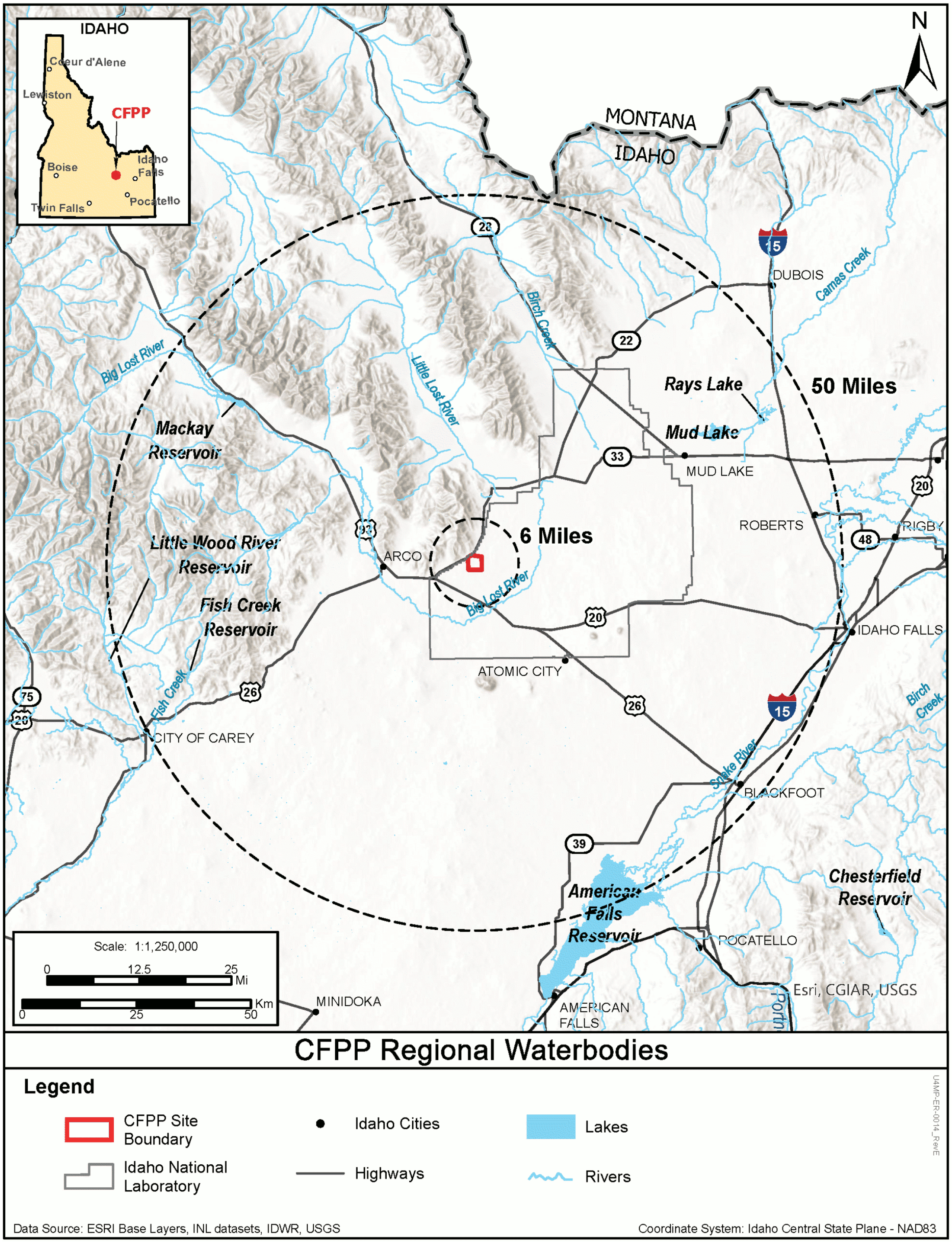


Figure 2.1-12: CFPP Regional Mineral and Mining Locations

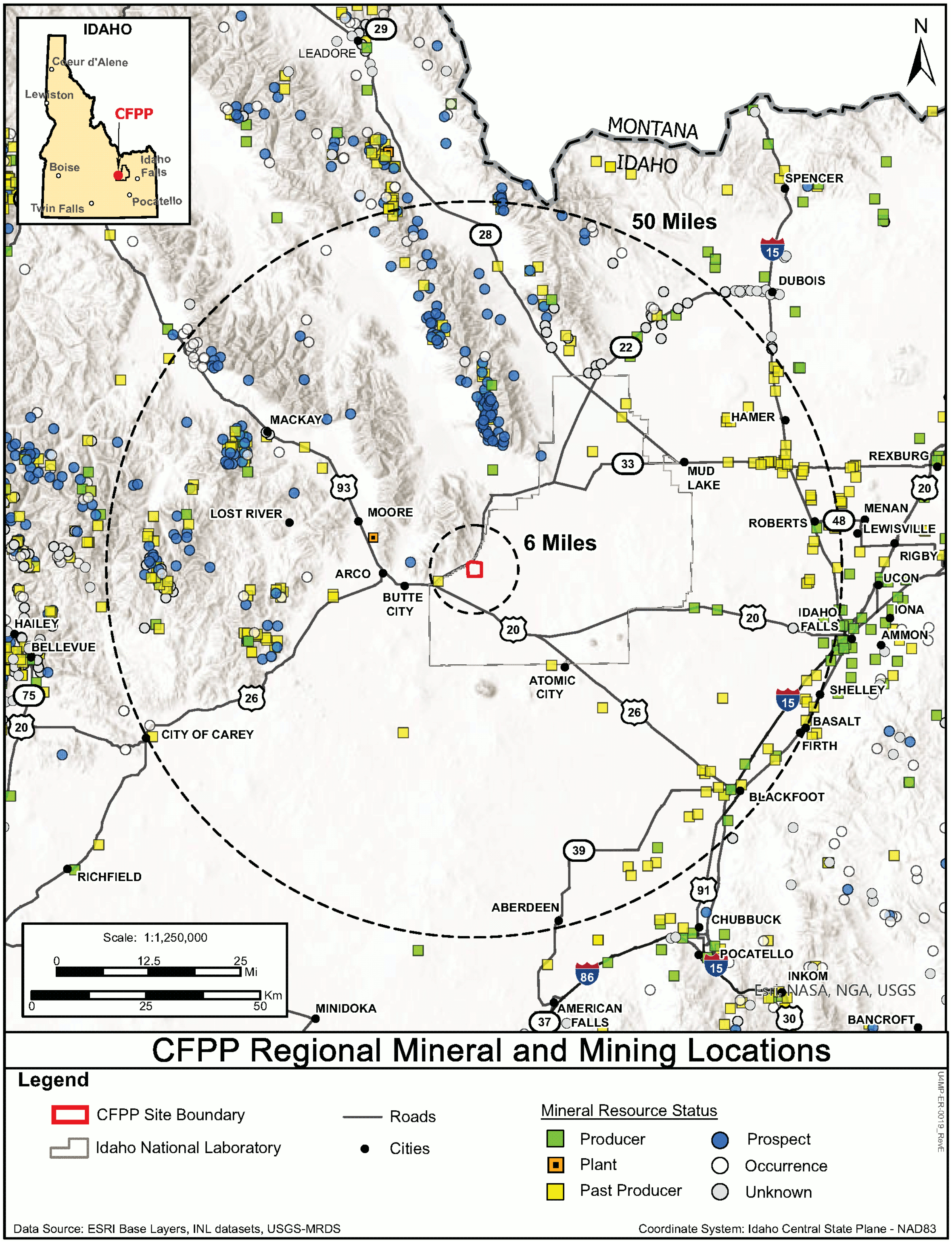


Figure 2.1-13: CFPP Vicinity Grazing Allotments

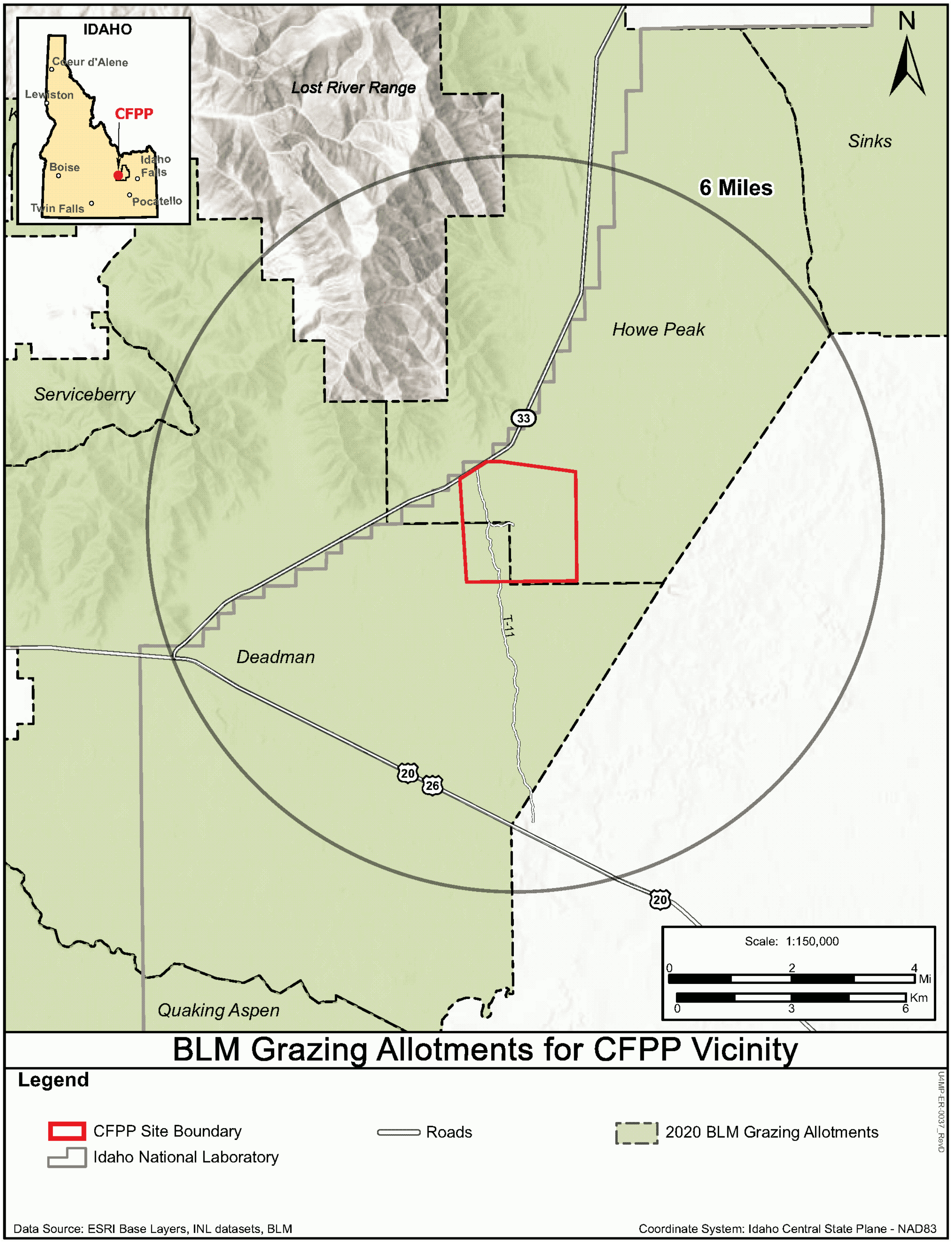


Figure 2.1-14: CFPP Vicinity Agriculture

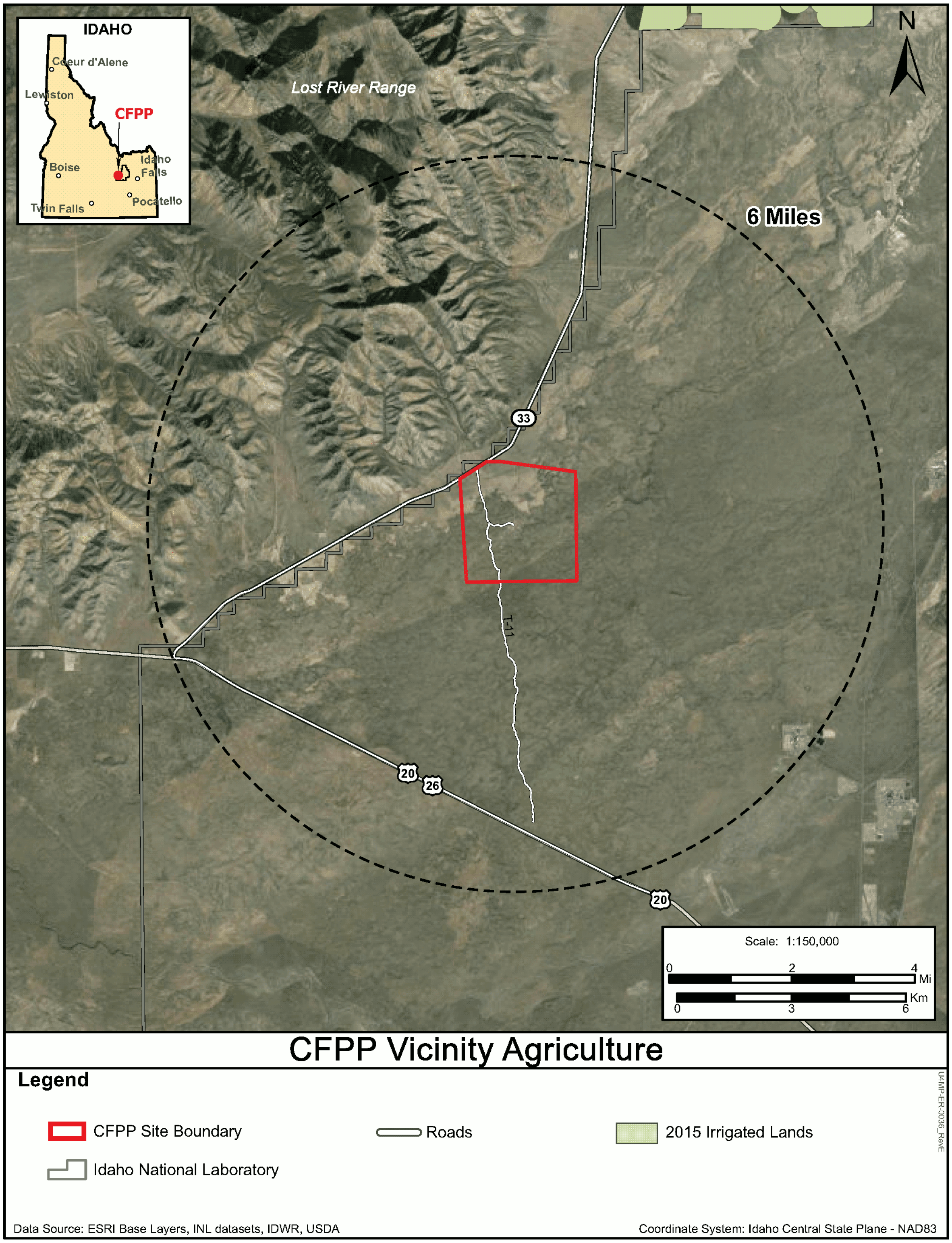


Figure 2.1-15: CFPP Regional Agriculture and Forest Products

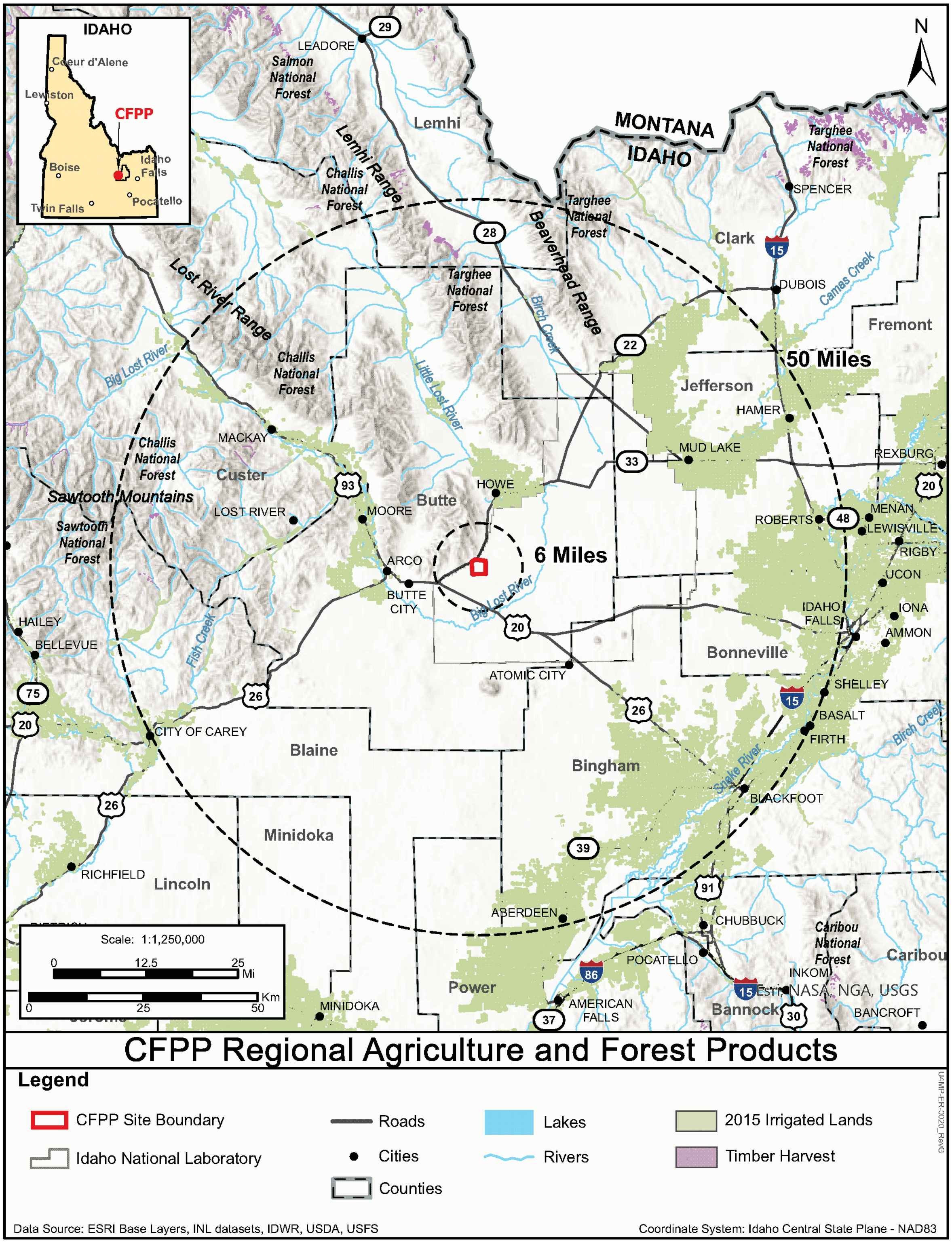


Figure 2.1-16: CFPP Regional Prime and Unique Farmlands

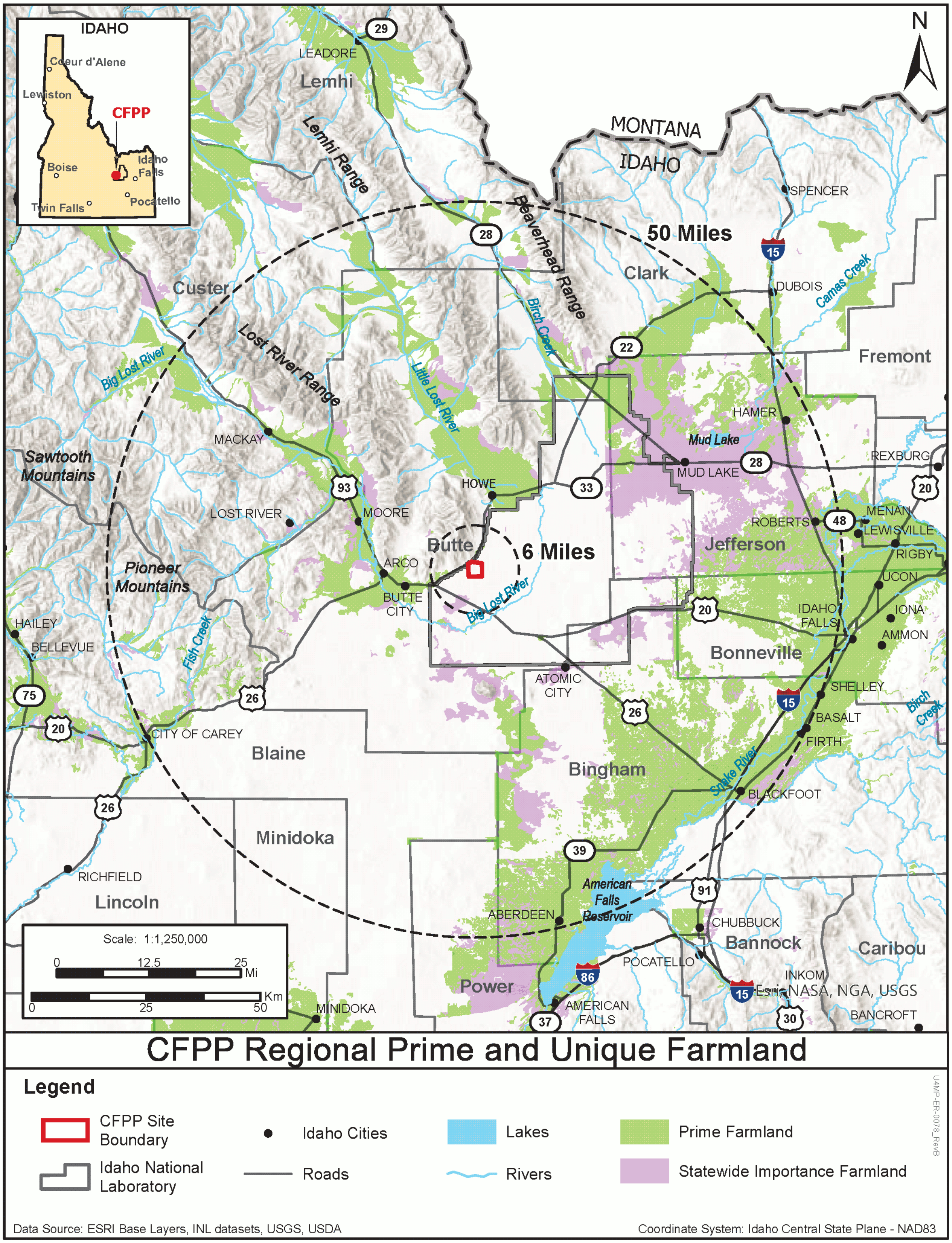


Figure 2.1-17: CFPP Regional Flood Hazards and Wetland Areas

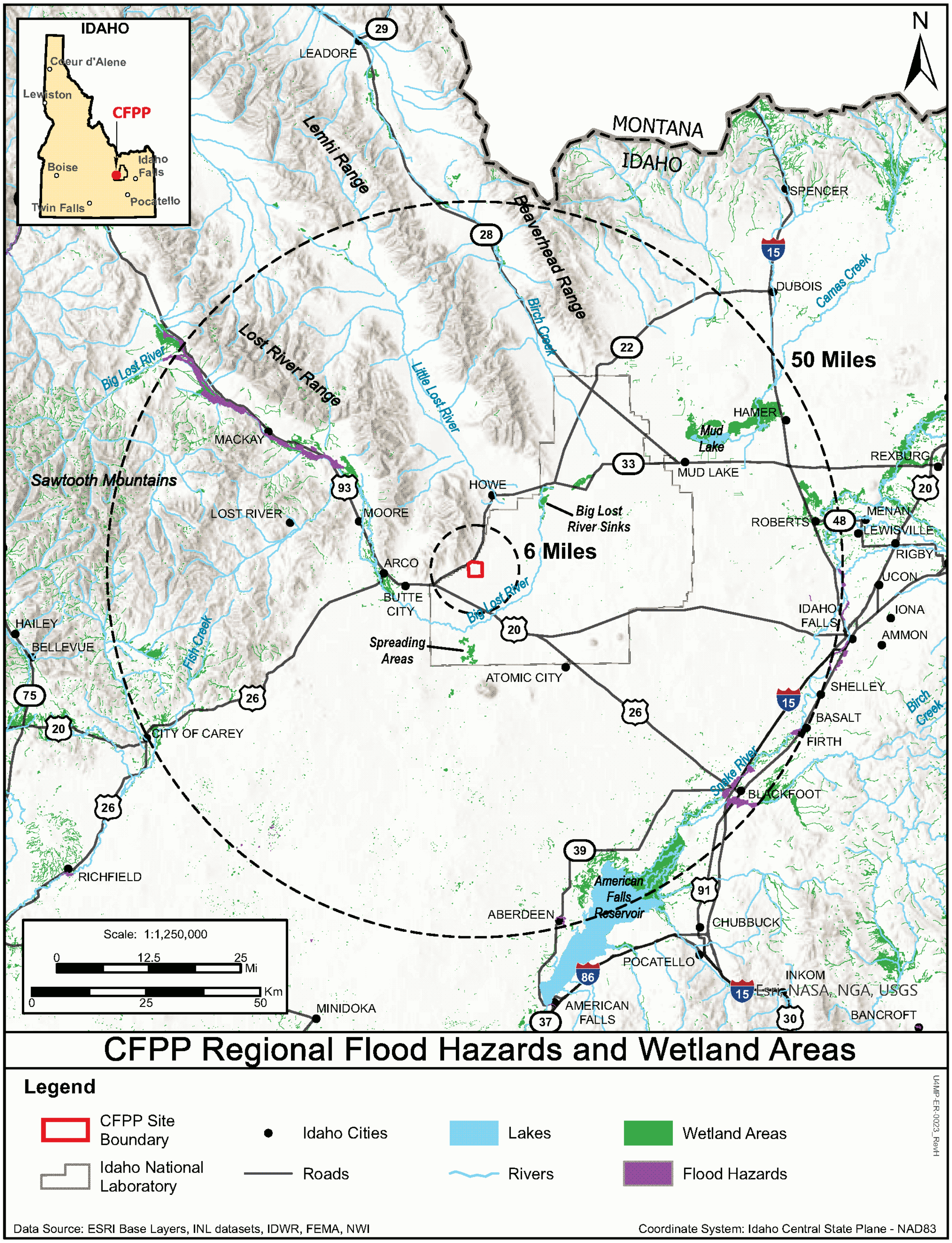


Figure 2.1-18: Probable Maximum Flood from Mackay Dam Failure

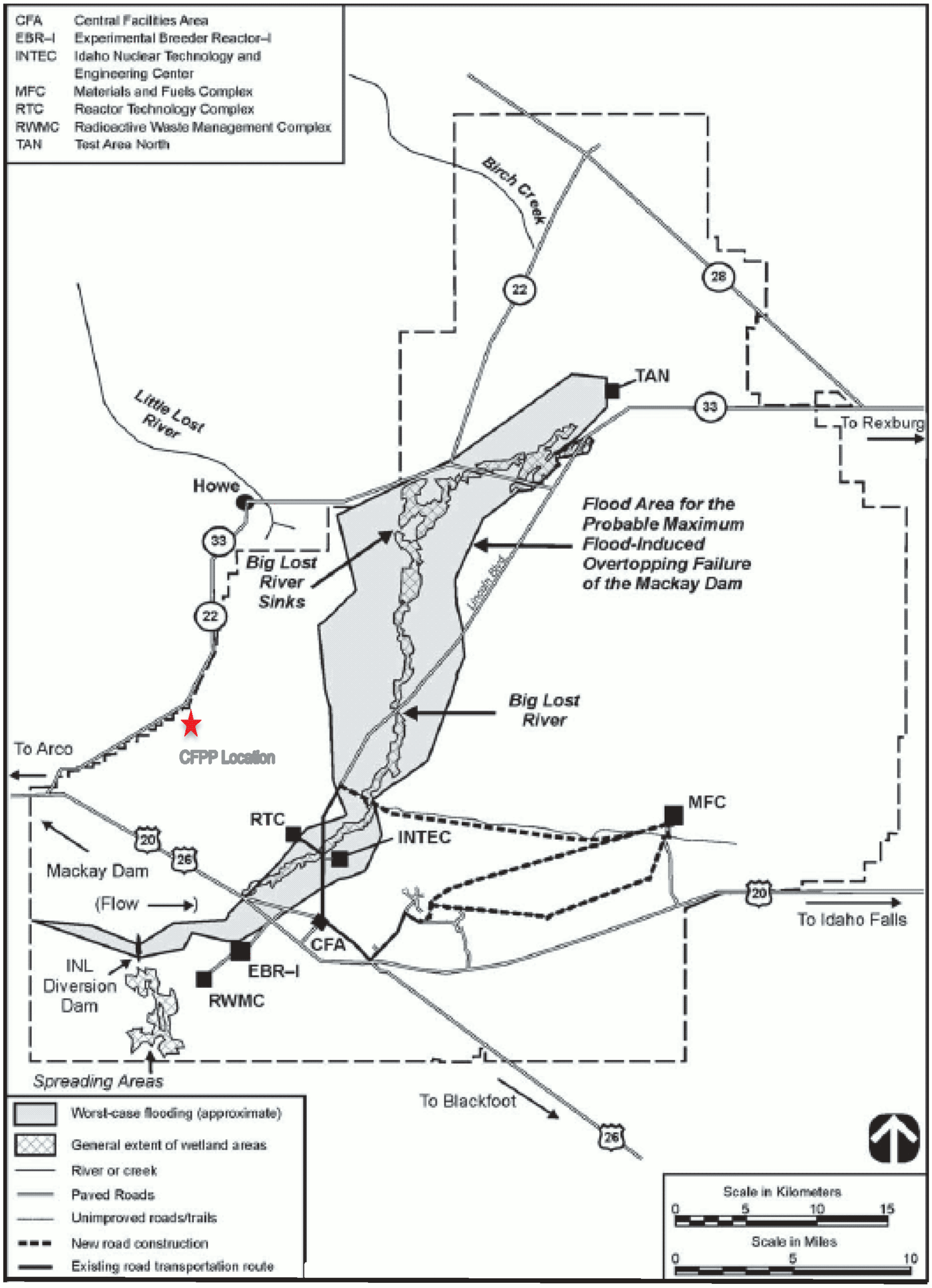


Figure 2.1-19: CFPP Regional Geologic Aspects and Unique Geology

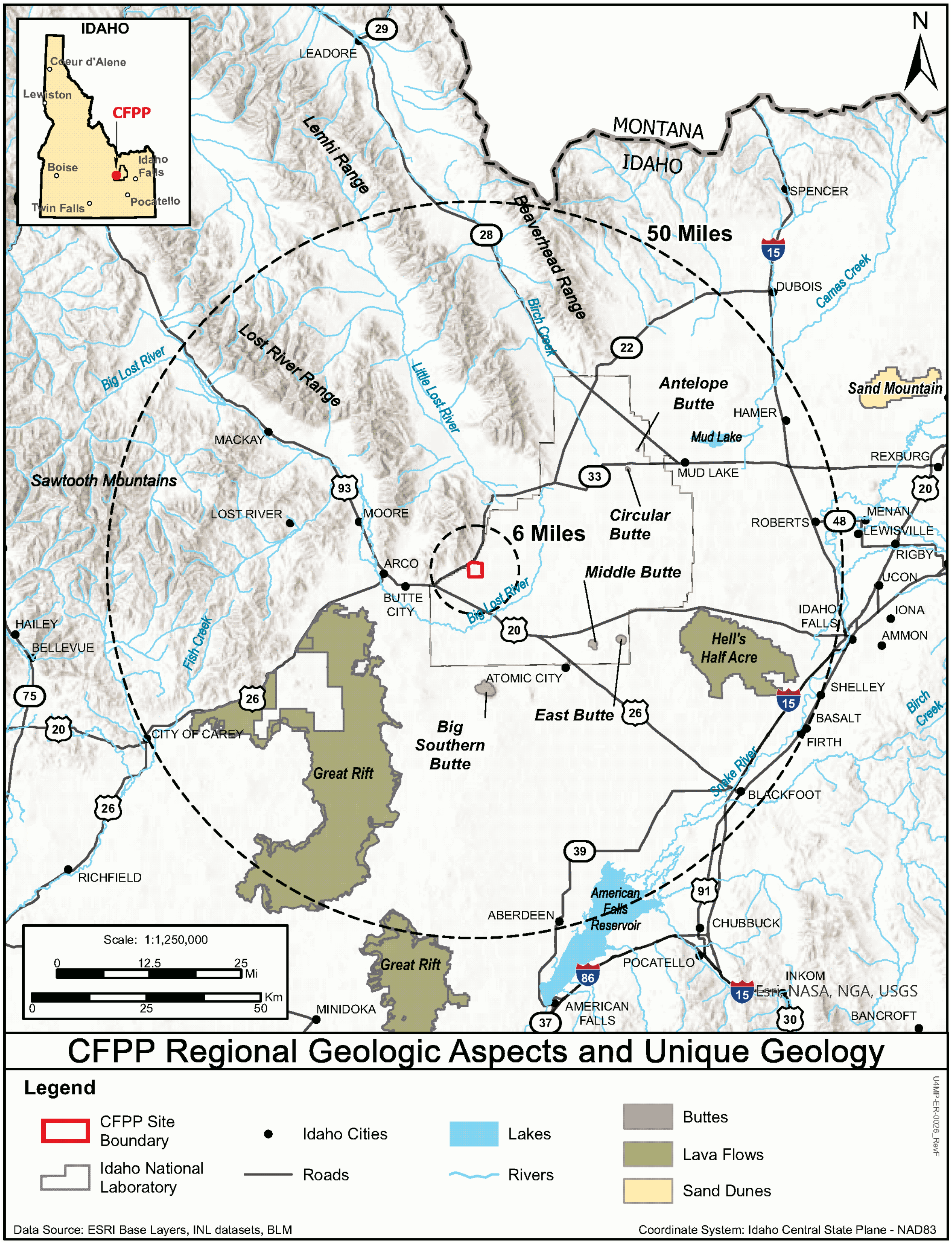


Figure 2.1-20: CFPP Regional Geologic Provinces

Figure 2.1-21: CFPP Site Soils

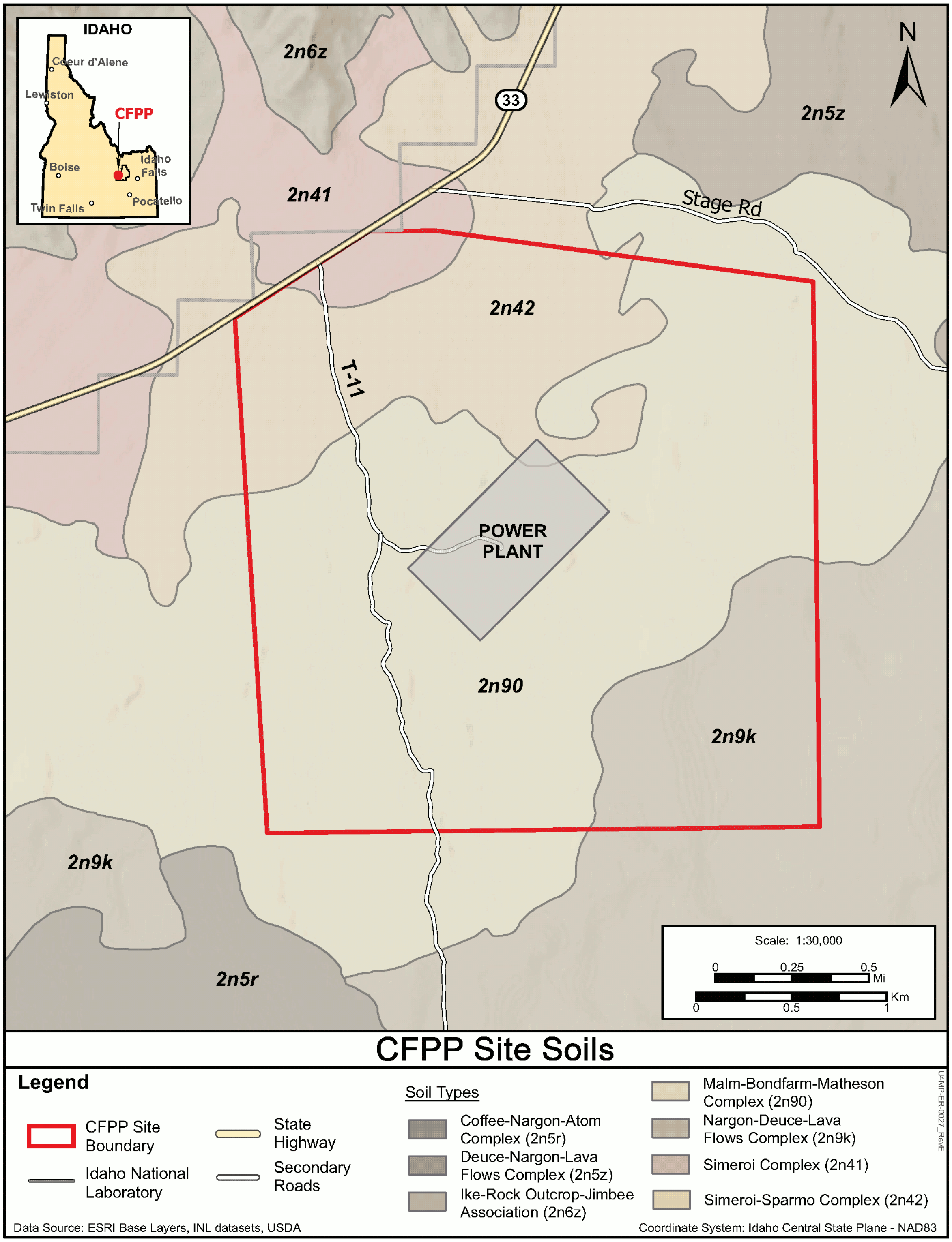
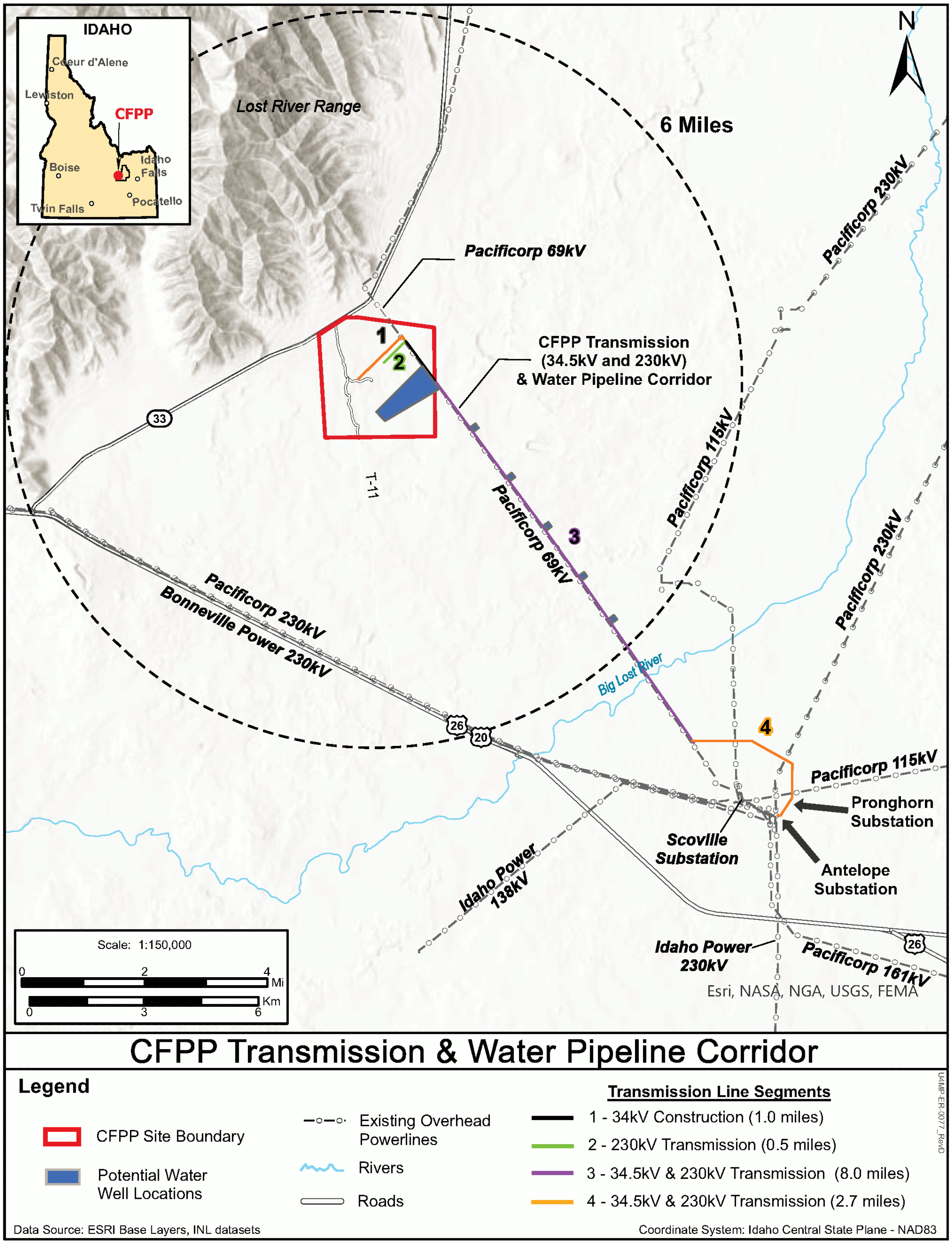


Figure 2.1-22: CFPP Transmission and Water Supply Pipeline Corridor



The water pipeline corridor, located within the transmission corridor, extends from the CFPP plant to no further than the last well location near the 6-mile radius as described in Table 2.1-9.

Figure 2.1-23a: CFPP Transmission Corridor - Land Cover, Part 1

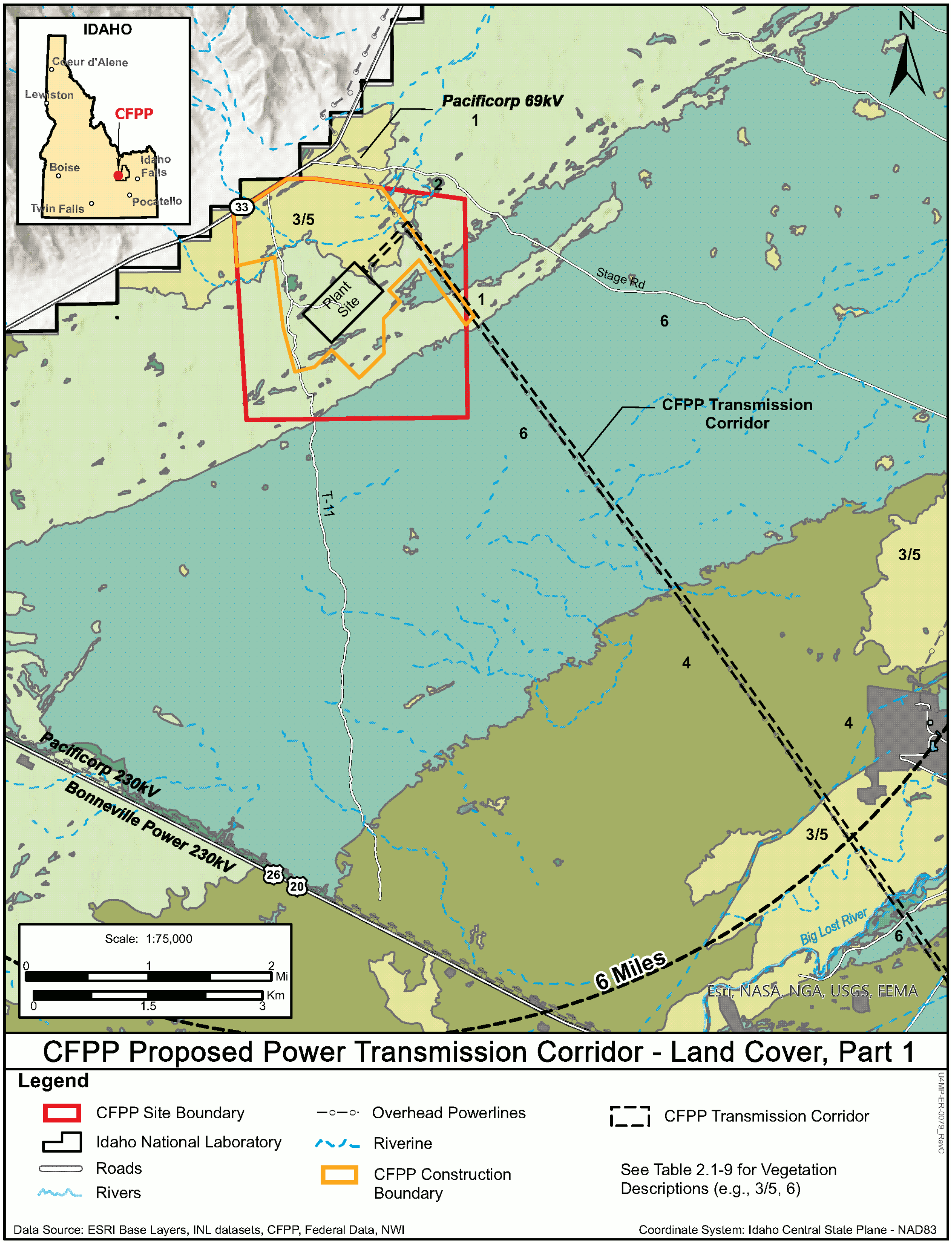
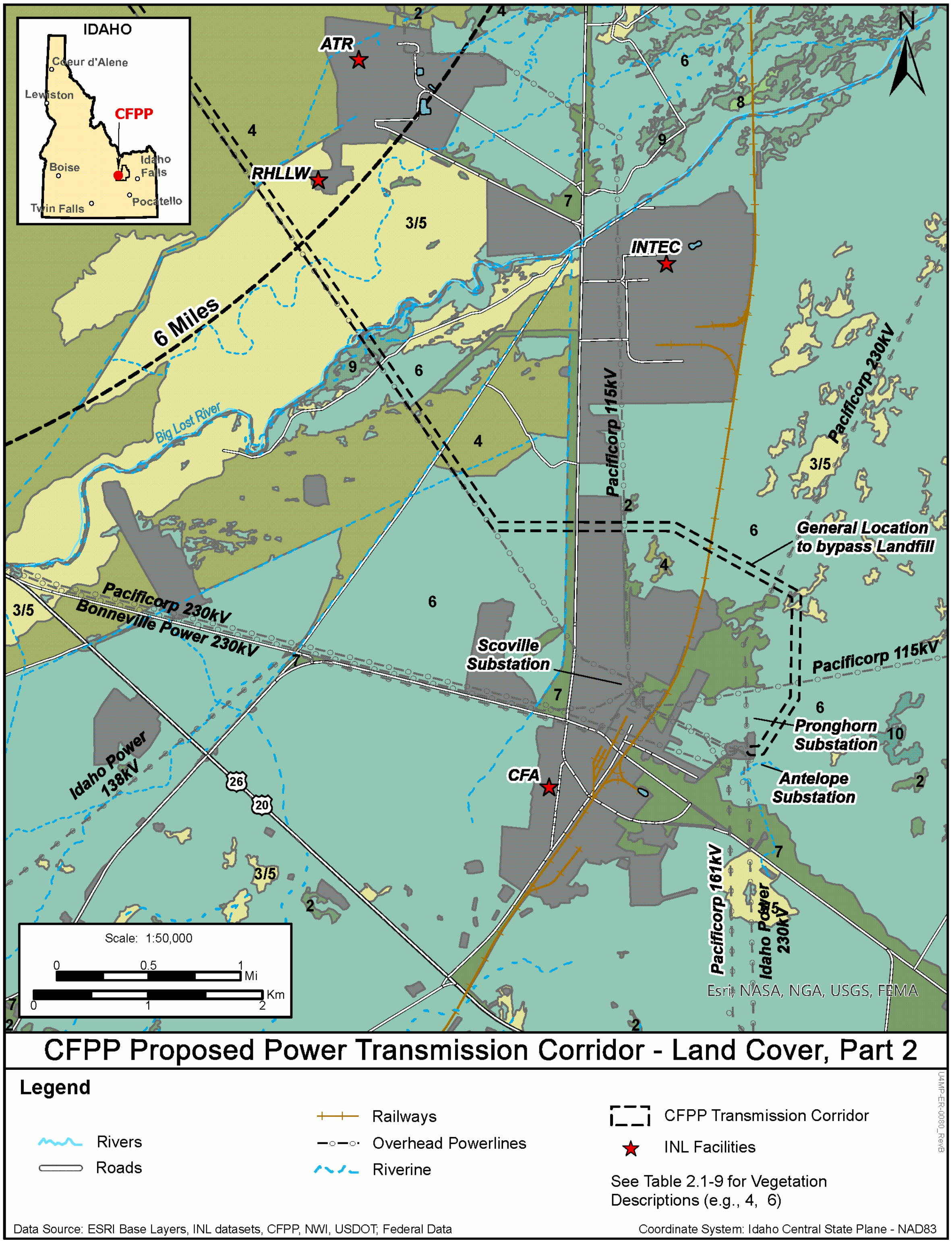


Figure 2.1-23b: CFPP Transmission Corridor - Land Cover, Part 2



2.2 Water Resources (Surface and Groundwater)

Consistent with NRC Regulatory Guide 4.2, Revision 3, this section provides site-specific and regional descriptions of the hydrology, water use, and water quality conditions in the area of the CFPP site at the INL. The CFPP site lies on the west-northwest side of the INL (Figure 2.1-20 and Figure 2.2-1).

The CFPP site lies within the Snake River Plain (SRP), specifically the Eastern Snake River Plain (ESRP) basin (Figure 2.2-1), which is underlain by the ESRP aquifer. The Snake River is the largest tributary of the Columbia River (Reference 2.2-1). The ESRP aquifer is one of the largest and most productive aquifers in the United States (Reference 2.2-2). The U.S. Environmental Protection Agency (EPA) classifies the ESRP aquifer as a sole-source aquifer (Reference 2.2-3). From a surface water perspective, however, the CFPP site lies with the Big Lost River drainage basin.

The detailed overview of the surface water and groundwater resources in the region surrounding the CFPP site are in the following sections of the LWA ER:

- Hydrology - Section 2.2.1
- Water use - Section 2.2.2
- Water quality - Section 2.2.3
- Water monitoring - Section 2.2.4

The potential impacts of plant preconstruction and construction activities on surface water and groundwater are discussed in LWA ER Section 4.2.

2.2.1 Hydrology

This section describes surface water and groundwater hydrologic characteristics that could potentially impact or be affected by the construction and operation of the NuScale US460 Power Plant at the CFPP. The site-specific and regional data on the physical and hydrologic characteristics are also summarized to provide the basis for an evaluation of impacts on water bodies, aquifers, aquatic ecosystems, and social and economic structures of the area.

2.2.1.1 Surface Water

2.2.1.1.1 Snake River Plain

Figure 2.2-2 presents an outline of the ESRP and tributary watersheds.

The primary water body within the SRP is the Snake River, which is more than 1000 miles long (Reference 2.2-1). The Snake River begins in Yellowstone Park, Wyoming and drains portions of western Wyoming, southern Idaho, northeastern Nevada, and eastern Oregon before it reaches a confluence with the Columbia River near Pasco, Washington.

The upper headwaters of the Snake River are comprised of three main branches, which are the Teton River, Henrys Fork, and the South Fork of the Snake River. The South Fork of the Snake River originates in the southeastern corner of Yellowstone National Park in Wyoming. It then flows southward through the Jackson Lake Reservoir, past Jackson, Wyoming, enters the Palisades Reservoir on the Wyoming-Idaho border, and then flows northwestward into the ESRP (Figure 2.2-1 and Figure 2.2-2). Henrys Fork is the second largest branch of the Snake River and originates from Henrys Lake on the Montana-Idaho border. It then flows southward through the Island Park Reservoir toward Rexburg, Idaho (Figure 2.2-2). The Teton River flows into the Henrys Fork near the town of Rexburg. Henrys Fork ultimately flows into the South Fork of the Snake River to form the main stem of the Snake River near Menan, Idaho.

From Menan, the Snake River flows southwest past Idaho Falls and Blackfoot before flowing into the American Falls Reservoir. The reservoir is formed from a dam on the Snake River near the town of American Falls. After exiting the reservoir, the river begins to flow westerly past the towns of Burley, Twin Falls, and Buhl, Idaho. The elevation of the Snake River where the main stem begins near Menan is approximately 4806 feet (ft) above mean sea level (amsl) North American Vertical Datum 1988 (NAVD88) and approximately 2474 ft amsl at Buhl, Idaho for a total drop of 2332 ft over a distance of approximately 200 miles.

Salmon Falls Creek flows into the Snake River west of Buhl and the stretch of the river from that point to King Hill is considered to be the division between the ESRP and the Western SRP (WSRP) (Reference 2.2-4 and Reference 2.2-5). This reach of the Snake River receives large flows of groundwater from Thousand Springs, Niagara Springs, Box Canyon Springs, Blue Heart Springs, and other springs (Reference 2.2-5, Reference 2.2-6, and Reference 2.2-7).

The break between the ESRP and WSRP is mainly due to a difference in hydrogeologic conditions (Reference 2.2-4). The ESRP is characterized mainly by Pliocene and younger basaltic rocks with some overlying and interbedded unconsolidated deposits. The WSRP aquifer system consists primarily of unconsolidated deposits with some Pliocene and younger basaltic rocks (Reference 2.2-2).

The ESRP is surrounded on the northwest, northeast, and southeast sides by mountain ranges and intermontane valleys. Significant amounts of runoff and snowmelt from these areas enter the ESRP and are tributaries to the Snake River and subsequently recharge the ESRP aquifer. Major tributary streams on the southeast side of the ESRP include Willow Creek, the Blackfoot River, the Portneuf River, Bannock Creek, and the Raft River (Figure 2.2-2). These streams flow directly into the Snake River.

Streams discharging from mountain valleys on the northwest side of the ESRP, within the vicinity of the CFPP, exhibit a different behavior. Five intermontane valleys to the northwest of the ESRP drain into enclosed basins; the Big Lost River, Little Lost River, Birch Creek, Medicine Lodge Creek, and Beaver-Camas Creek (Figure 2.2-3). The Big Lost River, Little Lost River, and Birch Creek flow south-southeast from the mountains and enter the Lost River Basin, also called the Big Lost Trough (Figure 2.2-4). Camas Creek (including the creek's primary tributary, Beaver Creek) and Medicine Lodge Creek flow south from the Centennial and Beaverhead Mountains, respectively, and flow into internally-drained Mud Lake (Figure 2.2-3).

2.2.1.1.2 Big Lost River Watershed

The CFPP site is contained within the Big Lost River watershed (Figure 2.2-3). The watershed lies upstream of the CFPP site (Figure 2.2-3). The watershed is bound by the White Knob and Pioneer Mountains to the west and the Lost River Range to the northeast (Figure 2.2-4). Hydrologically, the flow in the Big Lost River is affected spatially and temporally by geology, variations in annual snowpack accumulation and melting, variations in annual rainfall, seasonal demands for irrigation water and diversions, and exchange of water between surface water and groundwater within the watershed. The U.S. Geological Survey (USGS), the Idaho Department of Water Resources (IDWR), and the Idaho Geological Survey recently (2018 to 2023) performed extensive studies of the hydrology of surface water and groundwater in the Big Lost River watershed (Reference 2.2-8, Reference 2.2-9, and Reference 2.2-10). Surface water and groundwater resources are intimately interconnected in this watershed, and the water flow and availability are heavily affected by resource management for irrigated agriculture and other uses in the watershed.

The Big Lost River drains a total area of 1867 square miles (mi^2). Approximately 813 mi^2 drains into the Mackey Reservoir (upstream of USGS gaging station 13127000, Figure 2.2-5), which is formed behind an earth- and rock-filled dam constructed by the Utah Construction Company in 1917 and 1918 and sold to the Big Lost River Irrigation District in 1936. The U.S. Bureau of Reclamation raised the crest of the spillway five feet in September 1956. Current maximum storage at the crest of the spillway is 44,370 acre-ft (between gage heights of 7.0 ft and 66.5 ft). Water is retained in the reservoir in fall and winter and used to help supply irrigation water to approximately 33,000 acres in the Big Lost River Irrigation District. In addition, approximately 12,700 acres are irrigated from the Big Lost River and tributaries above the Mackay Reservoir by surface diversions. A maximum reservoir discharge of 2990 cubic feet per second (cfs) was recorded on June 10, 1921 and June 6, 1986 (Reference 2.2-11).

After the Mackay Reservoir, the Big Lost River continues southeastward for approximately 30 miles to Arco, passing Antelope Creek and Darlington Sinks to Arco, where at that point, the river drains 1410 mi^2 (Reference 2.2-12). The

Big Lost River continues to Box Canyon, a deep, narrow gorge with nearly vertical walls cut into basalt and flows through an alluvial channel before entering the INL site. The INL constructed a flood-control diversion structure on its property in 1958 to reduce the threat of flooding by routing stream flow to a series of interconnected spreading basins. The Big Lost River flows northward downstream from the INL diversion dam for approximately 18 miles to the Big Lost River Sinks and terminates in a series of interconnected playas where the surface water is lost to evaporation or percolates into the subsurface and recharges the ESRP aquifer (Reference 2.2-12).

Several flood studies have been conducted to calculate the potential magnitude of a 100-year flood for the Big Lost River at the Arco gaging station (Reference 2.2-49). The newest estimate of the 100-year flood magnitude is 3070 cfs (Reference 2.2-50). The maximum historic discharge recorded at Arco is approximately 2500 cfs, which occurred on June 29, 1965 (Reference 2.2-11). A 2005 study (Reference 2.2-51) examined the potential flooding effects caused by a probable maximum flood and overtopping or failure of the Mackay Dam. As shown in Figure 2.1-18, this hypothetical flood model indicated impacts to the CFPP site are unlikely to occur. Another assessment of potential flooding evaluated failure of the Mackay Dam from a probable maximum flood and other flood scenarios, including failure of INL's diversion dam (Reference 2.2-52). This study yielded a peak river flow of 66,830 cfs and a peak water elevation of 4917 ft amsl at the Idaho Nuclear Technical and Engineering Center (INTEC) (Reference 2.2-52). The CFPP site elevation ranges from 5020 to 5180 ft amsl indicating flooding under this scenario is also unlikely to cause impacts.

Riverine flooding has occurred along Birch Creek near Test Area North (TAN) localized as a result of ice jams. In 1969, because of concern for ice-jam related flooding, the INL constructed channels and began diverting Birch Creek to several gravel pits east of TAN (Figure 2.2-4). Most of the flows are lost to seepage in the lower portions of Birch Creek Valley before flowing onto the INL site. However, Birch Creek does flow onto INL during high water years and can negatively impact several TAN facilities if not diverted, especially when severe icing occurs in the channel (Reference 2.2-49).

A search of ice jams occurring on Big Lost River (Reference 2.2-13) yielded one incident. A freeze-up type ice jam caused local flooding approximately 4.5 miles upstream of Arco in January 2019. No information was available on the extent or duration of flooding. Another incident occurred on Antelope Creek further upstream.

2.2.1.1.3 Unnamed Local Drainage Area

The local unnamed drainage area, occurring within and uphill of the CFPP site, is shown in Figure 2.2-6. This watershed area includes hillslopes and ravines to the north and northwest of Highway 33, which drain southward, pass under State Highway 33, drain northeast through the CFPP site, and then drain to the north. The dry channel eventually ends and surface water that flows through the channels ultimately evaporates or recharges the ESRP aquifer. Small amounts of water have occasionally been observed ponded in these dry washes, however, no surface water has been observed actively flowing in the channel.

2.2.1.2 Groundwater

The regional, local, and site-specific data on the physical and hydrologic characteristics of the groundwater resources are summarized in this section to provide the basic data for an evaluation of impacts to the ESRP aquifer.

The CFPP site is situated within the larger SRP in southern Idaho, which is a structural basin expressed on the surface as a crescent-shaped topographic depression extending in an east-west direction across Idaho and into eastern Oregon (Figure 2.2-1). The SRP is divided into the WSRP and ESRP and the approximate divide is a segment of the Snake River from Salmon Creek to the town of King Hill. The CFPP site is located within the ESRP and underlain by the ESRP aquifer (Reference 2.2-2).

The ESRP aquifer is designated by EPA as a "Sole Source Aquifer" (Reference 2.2-3 and Reference 2.2-14) and an important resource for the State of Idaho because it supplies water for industry, irrigates approximately 900,000 acres of farmland (Figure 2.2-7), and is the sole source of drinking water for approximately 200,000 people (Reference 2.2-14). The aquifer is extensive in area (approximately 10,810 mi^2) and annually discharges nearly 2.6 trillion gallons of water to the Snake River (Reference 2.2-14). The ability to supply these large quantities of water makes it one of the most productive aquifers in the nation.

2.2.1.2.1 Geology

The ESRP formed as the crust moved over the stationary Yellowstone Hotspot and was subjected to continuing basaltic volcanism and subsidence (Reference 2.2-15) resulting from emplacement of a dense, mid-crustal sill (Reference 2.2-16). Interbedded eolian and terrestrial sediments and Pleistocene to late Pliocene basalt filled the ESRP basin as it subsided (Reference 2.2-2). While there are some mapped faults along the northwest edge of the ESRP (Figure 2.2-8 and Figure 2.2-9), the rocks are primarily steeply dipping as the result of structural downwarp (Reference 2.2-17).

Figure 2.2-9 presents a generalized cross-section of the ESRP in the vicinity of the CFPP site. A thick sequence (>20,000 ft) of Tertiary and Quaternary volcanic rocks are deposited on Paleozoic sedimentary rocks. The oldest volcanic rocks are the Miocene-age (10.2 to 7.7 mega-annum [Ma]) Picabo Group rhyolitic ignimbrite, which are estimated to be approximately 16,000 to 20,000 ft thick. Overlying the Picabo Group are Heise Group rhyolitic ignimbrites (6.66 to 4.5 Ma), including the Blacktail Creek ignimbrite and

Walcott Tuff, which are approximately 1600 ft thick (Figure 2.2-9). Overlying the Heise Group is a series of interbedded eolian and terrestrial sediments and Pleistocene to late Pliocene basalts. The cumulative thickness of the post-Miocene basalt deposits across the ESRP is shown in Figure 2.2-9 and Figure 2.2-10. The basalt ranges from minimal thickness near the edges of the ESRP to more than 5000 ft thick southwest of the CFPP site.

The basalt deposits of the ESRP can be divided into two main geologic groups (Figure 2.2-11); the Snake River Group (Pleistocene and lower Holocene age), which is the most extensive basalt rock group in the ESRP, and the underlying Idaho Group (Pliocene and lower Pleistocene age) (Reference 2.2-2 and Reference 2.2-5). The ESRP aquifer includes the Snake River Group and the upper part of the Idaho Group basalts (Bruneau Formation), and intervening and adjacent sediment layers (Reference 2.2-2 and Reference 2.2-5). The upper basalts included in the aquifer tend to be fresh to slightly altered, more fractured, and more permeable than the older (Pliocene age, > 1.8 Ma) basalts. The aquifer does not include the older Pliocene age Idaho Group basalts (Glenns Ferry equivalent, > 1.8 Ma) or the underlying rhyolite deposits. The older basalts tend to be deeper, hydrothermally altered, and more mineralized (Reference 2.2-18 and Reference 2.2-19). The hydraulic conductivities of these rock units are generally much smaller than the overlying basalts.

The thickness, particle-size distribution, degree of cementation, and hydraulic conductivity of sediment layers in the ESRP aquifer are highly variable. Sediments range from calcareous silty clay playa and lacustrine deposits, to silty-fine sand eolian deposits, to coarse sand, gravel, and boulder alluvium and alluvial fan deposits (Reference 2.2-5, Reference 2.2-8, Reference 2.2-17, and Reference 2.2-20). The sediments range in age from Pliocene to Holocene and are ubiquitous throughout the ESRP. Sediments in the INL area originated from alluvium and glacial outwash sourced from intermontane valleys to the north. Sediment layers at the foot of the mountains (in the immediate vicinity of the CFPP site) are likely to have originated as colluvium, landslides, and alluvial fans associated with the Lost River Range. As a result, the sedimentary units tend to be thicker and much coarser in the intermontane valleys (e.g., Big Lost River and Little Lost River valleys), and along the foot of the mountain ranges (Reference 2.2-5, Reference 2.2-8, Reference 2.2-17, and Reference 2.2-20). The sediment deposits tend to be thinner and finer grained toward the central axis of the ESRP.

2.2.1.2.2 Aquifer Thickness

The ESRP aquifer is considered to be an unconfined or water-table aquifer. However, some of the fine-grained sediment interbeds and massive unfractured basalt flows can act as horizontal or near-horizontal aquitards within the aquifer and partially retard vertical movement of groundwater. These localized aquitard units and small perched groundwater zones have been documented in many places on the INL site, especially where wastewater ponding, recharge basins, or shallow wastewater injection have locally increased the rate of near-surface groundwater recharge (Reference 2.2-21 and Reference 2.2-22).

Concerted efforts to define the full horizontal and vertical extent of the ESRP aquifer date to the late 1970s, to initiation of the USGS Regional Aquifer System Analysis (RASA) Program (Reference 2.2-2 and Reference 2.2-4). As part of the RASA Program, the USGS published a series of regional-scale maps of the ESRP aquifer, based largely on an isopach map of Quaternary basalt and interbedded sediments interpreted from electrical resistivity and magnetic data coupled with information from a limited number of deep boreholes. A regional low-resistivity layer corresponds to freshwater-saturated Quaternary basalts and underlying sediments. The USGS used the resistivity data along with water well data to define regional aquifer thicknesses. The RASA Program maps (Figure 2.2-10 and Figure 2.2-11), indicate a saturated aquifer thickness of less than 500 ft at the CFPP site with a thickening in a southwesterly direction across the INL site to more than 2500 ft near the central axis of the ESRP aquifer.

More recently, Smith (Reference 2.2-23) estimated the aquifer thicknesses in the ESRP based on decreases in hydraulic conductivity interpreted from deep pump test data in the sediments underlying the basalts (Reference 2.2-24) and interpretations of aquifer temperature profiles in wells. Based on those interpretations, Smith (Reference 2.2-23) conservatively estimated that the thickness of the ESRP aquifer ranges from less than approximately 330 ft to no more than approximately 1300 ft beneath the INL site.

The USGS monitoring wells USGS 142 and USGS 142A are located approximately 1.7 miles east of the CFPP site and approximately the same distance from the edge of the ESRP as is the CFPP site (Figure 2.2-8). They are the INL geological investigation borings located closest to the CFPP site. Separated laterally by approximately 30 ft, USGS 142 and 142A were drilled to depths of 1880 and 560 ft below ground surface (bgs), respectively (Reference 2.2-17). Basalt flows comprise most of the uppermost portion of USGS 142 to a depth of 830 ft bgs, including 45 basalt flows and 16 sediment interbeds. It then penetrated 566 ft of mostly calcareous fine-grained lacustrine and playa deposits, with a few basalt flows (Reference 2.2-17). The uppermost 830 ft of strata above the playa/lacustrine deposits are considered to be part of the ESRP aquifer. Based on boreholes B-41, B-01, and B-47 at the CFPP site, the total ESRP aquifer thickness ranges from 671.3 ft (B-41) to 772.6 ft (B-47), from north to south. As shown in Figure 2.2-10, the aquifer thickness increases to the south and southwest of the CFPP site.

Only the lowermost 90 to 140 ft of the ESRP water table aquifer is saturated at the CFPP site. The upper 540 to 660 ft of the aquifer is unsaturated. At USGS 142, the saturated thickness was interpreted to be approximately 299 ft (Reference 2.2-17). At INEL-1, the saturated aquifer thickness is approximately 660 ft (Reference 2.2-23). Thus, the saturated aquifer thickness increases toward the central axis of the ESRP (south and southwest of the CFPP site), as shown in Figure 2.2-10.

2.2.1.2.3 Groundwater Flow

The USGS developed a water-table map for the ESRP aquifer in 1980 that incorporated hundreds of water level measurements (Figure 2.2-12). The 1980 map is based on their most comprehensive set of water level measurements. However, the USGS continues to monitor water levels throughout the INL and surrounding areas. The highest water table elevation measured in 1980 was approximately 6200 ft amsl in the northeast corner and decreased to approximately 3000 ft amsl to the southwest near the Thousand Springs area for a hydraulic potential loss of 3200 ft. The water table drops from approximately 4600 ft to 4400 ft across the INL site. Arrows depicting interpreted regional groundwater flow direction (northeast to west-southwest) are shown on Figure 2.2-12.

To understand the CFPP site-specific groundwater flow patterns, 10 monitoring wells were installed to depths ranging from approximately 653 to 725 ft bgs. The locations are shown on Figure 2.2-13. The measured depth to groundwater in these wells in November 2022 ranged from 546.64 to 658.92 ft below top of riser pipe (Table 2.2-1). The groundwater elevations at the CFPP site in November 2022 ranged from 4515 ft amsl on the north side to 4460 ft amsl on the south side (Figure 2.2-13). The elevations at MW-06 and MW-07 on the northern and northwestern sides of the CFPP site are approximately 45 to 55 ft higher than those measured in the other eight wells. Thus, flow direction is from the northwest to southeast. These on-site elevations and flow directions are consistent with the regional water-table maps generated by the USGS (Reference 2.2-5 and Reference 2.2-6).

Groundwater elevations measured in CFPP wells, in November 2022 and groundwater elevations measured by the USGS and IDWR in 2022 and 2023 have been used to develop a more up-to-date regional water-table map (Figure 2.2-14). The water levels in most wells decreased between 1980 and 2023 so the contours have shifted slighly northward in Figure 2.2-14 when compared to Figure 2.2-12. As shown in Figure 2.2-13 and Figure 2.2-14, groundwater flow is southeast from the Lost River Range, through the CFPP site. Flow direction then shifts southward and then southwest.

Groundwater elevations were measured automatically in the 10 wells at the CFPP site using pressure sensors for 1 year (March 2022 to March 2023) and compared to hydrographs of 3 nearby USGS wells (Figure 2.2-15). The highest elevations measured at the CFPP site were recorded in MW-06, located near the north end of the site. MW-06 elevations ranged from 4514.14 to 4515.53 ft amsl (Table 2.2-1). The second highest groundwater elevations at the site were measured in MW-07, which are approximately 9 ft lower than MW-06 throughout the monitoring period. The other eight CFPP monitoring wells, located south and southeast of MW-07, have groundwater elevations ranging from 4460 to 4463.5 ft amsl (Table 2.2-1, Figure 2.2-16), which are approximately 43 ft lower than MW-06 elevations. The elevations in the eight southern wells are very similar to each other and it is interpreted that the water-table surface is relatively flat across the central and southern portions of the CFPP site. However, there is a steep hydraulic gradient that exists on the north-northwest side of the site between wells MW-06 and MW-08A, as depicted in Figure 2.2-13.

As shown in Figure 2.2-15, there appears to be little variation in elevations within each well over the course of one year. However, on closer inspection, there is a drop of approximately 1.5 ft for each CFPP well between March 2022 and March 2023 (Figure 2.2-16). Short-term variations observed in the water levels occur simultaneously throughout the group of wells. There are no apparent seasonal trends in the water-table elevations, which is atypical for groundwater aquifers. The overall long-term changes in water levels are small over time (about 1.5 ft per year) and short-term fluctuations are very small. The measured fluctuations in the water-table surface at a depth of 600 ft do not cause instability in the overlying bedrock.

Water levels have been measured in USGS 22 since 1951, in USGS 142 since 2015, and in USGS 145 since 2019. Figure 2.2-17 presents hydrographs of these three wells from 1995 to 2023. Although there was a general rise in the USGS 22 water level in 1999 and 2018, there was an overall drop of 9 ft in the groundwater level over this 28-year time period. Water levels in USGS 142 water level have dropped 30 ft since 2015 while levels in USGS 145 have dropped 4 ft since 2019. The general consensus is that water levels throughout the ESRP aquifer have been declining slowly over time, because of overpumping and recent drought conditions (Reference 2.2-7).

Hydraulic gradients are variable across the ESRP aquifer. Horizontal hydraulic gradients are steepest in the northeast portion, along the southwest side of the Mud Lake recharge area, near the southwest corner of the INL site, and the near the Thousand Springs discharge area where the ESRP aquifer terminates (Figure 2.4-13). The horizontal gradients are less steep (approximately 0.0009 to 0.0012 ft/ft) directly beneath the INL site and extending to the Snake River southeast of the INL site. At the CFPP site, the hydraulic gradient between wells MW-06 and PW-01 is approximately 0.016 ft/ft. However, the gradient is less than 0.001 in the southern portion of the site away from the mountains.

2.2.1.2.4 Aquifer Properties

Most wells on the INL site are shallow water-supply wells or groundwater monitoring wells that extend less than 200 feet into the saturated basalt aquifer (Reference 2.2-6 and Reference 2.2-23). Therefore, the characteristics of the shallow aquifer are better known than at greater depths. Based on single-well pumping tests in 114 wells, the effective hydraulic conductivity (K) of basalt and interbedded sediments that compose the ESRP aquifer at and near the INL site ranges from approximately 0.01 to 32,000 ft/day (Reference 2.2-20). K values of six wells tested at the CFPP Site range from 6.3 to 647 ft/day. Thus, there is lateral and vertical variability within the aquifer. Anderson et al. (Reference 2.2-20) state that "hydraulic conductivity varies as much as six orders of magnitude in a single vent corridor and varies from three to five orders of magnitude within distances of 500 to 1000 ft." This variability is consistent with what was measured at the CFPP and the INL sites.

Specific capacity is a measure of how much sustained flow rate a well can produce divided by the amount of water level drawdown that results. Five of the six CFPP wells tested have four-inch diameter screens; their specific capacities ranged from 1.64 to 22.6 gallons per minute (gpm)/ft of drawdown. PW-01 has a six-inch diameter screen and had a much higher specific capacity (113 gpm/ft of drawdown). It produced 203 gpm with only 1.79 ft of drawdown.

In many places (especially in the INL waste disposal areas), sediment interbeds are fine to medium grained and often partially indurated. The K values of these minor units, in general, are less than the basalt flows, and can thereby create perched zones within the aquifer (Reference 2.2-21 and Reference 2.2-22). However, some studies state that groundwater wells that intercept thick, coarse sediment (sand, gravel, boulder) zones near the edges of the ESRP may have relatively large K values, nearly equivalent to wells intercepting fractured basalts. Eleven wells having abundant sediment (20 to 50 percent sediment) on or near the INL site have K values ranging from 280 to 6500 ft/day (median = 2300 ft/day). Of these 11 wells, 5 are located near Big Lost River near INTEC and Reactor Test Complex (RTC), and 1 groundwater well penetrated through alluvial fans adjacent to the Lost River Range (Reference 2.2-20).

Porosity values for the ESRP basalts generally range from 0.05 to 0.27 while porosity in the sediment layers and interbeds are higher and range from 0.35 to 0.63 (Reference 2.2-6).

2.2.1.2.5 Conceptual Groundwater Budget

Conceptual and numerical groundwater flow models have been developed and calibrated by the USGS for a portion of the ESRP aquifer beneath and adjacent to the INL site (Reference 2.2-5 and Reference 2.2-6). The model area extends from the Mud Lake area on the northeast to Craters of the Moon National Monument to the southwest, and includes the entire CFPP site (Figure 2.2-18). A conceptual steady-state water budget was developed for the model area and used as input for the numerical model. A diagram of the model area and schematic for inflows and outflows are presented in Figure 2.2-18.

The total estimated inflow to the model area in 1980 was 2239 cfs. The largest sources of water entering the model domain enter via:

- Big Lost River underflow (16 percent),
- Little Lost River underflow (10 percent),
- Birch Creek underflow (5 percent), and
- northeast regional underflow (i.e., Mud Lake and Terreton areas) (55 percent).

For the model area, the underflow accounts for 86 percent of the total water entering the domain.

The other sources of water entering the domain include:

- direct rainfall infiltration (3 percent),
- infiltration of surface water from Big Lost River (4 percent),
- irrigation infiltration (1 percent),
- industrial wastewater infiltration (<1 percent),
- upflow from base of aquifer (2 percent), and
- net change in storage (4 percent).

The rate of water entering the model domain from the surface (precipitation, Big Lost River infiltration, irrigation, industrial wastewater) is 9 percent of the total. Far more (86 percent of total) is entering laterally via underflow from the northwest and northeast edges of the model domain.

The sources of water entering the ESRP aquifer have some differences in their water chemistry. As the different waters enter the aquifer, they flow downgradient with some advective mixing. The groundwater in the aquifer has been chemically divided by the USGS into different regions, which are associated with their primary recharge sources (Reference 2.2-25).

Although listed as a possible source of recharge to the aquifer, underflow from the base of the mountain ranges (particularly the Lost River Range, Lehmi Range, and Pioneer Mountains) were estimated to be zero for purposes of modeling (Reference 2.2-5 and Reference 2.2-6). However, the mountain ranges very likely do supply some underflow into the ESRP aquifer (Reference 2.2-25 and Reference 2.2-26) as is evidenced by the observed groundwater levels at the CFPP site (Figure 2.2-13 and Figure 2.2-14). Based on the water-table contours groundwater flow is flowing from the mountains, under the site, and then to the southeast.

Since the CFPP site is located so close to the carbonate rocks and southeastern base of the Lost River Range (Figure 2.2-8), underflow emanating from the Lost River Range should influence the chemistry of groundwater in the immediate area (Reference 2.2-25).

According to Ackerman et al. (Reference 2.2-5 and Reference 2.2-6), approximately 98 percent of discharge from the aquifer occurs as underflow along the southwestern model boundary (Figure 2.2-18) and ultimately discharges to the Snake River near Twin Falls and Thousand Springs reach of the Snake River (Figure 2.2-13). As stated previously, the southwest side of the ESRP aquifer discharges an average of approximately 2.6 trillion gallons of water each year to the Snake River.

2.2.2 Water Use

This section describes surface water and groundwater uses that could affect or be affected by the construction and operation of the NuScale US460 Power Plant at the CFPP site. Consumptive water uses of the region are identified, and water diversions, withdrawals, consumption, and returns are quantified.

The SRP spans most of southern Idaho, which consists of the majority Idaho's population and agricultural production. The dominant use of surface water and groundwater throughout the ESRP and adjacent tributary valleys is irrigation, which is vital to agriculture and ranching. Idaho ranked first among states in terms of surface water withdrawals (10,400 million gallons per day) and fourth in groundwater withdrawals (4900 million gallons per day) used for irrigation in 2015 (Reference 2.2-27). As shown in Figure 2.1-15, Figure 2.2-7, and Figure 2.2-13, significant land areas in the Big Lost River Valley, Little Lost River Valley, Mud Lake region, and along the Snake River are irrigated, totaling more than 900,000 acres of farmland. In the ESRP, approximately 60 percent of water used for irrigation is obtained from surface water sources and 40 percent is obtained from the ESRP aquifer (Reference 2.2-28).

Water is the primary limiting factor for agricultural production in the ESRP. A large portion of the land with soils suitable for agricultural production is not used because of insufficient water supply or water rights restrictions (Reference 2.2-28). The most profitable crops grown in the region can be grown only with irrigation, including grain corn, beans, and potatoes. Dryland agriculture is feasible in some areas for wheat, alfalfa, and pasture. However, yields for these crops are much higher with irrigation. For example, average yield for dryland alfalfa hay was 3.14 metric tons/hectare (ha) in 2012 compared to 10.31 metric tons/ha when irrigated (Reference 2.2-28).

2.2.2.1 Surface Water Use

Figure 2.2-7 and Figure 2.2-13 depict extensive irrigated land areas around Arco, Howe, Monteview, Mud Lake, Tarreton, and the Snake River. It is estimated that 60 percent of the water used for irrigation is diverted from streams and the Snake River.

In the Big Lost River valley, approximately 57,500 acres of farmland are irrigated (Table 2.2-2). Of this amount, 49,000 acres (85 percent) are irrigated with surface water diversions from the Big Lost River, its tributaries, and Mackay Reservoir. The Big Lost River and its tributaries are also the primary source of water for livestock on grazing land. As a result of both surface water and groundwater consumptive water use for irrigation, groundwater levels in the Big Lost River valley south of the Mackay Reservoir decreased from 10 to greater than 40 ft between 1967 and 2020 (Reference 2.2-29).

The primary uses of water in the Little Lost River watershed include man-made diversions of surface water and groundwater for irrigation, domestic use, and stock watering. Consumptive use for domestic purposes and stock watering is negligible when compared to irrigation. According to information furnished by the Natural Resources Conservation Service, a total of approximately 30,000 to 34,000 acres was under irrigation in 1967, of which approximately 16,000 acres used surface water sources. Of this amount, 1600 acres were located in the upper basin, 5600 acres in the middle basin, and 8800 acres in the lower basin near Howe (Reference 2.2-30). The total consumptive use of surface water used for irrigation in the watershed was estimated to be 28,000 acre-feet in 1967. In 2016, 33,279 acres of the Little Lost River watershed was being irrigated, approximately the same as in 1967 (Reference 2.2-53).

2.2.2.2 Groundwater Use

2.2.2.2.1 Eastern Snake River Plain

Groundwater is heavily pumped (approximately on average 4900 million gallons per day) from the ESRP aquifer for irrigation, mainly along the Snake River and near tributary valleys where they enter the ESRP (e.g., Big Lost River and Little Lost River valleys). Private and municipal groundwater wells throughout the ESRP also provide water for domestic and industrial purposes and livestock watering. Figure 2.2-19 shows locations of wells within a 50-mile radius of the CFPP site, as identified in the IDWR and USGS databases (Reference 2.2-31, Reference 2.2-32, and Reference 2.2-33). These wells are divided into six groups. The largest group "Not Specified/Other" has mostly wells for which the use was not specified in the databases. However, it is suspected that most of these wells are used for irrigation and/or domestic purposes. The second largest group is "Domestic", which are private wells used for drinking water. As presented in Figure 2.2-19, the majority of wells are concentrated in the Big Lost River basin, Little Lost River basin, Mud Lake area, and along the Snake River.

Declining aquifer levels, spring discharge rates, and Snake River flow rates have resulted in insufficient water supplies to satisfy future water demands in the ESRP (Reference 2.2-34). As a result, the Idaho Legislature passed Idaho Senate Concurrent Resolution No. 136 in April 2006, and requested that the Idaho Water Resource Board prepare and submit a comprehensive aquifer management plan for the ESRP aquifer (Reference 2.2-34). The main objectives of the Plan include to manage overall demand for water within the ESRP, to reduce withdrawals from the aquifer, and to develop alternatives to administrative curtailment. Thus, there was a recognition as far back as 2006 that water supply (surface water and groundwater) in southeastern Idaho is not unlimited and diminishing supplies could cause future problems.

Within INL property, most wells are used for groundwater monitoring or water supply (Figure 2.2-19) (Reference 2.2-35 and 2.2-36). The INL Site's Federal Reserved Water Right is 35,000 acre-ft/year (1.14×10^{10} gallons/year), not to exceed a maximum diversion rate of 80 cfs (35,906 gpm). The total volume of water diverted by the INL Site for 2020 was approximately 8.46×10^8 gallons or approximately 7.42 percent of the annual water right. The 2020 maximum monthly volume of water diverted was 96,901,777 gallons and the maximum diversion rate was 4.8 cfs that occurred in July. The average monthly volume of water diverted for INL site production and potable wells remained within the established water right.

The NuScale US460 Power Plant at the CFPP Site is designed based on recycling water and operating in a near zero liquid discharge mode so that total water use is reduced. The plant supports multiple air-cooled designs, which can reduce water consumption to as little as 1.1 gallons/MWh. The CFPP site is currently anticipated to need 1200 gpm of water, which is expected to be sourced from the ESRP aquifer. Tentative production well locations for CFPP are shown on Figure 2.1-22, and discussed in LWA ER Section 2.1.2.

Figure 2.2-20 is an expanded figure showing known wells that are located south and southwest of CFPP Site, and can be considered as downgradient. USGS monitoring wells USGS 22 and USGS 145 are the wells located downgradient and closest to the CFPP Site. Based on available data, the next closest groundwater monitoring well south or southwest of the site is approximately 11 miles distance (Figure 2.2-20). The "Highway 3" well is located along State Highway 33 at a public rest stop approximately seven miles south-southeast of the CFPP site. This well provides potable water for the rest stop.

2.2.2.2.2 Big Lost River Basin

Groundwater located within the Big Lost River basin is used for both agricultural and municipal purposes. There are approximately 1750 wells (Figure 2.2-21) used to irrigate approximately 8500 acres of farmland from the valley fill alluvium (Reference 2.2-29). There are five different public water supplies in the Big Lost River basin that derive water from wells and springs (Reference 2.2-35 and Reference 2.2-36). The locations of these well systems are shown in Figure 2.2-22. Arco, the largest public water supplier in the basin, historically had three municipal wells, which produced on average approximately 1.2 million gallons per day (gpd) and served a population of approximately 1000 people. In 2016, Arco was using two wells, including the Blattner well that was installed in 2013, which produced an average of 224,500 gpd (Reference 2.2-36).

In September 2016, the Director of IDWR was petitioned to designate the Big Lost River Basin as a Critical Ground Water Area by water users expressing concerns about declining groundwater levels, declining streamflow, and drought (Reference 2.2-37). The IDWR received a subsequent petition to designate this basin as a Groundwater Management Area (Reference 2.2-38 and Reference 2.2-39). Contemporaneous analysis by the IDWR indicated that statistically-significant declining trends in groundwater levels were occurring in the basin (Reference 2.2-40). Although these petitions were ultimately withdrawn, water users in the basin remain concerned about the future of water resources in the basin because of increasing demands (Reference 2.2-41).

2.2.2.2.3 Little Lost River Basin

In the Little Lost River Basin, there are more than 250 groundwater wells (Reference 2.2-31). These wells are used for irrigation or residential use (Figure 2.2-21). No information could be found on predictions of future water use changes for this area.

2.2.3 Water Quality

Surface water and groundwater characteristics in the region primarily consists of alkaline, calcium-magnesium bicarbonate water, and are low in total dissolved solids. However, localized groundwater in the region may contain higher concentrations of nutrients (e.g., nitrate or ammonia) or contain chemical or radiological contaminants (Reference 2.2-6, Reference 2.2-7, and Reference 2.2-42).

2.2.3.1 Surface Water Quality

Table 2.2-3 summarizes water quality characteristics that have been measured in four different tributary basins of the ESRP between 1981 and 2020 (Reference 2.2-25 and Reference 2.2-43). Because of seasonal changes, surface water temperatures ranged from 6.0 to 20.3 degrees Celsius. Each sample was alkaline, with pH values ranging from 7.7 to 9.1 and alkalinity ranged from 83.8 to 205 mg/L. Specific conductance values ranged from 155.6 to 485.5 microSiemens per centimeter (µS/cm). Calcium and magnesium dominated the major cations found in each watershed. Bicarbonate (calculated from alkalinity) was the most prevalent anion in each watershed. Nitrate and phosphorus were relatively low in each of the four watersheds listed in Table 2.2-3. Total uranium content in the surface water samples were less than 2.5 µg/L, which is typical for natural waters (Reference 2.2-25). There was no indication that organic, inorganic, or radiological contaminants were present in the three surface streams, or in Mud Lake.

2.2.3.2 Groundwater Quality

Groundwater quality data for the CFPP site and three different adjacent areas are listed in Table 2.2-4. In general, the groundwater quality data in each area are very similar to each other, and also similar to the surface water characteristics. Analytical results indicated groundwater is considered alkaline (pH 6.9 to 8.9), and dominated by low to moderate concentrations of calcium, magnesium, and bicarbonate ions. The groundwater concentrations of parameters in the CFPP site fall within the combined range of the other three groundwater groups, except water temperatures. The water temperatures measured in CFPP wells are higher than the other three groups (Table 2.2-4), indicating there may be a higher than average geothermal gradient in the vicinity of the CFPP site (Reference 2.2-44).

In the Little Lost River basin, two wells had chloride concentrations of 50 mg/L or greater (Reference 2.2-25), which may be indicative of contamination by road salt or some other source. However, these concentrations are below the USEPA Secondary Constituent Standard limit of 250 mg/L for chloride.

Agricultural and ranching activities occur in the area and constituents from fertilizers or feedlots can enter the surface water or groundwater systems. Nitrate is one of the primary water quality concerns in southern Idaho. One elevated nitrate concentration (6.6 mg/L) was detected in the Big Lost River basin (Reference 2.2-43); however, it does not exceed the Idaho Numerical Groundwater Water Standard Table II - Primary Constituent Standard of 10 mg/L. The ten CFPP wells were sampled and analyzed for nitrate, nitrite, ammonia, total organic nitrogen (Kjeldahl), orthophosphate, and total phosphorus. None of these analytes were found to be elevated and were below Idaho standards.

Additional constituents of concerns in groundwater related to current and past agricultural practices are pesticides, herbicides, insecticides, or fungicides. No cases could be found in the literature where these classes of chemicals were found in surface waters or groundwater within a 50-mile radius of the CFPP site. The ten CFPP wells were sampled and analyzed for organophosphorus pesticides, organochlorine pesticides, urea pesticides, and herbicides. These constituents were not detected in the samples.

In the past, INL wastewater disposal sites have included infiltration ponds and ditches, drain fields, and disposal wells. From 1996 to 1998, wastewater was discharged into infiltration and evaporation ponds and drain fields. Waste materials buried at the Radioactive Waste Management Complex are also sources of some constituents in groundwater (Reference 2.2-43). Several plumes of groundwater contamination exist within INL property (Reference 2.2-6). These plumes are shown on Figure 2.2-23. For example, the contaminated groundwater emanating from the RTC had elevated concentrations of calcium, sulfate, chromium, tritium, and was a calcium-sulfate water type.

Radiological-contaminated INL groundwaters include:

- the TAN plume, which contains 137Cs, tritium, and 90Sr,
- the RTC plume, which contains tritium, and
- the INTEC plume, which contains tritium, 90Sr, and 129I.

The main INL operations, waste disposal areas, and contaminant plumes are located east or southeast (cross-gradient) of the CFPP site and should not have impacted groundwater near the CFPP Site. However, as a precautionary effort, CFPP groundwater was sampled and analyzed for seven different radiological analytes (total uranium, total thorium, tritium, 226Ra, 228Ra, gross alpha, and gross beta). Based on the laboratory results, radiological analytes sampled from the ten CFPP wells (Table 2.2-4) were at or below naturally-occurring activities and below applicable EPA and Idaho standards.

The RTC plume (Figure 2.2-23) contained chromium concentrations measured as high as 168 µg/L in well USGS 65 in October 1998 (Reference 2.2-42). This plume is located approximately eight miles southeast of the CFPP site (Figure 2.2-23). The highest concentration of chromium detected in the ten CFPP wells was 5.7 µg/L, which suggest this area has not been affected by the RTC plume. No elevated concentrations of trace metals have been found at the CFPP site.

An estimated 88,400 gallons of organic waste were buried before 1970 at the Radioactive Waste Management Complex. These buried wastes included approximately 24,400 gallons of carbon tetrachloride; 39,000 gallons of lubricating oil; and approximately 25,000 gallons of other organic compounds, including trichloroethane, trichloroethylene, perchloroethylene, toluene, and benzene (Reference 2.2-42). Trichloroethylene, perchloroethylene, and 1,2-dichloroethylene (cis and trans) have also been disposed at the TAN (Reference 2.2-6). Groundwater collected from the ten CFPP monitoring wells were analyzed for volatile organic compounds, semi-volatile organic compounds, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, and other organic analytes. None of these organic contaminants were detected in CFPP samples, except for one low concentration of toluene (2.31 µg/L) that was detected in MW-08A.

Overall, the groundwater water quality at the CFPP site appears to be representative of groundwater found throughout most of the ESRP aquifer. There is no indication that impacted groundwater beneath INL has migrated towards the CFPP site.

2.2.4 Water Monitoring

The USGS and IDWR maintain hundreds of surface water and groundwater monitoring locations throughout the ESRP region and the nearby tributary valleys.

2.2.4.1 Surface Water Monitoring

Seven USGS stream gaging stations monitor flow and water quality in the Big Lost River watershed upstream of the INL site (Figure 2.2-5, Reference 2.2-12). The IDWR has recently used eight surface water monitoring stations in the watershed, six of which coincide with USGS monitoring stations (Reference 2.2-43). The USGS station 13132500 is located downstream of Arco and Butte City and is the last station used to measure flow before the stream channel enters INL property; this station has been used to monitor streamflow between 1946 and 2023.

Once the Big Lost River channel enters INL property, the USGS maintains five more surface water gaging stations, three of which are located in the vicinity of the Big Lost River Diversion (Reference 2.2-6). Flow is seldom recorded at these stations.

The principal USGS stream gaging station on the Little Lost River is located near Howe (Station 13119000). Flow data are available for this station between 1921 and 2022; however, this station has not been recording data since October 2022.

2.2.4.2 Groundwater Monitoring

During a recent (2018 to 2021) investigation of groundwater and surface water conditions in the Big Lost River basin, 621 wells were used to create a three-dimensional hydrogeologic framework for the basin. The IDWR currently maintains a network of groundwater level monitoring wells in the Big Lost River basin, although the number and locations of wells monitored has varied over time (Reference 2.2-43 and Reference 2.2-45). The USGS makes available their groundwater level measurement data on the internet (Reference 2.2-43). In 2020, 50 wells were sampled in the Big Lost River basin by the IDWR and results of these analyses have been reported (Reference 2.2-43).

More than 100 wells have been monitored or sampled in the Little Lost River basin (Reference 2.2-30, Reference 2.2-45, and Reference 2.2-46).

The USGS maintains an extensive set of monitoring wells throughout the INL site and surrounding areas (Figure 2.2-19 and Figure 2.2-20). Water levels and water quality data for these wells have been reported in numerous reports (e.g., Reference 2.2-5, Reference 2.2-6, and Reference 2.2-25).

At the CFPP site, 10 wells were installed around the perimeter of the power block area between September 2021 and February 2022 (Figure 2.2-14). Water levels in these wells have been monitored since March 2022 (Figure 2.2-15 and Figure 2.2-16). Fifteen samples have been collected from the 10 wells and the analytical data have been summarized and discussed in Section 2.2.3.2. Monitoring of these wells continues into the future.

2.2.5 References

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Table 2.2-1: Groundwater Elevations Measured in the CFPP Wells Using an Electric Water Level Indicator

Well ID	Feb. 2022	May 2022	July- Aug. 2022	Nov. 2022	Mar. 2023
Depth to Groundwater (ft BTOR)					
PW-01	618.78	619.07	619.52	620.25	620.58
MW-01	617.90	618.17	618.65	619.43	619.69
MW-02	618.24	618.52	618.98	619.75	620.29
MW-03	619.42	619.76	620.18	620.95	621.35
MW-04	620.42	620.66	621.04	621.91	622.25
MW-05B	589.19	589.21	589.62	590.92	591.08
MW-06	545.70	546.19	546.29	546.64	547.09
MW-07	595.29	595.78	595.93	596.20	596.35
MW-08A	657.41	657.68	657.95	658.92	659.40
MW-09	638.15	638.43	638.65	639.75	640.16
Groundwater Elevation (ft amsl)					
PW-01	4461.97	4461.68	4461.23	4460.50	4460.17
MW-01	4462.58	4462.31	4461.83	4461.05	4460.79
MW-02	4462.09	4461.81	4461.35	4460.58	4460.04
MW-03	4462.04	4461.70	4461.28	4460.51	4460.11
MW-04	4461.98	4461.74	4461.36	4460.49	4460.15
MW-05B	4463.30	4463.28	4462.87	4461.57	4461.41
MW-06	4515.53	4515.04	4514.94	4514.59	4514.14
MW-07	4506.93	4506.44	4506.29	4506.02	4505.87
MW-08A	4462.49	4462.22	4461.95	4460.98	4460.50
MW-09	4462.49	4462.21	4461.99	4460.89	4460.48

Table 2.2-2: Irrigated and Non-Irrigated Farmland in the Big Lost River Watershed

Location	Irrigated Acres		Non-Irrigated Acres[1]
	Surface Water	Groundwater	
Along Big Lost River Valley Above Mackay Reservoir, Including Warm Springs Creek	10,840	200	1000
Along Tributaries Above Mackay Reservoir	1840	0	0
Thousand Springs Creek Valley	0	0	9150
Along Big Lost River Below Reservoir	29,340	8300	8155
Antelope Creek Valley	6200	0	0
Alder Creek Valley	1000	0	0
Totals (rounded)	49,000	8500	18,000

[1] Locally called sub-irrigated land because the water table is near the land surface.
Data from Soil Conservation Service and Big Lost River Irrigation District.

Table 2.2-3: Summary of Surface Water Quality

Watershed		Big Lost River[1,2,3]	Little Lost River[1,2]	Birch Creek[1,2]	Mud Lake[1,2]
No. of Sampling Locations		14	2	2	1
Analyte	Units				
Water Temperature	°C	6.0 - 20.3	12.0 - 14.1	9.4 - 16.5	14.7
pH	S.U.	7.7 - 9.1	8.1 - 8.4	8.5 - 8.6	8.5
Specific Conductance	µS/cm	155.5 - 485.5	245 - 324	320 - 326	276
Alkalinity, as $CaCO_3$	mg/L	83.8 - 205	98 - 107	134 - 165	103
Dissolved Oxygen	mg/L	7.2 - 12.9	9.1 - 9.2	9.2 - 10.0	8.4
Calcium	mg/L	25.9 - 50	26.8 - 30.0	38 - 41.9	28.4
Magnesium	mg/L	5.9 - 22.0	8.7 - 10.0	15.0 - 15.1	6.5
Sodium	mg/L	0.8 - 7.1	2.8 - 4.0	5.1 - 5.2	5.2
Potassium	mg/L	0.3 - 1.7	0.6 - 1.2	0.9 - 0.9	2.1
Chloride	mg/L	0.59 - 5.0	2.2 - 3.8	4.6 - 4.8	2.5
Sulfate	mg/L	12.6 - 33.1	8.5 - 11.4	23.0 - 25.3	4.3
Fluoride	mg/L	0.18 - 0.30	0.10 - 0.12	0.18 - 0.22	0.12
Nitrate	mg/L	<0.05 - 0.28	<0.05 - 0.1	0.1 - 0.2	0.25
Phosphorus, as P	mg/L	0.01 - 0.06	NA	NA	NA
Silica	mg/L	4.7 - 14.0	9.2 - 10.1	7.7 - 10.0	14.7
Barium	µg/L	57 - 110	44 - 51	61 - 62	40
Iron	µg/L	<10 - 100	<20 - 39	<11 - 28	58
Uranium	µg/L	<1 - 2.4	0.91 - 0.91	2.2 - 2.2	0.47

NA = Not analyzed

[1] Ranges include minimum and maximum values.

[2] Reference 2.2-25

[3] Reference 2.2-43

Table 2.2-4: Summary of Groundwater Quality[1]

Area		Big Lost River Valley[5,6]	Little Lost River Valley[5]	INL "natural groundwater" [2,5]	CFPP [3]
No. of Sampling Locations		52	7	58	10
Analyte	Units				
Water Temperature	°C	6.5 - 18.2	7.0 - 15.0	9.5 - 20.0	19.8 - 24.6 [4]
pH	S.U.	6.9 - 8.9	7.4 - 8.0	7.5 - 8.6	7.11 - 8.52
Specific Conductance	µS/cm	180 - 893.2	255 - 964	236 - 680	297.1 - 356.4
Alkalinity, as $CaCO_3$	mg/L	64.6 - 258	125 - 213	71 - 221	100 - 160
Dissolved Oxygen	mg/L	0.01 - 15	7.1 - 9.6	0.7 - 12.2	0.20 - 6.17
Calcium	mg/L	21 - 85	28 - 85	24 - 74	23 - 46
Magnesium	mg/L	4.3 - 34	11 - 45	9 - 27.4	12 - 17
Sodium	mg/L	2.6 - 20	4 - 27	5.7 - 24.0	8.3 - 14
Potassium	mg/L	0.66 - 3.2	0.9 - 1.8	1.3 - 6.4	1.6 - 4.0
Chloride	mg/L	0.77 - 27.7	2.6 - 143	4.9 - 66.6	10 - 27
Sulfate	mg/L	6.38 - 45.1	5.0 - 60.3	12.4 - 40.4	17 - 33
Fluoride	mg/L	<0.2 - 0.59	<0.1 - 0.16	0.12 - 0.79	0.17 - 0.31
Nitrate	mg/L	<0.01 - 6.6	0.2 - 4.2	0.3 - 3.6	0.15 - 0.57
Phosphorus, as P	mg/L	0.01 - 0.21	NA	NA	0.03 - 0.16
Silica	mg/L	8.7 - 32	14.0 - 23	14.5 - 37.2	15 - 35
Barium	µg/L	39 - 185	38 - 132	11 - 342	20 - 65
Iron	µg/L	<10 - 960	<10 - 29	5 - 230	13 - 300
Uranium, total	µg/L	<1 - 3.9	ND - 1.2	0.43 - 3.04	1.3 - 2.2
Thorium, total	µg/L	NA	NA	NA	0.78 - 1.4
Gross Alpha	pCi/L	NA	NA	NA	2.28 - 4.18
Gross Beta	pCi/L	NA	NA	NA	1.08 - 19.3
Radium-226	pCi/L	NA	NA	NA	0.095 - 0.17
Radium-228	pCi/L	NA	NA	NA	0.597 - 1.25

NA = Not analyzed, ND = Not Detected

1 Ranges include minimum and maximum values.

2 Includes samples collected from shallow wells in areas considered to be not contaminated.

3 Includes 15 samples collected from 10 wells in July-November 2022.

4 Water temperatures measured in wells using calibrated in situ sensors.

5 Reference 2.2-25

6 Reference 2.2-43

Figure 2.2-1: The Snake River Plain (Eastern and Western) of Southern Idaho

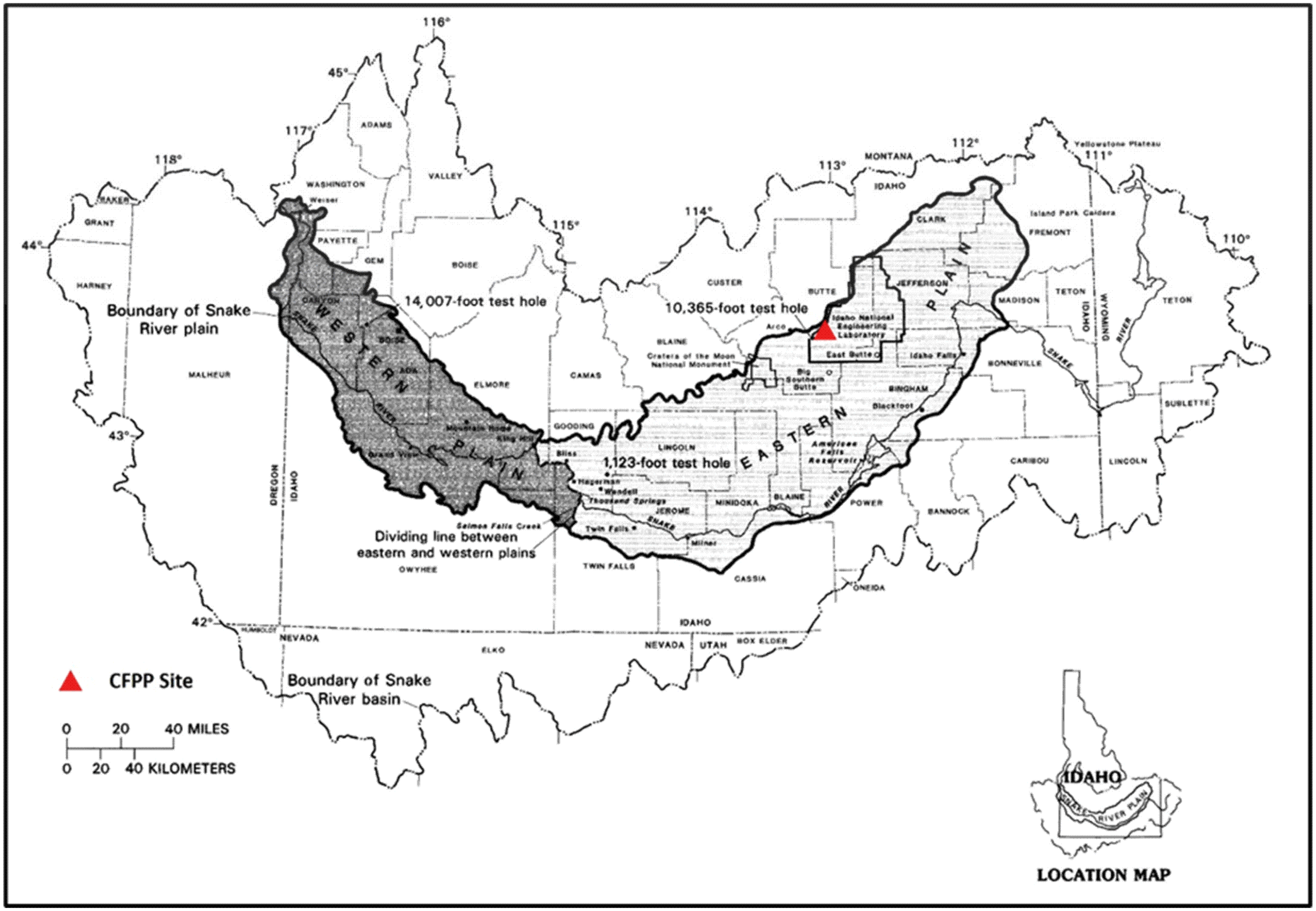
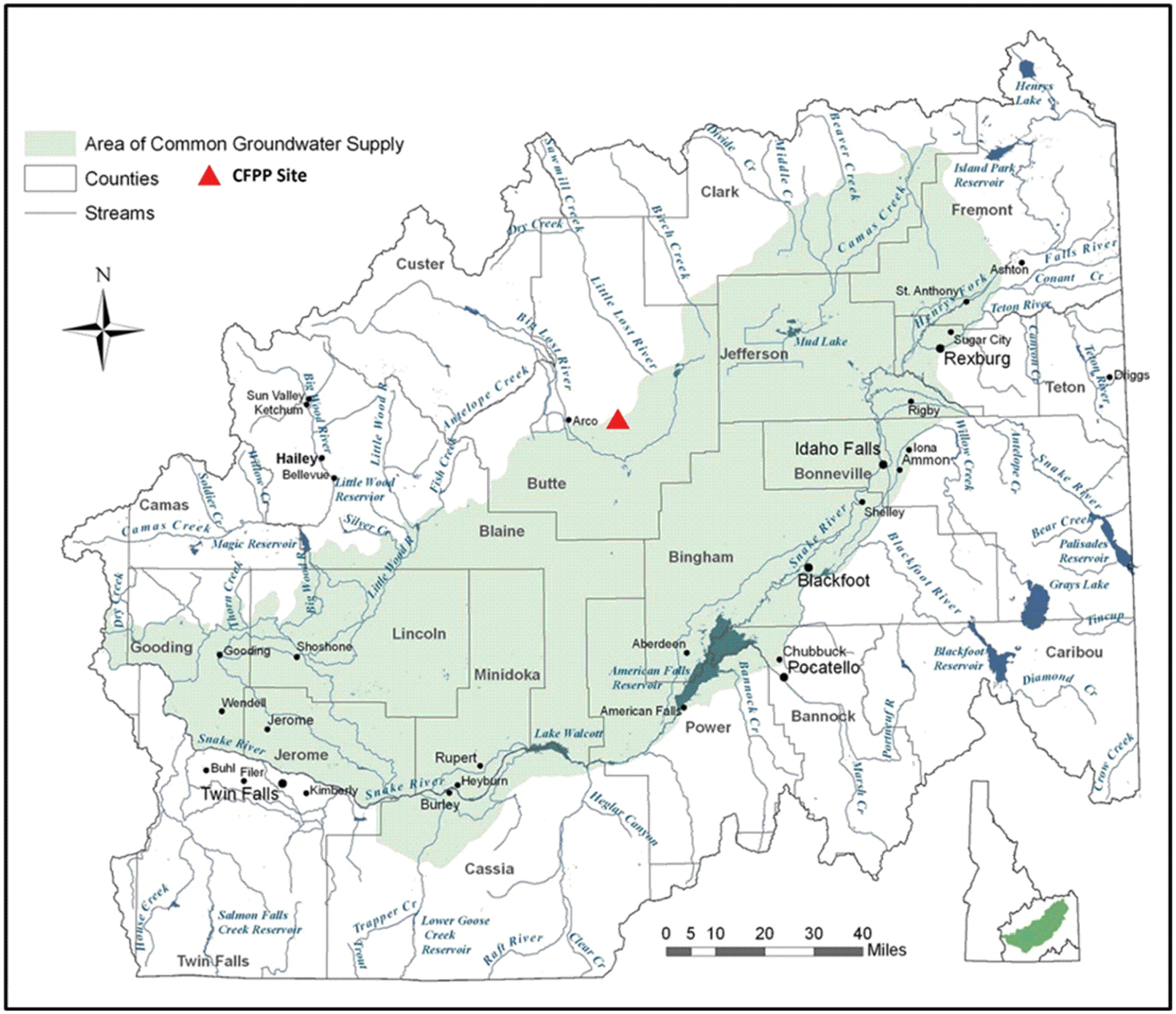
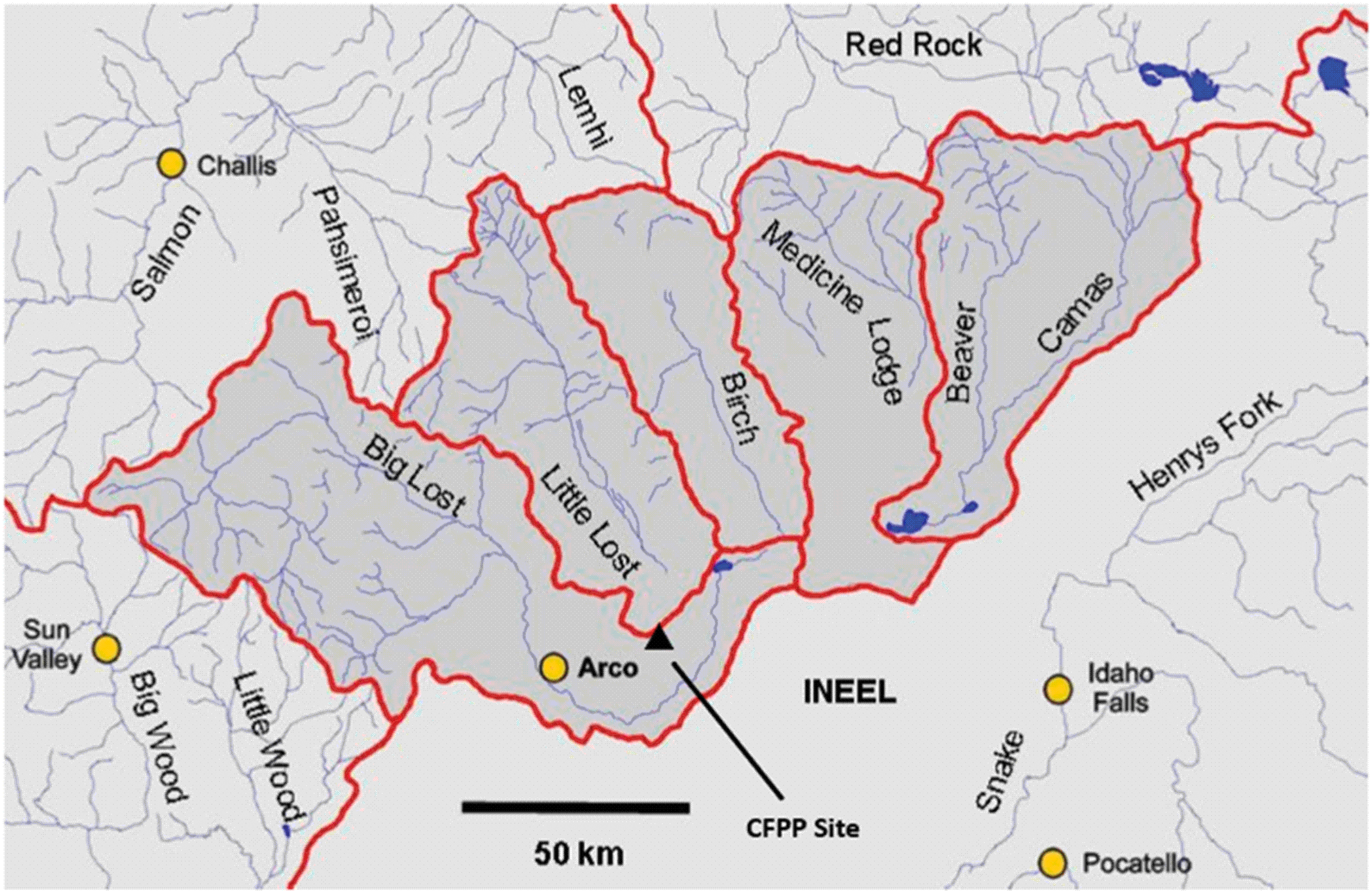


Figure 2.2-2: The Eastern Snake River Plain and Adjacent Watersheds



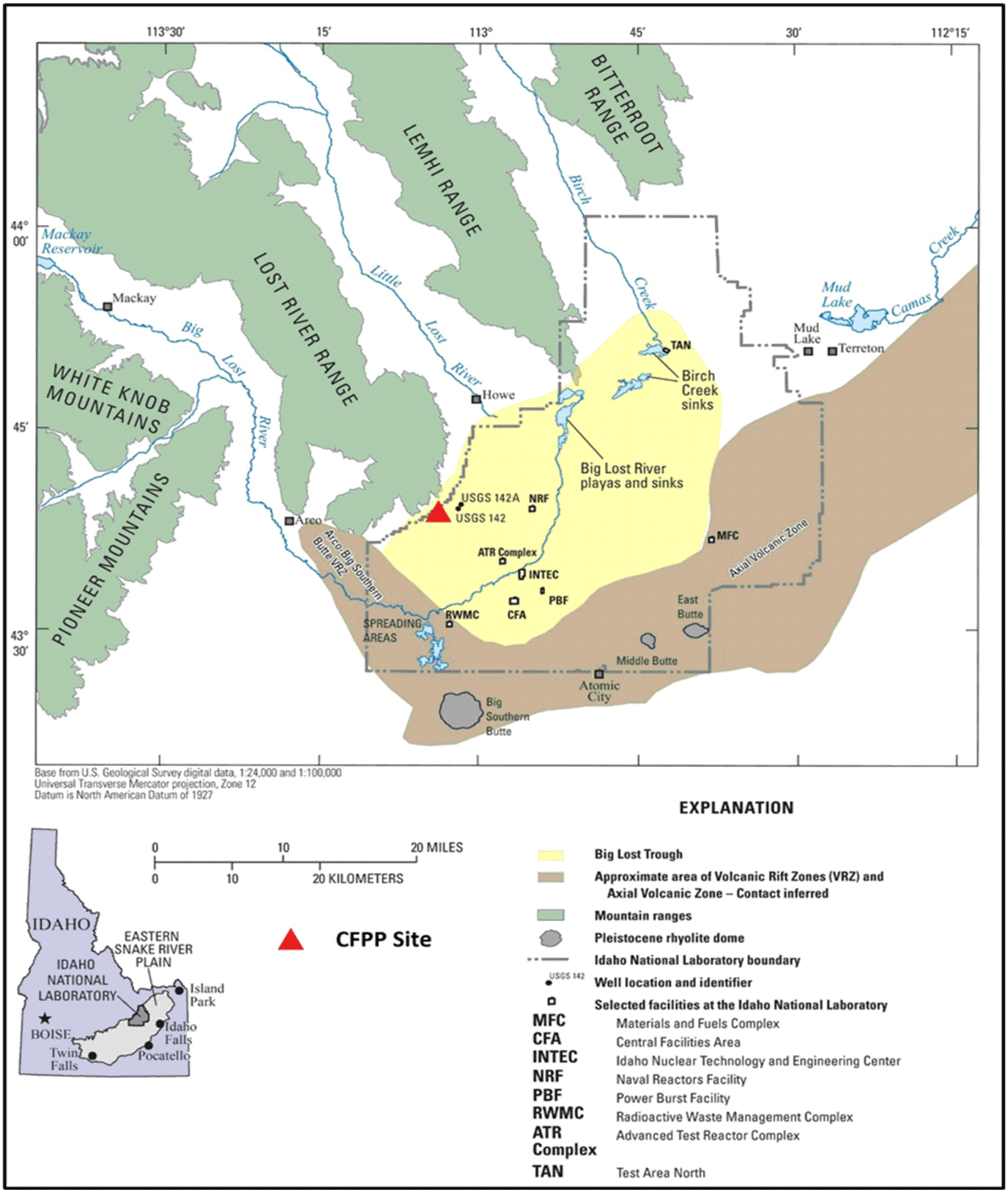
Reference 2.2-34

Figure 2.2-3: Enclosed Drainage Basins on the Northwest Side of the Eastern Snake River Plain



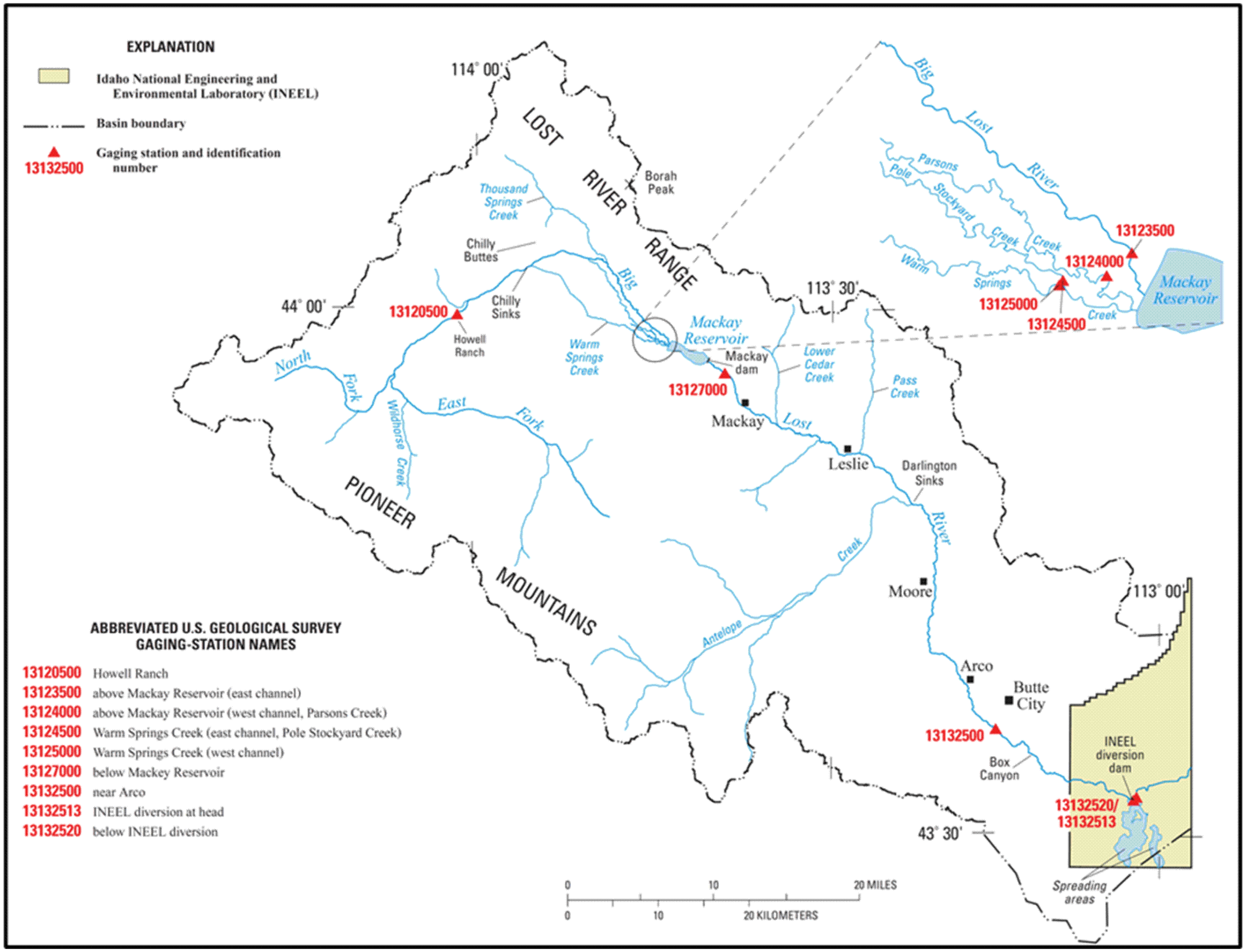
Reference 2.2-47

Figure 2.2-4: Big Lost Trough and Tributary Valleys North and Northwest of INL



Reference 2.2-17

Figure 2.2-5: Big Lost River Watershed and Surface Water Monitoring Stations



Reference 2.2-12

Figure 2.2-6: Local Unnamed Watershed Area

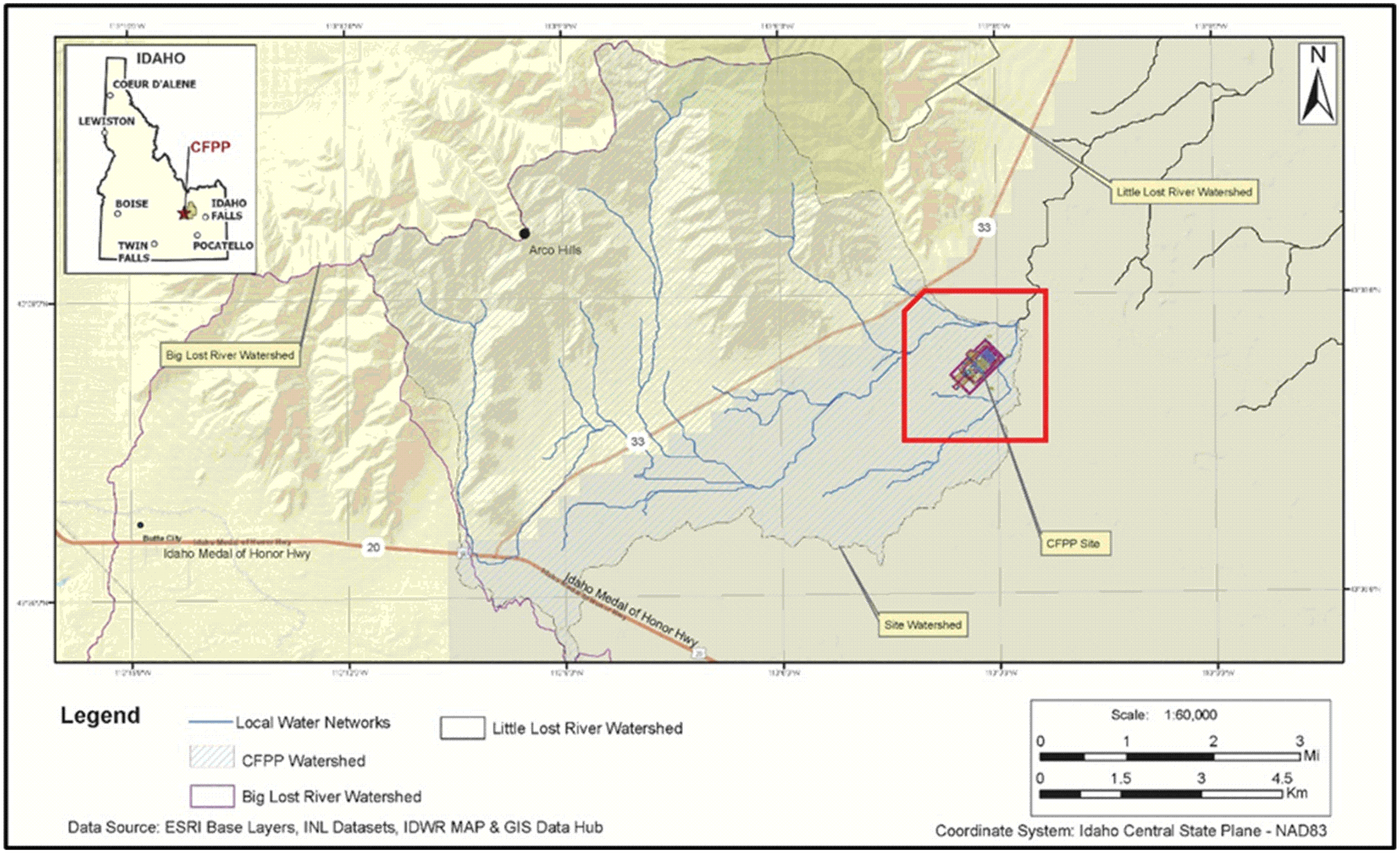
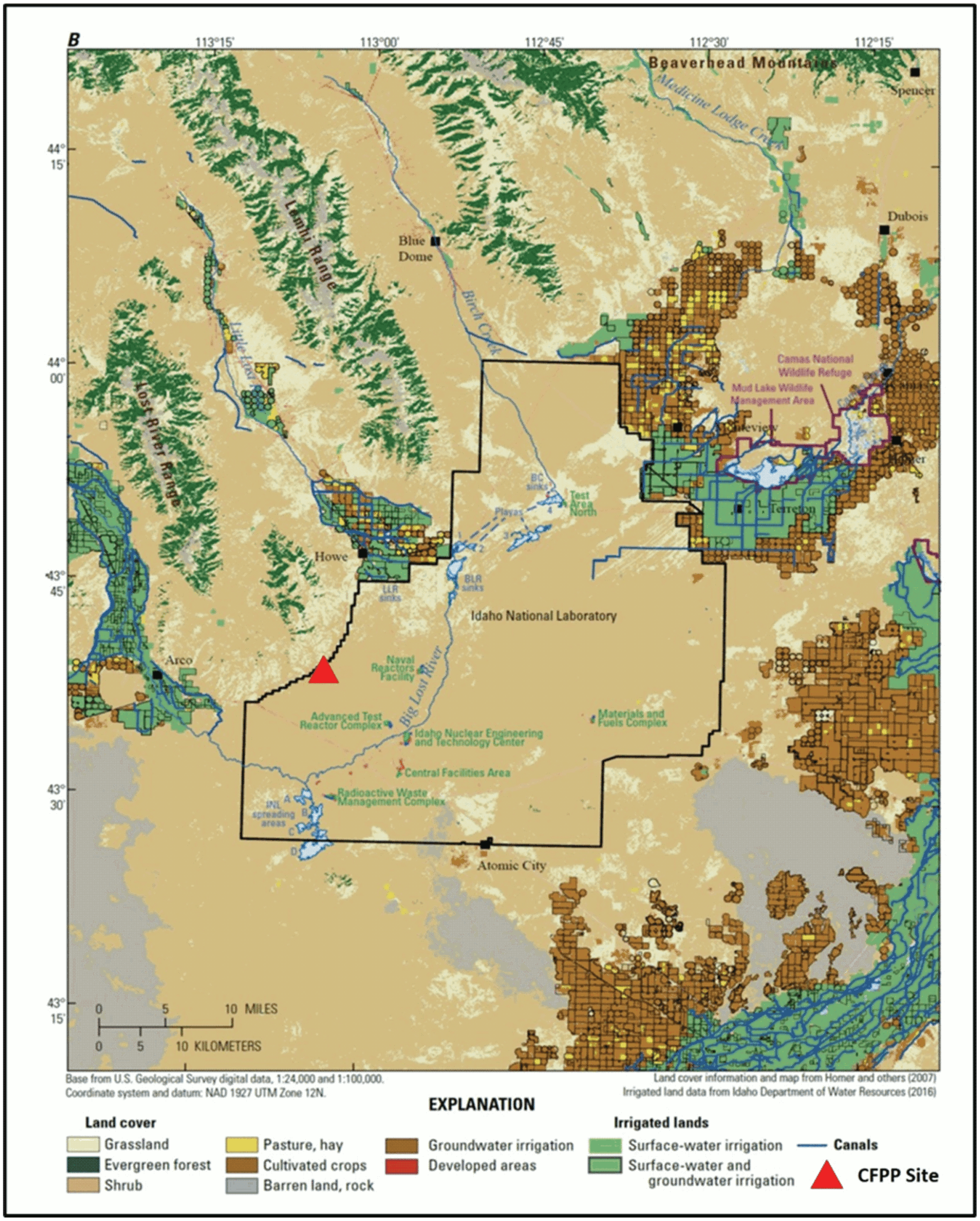
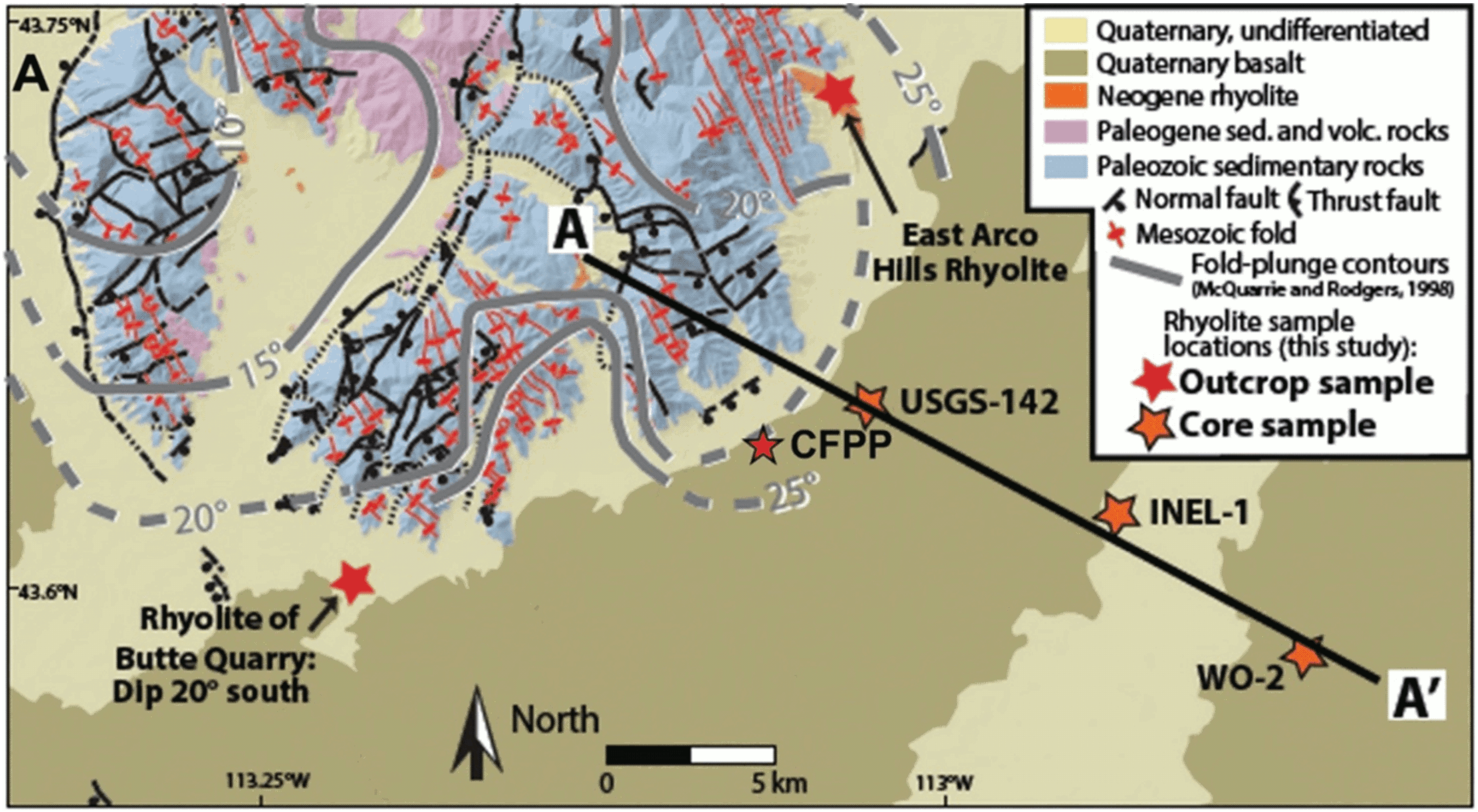


Figure 2.2-7: Land Use, Canals, and Irrigated Areas near CFPP Site and INL



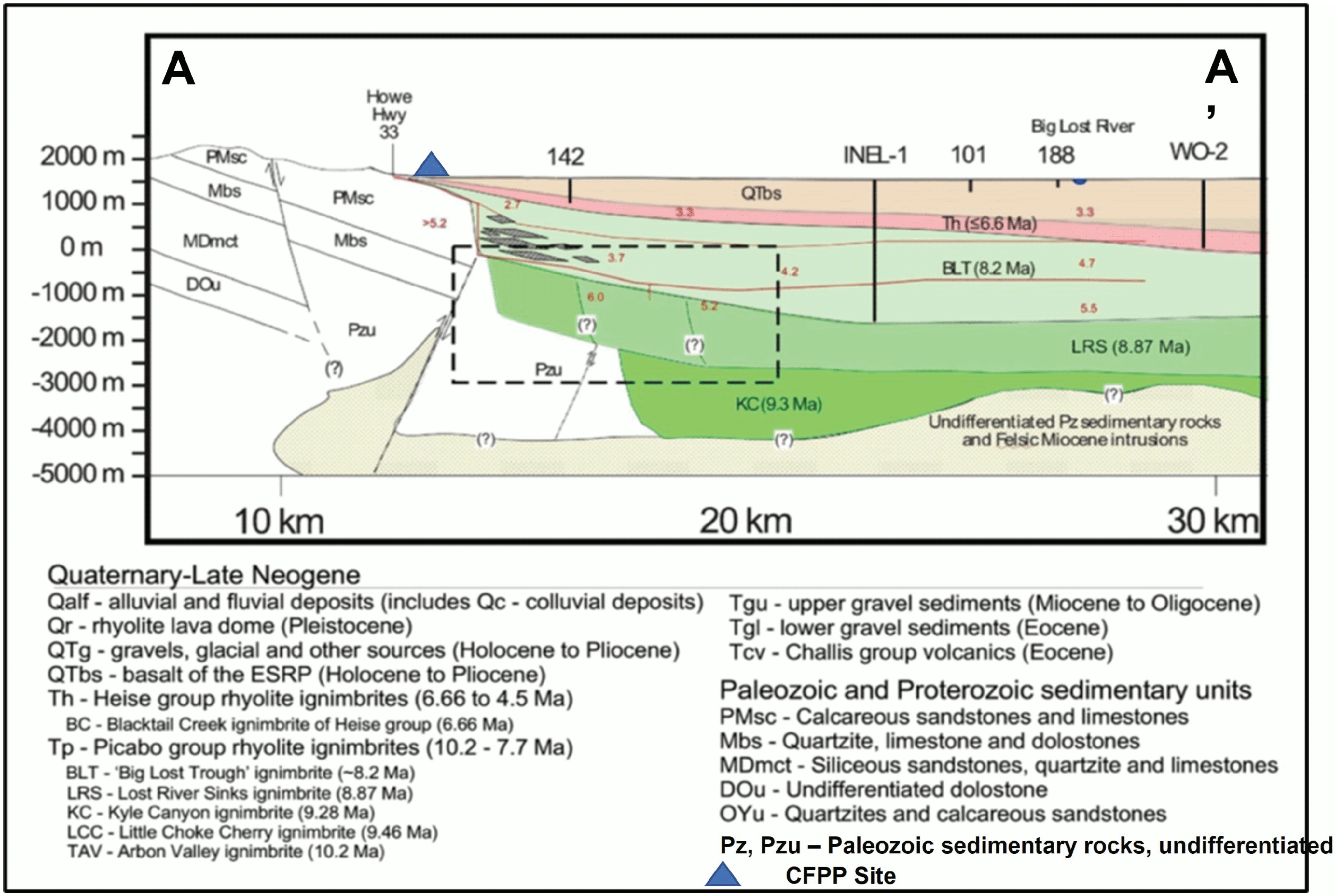
Reference 2.2-25

Figure 2.2-8: Surficial Geology of Area and Location of Cross Section A-A'



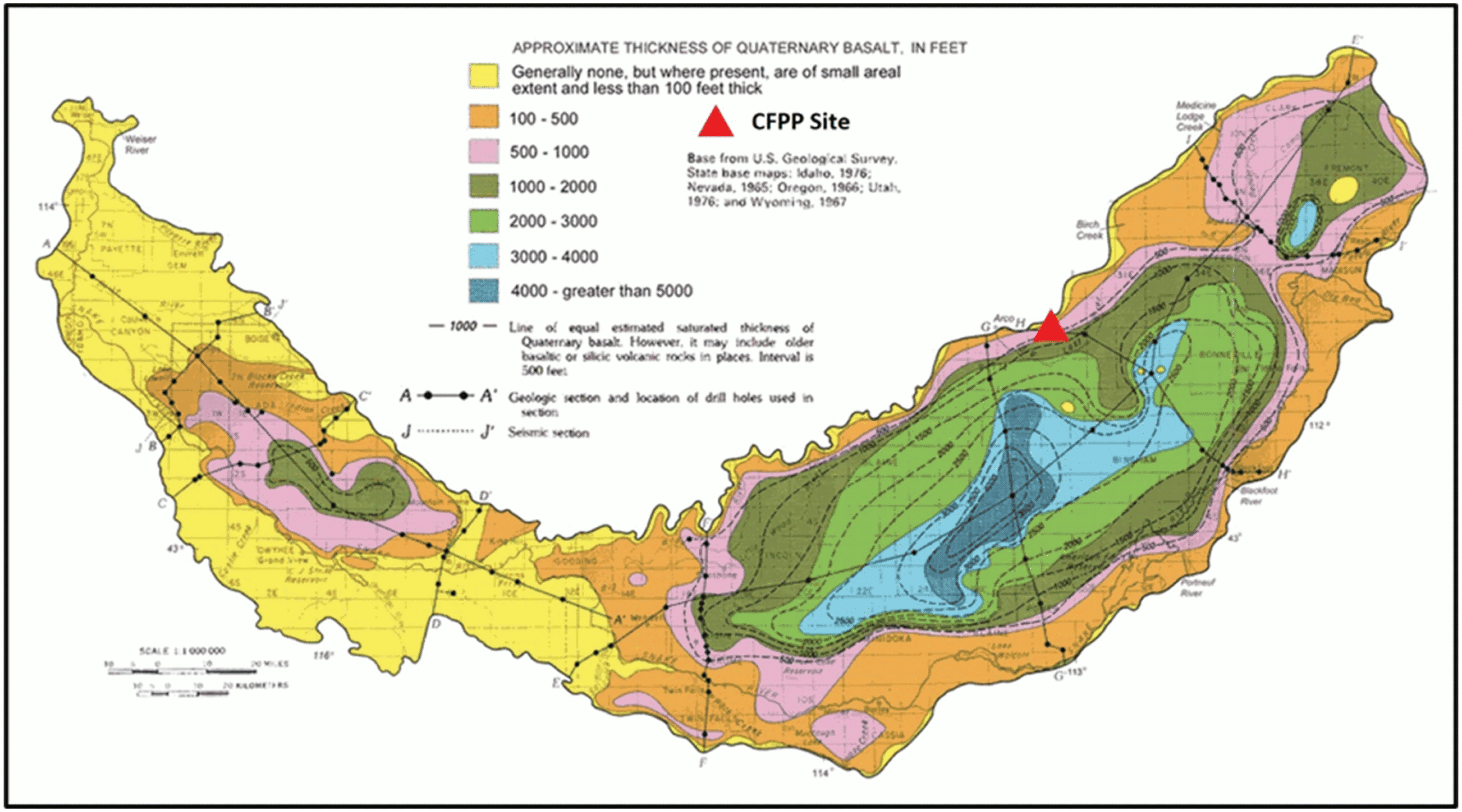
Reference 2.2-44

Figure 2.2-9: Geologic Cross Section A-A'



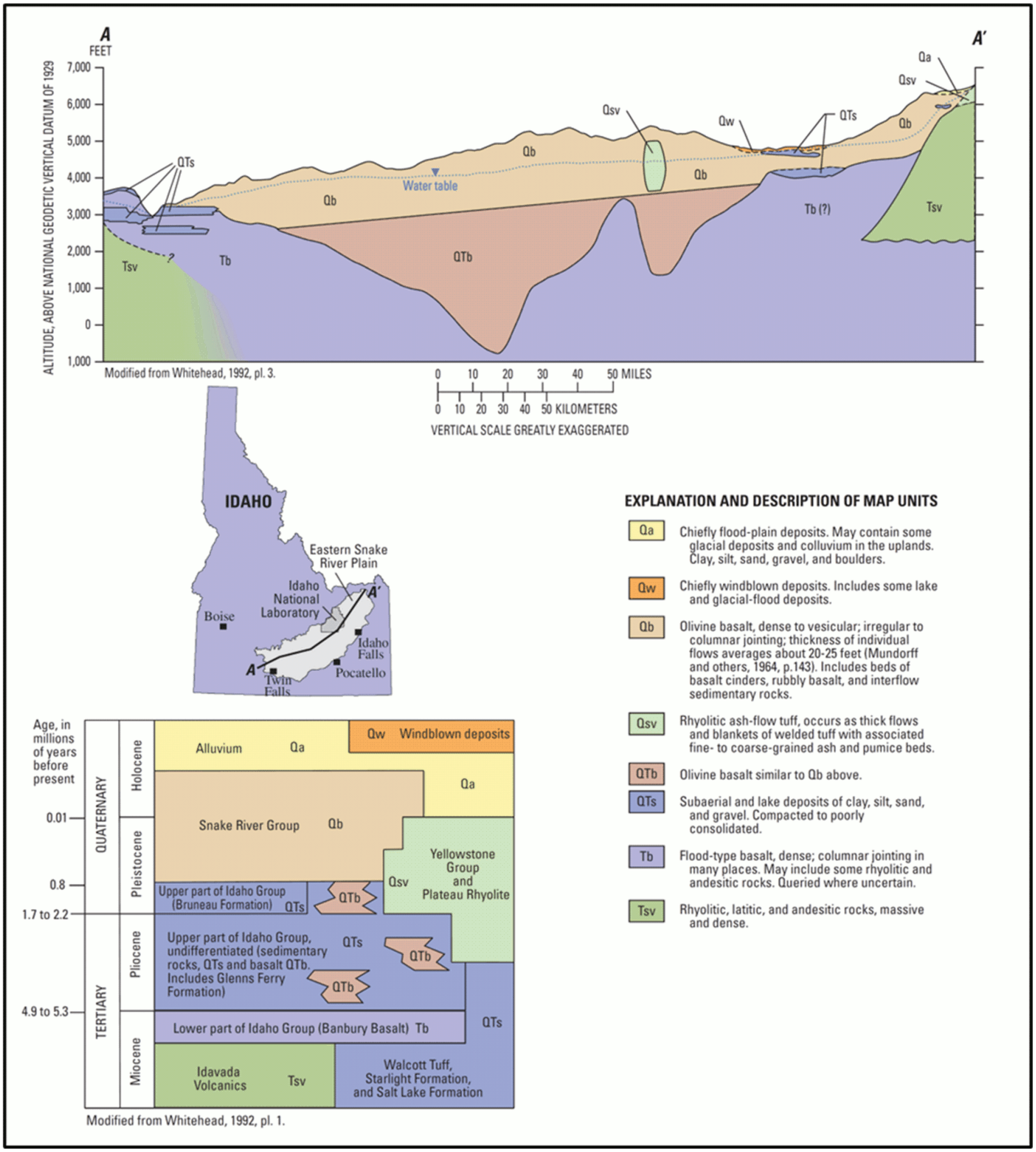
Reference 2.2-44

Figure 2.2-10: Thickness of Quaternary Basalts and Saturated Quaternary Basalts in the Snake River Plain



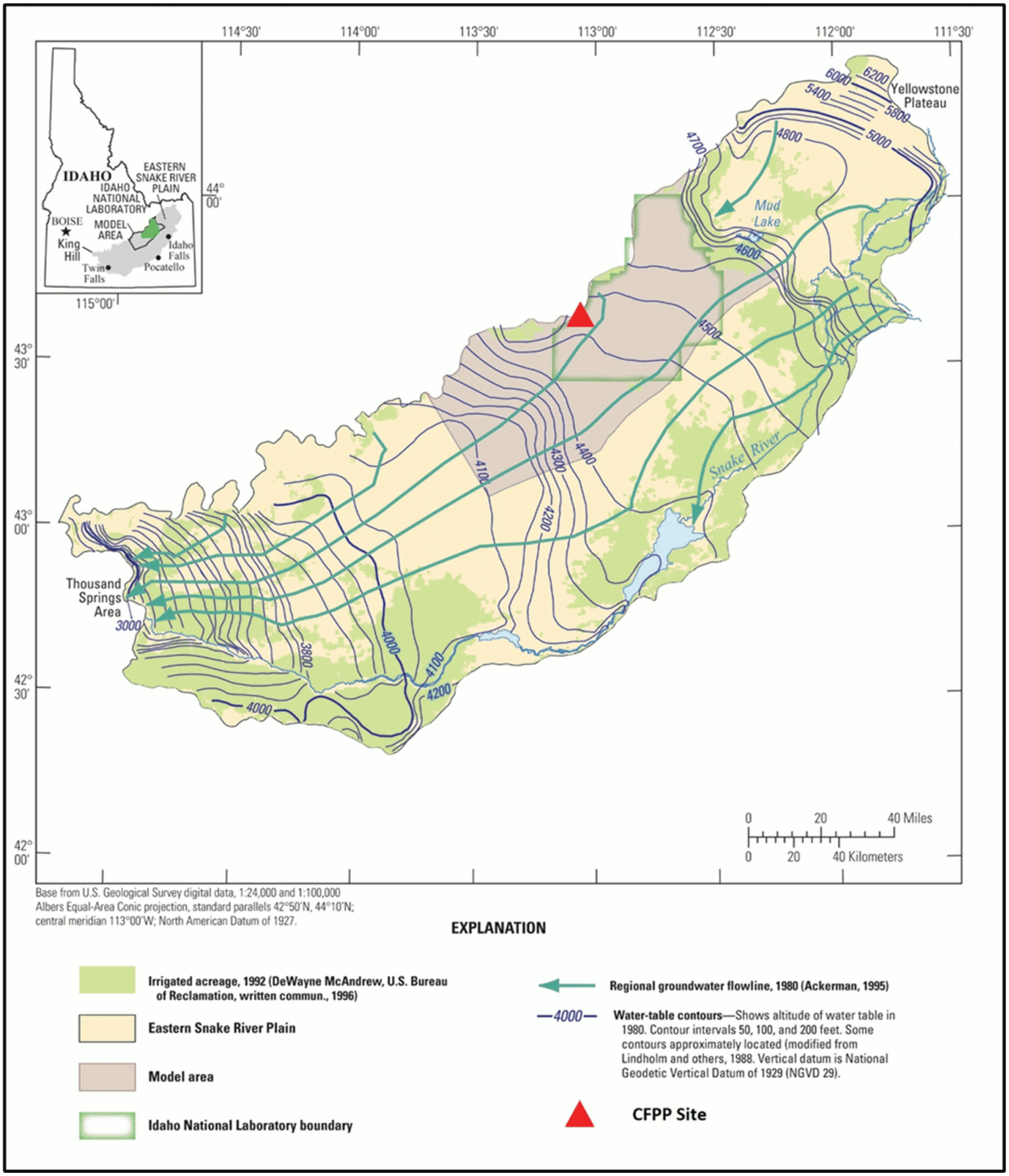
Reference 2.2-48

Figure 2.2-11: Generalized Geologic Cross Section Longitudinally Through the Eastern Snake River Plain



Reference 2.2-5

Figure 2.2-12: 1980 Water-Table Map, Irrigated Areas, and Regional Groundwater Flow Directions in the Eastern Snake River Plain Aquifer



Reference 2.2-6

Figure 2.2-13: Water-Table Map at the CFPP Site, November 2022

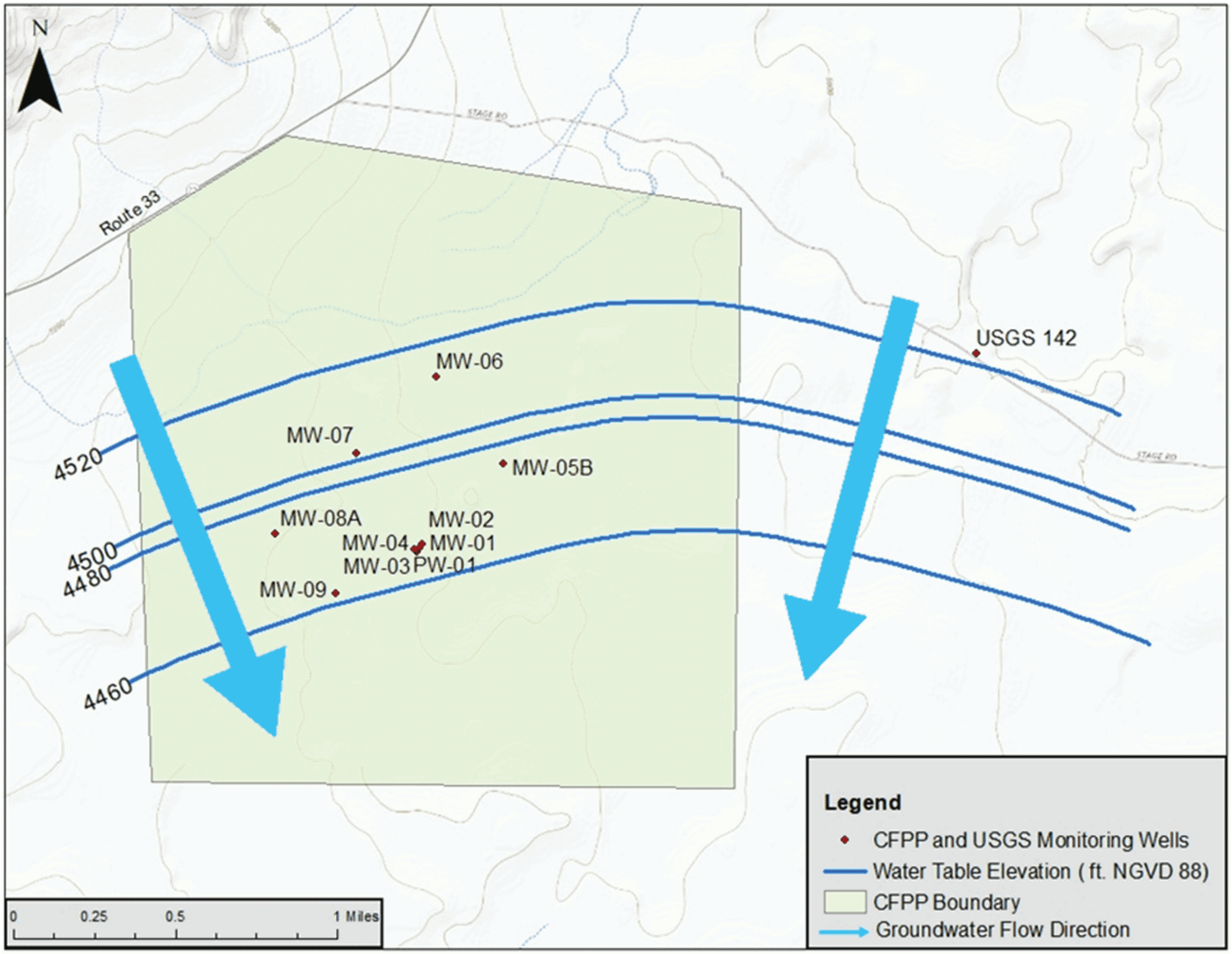


Figure 2.2-14: Regional Water Table Map, 2022

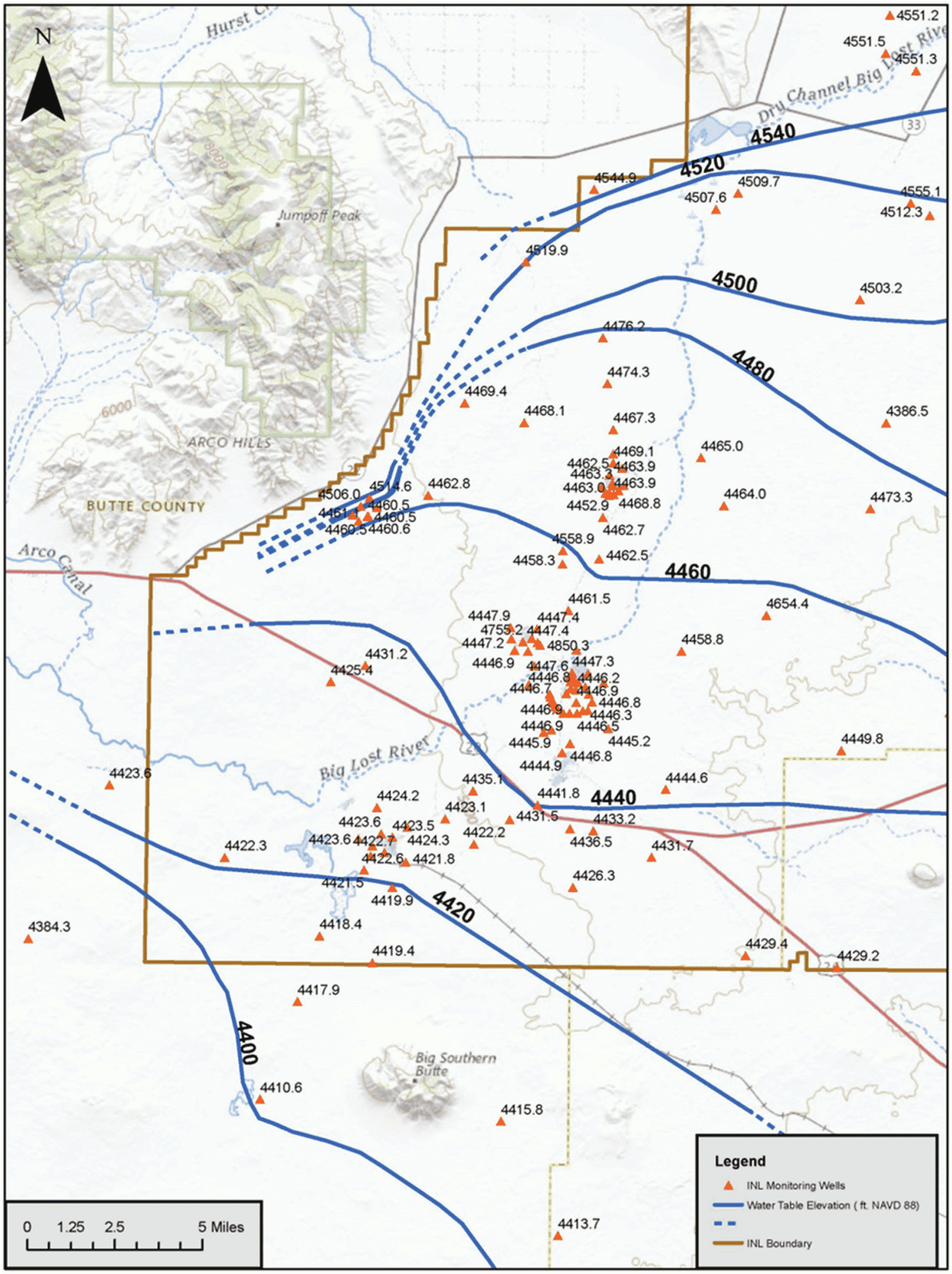


Figure 2.2-15: Groundwater Elevations Measured in CFPP and Nearby U.S. Geological Survey Wells, March 2022-March 2023

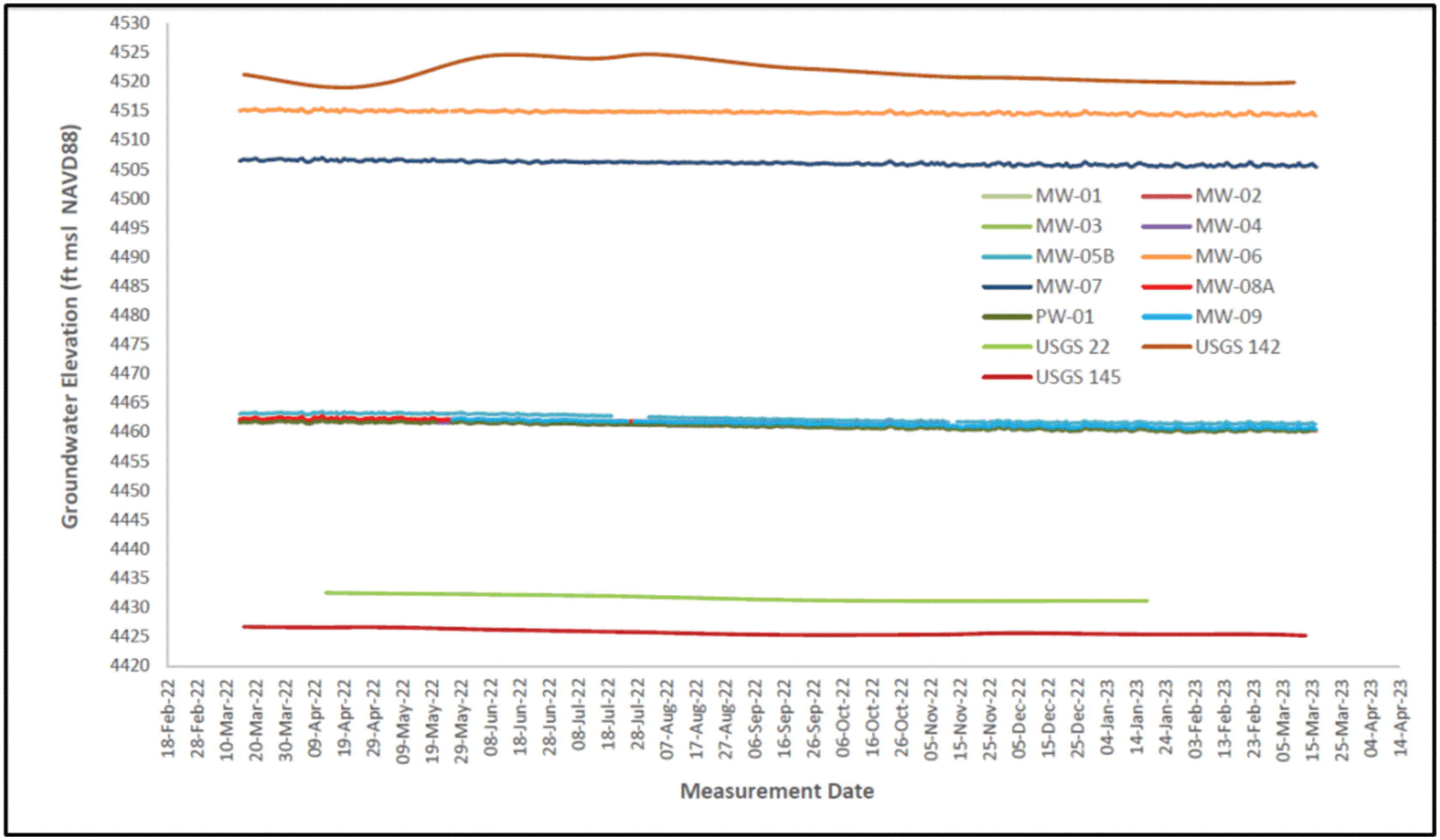


Figure 2.2-16: Groundwater Elevations Measured in Eight CFPP Wells, March 2022-March 2023

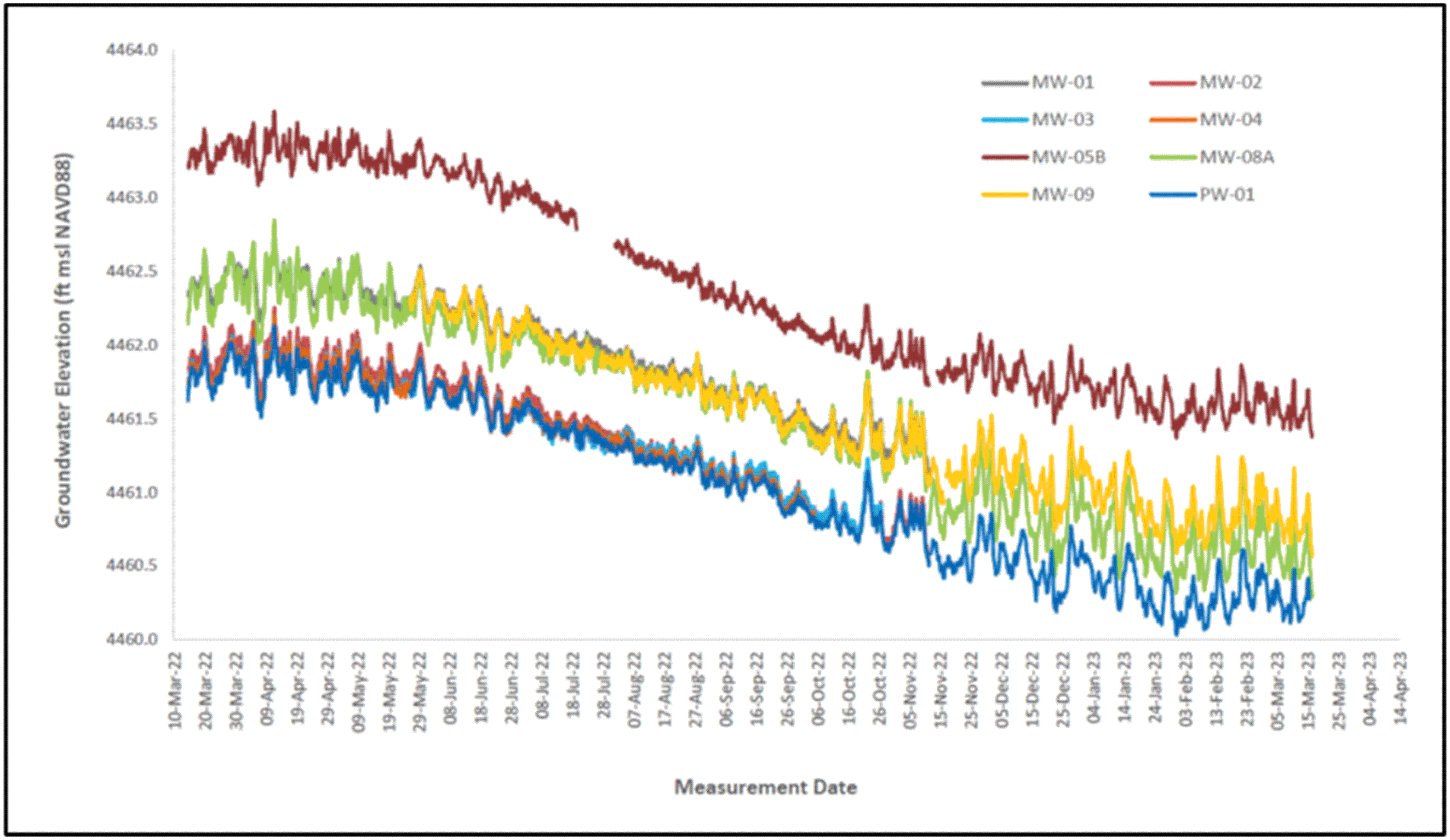


Figure 2.2-17: Long-Term Groundwater Elevations Measured in Nearby U.S. Geological Survey Wells, 1995 - 2023

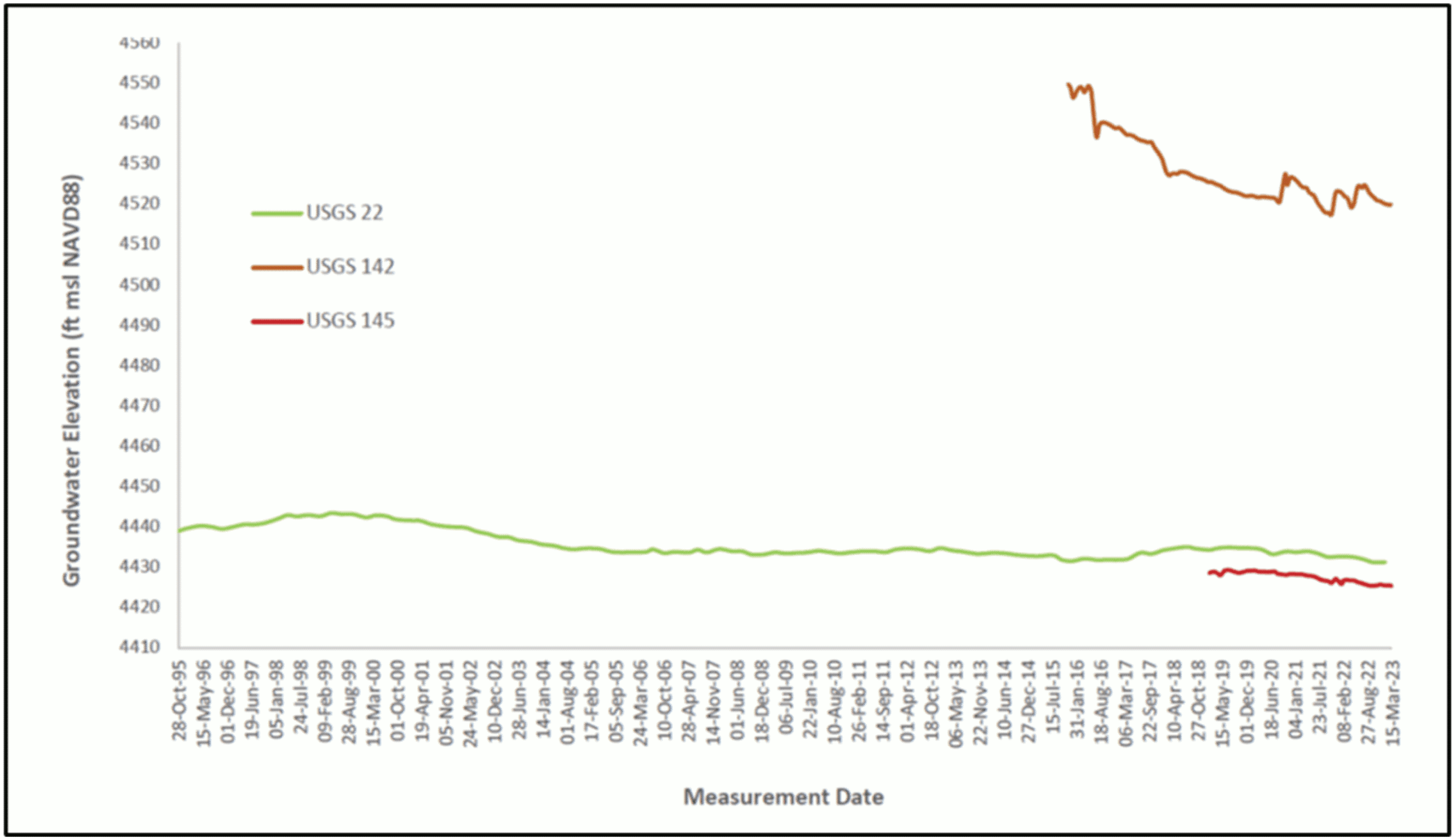
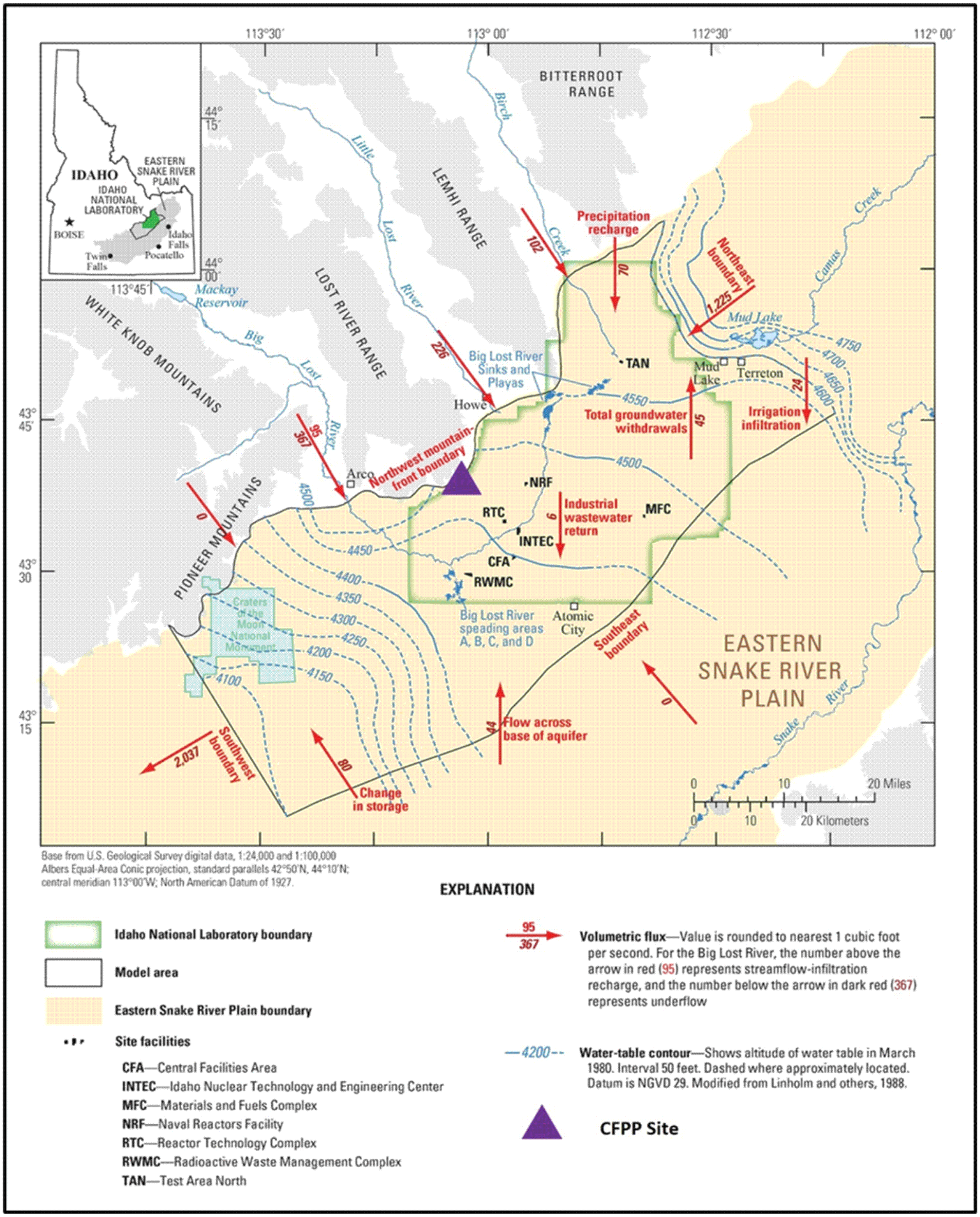
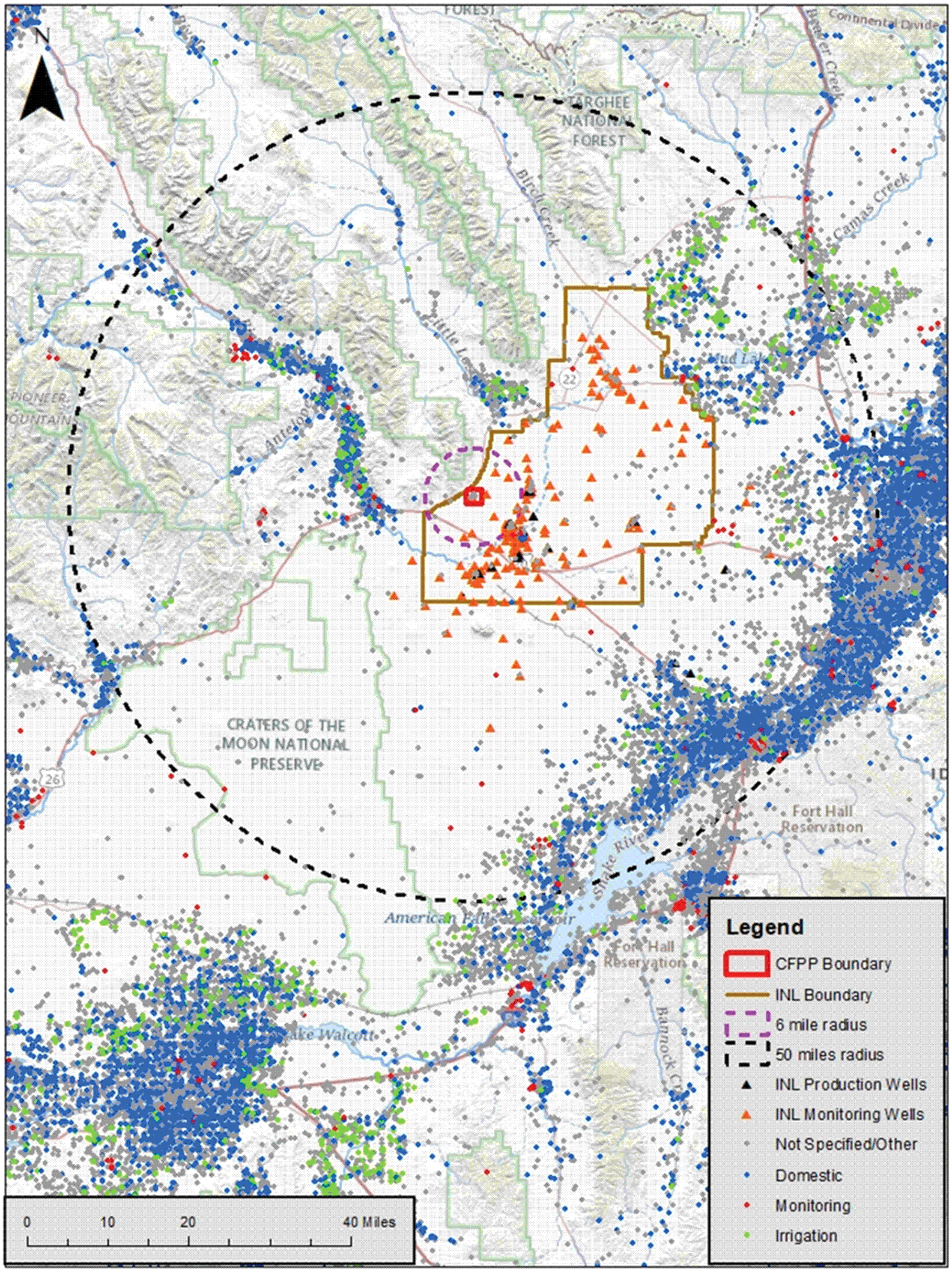


Figure 2.2-18: Generalized Groundwater Budget Components for Groundwater Model Area, INL and Vicinity



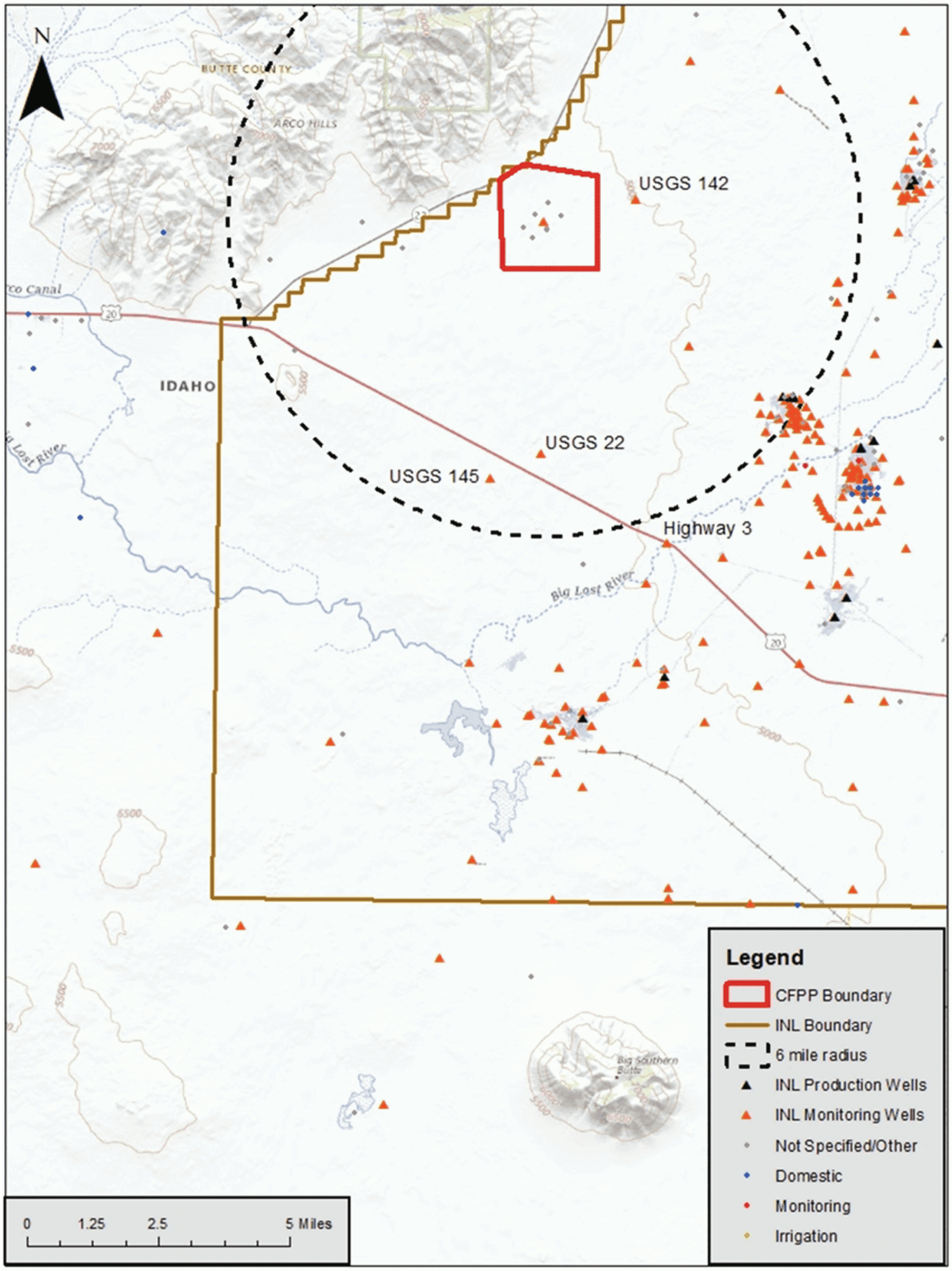
Reference 2.2-6

Figure 2.2-19: Groundwater Wells Within CFPP Region



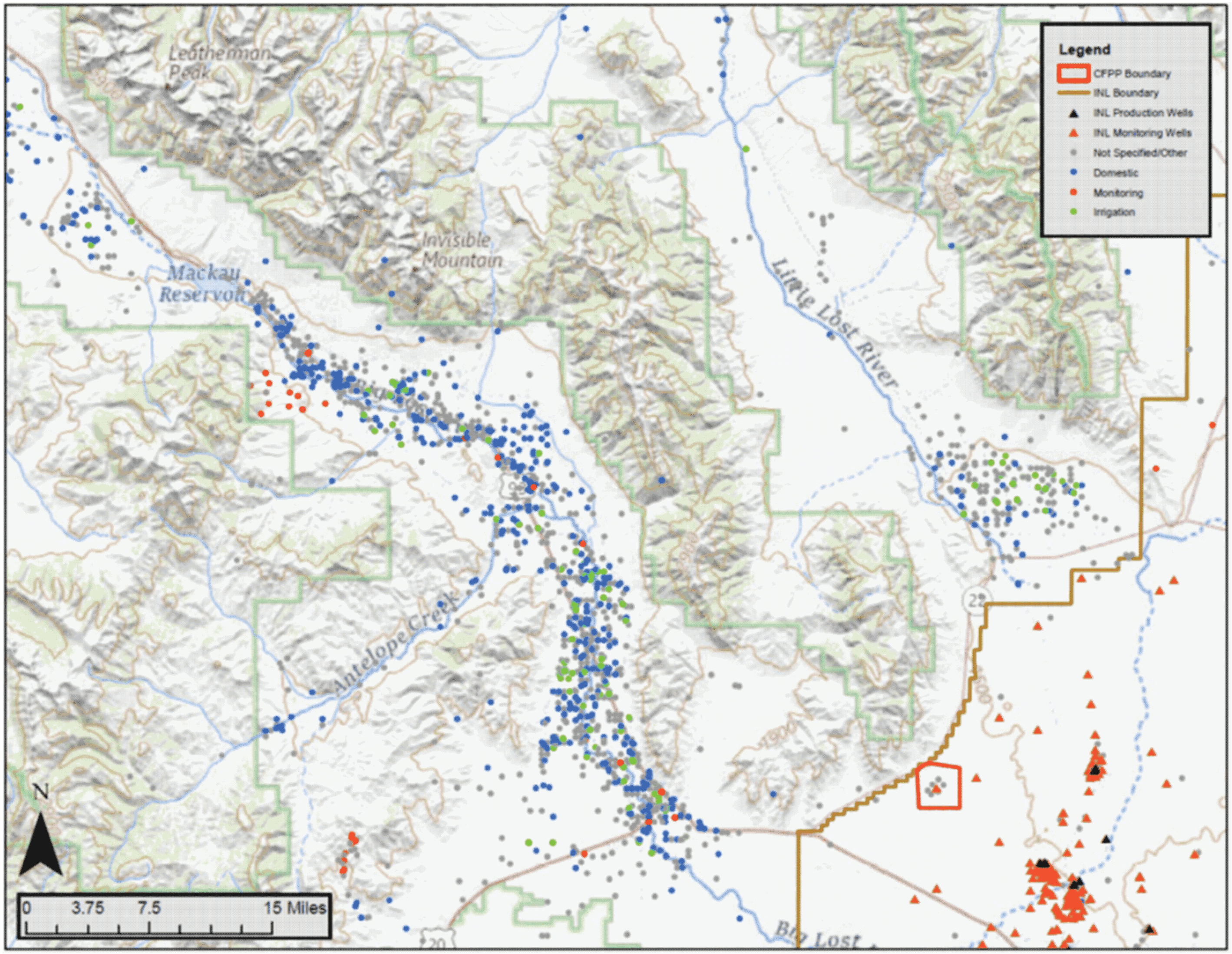
Reference 2.2-31, Reference 2.2-32, and Reference 2.2-33

Figure 2.2-20: Groundwater Wells Located Downgradient of the CFPP



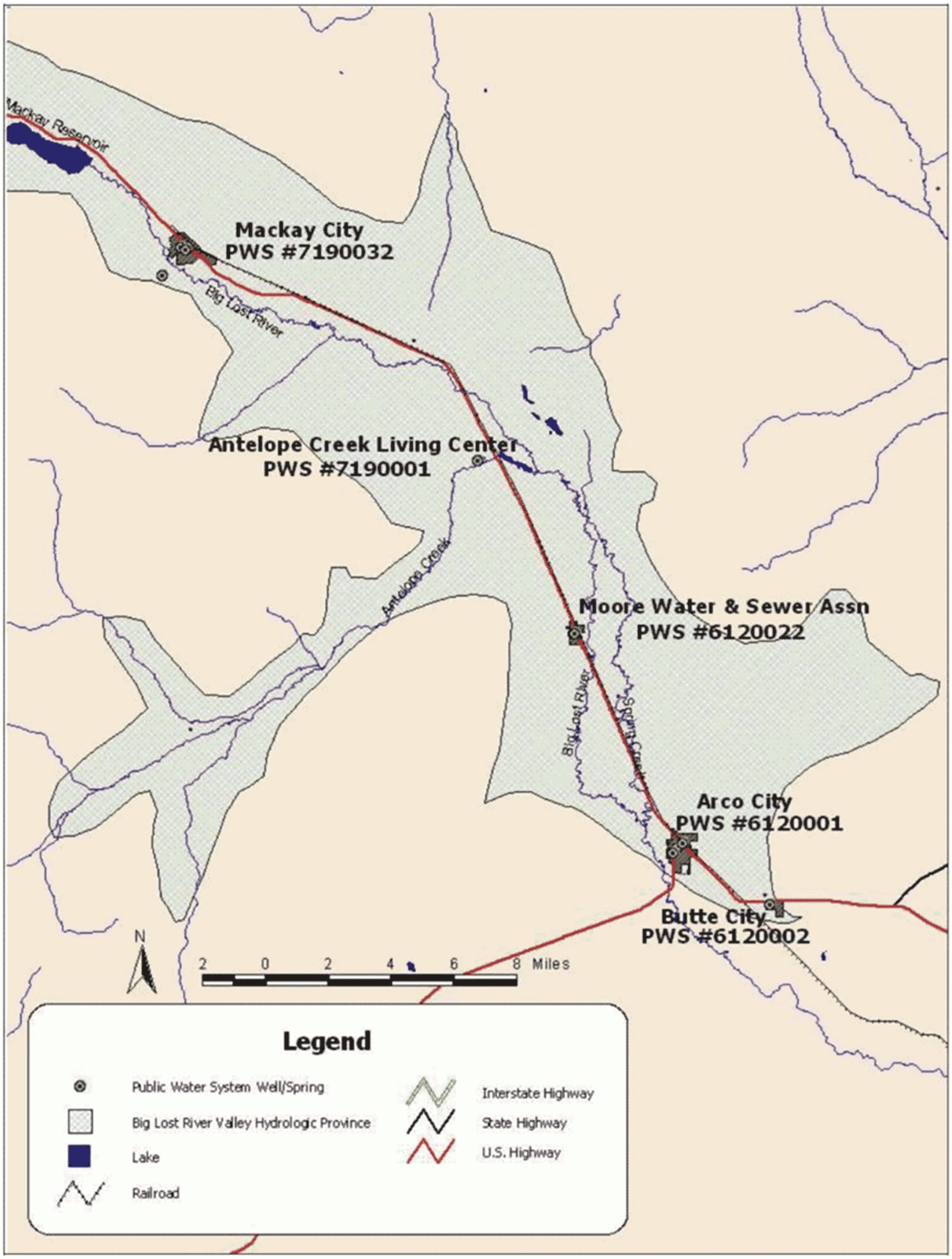
Reference 2.2-31, Reference 2.2-32, and Reference 2.2-33

Figure 2.2-21: Groundwater Wells Located in the Big and Little Lost River Valleys



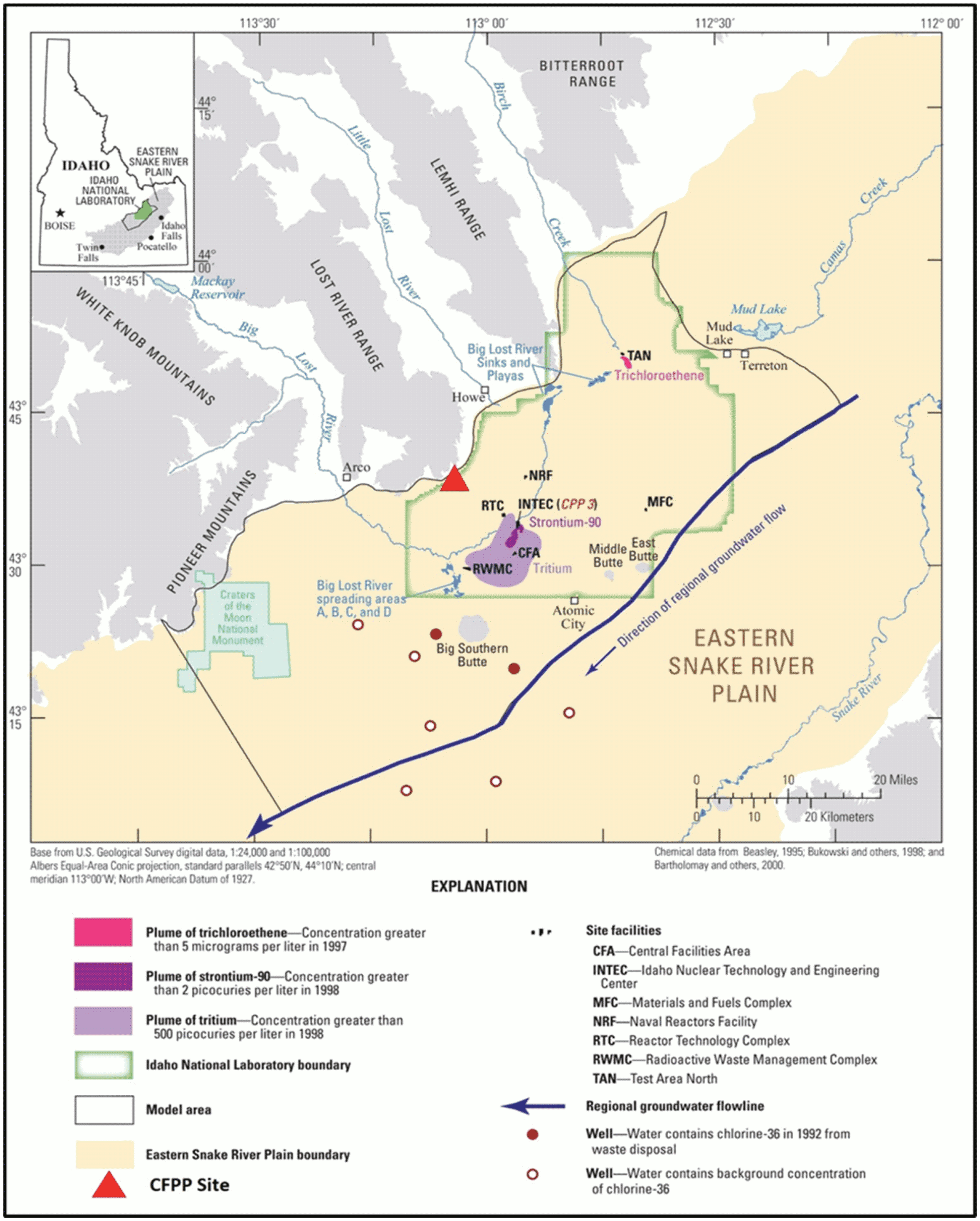
Reference 2.2-31, Reference 2.2-32, and Reference 2.2-33

Figure 2.2-22: Municipal Water-Supply Wells Located in Big Lost River Valley



Reference 2.2-35

Figure 2.2-23: Areas Where Groundwater Contamination Detected on INL Property



Reference 2.2-6

2.3 Ecological Resources

This section describes the potentially affected ecological resources for the CFPP, including off-site areas used for power transmission and supply water. Details regarding the locations of proposed facilities on the CFPP site and off-site areas are provided in LWA ER Section 2.1 and Chapter 3. Details on construction activities, areas affected, and planned operation of the facility systems are provided in LWA ER Chapter 3. Ecological resources include the plant and animal species, habitats, and ecological relationships of the land and water areas within the CFPP site, vicinity, and region. Particular consideration is given to those species protected under Federal or State law, including threatened, endangered, and sensitive species, migratory birds, and bald and golden eagles. For the purposes of this ER, sensitive and protected ecological resources include plant and animal species that are federally (U.S. Fish and Wildlife Service [USFWS]) or State (Idaho Department Fish and Game [IDFG]) listed for protection or conservation.

The DOE and its INL, U.S. Forest Service (USFS), USFWS, IDFG, National Park Service (NPS), U.S. Geological Survey, and Bureau of Land Management (BLM) have long established programs of monitoring and ecological resource management in the CFPP site region that provide readily available data and information to inform the ecological resources section of this ER. To augment the existing data set, CFPP LLC conducted terrestrial ecological surveys to provide recent, site-specific information and to fill data gaps specific to the CFPP activities. This ER presents a mix of existing and newly collected data to address the NRC Regulatory Guide 4.2, Revision 3, elements for ecological resources. These data are discussed in the following sections:

- Terrestrial Ecology – Section 2.3.1
- Aquatic Ecology – Section 2.3.2

Aquatic resources are briefly discussed in this ER, and no aquatic investigations were conducted because the CFPP site is not located on or near aquatic resources that are impacted by CFPP construction and operation. The Big Lost River is the nearest body of water to the CFPP site. On the INL site, the river is ephemeral and generally dry with infrequent temporary flow during exceptional rain or snowmelt (Reference 2.3-1). The river does flow in the Big Lost River valley northwest of the CFPP site, discharging into a reservoir above the Mackay Dam where much of the water is diverted for agricultural purposes. Below the reservoir, the river flows approximately 35 miles (mi) and supports fish and other aquatic organisms. The water is almost completely taken for agriculture before reaching the INL site or flows underground into the stream bed. Discharge measured by the U.S. Geological Survey at the Arco water gage, approximately 12.3 mi west of the CFPP site, recorded zero flow in five of the past ten years (2013 to 2022) (Reference 2.3-2).

The Snake River is the nearest major perennial river in the area, located at the outer edge of the CFPP region at approximately 44 mi from the CFPP center point. The Snake River has low potential to experience impacts from the CFPP construction and operation. Mud Lake, a natural lake of approximately 4500 acre (ac) surface area and an average depth of 5 ft, is located approximately 34 mi from the CFPP center point with no hydraulic connection. LWA ER Section 2.1.1, Land Use, and Section 2.2, Water Resources, provide additional details on the water resources in the CFPP vicinity and region.

2.3.1 Terrestrial Ecology

Construction and operation of the CFPP have the potential to affect terrestrial resources occurring on and within the vicinity and region of the approximately 2325-ac CFPP site. Idaho is made up of semi-arid shrub- and grass-covered plains, irrigated agricultural valleys, volcanic plateaus, forested mountains, woodland- and shrubland-covered hills, glaciated peaks, lava fields, and riparian forests and wetlands. Ecological diversity is enormous in the state (Reference 2.3-3). The CFPP site is located in Butte County in southeastern Idaho. The CFPP vicinity and regional lands are controlled almost entirely by State and Federal lands agencies (i.e., State of Idaho, DOE, BLM, USFS, NPS, and USFWS) with some privately held land areas. State and Federal control have resulted in reduced human influence on the ecology surrounding the CFPP site. The CFPP site is located on the INL site, near the Lost River Range, a mountain range largely in the Salmon-Challis National Forest.

CFPP LLC conducted a series of ecological field surveys at and around the CFPP site to provide recent and site-specific information. Surveys were conducted by representatives of the INL Natural Resources Group that supports ecological monitoring and surveys for the INL site monitoring and National Environmental Policy Act processes. This group is composed of biologists and environmental experts with extensive experience of natural systems on and around the INL site. A series of reports present the methodology, data, and results of the CFPP ecological surveys, as follows:

- Carbon Free Power Project Rare and Sensitive Plant Species Survey (Reference 2.3-4)
- Carbon Free Power Project Plot-Based Ecological Survey – 2022 Activities (Reference 2.3-5)
- Carbon Free Power Project Plot-Based Ecological Survey – 2023 Activities (to be completed following spring and summer 2023 sampling)
- Carbon Free Power Project Acoustic Bat Survey (Reference 2.3-6)
- Carbon Free Power Project Wildlife Survey (Reference 2.3-7)

In addition to DOE’s nuclear mission, the INL site was designated as a National Environmental Research Park in 1975 for ecosystem preservation, education, and study. The INL site is one of the few protected reserves of sagebrush-steppe habitat in eastern Idaho. According to Plant Communities, Ethnoecology, and Flora of the Idaho National Engineering Laboratory (Reference 2.3-8), approximately 40 percent of the area has been closed to cattle grazing for more than 50 years. Approximately 94 percent of INL land is open and undeveloped, including the approximately 2325 ac that DOE granted to the Utah Associated Municipal Power Systems for siting investigations and ultimately construction and operation of the CFPP. Protection from cattle grazing, off-road vehicle use, and development contributes, in part, to a rich diversity of native plant species. Native species make up approximately 85 percent of the total plant species found on the INL site.

2.3.1.1 Ecoregions

The U.S. Environmental Protection Agency provides Idaho-specific ecoregion information in Reference 2.3-3, which divides Idaho into two Level I ecoregions:

- Northwestern Forested Mountains (6.0 [ecoregion number that corresponds to Reference 2.3-3])
- North American Deserts (10.0)

The CFPP site, vicinity, and region occur in these Level I ecoregions. At Level II, the CFPP site is located within the Western Cordillera (ecoregion 6.2) and Cold Deserts (10.1) ecoregions. The CFPP region includes three Level III and nine Level IV ecoregions. Table 2.3-1, taken from Reference 2.3-3, describes the Level IV ecoregions for the CFPP site, region, and vicinity. Figure 2.3-1 presents the Level IV ecoregions for the CFPP site and vicinity; Figure 2.3-2 presents the Level IV ecoregions for the CFPP region.

The CFPP site is located almost completely within Level IV ecoregion 12g, Eastern Snake River Basalt Plains. The CFPP vicinity that extends to the west beyond the INL site border transitions from the Eastern Snake River Basalt Plains to ecoregion 17aa, Dry Intermontane Sagebrush Valleys, and 17ab, Dry Gneissic–Schistose–Volcanic Hills. The outer bounds of the vicinity radius terminate in ecoregion 17e, Barren Mountains. The ecology of these ecoregions is summarized from Reference 2.3-3 in Section 2.3.1.1.1 through Section 2.3.1.1.4. Table 2.3-1 and Table 2.3-2 provide additional information on physiography, geology, soils, and climate (Reference 2.3-3). For the purposes of this section, common names are used in the text, with scientific names available in tables. In some instances, scientific names are included in italicized parentheticals in the text for clarity or where species do not occur on tables.

2.3.1.1.1 Ecoregion 12g, Eastern Snake River Basalt Plains

This ecoregion is generally characterized by shallow, stony soils that are unsuitable for cultivation. Only small areas have soils deep enough to be farmed under sprinkler irrigation. Potential natural vegetation includes sagebrush steppe-bluebunch wheatgrass, basin and Wyoming big sagebrush, Thurber’s needlegrass, Indian ricegrass, antelope bitterbrush, bluegrass, and cheatgrass. In saline areas, vegetation includes fourwing saltbush, shadscale, and winterfat. Land cover consists of shrubs and grass. Land use is mostly rangeland with small, sprinkler-irrigated areas with deep soil used for pasture or small grain, potato, sugar beet, bean, and alfalfa farming.

2.3.1.1.2 Ecoregion 17aa, Dry Intermontane Sagebrush Valleys

This ecoregion is characterized by stream terraces, floodplains, saline areas, and alluvial fans in the rain shadow of the high mountains. Limited mountain runoff, highly permeable valley fill deposits, and low precipitation result in low water availability. Potential natural vegetation includes mostly sagebrush steppe-Wyoming big sagebrush, bluebunch wheatgrass, Indian ricegrass, squirreltail, sedges, tufted hairgrass, and rushes. On alkaline or saline soils, shadscale and greasewood may be present. Land cover is mostly brush and grasses, and land use consists of grazing, pastureland, and hay and small-grain crops.

2.3.1.1.3 Ecoregion 17ab, Dry Gneissic-Schistose-Volcanic Hills

This ecoregion is shrub- and grass-covered and is underlain by Quaternary and Tertiary volcanics. Ecoregion 17ab is less rugged and drier than the higher Barren Mountains (17e) but more rugged and receives more precipitation than the lower Dry Intermontane Sagebrush Valleys (17aa). The sagebrush-grassland vegetation contrasts with the open-canopied forest-shrubland-grassland mosaic of Ecoregion 17e. Potential natural vegetation consists mostly of sagebrush steppe-Wyoming and mountain big sagebrush, Idaho fescue, low sagebrush, bluebunch wheatgrass, shadscale, Indian ricegrass; scattered pinyon pine, and Utah juniper. Land use is primarily grazing, recreation, woodland, and wildlife habitat with some irrigated alfalfa, barley, and pasture farming.

2.3.1.1.4 Ecoregion 17e, Barren Mountains

This ecoregion is largely underlain by quartzite and carbonate-rich rocks and is drier than mountainous ecoregions to the north. Elevations are higher than those of Ecoregion 17ab and range from about 6800 to 10,000 ft. Open-canopied Douglas fir–lodgepole pine–subalpine fir forests, aspen groves, sagebrush, mountain brush, and grasses occur. Forests are limited to a narrow elevational band and are most widespread on north-facing slopes. Pacific forest elements are absent, and barrens are common. Potential natural vegetation consists mainly of Western spruce–fir forest and Douglas-fir forest. North-facing slopes may have open-canopied Douglas-fir–lodgepole pine–subalpine fir stands, aspen groves, sparse shrubs, and grasses while south-facing slopes include mountain big sagebrush, mountain brush, and sparse grasses. Vegetation occurring over limestone includes curl-leaf mountain mahogany. Land is covered by open-canopied coniferous forests, aspen groves, sagebrush, mountain brush, and grasses. Land uses include grazing, logging, mining, recreation, and wildlife habitat.

2.3.1.2 Terrestrial Habitat Types

The CFPP site is located within the Eastern Snake River Plain, an area of sagebrush steppe with harsh winter and summer conditions that place severe constraints on plant growth and animal survival. In spite of these harsh conditions, around 400 species of vascular plants have been identified on the INL site according to the Comprehensive Land Use and Environmental Stewardship Report Update (Reference 2.3-9). Table 2.3-3 identifies the habitat types and percentages of each within the CFPP site, vicinity, and region.

In 2017, DOE and its contractors undertook an extensive field sampling and model refinement to update habitat mapping in Vegetation Community Classification and Mapping of the Idaho National Laboratory Site 2019 (Reference 2.3-10). Reference 2.3-10 updates vegetation classification and descriptions for the INL site and includes information covering the CFPP site and portions of the CFPP vicinity and region. Because the CFPP vicinity and region extend beyond the INL site, the 2022 draft IDFG state wildlife action plan (SWAP) (Reference 2.3-11) and Idaho 2015 SWAP (Reference 2.3-12), provide information on terrestrial habitats in the CFPP vicinity and region outside the INL site. Figure 2.3-3 presents IDFG habitat data from Reference 2.3-12 for the CFPP region because mapping data for Reference 2.3-11 were not available for use in this ER at the time of preparation of this section. Updates to Reference 2.3-11 mapping data are reviewed and incorporated into the Combined License Application. The vegetation map for the INL site is provided in Figure 3-1 of Reference 2.3-10.

As reported in Reference 2.3-10, the natural vegetation of the INL site consists of an overstory of shrubs and an understory of grasses and forbs; only a few widely scattered trees occur in the area. Big sagebrush and green rabbitbrush are the most common shrubs, but more than 40 species of shrubs are present on the INL site and adjacent buttes or mountain toe slopes (e.g., Big Southern Butte and East Butte, and Lost River and Lemhi Mountain Ranges). Perennial grasses are generally the most abundant understory species and forbs are quite diverse in most plant communities.

Although vegetation types characterized by the dominance of big sagebrush are the most prevalent across most of the CFPP region, several other communities are common across the landscape. Green-rabbitbrush dominated communities occur in wildland fire scars, on stabilized dunes, and in stands where big sagebrush cover has declined. Communities dominated or co-dominated by low sagebrush, black sagebrush, and three-tip sagebrush are frequently distributed around the periphery but within the boundary of the INL site. Salt desert shrub communities, which are dominated by shadscale saltbush, sickle saltbush, and spiny hopsage, are associated with playas and floodplains. Grasslands may be dominated by rhizomatous species like streambank wheatgrass and western wheatgrass or by bunchgrasses like bluebunch wheatgrass, needle and thread, or Indian ricegrass and are common in wildland fire scars and associated with temporarily flooded landforms. Junipers are common at higher elevations and dominate communities associated with the buttes and foothills.

A few communities are dominated by non-native species. They are often limited in spatial extent but occur throughout the INL site. Some have been planted (i.e., for erosion control or to promote grazing) and continue to spread, such as sites dominated by crested wheatgrasses. Others are the result of invasions that are facilitated and spread by a combination of disturbances, such as altered hydrologic regime, overgrazing by domestic livestock, mechanical removal of soil, and wildland fire. These communities are often dominated by annuals, such as cheatgrass, tall tumblemustard, and desert alyssum.

Habitat types have been studied in the CFPP region for more than 70 years. The DOE, BLM, NPS, USFWS, and IDFG conduct ongoing evaluations of terrestrial habitats and the plants and animals that use them. These ongoing activities provide historical context for the terrestrial habitat for the CFPP site, vicinity, and region.

The INL long-term vegetation (LTV) transects monitoring comprises one of the oldest, largest, and most comprehensive vegetation data sets for sagebrush-steppe ecosystems in North America (Reference 2.3-13). Vegetation abundance data have been collected periodically once every two to ten years since 1950 from plots located along two macro-transects that bisect the INL site. Eighty-nine active LTV plots were sampled for the 13th time in 2016, as shown in Figure 1 of Reference 2.3-13. Ten of these plots are located within the CFPP vicinity, to the north side of the CFPP site boundary. Figure 2.3-4 presents the LTV transects relative to the CFPP site and vicinity.

Analysis of the data collected during the LTV 2016 sample period included updating functional group trends, which have been reported for several decades. Notable changes between the 2011 and 2016 sample periods include decreases in shrub cover, particularly big sagebrush; increases in native grass cover; and declines in the densities of introduced annual grasses and forbs. In terms of long-term trends, big sagebrush cover in 2016 was at its lowest point in the 66-year history of the data set. Native, perennial grasses were near the upper end of their historical range of variability. Although the abundance of introduced annuals declined between 2011 and 2016, introduced annuals were much more abundant than native annuals across the LTV plots. Introduced annuals also exhibited fluctuations with greater magnitudes of change from one sample period to the next over the previous two decades when compared with earlier sample periods. Coincidentally, annual precipitation was below average for four of the five years before the 2016 sample period and the seasonal timing of precipitation has shifted away from wet spring periods to elevated precipitation in late-summer and fall over the past five to ten years.

Declines in big sagebrush cover are due to direct losses from wildland fire and possibly from reduced germination and establishment because of below average spring precipitation over the past decade. Changes in the seasonality of precipitation are likely also affecting the abundance of introduced annuals, especially with respect to the magnitude of change from one sample period to the next. Increased pressure from non-native species, including annuals (e.g., cheatgrass) and perennials (e.g., crested wheatgrass), may persist over the next few decades. Some of the recent changes in vegetation distribution and structure on the LTV plots may suggest the beginning of a shift to less resilient native plant communities on the INL site.

2.3.1.2.1 CFPP Habitat

Figure 2.3-5 and Figure 2.3-6 present the vegetation cover for the CFPP site and vicinity, respectively, based on Reference 2.3-10.

On August 2, 4, and 9, 2022, CFPP LLC initiated the first plot-based survey phase to characterize vegetation on the CFPP construction and operation area. Additional plot-based surveys are planned for spring and summer of 2023 to provide a full year of data; information is included with the Combined License Application (COLA) submittal. The data collected augments the existing vegetation information from Reference 2.3-10, Reference 2.3-13, habitat information from Implementing the Candidate Conservation Agreement for Greater Sage-Grouse on the Idaho National Laboratory Site: 2022 Summary Report (Reference 2.3-14), and biological resource reviews conducted to support CFPP mowing, well drilling, and other investigation activities (Reference 2.3-15).

The area within the CFPP construction and operation boundary was surveyed using a plot-based sample design to characterize vegetation and to summarize signs of wildlife presence. Special status plant species were surveyed separately, and results are reported in Section 2.3.1.5.1. Signs of special status wildlife species are assessed during the plot-based surveys, and results are reported in Section 2.3.1.5.2.

A systematic sampling approach was used with a sampling grid comprising circular sample plots spaced at approximately 500 ft intervals (Figure 2.3-4). Each plot was about 50 ft in diameter, with an area of about 2100 sq ft. One hundred and nine plots were sampled for vegetation relative abundance. One hundred and eleven plots were sampled for vegetation community classes and wildlife presence, sign, or both throughout the project footprint.

Table 2.3-4 provides the plant species identified during the phase 1 plot-based vegetation survey and associated constancy and mean rank within plant functional groups. Seventy-one species were observed across the 109 plots - 59 native species and 12 introduced species. The majority of the native species documented during the survey are perennial, most of the introduced species are annual, and both native and introduced species are relatively common across the INL site. The native species are widely distributed across a variety of plant communities and the introduced species occur frequently in disturbed areas. Table 2.3-4 includes CFPP-site-specific data from Reference 2.3-13, Reference 2.3-14, and other INL vegetation sampling efforts to maximize the data describing CFPP habitats.

Green rabbitbrush, a native shrub, is the most abundant species across the CFPP site (Table 2.3-5). The herbaceous understory of local green rabbitbrush shrublands ranges from predominately native to mostly weedy. Perennial bunchgrasses are the most abundant native understory species and cheatgrass, a non-native annual, is the most abundant introduced weedy species. The composition of the plant communities at the CFPP site are consistent with those common in post-fire footprints at the INL site (Reference 2.3-13). The area around the CFPP site burned in a 1994 wildland fire and is on a post-fire recovery trajectory to return to sagebrush shrublands. Sagebrush cover can take more than 100 years to return to pre-burn levels, and the process of sagebrush reestablishment can be particularly slow during the first few decades (Reference 2.3-5 and 2008 field inventory for special status plant species on BLM lands [Reference 2.3-16]). Because sagebrush only grows from seed, cannot resprout, and is removed entirely from areas that have burned, the presence of sagebrush in a portion of the survey plots is indicative of natural recovery; no known fire recovery treatments were conducted on this wildland fire footprint. While big sagebrush is beginning to reestablish in burned areas, it also dominates the plant community in some unburned islands that occur within the project footprint (Reference 2.3-5).

2.3.1.2.1.1 Green Rabbitbrush/Sandberg Bluegrass-Bluebunch Wheatgrass Shrub Grassland (INL 1 habitat from Figure 2.3-5 and Table 2.3-3)

The Green Rabbitbrush/Sandberg Bluegrass-Bluebunch Wheatgrass Shrub Grassland class generally exhibits a shrub canopy that ranges from moderately open to nearly closed with an abundant medium-tall herbaceous layer. Green rabbitbrush clearly dominates the shrub stratum and other shrubs, such as big sagebrush and gray horsebrush, occur sporadically. Sandberg bluegrass dominates and bluebunch wheatgrass is typically abundant and often co-dominates the herbaceous stratum. Bottlebrush squirreltail may be locally abundant in some stands of this vegetation class; Indian ricegrass and thickspike wheatgrass are often present, but these species generally contribute little total cover. Forbs are diverse and highly variable in stands of this vegetation type. Shaggy fleabane, tapertip hawksbeard, and Hood's phlox are the perennial forbs that occur with the greatest cover and constancy. Cheatgrass is present in most communities of this vegetation type, though cover can range from very low to quite abundant.

Stands of this vegetation type are generally supported by loamy soils with a moderate depth to bedrock. Neither very coarse nor very fine soils are conducive to the dominance or co-dominance of bluebunch wheatgrass in the plant community. This community tends to occur on the rolling upland topography found at the higher elevations around the periphery, especially to the south and west and is not found in the slightly lower elevation areas near the center of the INL site. The slightly higher elevations around the periphery of the INL site likely experience more precipitation and have higher soil moisture holding capacity because bluebunch wheatgrass is rare where soils are very coarse. This class is often associated with post-fire burn scars.

2.3.1.2.1.2 Cheatgrass Ruderal Grassland (INL 14 habitat from Figure 2.3-5 and Table 2.3-3)

Cheatgrass, an introduced invasive, annual grass species dominates this vegetation class. Total vegetation cover is highly variable from one stand to another. Native species persist in some stands; however, cover and diversity are typically low, and component native species composition can be quite variable depending on the plant community that was present before the conversion to an introduced herbaceous species. Native shrubs may occur sporadically with low cover values. Green rabbitbrush, big sagebrush, and gray rabbitbrush shrubs occur most frequently in this class. Bluebunch wheatgrass, Sandberg bluegrass, needle and thread, Indian ricegrass, and bottlebrush squirreltail are the most frequently occurring native grasses in this community type; although, they tend to occur sporadically with sparse cover relative to cheatgrass. Several native perennial and annual forb species may also occur infrequently in stands of this type. Introduced annual forbs, such as tall tumblemustard and desert alyssum, often occur in patches with substantial abundance within communities of this vegetation class.

This vegetation class can occur across a wide range of environmental conditions, often associated with sites that have been anthropogenically disturbed, and is not tightly constrained by slope, aspect, soil texture, or soil depth. Communities dominated by cheatgrass also frequently occupy basalt outcroppings, stabilized dunes, and low-lying playas and drainages. This vegetation class is becoming increasingly common in post-fire communities, such as the CFPP site.

2.3.1.2.1.3 Green Rabbitbrush-Thickspike Wheatgrass Shrub Grassland (INL 3/5 habitat from Figure 2.3-5 and Table 2.3-3)

This plant community is characterized by an abundance of native, perennial rhizomatous grasses. The dominant species in the herbaceous stratum is thickspike wheatgrass. Several native bunchgrasses are generally also present; Indian ricegrass and needle and thread are the most abundant. Green rabbitbrush occurs with high constancy and low to moderate cover. Additional shrubs, such as big sagebrush, spiny hopsage, and winterfat may also occur sporadically and with minimal cover. A variety of forb species may be present in communities of this class with low to moderate cover. Some of the more consistently occurring species include western tansymustard, flatspine stickseed, and Hood's phlox. Cover from non-native herbaceous species may range from absent to moderate. In stands where they occur, the most abundant non-native species include cheatgrass and desert alyssum.

This shrub herbaceous community type occurs across a variety of terrain and is generally associated with rolling upland sites. Aspect is of little importance with respect to stand distribution. Soils supporting this rhizomatous plant community are moderate to relatively deep and trend towards coarse-textured loams. This class is very common in post-fire recovering plant communities.

2.3.1.2.1.4 Green Rabbitbrush/Desert Alyssum (Cheatgrass) Ruderal Shrubland (INL 4 habitat from Figure 2.3-5 and Table 2.3-3)

This vegetation class represents plant communities where the shrub stratum is dominated by green rabbitbrush, but the herbaceous understory is dominated by non-native annuals. The canopy of the shrub layer ranges from open to moderately dense. Few other shrub species are common in this plant community, but big sagebrush individuals may occur sporadically. The herbaceous layer is generally very diverse and substantial in terms of species composition and relative cover. Desert alyssum is usually the dominant herbaceous species; however, several non-native annual species may be abundant or even dominate localized stands. Additional non-native species may include: cheatgrass, saltlover, Russian thistle, tall tumblemustard, and herb sophia. Native herbaceous species are common in this vegetation type, but when combined, they contribute less than half of the total herbaceous cover. Native bunchgrasses, such as needle and thread, Indian ricegrass, bottlebrush squirreltail, and Sandberg bluegrass, are present but are not highly abundant. Associated native forbs generally contribute very little cover; the most frequently occurring species is Hood's phlox.

The distribution of this vegetation type is not tightly constrained by soil texture or depth, often occurring in areas with rolling topography and gentle slopes such as old basalt flows with some soil accumulation. This class generally occurs in areas that have experienced relatively recent wildland fire and occasionally appears to be associated with locations that have experienced greater than average livestock use.

2.3.1.2.1.5 Needle and Thread Grassland (INL 3/5 habitat from Figure 2.3-5 and Table 2.3-3)

The grassland community represented by this vegetation class occurs in small to medium-sized patches, often in scars of recent wildland fires. Needle and thread forms a moderate to dense herbaceous layer. Thickspike wheatgrass and Indian ricegrass tend to have high constancy but contribute moderate to low relative cover in this vegetation type. Additional native grass species that may be common, but not necessarily constant, include Western wheatgrass and bottlebrush squirreltail. Scattered shrubs may be present and include green rabbitbrush, big sagebrush, plains pricklypear, and winterfat; they often occur with very low cover. Native forbs tend to have low to moderate cover and high diversity with highly variable species composition among sites. Common species include western tansymustard, flatspine stickseed, and whitestem blazingstar. Non-native species cover ranges from absent to nearly codominant in patches of this community type. When present, the most abundant non-native species are cheatgrass, tall tumble mustard, and desert alyssum.

Needle and thread may occur in a variety of substrates, ranging in texture from loams to very sandy soils. It tends to dominate where soils are moderately deep and well-drained. Consequently, this vegetation class is often found on rolling upland topography such as basalt flows with substantial accumulation of coarse-textured soils, including stabilized dunes. The patch size of this community type is directly influenced by the scale and abruptness of soil depth and texture changes.

2.3.1.2.1.6 Big Sagebrush – Green Rabbitbrush (Threetip Sagebrush) Shrubland (INL 6 habitat from Figure 2.3-5 and Table 2.3-3)

This broadly defined big sagebrush class is characterized by an open to moderately dense shrub layer. Big sagebrush is always abundant, but other shrubs range from abundant to codominant. Green rabbitbrush is always abundant across this community type and can be dominant in some stands. This vegetation class also encompasses threetip sagebrush stands. While not present in the communities of this vegetation type, it ranges from abundant to codominant where it does occur. Other shrubs occur sporadically within stands of this shrubland. Spineless horsebrush, winterfat, and spiny hopsage are a few of the more commonly occurring species. The herbaceous stratum of this plant community ranges from sparse to moderate cover. Species composition of native grasses may be quite variable from one stand to another; however, bottlebrush squirreltail, Sandberg bluegrass, thickspike wheatgrass, bluebunch wheatgrass, and Indian ricegrass sites may include: Hood's phlox, goosefoot species, storksbill species, western tansymustard, and flatspine stickseed. Cover from exotic species ranges from absent to moderate, the most abundant of which are cheatgrass, crested wheatgrass, and desert alyssum.

A wide range of plant communities are represented by this class, and they can occupy a wide range of environmental conditions. Heterogenous communities characterized by a mix of shrub species in the overstory often occur in areas with moderately complex topography where soil textures and depths change abruptly and at fine spatial scales, such as on rolling hills created by soil accumulation over basalt flows. This community type is also often associated with linear sand dunes and is distributed amongst dry braided stream channels. Substrates are highly variable and range from very fine to coarse-textured and may have low salinity and high sand content, gravel and/or rocks.

2.3.1.2.2 CFPP Vicinity Habitat

The following habitats comprise approximately 90 percent of the CFPP vicinity habitat types (Figure 2.3-6 and Table 2.3-3 provide habitat numbers and percentages):

- INL 6 habitat: Big Sagebrush-Green Rabbitbrush (Threetip Sagebrush) Shrubland
- IDFG 13 habitat: Sagebrush Steppe
- INL 1 habitat: Green Rabbitbrush-Sandberg Bluegrass – Bluebunch Wheatgrass Shrub Grassland
- INL 4 habitat: Green Rabbitbrush-Desert Alyssum (Cheatgrass) Ruderal Shrubland (approximately 12 percent)
- INL 3/5 habitat: Green Rabbitbrush-Thickspike Wheatgrass Shrub Grassland and Needle and Thread Grassland

Habitats INL 1, INL 3/5, INL 4, and INL 6 are described in ER Section 2.3.1.2.1 based on Reference 2.3-10 and Reference 2.3-5. Habitat IDFG 13, located outside the CFPP and INL site boundary to the west, is based on information from Reference 2.3-11 and Reference 2.3-12.

The Sagebrush Steppe habitat identified in Figure 2.3-6, based on Reference 2.3-12, is further detailed in Reference 2.3-11 into three sagebrush habitat types. Mapping data for Reference 2.3-11 is not currently available to detail these three habitats individually; however, summaries of the descriptions are provided here.

2.3.1.2.2.1 Tall Sagebrush Steppe and Shrubland

This sagebrush steppe ranges from hot, dry canyons and plains to mesic foothills, to cool, snowy mountains in semiarid regions. Stands occur on plateaus, badlands, valley alluvial fans and terraces, glacial outwash flats, slopes, ridges, and stabilized dunes. Productivity and diversity increase with the amount and reliability of soil moisture, which increases eastward (moister summers), with elevation (more snow), and on north-east aspects. Extensive areas of intact tall sagebrush steppe, characterized by diverse and productive native vegetation, occur across higher elevations of the state. At lower elevations, tall sagebrush with native understories is more likely to occur on north- to east-facing slopes or mesic regions of the Owyhee Plateau and east-central Idaho. Elsewhere, the extent and condition of this habitat is affected by human land uses, invasive plant species, wildfire, and climate change. (Reference 2.3-11).

Wyoming big sagebrush dominates xeric soils. Basin or foothill big sagebrush, or threetip sagebrush, dominate mesic sites. Mountain big sagebrush occurs from montane basins with cold-air drainage to steep, rocky subalpine ridges and slopes. Wildfire reduces sagebrush.

Sagebrush is often associated with antelope bitterbrush, rabbitbrush (after fire), and horsebrush. Xeric stands may have spiny hopsage, granite pricklyphlox, saltbush, winterfat, or goldenbush intermixed. Mesic and mountain stands may include mountain snowberry, serviceberry, cherry, snowbrush ceanothus, currant, and prairie sagewort. Native bunchgrasses dominate the herb layer, with bluebunch wheatgrass, Idaho fescue, Sandberg bluegrass, and squirreltail being widespread. Indian ricegrass, needle and thread, Thurber's needlegrass, thickspike wheatgrass, sand dropseed, and purple threeawn occur on xeric sites. Basin wildrye, western wheatgrass, prairie junegrass, needlegrass, slender wheatgrass, mountain brome, elk sedge, and spike fescue occur in mesic or high elevation areas. Most forb genera are widespread. They include fleabane, globemallow, pricklypear cactus, phlox, onion, hawksbeard, milkvetch, yarrow, sandwort, arrowleaf balsamroot, Indian paintbrush, buckwheat, biscuitroot, beardtongue lupine, larkspur, western stoneseed, lambstongue ragwort, cinquefoil, pussytoes, prairie smoke, nettleleaf giant hyssop, Jessica sticktight, and oneflower helianthella. Annuals or soil crust fill gaps. (Reference 2.3-11).

2.3.1.2.2.2 Dwarf Sagebrush Steppe and Shrubland

This xeric dwarf shrubland steppe is found on windblown convex ridges, plateaus and benches, gravelly alluvial fans and flats, and gravelly or rocky slopes. In the CFPP vicinity, this habitat occurs mainly in the Lost River Range foothills. Dwarf sagebrush species and herb cover varies according to soil and climate and occupies inter-mound flats and swales in areas of mounded topography. Black sagebrush is widespread, occurring on gravelly, calcareous soils. Little sagebrush also occurs widely, but on shallow, fine-textured soils over bedrock or pan that impedes drainage. Prairie sagewort can occur at higher elevations. Adapted to poor drainage and spring saturation, early sagebrush occurs on shallow, alkaline, clayey soils, while scabland sagebrush is found on shallow lithic soils over basalt in western Idaho. On scabland sites shrubby buckwheats (thymeleaf, rock buckwheat) are locally dominant. Other shrubs can be present or codominant, including antelope bitterbrush, big sagebrush, spiny hopsage, and saltbush, especially on deep soil mounds. Herbaceous cover is lowest on scabland sites. (Reference 2.3-11).

Characteristic bunchgrasses are Sandberg bluegrass, Idaho fescue, bluebunch wheatgrass, Indian ricegrass, squirreltail, onespike danthonia, Thurber's needlegrass, and introduced bulbous bluegrass. Forbs include cushion, woody-based, and deeply taprooted species, such as Hooker's balsamroot, buckwheat, desert parsley, spiny phlox, fleabane, goldenweed, largehead clover, pussytoes, lava aster, Gairdner's penstemon, onion, rockcress, Gairdner's yampah, Indian paintbrush, hawksbeard, and stonecrop. Annuals, such as knotweeds, may be seasonally common. Moss and lichen cover is high in undisturbed areas. (Reference 2.3-11)

2.3.1.2.2.3 Dry Shrubland and Grassland

These low elevation shrublands and grasslands comprise highly drought-resistant plants found in semiarid to arid settings. Stands occur on plateaus, benches, bluffs, breaklands, foothill slopes (often south to west aspects), and alluvial fans and flats, including in bottoms of hot and dry river canyons. Soils in this habitat have relatively low cover of perennial vegetation and microbiotic crust, making them vulnerable to severe erosion if disturbed. (Reference 2.3-11)

Vegetation is a mix of shrubs or dwarf-shrubs or grass-dominated with a sparse shrub layer, but total cover is low (10 to 30 percent). Frequent shrubs are rabbitbrush (e.g., yellow, rubber, Truckee), horsebrush (e.g., littleleaf, shortspine), spiny hopsage, saltbush (e.g., fourwing, shadscale), winterfat, purple sage, granite prickly phlox, slender buckwheat, bud sagebrush, and broom snakeweed. Big sagebrush, low or black sagebrush, bitterbrush, greasewood, or juniper co-occur, but rarely have more than 5 percent cover. Periodic fire prevents shrub invasion in grasslands. Important grasses include needle and thread, Indian ricegrass, purple threeawn, sand dropseed, saline wildrye, bluebunch wheatgrass, Sandberg bluegrass, squirreltail, and cheatgrass. Forbs can be diverse but have low cover. Characteristic native forbs include pricklypear cactus, arrowleaf balsamroot, shaggy fleabane, milkvetch, northwestern Indian paintbrush, Douglas' dustymaiden, nakedstem sunray, thorn skeletonweed, hoary tansyaster, pale evening-primrose, sharpleaf penstemon, and desert princesplume. Favorable precipitation can result in a flush of annuals, such as suncup, cushion cryptantha, Great Basin langloisia, desert dandelion, whitestem blazingstar, carveseed, and Indian wheat. (Reference 2.3-11)

2.3.1.2.3 Regional Habitat

Figure 2.3-3 depicts the vegetation cover for the CFPP region based on data from the IDFG in Reference 2.3-11, Reference 2.3-12, and IDFG Open Data Portal (Reference 2.3-17). In addition to the habitats discussed in Section 2.3.1.2.2, the following habitats individually account for 2 percent or more (as shown in Table 2.3-3) of the habitat in the CFPP site, vicinity, or region and are described in Table 2.3-6 and shown on Figure 2.3-3 and Figure 2.3-6:

- IDFG 1: Dry lower montane-foothill forest
- IDFG 2: Subalpine-high montane conifer forest
- IDFG 5: Mountain mahogany scrub and woodland
- IDFG 7: Lower montane-foothill grassland and shrubland
- IDFG 14: Cliff, scree, and badland
- IDFG 15: Alpine and high montane scrub, grassland, and barrens

- IDFG 22: Agricultural lands
- INL 10: Basin wildrye – mixed mustards infrequently inundated playa/ streambed

Detailed descriptions of habitats outside the 6-mi CFPP vicinity or that represent less than 2 percent of the total habitat are not described in this ER as they comprise less than 15 percent of habitats in the 50-mi radius CFPP region. Information for these additional habitats is available in Reference 2.3-10, Reference 2.3-11, and Reference 2.3-12.

2.3.1.2.4 Transmission and Water Pipeline Corridor Habitat

LWA ER Section 2.1.2.4, Figure 2.1-23a and Figure 2.1-23b, and Table 2.1-10 describe the land cover for the transmission and water pipeline corridor. The corridor location is consistent with habitats INL 1, INL 3/5, INL 4, and INL 6 as described in Section 2.3.1.2. Descriptions of the other habitats (i.e., INL 7, Crested Wheatgrass Ruderal Grassland and INL 9, Western Wheatgrass Grassland) are provided in LWA ER Table 2.1-10.

The transmission line and water pipeline corridor is located parallel to the existing 69 kV PacifiCorp power line, as described in LWA ER Section 2.1.1.5.4 and Section 2.1.2. While the CFPP site habitat has been impacted by a past fire, the sagebrush habitat associated with the CFPP transmission and pipeline corridor is of higher quality in areas that have not burned in recent history.

2.3.1.3 Wetlands

The EPA defines wetlands as “areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (40 CFR 230.3[t]).

The USFWS, as part of a 1992 preliminary survey, conducted an evaluation of aquatic habitats at the INL site for the National Wetlands Inventory (National Wetlands Inventory as Mapped for the Idaho Nation Engineering Laboratory [Reference 2.3-18]). This inventory identified and mapped approximately 135 areas within the boundaries of the INL site. Of these areas, 121 INL site wetlands were surveyed and grouped into five wetland categories (i.e., palustrine and lacustrine, riverine, manmade, unmapped, and unclassified). Jurisdictional wetlands, governed by the Clean Water Act (33 USC 1251-1376), are those wetlands that exhibit:

- prevalence of hydrophytic plants
- hydrological conditions suited to such plants
- presence of hydric soils

The only area of the INL site identified as potential jurisdictional wetlands is the Big Lost River Sinks located approximately 11 mi from the CFPP site. LWA ER Section 2.1.1 provides additional details on the wetland areas in the CFPP region.

Water bodies in the CFPP region are used by resident and migrating birds, fish, invertebrates, and amphibians. The construction and operation of CFPP are not expected to impact wetlands or result in wetland losses in the CFPP region. No wetland areas exist on the CFPP site and wetted areas in the vicinity are located at significant distance from the CFPP site. Figure 2.1-17 in LWA ER Section 2.1 presents the wetland areas in the CFPP region.

2.3.1.4 Wildlife

Table 2.3-7 lists wildlife associated with the CFPP site and region and the INL site based on USFWS and IDFG county-specific information, INL site data, and results of CFPP site-specific ecological surveys. The table presents known and potential species on the CFPP and INL sites and the 12 counties located in the CFPP region. While the CFPP region encompasses 12 counties, Butte County makes up almost 30 percent of the CFPP regional area, and the CFPP site and transmission and water pipeline corridors lie entirely within Butte County. Figure 2.1-2 in LWA ER Section 2.1 provides a basis for relying on the CFPP and INL sites and Butte County data to define the relevant wildlife species for the CFPP site and vicinity. The remaining counties are located at distances ranging from approximately 14 mi to 47 mi from the CFPP center point to the closest county boundary. Species from these counties may be migrants or occasional visitors to the CFPP site and vicinity and are provided for completeness. Additionally, larger mammals and birds can have wide-ranging territories and migratory habits. Table 2.3-7 includes the global and Idaho state conservation rankings and Species of Greatest Conservation Need (SGCN) designation. Threatened, endangered, and sensitive species are considered for the 12 counties in the CFPP region in ER Section 2.3.1.5.

2.3.1.4.1 CFPP Site Species

In 2022, CFPP LLC implemented site-specific surveys to evaluate wildlife species and associated habitats on the CFPP site. Table 2.3-8 presents the species identified through the following site-specific wildlife surveys:

- Surveys for wildlife and wildlife sign as part of the plot-based vegetation survey described in Section 2.3.1.2.1.
- Winter raptor and eagle surveys.
- Spring and fall migration surveys for ungulates and birds.
- Breeding bird surveys.
- Point count surveys at 19-to-35 points with good views of draws, gullies, and other habitat areas.

- Acoustical bat surveys on the CFPP site and in the foothills of the Lost River Range.
- Snow track surveys to identify winter resident and visitor wildlife at the CFPP site and along the transmission corridor.

Table 2.3-8 represents the 2022 summer and fall and 2022-2023 winter seasons. Information from the 2023 spring and summer seasons is included in the COLA.

Most wildlife species are highly mobile and, if present, are likely to use an area at various times of day or year depending upon the resources available within the area. Visual observations of wildlife may not be possible during short duration surveys. Therefore, plot-based survey methods are designed to document signs that animals have left behind to indicate their presence and use of the area, such as tracks or droppings. The results provide information regarding the abundance of species and help to identify the areas and habitats frequently used by wildlife.

During the plot surveys, visual sightings of animals and signs that indicate the presence of wildlife, regardless of sign age, are recorded, and if possible, the species is identified. Signs included, but are not limited to tracks, scat (droppings), burrows, bones, trails, beds, scrapes, digging, raised tunnels, or shed skins. If sign is detected on the plot, the biologist ranks the abundance of sign as described in Table 2.3-9. Abundance is determined based upon observer experience and familiarity with species that occur on the INL site. Wildlife observed or heard while at a plot are recorded as occurring on the plot and ranked.

Habitats for species listed as either SGCN or Species of Greatest Information Need in Reference 2.3-11 were searched during the surveys. For example, areas that appeared to be suitable pygmy rabbit habitat, whether within a plot or not, were searched for rabbit presence (burrows and pellets). If an observation of a species with very low detectability occurred while surveyors were walking between sample plots, the species was identified and noted, but no specific locations were collected.

Burrows located on the INL site primarily consist of those constructed by small mammals, such as deer mice and kangaroo rats, with a few larger burrows constructed or used by medium sized animals, such as American badger, coyote, or burrowing owl. Unless scat or other sign is located at the entrance, determining the species that occupies the burrows is often difficult. Observations were recorded as belonging to small or medium mammals when the species could not be identified.

Signs from 19 wildlife species were identified during the plot surveys and sign of at least one species was detected on all but two plots. The presence of six species was identified from scat, which was the most common sign observed (Table 2.3-8). Scat was observed on 80 percent of the plots with 37 percent of those plots containing scat from multiple species. The amount of scat considered abundant or common was observed on only 7 plots and consisted of either mountain cottontail or pronghorn antelope pellets. Pronghorn antelope scat was the most frequently observed and was present on 66 percent of the total plots and in every vegetation community type, though most plots only contained one to a few pellets. Elk and rabbit (mountain cottontail and black-tailed jackrabbit) scat were also frequently observed, occurring on 26 and 30 percent (both rabbit species are combined) of the plots, respectively.

Burrows were the second most common observation made during the plot surveys and were observed on 55 percent of the plots (Table 2.3-8). Most burrows observed belonged to small mammals with only two belonging to a medium mammal, both of which occurred in the same plot as small mammal burrows. During the plot surveys, a North American deer mouse was observed on one plot. Based on other INL site surveys, this is the most common rodent on the INL site. Many of the burrows observed were likely inhabited by this species (Reference 2.3-5).

Visual sightings were made of six bird species, three mammals, and two reptiles (Table 2.3-8). Horned larks were the most common visual observation and were observed from 27 percent of the plots. This species was often observed flying around in flocks across the project site.

A gopher snake was observed while surveyors were travelling between plots; the snake was not recorded on the plots. Snake observations are highly unusual during the summer unless temperatures are optimal. This snake was observed during the early morning hours traveling between rock piles.

According to Reference 2.3-7, Brewer's sparrows and sagebrush sparrows were the most commonly detected species during the point count surveys, occurring on approximately 68 percent and 63 percent, respectively, of the points surveyed. Overall, 56 species were identified through the point count surveys with a total of 2171 wildlife observations. Winter track count surveys identified 16 discernable wildlife species via animal track observations, with the coyote accounting for approximately 64 percent of track observations. Visual observations during the the survey effort detected 12 different species with a total of 143 individuals. The most common visual observations were of the rough-legged hawk and the snow bunting, accounting for approximately 27 percent and 24 percent of observations, respectively. Overall, 51 birds and 5 mammal species were identified in the point count and snow track surveys.

2.3.1.4.2 Vicinity Terrestrial Species

The INL site encompasses a large area of sagebrush-steppe habitat protected through decades of federal site management. Wildlife studies provide understanding of the species that inhabit, use, and visit the INL site.

Table 2.3-7 provides a list of species that occur or potentially occur on the INL site. Because much of the CFPP vicinity and the transmission and water pipeline corridor lie within the INL site, species from the INL site may also be present or visit the CFPP site. The habitats in the BLM-controlled areas outside the CFPP and INL site-boundaries are similar to INL site habitats and similar mobile wildlife species, such as birds and large mammals, can be expected to inhabit or visit across the boundaries.

2.3.1.4.3 Regional Terrestrial Species

The CFPP region provides habitat for a diversity of wildlife species that serve as predators, prey, scavengers, seed dispersers, and pollinators in ecosystems. Taxa include mammals, birds, fish, reptiles, amphibians, and invertebrates, almost exclusively terrestrial. Ongoing programs by DOE, BLM, USFWS, and IDFG provide information on wildlife in the region.

The DOE conducts recurring wildlife surveys on the INL site as part of its environmental management requirements. Additionally, the USFWS and IDFG issue technical and informational reports and maintains online information sources on wildlife species in the region. The following sources provide supporting information for this section:

- 2021 INL Breeding Bird Survey (Reference 2.3-19)
- Idaho National Laboratory Site Bat Protection Plan Annual Report 2022 (Reference 2.3-20)
- 2022 sage-grouse candidate conservation agreement summary report (Reference 2.3-14)
- Idaho Species (Reference 2.3-21)
- LTV update report (Reference 2.3-13)
- 2022 SWAP (Reference 2.3-11)
- ESER Website (Reference 2.3-22)
- 2020 INL comprehensive land use plan update Reference 2.3-9

The list of species originates from the county species lists (Reference 2.3-21). The list is then augmented with information from the other identified references to obtain a comprehensive list of animals in the CFPP site, vicinity, and region, including the INL site. The list includes amphibians, reptiles, birds, mammals, and terrestrial invertebrates. Many species identified in the CFPP region depend on the sagebrush-steppe habitat.

The following terrestrial wildlife species are identified as occurring or potentially occurring in the CFPP region.

2.3.1.4.3.1 Amphibians

Nine species of frogs, salamanders, and toads are identified for the CFPP region. Six species are identified as occurring or potential on the INL site. The Great Basin spadefoot, a species of toad, is the only documented amphibian on the INL site (Reference 2.3-9). An additional species, the long-toed salamander, is identified in Butte County but not on the CFPP or INL sites. These amphibians inhabit riparian, herbaceous wetlands, temporary pools, and scrub-shrub wetlands. The closest amphibians to the CFPP site are associated with the Big Lost River during high-precipitation periods when the river flows onto the INL site. The Big Lost River is more than 69 mi from the CFPP center point at its closest location. Three of the amphibians are designated by the State of Idaho as SGCN in the SWAP as species most in need of conservation (i.e., Columbia spotted frog, northern leopard frog, and western toad); these three species occur or potentially occur on the INL site. To date, they have not been identified on the CFPP site. The nine amphibians are protected non-game species under the Idaho Administrative Procedures Act 13, Fisheries and Wildlife Bureaus, Section 13.01.06 – Rules Governing Classification and Protection of Wildlife. Amphibians are not expected to be impacted during the CFPP construction and operations due to the general lack of habitat, specifically standing water for breeding, and the distance between the CFPP site and amphibian habitats.

2.3.1.4.3.2 Reptiles

Twenty species of snakes and lizards are identified for the CFPP region. Fifteen species are identified as occurring or potentially occurring on the INL site and two are identified on the CFPP site, the sagebrush lizard and short-horned lizard. These lizards inhabit sagebrush and pinyon-juniper woodlands, burrowing or using existing burrows. One reptile species, the common garter snake, is designated in Reference 2.3-11 as a SGCN and may potentially occur on the INL site. The ringneck snake, designated as sensitive by the USFWS, inhabits a range of habitats; in the Rocky Mountain area, the ringneck snake is mainly confined to riparian corridors. Individual reptiles may be impacted by CFPP construction and operation.

2.3.1.4.3.3 Birds

Two-hundred and fifty-five species of birds are identified for the CFPP region. One-hundred seventy-two species occur or possibly occur on the INL site. Twenty-one species are identified on the CFPP site to date, as shown in Table 2.3-7. Forty-one species in the region are identified as SGCN, 29 of which occur or possibly occur on the INL site and 6 that are found on the CFPP site (i.e., Brewer’s sparrow, common nighthawk, greater sage-grouse, loggerhead shrike, sage sparrow, and sage thrasher). Bird habitats include both terrestrial, such as sagebrush steppe; and aquatic, such as rivers, streams, lakes, and ponds. The six SGCN birds on the CFPP site are sagebrush obligate or dependent. Removal of sagebrush habitat is the largest potential impact from CFPP construction and operations; however, these activities may also affect nesting and migration periods. Impacts to aquatic birds are not expected because of the lack of aquatic habitat on or near the CFPP site.

2.3.1.4.3.4 Mammals

Seventy-one species of mammals, including rodents, ungulates, bats, and predators are identified for the CFPP region. Fifty-one species occur or possibly occur on the INL site. Nine species are identified on the CFPP site to date, as shown in Table 2.3-7. Fifteen species are designated as SGCN with 10 species occurring or potentially occurring on the INL site and 1 species, the pronghorn, as identified to date on the CFPP site. Habitats range from sagebrush steppe to foothills and mountainous areas of the Lost River and Lemhi Ranges. Small mammals, such as black-tailed jack rabbits, and pronghorn, mule deer, elk, moose, and mountain lion are documented or have modelled potential habitat on the INL site. The INL site is situated near the base of the Beaverhead Mountains, Lemhi Range, and Lost River Range on the north and west and is in proximity to other ranges to the east and south. The mountain goat is associated with mountainous terrain and has limited potential to occur on the CFPP and INL sites, based on IDFG modeled habitat.

2.3.1.4.3.5 Terrestrial Invertebrates

Thirty-three species of invertebrates, including mites, grasshoppers, flies, beetles, butterflies, and bees, are identified for the CFPP region. Ten species are identified as SGCN with only the Suckley cuckoo bumble bee identified as occurring or possibly occurring on the INL site. Insects are not an identified objective of CFPP site-specific surveys, and no occurrences were documented on the CFPP site during the field effort. An Idaho point-headed grasshopper, a SGCN, was observed during the rare and sensitive plant surveys in the foothill area of the Lost River Range. Biologists conducting the surveys are familiar with local insect issues, and information for this ER is derived from government databases and published sources. Most of the terrestrial invertebrate species inhabit or use the sagebrush-steppe habitat of the INL site and surrounding region. Some also inhabit the caves located on the INL site and surrounding mountain areas. The Idaho dune tiger beetle is an obligate species in the Sparsely Vegetated Dune Scrub and Grassland habitat on the eastside of the CFPP region (Reference 2.3-11). The monarch may be found in areas with milkweed, the main source of food for the butterfly. The INL site has some types of milkweed but monarch sightings are rare. Ants are generally present in much of the CFPP region and play an important role in the desert habitat by moving seeds. Caves and lava tubes on the INL site provide unique habitats for some invertebrates, such as cave obligate harvestman species.

Figure 2.3-7 identifies critical habitat within the CFPP region based on the USFWS Critical Habitat for Threatened & Endangered Species (Reference 2.3-23). Bull trout and yellow-billed cuckoo have designated critical habitats located within the CFPP region. Bull trout critical habitat is in the Little Lost River valley in Custer and Lemhi Counties. The bull trout range is mainly on the outer edge of the regional boundary, 40 mi or more from the CFPP site. The yellow-billed cuckoo critical habitat is located in Bannock, Jefferson, and Madison Counties, at the outer edge of or outside the CFPP region associated with the Snake River. The CFPP construction and operations are not expected to impact these critical habitat areas.

The sagebrush steppe is considered sensitive habitat that supports a range of sagebrush obligate, dependent, and associated species. During CFPP preconstruction activities, the surface of the site is removed or altered to allow excavation of building foundations and ponds and development of laydown and staging, rock crushing and batch plant, parking and administrative, and balance of plant areas. While the sagebrush on the CFPP site is in a recovery state from a 1994 fire, valuable habitat is impacted to some extent during pre-Combined Operating License (COL) and Combined Operating License activities. The greater sage-grouse, generally considered a sagebrush obligate, presents one of the biggest habitat concerns. Mitigation strategies for the construction activity impacts to the sagebrush habitat are discussed in ER Section 4.3 and included in ER Appendix B, Environmental Protection Plan.

2.3.1.4.4 Habitat Value for Wildlife Groupings

Wildlife on the CFPP site, vicinity, and region are diverse, and extensive expanses of good-condition habitats exist in many parts of this area. The CFPP site has limitations to the wildlife species it can sustain.

- The CFPP site has been disrupted by wildfire within the past 30 years, and plant communities in this habitat are undergoing successional stages that may take 100 years to again reach a climax sagebrush-dominated plant community.
- No streams or waterbodies exist closer than approximately 10 mi from the CFPP site; wildlife drinking water is available on the site for short periods during rain events or after snowmelt.
- Few small shrubs and no large trees exist on the site, which precludes nesting by many species of birds and small mammals, the opportunity for hunting perches by predatory birds, and cover for many species.
- Traffic on State Highway 33 that runs along the northern edge of the CFPP site affects wildlife through disturbance, potential for easy poaching of game, and wildlife strikes.
- Winter conditions are harsh at the CFPP site for wildlife and plants because of snowpack, high winds, and sub-zero temperatures, which

causes many species to be dormant throughout the winter. Summers can be dry and windy, limiting wildlife activity.

The desert provides habitat for several invertebrate species, including types of worms, arachnids, and insects, living in or on vegetation and the soil and rocks. Systematic surveys to catalog invertebrates in the region have not been conducted and species occurrence is likely limited by much of the area having relatively recent volcanic activity, seasonal temperature extremes, and a paucity of water. A rare Idaho point-headed grasshopper was identified in foothill areas north of the CFPP site during CFPP biological surveys in habitat that does not occur at the CFPP site.

The sagebrush-steppe habitat that dominates the CFPP site was burned by wildfire in 1994 and the site is currently dominated by grass species and small dispersed shrubs, though reestablishment of the sagebrush community appears to be following a natural progression that may take 100 years or more to establish a climax sagebrush community. The wildfire undoubtedly disrupted the invertebrate community and as succession progresses invertebrate species assemblages likely change.

Fish populations and aquatic habitat are absent within the vicinity of the CFPP site. In exceptional snowmelt runoff years, dry channels may carry water for a short period in the spring and fish and other aquatic species may move near the CFPP area (none of these channels pass through the CFPP site), but these individuals cannot persist or reproduce because the channels quickly dry and the fish die. Channels that flow nearby are managed for agriculture irrigation and summertime flow does not occur.

Amphibians require standing water to successfully reproduce because eggs are laid in water and the larvae stage breathes through gills, though the waterbody need only be seasonal. One amphibian, the Great Basin spadefoot, is found in the CFPP vicinity, though not at the CFPP site. This species is highly desert adapted to make use of cool or moist burrows and rare reproduction opportunities. Artificial water ponds at the INL facilities provide potential breeding habitat for the Great Basin spadefoot. Ponds at the CFPP site, with water derived from storm runoff and groundwater, may similarly provide potential breeding habitat for amphibians.

The eastern Idaho desert is home to many reptile species, including types of snakes and lizards. Reptiles typically inhabit below-ground burrows and feed either under or above ground on plant matter, invertebrates, small mammals, birds, and other reptiles. These species are adapted to desert conditions and do not require constant water to drink or reproduce.

Large expanses of sagebrush steppe habitat occurring in the CFPP region provide valuable habitat for reptiles. Rock outcrops provide burrow, shade, and cover opportunities. Few natural perches exist for predator birds at the CFPP site, which is advantageous for potential snake and lizard prey species.

Western rattlesnakes occur in the vicinity. No known wild populations of exotic reptile species occur in the vicinity. The greatest non-natural hazard to reptiles is habitat loss from wildfire and interactions with vehicles while crossing roads.

A variety of mammals common to this part of Idaho live in or use the habitats of the CFPP site, vicinity, and region. The sagebrush-steppe habitat is important to many wildlife species that use or visit the CFPP vicinity. Small rodents, such as kangaroo rats, deer mice, and jackrabbits, are common in the desert and serve as prey for many predator species, including large mammals, snakes, and birds of prey. Bats are seasonally common, and more than a dozen species are recorded during regional surveys. Large ungulates in the region include moose, elk, mule deer, bighorn sheep, mountain goats, and pronghorn. Pronghorn occur year-round in the CFPP region. Many large ungulates migrate from mountain areas to desert areas in the region to spend the winter.

Large predators known to occur at the INL include badgers, red fox, and coyotes. Grizzly bear, black bear, and gray wolf are major predators that occur in the CFPP region, though sightings on the INL site are rare and the desert habitat of the site is not preferable for these species. Wolverine and other mustelids (e.g., skunk and weasel), racoon, and mountain lion, are predators in the mountains north of the CFPP region and could conceivably traverse the CFPP site while hunting or expanding to new areas, though sagebrush-steppe habitat is not preferred or normally inhabited by these species. Many small mammals in the mountains surrounding the CFPP site, such as marmot, porcupine, and squirrel species, do not prefer sagebrush steppe habitat and are a rare occurrence at INL. No habitat exists for aquatic mammals, such as beaver, otter, or muskrat on or near the CFPP site.

Non-native mammals that have established wild populations in Idaho and might occur at the site include Virginia opossum, house mouse, and black and Norway rats; though, none of these have been recorded on the INL site and are generally not desert species. The nearest wild horse herd is managed by the BLM approximately 50 mi northwest of the INL near Challis, Idaho.

The shrub-steppe/grassland habitats common in the vicinity include many resident and migratory bird species. Shrub-steppe/grassland songbirds include many small species, such as sagebrush sparrow, Brewer’s sparrow, sage thrasher, and vesper sparrow, with horned lark and western meadowlark as the most common species. The INL areas adjacent to farmed areas seasonally have species of blackbird, starling, and cowbird. Common raven, black-billed magpie, and loggerhead shrike, joined by northern shrike during winter, are predators and scavengers throughout the vicinity. Raptors are relatively common, including golden eagle, northern harrier, red-tailed hawk, and occasional ferruginous hawk and prairie falcon; a summertime addition is Swainson’s hawk, and a wintertime addition is the rough-legged hawk. Short-eared owl and burrowing owl nest in this area. A notable species is the greater sage-grouse, a sagebrush habitat obligate, which breeds near the CFPP site and lives year-round in sagebrush dominated areas.

Many other species can be observed in the vicinity during spring and fall migrations. Seasonal migratory species range in size from hummingbird species to sandhill crane and trumpeter swans. Several warbler species and other passerines pass through the site in the late spring and early autumn and may forage where possible. Waterfowl, shorebirds, and gulls/terns also migrate through this area with some species using wetlands, lakes, or rivers in the region year-round. No wetland and open-water habitats exist on the CFPP and are limited in the CFPP vicinity. Woodland species, such as woodpecker, nuthatch, crossbill, chickadee, and titmouse are uncommon in the desert, and obligate tree nesting species are absent because of the absence of trees.

Federal and state wildlife areas are located within 50 mi of the CFPP site with management oriented to birds, mostly for waterfowl hunting, nesting, and wintering. Thousands of trumpeter swans, and occasionally other swan species, winter in agricultural fields east of the CFPP site, and thousands of ducks and geese winter in eastern Idaho in open water areas along the major Idaho rivers. Hay (grass and alfalfa) is a major crop in agricultural areas in the region and many types of upland shorebirds and upland game birds seasonally use these fields during migration, including sandhill cranes and long-billed curlews. Non-native species in the vicinity may include starling, house finch, house sparrow, pheasant, rock dove, Eurasian collared-dove, chukar, and gray partridge; though, none of these species is considered a major threat to the ecosystem and no controls are practiced.

The INL and CFPP sites provide good sagebrush scrub habitat, and the general absence of livestock, fences, hunting, and human activity (such as offroad vehicle use) creates favorable conditions for many species. The absence of water in deserts is a limiting factor and little effort has been made to install livestock or wildlife watering structures in the vicinity. Invasion of non-native plants, especially cheatgrass, and wildfires have reduced the quality of much habitat in sagebrush-steppe areas.

The INL site provides valuable habitat to several species because of large expanses of habitat, valuable foraging opportunities, limited hunting, controlled livestock grazing, and limited disturbance by humans. Lack of water and trees limits bird species occurrence and number of birds at INL, particularly near the CFPP site, but desert adapted species persist. Notable rare regional residents include greater sage-grouse, ferruginous hawk, and burrowing owl, which are often featured in land management agency conservation programs. Several species of birds from many groups around the INL have shown declines over the past few decades (based on breeding bird survey data), mostly attributed to declines in habitat caused by wildfires (Reference 2.3-19).

2.3.1.4.5 Indicator Organisms

The sagebrush steppe of southeastern Idaho provides resident, breeding, roosting, and stop-over habitats for a variety of species. Sagebrush obligate species, such as greater sage-grouse, sagebrush sparrow, sage thrasher, pygmy rabbit, and some terrestrial invertebrates, can provide evidence of habitat health. Monitoring sagebrush provides information on habitat quality and biodiversity. For example, in wildfire burn areas, the sagebrush can take decades to recover; invasive grasses and noxious weeds that more readily spread after fire reduce the biodiversity of both plants and animals.

Once abundant throughout the western United States and some portions of Canada, the greater sage-grouse has experienced drastic declines and can now be found in a lesser number of areas. Greater sage-grouse populations are affected by a multitude of factors, including reduction of habitat through agriculture and commercial and residential developments, livestock grazing, wildfire, hunting, and environmental factors, such as weather.

Greater sage-grouse are highly dependent on sagebrush for forage, nesting, and protective cover in life phases throughout the year. Approximately 99 percent of the sage-grouse winter diet consists of sagebrush leaves and buds. At other times of the year, they also eat forbs, and, in the summer, insects are also part of their diet, especially for young grouse. Greater sage-grouse do not require open water for day-to-day survival if succulent vegetation is available.

In 2014, DOE-Idaho and the USFWS entered into a Candidate Conservation Agreement (CCA) (Reference 2.3-24) to conserve the greater sage-grouse and its habitat on the INL site. This voluntary agreement established a Greater Sage-Grouse Conservation Area, and DOE-Idaho committed to deprioritize the conservation area when planning infrastructure development and to establish mechanisms for reducing human disturbance of breeding and nesting greater sage-grouse. To guard against greater sage-grouse declines outside the natural range of variation, the CCA established a population trigger that, if tripped, would initiate a predetermined response by both agencies. In 2022, male greater sage-grouse counted on baseline leks on the INL site were 8.4 percent higher than in 2021 (246 males), but the three-year running average declined 7.9 percent, tripping the population trigger. Counts on six lek route counts increased 24 percent compared to 2021. Three leks were downgraded to inactive status and one was discovered, reducing the total number of known active leks on the INL Site to 36. This is the lowest number of known active leks since 2010. [2022 CCA report] In 2022, sagebrush habitat condition summary metrics were within or above the normal range of variability of the five-year baseline dataset. Sagebrush habitat plot trend analyses indicate that sagebrush cover continues to increase, intact sagebrush habitat communities are resistant to invasive species dominance, and native perennial functional groups are exhibiting resilience to drought.

Post-fire communities appear to have more annual fluctuation in species abundance and composition in response to precipitation amount and timing.

Amphibians and reptiles are viewed as indicators of ecosystem health. They are sensitive to a variety of threats and thus, can serve as early indicators of ecosystem change when monitored over long-time scales. Changes in populations can often be linked to one of the following causes, which suggest a decrease in overall ecosystem health:

- pollution
- introduced species
- drought
- habitat destruction
- disease
- ultraviolet radiation

These changes in ecosystem health may exhibit measurable changes in distribution, occupancy, abundance, species richness, and increases in disease. They also have a cascading effect on other aspects of the ecosystem, such as predator/prey/competitor populations, energy flow, and nutrient cycling.

The INL site is home to one amphibian species, the Great Basin spadefoot toad, with potential for five other amphibian species (Reference 2.3-9 and Reference 2.3-22); 19 reptile species are identified as occurring or potentially occurring in the 12 counties in the CFPP region. These species rely on the sagebrush-steppe habitat for food, shelter, and breeding. Additionally, fifteen reptile species occur or may occur on the INL site as shown in Table 2.3-7. To date, two reptile species, sagebrush lizard and short-horned lizard, have been observed on the CFPP site.

Bats are sensitive to changes in environmental quality because of their roles as seed spreaders, pollinators, and insectivores. They are particularly affected by habitat loss and fragmentation. Bats have been used by researchers to study light pollution, heavy metals, urbanization, droughts, and agricultural changes. They have been studied non-invasively and cost-effectively using camera traps, acoustic surveys, and hair collection. Researchers at Yellowstone National Park use bats to study climate change and infectious diseases in bat populations.

The DOE administers the INL site bat protection and monitoring program that provides a framework for eliminating DOE impacts associated with protected bat species, monitoring bat populations, providing current data for environmental analysis, and engaging resource agency stakeholders, such as USFWS, BLM, and IDFG. In addition to the documented INL site bat monitoring activities in Reference 2.3-20, acoustic bat monitoring is ongoing at the CFPP site through summer of 2023. Table 2.3-10 presents the information to date on the acoustical bat monitoring at the CFPP site and in the Lost River Range foothills of the CFPP vicinity. Reference 2.3-6 Figure 1 provides the bat monitoring locations. Monitors were in place from June 1 to October 26, 2022, at three locations:

- site 1, located northwest of the CFFP site in a draw with juniper trees in the Lost River Range foothills.
- site 2, located north of the CFPP site in a drainage with juniper trees and sagebrush, in the Lost River Range foothills.
- site 3, located at the northwest corner of the CFPP site near a rocky outcrop on the west side of INL site road T-11.

Locations were chosen to detect bats that may be using the foothill area to roost, may fly towards the project area to forage, and provide good acoustical vantage points.

Nine bat species were identified at site 1, 10 species at site 2, and 8 species at site 3. The western small-footed myotis is the most common. Western small-footed myotis is a resident species that uses rocky outcrops. These bats were detected consistently nightly June, July, and August and tapered off in September. Bats are generally inactive when cold temperatures inhibit their insect prey. Hoary bats were the next most detected species at the three sites. Silver-haired bats were frequently detected at site 2, and long-legged myotis were frequently detected at site 3. The hoary bat, silver-haired bat, and long-legged myotis are migratory species that use trees to roost. Other detected species include Townend's big-eared bat, big brown bat, long-eared myotis, and little brown myotis.

Spring monitoring is planned for 2023 using these same locations. Information from spring bat monitoring is included in the COLA.

Bats are important ecosystem components and represent more than 30 percent of mammal species described for the INL site. A mosaic of high-quality, shrub-steppe habitat overlying near-surface basalt deposits with abundant lava-tube caves, fractured rock outcrops, talus-flanked buttes, and juniper uplands provide foraging and roosting habitat for resident and migrant bat species, including at least six with heightened conservation concern.

The INL bat monitoring program includes methods directed at understanding and conserving bat species at the INL site:

- Hibernacula counts - Population estimates are determined by counting bats in caves during hibernation. These results quantify long-term trajectories of these populations and guide biologists in prioritizing caves to sample for the arrival of white-nose syndrome, a major threat to bats, and help with the management and conservation of bats and their habitat. Counts of Townsend's big-eared bats and western small-footed myotis in

2018 fell within the normal variation of historical population counts on the INL site and indicate the number of these species did not decline on the INL site. Data are not available for 2019, 2020, and 2021 due to COVID-19 restrictions that prevented sampling.

- Winter passive acoustic monitoring - Acoustic detectors are used to identify bat species and quantify bat activity. Townsend's big-eared bats and western small-footed myotis were analyzed in winter because those species represent more than 99 percent of bats observed in hibernacula counts over the last 30 years. The number of calls for Townsend's big-eared bats remained steady from 2018 through 2022 winter monitoring seasons. The number of calls for western small-footed myotis has decreased since winter 2018 in Middle Butte and Rattlesnake caves; too few calls were recorded for analysis in six additional caves that are monitored.
- Spring, summer, and fall passive acoustic monitoring – Monitoring bats acoustically throughout the year can provide data on white nose syndrome and wind-energy development effects on bat populations. Big brown bat, hoary bat, silver-haired bat, California myotis, western small-footed myotis, long-eared myotis, little brown myotis, and Yuma myotis were documented at INL site facilities during May to September from 2019 to 2021. These species plus Townsend's big-eared bat and long-eared myotis were documented during the same period at nine caves on the INL site. The CFPP site is located approximately 5 mi from the closest cave.

2.3.1.4.6 Trophic Interactions Between Predators and Prey

The sagebrush-steppe and foothill areas of the CFPP vicinity encompass complex food webs at all trophic levels. A variety of birds, mammals, insects, and reptiles inhabit the sagebrush steppe providing food sources for predators. Interaction among the species also involves displacement from burrows, an important habitat feature for desert survival for many species, where larger or more aggressive species takeover burrows occupied by other species.

Primary predators at the site include (no aquatic habitat is present at or near the CFPP site and fish are not included here):

- Invertebrates - several types of worms, arachnids, and insects occur in the region that may prey on invertebrate species. No known exotic invertebrates are known to exist in the area that prey on native species. Many species of wildlife naturally prey on the local invertebrates.
- Mammals - grizzly bear, black bear, gray wolf, and mountain lion are large predators that prey on other large species in the region, such as adult elk and moose. The occurrence of these species in the vicinity of the CFPP site is rare. Coyotes are the largest common predator in the vicinity with a diverse diet, wide hunting range, and ability to dig out subterranean species such as small mammals. Coyotes seldom attempt to take large

ungulates such as moose, elk, deer, or pronghorn, but can take juveniles under the right conditions. Badgers are common in the vicinity, though secretive and seldom seen. Badgers and coyotes largely prey on small mammals, birds, reptiles, and invertebrates ranging in size from rabbits to large insects. Small mammals (e.g., kangaroo rats, mice species) are generally plant and seed eaters, but may prey on insects. Bats are common in the vicinity. Most species feed almost entirely on insects. Greater sage-grouse and most other birds that nest on the CFPP site are ground nesters because the absence of trees and large shrubs limits nesting habitat for bird species that nest off the ground. Predation by mammals on eggs and non-fledged young is a threat to ground-nesting species.

- Birds - bird species prey on insects if given the opportunity and some desert-occurring species, such as nighthawks, feed almost entirely on insects. Raptors in the region include several species of eagles, hawks, owls, and falcons that feed on rabbit-sized and smaller prey, including small invertebrates that seasonally provide a portion of the diet of kestrel, merlin, and Swainson's hawk. Small mammal and reptile prey appear to be readily available on the CFPP site, vicinity, and region. Though tree perches for hunting are limited in the vicinity, predaceous birds commonly perched on rocks and posts or soar over the area. Predation by common ravens on greater sage-grouse eggs and chicks is a threat to that species.
- Reptiles and Amphibians - snakes, lizards, and one toad-like amphibian occur in the vicinity and prey on invertebrates, birds and bird eggs, small mammals, and other reptiles and amphibians. The western rattlesnake is venomous and can bite and injure large animals, though this would be defensive and not predaceous behavior.

2.3.1.4.7 Wildlife Movement and Migration

Many types of wildlife migrate in Idaho each year, including long-distant migrations by many breeding and wintering bird species and pronghorn and shorter seasonal migrations between elevations by mammals. Some Swainson's hawks migrate to and from Argentina every year (Reference 2.3-25). Most species that occur in the CFPP region perform some type of seasonal movements based on weather, breeding and rearing periods, and food availability.

Amphibian and reptile species in the CFPP vicinity may have short seasonal movements to breed, feed, and winter, but no major migrations of these species occur in Idaho.

Invertebrates migrate seasonally in Idaho, including the western population of monarch butterfly, some of which breed in Idaho and winter along the Pacific coast. Monarch occurrence on the INL site is rare. Mass movement of insects occur in Idaho, most notably Mormon cricket (*Anabrus simplex*, a type of flightless katydid) and grasshoppers. In favorable years, these native species invade agricultural areas, such as those located in the Big Lost and Little Lost River valleys of the CFPP region, and damage crop yields, so control measures are applied by the Idaho Department of Agriculture (Reference 2.3-26).

Idaho is within the Pacific Flyway, a major north-south flyway for migratory birds in America, and hundreds of bird species migrate to, through, and from Idaho every year (Reference 2.3-27). The CFPP region provides a wide variety of bird habitats because of its diverse elevation, landforms, agriculture, and water features. Sizeable numbers of waterfowl summer and winter in Idaho and also pass to and from breeding grounds in Canada; waterfowl hunting is a common activity in Idaho managed by IDFG. Accidental migrants (birds far outside of their normal migration area) may occur in Idaho each year and sightings of snowy owl, gyrfalcon, Eurasian widgeon, and whopping crane have occurred. Raptors are common migrants with spring and autumn flocks consisting of hundreds or more birds passing through the region. Several species of small birds, such as warblers, tanagers, swallows, and flycatchers, breed in the riparian forests along southeast Idaho's rivers and migrate to and from their southern wintering grounds. Idaho has a single species of endemic bird, Cassia crossbill, that exists in mountain ranges approximately 100 mi south of the CFPP site. Cassia crossbill does not migrate or occur in the CFPP region.

Figure 20 in Reference 2.3-9 presents big game and large mammal species potential habitat on the INL site. Elk and pronghorn are common visitors to the CFPP and INL sites and surrounding region. The sagebrush-steppe habitat provides forage and cover. Water sources from INL facility ponds also draw large ungulates that have historically damaged pond liners if not adequately fenced.

Per Reference 2.3-9, in 2009, researchers from the Wildlife Conservation Society and the Lava Lake Land and Livestock discovered a pronghorn migration route that ranks among the farthest for land mammals in the Western Hemisphere. This route stretches from the low-elevation Craters of the Moon National Monument in Idaho to the Beaverhead Mountains in Montana, a round trip of 180 mi. In 2009 and 2010, a two-year study documented pronghorn migration from Lower Little Wood to Leadore, Idaho. This corridor encompasses a portion of the INL site including the area around the CFPP site (Figure 20 in Reference 2.3-9).

According to Ungulate Migrations of the Western United States, Volume 1, (Reference 2.3-27) many ungulate herds must migrate seasonally to access resources and avoid harsh winter conditions. These migration paths cover vast landscapes (e.g., migration distances up to 150 mi) and are increasingly threatened by roads, fencing, subdivisions, and other development. Many western U.S. landscapes contain a juxtaposition of mountains and plains or sagebrush basins, wherein the best forage is produced in mountain habitats fed by winter snowmelt and summer precipitation. Thus, many herds migrate into the mountains in spring in search of high-quality forage. The mountains become largely inhospitable, however, once winter advances and blankets the high country with snow. Species of ungulates suffer elevated energy costs when forced to move through deep snow. The migratory cycle is complete when animals move out of the high country in early winter and head for low-elevation basins, where snow levels are relatively shallow, and some forage remains accessible. Migration is recognized as a ubiquitous behavior that allows ungulates to survive and thrive in seasonal landscapes that characterize the American West.

Reference 2.3-28 provides initial results of migratory studies, including mule deer in Idaho. Twelve different mule deer routes are evaluated and mapped in the reference. Antelope Creek and Mount Borah routes are potentially within the CFPP region.

The Antelope Creek map indicates migration routes between the summer range near Sun Valley to the winter range south of Mackay. Per Reference 2.3-28, no currently known significant migration challenges exist for this deer herd, but continued development of infrastructure and loss of native habitat across their range could result in cumulative impacts over time. The migration route is partially located in the CFPP region, with the winter range approximately 30 mi northwest of Arco. The CFPP is not expected to impact this mule deer migration route due to the distance from the site and the unlikelihood of worker, material, or equipment transportation from the winter range area.

The Mount Borah map indicates a winter range approximately 15 mi northwest of Mackay along U.S. Route 93. The mule deer migration route crosses the highway at three locations and could be impacted by increased transportation. However, this highway is not expected to be used to obtain workers, materials, or equipment for the CFPP.

Ungulate migrations of the Western United States, Volume 2 (Reference 2.3-29) evaluates migration routes for Idaho pronghorn and elk. None of the elk migration routes evaluated in the reference are within or near the CFPP region; though, elk do migrate seasonally between elevations in the region and are commonly found on the CFPP and INL sites.

The Upper Snake River Plain pronghorn route, as shown in Figure 28 of Reference 2.3-29, runs from the summer range near Carey and Bellevue and north of Leadore to the winter range near Howe. The high use route area runs through the CFPP site, vicinity, and region along State Highway 33 and the toe of the Lost River Range. This region from Howe to Crooked Creek is wind-swept, keeping snow depth minimal. From this central location, herds migrate across the Continental Divide into several regions in Montana, higher elevation sage steppe system in Idaho, and the surrounding Snake River Plain. Historically, summer herds also migrated to the east towards higher elevations near the vicinity of Island Park Reservoir. Seasonal migrations still occur at great distances, especially to higher elevation habitats securing better forage and precipitation during the hot summer months. Pronghorn encounter many fence lines, fire burn scars, invasive cheatgrass, and natural barriers such as lava flows, to reach more fertile summer ranges. Future challenges to these migrations include solar and wind farm energy developments and expansion of irrigated agriculture. The CFPP construction and operation have the potential to alter migration routes, potentially pushing the pronghorn westward into the mountains, where they may encounter larger numbers of predators and vehicle encounters along State Highway 33. Conversely, the pronghorn could move farther eastward into the INL site to avoid construction and operations at the CFPP site. Mitigation approaches are discussed in LWA ER Section 4.3.

2.3.1.4.8 Subsistence Use and Recreational Hunting

The CFPP region is located in designated game management units administered by the IDFG. Hunting is permitted in accordance with Idaho requirements for the following:

- Big game, such as elk, mule deer, and pronghorn
- Migratory game birds, such as ducks, geese, and doves
- Moose, bighorn sheep, and mountain goat
- Upland game, such as rabbits and squirrels, and turkeys
- Furbearing animals, such as badgers, martens, bobcat, and foxes.

Hunting is an important activity for some residents and visitors of the state, who hunt for both recreation and food. The INL site provides important habitat for big game, including elk, mule deer, and pronghorn; however, big game use of adjoining farmlands has resulted in depredation concerns. To help alleviate crop damage and stress on adjacent land, DOE cooperates with IDFG to facilitate controlled hunting of pronghorn and elk on portions of the INL site. Hunting is restricted to specific species and locations. A number of game species are documented on the INL site, including waterfowl in seasonal riparian areas and elk and pronghorn in upland habitats. (Reference 2.3-9) Hunting is not currently allowed on the CFPP site. Hunting is allowed in the areas of the CFPP region outside the INL site.

2.3.1.5 Important Species and Habitats

The 12 counties of the CFPP region provide habitat for 156 species with a state conservation rank of S1, critically imperiled; S2, imperiled, or S3, rare or uncommon, including amphibians, birds, invertebrates, mammals, and reptiles. Seventy species in these counties are designated SGCN through the Idaho SWAP (Reference 2.3-11). Table 2.3-7 provides information on these species and rankings. Six SGCN species are known to occur on the CFPP site (i.e., Brewer’s sparrow, common nighthawk, greater sage-grouse, loggerhead shrike, sage thrasher, and pronghorn), and 44 occur or possibly occur on the INL site.

2.3.1.5.1 Important Plant Species and Habitats

Important plant species and habitats are identified and monitored by a number of federal and state entities in the CFPP region. The following references provided information to evaluate and identify important plant species in the CFPP region:

- Idaho BLM Rare Plants of Idaho (Reference 2.3-30) – provides information on plant descriptions (including photographs), identification tips, similar species, phenology, habitat, distribution, and taxonomy; helps users recognize and identify special status plant species in the field.
- Reference 2.3-21 - provides county-specific location information, conservation ranks, taxonomy, detailed information on observations, and links to additional information, such as NatureServe profiles.
- Idaho Native Plant Society Idaho Rare Plant List (Reference 2.3-31) - identifies plants of concern and provides information on conservation rankings, range, occurrences and associated counties, and habitat; used by IDFG's Idaho Fish and Wildlife Information System (IFWIS) (Reference 2.3-32), the primary database for spatial information and population and habitat conditions for rare plants.
- U.S. Department of Agriculture, The PLANTS Database (Reference 2.3-33) - provides standardized information about vascular plants, mosses, liverworts, hornworts, and lichens of the U.S. and its territories; includes names, plant symbols, checklists, distributional data, species abstracts, characteristics, and images.
- Reference 2.3-8 – documents the floristic diversity of the INL site, describes the abiotic environment and most common plant communities, and discusses the ethnoecology of the area.
- A Survey and Assessment of the Rare Vascular Plants of the Idaho National Engineering Laboratory Site (Reference 2.3-34) – documents a two-year study of rare plants that generated new data on abundance, distribution, and habitat features of eight taxa under either federal or state review at the time.
- Reference 2.3-16 – documents a thorough, systematic, multi-species field inventory of special status plants in these river valleys, located in Butte, Clark, Custer, Jefferson, and Lemhi Counties (counties in the CFPP region).
- A Review of Special Status Plant Species on the Idaho National Laboratory Site (Reference 2.3-35) – integrates and updates information from prior efforts on the INL site (e.g., Reference 2.3-32 and Reference 2.3-8).

No threatened or endangered plant species have been identified on the CFPP site. Reference 2.3-21 and Reference 2.3-30 provide information on threatened and endangered plant species in Idaho. The CFPP evaluated

Idaho listed and proposed endangered, threatened, and candidate plant species under the U.S. Endangered Species Act, BLM, USFS, and IDFG. Table 2.3-11 identifies and evaluates Idaho threatened and endangered species, their habitats and threats, and their relevance to CFPP construction and operational activities.

The CFPP developed an integrated list of potential rare and sensitive plants for the CFPP vicinity and region, with focus on known plants in Butte County and areas of similar habitat to that of the CFPP site, using the above listed references. Initially, 80 rare and sensitive plant species were identified for Butte County and similar habitat types in the regional counties. Species associated with wetland habitats or with state status rankings (Table 2.3-12) of Apparently Secure (S4) or Secure (S5) were screened. State rankings were used instead of global rankings to account for species that may have a rare global rank but be locally abundant. The list was further narrowed to 15 target rare and sensitive plant species, as shown in Table 2.3-13, to focus field survey efforts on the CFPP site and vicinity. This list represents the most current Element Occurrence (EO) data within Butte County acquired from Reference 2.3-32 at IDFG and secondary sources.

Ground surveys were conducted under the direction of a qualified specialist between June 1 and June 17, 2022. The 2022 season was favorable for plants with warm weather and favorable precipitation levels. Terrestrial surveys for rare and sensitive plant species were prioritized within the anticipated project construction and operation footprint to obtain more detailed information in areas with a higher likelihood of land disturbance. Field observers focused on the one- and three-mile sample zones shown in Figure 2.3-8 with greater intensity than the six-mile sample zone. Two rare and sensitive plant surveys were conducted within the one-mile sampling zone, and five rare and sensitive plant surveys were conducted within the three-mile plant sampling zone. The peripheral six-mile plant sampling zone comprised habitats comparable to the three-mile sample zone and official EOs documented throughout the six-mile sample zone in the Lost River Range located west and north of the CFPP site (Reference 2.3-4).

Surveys used a meandering pedestrian survey, consistent with BLM Manual 6840, Special Status Species Management Manual (Reference 2.3-36) to maximize field observers survey efficiencies within the sample zones. Previous rare and sensitive plant species observations documented within sample zones were used to define key habitat types most likely to support these plant species populations (Measuring & Monitoring Plant Populations [Reference 2.3-37]; Reference 2.3-16). Within each of the rare and sensitive plant species sampling zones, key habitats were prioritized over habitats with dominant introduced plant species, gravel pads, laydown areas, and unimproved two-track roads as these areas are unlikely to support the identified species. Data collected are summarized from Reference 2.3-4. A GPS location, habitat description, high resolution photographs, rare and sensitive plant species abundance, phenological status, co-occurring species, soil attributes, and initiated survey track-logs were collected at known rare and sensitive plant species observations. Additionally, field observers opportunistically surveyed distinctive habitats for rare and sensitive plant species, consistent with Reference 2.3-30. Data and information were collected for unknown plant species discovered while opportunistically surveying distinctive habitats.

No rare and sensitive target plant species were documented within the one- and six-mile sampling zones (Figure 2.3-8); however, rare and sensitive target plant species occurrences were documented within the three-mile sampling zone (Table 2.3-14 and Figure 2.3-8). Field surveys updated the EO of the pygmy suncup reported in Reference 2.3-16 in 2009 and located three suboccurrences. In addition, one new occurrence of the pygmy suncup, three new occurrences for imperfect buckwheat, and one new occurrence for Lost River draba were discovered within the foothill area of the Lost River Range. Habitats for these rare and sensitive species are not likely on the CFPP site and impacts from construction and operations are not expected.

2.3.1.5.1.1 Pygmy suncup (*Camissonia pterosperma*)

This species was previously documented in two rare plant survey efforts (Reference 2.3-34 and Reference 2.3-16). The pygmy suncup was identified at two locations north of Highway 33 in 1984, outside the CFPP region, and at two EOs within the CFPP vicinity in 2009 (Reference 2.3-16). A prior EO was revisited during the current survey and documented three suboccurrences (locations 1, 2, and 3 on Figure 2.3-8) with abundances ranging from a few individuals (between 2 and 10 individuals) to a small patch (between 25 and 100 individuals). Field observers selected key habitat similar to the prior remote EO and discovered a new occurrence at location 4 on Figure 2.3-8 and Table 2.3-14 as an extensive patch (more than 100 individuals). Phenology at both locations ranged from immature individuals up to mature fruiting specimens). Two voucher specimens were collected and are stored in the Plants of the INL Herbarium.

This annual species is a small (0.8 to 5.5 in) forb in the Evening-Primrose Family (*Onagraceae*) with inconspicuous white flowers and, if pollinated, matures into a tightly constricted red capsule before splitting open to disperse the seeds. Each occurrence was closely associated with shy gilia and western tansymustard and surrounded by Utah juniper and curl-leaf mountain mahogany woodlands and/or black sagebrush communities. Key microhabitats were characterized by southern aspects with well-draining loose carboniferous limestone rubble to shallow Challis volcanic rocky soils.

2.3.1.5.1.2 Lost River draba (*Draba hitchcockii*)

This species is endemic to Butte and Custer Counties in Idaho. A recent herbarium specimen was collected on the outer edge of the six-mile plant sampling zone in 2019. Field botanists targeted key habitat within the three-mile plant sample zone and discovered one new occurrence estimated as an extensive patch (Table 2.3-14). The occurrence was near the lower end of a weathered limestone cliff in an unnamed drainage of the Lost River Range. Individuals were typically observed in microhabitats protected from the wind by growing within fissures or on the leeward side of cliff ledges. The observed phenological status was bearing either mature fruits or the remnant structures of dehisced silicles. One voucher specimen was collected and is stored in the Plants of the INL Herbarium.

This perennial species is a small (1.8 to 4 inches) herbaceous forb in the Mustard Family (*Brassicaceae*) forming dense tufts of tightly integrated hairy leaves. This species grows on key habitats defined by limestone outcroppings. Individuals are found in microhabitats protected from the harsh conditions. Showy white flowers extend above the main plant on racemes and the fruits are covered in short dense hairs to protect the seeds as they mature from exposure to the elements. Associated species observed with this occurrence were mat rock spirea, Salmon wildrye, and cheatgrass. The surrounding plant communities ranged from juniper woodlands to black sagebrush dominated shrublands.

2.3.1.5.1.3 Imperfect buckwheat (*Eriogonum mancum*)

This species is a regional endemic plant widely scattered throughout Idaho, Montana, and Wyoming. Three new occurrences were recorded on windswept limestone outcroppings within the three-mile sample zone at the toe of the Lost River Range (Figure 2.3-8). The abundance of each occurrence was recorded as an extensive patch (Table 2.3-14). The phenology of encountered occurrences was at peak bloom with a few specimens producing mature fruits. Two voucher specimens were collected and are stored in the Plants of the INL Herbarium.

Imperfect buckwheat was not expected to be present within the CFPP vicinity, but project botanists were able to identify the species when encountered. Reference 2.3-34 reports this species as an associative plant with a pygmy suncup occurrence north of Highway 33 during their rare plant survey efforts published in 1984, but they did not include it for specific surveys at that time nor was it within the outer six-mile sample zone. Although two online herbaria specimens had been collected along the border of the six-mile sample zone, no comparable high elevation habitats were within sample zones similar to the mountain top ridgelines recorded on the specimen sheets and no formal EOs were reported.

This perennial species is a small (4 to 8 inches) herbaceous forb in the Buckwheat Family (*Polygonaceae*) with dense clusters of flowers on thin, stiff leafless stalks. Flower color fades from white to a rosy-pink as the plants are pollinated and seeds begin to mature. The base of the plant has a tuft of small hairy leaves attached to a woody stem. In addition, species growing within similar habitat as the imperfect buckwheat included stemless mock goldenweed, longsac penstemon, and Salmon River beardtongue and the open windswept limestone ridges were consistently surrounded by plant communities of black sagebrush and juniper woodlands. Individuals were physically exposed to the elements as just their roots grew into the vast network of cracks in the brittle limestone outcroppings. Individuals were mainly located on the distinct limestone microhabitat and only a few specimens were observed growing in the nearby carboniferous loose talus rocky soils.

2.3.1.5.2 Important Wildlife Species and Associated Habitats

The IDFG provides a list, by county, of threatened and endangered species and other species of concern for the State of Idaho (Reference 2.3-21). Table 2.3-15 provides information on threatened or endangered wildlife species for the State of Idaho, global and state rankings, and relevance to the CFPP site. None of the threatened or endangered species are considered species of concern for CFPP as described in the table.

Four species, the bald eagle, peregrine falcon, gray wolf, and grizzly bear (Yellowstone population) have been delisted; however, the gray wolf designation is in litigation. The bald eagle was delisted in 2007 but is still protected under the Bald and Golden Eagle Protection Act. This species often winters in the Little Lost River Valley northwest of the CFPP site, and several have been known to winter on the INL site (Reference 2.3-37). The peregrine falcon is under continuing monitoring and has been observed infrequently on the northern portion of the INL site (Reference 2.3-37). Wolves and grizzlies are not expected on the CFPP site or vicinity or INL site (Reference 2.3-22); though, they may occur in the mountainous areas north and west of the CFPP region.

The following fish species are listed in Reference 2.3-21 as threatened or endangered under the Endangered Species Act:

- Bull trout (*Salvelinus confluentus*) threatened; found in Little Lost River more than 40 mi north of the CFPP site.
- Chinook salmon (*Oncorhynchus tshawytscha*) Snake River populations 2 (fall run) and 8 (spring and summer run) are listed as threatened; population 2 is found in Snake River below Hell's Canyon Dam, more than 200 mi from the CFPP site. Population 8 comprises of naturally spawned populations in the mainstream Snake River and other rivers outside the CFPP region.

- Kokanee (*Oncorhynchus nerka*) listed as endangered; found in Salmon and Snake Rivers with spawning limited to the Redfish Lake system in the Sawtooth National Forest, approximately 100 mi from the CFPP site
- Sockeye salmon (*Oncorhynchus nerka*) Snake River population 1 is listed as threatened; found in the Redfish Lake system.
- Steelhead (*Oncorhynchus mykiss*) Snake River population 13 is listed as threatened; found in Snake River tributaries above the Lower Granite Dam, which is approximately 300 mi from the CFPP site.
- White sturgeon (*Acipenser transmontanus*) Kootenai River population 1 is listed as endangered; found in northeastern Idaho in the Kotenai River.

None of these fish are found near the CFPP site or vicinity; most are associated with the Snake, Salmon, or Kootenai Rivers and are at or outside the 50-mi CFPP region boundary.

Similarly, the following aquatic invertebrates are listed as endangered in Reference 2.3-21:

- Banbury springs limpet *(Idaholanx fresti*) - known to exist only in four coldwater spring complexes along about 6 mi of the middle Snake River in Gooding County, outside the CFPP region.
- Bliss rapids snail (*Taylorconcha serpenticola*) found in middle Snake River near Hagerman, Idaho, approximately 109 mi from the CFPP site.
- Bruneau hot springsnail (*Pyrgulopsis bruneauensis*) endemic to geothermal hot springs and seep on the Bruneau River in southwest Idaho.
- Snake River physa (*Physella natricina*) restricted to the Snake River in Gooding County.

One species that is not listed as endangered or threatened that inhabits the CFPP site, vicinity, and region, the greater sage-grouse, is considered a species of concern for CFPP. The greater sage-grouse is facing declining numbers and loss of habitat in many areas of the west. The species is generally considered an obligate of the sagebrush-steppe system, requiring sagebrush for nesting, winter feeding, and shelter from weather and predators throughout the year. Greater sage-grouse are abundant at the INL site and are monitored annually through provisions of a CCA between DOE and USFWS as discussed in ER Section 2.3.1.4.3.

2.3.1.5.3 Noxious Weeds and Invasive Species

One noxious, non-native weed species, rush skeletonweed was observed on the CFPP site within nine plots. Rush skeletonweed is listed as an Idaho statewide containment noxious weed (Reference 2.3-38). This species occurs sporadically across the INL site. Distribution has become widespread for the past five years, but no known large monotypic stands have developed. The

DOE monitors and treats noxious weeds in accordance with State law. Weeds listed in the containment noxious weeds list are known to exist in various populations throughout the State of Idaho (Reference 2.3-38). Table 2.3-16 identifies noxious weeds for the State of Idaho and provides information on their relevance to the CFPP site, vicinity, and region. The DOE implements a weed control program on the INL site for Idaho-identified containment noxious weeds. Additionally, Weeds of the INEEL provides pictures and information on weeds on the INL site (Reference 2.3-39).

Non-native and/or invasive plants (not classified as noxious weeds) identified on the CFPP site include cheatgrass, desert alyssum, tall tumblemustard, and yellow salsify. Most of these non-native species can produce large amounts of seed every year that remain viable for long periods of time. Because many of them are annuals, their populations can experience large fluctuations from year to year based on seasonal precipitation patterns, or even discrete weather events.

2.3.2 Aquatic Ecology

Surface water in the CFPP vicinity and region is limited to the Big Lost River, Little Lost River, Snake River, Birch Creek, Big Lost River Sinks, Mackay Reservoir, American Falls Reservoir, and other lakes as described in LWA ER Section 2.1.1. No surface water is present on the CFPP site. The Big Lost River is ephemeral and occasionally flows onto the INL site south of the CFPP. The river disappears underground on the INL site. An upstream dam and agricultural use, combined with the dry climate limit fish and other water wildlife to only those occasions when precipitation, dam control, and changes in agricultural withdrawal allow some flow onto the INL site. The Big Lost River Spreading Areas, located in the southern part of the INL site act to control potential flooding of the river onto the facility areas of the INL site. The river is approximately 6 mi from the CFPP center point at its closest location. The Big Lost River Spreading Area and Lost River Sinks are approximately 9 mi and 11 mi from the CFPP center point, respectively. The Little Lost River is approximately 10 mi north of the CFPP site; this river is not known to have flowed onto the INL site (Reference 2.3-9). Similarly, Birch Creek, approximately 23 mi north of the CFPP site, is diverted to gravel pits east of the Test Area North. The Snake River is approximately 44 mi from the CFPP center point; American Falls Reservoir is located at the boundary of the CFPP region on the Snake River.

Six species of fish have been observed upstream within the Big Lost River, including brook trout, rainbow trout, mountain whitefish, speckled dace, shorthead sculpin, and kokanee salmon. Upstream of the INL site, the Little Lost River does support bull trout, a threatened species under the Endangered Species Act. The bull trout has a secure global conservation status and a secure Idaho state conservation ranking. Birch Creek, north of the CFPP site, enters the INL site only during periods of high flow. Surveys of fish in these water bodies during the rare occurrences of flow on the INL site have not been conducted. A number of man-made INL liquid waste disposal ponds and ditches also provide habitat. The liquid waste disposal ponds currently on INL, while considered aquatic habitat, do not support fish.

Construction and operational activities at the CFPP site, including transmission and water pipeline corridors and transportation, have limited potential to impact aquatic species in the CFPP site, vicinity, or region due to limited flow, limited populations, and distance from the CFPP site.

2.3.3 References

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Table 2.3-1: CFPP Region Level III and Level IV Ecoregions

Level III Ecoregion	Level IV Ecoregion	Level IV Ecoregion Description
12. Snake River Plain	12b. Lava Fields	The Lava Fields ecoregion contains basalt flows, cinder cones, and spatter cones. Exposed basalt or very shallow loessial soils over volcanics are characteristic and are either barren or sparsely covered by hardy shrubs and grasses. Livestock carrying capacity is low. Surface water availability is very limited. Ecoregion 12b includes the Craters of the Moon National Monument and parts of the Idaho National Engineering Laboratory. Lithology, depth to bedrock, stock carrying capacity, and water availability are unlike neighboring ecoregions.
	12e. Upper Snake River Plain	The nearly level Upper Snake River Plain contains cropland, pastureland, cities, suburbs, and industries. Extensive surface-irrigated small grain, sugar beet, potato, and alfalfa farming occur. Frost-free season is shorter and crop variety is less than downstream in Ecoregions 12a and 12i. Ecoregion 12e is lower and less rugged than Ecoregions 12d and 80b. Aquatic resources have been degraded by irrigation diversions, channelization, dams, sewage treatment, nonpoint pollution, food processing, and phosphate processing.
	12g. Eastern Snake River Basalt Plains	The Eastern Snake River Basalt Plains ecoregion typically has shallow, stony soils that are unsuitable for cultivation. Only small areas have soils deep enough to be farmed under sprinkler irrigation. Rangeland is widespread and contrasts with the cropland of Ecoregions 12d, 12e, and 12i. Potential natural vegetation is mostly sagebrush and bunchgrass. It is cool enough to have some regeneration capacity and still contains native plants unlike Ecoregion 12h. Eastern parts of Ecoregion 12g are higher and more continental than the west.
16. Idaho Batholith	16d. Dry, Partly Wooded Mountains	The Dry, Partly Wooded Mountains ecoregion is largely underlain by sedimentary and extrusive rocks; granitics are less common than in other parts of the Idaho Batholith (16). Ecoregion 16d is in the rain shadow of high mountains. Winter precipitation is less than in Ecoregions 16h and 16k and maritime influence is absent. A mosaic of shrubland, open Douglas-fir forest, and aspen occurs and is unlike other parts of Ecoregion 16. Mining has affected water quality. Rapid residential and commercial growth is occurring near Ketchum.
	16f. Foothill Shrublands-Grasslands	The Foothill Shrublands-Grasslands ecoregion is in the rain shadow of high mountains. Its hills and benches are dry, treeless, and covered by shrubs and grasses. The vegetation mosaic is unlike the open forests of Ecoregion 16k and the mountain sagebrush/forest mosaic of the lithologically distinct Ecoregion 16d. Land use is mostly grazing but rural residential development is expanding near Boise.

Table 2.3-1: CFPP Region Level III and Level IV Ecoregions (Continued)

Level III Ecoregion	Level IV Ecoregion	Level IV Ecoregion Description
17. Middle Rockies	17e. Barren Mountains	The Barren Mountains ecoregion is largely underlain by quartzite and carbonate-rich rocks and is drier than mountainous ecoregions to the north. Elevations are higher than those of Ecoregion 17ab and range from about 6800 to 10,000 ft. Open-canopied Douglas fir-lodgepole pine-subalpine fir forests, aspen groves, sagebrush, mountain brush, and grasses occur. Forests are limited to a narrow elevational band and are most widespread on north-facing slopes. Pacific forest elements are absent, and barrens are common.
	17h. High Elevation Rockland Alpine Zone	The wet, severely exposed, glaciated High Elevation Rockland Alpine Zone contains jagged peaks, tarns, rockland, and talus deposits. It is often snowcapped and maximum annual precipitation is higher than in surrounding, but lower, ecoregions. Soils are stony and have a cryic temperature regime. Alpine tundra, alpine grassland, subirrigated meadows, and wetlands occur above timberline. Krummholz vegetation occupies windswept areas near timberline. Subalpine fir and whitebark pine are found in glacial cirques.
	17aa. Dry Intermontane Sagebrush Valleys	The Dry Intermontane Sagebrush Valleys ecoregion contains stream terraces, floodplains, saline areas, and alluvial fans. Water availability and potential for cropland agriculture are low because Ecoregion 17aa is in the rain shadow of high mountains, receives little mountain runoff, and is underlain by highly permeable valley fill deposits. Its deep gravels are unlike the basalts of Ecoregion 12. Sagebrush grassland is widespread and contrasts with the open-canopied forests of the more rugged and higher Ecoregion 17e. Shadscale and greasewood grow on alkaline soils that receive less than 8 inches of precipitation annually. Grazing is the dominant land use. Both the Pahsimeroi and Lemhi rivers were once important salmon and steelhead fisheries.
	17ab. Dry Gneissic-Schistose-Volcanic Hills	The semiarid Dry Gneissic-Schistose-Volcanic Hills ecoregion is shrub- and grass-covered and is underlain by Quaternary and Tertiary volcanics. It is less rugged and drier than the higher Barren Mountains (17e) but is more rugged and receives more precipitation than the lower Dry Intermontane Sagebrush Valleys (17aa). Its sagebrush-grassland vegetation contrasts with the open-canopied forest-shrubland-grassland mosaic of Ecoregion 17e. Grazing is the most common land use in Ecoregion 17ab.

Source: Reference 2.3-3

Table 2.3-2: CFPP Site, Vicinity, and Region Level IV Ecoregion Information

Level IV Ecoregion		Physiography		Geology	Soil			Climate			Potential Natural Vegetation*/ Present Vegetation	Land Use and Land Cover
	Area (sq mi)		Elevation/ Local Relief (ft)	Surficial and Bedrock	Order (Great Groups	Common Soil Series	Temperature/ Moisture Regimes	Precipitation Mean Annual (in)	Frost Free Mean Annual (days)	Mean Temperature January min/max; July min/max (ºF)		
12b. Lava Fields	1122	Unglaciated. Irregular plains with flows, cinder cones, and spatter cones. Surface water availability is extremely limited.	3800-5500/ 0-400	Quaternary basalt, loess, and volcanic ash mixed with alluvium. Rock outcrops are common.	Aridisols (Haplocalcids), Mollisols (Argixerolls, Durixerolls), Andisols (Vitrixerands)	Pancheri, Cinderhurst, Polatis, Deerhorn, McCarey, Rehfield. Exposed lava flows, cinder cones, and very shallow soils are common.	Mesic, Frigid/ Aridic, Xeric	7-16	55-160	10/29; 52/84	Sagebrush steppe/Open basin sagebrush, mountain sagebrush, Wyoming big sagebrush, rabbitbrush, bluegrass, bluebunch wheatgrass, squirreltail, Thurber's needlegrass, Indian ricegrass.	Sparsely covered by grass and brush or just barren. Rangeland, wildlife habitat, and recreation. Low livestock carrying capacity. Craters of the Moon National Monument is located in the ecoregion.
12e. Upper Snake River Plain	1463	Unglaciated. Nearly level river terraces, floodplains, and lake plains containing many canals and reservoirs.	4400-5000/ 0-200	Quaternary mixed alluvium, lake deposits, and basalt.	Mollisols (Haploxerolls, Calcixerolls), Entisols (Xerofluvents, Torriorthents), Aridisols (Haplocalcids)	Bannock, Bock, St. Anthony, Labenzo, Heiseton, Terreton, Declo, Tindahay	Frigid, Mesic/ Aridic	7-16	80-130	11/30; 50/86	Sagebrush steppe. In southwest: saltbush-greasewood/big sagebrush, bluebunch wheatgrass, bluegrass, cheatgrass, rabbitbrush, squirreltail, needleandthread, Indian ricegrass, fourwing saltbush. Riparian areas: sedges, perennial grasses, willows, cottonwood.	Irrigated cropland, pastureland, suburban and urban developments, and industrial areas. Small grains, sugar beets, potatoes, and alfalfa are grown. Some rangeland occurs. Land use has affected water quality.
12g. Eastern Snake River Basalt Plains	6426	Unglaciated. Irregular plain.	3700-6400; isolated buttes to 7500/ 0-800	Quaternary loess, alluvium, basalt flows, and cinder cones. Rock outcrops occur.	Aridisols (Haplocalcids, Haplodurids, Haplocambids, Haplargids), Mollisols (Argixerolls, Haploxerolls, Calcixerolls), Entisols (Xeropsamments)	Pancheri, McCarey, Portneuf, Minidoka, Jipper, Juniperbute, Grassyridge, Scoon, Trevino, Portino, Whiteknob, Malm, Eaglecone. Shallow, stony soils occur.	Frigid, Mesic/ Aridic, Xeric	6-16	75-140	11/30; 51/87	Sagebrush steppe/ bluebunch wheatgrass, basin and Wyoming big sagebrush, Thurber's needlegrass, Indian ricegrass, bitterbrush, bluegrass, cheatgrass. Saline areas: fourwing saltbush, shadscale, winterfat.	Shrub- and grass-covered. Mostly rangeland. Small, sprinkler-irrigated areas of deep soil occur and are used for pasture or small grain, potato, sugar beet, bean, and alfalfa farming
16d. Dry, Partly Wooded Mountains	1412	Partly glaciated. Mountains in rain shadow of the central Idaho mountains	4000-9000/ 600-2600	Quaternary glacial deposits and colluvium. Tertiary extrusive volcanics, Paleozoic siltstone, dolomite, slate, quartzite, and argillite. Rock outcrops occur.	Mollisols (Calcicryolls, Argicryolls, Haplocryolls, Argixerolls, Durixerolls), Inceptisols (Eutrocryepts)	Hagenbarth, Dawtonia, Koffgo, Vitale, Povey, Peevywell, Starhope, Zeelnot, Gany, Mitring, Ketchum, Dollarhide	Frigid/ Xeric	8-25. In the rain shadow of high mountains	40-100	3/31; 41/81	Sagebrush steppe; some western spruce-fir forest, grand fir-Douglas-fir forest/ Wyoming and mountain and basin big sagebrush, snowberry, bluebunch wheatgrass, Idaho fescue; scattered Douglas-fir, aspen, juniper, lodgepole pine, subalpine fir.	Shrub- and open forest-covered. Rangeland, recreation, woodland, mining, and wildlife habitat. Residential, commercial, and second home developments are expanding in the Ketchum area.
16f. Foothill Shrublands-Grasslands	1420	Unglaciated. Foothills, hills, benches, and ridges.	5000-7000/ 600-2000	Quaternary alluvium and colluvium. Cretaceous granitics, Paleozoic sandstone, Tertiary basalt, tuffs, quartz monzodiorite, and sedimentary rocks.	Mollisols (Haploxerolls, Argixerolls, Argicryolls, Haplocryolls), Inceptisols (Eutrocryepts)	Roanhide, Rainey, Vitale, Elksel, Moonstone, Mulshoe, Povey, Friedman, Starhope, Ketchum, Dollarhide	Mesic, Frigid, Cryic/	12-22	60-120	20/35; 57/91	Sagebrush steppe/ bluebunch wheatgrass, mountain and Wyoming big sagebrush, Thurber's needlegrass, bluegrass, Idaho fescue, bitterbrush, snowberry.	Grass- and brush-covered. Mostly rangeland, wildlife habitat, and expanding rural residential development.

Table 2.3-2: CFPP Site, Vicinity, and Region Level IV Ecoregion Information (Continued)

Level IV Ecoregion		Physiography		Geology	Soil			Climate			Potential Natural Vegetation*/ Present Vegetation	Land Use and Land Cover
	Area (sq mi)		Elevation/ Local Relief (ft)	Surficial and Bedrock	Order (Great Groups	Common Soil Series	Temperature/ Moisture Regimes	Precipitation Mean Annual (in)	Frost Free Mean Annual (days)	Mean Temperature January min/max; July min/max (ºF)		
17e. Barren Mountains	1817	Partially glaciated. Block faulted mountains with high basal elevations.	6800-10000+/ 600-3000	Quaternary glacial deposits and colluvium. Tertiary volcanics, faulted Mesozoic and Paleozoic sedimentary and metasedimentary rocks including quartzite and carbonate-rich rocks, and Precambrian metamorphics. Rock outcrops occur.	Inceptisols (Eutrocryepts), Mollisols (Calcicryolls, Argicryolls), Alfisols (Palecryalfs)	Gany, Koffgo, Edgway, Fitzwill	Cryic/Udic, Xeric	18-30; lower elevations are usually semiarid	25-70	Long cold winters, moist springs	Western spruce-fir forest, Douglas-fir forest/ North-facing slopes: open-canopied Douglas-fir-lodgepole pine-subalpine fir stands, aspen groves, sparse shrubs, and grasses. South-facing slopes: mountain big sagebrush, mountain brush, sparse grasses. Over limestone: curl-leaf mountain mahogany.	Covered by open-canopied coniferous forests, aspen groves, sagebrush, mountain brush, and grasses. Grazing, logging, mining, recreation, and wildlife habitat.
17h. High Elevation Rockland Alpine Zone	391	Glaciated. Very high, often severely exposed mountains. Jagged peaks and tarns occur.	9000-12600+/ 400-2600	Quaternary glacial deposits and colluvium. Mesozoic and Paleozoic sedimentary and metasedimentary rocks. Rock outcrops are very common.	Mollisols (Haplocryolls), Entisols (Cryorthents), Inceptisols (Eutrocryepts)	Very gravelly to stony soils are common	Cryic/Udic	30+	30-60	Very long, cold winters.	Alpine meadows-barren/ Above timberline: tundra, alpine grassland, meadows, wetlands. At timberline: krummholz. In cirques: subalpine fir, whitebark pine.	Tundra, alpine grassland, meadowland, open high altitude forest, or just rockland. Summer grazing, recreation, and wildlife habitat.
17aa. Dry Intermontane Sagebrush Valleys	1957	Unglaciated. Stream terraces, floodplains, benches, and alluvial fans in the rain shadow of mountains. Limited mountain runoff, highly permeable valley fill deposits, and low precipitation cause water availability to be low.	3800-6800/ 200-1000	Quaternary alluvium and thick, highly permeable valley fill deposits. Tertiary andesite, latite, basalt, tuffaceous conglomerate, sandstone, siltstone, and limestone, and Precambrian quartzite.	Aridisols (Haplocalcids, Natrargids, Haplocambids, Calcicryids, Haplodurids, Petrocryids), Mollisols (Endoaquolls, Haploxerolls)	Millhi, Leadore, Pahsimeroi, Mitring, Ringle, Paint, Arbus, Bartonflat, Whiteknob, Bluedome, Fandow, Leatherman	Frigid, Cryic/ Mostly Aridic; by springs and streams: Aquic	6-12	30-90	6/30; 48/85	Mostly sagebrush steppe/ Wyoming big sagebrush, bluebunch wheatgrass, Indian ricegrass, squirreltail, sedges, tufted hairgrass, rushes. On alkaline or saline soils: shadscale, greasewood.	Mostly brush- and grass-covered. Grazing, hay, pastureland, and small grain crops.
17ab. Dry Gneissic-Schistose-Volcanic Hills	2799	Unglaciated hills.	4000-9000/ 1100-2600	Quaternary alluvium, colluvium, and alluvial fan deposits. Quaternary rhyolite and basalt. Tertiary basalt, tuffs, andesite flows, and sedimentary rocks.	Aridisols (Natrargids, Haplocalcids, Haplodurids), Mollisols (Argixerolls, Argicryolls, Calcicryolls), Inceptisols (Eutrocryepts)	Millhi, Hagenbarth, Dacore, Koffgo, Farvant, Mitring, Parkalley, Zeelnot, Howcan	Frigid, Cryic/ Aridic, Xeric	7-22	30-100	-2/28; 40-79	Mostly sagebrush steppeWyoming and mountain big sagebrush, Idaho fescue, low sagebrush, bluebunch wheatgrass, shadscale, Indian ricegrass; scattered pinyon pine, Utah juniper.	Shrub- and grass-covered. Primarily grazing, recreation, woodland, wildlife habitat; also, some irrigated alfalfa, barley, and pasture farming.

Table 2.3-3: CFPP Site, Vicinity, and Region Habitats and Percentages

Habitat Number[1]	Title[2]	Percentage[3]		
		Table 2.3-3: Carbon Free Power Project Site, Vicinity, and Region Habitats and Percentages		
IDFG 1	Dry Lower Montane-Foothill Forest	2.57%	0.96%	N/A
IDFG 2	Subalpine-High Montane Conifer Forest	2.99%	0.14%	N/A
IDFG 3	Aspen Forest and Woodland	0.08%	0.00%	N/A
IDFG 4	Juniper Woodland and Savanna	0.09%	N/A	N/A
IDFG 5	Mountain Mahogany Scrub and Woodland	0.97%	3.84%	0.01%
IDFG 6	High Montane Mesic Shrubland	0.12%	0.00%	N/A
IDFG 7	Lower Montane-Foothill Grassland and Shrubland	1.20%	2.55%	0.02%
IDFG 8	Montane Grassland	0.51%	0.01%	N/A
IDFG 9	Subalpine-Montane Mesic Meadow	0.17%	0.00%	N/A
IDFG 10	Nonnative Annual and Perennial Grassland and Forbland	1.54%	N/A	N/A
IDFG 11	Semi-Desert Shrubland and Steppe-Saltbrush Scrub	1.09%	N/A	N/A
IDFG 13	Sagebrush Steppe	45.4%	23.4%	0.02%
IDFG 14	Cliff, Scree, and Badland	9.83%	0.00%	N/A
IDFG 15	Alpine and High Montane Scrub, Grassland, and Barrens	2.39%	N/A	N/A
IDFG 16	Riverine-Riparian Forest and Shrubland	1.16%	0.01%	N/A
IDFG 17	Depressional Wetlands	0.01%	N/A	N/A
IDFG 18	Springs and Groundwater-Dependent Wetlands	0.13%	N/A	N/A
IDFG 19	Lakes, Ponds, and Reservoirs	0.45%	N/A	N/A
IDFG 20	Developed	1.64%	0.54%	0.00%
IDFG 21	Quarries, Mines, Gravel Pits, and Oil Wells	0.00%	N/A	N/A
IDFG 22	Agricultural Lands	14.6%	N/A	N/A
IDFG 23	Harvested Forest	0.02%	N/A	N/A
IDFG 24	Recently Burned	1.70%	N/A	N/A
INL 1	Green Rabbitbrush / Sandberg Bluegrass - Bluebunch Wheatgrass Shrub Grassland	0.78%	20.5%	56.4%
INL 2	Cheatgrass Ruderal Grassland	0.45%	0.60%	0.83%
INL 3/5	Green Rabbitbrush / Thickspike Wheatgrass Shrub Grassland and Needle and Thread Grassland	2.81%	4.15%	23.8%
INL 4	Green Rabbitbrush / Desert Alyssum (Cheatgrass) Ruderal Shrubland	0.66%	11.6%	N/A

Table 2.3-3: CFPP Site, Vicinity, and Region Habitats and Percentages (Continued)

Habitat Number[1]	Title[2]	Percentage[3] Table 2.3-3: Carbon Free Power Project Site, Vicinity, and Region Habitats and Percentages		
INL 6	Big Sagebrush - Green Rabbitbrush (Threetip Sagebrush) Shrubland	4.19%	30.9%	18.8%
INL 7	Crested Wheatgrass Ruderal Grassland	0.48%	0.00%	N/A
INL 8	Big Sagebrush Shrubland	1.18%	0.04%	N/A
INL 9	Western Wheatgrass Grassland	0.15%	0.07%	N/A
INL 9*	Western Wheatgrass Grassland (Degraded)	0.01%	0.06%	N/A
INL 10	Basin Wildrye - Mixed Mustards Infrequently Inundated Playa/ Streambed	0.07%	20.5%	N/A
INL 10*	Basin Wildrye - Mixed Mustards Infrequently Inundated Playa/ Streambed (Degraded)	0.01%	N/A	N/A
INL 11	Juniper Woodland	0.12%	N/A	N/A
INL 12/14	Indian Ricegrass Grassland and Gardner's Saltbush (Winterfell) Shrubland	0.12%	N/A	N/A
INL 13	Shadscale Saltbush - Winterfat Shrubland	0.10%	N/A	N/A
INL 15	Black Sagebrush Shrubland	0.05%	N/A	N/A
INL 99	Other (e.g., facilities, borrow sources/disturbed, paved roads, exposed rock/cinder)	0.15%	0.66%	0.11%

[1] Habitat number references habitats in Figure 2.3-6 for INL; Figure 2.3-3 for IDFG.

[2] Habitat titles are taken from Reference 2.3-10 for INL habitats and Reference 2.3-11 and Reference 2.3-12 for habitats within the CFPP region but outside the INL boundary

[3] Percentages are calculated using the geographical information system and data from Reference 2.3-10 and Reference 2.3-17. The site percentages represent the 2325-acre CFPP site, while the vicinity and region percentages represent the area within the 6-mi radius vicinity and 50-mi radius region, respectively. Percentages at three significant digits.

Table 2.3-4: Plants Observed on the CFPP Site

Scientific Name	Common Name	Constancy[1]	Mean Rank[2]
Native			
Shrubs			
Artemisia arbuscula	low sagebrush	N/A[3]	N/A
Artemisia tridentata	big sagebrush	74	3.07
Artemisia tripartita	threetip sagebrush	3	2.67
Atriplex falcata	sickle saltbush	1	3.00
Chrysothamnus viscidiflorus	green rabbitbrush	102	1.95
Ericameria nana	dwarf goldenbush	N/A	N/A
Ericameria nauseosa	rubber rabbitbrush	1	4.00
Eriogonum microthecum	shrubby buckwheat	9	3.56
Gutierrezia sarothrae	broom snakeweed	12	3.17
Krascheninnikovia lanata	winterfat	3	3.33
Linanthus pungens	granite prickly phlox	9	3.33
Opuntia polyacantha	plains pricklypear	40	3.45
Tetradymia canescens	spineless horsebrush	71	3.07
Perennial Graminoids			
Achnatherum hymenoides	Indian ricegrass	88	2.95
Carex douglasii	Douglas' sedge	6	3.00
Elymus elymoides	bottlebrush squirreltail	11	3.09
Elymus lanceolatus	thickspike wheatgrass	29	2.83
Hesperostipa comata	needle and thread	89	2.16
Leymus cinereus	basin wildrye	10	3.40
Pascopyrum smithii	western wheatgrass	3	3.33
Poa secunda	Sandberg bluegrass	83	2.99
Pseudoroegneria spicata	bluebunch wheatgrass	68	2.50
Perennial Forbs			
Agoseris glauca	pale agoseris	N/A	N/A
Agoseris retorsa	spear-leaf agoseris	N/A	N/A
Allium textile	textile onion	2	4.00
Antennaria dimorpha	low pussytoes	N/A	N/A
Antennaria microphylla	littleleaf pussytoes	1	4.00
Astragalus calycosus	Torrey's milkvetch	21	3.43
Astragalus filipes	basalt milkvetch	15	3.73
Astragalus lentiginosus	freckled milkvetch	N/A	N/A
Astragalus purshii	woollypod milkvetch	1	4.00
Balsamorhiza sagittata	arrowleaf balsamroot	2	4.00
Calochortus bruneaunis	Bruneau mariposa lily	7	3.86
Castilleja angustifolia	northwestern Indian paintbrush	22	3.55
Cirsium subniveum	Jackson Hole thistle	2	4.00
Corallorhiza maculata	summer coralroot	3	3.00
Crepis acuminata	tapertip hawksbeard	38	3.34
Delphinium nuttallianum	upland larkspur	N/A	N/A
Erigeron pumilus	shaggy fleabane	27	3.30
Eriogonum ovalifolium	cushion buckwheat	2	4.00
Ipomopsis congesta	ballhead gilia	15	3.67

Table 2.3-4: Plants Observed on the CFPP Site (Continued)

Scientific Name	Common Name	Constancy[1]	Mean Rank[2]
Iva axillaris	povertyweed	3	3.00
Lomatium dissectum	fernleaf biscuitroot	7	3.29
Lomatium foeniculaceum	desert biscuitroot	5	3.40
Lupinus argenteus	silvery lupine	1	4.00
Machaeranthera canescens	hoary tansyaster	25	3.64
Oenothera caespitosa	tufted evening primrose	N/A	N/A
Oenothera pallida	pale evening primrose	2	3.50
Penstemon cyaneus	blue penstemon	1	4.00
Phacelia hastata	silverleaf phacelia	3	4.00
Phlox aculeata	sagebrush phlox	8	3.50
Phlox hoodii	Hood's phlox	52	3.15
Phlox longifolia	longleaf phlox	N/A	N/A
Pteryxia terebinthina	turpentine wavewing	53	3.00
Sphaeralcea munroana	whitestem globemallow	21	3.76
Zigadenus paniculatus	foothill deathcamas	N/A	N/A
Zigadenus venenosus	meadow deathcamas	15	3.93
Annual/Biennial Forbs			
Chaenactis douglasii	Douglas' dustymaiden	1	4.00
Chenopodium leptophyllum	slimleaf goosefoot	1	3.00
Cordylanthus ramosus	bushy bird's beak	2	3.00
Crytantha interrupta	Elko cryptantha	N/A	N/A
Descurainia pinnata	western tansymustard	4	3.25
Eriastrum wilcoxii	Wilcox's woollystar	19	3.53
Gayophytum diffusum	spreading groundsmoke	2	4.00
Gilia sinuata	rosy gilia	1	4.00
Lappula occidentalis	flatspine stickseed	11	3.45
Mentzelia albicaulis	whitestem blazingstar	2	3.00
Orobanche fasciculata	clustered broomrape	2	4.00
Solanum triflorum	cutleaf nightshade	1	4.00
Townsendia florifer	showy Townsend daisy	1	4.00
Introduced			
Perennial Graminoids			
Agropyron cristatum	crested wheatgrass	3	3.00
Annual Graminoids			
Bromus arvensis	field brome	1	3.00
Bromus tectorum	cheatgrass	95	2.06
Perennial Forbs			
Chondrilla juncea	rush skeletonweed	9	3.89
Annual/Biennial Forbs			
Alyssum desertorum	desert alyssum	75	2.99
Amaranthus blitoides	mat amaranth	1	4.00
Descurainia sophia	herb sophia	3	3.00
Halogeton glomeratus	saltlover	12	2.83
Lactuca serriola	prickly lettuce	6	3.33
Salsola tragus	prickly Russian thistle	7	3.14

Table 2.3-4: Plants Observed on the CFPP Site (Continued)

Scientific Name	Common Name	Constancy[1]	Mean Rank[2]
Sisymbrium altissimum	tall tumble mustard	39	3.18
Taraxacum officinale	common dandelion	N/A	N/A
Tragopogon dubius	yellow salsify	31	3.52

[1] Constancy indicates the number of plots in which a species was present.

[2] Mean rank is the average abundance rank for that species in the plots where it occurred (ranging from 1, most abundant, to 4, least abundant).

Source: Reference 2.3-5.

Table 2.3-5: Plant Species Dominance on CFPP Site

Common Name	Scientific Name	Frequency of Dominance[1]
Native		
Shrubs		
Green rabbitbrush	*Chrysothamnus viscidiflorus*	43
Big sagebrush	*Artemisia tridentata*	8
Perennial Graminoids		
Needle and thread	*Hesperostipa comata*	20
Bluebunch wheatgrass	*Pseudoroegneria spicata*	5
Bottlebrush squirreltail	*Elymus elymoides*	1
Introduced		
Annual Graminoids		
Cheatgrass	*Bromus tectorum*	32
Annual Forbes		
Saltlover	*Halogeton glomeratus*	1

[1] Frequency of dominance indicates the number of plots where the species was dominant.
Source: Reference 2.3-5

Table 2.3-6: Select CFPP Regional Habitat Descriptions

Number[1]	Title	Description[2]
IDFG 1	Dry Lower Montane-Foothill Forest	• Fire-dependent conifer forests, woodlands, and savannas typically dominated by ponderosa pine or Douglas-fir or both, with limber pine and Rocky Mountain juniper on rocky outcrops • Often occurs on drought-prone slopes and ridgetops near the lower elevation of tree growth • Relatively frequent, low- to moderate-intensity wildfires historically maintained stands of widely spaced, larger fire-resistant trees • Understory vegetation reflects fire history, topography, and soils. Tall understory shrubs, such as Rocky Mountain maple, Saskatoon serviceberry, and curl-leaf mountain mahogany, are patchy, while mid-height big sagebrush, antelope bitterbrush, mallow ninebark, white spirea, snowberry, or snowbrush are more widespread. • Low shrubs, such as kinnikinnick, creeping barberry, Oregon boxleaf, and common juniper, also occur. Graminoids are often abundant in the understory, especially bluebunch wheatgrass, Idaho fescue, pinegrass, and Geyer's sedge, but also spike fescue, needlegrass, Wheeler's bluegrass, and cheatgrass. • Forbs can be conspicuous, including arrowleaf balsamroot, buckwheats, heartleaf arnica, sweetcicely, Nevada pea, spreading dogbane, timber milkvetch, and others.
IDFG 2	Subalpine-High Montane Conifer Forest	• High elevation forests and woodland found throughout montane and subalpine mountains • Extensive stands of even-aged lodgepole pine develop after fires. Insect outbreaks (e.g., mountain pine beetle) are major natural disturbances. • Susceptible to warming temperatures, reduced snow cover, and drought • Characteristic trees, often forming large stands across glacial carved terrain, are subalpine fir, Engelmann spruce, lodgepole pine, mountain hemlock (maritime climate influenced areas), and quaking aspen. • Subalpine larch, subalpine fir, whitebark pine, and limber pine form clumped to open stands closer to timberline. • The variable understory is a mix of species adapted to dry, cool summers and cold, snowy winters. Heath-family shrubs, such as western Labrador tea, thinleaf huckleberry, rusty menziesia, grouse whortleberry, pink mountainheath, and dwarf bilberry, are common. Other evergreen shrubs include common juniper, snowbrush ceanothus, and mountain big sagebrush. Deciduous shrubs, such as Sitka alder, Rocky Mountain maple, gooseberry currant, russet buffaloberry, mountain snowberry, white spirea, and bunchberry dogwood, can also occur. • Open stands support abundant graminoids, namely Hitchcock's smooth woodrush, Idaho fescue, Geyer's sedge, rushes, and pinegrass, with bluejoint and softleaf sedge where moist. • Forbs are diverse and range from common beargrass, Jacob's-ladder, sickletop lousewort, timber milkvetch, prickly sandwort, poke knotweed, and arnica on drier sites, to white marsh marigold, red baneberry,

Table 2.3-6: Select CFPP Regional Habitat Descriptions (Continued)

Number[1]	Title	Description[2]
IDFG 5	Mountain Mahogany Scrub and Woodland	• Mesic meadows seasonally moist, relatively well-drained sites in broad glacial outwash basins, on toeslopes and steeper rocky slopes with ample moisture, and in snow-accumulating swales at mid to high elevations. • Soils, fire, cold air accumulation, and sometimes windswept drought conditions limit tree establishment. • Transitional between wet meadows and upland forests or Mountain Big Sagebrush steppe. • Some mesic meadows support patches of shrubby cinquefoil, silver sagebrush, or wolf's willow on fringes. • More typically, open to dense, diverse, and often forb-rich herb community. • Burrowing mammals can increase forb diversity. Important forbs include Engelmann's aster, fleabane, licorice-root, western sweetroot, stickseed, bluebells, American saw-wort, fireweed, common cow parsnip, angelica, meadow-rue, valerian, ragwort, false hellebore, poke knotweed, western coneflower, small camas, globe penstemon, mule-ears, cinquefoil, goldenrod, Western pearly everlasting, Indian paintbrush, mountain deathcamas, common beargrass, phlox, yarrow, onion, bellflower, pussytoes, gentian, and Rocky Mountain iris. • Many meadows have dense stands of native graminoids, the most abundant being Baltic rush, oatgrass (e.g., timber oatgrass, California oatgrass), tufted hairgrass, western wheatgrass, blue wildrye, bluejoint, muhly, Idaho fescue, and a number of sedges (e.g., clustered field sedge, meadow sedge, smallwing sedge, widefruit sedge, slenderbeak sedge, brown sedge, Hood's sedge, Raynolds' sedge, Parry's sedge).

Table 2.3-6: Select CFPP Regional Habitat Descriptions (Continued)

Number[1]	Title	Description[2]
IDFG 7	Lower Montane-Foothill Grassland and Shrubland	• Grassland and deciduous shrublands range from canyons and loess hills on plateaus, to foothill and montane slopes; include dry foothills below tree line and shrubby gaps in mountains maintained by avalanches, wildfires, and timber harvest. • Grasslands occur on warm, dry sites maintained by frequent low-intensity wildfire, while deciduous shrubs occur on cool, mesic sites (e.g., drainages, snow drift areas, north aspects) and borders of talus. • Canyon and foothill grasslands are dominated by bluebunch wheatgrass, Idaho fescue, rough fescue, basin wildrye, prairie junegrass, needle and thread, and Sandberg bluegrass. Others include purple threeawn, sand dropseed, wheatgrass, and invasive annual grasses. • Oatgrass, needlegrass, sedges, and spike fescue are more abundant at high elevations. Spikemoss, moss, and lichen can cover soil between bunchgrasses. • Low elevation shrub patches are dominated by serviceberry, netleaf hackberry, hawthorn, mallow ninebark, common snowberry, rose, smooth sumac, blue elderberry, and oceanspray. Rocky Mountain maple, mountain snowberry, bitter cherry, chokecherry, and redstem ceanothus become prominent in the lower montane. • Forbs are conspicuous such as arrowleaf Balsamroot, blanketflower, lupine, buckwheat, desertparsley, little sunflower, beardtongue, geranium, houndstongue hawkweed, cinquefoil, arnica, aster, phlox, fleabane, old man's whiskers, stoneseed, yarrow, milkvetch, goldenrod, Indian paintbrush, and pussytoes. • Montane shrubs occur with mesic herbs, including Sitka alder, mountain ash, rusty menziesia, Scouler's willow, thinleaf huckleberry, elderberry, snowbrush ceanothus, currant, spirea, thimbleberry, and American red raspberry.

Table 2.3-6: Select CFPP Regional Habitat Descriptions (Continued)

Number[1]	Title	Description[2]
IDFG 14	Cliff, Scree, and Badland	• Sparsely vegetated (less than 10 percent cover) rock, slopes, and badlands in arid and semiarid canyons, basins, and foothills. • Landforms include cliff and canyon walls, bedrock outcrops, steep mesa and plateau breaks, and scree and talus. • Sites include shale outcrops, clayey badlands, and volcanic deposits such as lava, cinder, ash, tuff, and basalt. • Some substrates are alkaline or saline, which chemically limits plant growth. Badlands often have heavy clay soils that reduce water infiltration, increasing erosion and limiting moisture and nutrient availability. • Unique soils or geology can result in high numbers of endemic or uncommon plant species. Characteristic shrubs in semidesert ash, badland, and calcarous rocks include saltbush (fourwing, Gardner's, shadscale), spiny hopsage, purple sage, slender buckwheat, and greasewood. • Characteristic herbs in badlands include ricegrass, saline wildrye, dustymaiden, nakedstem sunray, skeletonweed, princesplume, spiderflower, buckwheat, goldenweed, and yellow phacelia. • Calcareous foothills of eastern Idaho ranges also support mat rockspirea, nailwort, and oneflower kelseya. Lava and cinder at CRMO support scattered limber pine and juniper trees with fernbush, dwarf goldenbush, rockspirea, granite pricklyphlox, Lewis' mock orange, and antelope bitterbrush shrubs. Herbs include needle and thread, basin wildrye, needlegrass, Sandberg bluegrass, cushion buckwheat, and scabland penstemon. • In addition to many of the above species, basalt cliffs and talus in river canyons of the Snake, lower Clearwater, and lower Salmon can have curl-leaf mountain mahogany, ponderosa pine, big sagebrush, brickelbush, rubber rabbitbrush, goldenbush, spiny greasebush, currants, bluebunch wheatgrass, cheatgrass, stonecrop, biscuitroot, and blazingstar.
IDFG 15	Alpine and High Montane Scrub, Grassland, and Barrens	• Alpine and tundra habitats occur above tree line on high mountain peaks. • Tree line varies depending on latitude, elevation, climate (precipitation, temperature), moisture (snow accumulation, drainage), and topography (slope, aspect, landform). • Plant cover and density ranges from high on snow accumulating protected sites, to sparse or patchy on boulder fields and frost-sorted or windblown gravelly ridges. • Vegetation types include grass (bunchgrass or sod-forming) and forb (cushion or rosette-forming) turf and fell-fields, and creeping or matted dwarf shrublands. Moss and lichen cover is highly variable. • Wind exposure is a major determinant of vegetation type and cover. Wind and topography affect the depth and duration of snow cover. Snow accumulation protects vegetation, influences growing season length, and moisture availability. • Avalanches can also be an important vegetation disturbance.

Table 2.3-6: Select CFPP Regional Habitat Descriptions (Continued)

Number[1]	Title	Description[2]
IDFG 22	Agricultural Lands	• Idaho has approximately 11.5 million acres of agricultural and ranch lands; approximately, 50 percent are herbaceous agricultural vegetation that includes cultivated crops, pastures, and hayfields. Cultivated cropland accounts for about half of herbaceous agricultural acreage. • Primary cultivated crops are annual vegetables (e.g., potatoes, sugar beets, chickpeas, peas, lentils, onions, corn), grains (wheat, barley, oats), oilseeds and herbs (e.g., safflower, canola, mint), and horticultural commodities (e.g., flowers, seeds). • This habitat is characterized by regularly-spaced rows (often linear) of herbaceous plants with annual plowing, planting, and management (e.g., irrigation, fertilization, pest and weed management, erosion prevention) that determines structure and growth. • This habitat also includes fallow or recently-tilled fields. Pastures and hayfields are perennial herbaceous agricultural fields used for livestock forage production. They are managed and harvested (e.g., mowed, grazed) on a perennial cycle and characterized by purposely seeded nonnative perennial grasses or legumes (e.g., alfalfa). • Pastures and hayfields dominated or co-dominated by native species are classified as grassland, mesic meadow, or wet meadow habitats. • Cultivated cropland commonly occurs on deep, well-drained loamy or loess soils of plains or rolling terrain at lower elevations with longer growing seasons (formerly sagebrush steppe or grasslands). • Pastures and hayfields are more common on alluvial soils of river valleys (including former floodplains and drained wetlands) but may occur anywhere from plains to montane basins. Herbaceous agriculture is heavily dependent on irrigation, especially in drier regions. • Idaho has approximately 3.4 million acres of irrigated agriculture, using 17 million acre-feet of diverted surface water and pumped

Table 2.3-6: Select CFPP Regional Habitat Descriptions (Continued)

Number[1]	Title	Description[2]
INL 10	Basin Wildrye-Mixed Mustards Infrequently Inundated Playa/Streambed	• May be dominated by basin wildrye, a mix of mustard species, or combinations • Various abundant mustard species include desert alyssum, herb sophia, western tansymustard, and flaxleaf plainsmustard, and tall tumblemustard. • Cheatgrass, a non-native annual grass, is generally present, but mean cover is low. Total vegetation cover ranges from 10 percent to 70 percent, with less than half generally from native species. • In additional to basin wildrye, other native species may occur in many stands of this vegetation type but with low cover and diversity are typically low • Native shrubs, specifically green rabbitbrush, may occur sporadically with low abundance values. • Bottlebrush squirreltail is the most constantly occurring native grass, although, needle and thread and Sandberg bluegrass may be locally more abundant where they occur. Native forb species may also occur with sparse cover values and variable species composition across stands of this vegetation type. • Historically, physiognomy is tall, moderately dense grassland dominated by basin wildrye. Most basin wildrye is found along lower elevation riparian (or remnant riparian) corridors and in association with playas where seasonal flooding may occur. • Weedy variations tend to occur as patches on mesic sites with more soil moisture than is available to the surrounding vegetation. • Soils are often fine in texture with substantial clay content. Depths range from moderate to relatively deep and are often poorly drained, though some locations with moderate drainage also support stands of this vegetation class.

[1] Number corresponds to information, including percentages in Table 2.3-3, Figure 2.3-3, and Figure 2.3-6. Section 2.3.1.2 has additional habitat descriptions.

[2] Habitat descriptions are summarized from Reference 2.3-11 for IDFG habitats and Reference 2.3-10 for INL habitats.

Table 2.3-7: Wildlife Species Associated with the CFPP Site, Vicinity, and Region

Common Name[1]	Scientific Name[1]	CFPP Site[2]	INL Site[3]	Global Rank[4]	State Rank[5]	SGCN[5]
AMPHIBIANS						
Boreal Chorus Frog	*Pseudacris maculata*		X	G5	S4	
Columbia Spotted Frog	*Rana luteiventris*		X	G4	S4	Yes
Great Basin Spadefoot	*Spea intermontana*		X	G5	S4	
Inland Tailed Frog	*Ascaphus montanus*			G4	S3	
Long-toed Salamander	*Ambystoma macrodactylum*			G5	S5	
Northern Leopard Frog	*Rana pipiens*		X	G5	S2	Yes
Pacific Chorus Frog	*Pseudacris regilla*			G5	S5	
Tiger Salamander	*Ambystoma tigrinum*		X	G5	S5	
Western Toad	*Anaxyrus boreas*		X	G4	S2	Yes
REPTILES						
Common Garter Snake	*Thamnophis sirtalis*		X	G5	S5	Yes
Desert Horned Lizard	*Phrynosoma platyrhinos*			G5	S4	
Gopher Snake	*Pituophis catenifer*		X	G5	S5	
Great Basin Collared Lizard	*Crotaphytus bicinctores*		X	G5	S2	
Long-nosed Leopard Lizard	*Gambelia wislizenii*		X	G5	S5	
Night Snake	*Hypsiglena torquata*		X	G5	S3	
Prairie Rattlesnake	*Crotalus viridis*		X	G5	S4	
Pygmy Short-horned Lizard	*Phrynosoma douglassi*			G5	S4	
Racer	*Coluber constrictor*		X	G5	S5	
Ringneck Snake	*Diadophis punctatus*		X	G5	S2	
Rubber Boa	*Charina bottae*		X	G5	S5	
Sagebrush Lizard	*Sceloporus graciosus*	X	X	G5	S5	
Short-horned Lizard	*Phrynosoma douglasii*	X	X	G5	S5	
Side-blotched Lizard	*Uta stansburiana*			G5	S5	
Striped Whipsnake	*Masticophis taeniatus*		X	G5	S4	
Western Fence Lizard	*Sceloporus occidentalis*			G5	S4	
Western Rattlesnake	*Crotalus oreganus*		X	G5	S4	
Western Skink	*Eumeces skiltonianus*		X	G5	S5	
Western Terrestrial Garter Snake	*Thamnophis elegans*		X	G5	S5	
Western Whiptail	*Aspidoscelis tigris*			G5	S4	
BIRDS						
American Avocet	*Recurvirostra americana*		X	G5	S5B	
American Bittern	*Botaurus lentiginosus*		X	G4	S4B	Yes
American Coot	*Fulica americana*		X	G5	S4B/S4N	
American Goldfinch	*Carduelis tristis*		X	G5	S5	
American Kestrel	*Falco sparverius*		X	G5	S5B,S5N	
American Pipit	*Anthus spinoletta*			G5	S4B	
American Redstart	*Setophaga ruticilla*			G5	S2B	
American Robin	*Turdus migratorius*		X	G5	S5B,S3N	
American White Pelican	*Pelecanus erythrorhynchos*			G3	S1B	
American Wigeon	*Anas americana*		X	G5	S4B,S4N	

Table 2.3-7: Wildlife Species Associated with the CFPP Site, Vicinity, and Region (Continued)

Common Name[1]	Scientific Name[1]	CFPP Site[2]	INL Site[3]	Global Rank[4]	State Rank[5]	SGCN[5]
Arctic Tern	*Sterna paradisaea*			G5	SNA	
Baird's Sandpiper	*Calidris bairdii*			G5	S2N	
Bald Eagle	*Haliaeetus leucocephalus*		X	G5	S3B,S4N	
Baltimore Oriole	*Icterus galbula*		X	G5	SNR	
Band-tailed Pigeon	*Columba fasciata*			G4	SNA	
Bank Swallow	*Riparia*		X	G5	S5B	
Barn Owl	*Tyto alba*		X	G5	S3?	
Barn Swallow	*Hirundo rustica*		X	G5	S5B	
Barred Owl	*Strix varia*		X	G5	S4	
Barrow's Goldeneye	*Bucephala islandica*		X	G5	S3B,S3N	
Belted Kingfisher	*Ceryle alcyon*		X	G5	S5	
Black Rosy-Finch	*Leucosticte atrata*			G4	S2	Yes
Black Tern	*Chlidonias niger*		X	G4	S1B	Yes
Black-backed Woodpecker	*Picoides arcticus*			G5	S3	
Black-bellied Plover	*Pluvialis squatarola*			G5	S2N	
Black-billed Cuckoo	*Coccyzus erythropthalmus*			G5	S1B	
Black-billed Magpie	*Pica hudsonia*		X	G5	S5	
Black-capped Chickadee	*Poecile atricapilla*		X	G5	S5	
Black-chinned Hummingbird	*Archilochus alexandri*		X	G5	S5B	
Black-crowned Night-Heron	*Nycticorax nycticorax*		X	G5	S2B	
Black-headed Grosbeak	*Pheucticus melanocephalus*		X	G5	S5B	
Black-legged Kittiwake	*Rissa tridactyla*		X	G5	SNA	
Black-necked Stilt	*Himantopus mexicanus*		X	G5	S3B	
Black-throated Gray Warbler	*Dendroica nigrescens*			G5	S3?B	
Black-throated Sparrow	*Amphispiza bilineata*		X	G5	S2B	
Blue Grouse	*Dendragapus obscurus*		X	G5	S5	
Blue-gray Gnatcatcher	*Polioptila caerulea*		X	G5	S3?	
Blue-winged Teal	*Anas discors*		X	G5	S2B	
Bobolink	*Dolichonyx oryzivorus*			G5	S4B	Yes
Bohemian Waxwing	*Bombycilla garrulus*		X	G5	S1B,S3N	
Bonaparte's Gull	*Larus philadelphia*		X	G5	SNA	
Boreal Owl	*Aegolius funereus*			G5	S2	
Brewer's Blackbird	*Euphagus cyanocephalus*	X	X	G5	S5B,S5N	
Brewer's Sparrow	*Spizella breweri*	X	X	G5	S4B	Yes
Broad-tailed Hummingbird	*Selasphorus platycercus*		X	G5	S5B	
Brown Thrasher	*Toxostoma rufum*			G5	SNA	
Brown-headed Cowbird	*Molothrus ater*		X	G5	S5B	
Bufflehead	*Bucephala albeola*		X	G5	S1B,S1N	
Bullock's Oriole	*Icterus bullockii*			G5	S5B	
Burrowing Owl	*Athene cunicularia (including subspecies hypugaea)*		X	G4	S2B	Yes
Bushtit	*Psaltriparus minimus*			G5	S4	
California Gull	*Larus californicus*		X	G5	S2B,S3N	Yes

Table 2.3-7: Wildlife Species Associated with the CFPP Site, Vicinity, and Region (Continued)

Common Name[1]	Scientific Name[1]	CFPP Site[2]	INL Site[3]	Global Rank[4]	State Rank[5]	SGCN[5]
Calliope Hummingbird	*Selasphorus calliope*		X	G5	S5B	
Canada Goose	*Branta canadensis*		X	G5	S5B,S5N	
Canada Jay	*Perisoreus canadensis*			G5	S2	Yes
Caspian Tern	*Hydroprogne caspia*		X	G5	S2B	Yes
Cassin's Finch	*Haemorhous cassinii*			G5	S5	Yes
Cassin's Vireo	*Vireo cassinii*			G5	S5B	
Cattle Egret	*Bubulcus ibis*		X	G5	S2B	
Cedar Waxwing	*Bombycilla cedrorum*		X	G5	S5B,S3N	
Chestnut-sided Warbler	*Dendroica pensylvanica*			G5	SNA	
Chipping Sparrow	*Spizella passerina*	X	X	G5	S5B	
Cinnamon Teal	*Spatula cyanoptera*		X	G5	S4B	Yes
Clark's Grebe	*Aechmophorus clarkii*		X	G5	S2B	Yes
Clark's Nutcracker	*Nucifraga columbiana*		X	G5	S5	Yes
Cliff Swallow	*Petrochelidon pyrrhonota*		X	G5	S5B	
Columbian Sharp-tailed Grouse	*Tympanuchus phasianellus columbianus*			G4T3	S1	
Common Goldeneye	*Bucephala clangula*		X	G5	S5B,S5N	
Common Grackle	*Quiscalus quiscula*			G5	S2B	
Common Loon	*Gavia immer*		X	G5	S1B,S2N	Yes
Common Merganser	*Mergus merganser*		X	G5	S3	
Common Nighthawk	*Chordeiles minor*	X	X	G5	S5B	Yes
Common Poorwill	*Phalaenoptilus nuttallii*			G5	S4B	
Common Raven	*Corvus corax*	X	X	G5	S5	
Common Tern	*Sterna hirundo*		X	G5	S1B	
Common Yellowthroat	*Geothlypis trichas*		X	G5	S5B	
Cooper's Hawk	*Accipiter cooperii*		X	G5	S4	
Cordilleran Flycatcher	*Empidonax occidentalis*			G5	S4B	
Cordilleran Flycatcher	*Empidonax occidentalis*		X	G5	S5B	
Dark-eyed Junco	*Junco hyemalis*		X	G5	S5	
Double-crested Cormorant	*Phalacrocorax auritus*			G5	S2B	
Downy Woodpecker	*Picoides pubescens*		X	G5	S5	
Dusky Flycatcher	*Empidonax oberholseri*		X	G5	S5B	
Eared Grebe	*Podiceps nigricollis*		X	G5	S4B	Yes
Eastern Kingbird	*Tyrannus tyrannus*		X	G5	S4B	
Eastern Towhee	*Pipilo erythrophthalmus*		X	G5	SNA	
European Starling	*Sturnus vulgaris*		X	G5	SNA	
Evening Grosbeak	*Coccothraustes vespertinus*		X	G5	S4	
Ferruginous Hawk	*Buteo regalis*		X	G4	S3B	Yes
Flammulated Owl	*Psiloscops flammeolus*		X	G4	S3B	
Forster's Tern	*Sterna forsteri*		X	G5	S1B	
Fox Sparrow	*Passerella iliaca*			G5	S5B	
Franklin's Gull	*Leucophaeus pipixcan*		X	G4G5	S2B	Yes
Gadwall	*Anas strepera*		X	G5	S3	

Table 2.3-7: Wildlife Species Associated with the CFPP Site, Vicinity, and Region (Continued)

Common Name[1]	Scientific Name[1]	CFPP Site[2]	INL Site[3]	Global Rank[4]	State Rank[5]	SGCN 5
Glaucous-winged Gull	*Larus glaucescens*			G5	SNA	
Golden Eagle	*Aquila chrysaetos*		X	G5		Yes
Grasshopper Sparrow	*Ammodramus savannarum*			G5	S3B	Yes
Gray Catbird	*Dumetella carolinensis*			G5	S5B	
Gray Flycatcher	*Empidonax wrightii*		X	G5	S2B,S2N	
Gray Partridge	*Perdix perdix*		X	G5	SNR	
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*					
Great Blue Heron	*Ardea herodias*		X	G5	S5B,S5N	
Great Egret	*Ardea alba*		X	G5	S1B	
Great Gray Owl	*Strix nebulosa*			G5	S3	Yes
Great Horned Owl	*Bubo virginianus*		X	G5	S5	
Greater Sage-Grouse	*Centrocercus urophasianus*	X	X	G4	S2	Yes
Greater Yellowlegs	*Tringa melanoleuca*		X	G5	S2N	
Green-tailed Towhee	*Pipilo chlorurus*		X	G5	S5B	
Gyrfalcon	*Falco rusticolus*		X	G5	SNR	
Hairy Woodpecker	*Picoides villosus*		X	G5	S5	
Harlequin Duck	*Histrionicus histrionicus*			G4	S1B	Yes
Herring Gull	*Larus argentatus*		X	G5	S2N	
Hooded Merganser	*Lophodytes cucullatus*			G5	S2B,S3N	
Horned Grebe	*Podiceps auritus*		X	G5	S1?	
Horned Lark	*Eremophila alpestris*	X	X	G5	S5	
House Finch	*Haemorhous mexicanus*	X	X	G5	S5	
House Sparrow	*Passer domesticus*		X	G5	SNR	
House Wren	*Troglodytes aedon*		X	G5	S5B	
Killdeer	*Charadrius vociferus*		X	G5	S5B,S3N	
Lapland Longspur	*Calcarius lapponicus*			G5	S1n	
Lark Bunting	*Calamospiza melanocorys*		X	G5	S1?B	
Lark Sparrow	*Chondestes grammacus*		X	G5	S5B	
Lazuli Bunting	*Passerina amoena*		X	G5	S5B	
Least Bittern	*Ixobrychus exilis*			G5	SNA	
Least Flycatcher	*Empidonax minimus*			G5	SNA	
Least Sandpiper	*Calidris minutilla*			G5	S2N	
Lesser Goldfinch	*Carduelis psaltria*			G5	S2B	
Lesser Scaup	*Aythya affinis*		X	G5	S3	
Lesser Yellowlegs	*Tringa flavipes*			G5	S2N	
Lewis' Woodpecker	*Melanerpes lewis*			G4	S3B	Yes
Lincoln's Sparrow	*Melospiza lincolnii*			G5	S5B	
Loggerhead Shrike	*Lanius ludovicianus*	X	X	G4	S3	Yes
Long-billed Curlew	*Numenius americanus*		X	G5	S2B	Yes
Long-billed Dowitcher	*Limnodromus scolopaceus*			G5	S2N	
Long-eared Owl	*Asio otus*			G5	S5	
Long-tailed Jaeger	*Stercorarius longicaudus*			G5	SNA	
MacGillivray's Warbler	*Oporornis tolmiei*		X	G5	S5B	

Table 2.3-7: Wildlife Species Associated with the CFPP Site, Vicinity, and Region (Continued)

Common Name[1]	Scientific Name[1]	CFPP Site[2]	INL Site[3]	Global Rank[4]	State Rank[5]	SGCN[5]
Mallard	*Anas platyrhynchos*		X	G5	S4B,S4N	
Marbled Godwit	*Limosa fedoa*		X	G5	S2N	
Marsh Wren	*Cistothorus palustris*		x	G5	S5B,S5N	
McCown's Longspur	*Calcarius mccownii*			G4	SNA	
Merlin	*Falco columbarius*		X	G5	S2B,S2N	
Mountain Bluebird	*Sialia currucoides*		X	G5	S4B	
Mountain Chickadee	*Poecile gambeli*		X	G5	S5	
Mountain Plover	*Charadrius montanus*			G2	SNA	
Mourning Dove	*Zenaida macroura*	X	X	G5	S5	
Nashville Warbler	*Vermivora ruficapilla*			G5	S5B	
Northern Flicker	*Colaptes auratus*		X	G5	S5	
Northern Goshawk	*Accipiter gentilis*		X	G5	S4	
Northern Harrier	*Circus cyaneus*	X	X	G5	S4	
Northern Mockingbird	*Mimus polyglottos*		X	G5	S1B	
Northern Pintail	*Anas acuta*		X	G5	S5B,S2N	Yes
Northern Pygmy-Owl	*Glaucidium gnoma*		X	G5	S4	
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		X	G5	S5B	
Northern Saw-whet Owl	*Aegolius acadicus*		X	G5	S4	
Northern Shoveler	*Anas clypeata*		X	G5	S4B,S4N	
Northern Shrike	*Lanius excubitor*	X	X	G5	S3N	
Northern Waterthrush	*Seiurus noveboracensis*			G5	S3?	
Olive-sided Flycatcher	*Contopus cooperi*		X	G4	S3B	Yes
Orange-crowned Warbler	*Vermivora celata*		X	G5	S5B	
Osprey	*Pandion haliaetus*		X	G5	S5B	
Pacific Loon	*Gavia pacifica*			G5	SNA	
Pectoral Sandpiper	*Calidris melanotos*			G5	SNA	
Peregrine Falcon	*Falco peregrinus anatum*		X	G4T4	S2B	
Pied-billed Grebe	*Podilymbus podiceps*		X	G5	S4B,S3N	
Pileated Woodpecker	*Dryocopus pileatus*			G5	S4	
Pine Siskin	*Spinus pinus*	X	X	G5	S5	
Pinyon Jay	*Gymnorhinus cyanocephalus*			G5	S1	Yes
Plain Titmouse	*Baeolophus ridgwayi*			G5	S2	
Plumbeus Vireo	*Vireo plumbeus*			G5	S2S3B	
Prairie Falcon	*Falco mexicanus*		X	G5	S5B,S3N	
Purple Martin	*Progne subis*			G5	S1?B	
Red Crossbill	*Loxia curvirostra*			G5	S5	
Red-breasted Merganser	*Mergus serrator*			G5	S1M	
Red-breasted Nuthatch	*Sitta canadensis*			G5	S5	
Red-eyed Vireo	*Vireo olivaceus*			G5	S5B	
Redhead	*Aythya americana*		X	G5	S4	
Red-naped Sapsucker	*Sphyrapicus nuchalis*			G5	S5B	
Red-necked Grebe	*Podiceps grisegena*			G5	S2B	

Table 2.3-7: Wildlife Species Associated with the CFPP Site, Vicinity, and Region (Continued)

Common Name[1]	Scientific Name[1]	CFPP Site[2]	INL Site[3]	Global Rank[4]	State Rank[5]	SGCN[5]
Red-necked Phalarope	*Phalaropus lobatus*		X	G4G5	S2N	
Red-tailed Hawk	*Buteo jamaicensis*		X	G5	S5B,S5N	
Red-winged Blackbird	*Agelaius phoeniceus*		X	G5	S5B,S3N	
Ring-billed Gull	*Larus delawarensis*		X	G5	S2S3B,S3N	Yes
Ring-necked Duck	*Aythya collaris*		X	G5	S4B,S4N	
Ring-necked Pheasant	*Phasianus colchicus*		X	G5	SNA	
Rock Dove	*Columa livia*		X	G5	SNA	
Rock Wren	*Salpinctes obsoletus*		X	G5	S5B	
Rough-legged Hawk	*Buteo lagopus*		X	G5	S4N	
Ruby-crowned Kinglet	*Regulus calendula*		X	G5	S5B	
Ruddy Duck	*Oxyura jamaicensis*		X	G5	S2	
Rufous Hummingbird	*Selasphorus rufus*		X	G5	S5B	
Sage Thrasher	*Oreoscoptes montanus*	X	X	G5	S5B	Yes
Sagebrush Sparrow	*Artemisiospiza nevadensis*	X	X	G5	S4B	Yes
Sandhill Crane	*Grus canadensis*		X	G5	S3B	Yes
Savannah Sparrow	*Passerculus sandwichensis*		X	G5	S5B	
Say's Phoebe	*Sayornis saya*		X	G5	S5B	
Scott's Oriole	*Icterus parisorum*			G5	S1?B	
Semipalmated Plover	*Charadrius semipalmatus*			G5	S2N	
Semipalmated Sandpiper	*Calidris pusilla*			G5	S2N	
Sharp-shinned Hawk	*Accipiter striatus*		X	G5	S5	
Sharp-tailed Grouse	*Tympanuchus phasianellus*			G5	S3	Yes
Short-eared Owl	*Asio flammeus*		X	G5	S4	Yes
Snow Bunting	*Plectrophenax nivalis*	X	X	G5	S4N	
Snow Goose	*Chen caerulescens*		X	G5	S5M	
Snowy Egret	*Egretta thula*		X	G5	S2B	
Snowy Owl	*Nyctea scandiaca*			G5	SNA	
Solitary Sandpiper	*Tringa solitaria*		X	G5	SNA	
Solitary Vireo	*Vireo solitarius*			G5	SNA	
Song Sparrow	*Melospiza melodia*		X	G5	S5B,S5N	
Sora Rail	*Porzana carolina*		X	G5	S5B	
Spotted Sandpiper	*Actitis macularia*		X	G5	S5B	
Spotted Towhee	*Pipilo maculatus*			G5	S5B	
Stilt Sandpiper	*Calidris himantopus*			G5	SNA	
Swainson's Hawk	*Buteo swainsoni*	X	X	G5	S3B	
Swainson's Thrush	*Catharus ustulatus*			G5	S5B	
Three-toed Woodpecker	*Picoides dorsalis*			G5	S2	
Townsend's Solitaire	*Myadestes townsendi*		X	G5	S5	
Townsend's Warbler	*Setophaga townsendi*	X	X	G5	S4B	
Tree Swallow	*Tachycineta bicolor*		X	G5	S5B	
Trumpeter Swan	*Cygnus buccinator*		X	G4	S1B,S2N	Yes
Turkey Vulture	*Cathartes aura*		X	G5	S4B	
Veery	*Catharus fuscescens*			G5	S5B	

Table 2.3-7: Wildlife Species Associated with the CFPP Site, Vicinity, and Region (Continued)

Common Name[1]	Scientific Name[1]	CFPP Site[2]	INL Site[3]	Global Rank[4]	State Rank[5]	SGCN[5]
Vesper Sparrow	*Pooecetes gramineus*	X	X	G5	S4B	
Violet-green Swallow	*Tachycineta thalassina*		X	G5	S5B	
Virginia Rail	*Rallus limicola*		X	G5	S5B	
Virginia's Warbler	*Oreothlypis virginiae*			G5	S1B	
Warbling Vireo	*Vireo gilvus*		X	G5	S5B	
Water (American) Pipit	*Anthus rubescens*		X	G5	S3B	
Western Bluebird	*Sialia mexicana*		X	G5	S3B	
Western Burrowing Owl	*Athene cunicularia hypugaea*			G4T4	S3S4	
Western Grebe	*Aechmophorus occidentalis*		X	G5	S2B	Yes
Western Kingbird	*Tyrannus verticalis*		X	G5	S5B	
Western Meadowlark	*Sturnella neglecta*	X	X	G5	S5B,S3N	
Western Sandpiper	*Calidris mauri*			G5	S2N	
Western Screech-Owl	*Megascops kennicottii*		X	G5	S1	
Western Scrub-Jay	*Aphelocoma californica*			G5	S2?	
Western Tanager	*Piranga ludoviciana*		X	G5	S5B	
Western Wood-Pewee	*Contopus sordidulus*			G5	S5B	
White-crowned Sparrow	*Zonotrichia leucophrys*		x	G5	S5B,S4N	
White-faced Ibis	*Plegadis chihi*		X	G5	S2B	Yes
White-throated Sparrow	*Zonotrichia albicollis*			G5	S1N	
White-throated Swift	*Aeronautes saxatalis*		X	G5	S4B	
White-winged Crossbill	*Loxia leucoptera*			G5	S1	
Whooping Crane	*Grus americana*			G1	SNA	
Willet	*Tringa semipalmata*		X	G5	S4B	
Williamson's Sapsucker	*Sphyrapicus thyroideus*			G5	S5B	
Willow Flycatcher	*Empidonax traillii*		X	G5	S5B	
Wilson's Phalarope	*Phalaropus tricolor*		X	G5	S3B	
Wilson's Warbler	*Wilsonia pusilla*		X	G5	S5B	Yes
Yellow Rail	*Coturnicops noveboracensis*			G4	SNA	
Yellow Warbler	*Setophaga petechia*	X	X	G5	S5B	
Yellow-billed Cuckoo	*Coccyzus americanus*			G5	S2B	Yes
Yellow-billed Loon	*Gavia adamsii*			G4	SNA	
Yellow-breasted Chat	*Icteria virens*		X	G5	S5B	
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*		X	G5	S5B	
Yellow-rumped Warbler	*Dendroica coronata*		X	G5	S5B	
MAMMALS						
American Badger	*Taxidea taxus*		X	G5	S4	
American Beaver	*Castor canadensis*		X	G5	S4	
American Pika	*Ochotona princeps*			G5	S5	Yes
Big Brown Bat	*Eptesicus fuscus*		X	G5	S4?	
Bighorn Sheep	*Ovis canadensis*		X	G4	S3	Yes
Black-tailed Jack Rabbit	*Lepus californicus*	X	X	G5	S4	
Bobcat	*Lynx rufus*		X	G5	S4	

Table 2.3-7: Wildlife Species Associated with the CFPP Site, Vicinity, and Region (Continued)

Common Name[1]	Scientific Name[1]	CFPP Site[2]	INL Site[3]	Global Rank[4]	State Rank[5]	SGCN[5]
Bushy-tailed Woodrat	*Neotoma cinerea*		X	G5	S5	
California Myotis	*Myotis californicus*		X	G5	S2	
Canyon Bat (Western Pipistrelle)	*Parastrellus hesperus*		X	G5	S3	
Coyote	*Canis latrans*	X	X	G5	S5	
Elk	*Cervus canadensis*	X	X	G5	S5	
Fisher	*Martes pennanti*			G5	S1	Yes
Fringed Myotis	*Myotis thysanodes*		X	G4G5	S2	
Golden-mantled Ground Squirrel	*Spermophilus lateralis*			G5	S5	
Gray Wolf	*Canis Lupus*			G4	S3	
Great Basin Pocket Mouse	*Perognathus parvus*		X	G5	S5	
Grizzly Bear	*Ursus arctos*			G4	S1	Yes
Hoary Bat	*Lasiurus cinereus*		X	G3G4	S3	Yes
House Mouse	*Mus musculus*		X	G5	SNA	
Idaho Pocket Gopher	*Thomomys idahoensis*			G4	S3	
Kit Fox	*Vulpes macrotis*			G4	S1	
Least Chipmunk	*Neotamias minimus*	X	X	G5	S5	
Little Brown Myotis	*Myotis lucifugus*		X	G5	S5	Yes
Long-eared Myotis	*Myotis evotis*		X	G5	S3?	
Long-legged Myotis	*Myotis volans*		X	G5	S3?	
Long-tailed Weasel	*Mustela frenata*		X	G5	S5	
Lynx	*Lynx canadensis*			G5	S1	
Meadow Vole	*Microtus pennsylvanicus*		X	S5	G5	
Merriam's Shrew	*Sorex merriami*	X	X	G5	S2	
Montane Vole	*Microtus montanus*		X	G5	S4	
Moose	*Alces alces*		X	G5	S3	Yes
Mountain Cottontail	*Sylvilagus nuttallii*	X	X	G5	S4	
Mountain Goat	*Oreamnos americanus*			G5	S3	Yes
Mountain Lion	*Puma concolor*		X	G5	S5	
Mule Deer	*Odocoileus hemionus*		X	G5	S4	
Muskrat	*Ondatra zibethicus*		X	G5	S4	
North American Deermouse	*Peromyscus maniculatus*	X	X	G5	S5	
North American Porcupine	*Erethizon dorsatum*		X	G5	S5	
North American Wolverine	*Gulo gulo luscus*			G4T4	S2	
Northern Flying Squirrel	*Glaucomys sabrinus*			G5	S4	
Northern Grasshopper Mouse	*Onychomys leucogaster*		X	G5	S4	
Northern Pocket Gopher	*Thomomys talpoides*		X	G5	S5	
Northern Racoon	*Procyon lotor*		X	G5	S5	
Norway Rat	*Rattus norvegicus*		X	G5	SNR	
Ord's Kangaroo Rat	*Dipodomys ordii*		X	G5	S4	
Pallid Bat	*Antrozous pallidus*		X	G5	S1?	
Piute Ground Squirrel	*Urocitellus mollis*			G5	S2	

Table 2.3-7: Wildlife Species Associated with the CFPP Site, Vicinity, and Region (Continued)

Common Name[1]	Scientific Name[1]	CFPP Site[2]	INL Site[3]	Global Rank[4]	State Rank[5]	SGCN[5]
Pronghorn	*Antilocapra americana*	X	X	G5	S4	Yes
Pygmy Rabbit	*Brachylagus idahoensis*		X	G4	S2	Yes
Red Fox	*Vulpes*		X	G5	S4	
Red Squirrel	*Tamiasciurus hudsonicus*			G5	S5	
Red-tailed Chipmunk	*Neotamias ruficaudus*			G5	S3	
Rocky Mountain Bighorn Sheep	*Ovis canadensis canadensis*			G4T4	S1	Yes
Sagebrush Vole	*Lagurus curtatus*		X	G5	S5	
Short-tailed Weasel (Ermine)	*Mustela erminea*		X	G5	S4	
Silver-haired Bat	*Lasionycteris noctivagans*		X	G5	S4?	Yes
Spotted Bat	*Euderma maculatum*			G4	S3	
Striped Skunk	*Mephitis*		X	G5	S4	
Townsend's Big-eared Bat	*Corynorhinus townsendii*		X	G4	S3	Yes
Townsend's Pocket Gopher	*Thomomys townsendii*			G4G5	S2	
Uinta Chipmunk	*Neotamias umbrinus*			G5	S1	
Western Harvest Mouse	*Reithrodontomys megalotis*	X	X	G5	S4	
Western Small-footed Myotis	*Myotis ciliolabrum*		X	G5	S4?	Yes
Western Spotted Skunk	*Spilogale gracilis*		X	G5	S4	
White-tailed Jack Rabbit	*Lepus townsendii*		X	G5	S4	
Wyoming Ground Squirrel	*Spermophilus elegans*			G5	S4?	
Yellow-bellied Marmot	*Marmota flaviventris*		X	G5	S4	
Yellow-pine Chipmunk	*Neotamias amoenus*			G5	S5	
Yuma Myotis	*Myotis yumanensis*		X	G5	S3?	Yes
INVERTEBRATES						
A Cave Obligate Harvestman	*Speleomaster lexi*			G1G2	S1	
A Cave Obligate Harvestman	*Speleomaster pecki*			G1G2	S1	
A Cave Obligate Mite	*Flabellorhagidia pecki*			G1G2	S1	
A Grasshopper	*Argiacris amissuli*			G1G3	S1	
A Grasshopper	*Argiacris keithi*			G1G3	S1	
A Grasshopper	*Argiacris militaris*			G3G4	S2	
A Grasshopper	*Barracris petraea*			G3?	S2	
A Mayfly	*Ameletus sparsatus*			G3G4	S2	
A Mayfly	*Caurinella idahoensis*			G3	S2	
A Mayfly	*Centroptilum selanderorum*			G5	S1	
A Mayfly	*Paraleptophlebia vaciva*			G3G4	S1	
A Mayfly	*Parameletus columbiae*			G2	SNR	
A Spring Stonefly	*Malenka tina*			G3	S2	
A Spur-throat Grasshopper	*Melanoplus digitifer*			G2G3	S2	
A Spur-throat Grasshopper	*Melanoplus idaho*			G1G2	S1	
A Spur-throat Grasshopper	*Melanoplus lemhiensis*			G1G2	S1	

Table 2.3-7: Wildlife Species Associated with the CFPP Site, Vicinity, and Region (Continued)

Common Name[1]	Scientific Name[1]	CFPP Site[2]	INL Site[3]	Global Rank[4]	State Rank[5]	SGCN 5
A Spur-throat Grasshopper	*Melanoplus papyraedus*			G1G2	S1	
A Spur-throat Grasshopper	*Melanoplus salmonis*			G1G3	S1	
A Spur-throat Grasshopper	*Melanoplus trigeminus*			G1G2	S1	
A Stonefly	*Bolshecapnia milami*			G3	S1	
A Stonefly	*Isoperla bifurcata*			G3	S1	
A Stonefly	*Pictetiella expansa*			G3	S2	
An Agapetus Caddisfly	*Agapetus montanus*			G2	S1	
Blind Cave Leiodid Beetle	*Glacicavicola bathyscioides*			G1G3	S1	
Gillette's Checkerspot	*Euphydryas gillettii*			G2G3	S3	Yes
Idaho Dune Tiger Beetle	*Cicindela arenicola*			G1G2	S2	Yes
Idaho Point-headed Grasshopper	*Acrolophitus pulchellus*			G1G3	S1	Yes
Monarch	*Danaus plexippus*			G4	S2	Yes
Morrison Bumble Bee	*Bombus morrisoni*			G4G5	S4	Yes
Sagebrush Spur-throat Grasshopper	*Melanoplus artemesiae*			G1G3	S1	
Suckley Cuckoo Bumble Bee	*Bombus suckleyi*			GU	S2	Yes
Western Bumble Bee	*Bombus occidentalis*			G4	S3	Yes
Yellow Bumble Bee	*Bombus fervidus*			G4?	S5	Yes

1 Common and scientific names reflect Reference 2.3-21.

2 CFPP species identified through Reference 2.3-5, Reference 2.3-6, Reference 2.3-7 Reference 2.3-15, and Reference 2.3-19.

3 INL site species identified through Reference 2.3-9, Reference 2.3-14, Reference 2.3-19, Reference 2.3-20, and Reference 2.3-22.

4 Global Rank from Reference 2.3-21. Table 2.3-12 provides ranking descriptions.

5 State Rank for Idaho from Reference 2.3-21. Table 2.3-12 provides ranking descriptions.

6 SGNC - Species of Greatest Conservation Need as identified in Reference 2.3-11.

Table 2.3-8: Wildlife Species Observations from Plot-Based Surveys on CFPP Site

Scientific Name	Common Name	Type	Number of Plots Where Sign was Observed							
			Audio	Bones	Burrow	Visual	Disturbed Soil[1]	Scat[2]	Tracks	Trail
Antilocapra americana[3]	Pronghorn Antelope	Mammal		1		1		74	4	
Buteo swainsoni	Swainson's Hawk	Bird				1				
Canis latrans	Coyote	Mammal						5	3	
Centrocercus urophasianus[3]	Greater Sage-Grouse	Bird						5		
Cervus elaphus	Rocky Mountain Elk	Mammal						29	6	
Chordeiles minor[3]	Common Nighthawk	Bird	1			2				
Corvus corax	Common Raven	Bird	1							
Eremophila alpestris	Horned Lark	Bird	3			30				
Lanius ludovicianus[3]	Loggerhead Shrike	Bird				2				
Lepus californicus	Black-tailed Jackrabbit	Mammal						17		
Oreoscoptes montanus[3]	Sage Thrasher	Bird				1				
Peromyscus maniculatus	North American Deer Mouse	Mammal				1				
Phrynosoma douglassi[4]	Short-horned Lizard[5]	Reptile				1				
Sceloporus graciosus	Sagebrush Lizard	Reptile				5				
Spizella breweri[3]	Brewer's Sparrow	Bird				1				
Spizella passerina	Chipping Sparrow	Bird				1				
Sturnella neglecta	Western Meadowlark	Bird	9							
Sylvilagus nuttallii	Mountain Cottontail	Mammal						16		1
Tamias minimus	Least Chipmunk	Mammal	2			2				
	Unknown Medium Mammal	Mammal			2		5			
	Unknown Small Mammal	Mammal			61		2		3	
	Unknown Ungulate	Mammal		2						

1 Includes digging, raised tunnels, and upturned soil.

2 Includes sage-grouse tar.

3 Species of Greatest Conservation Need per Reference 2.3-11.

4 Species of Greatest Information Need per Reference 2.3-11.

Source: Reference 2.3-5.

Table 2.3-9: CFPP Wildlife Abundance Ranking Methodology

Abundance Rank	Description
1	Abundant - sign occurs throughout the plot
2	Common - sign is scattered throughout plot but not completely
3	Few - sign occurs randomly throughout the plot
4	Rare - only one or a few observations throughout the plot

Source: Reference 2.3-5

Table 2.3-10: CFPP Bat Species Identified During Acoustical Monitoring

Common Name[1]	Scientific Name[1]	Distribution, Habitat, and Seasonal Occurrence	Protection Status	
			Global Rank[2]	State Rank[3]
Big Brown Bat	*Eptesicus fuscus*[4]	Sitewide; buildings, caves, and lava tubes; year-round	G5	S3
California Myotis	*Myotis califonicus*[5]	Sitewide; trees; summer and autumn	G5	S3
Hoary Bat	Hoary Bat	Patchy; riparian and junipers; autumn	G4	S3
Little Brown Myotis	*Myotis lucifugus*[5]	Sitewide; roosts in buildings; summer and autumn	G3[6]	S3
Long-legged Myotis	*Myotis volans*[5]	Patchy; clearings or along forest edges	G4G5	S3
Silver-haired Bat	*Lasionycteris noctivagans*[5]	Patchy; riparian and junipers; autumn	G4	S3
Townsend's Big-eared Bat	*Corynorhinus townsendii*[4,7]	Sitewide; caves and lava tubes; year-round	G3G4	S3
Western Long-eared Myotis	*Myotis evotis*[5]	Southeast and northwest INL Site; caves and junipers; summer and autumn	G5	S3
Western Small-footed Myotis	*Myotis ciliolabrum*[4]	Sitewide; buildings, caves, and lava tubes; year-round	G4G5	S3

[1] Common and scientific names reflect Reference 2.3-21.
[2] Global Rank from Reference 2.3-21. Table 2.3-12 provides rank definitions.
[3] State Rank for Idaho from Reference 2.3-21. S3: rare or uncommon but not imperiled.
[4] Resident species.
[5] Migratory species.
[6] Status is currently under review by USFWS.
[7] Identified as Sensitive by USFS Region 1 in Reference 2.3-21

Table 2.3-11: Threatened and Endangered Plant Species Evaluation for the CFPP

Scientific Name[1]	Common Name[1]	USESA[2]	BLM[3]	Global Rank[4]	State Rank[5]	Carbon Free Power Project Relevance
Howellia aquatilis	Water Howellia	Delisted	Type 1	G3	S1	• Pacific Northwest endemic from northern California, western Oregon, Washington, northern Idaho, and western Montana[6] • Occurs in small, vernal, freshwater ponds and at the margins of permanent ponds with an annual cycle of filling with water and drying up late in the season[7] • Threatened by changing water levels, invasive species, livestock grazing, road construction, and timber management[6] • Not observed in Butte County; observed and modeled in Benewah and Kootenai Counties in the Idaho panhandle[6] • No supportive habitat in CFPP region; not known or observed with CFPP region • No CFPP construction or operational impacts identified
Lepidium papilliferum	Slickspot Peppergrass	Threatened	Type 2	G2	S2	• Endemic to southwestern Idaho, restricted to unique small-scale openings within sagebrush-steppe habitat[6] • Restricted to specialized habitats known as slick spots - visually distinct, whitish, sparsely-vegetated soil inclusions created by unusual edaphic conditions[7] • Threatened by habitat loss due to pervasive elimination and degradation of sagebrush steppe and reduced precipitation[6] • Not observed in Butte County; observed and modeled in southwestern Idaho in Ada, Elmore, Gem, Owyhee, and Payette Counties[6] • No supportive habitat in CFPP region; not known or observed within CFPP region • No CFPP construction or operational impacts identified

Table 2.3-11: Threatened and Endangered Plant Species Evaluation for the CFPP (Continued)

Scientific Name1	Common Name[1]	USESA[2]	BLM[3]	Global Rank[4]	State Rank[5]	Carbon Free Power Project Relevance
Mirabilis macfarlanei	Macfarlane's Four-o'clock	Threatened	Type 1	G2	S1	• Narrow endemic of canyon slopes above the Snake, Salmon, and Imnaha Rivers in western Idaho and extreme northeastern Oregon[6] • Occurs in deep river canyon grassland habitats, most often on southeast to western exposures with gravelly to loamy and sandy soils[7] • Threatened by invasive species (e.g., cheatgrass [*Bromus tectorum*]) including habitat degradation associated with historic livestock grazing, competition for pollinators, and fire regimes; also susceptible to human trampling, off-road vehicle use, construction, pest damage, road and trail maintenance, and roadside herbicide treatments[6] • Observations confined to central Idaho on western border in Idaho County[6] • No supportive habitat in CFPP region; not known or observed in CFPP region • No CFPP construction or operations impacts identified
Pinus albicaulis	Whitebark Pine	Threatened	Type 2	G3G4	S3	• Occurs in upper subalpine forests[6] at elevations above 6000 ft in locations characterized by rocky soils and cold temperatures mostly on peaks, ridges, and exposed snowy slopes from upper tree line to montane elevations[7] • Severely threatened by introduced white pine blister rust (*Cronartium ribicola*), outbreaks of mountain pine beetle (*Dendroctonus ponderosae*)[6] • Observed in Butte County in Lemhi Range on Tyler Peak and near Saddle Mountain[6] • No supportive habitat in CFPP region; not known or observed within CFPP regionNo CFPP construction or operations impacts identified

Table 2.3-11: Threatened and Endangered Plant Species Evaluation for the CFPP (Continued)

Scientific Name1	Common Name[1]	USESA[2]	BLM[3]	Global Rank[4]	State Rank[5]	Carbon Free Power Project Relevance
Silene spaldingii	Spalding's Silene	Threatened	Type 1	G2	S1S2	• Regional endemic restricted to remnants of the prairie grasslands of eastern Washington, northeastern Oregon, northern Idaho, and western Montana[6] • Occurs in mesic grassland and sagebrush steppe in Idaho, Latah, Lewis, and Nez Perce Counties[7] • Threatened by loss of habitat due to conversion to agriculture, herbicides, and grazing[6] • Not observed in Butte County; observed in north-central Idaho in Idaho, Latah, Lewis, and Nez Perce Counties[6] • No supportive habitat in CFPP region; not known or observed within CFPP region • No CFPP construction or operational impacts identified
Spiranthes diluvialis	Ute Lady's Tresses	Threatened	Type 1	G2G3	S1	• Occurs primarily on moist, subirrigated, or seasonally flooded soils in valley bottoms, riparian edges, gravel bars, or floodplains bordering rivers, perennial streams, springs, and lakes[7] • Threatened by habitat loss or alteration from non-native plant competition and vegetation succession; habitat has been drastically modified by urbanization and stream channelization for agriculture and development[6] • Not observed in Butte County; observed in Bonneville, Fremont, and Jefferson Counties[6] • Known or observed at or outside outer eastern boundary of CFPP region[6]; • CFPP vicinity lacks habitat for this speciesNo CFPP construction or operational impacts identified

[1] Scientific and common names consistent with Reference 2.3-21 and Reference 2.3-33.

[2] USESA - U.S. Endangered Species Act; USESA ranking from Reference 2.3-21.

[3] Rankings from Reference 2.3-21 and Reference 2.3-30; Type 1: Federally listed as threatened and endangered; Type 2: Rangewide or Globally Imperiled Species.

[4] Global rank from Reference 2.3-21. Table 2.3-12 provides rank definitions.

[5] State rank from Reference 2.3-21. Table 2.3-12 provides rank definitions.

[6] Reference 2.3-21.

[7] Reference 2.3-30.

Table 2.3-12: Global and Subnational (State) Conservation Status Ranking Definitions

Global Rank	Global Conservation Status Rank Definition	State Rank	Subnational (State) Conservation Status Rank Definition
G1	Critically Imperiled - At very high risk of extinction or collapse due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.	S1	Critically Imperiled- At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
G2	Imperiled - At high risk of extinction or collapse due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.	S2	Imperiled- At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
G3	Vulnerable - At moderate risk of extinction or collapse due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.	S3	Vulnerable- At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
G4	Apparently Secure - At fairly low risk of extinction or collapse due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.	S4	Apparently Secure- At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
G5	Secure - At very low risk or extinction or collapse due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.	S5	Secure- At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.

Note: Ranking descriptions from Reference 2.3-21. Additional potential rankings can include the following: Multiple rankings (e.g., G2G3, S2S3) indicate uncertainty in the specific ranking. B indicates breeding population. N indicates nonbreeding population. SNA indicates state rank not applicable. SNR indicates no ranked at state level. U indicates unrankable. “?” indicates uncertainty about rank.

Table 2.3-13: CFPP Rare and Sensitive Plant Species Target List

Scientific Name[1]	Common Name[1]	Global Rank[2]	State Rank[2]	Key Habitat
Abronia mellifera[3]	white sand-verbena	G4	S1S2	Sandy soils, cold desert scrub
Agastache cusickii[4]	Cusick's giant hyssop	G3	S2	Talus slopes below limestone outcroppings
Astragalus amnis-amissi[5]	Lost River milkvetch	G3	S3	Shaded and moist microsites on steep limestone cliffs, cracks, and ledges in talus fields
Astragalus aquilonius[5]	Lemhi milkvetch	G3	S3	Various slopes to open flats generally with gravely and sandy soils - occasionally clayey
Astragalus ceramicus var. apus[6]	painted milkvetch	G3	S3	Sandy well-draining soils in early successional habitats of the cold desert steppe
Astragalus gilviflorus[7]	threeleaf milkvetch	G5	S2	Barren slopes to scree fields below sandstone outcroppings
Camissonia pterosperma[8]	pygmy suncup	G4	S2	Dry open slopes, ridges, and washes on limestone and volcanic-derived substrates. Most known locations occur on gravelly-silty soils, on southerly-facing limestone slopes in juniper woodlands.
Cryptantha celosioides[4]	cocks-comb cat's-eye	G5	S3	Sparsely vegetated areas in plains, valleys, montane, and sagebrush steppe in rocky soils
Draba hitchcockii[4]	Lost River draba	G3	S3	Limestone out crops in sheltered cracks and crevasse and leeward sides of cliffs
Eriogonum capistratum var. welshii[7]	Welsh's buckwheat	G4	S2	Volcanic to metamorphic outcrops or basaltic to granitic sandy flats, washes, slopes, and ridges
Eriogonum hookeri[3]	Hooker's buckwheat	G5	S1	Volcanic talus in disturbed areas to open sagebrush flats to mountain mahogany communities
Ipomopsis polycladon[8]	spreading gilia	G4	S2	Southern facing limestone slopes with fine sediment deposits and associated talus
Malacothrix torreyi[4]	Torrey's malacothrix	G4	S2	Fine sediment deposits within limestone talus fields and rocky hillsides
Pediocactus simpsonii[7]	Simpson's hedgehog cactus	G5	S3	Sagebrush, montane, to pinyon-juniper woodlands in rocky soils
Silene scaposa[8]	blue mountain catchfly	G4	S3	Subalpine grassy, gravelly, or rocky slopes to juniper or sagebrush scrub

1 Nomenclature follows Reference 2.3-33.

2 Rankings are from Reference 2.3-21; Table 2.3-12 provides rank definitions.

3 Reference 2.3-35.

4 Reference 2.3-21.

5 Reference 2.3-30.

6 Reference 2.3-34.

7 Reference 2.3-16.

8 Reference 2.3-32.

Source: Reference 2.3-4

Table 2.3-14: Rare and Sensitive Plant Species Observed in the CFPP Site and Vicinity

#[1]	Event	Common Name	State Rank[2]	Abundance[4]	Habitat Description	Revisit[5]	New[5]
Occurrence[3]							
1	Suboccurence	Pygmy suncup	S2	small patch	Juniper woodland associated with Salmon wildrye and black sagebrush on open rocky slopes near transmission line and within 100 ft of two track road	X	
2	Suboccurence	Pygmy suncup	S2	few	Juniper woodland associated with Salmon wildrye and black sagebrush on open rocky slopes near transmission line and within 100 ft of two track road	X	
3	Suboccurence	Pygmy suncup	S2	few	Juniper woodland associated with Salmon wildrye and black sagebrush on open rocky slopes near transmission line and within 100 ft of two track road	X	
4	Occurrence	Pygmy suncup	S2	extensive patch	Juniper woodland with Salmon wildrye, shy gilia, and stemless mock goldenweed on limestone rubble and scree on southern aspect with a 20-degree slope		X
5	Occurrence	Imperfect buckwheat	S3	extensive patch	Juniper woodland dominated community associated with black sagebrush, big sagebrush, and stemless mock goldenweed and growing in protected cracks on leeward sides of limestone outcroppings		X
6	Occurrence	Lost River draba	S2	extensive patch	Low growing cushion plants sparsely associated on unique limestone outcroppings on windswept ridgelines		X
7	Occurrence	Lost River draba	S2	extensive patch	Low growing cushion plants sparsely associated on unique limestone outcroppings on windswept ridgelines		X

Table 2.3-14: Rare and Sensitive Plant Species Observed in the CFPP Site and Vicinity (Continued)

#[1]	Event	Common Name	State Rank[2]	Abundance[4]	Habitat Description	Revisit[5]	New[5]
8	Occurrence	Lost River draba	S2	extensive patch	Low growing cushion plants sparsely associated on unique limestone outcroppings on windswept ridgelines		X

[1] Number (#) refers to Figure 2.3-8.

[2] Rankings are from Reference 2.3-21; Table 2.3-12 provides rank definitions.

[3] Rare and sensitive plant observation events more than one kilometer (0.6 mi) apart are considered an occurrence, while events within one kilometer (0.6 mi) of each other are considered suboccurrences.

[4] Abundance categories are single (one individual), several (2-10 individuals), few (10-25 individuals), small patch (25-100 individuals), and extensive patch (more than 100 individuals).

[5] Occurrences are marked as a revisit for previous EOs or as new occurrences discovered during survey efforts.

Source: Reference 2.3-4.

Table 2.3-15: Threatened and Endangered Wildlife Species Evaluation for the CFPP

Common Name[1]	Scientific Name[1]	USESA[2]	SGCN[3]	Global Rank[4]	State Rank[5]	USFS Region 4	Carbon Free Power Project Relevance
				BIRDS			
Bald Eagle	*Haliaeetus leucocephalus*	Delisted; being monitored		G5	S5	Sensitive	• Habitats include riparian, riverine, woodlands, and forests • Breeding habitat is commonly near water with fish, waterfowl, or seabirds • Nesting in tall trees or cliffs • Winter near waterfowl areas or areas with abundant fish • Observed and modeled in Butte County, including in the Lost River Range foothills near the CFPP site • Documented on INL site as rare migrant and uncommon in winter • Lack of tall trees or cliffs on CFPP site limit presence to flyover or occasional visitors • Not a species of concern for CFPP
Peregrine Falcon	*Falco peregrinus*	Delisted; being monitored		G4	S3B		• Inhabits open situations from tundra, mountains, steppe, and seacoasts, especially with suitable nesting cliffs, to mountains, open forested regions, and human population centers • When not breeding, occurs in areas where prey concentrate, including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, cities, and airports. • Often nests on ledge or hole on rocky cliffs or crags • Threatened by loss of wetland habitat of primary prey, hunting and poachers robbing nests, and food-chain contamination from pesticides • Butte County observations noted in 2008 and before in Lemhi Range; noted as rare on INL site • Not a species of concern for CFPP

Table 2.3-15: Threatened and Endangered Wildlife Species Evaluation for the CFPP (Continued)

Common Name[1]	Scientific Name[1]	USESA[2]	SGCN[3]	Global Rank[4]	State Rank[5]	USFS Region 4	Carbon Free Power Project Relevance
Yellow-billed Cuckoo	*Coccyzus americanus*	Threatened	Yes	G5	S1B	Sensitive	• Migratory bird that breeds in North America and winters in South America. Occurs widely in eastern U.S., but rare in the western U.S. and the Western Distinct Population Segment, including Idaho, is Federally listed as threatened • Forages and breeds in riparian woodland; very secretive and difficult to detect • May occur in scrub-shrub wetland, shrubland/ chaparral, and other habitats during migration; • Seen in 1990s at Mud Lake and Camas National Wildlife Refuge; approximately 41 mi from CFPP and along Snake River at the outer edge of CFPP region to the southeast • Threatened by loss, degradation, and fragmentation of riparian habitat and possible insecticide spraying because it largely eats insects • No habitat found near CFPP; individuals could pass through during migration
Greater Sage-Grouse	*Centrocercus urophasianus*	Not listed, conservation actions required	Yes	G3G4	S3	Sensitive	• Non-migratory species that occurs in sagebrush-steppe habitat in eleven western states; • Sagebrush obligate species; sagebrush is critical for diet and breeding areas • Threats include hunting and loss of sagebrush habitat • DOE and USFWS have Candidate Conservation Agreement in place to protect birds and habitat • Occur on INL and CFPP sites. Closest mating grounds (leks) are 2 mi or more from the CFPP site • Limited sagebrush habitat on CFPP site due to 1994 fire; does not provide suitable wintering, nesting, or rearing of young habitat • Transmission and water pipeline corridor has more sagebrush habitat than CFPP site; closest lek is more than 2 mi from the corridor (LWA ER Figure 4.3-5) • Expected to be species of concern for CFPP due to potential destruction of habitat during construction

Table 2.3-15: Threatened and Endangered Wildlife Species Evaluation for the CFPP (Continued)

Common Name[1]	Scientific Name[1]	USESA[2]	SGCN[3]	Global Rank[4]	State Rank[5]	USFS Region 4	Carbon Free Power Project Relevance
INVERTEBRATES							
Monarch	*Danau plexippus*	Candidate	Yes	G4	S2		• Found in scrub-shrub and herbaceous wetlands, savannahs, cropland conifer woodlands, grasslands, and shrubland - chaparral • Overwinter in high-altitude Mexican conifer forests or coastal California conifer or eucalyptus groves • Major threat is pesticide and cold in overwintering locations • Breed in milkweed patches • Observed and modeled in Butte County, including Lost River Range foothill area near Arco • Not known on CFPP or INL sites; however, milkweed plants, Monarch's food source, do occur on the INL site • Not expected to be species of concern for CFPP
MAMMALS							
Canada Lynx	*Lynx canadensis*	Threatened	Yes	G5	SNA	Threatened	• A wildcat present in northern boreal forests around the world; listed as threatened in the lower 48 states • Resident breeding population in northern Idaho and possibly in Greater Yellowstone Area of Wyoming. • Observed in counties in CFPP Region • Threatened by trapping, hunting, and loss of habitat • CFPP site has no breeding habitat; wandering individuals may pass through the CFPP region (no confirmed sightings) • Not a species of concern for CFPP
Gray Wolf	*Canus lupus*	Delisted		G4G5	S4	Sensitive	• High profile species that was delisted as Federally endangered in Idaho in 2011; however, litigation continues regarding its status • Uses a wide variety of habitats and historically has occurred in all counties in the CFPP region • May visit CFPP region; no recent confirmed sightings on INL site • Not a species of concern for CFPP

Table 2.3-15: Threatened and Endangered Wildlife Species Evaluation for the CFPP (Continued)

Common Name[1]	Scientific Name[1]	USESA[2]	SGCN[3]	Global Rank[4]	State Rank[5]	USFS Region 4	Carbon Free Power Project Relevance
Grizzly Bear	*Ursus arctos* *Ursus arctos (Greater Yellowstone Ecosystem Population)*	Threatened Delisted:	Yes Yes	G4 G4TNR	SU SNR	Sensitive N/A	• Occurs locally in Idaho, Montana, Washington, and Wyoming, chiefly in higher elevation forests and meadows and along riparian corridors • Often exhibits discrete elevational movements from spring to fall, following seasonal food availability; generally, at lower elevations in spring, higher elevations in mid-summer and winter. • In 2017, Greater Yellowstone Ecosystem Distinct Population Segment (highest potential to visit CFPP region) were federally delisted. • No observations on the INL site • Human-grizzly encounters occurred annually in eastern Idaho during past decade • Unlikely occasional visitor to CFPP region; desert provides marginal habitat • Not a species of concern for CFPP
Northern Idaho Ground Squirrel	*Urocitellus brunneus*	Threatened	Yes	G2	S2		• A burrowing species only found in west-central Idaho in Adams and Valley counties outside of the CFPP Region • Hibernates up to 8 months per year; typically, active from April - July • Occupies dry rocky meadows within Douglas-fir and ponderosa pine forests • Threats include habitat loss from logging/wildfire • No habitat found near CFPP • Not a species of concern for CFPP
North American Wolverine	*Gulo gulo luscus*	Proposed Threatened	Yes	G4	S1	Sensitive	• Occupy montane regions of Idaho, Montana, Wyoming, and Washington and northward • Inhabit alpine and arctic tundra, boreal and mountain forests, primarily coniferous • Threatened by habitat loss to timber harvest, ski area construction, road construction, general human disturbance, and conflicts with backcountry trappers • CFPP site has no breeding habitat for wolverine, but possible occasional visitor to CFPP and INL sites (no confirmed sightings) • Not a species of concern for CFPP

Table 2.3-15: Threatened and Endangered Wildlife Species Evaluation for the CFPP (Continued)

Common Name[1]	Scientific Name[1]	USESA[2]	SGCN[3]	Global Rank[4]	State Rank[5]	USFS Region 4	Carbon Free Power Project Relevance
Woodland or Southern Mountain Caribou	*Rangifer tarandus ssp. caribou*	Endangered	Yes	G5	S1	Endangered	• Large deer occurring in boreal areas around the world • Southern Mountain Caribou Distinct Population Segment is listed as Federally Endangered • Occurs in panhandle area of northern Idaho, far outside the CFPP region; critical habitat has been designated in that area • Threats include predation, forest harvest and burning, development, recreation, and climate change • No habitat found near CFPP • Not a species of concern for CFPP

[1] Scientific and common names based on Reference 2.3-21.

[2] USESA - U.S. Endangered Species Act; USESA ranking from Reference 2.3-21.

[3] Rankings from Reference 2.3-21; Type 1: Federally listed as threatened and endangered; Type 2: Rangewide/Globally Imperiled Species.

[4] Global rank from Reference 2.3-21. Table 2.3-12 provides rank definitions.

[5] State rank from Reference 2.3-21. Table 2.3-12 provides rank definitions.

Table 2.3-16: Invasive Species and Noxious Weeds

Scientific Name	Common Name	Description and Relevance to Carbon Free Power Project Site
Hyoscyamus niger	Black henbane	• Annual or biennial, reproduces by seed • Can form dense monocultures that displace native species and agriculture crops, decreasing biodiversity and crop yields [Idaho Invasive Species • Toxic to humans and animals • Has been used as poison and hallucinogen in rituals; still used as ingredient in traditional and homeopathic medicines • Inhabits disturbed areas such as roadsides, building sites, field margins, and pastures • Distribution includes Butte County; identified on INL site • Not identified on CFPP site
Cirsium arvense	Canada thistle	• Perennial, reproduces by seed and creeping roots • Highly aggressive weed that produces allelochemicals that inhibit growth of nearby plant species, reducing biodiversity • Inhabits disturbed areas such as roadsides, cultivated fields, pastures, and rangelands • Distribution includes Butte County; known on INL site • Not identified on CFPP site
Bromus tectorum	Cheatgrass	• Annual, reproduces by root tillers and seed • Forms large monocultures through rapid growth and prolific seed production that compete with native plants • Frequently enters disturbed sites and quickly spreads; particularly invasive in sagebrush-steppe ecosystems • Increases fire frequency • Inhabits grassy places, dry slopes, river beaches, dry sandy places, wastelands, and roadsides • Distribution includes Butte County; found on INL and CFPP sites
Linaria dalmatica ssp. Dalmatica	Dalmatian toadflax	• Perennial, reproduces by seed and creeping roots; seeds can remain viable for 10 years • Highly invasive plant can crowd out and displace native species, reducing biodiversity • Inhabits disturbed open sites, pastures, rangelands, and forest clearings • Single point distribution in northern Butte County; not known on INL site • Not identified on CFPP site
Centaurea diffusa	Diffuse knapweed	• Annual, biennial, or short-lived perennial, reproduces by seed • Rangeland weed with prolific seed production and tumbleweed characteristics • Displaces native species • Can tolerate wide range of soil and environmental conditions, and seed germination is stimulated by fire • Inhabits disturbed sites such as rangeland, pastures, sandy river shores, and gravel banks • Distribution includes Butte County; not known on INL or CFPP sites

Table 2.3-16: Invasive Species and Noxious Weeds (Continued)

Scientific Name	Common Name	Description and Relevance to Carbon Free Power Project Site
Convolvulus arvensis	Field bindweed	• Perennial, reproduces by seeds or rootstocks • Forms dense mats that crowd out other plant species, reducing biodiversity • Grows rapidly and competes with other species for nutrients, moisture, light, and space • Inhabits disturbed sites such as cultivated fields, pastures, lawns, and roadsides • Distribution includes Butte County; known on INL site • Not identified on CFPP site
Halogeton glomeratus	Halogeton	• Reproduces only by seed • Toxic to livestock • Inhabits disturbed, barren, alkaline soils; domestic stock trails; overgrazed rangeland; roadsides; and gravel pits • Distribution includes Butte County; known on INL site • Identified on CFPP site (as saltlover in Table 2.3-4)
Cynoglossum officinale	Houndstongue	• Biennial, reproduces by seed • Herbaceous weed that outcompetes native species for space and nutrients • Inhabits disturbed areas, roadsides, rangelands, forest margins, and riparian zones • Distribution includes Butte County; not know n INL site • Not identified on CFPP site
Euphorbia esula	Leafy spurge	• Perennial, reproduces through seed or creeping roots; seeds can remain viable for 8 years • Overtakes large areas of land, displacing native species • Contains viscous latex that can cause skin irritation and blindness; toxic to cattle and horses; reduces grazing quality for sheep and goats • Inhabits rangeland, pastures, roadsides, and riparian areas • Biological control available, but inconsistent; control with chemical and goat or sheep grazing • Distribution includes Butte County; not known on INL or CFPP sites
Carduus nutans	Musk thistle	• Biennial or winter annual • Thought to have an allelopathic effect, inhibiting growth of nearby species and reducing biodiversity • Inhabits rangeland, pastures, stream banks, and roadsides • Distribution includes Butte County; known on INL site • Not identified on CFPP site
Tribulus terrestris	Puncture vine	• Annual, reproduces by seeds • Forms dense mats that compete with native plants • Has spiny burrs that can injure livestock, pets, and humans, and cause damage to recreational gear • Can thrive in wide range of soil types but prefers dry, loose, sandy soils often found in disturbed sites such as pastures, cultivated fields, roadsides, and ditches • Distribution includes Butte County; known on INL site • Not identified on CFPP site

Table 2.3-16: Invasive Species and Noxious Weeds (Continued)

Scientific Name	Common Name	Description and Relevance to Carbon Free Power Project Site
Chondrilla juncea	Rush skeletonweed	• Perennial, rosette then bolts • Can form dense stands that diminish native plant habitat and associated wildlife • One of the invasive species impacting threatened species, Spalding's catchfly • Inhabits disturbed areas, such as rangeland, cultivated sites, and burn areas; prefers well-drained, course soils • Identified on CFPP site; distribution includes Butte County; known on INL site • Identified on CFPP site
Acroptilon repens	Russian knapweed	• Perennial, spreads by seed • Highly invasive plant forms large monocultures that reduce biodiversity and crop yields • In Idaho, has threatened rare species such as Spalding's silene, Smallhead goldenweed, sagebrush Mariposa lily, and Idaho hawksbeard • Inhabits cultivated fields, irrigations ditches, pastures, roadsides, and disturbed areas • Distribution includes Butte County; known on INL site • Not identified on CFPP site
Tamarix spp.	Saltcedar	• Small tree or shrub; forms dense thickets that eliminate backwaters, increase sedimentation, alter water temperature and turbidity, cause bank aggradation, and increase wildfire frequency • Extracts salt from deep soils and extrudes it to form saline litter that inhibits growth of desired native species • Inhabits streambanks, river bottoms, lake shores, wetlands, canals, and reservoirs • Distribution includes Butte County; not know on INL site; may be present in Big Lost River, Little Lost River, and Birch Creek valleys • Not identified on CFPP site
Onopordum acanthium	Scotch thistle	• Biennial, reproduce by seeds • Forms dense stands that can compete with plant and animal species • Sharp spines can injure livestock and wild animals • Inhabits pastures, rangelands, and agricultural fields • Distribution includes Butte County; known on INL site • Not identified on CFPP site
Centaurea maculosa	Spotted knapweed	• Perennial or biennial, reproduces by seed • Reduces soil fertility and stream sedimentation rates, increasing water runoff and causing wildlife habitat disruption • Inhabits relatively dry disturbed sites, such as roadsides, waste areas, plains, and dry rangeland • Distribution includes Butte County; known on INL site • Not identified on INL site

Table 2.3-16: Invasive Species and Noxious Weeds (Continued)

Scientific Name	Common Name	Description and Relevance to Carbon Free Power Project Site
Centaurea virgata ssp. squarrose	Squarrose knapweed	• Long-lived perennial, reproduces by seed • Rapidly reproduces to form dense monocultures, inhibiting growth of nearby plants • Infestations can disrupt wildlife habitat and decrease plant and animal biodiversity • More adaptable too drought and cold temperatures that other knapweeds • Inhabits grasslands, rangelands, and dry, disturbed areas • Identified in Butte County • Not known on INL or CFPP sites
Lepidium draba	Whitetop	• Perennial herb, reproduces by seed and root regeneration • Forms monocultures that inhibit growth of nearby plant species • Inhabits disturbed sites, such as roadsides, rangelands, meadows, pastures, and cultivated fields • Distribution includes Butte County; not known on INL site • Not identified on CFPP site
Linaria vugaris	Yellow toadflax	• Perennial, reproduces by seed • Forms dense monocultures the outcompete crops and native vegetation • Infestations can cause soil erosion, surface runoff, and increased sediment yield • Inhabits disturbed areas, such as cultivated fields, gardens, grasslands, rangelands, pastures, and roadsides • Distribution includes Butte County; not known on INL or CFPP sites

Sources: Reference 2.3-5, Reference 2.3-9, Reference 2.3-38, and Reference 2.3-39.

Figure 2.3-1: CFPP and Vicinity Level IV Ecoregions

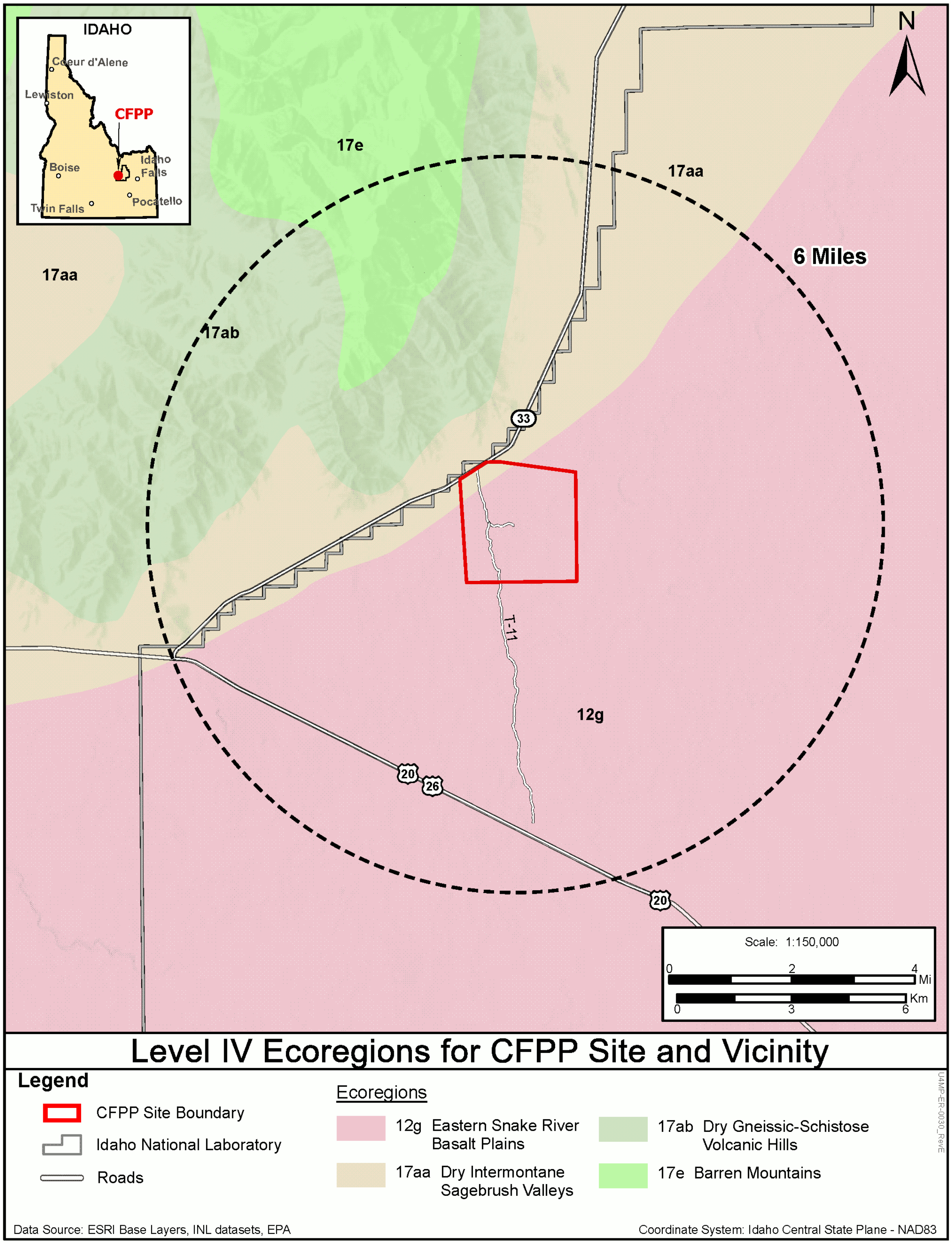


Figure 2.3-2: CFPP Regional Level IV Ecoregions

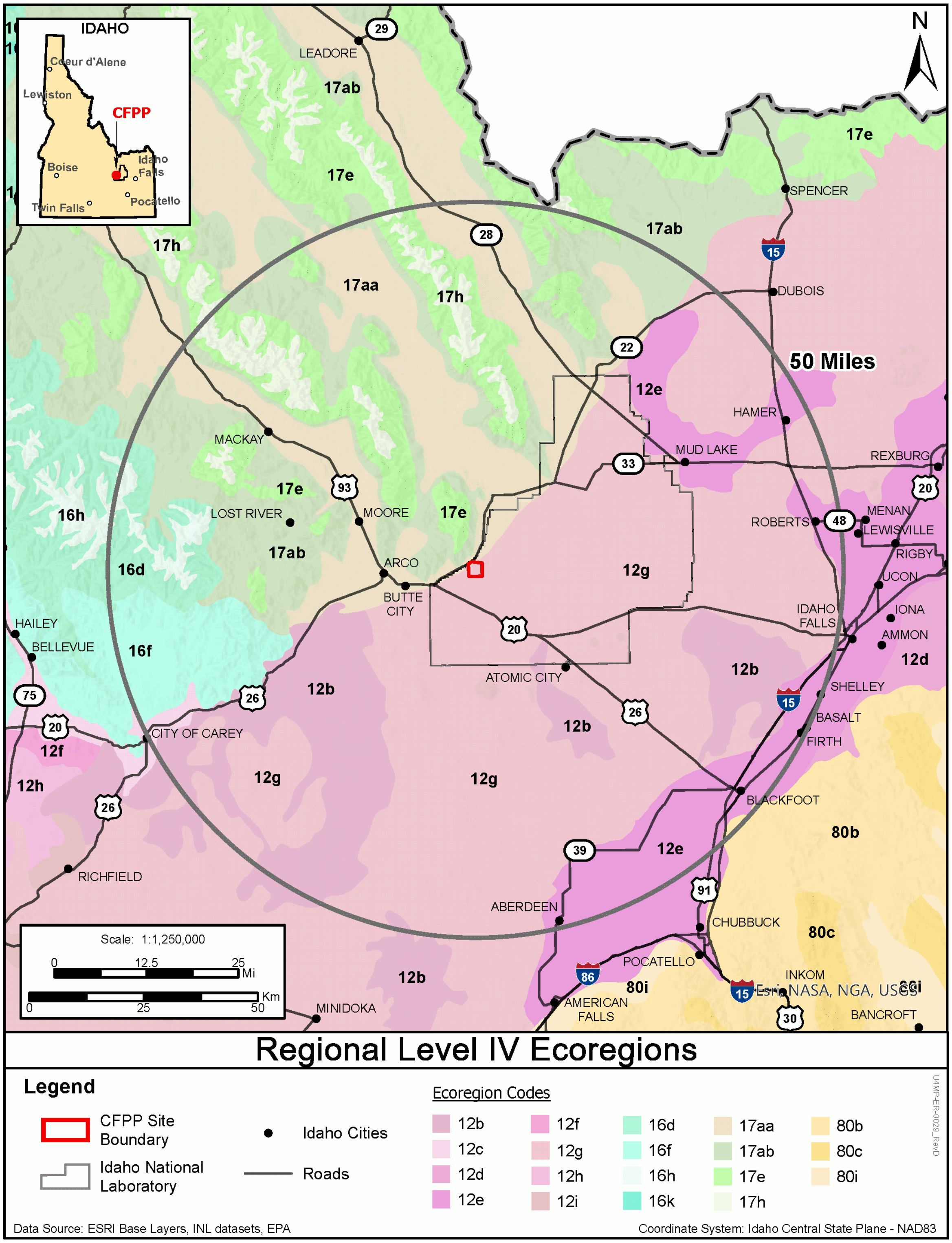


Table 2.3-3 and Table 2.3-6 provide vegetation and habitat descriptions.

Figure 2.3-3: CFPP Regional Habitats

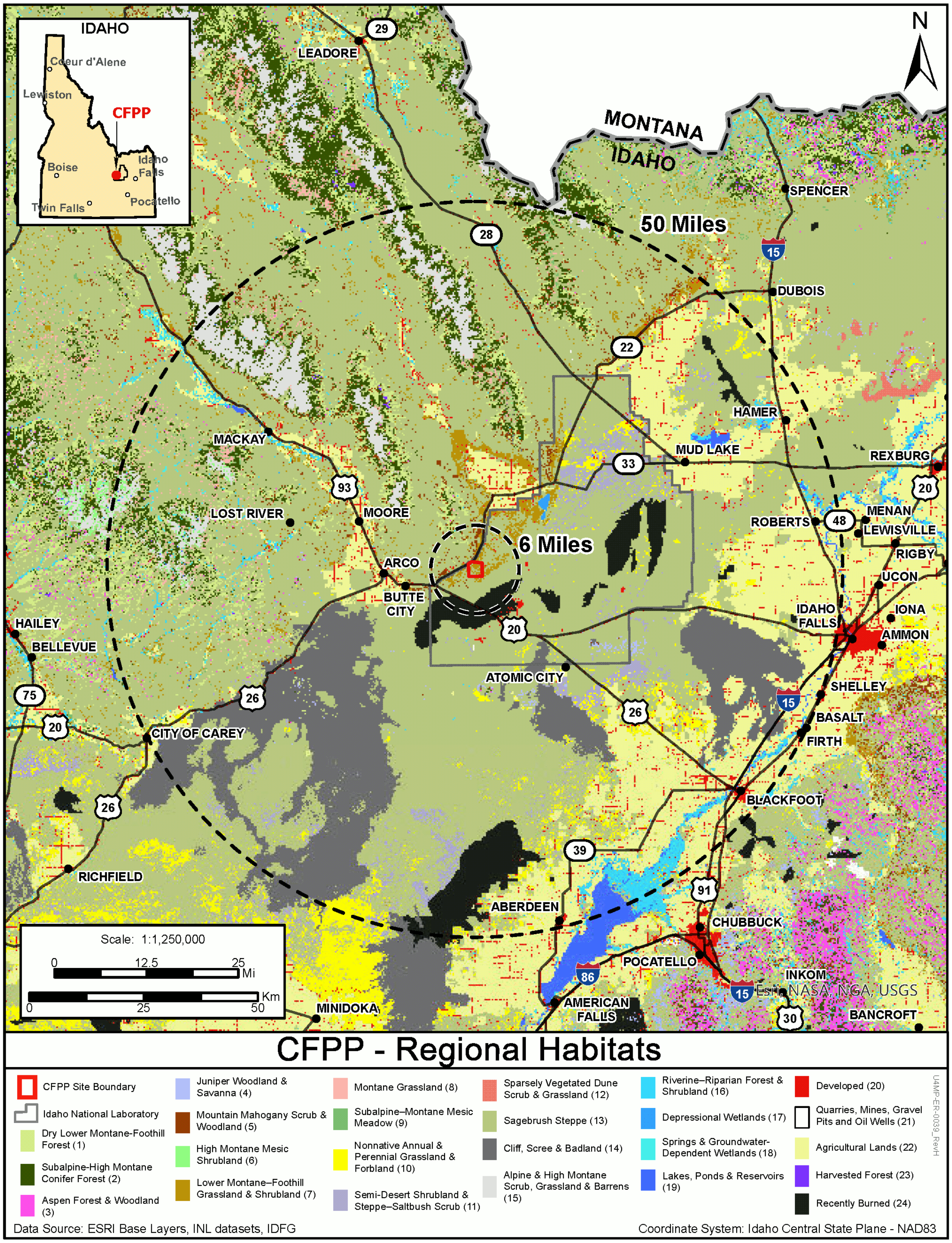


Table 2.3-3 and Table 2.3-6 provide vegetation and habitat descriptions.

Figure 2.3-4: CFPP Ecological Field Sampling and Data Locations

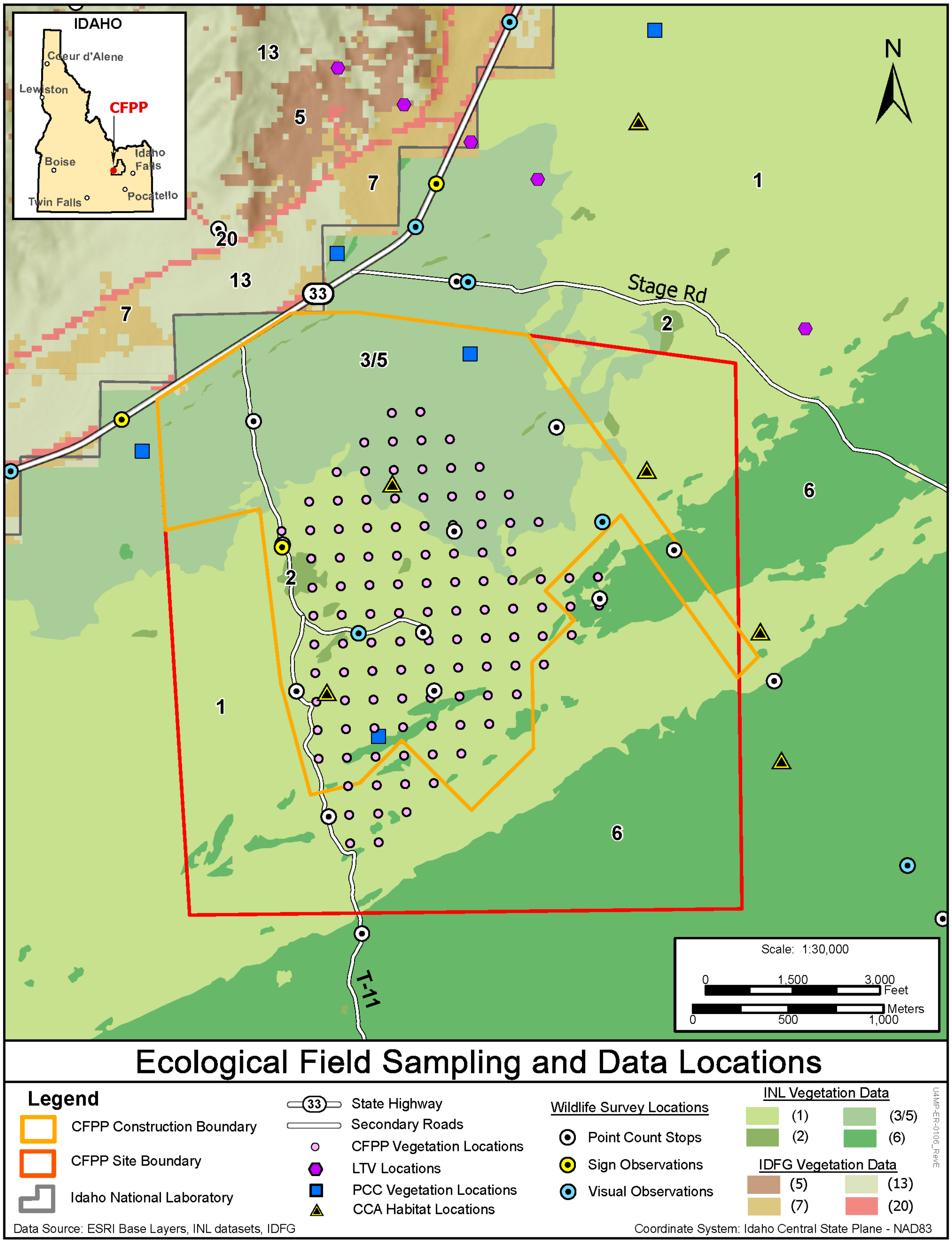


Table 2.3-3 and Table 2.3-6 provide vegetation and habitat descriptions.

Figure 2.3-5: CFPP Site Vegetation and Habitat

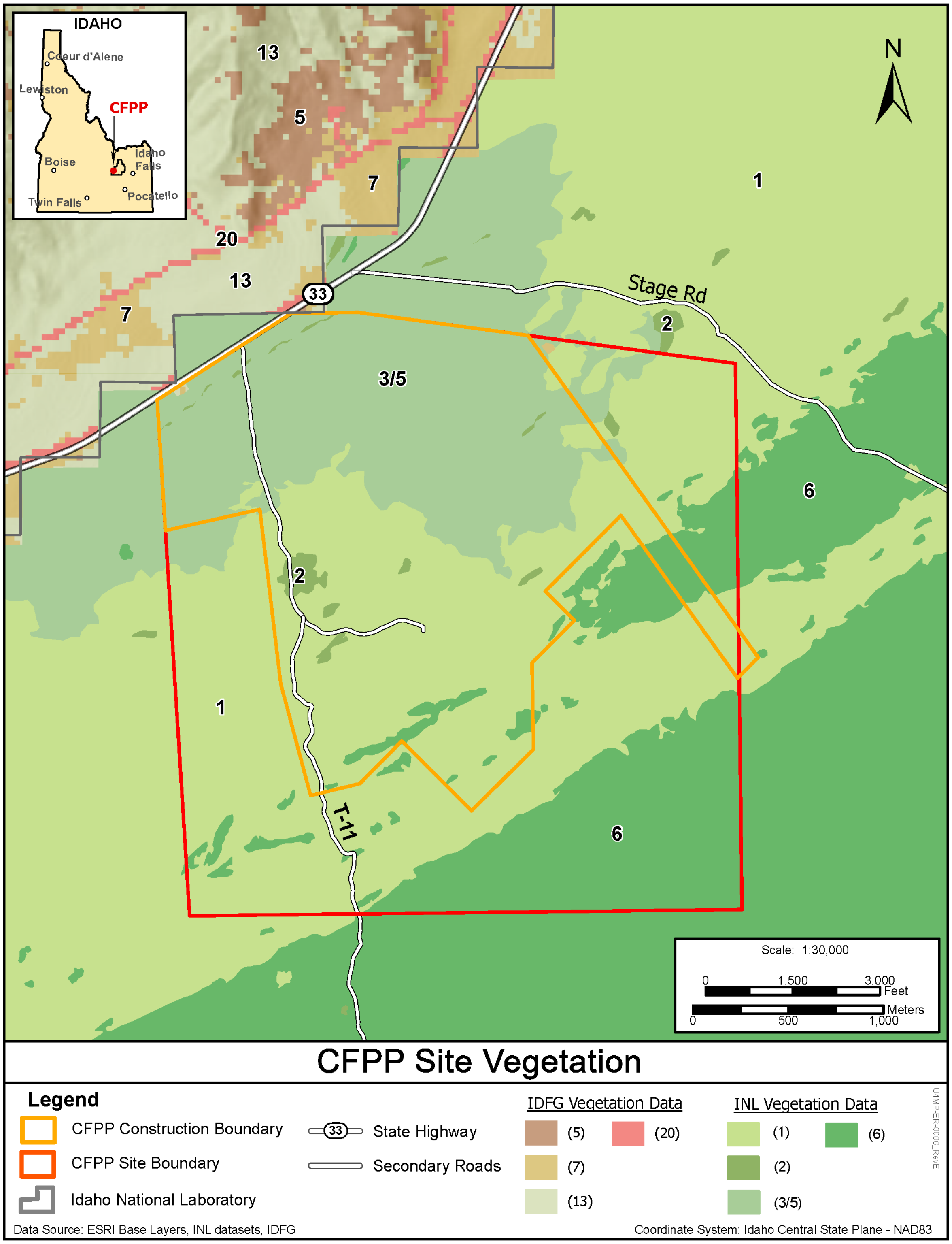


Table 2.3-3 and Table 2.3-6 provide vegetation and habitat descriptions.

Figure 2.3-6: CFPP Vicinity Vegetation and Habitat

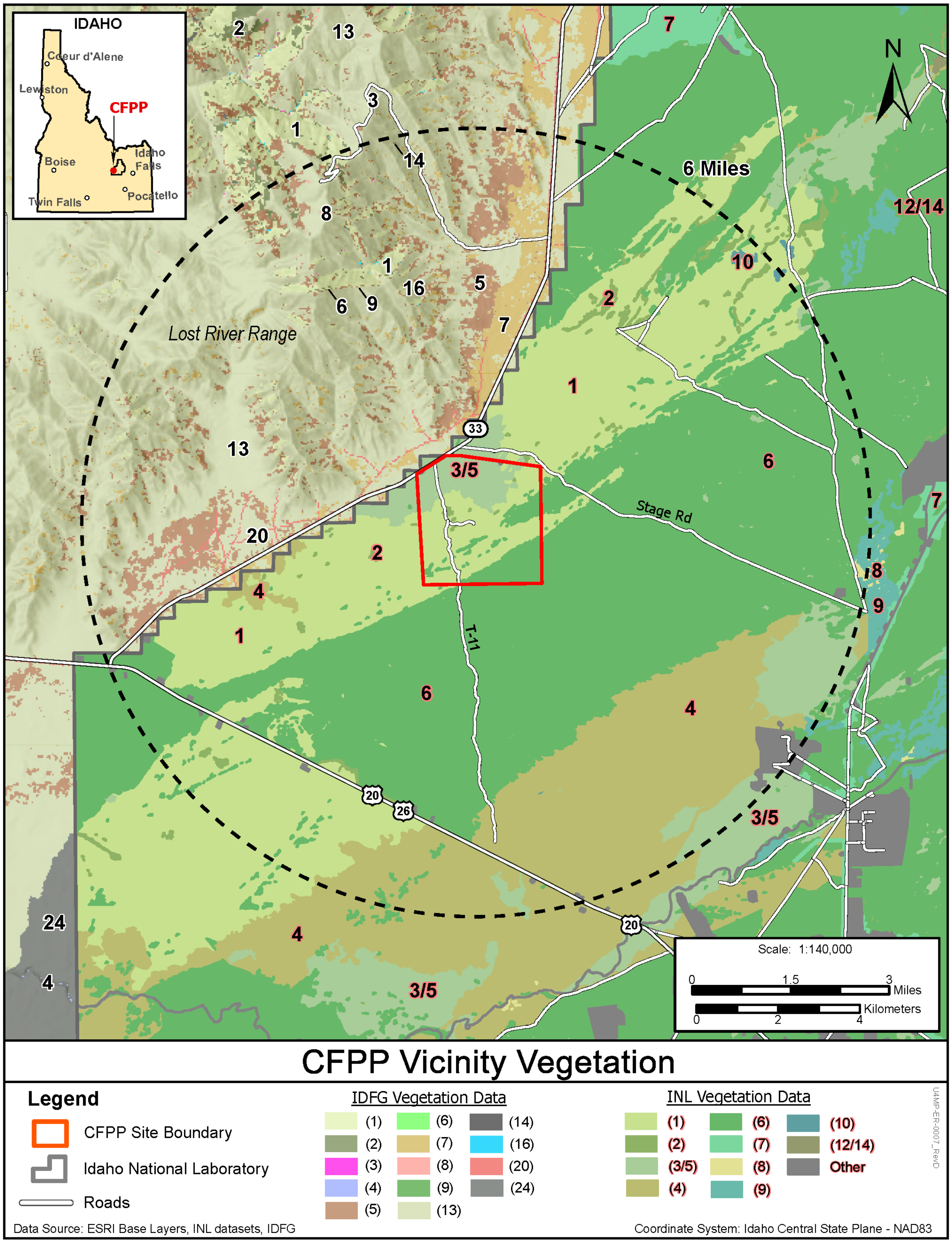


Table 2.3-3 and Table 2.3-6 provide vegetation and habitat descriptions.

Figure 2.3-7: Critical Habitat in the CFPP Region

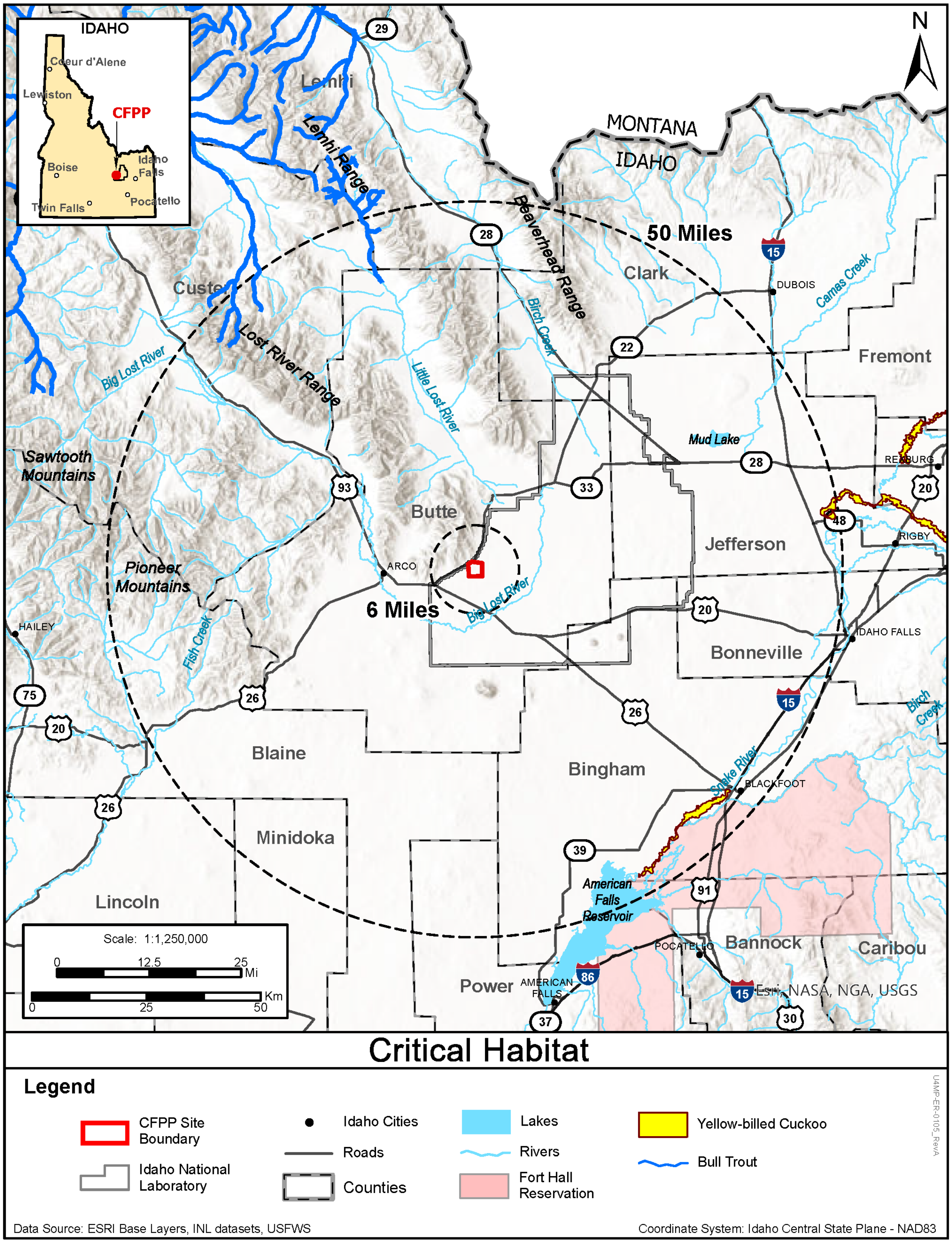
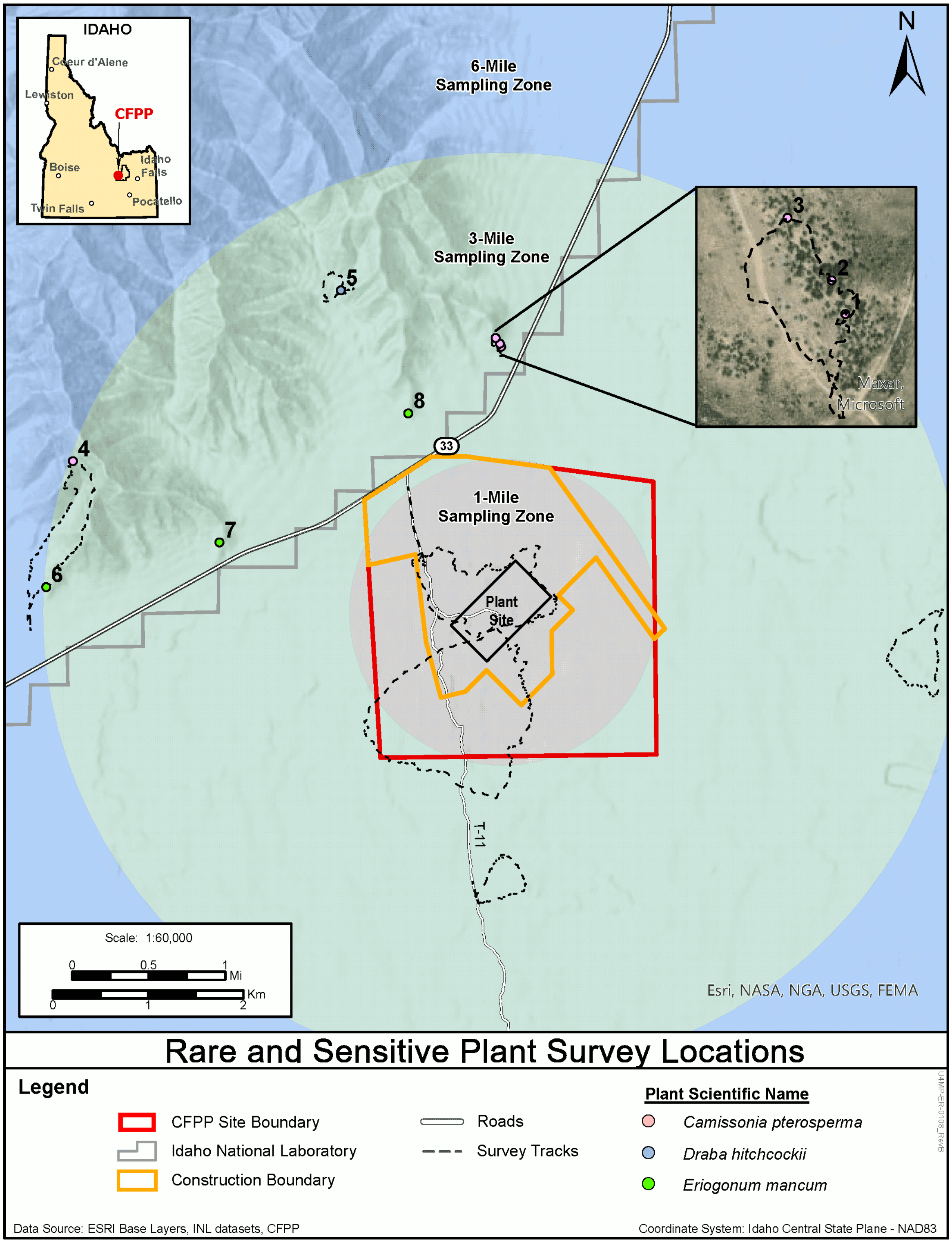


Figure 2.3-8: CFPP Rare and Sensitive Plant Survey Locations



2.4 Socioeconomics

This section describes the baseline socioeconomic resources and characteristics within the region of the proposed CFPP in the following sections of the ER:

- Demographics - Section 2.4.1
- Community Characteristics - Section 2.4.2

Potential socioeconomic impacts from CFPP construction and operations to the demographic and economic regions are discussed further in LWA ER Section 4.4 and in the Combined License Application.

2.4.1 Demographics

This section describes the baseline population characteristics of the demographic region surrounding the CFPP. The demographic region is consistent with that defined in Regulatory Guide 4.2, Revision 3, that is, "...the site and the surrounding area within a 50-mi radius from the center of the proposed site, and should encompass the majority of population groups potentially affected by building and operations."

As shown on Figure 2.4-1, 12 Idaho counties are located within or partially within the CFPP site 50-mi radius: Bannock, Bingham, Blaine, Bonneville, Butte, Clark, Custer, Jefferson, Lemhi, Lincoln, Minidoka, and Power Counties. The proposed CFPP site is located within Butte County, the only county completely within the 50-mi radius. Many of the counties in the demographic region are large and extend significantly beyond the 50-mi radius. Figure 2.4-1 also highlights a unique characteristic of the 50-mi radius region - the location of the INL site within the region and the associated influence on the demographic characteristics. The INL site includes approximately 536 mi^2 of the total 2239 mi^2 of Butte County, roughly 24 percent. The DOE and U.S. Department of the Interior Bureau of Land Management (BLM) administer land use on the INL site. No resident populations exist on the INL site and access is controlled by DOE. Workers at the INL site generally travel daily to the site from local communities or support INL site activities through the DOE Idaho National Laboratory campus located in Idaho Falls, Idaho. The INL site is expected to remain under federal government management and control at least through 2095 as documented in the 2020 INL land use report update (Reference 2.4-1).

The major population areas of the demographic region counties are generally located outside the eastern and southeastern extent of the 50-mi radius region. These population areas are likely to be significant sources of potential construction and operations workers; worker housing, services, and recreation; and main transportation corridors that access the CFPP site location. Based on the regional characteristics, and consistent with Regulatory Guide 4.2, the regional radius was expanded for the CFPP site as shown in Figure 2.4-1 to incorporate these potential impact areas. The U.S. Census Bureau (USCB) Census Block Groups (CBGs) were used as a basis to identify both the demographic and economic regions. This approach supports use of the American Community Survey (ACS) data from the USCB website (Reference 2.4-2).

The process for expansion was guided by maintaining the original 50-mi radius from the CFPP site center point to the west, northwest, and southwest of the CFPP site. The counties in these directions are large, generally low population, with few communities and are mainly dominated by mountainous areas with farming and ranching in the valleys. To the east and southeast, the boundary is expanded to include population centers and transportation corridors that are outside the 50-mile radius, as shown in Figure 2.4-1. This approach reduces bias that might be associated with shifting the 50-mi radius to the east while providing inclusion of potentially impacted populations associated with the larger cities and surrounding communities. Table 2.4-1 provides the CBGs included in the expanded demographic region by county. The table includes a relational designator that ties the CBGs to Figure 2.4-2 through Figure 2.4-6 showing the specific CBGs included in the expanded demographic region.

The expanded demographic region includes portions of 14 counties, adding Fremont and Madison Counties that are completely outside the 50-mi radius; 27 incorporated cities, four of which are principal cities; 21 unincorporated communities; and the Fort Hall Reservation, home to the Shoshone-Bannock Tribes, as shown in Table 2.4-2 and Figure 2.4-1. The Fort Hall Reservation is located in Bannock, Bingham, Power, and Caribou Counties. Caribou County is excluded from the expanded demographic region because the impacts to the Fort Hall Reservation are addressed more effectively through Bannock, Bingham, and Power Counties and only a small portion of Caribou is potentially impacted.

The Office of Management and Budget (OMB) Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas (Reference 2.4-3) and 2010 Standards for Delineating Metropolitan and Micropolitan Statistical Areas; Notice (Reference 2.4-4) define a principal city as the most-populous city of either a micropolitan or a metropolitan statistical area. A micropolitan statistical area is an area associated with at least one urban area that has a population of 10,000 to 50,000 people. Two of the four principal cities, Blackfoot and Rexburg, in the expanded demographic region are micropolitan statistical areas. A metropolitan statistical area is an area associated with at least one urbanized area that has a population of at least 50,000 people; two of the four principal cities, Idaho Falls and Pocatello, are metropolitan statistical areas. The expanded demographic region includes the following principal cities (Table 2.4-2 and Figure 2.4-1).

- Idaho Falls - located in Bonneville County; core city of the Idaho Falls metropolitan statistical area; USCB 2020 decennial population of 64,818 people (Reference 2.4-5). Approximately 52.6 direct miles and 66 driving miles from the CFPP site to the closest boundary of Idaho Falls (as measured from the center point of the CFPP site to the map point location of the city) (Reference 2.4-6).
- Pocatello - located in Bannock County; core city of the Pocatello metropolitan statistical area; population of 58,320 people. Approximately 61.2 direct miles and 81 driving miles from the CFPP site to Pocatello.

- Blackfoot - located in Bingham County within the 50-mile radius; core city of the Blackfoot micropolitan statistical area; population of 12,346 people. Approximately 47.2 direct miles and 57 driving miles from the CFPP site to the closest boundary of Blackfoot.
- Rexburg - located in Madison County; core city of the Rexburg micropolitan statistical area; population of 39,409 people. Approximately 64.6 direct miles and 73 driving miles from the CFPP site to the closest boundary of Rexburg.

Butte City (approximate population 78) is the closest incorporated city to the CFPP site at approximately 9.7 direct miles and 10 driving miles. Unincorporated communities are similar to cities but do not have a legally defined boundary or an active, functioning municipal corporation. The closest unincorporated community is Howe at approximately 10.4 direct miles and 11 driving miles north from the CFPP site.

2.4.1.1 Population

Data on populations were obtained from ACS 5-yr estimates, Table B01003 (Reference 2.4-7), using the CBGs identified in Table 2.4-2 and shown on Figure 2.4-2 through Figure 2.4-6 (i.e., locations based on ArcGIS Tele Atlas [Reference 2.4-8], U.S. Geologic Survey geographic names [Reference 2.4-9], the State of Idaho cities website [Reference 2.4-10]). During the 2016 to 2020 5-year period, the State of Idaho had a population of 1,754,367 people (Table 2.4-3). Approximately 20 percent of the Idaho population, or 351,329 people, lived in the 12 counties within or partially within the 50-mile regional radius around the CFPP site. Approximately 18 percent of the Idaho population, or 319,951 people, lived in the CBGs included in the 14 counties in the expanded demographic region. The total populations of the CBGs in each of the 14 counties varied considerably, ranging from 526 people in Minidoka County to 116,970 in Bonneville County (where Idaho Falls is located), which includes 2016 to 2020 CBGs for that county in the expanded demographic region. As Table 2.4-3 and Figure 2.4-7 show, most of the population relative to the CFPP site live in the expanded area east of the 50-mile radius in Bingham, Bannock, Bonneville, Jefferson, and Madison Counties, which drives the designation of the expanded economic region in Section 2.4.2.

2.4.1.2 Population Change

Table 2.4-4 provides total populations of Idaho and the counties of the expanded demographic region for 2000, 2010, and 2020. Data included in Table 2.4-4 were obtained from the USCB decennial census redistricting data for 2020, 2010, and 2000, respectively (Reference 2.4-5, Reference 2.4-11, and Reference 2.4-12) and the ACS for the periods 2016 to 2020 (USCB 5-yr estimates Table B02001, Race [Reference 2.4-13]) and 2009 to 2013 Table B02001, Race [Reference 2.4-14]). These data are used to evaluate population changes within the expanded demographic region at the county level. The CBGs changed in the 2019 time period with six counties having additional CBGs for the

2016 to 2020 5-yr timeframe. This complicated a CBG-by-CBG comparison using the CBGs within the expanded demographic region. Since the majority of changes occurred in counties with the most substantial growth rates, keeping the data from the CBGs introduces only minor error on the conservative side versus screening out some of the CBGs consistent with the expanded demographic region.

From 2000 to 2020:

- Population of Idaho increased by 545,153 people, with a calculated annual growth rate of 1.77 percent.
- Population of the expanded demographic region, evaluated on a full-county basis, increased by 104,021 people for a calculated annual growth rate of 1.44 percent.
- Counties to the east of the CFPP site located within the expanded demographic region and along the Interstate 15 corridor (i.e., Bannock, Bingham, Bonneville, Jefferson, and Madison) had notable increases in population, highlighting the importance of this expanded area to the demographic characteristics of the CFPP region. Bonneville, Jefferson, and Madison Counties experienced annual growth rates more than 2 percent, with Madison County growing annually by an average of 3.33 percent.
- Blaine County grew at an annual rate of 1.23 percent. The growth areas for this county are located to the southwest of the CFPP site outside the 50-mi radius. The population areas are situated in a more mountainous region, generally related to high-end recreational activities and second homes. Roadways from this area of Blaine County to the CFPP site are limited and make support to the CFPP site by workers, material, equipment, and services difficult. The cities of Bellevue, Haley, Sun Valley, and Ketchum and their associated CBGs are located outside the 50-mi radius and were excluded from the CFPP demographic region. The portion of Blaine County within the 50-mi radius has a single incorporated town, Carey, with an estimated population of 1265 people in the 2016 to 2020 ACS.
- Lincoln, Minidoka, and Power Counties experienced positive annual growth on a county basis. As shown on Figure 2.4-2, only a very small area and one CBG of Lincoln County are within the 50-mi radius. Minidoka and Power Counties are similar, with no towns and only single CBGs within the 50-mi radius.
- Butte, Clark, and Custer Counties experienced a decrease in population. These are sparsely populated, rural counties with small, incorporated towns and unincorporated communities.

In 2021, Idaho led the United States in population growth for a fifth year in a row, with an estimated population growth of 2.9 percent from 2020 to 2021 (Idaho@Work, Reference 2.4-15). Populations are expected to maintain growth in accordance with county-specific comprehensive plans. Many of the counties in the demographic region place high value on the natural environment and strive to maintain a balance between growth and environmental preservation of forests, sagebrush lands, mountainous regions, wildlife areas, lakes, rivers, streams, and other recreational or conservation areas.

A number of annual growth rates were reviewed to support future populations for the operating period of the CFPP. County-specific comprehensive plans were reviewed as the first source for growth data. Comprehensive plans for Bannock (Reference 2.4-16), Bingham (Reference 2.4-17), Blaine (Reference 2.4-18), Clark (Reference 2.4-19), Fremont (Reference 2.4-20), Lincoln (Reference 2.4-21), Madison (Reference 2.4-22), Minidoka (Reference 2.4-23), and Power (Reference 2.4-24) Counties and for Idaho Falls (Reference 2.4-25), Pocatello (Reference 2.4-26), and Rexburg (Reference 2.4-27) include some information on growth rates or projections to obtain growth rates. The county comprehensive plans for Bonneville, Butte, Custer, Jefferson, and Lemhi (Reference 2.4-28 through Reference 2.4-32, respectively), do not provide this information. Some of the counties that provide growth rates have not been updated recently, so even though a growth rate or calculation of growth rate is available, other data were reviewed to verify the older comprehensive plan data.

An analysis of growth rates was performed for the 12 counties in the 50-mi radius using information from Reference 2.4-5, Reference 2.4-11, and Reference 2.4-12. This detailed analysis of annual growth rates is based on decennial populations. Two additional counties - Fremont and Madison County - were evaluated using the same process.

Population growth rates were also evaluated using the ACS data at the county level for comparison to the decennial data and to provide consistency with the use of ACS data for population parameters. Data were evaluated for the 2009 to 2013 and 2016 to 2020 5-yr time periods. Decennial data resulted in annual growth rates that were slightly higher than the ACS data for the counties except Clark and Minidoka where the ACS rate was slightly higher. However, because of the recency and direct count of the 2020 decennial data, the decennial rate was selected for the counties. The difference in rates for Clark County was the largest; the population in the county fluctuates up and down, so the limited 5-yr data set windows for ACS do not capture the longer-term data set of the decennial data. Therefore, the decennial rate is used for Clark County. Minidoka County had only a small annual growth rate difference between the decennial and ACS data sets. For consistency with the other counties, the decennial annual percentage rates are used.

Table 2.4-5 provides population predictions at 2025, representing the start of construction; 2030, representing facility startup; 2040, 2050, 2060, and 2070, representing a 40-year operating period; and 2073, representing three years beyond the full commercial operation. The 2020 population reported in Table 2.4-5 represents the 2016 to 2020 ACS 5-yr population estimate for the county CBGs included in the expanded demographic area as identified in Table 2.4-1 and Figure 2.4-2 through Figure 2.4-6. This approach focuses the analysis on the expanded economic region population.

As shown in Table 2.4-5, increased annual growth is expected for the counties except Butte, Clark, and Custer Counties with most annual growth occurring in Jefferson, Bonneville, and Madison Counties. Population in the expanded demographic region CBGs is projected to increase approximately 8 percent by the start of operations and approximately 59 percent by 3 years following the end of the 40-year CFPP operating life.

2.4.1.3 Race and Ethnicity

The OMB standards for classification of Federal data on race and ethnicity (Reference 2.4-33) defines five minimum categories for data on race: (1) American Indian or Alaska Native; (2) Asian; (3) Black or African American; (4) Native Hawaiian or Other Pacific Islander; and (5) White. Regulatory Guide 4.2 identifies Some Other Race and Two or More Races as additional categories to be considered. Reference 2.4-33 defines ethnicity as two distinct categories: (1) Hispanic or Latino; and (2) Not Hispanic or Latino. Regulatory Guide 4.2 also identifies Aggregate Minority, calculated as Total Population minus White (not Hispanic or Latino) as an additional category to be considered. Table 2.4-3 provides race data for the expanded demographic region. Table 2.4-6 provides ethnicity and aggregate minority data for the expanded demographic region (ACS 2016 to 2020 estimates, Table B03002, Hispanic or Latino Origin by Race [Reference 2.4-34]).

Key points for race and ethnicity for the 2016 to 2020 5-yr period include

- Approximately 82 percent (261,890 out of 319,951 people) of the expanded demographic regional population was White - Not Hispanic or Latino.
- 6642 people classified as American Indian or Alaska Native lived in the expanded demographic region with 5150 people, approximately 77.5 percent, living in Bannock and Bingham Counties, associated mainly with the Fort Hall Reservation.
- 1297 people classified as Black or African American lived in the expanded demographic region with 10 of the 14 counties having at least one person classified as Black or African American.
- The Asian population for the expanded demographic region was 3673 people, almost exclusively within Bannock, Bonneville, and Madison, Jefferson, and Bingham Counties.
- Native Hawaiian or Other Pacific Islanders made up only 0.1 percent of the population, 361 people, in the expanded demographic region, mostly in Bonneville, Bannock, Madison, and Bingham Counties.
- People classified as Some Other Race or as Two or More Races were present in most of the 14 counties with the highest populations located in Bannock, Bingham, Bonneville, Jefferson, and Madison Counties.
- 39,675 people classified as Hispanic or Latino (of any race) and were present in each county with the largest populations in Bonneville, Bingham, Bannock, Jefferson, and Madison Counties.

- 280,276 people classified as Not Hispanic or Latino (of any race) and were present in each county; largest populations were found in Bonneville, Bannock, Bingham, Madison, and Jefferson Counties.
- Aggregate minority populations in the demographic region were present in each county and consisted of 58,061 people primarily living in Bonneville, Bannock, Bingham, Madison, and Jefferson Counties.

Data on total population, race, and ethnic distributions in the expanded demographic region show the clear importance of Bannock, Bingham, Bonneville, Jefferson, and Madison Counties to the regional demographic and economic characteristics relative to the CFPP site. The CBGs that form the expanded demographic region within these five counties account for 301,688 people, or 94 percent, of the total population in the expanded demographic region. The CBGs in the expanded demographic for the five counties account for the following race and ethnicity distribution for the 2016 to 2020 ACS 5-yr period (rounded to nearest whole number):

- 83 percent of the White population
- 98 percent of the Black or African American population
- 95 percent of the American Indian or Alaska Native population
- 100 percent of the Asian population
- 99 percent of the Native Hawaiian or Other Pacific Islander population
- 98 percent of the Some Other Race population
- 88 percent of the Two or More Races population
- 93 percent of the Hispanic or Latino population
- 94 percent of the Not Hispanic or Latino population
- 94 percent of the White (Not Hispanic or Latino) population
- 94 percent of the Aggregate Minority population

Data from the ACS 5-yr estimates are used for the counties in the expanded demographic region to evaluate trends in populations as follows:

- 2006 to 2010, Race (Reference 2.4-35) and Ethnicity (Reference 2.4-36)
- 2011 to 2015, Race (Reference 2.4-37) and Ethnicity (Reference 2.4-38)
- 2016 to 2020 (Reference 2.4-7 and Reference 2.4-34)

Data are evaluated by county versus by the CBGs for the counties in the expanded demographic region because the number of CBGs changed between the 2006 to 2010 and 2011 to 2015 time periods, so direct comparison of the CBGs is not possible. The county-level data provide a conservative foundation for the evaluation of race and ethnicity trends.

Data are presented in Table 2.4-7 as both population counts by year and race and annual growth rates for the 10 years between the 2006--2010 and 2016--2020 ACS 5-yr time periods, the five years between the 2006--2010 and 2011--2015 ACS 5-yr periods, and the 2011--2015 and 2016--2020 ACS 5-yr periods. Data are presented for each county, the expanded demographic region, and the State of Idaho. The following points summarize the race information for the time period of 2006 to 2010 to 2016 to 2020:

- The total population for Idaho, based on the ACS data, grew by 1.4 percent annually while the expanded demographic region experienced 0.92 percent annual growth.
- The race populations of Two or More Races, Some Other Race, and Asian had the most significant increases in this period for the expanded demographic region, while Black or African American and American Indian or Alaska Native populations had negative annual growth during this same period.
- Bingham, Bonneville, Custer, Fremont, Lemhi, Lincoln, Madison, and Power Counties had their highest percentage increases in the categories of Some Other Race, Two or More Races, or both, while Clark and Minidoka Counties experienced their greatest negative annual growth in the Some Other Race category.
- The Black or African American category decreased in Bingham, Bonneville, Jefferson, Lemhi, Lincoln, and Madison Counties and the expanded economic region.
- The Native Hawaiian and Other Pacific Islander category had negative annual growth in Bannock, Blaine, Jefferson, and Power Counties but significant growth in Minidoka County relative to the total for this population.
- The American Indian or Alaska Native category showed negative annual growth in Bannock, Blaine, Bonneville, Custer, Fremont, Jefferson, Lincoln, and Madison Counties with increases in populations or growth rates in Bingham, Clark, Fremont, Lemhi, and Power Counties.
- Butte County experienced negative annual growth in all race categories.

Overall, for the expanded economic region for the 2006 to 2010 to 2016 to 2020 time period:

- White and Native Hawaiian and Other Pacific Islander categories had annual growth of less than 1 percent.
- Black or African American and American Indian or Alaska Native categories had negative annual growth of less than 1 percent.
- Asian, Some Other Race, and Two or More Races categories had annual increases of greater than 3 percent.

These data indicate an increasing diversity in some areas with loss of diversity in others. With the smaller populations of the non-white race categories and large population deltas between time periods, consistent trends are not apparent in the data. Additionally, the full impacts of the recent pandemic on population and race movement are not yet fully understood as not all impacted years have available data. The data do support a trend of continued diversity with White population somewhat more stable during the period while other races increased significantly. This trend is indicative of both the draw of the natural environment of Idaho and the focus on increasing opportunities, especially in the areas of the principal cities, recreational areas, and agriculture.

Table 2.4-8 provides similar data on ethnicity. For the ACS 5-yr periods of 2011 to 2015 and 2016 to 2020, the following highlight the growth rates and trends from the ethnicity data:

- Idaho and the expanded demographic region had positive annual growth across all ethnic categories.
- Hispanic or Latino and Aggregate Minority categories experienced similar growth in Idaho, at more than 3 percent, and for the expanded demographic region, at more than 2.5 percent.
- White (Not Hispanic or Latino) category grew at a significantly slower rate (0.52 percent) versus the Hispanic or Latino and Aggregate Minority categories (2.89 percent and 2.82 percent, respectively) for the expanded demographic region. The Not Hispanic or Latino category grew at 0.63 percent, less than the total population of the expanded demographic region, which increased by 0.92 percent.
- Counties except Butte and Clark had positive growth in the Hispanic or Latino and Aggregate Minority categories, with Custer County having growth rates of 12.27 percent for Hispanic or Latino and 12.72 percent for Aggregate Minority populations.
- Custer, Lemhi, Lincoln, Minidoka, and Power Counties had negative growth rates for both Not Hispanic or Latino and White (Not Hispanic or Latino) categories.
- Butte County experienced negative annual growth in all ethnic categories and in the total population.

Overall, ethnic diversity increased in most of the expanded demographic region, a trend expected to continue into the foreseeable future.

2.4.1.4 Sex and Age Populations

Table 2.4-9 and Table 2.4-10 provide the age and sex characteristics of the population within the expanded demographic region based on ACS 5-yr estimates 2016 to 2020, Table B01001, Sex by Age (Reference 2.4-39) and Table B01002, Median Age by Sex (Reference 2.4-40). The female population of the expanded demographic region for the included county CBGs is 158,893 (49.7 percent) with 161,058 males (50.3 percent). The median age for the region is approximately 37.5 years, slightly younger than the national median age of

38.2 years and slightly older than the Idaho median age of 36.6 years. Table 2.4-11 provides age distribution and percentages (Reference 2.4-39). The 25-to-44 age group represents the largest percentage at 25.9 percent. The 25-to-44 and 45-to-64 age groups account for 42.6 percent of the population, reflecting a significant portion of working-age people. Butte, Fremont, and Lemhi Counties have the highest percentages of the over-65 age group. This may reflect retired individuals, older persons associated with long-term farming and ranching operations, or a potential impact of the smaller populations of these counties on the percentages. Madison County has the highest 15-to-24 age group percentage, more than double the other counties, reflecting the presence of the university in Rexburg. A third of the expanded demographic region population is over 45, which aligns with the recreational and retirement uses of the area.

2.4.1.5 Migrant Workforce

Table 2.4-11 provides current and historical data on migrant farm labor in Idaho and the expanded demographic region. These data were obtained from the U.S. Department of Agriculture (USDA) 2012 Census of Agriculture (Reference 2.4-41) and 2017 Census of Agriculture (Reference 2.4-42). The USDA first began reporting migrant farm labor data in its 2012 census; therefore, Table 2.4-11 only includes data from Reference 2.4-41 and Reference 2.4-42. The data are presented at the county level as the USDA does not capture data at the CBG level.

Reference 2.4-41 and Reference 2.4-42 define a farm as a place that produces and sells (or could sell) at least $1000 of agricultural products during a census year. In 2017, the expanded demographic region had a total of 7016 farms for the 14 counties, 144 fewer farms than the 7160 farms identified in 2012. The number of farms decreased from 2012 to 2017 in 11 of the 14 counties. However, farms in Bonneville County increased by 216 farms from 2012 to 2017. While the 14 counties except Clark County had greater than 100 farms, the highest numbers of farms were in Bingham and Bonneville Counties, with 1177 and 1109 farms in 2017, respectively. The counties of Bannock, Bingham, Bonneville, Fremont, Jefferson, and Madison that lie along the Interstate 15 corridor and the expanded area of the demographic region accounted for 4760 (68 percent) of the 7016 total farms. Figure 2.4-8 illustrates the irrigated and other farmland around the CFPP site. Farming areas closest to the CFPP site are located near Arco, Butte City, and Moore and in the Little Lost River valley. Major agricultural areas surround the population areas of Blackfoot, Idaho Falls, Pocatello, and Rexburg.

Reference 2.4-41 and Reference 2.4-42 define a migrant farm worker as a worker whose employment requires them to travel to a location that prevents them from returning to their permanent home in the same day. From 2012 to 2017, the number of farms with workers decreased from 2471 to 2419. During that same period, the number of migrant workers also decreased, from 2088 to 2030, a reduction of approximately 2.8 percent that corresponds to a similar 2.0 percent reduction in the total number of farms.

Four counties saw an increase in migrant workers, five had decreases, and five lacked data necessary to evaluate changes between 2012 and 2017. Bingham, Fremont, and Jefferson Counties have the highest numbers of migrant workers for 2017, reflecting the strong agricultural land use in these areas. Agriculture in Minidoka County is most prevalent in the south, outside the expanded demographic region. As farms become more efficient through use of improved technology and practices, the number of farms and related need for migrant labor are expected to decrease over time.

2.4.1.6 Income and Poverty

Table 2.4-12 presents the income distribution, median household income, and poverty status of households in the expanded demographic region. The data were obtained from the ACS 2016 to 2020 5-yr estimate Table B19001, Household Income in the Past 12 Months (Reference 2.4-43); Table B19013, Median Household Income in the Past 12 Months (Reference 2.4-44); and Table B17010, Poverty Status in the Past 12 Months of Families (Reference 2.4-45) and represent the CBGs identified in Figure 2.4-2 through Figure 2.4-6 and Table 2.4-1. As shown in Table 2.4-12:

- Median household income in Idaho was $58,915 in 2020 inflation-adjusted dollars across 649,299 total households.
- Median household income for the region was $52,165, a difference of $6750 or approximately 11 percent from the state median.
- Approximately 60 percent of regional households had incomes of $45,000 or greater while nearly 10 percent of the families were below the poverty level.
- Household income varied greatly by county. Blaine County had the highest average income at $96,956, reflecting the recreational environment of the county that draws people with greater wealth for recreational living and retirement.
- Butte, Minidoka, and Lemhi Counties had average incomes less than $40,000, reflecting the smaller populations, fewer communities, lower industry, and natural environment that result in fewer job opportunities.

The USCB's How the Census Measures Poverty (Reference 2.4-46) indicates that family poverty status is based on thresholds determined by the USCB using family income levels, size, and composition. Family poverty status is defined by family income before taxes and does not include capital gains or other non-cash benefits. This section discusses poverty at the family level, which is consistent with the USCB approach. Table 2.4-12 summarizes the poverty status of families in both Idaho and the demographic region based on race and ethnicity. In Idaho, 8.12 percent of the 441,391 families were below the poverty level, while in the expanded economic region 9.97 percent of the families were below this level. Among the counties of the demographic region, the number of families in poverty ranged from 8 families in Clark County to 2,130 families in Bonneville County. Minidoka, Madison, and Butte Counties had the highest percentages of families below the poverty level. Butte and Minidoka reflect small populations with larger percentages of lower wage jobs. Some effects of the smaller populations may also be present. Madison County reflects impacts of a larger number of university students with lower incomes and lower paying or part-time jobs.

2.4.1.7 Transient Populations

Regulatory Guide 4.7 defines transient populations as people who are temporary residents of an area, including people who work, live part-time, or participate in recreational activities in an area. Transient populations do not include people who are simply passing through the area. Consistent with the Regulatory Guide 4.7 definition, this section focuses specifically on those transient-population activities specifically identified in Regulatory Guide 4.2 that include

- Public venues
- Stadiums and arenas
- Resident camps
- Large employers
- National and state parks and recreation areas

2.4.1.7.1 Public Venues

Several public venues open to individuals and groups including transient populations are located in the surrounding communities and counties of the region. Sports facilities vary from ski resorts, shooting and archery ranges, skateparks, aquatic facilities, recreation centers and sports parks, raceways, golf and disc golf courses, bowling, axe throwing, and others. Zoos, aquariums, fairgrounds, performing arts, horse racing, libraries, museums, and water parks are also available to the public with numerous trails and local parks. Table 2.4-13 lists public venues available to resident and transient populations as described in eight online web sites (Reference 2.4-47 through Reference 2.4-54). City and community parks of significant size are included in Table 2.4-13; Federal and state parks are discussed below.

Table 2.4-14 summarizes the types of venues by county, with Bannock and Bonneville Counties providing the highest numbers and most diverse types of venues. Museums, performing arts, golf courses, and parks make up about 40 percent of the 170 identified venues in the expanded demographic region for the public to use.

2.4.1.7.2 Stadiums and Arenas

Table 2.4-15 provides information about stadiums and arenas in the region that include multi-purpose athletic stadiums, baseball and football stadiums, and equestrian facilities (Reference 2.4-49 and American football stadiums [Reference 2.4-55]). The Brigham Young University-Idaho (BYU-Idaho) Stadium Field in Rexburg has the highest capacity, 15,000 people, of the stadiums and arenas in the region followed by Holt Arena in Pocatello at

12,000 people. Holt Arena is home to the Idaho State University Bengals football; Davis Field to Idaho State University Bengals soccer; and Melaleuca Field to the Idaho Falls Chukars, a minor league baseball team. The region has 21 larger stadiums and arenas with numerous smaller high school stadiums that host football, track, soccer, baseball, and dances.

2.4.1.7.3 Resident Camps

As shown in Table 2.4-16, the region has 41 resident camps available for use by transient populations for short-term or long-term stays consistent with the operational seasons of the individual camps listed in the campground directory (Reference 2.4-56). Resident camps operated by Federal or state agencies implement 14 out of 28 day time limits and are not likely to be used as a long-term residence for transient populations associated with the construction and operation of CFPP.

Resident camps, while located within the expanded region, tend to be long distances from the CFPP site. Of the 41 identified camps, 29 are more than 50 miles from the site, with some as far as 95 miles away. Only three camps with a total of 145 sites are within 30 miles of the CFPP site.

Table 2.4-17 summarizes the seasonal availability of resident camps between the counties of the expanded demographic region. Jefferson, Custer, and Bannock Counties have the highest numbers of camps while Bannock, Bonneville, Jefferson, and Custer have the most available sites within camps. Of the 41 camps, 15 are available year-round with roughly 40 percent (i.e., more than 600 resident camp sites), available year round.

2.4.1.7.4 Large Employers

Table 2.4-18 includes data from 2021 presented by the Idaho Department of Labor in labor force and economic profile reports for each county (Reference 2.4-57 through Reference 2.4-70). Battelle Energy Alliance is the largest employer in the expanded demographic region with more than 5000 employees at the INL site in Butte County. Twelve employers in the region had between 1000 to 2499 employees, including Idaho State University, BYU-Idaho; three school districts (i.e., Pocatello/Chubbuck, Bonneville Joint, and Idaho Falls); Eastern Idaho Regional Medical Center; and Fluor Idaho (now Idaho Environmental Coalition, LLC). Both the Cities of Pocatello and Idaho Falls and 16 other large employers employ between 500 to 999 employees, including the Shoshone-Bannock Tribes and a few hospitals and school districts. Smaller employers are divided further into ranges of 250 to 499, 100 to 249, and 50 to 99 employees as shown in Table 2.4-18. Clark County has employers with only 10 to 49 or 1 to 9 employees (county labor force and economic profile report [Reference 2.4-70]). Table 2.4-18 includes only employers that permit Idaho Department of Labor to release employment range data.

Table 2.4-19 summarizes the large employers by employment type for the counties of the region. Private employers account for more than half of the total large-employer base with local governments accounting for another one-third. The majority of employers (i.e., 68 percent) have fewer than 500 employees with 47 percent having fewer than 250 employees. The largest employers are located in Butte, Bannock, Bonneville, and Madison Counties.

According to the INL Economic Impact Summary, FY-2020 (Reference 2.4-71), DOE and its contractors at the INL Site make up the seventh largest private employer base in Idaho; the site employs more than 7000 individuals between DOE, its contractors, and other entities at the site, such as the U.S. Geological Survey.

According to the 2020 U.S. Census, the population of Butte County, the location of the proposed CFPP site, was 2574 people (Reference 2.4-72) and the number of employees at INL was approximately 7500. Nearly twice as many people work at the INL site compared to those who reside in Butte County. A reasonable assumption is that a transient population constitutes the majority of total employees at INL. The expanded demographic area supports this as employees at INL travel for work to Butte County from Bannock, Bonneville, Madison, and other counties where children attend school and families reside. Butte County has a population growth rate less than 1.00 (0.99), indicating a declining population during the evaluated time frame. With fewer people in the already sparsely populated Butte County, transient populations at the INL site and the proposed CFPP are likely to trend upward.

2.4.1.7.5 National and State Parks and Recreation Areas

National and state parks and recreation areas in the region are presented in Table 2.4-20. These parks and recreation areas are considered protected lands by either federal or state government agencies. Below is a summary of the types of national and state parks and recreation areas in the region.

- National forests - The U.S. Forest Service's top priority is to maintain and improve the health, diversity, and productivity of the nation's forests to meet the needs of current and future generations (U.S. Forest Service, Managing the Land [Reference 2.4-73]).
- Research natural areas - Protected natural areas that include unique ecosystems or ecological features; rare or sensitive species of plants and animals and their habitat; high-quality examples of widespread ecosystems (U.S. Forest Service, Reference 2.4-74). Research Natural Areas are areas that have been designated to be permanently protected and maintained in natural condition and are managed by the U.S. Forest Service.
- National natural landmarks and monuments - Designated sites based on their condition, scenic quality, rarity, diversity, and value to science and education (National Park Service, National Natural Landmarks

[Reference 2.4-75]). These areas are managed by the National Park Service.

- Wilderness areas and wilderness study areas - Land designated to have wilderness characteristics. These characteristics include (1) having at least 5000 acres of public land; (2) naturalness; (3) excellent recreation opportunity (BLM, Wilderness and Wilderness Study Areas [Reference 2.4-76]. These areas are managed by the BLM.
- Areas of critical environmental concern - Designated areas managed by BLM to preserve important historic, cultural, and visual and natural resources or to protect human life and provide safety from natural hazards (BLM, Areas of Critical Environmental Concern [Reference 2.4-77]).
- National wildlife refuges - Established to conserve native species that depend on the lands and waters of refuges (U.S. Fish and Wildlife Service, National Wildlife Refuge System [Reference 2.4-78]. These refuges are managed by the U.S. Fish and Wildlife Service.
- Wildlife management areas - Land managed to conserve vulnerable wildlife or furnish unique recreational opportunities (Idaho Fish and Game, Idaho's Wildlife Management Areas [Reference 2.4-79]). These areas are managed by Idaho Fish and Game.

The three national forests in the demographic region - Salmon-Challis, Caribou-Targhee, and Sawtooth - total 9,400,000 acres. In 2020, 2,720,000 people visited these national forests. Craters of the Moon National Monument and Wilderness Area entertained 251,000 guests in 2020 on the 410,000-acre preserve. Craters of the Moon is discussed further in Section 2.4.2.9.

With 15 wilderness study areas, 6 areas of critical environmental concern, 5 wildlife management areas, 7 research natural areas, and other protected lands, the region has a multitude of federal and state facilities for both resident and transient populations.

2.4.2 Community Characteristics

This section describes the baseline community characteristics, including housing, infrastructure, and community services, for the CBGs and associated counties that serve as likely sources of construction and operations labor forces. These CBGs and counties are most likely to be impacted from the proposed construction and operation of the CFPP.

Table 2.4-21 identifies and justifies the counties included in the expanded economic region. Table 2.4-1 specifies the CBGs in the counties that comprise the expanded economic region. Figure 2.4-2 through Figure 2.4-7 graphically portray the expanded economic region counties and CBGs.

A majority of the socioeconomic impacts related to construction and operation of the proposed CFPP are anticipated to occur in the six counties identified in Table 2.4-21, which constitute the expanded economic region discussed throughout this section. Table 2.4-2 identifies the cities and communities located in the counties. Data in this section are presented for the CBGs within or partially within the expanded economic region unless data are only available at the county level, which is noted where appropriate. To streamline this section, the use of the term region means expanded economic region. References to the expanded demographic region use the full term. When data are obtained at the CBG level, the term county implies the portion of the county included in the identified CBGs within the region. For example, the CBGs in Bonneville County are within or partially within the expanded economic region. Conversely, only some of Madison County's CBGs are within or partially within the region. If data are only available at the county level, as noted, the term county implies the entire county.

2.4.2.1 Current Site Labor Force

The proposed CFPP site is located on an undeveloped area of the INL site. No existing power plants are located near the CFPP site, so no current site labor force is associated with the CFPP site. The INL site has a considerable labor force within the region. In 2020, approximately 5000 people worked for INL operations managed by Battelle Energy Alliance, both at the INL site and facilities in Idaho Falls. Additionally, more than 700 people work at the Naval Reactor Facility and approximately 1600 people support the environmental cleanup effort at the INL site, in addition to individuals employed by DOE, U.S. Geologic Survey, and other contractors. The INL site includes the Advanced Test Reactor, the world's premier test reactor used to study the effects of radiation on materials.

As noted in INL's Choose Idaho-Socioeconomic and Industry Site Selection Information presentation (Reference 2.4-80), no residences are located within the INL site. More than 60 percent of INL site employees reside in Bonneville County. During the 2016 to 2020 ACS 5-yr period, about 12 percent of Bonneville County residents worked outside the county (USCB, ACS 2016 to 2020, ACS 5-yr estimates Table S0801, Commuting Characteristics by Sex [Reference 2.4-81]).

2.4.2.2 Housing

Housing data were obtained from ACS 5-yr estimates of housing characteristics for the time periods 2006 to 2010 (Reference 2.4-82) and 2016 to 2020 (Reference 2.4-83) and vacancy status for the same periods (Reference 2.4-84 for 2006-2010 and Reference 2.4-85 for 2016 to 2020). Data are presented at the county level as data at the CBG level were not available from ACS. Table 2.4-20 provides data on housing occupancy from 2016 to 2020.

- A total of 120,737 housing units were present in the region in 2020.
- A total of 12,802 housing units were added to the housing stock between the 2006 to 2010 and 2016 to 2020 time periods.

- Bannock and Bonneville Counties together had the largest number of housing units, 78,284 or approximately 65 percent of the housing unit stock, consistent with the principal cities of Pocatello and Idaho Falls in these counties.
- During the 2016-to-2020 period, housing units in Butte County fell from 1415 to 1292. The INL Site, which has no residences, occupies a large area of Butte County.
- The areas to the east of the 50-mi radius from the CFPP Site are likely locations for housing and related services for CFPP construction and operations work force and consequently, associated impacts.
- From 2016 to 2020, 75,333 owner-occupied housing units were present in the region with 34,543 renter-occupied units.
- The region had 10,861 vacant housing units, with the largest numbers in Bannock, Bonneville, and Madison Counties.
- The median home value in the expanded economic region was $185,150, an increase of $40,700 from the 2006 to 2010 time period. Median home values exceeded $200,000 in Bonneville, Jefferson, and Madison Counties. Median home values may not reflect the currently heated real estate market from 2021 and 2022. However, in late summer of 2022, the housing market began to cool, reflecting a potential for home values to stabilize or even fall slightly in the future.
- From 2016 to 2020, 10,861 housing units were vacant with 3,665 available for rent in the region.
- Bannock, Bonneville, and Madison Counties had the largest numbers of vacant units with more than half the available rentals in Madison County.
- The regional homeowner vacancy rate was 1.8 percent, down from 2.6 percent in the 2006 to 2010 time period.
- Homeowner vacancy rates ranged from 0.4 percent in Jefferson County to 4.0 percent in Butte County. Vacancy rates in Bannock, Bonneville, and Jefferson Counties regionally declined from the 2006 to 2010 levels as the popularity of Idaho saw increased movement to the state.
- Madison County experienced a 2.1-percent increase in the homeowner vacancy rate and a 21.6-percent increase in the rental vacancy rate, indicating a potential adjustment as reaction to the university expansion levels off.
- The regional rental vacancy rate was 10.1 percent in 2016 to 2020 compared to 10 percent in 2006 to 2010 and rental vacancy rates ranged from 0.5 percent in Jefferson County to 21.6 percent in Madison County.
- Median gross rent for renter-occupied housing units was $739, up $154 from the 2006-to-2010 period. Rents were highest in Bonneville and Jefferson Counties. Rent rose by the largest amount in Butte County and the least amount in Bannock County.

Table 2.4-23 provides information on the listing or sold prices of housing units in the region using ACS data from 2016 to 2020 (Reference 2.4-86). No housing units were listed or sold for more than $400,000; the majority were listed or sold at values between $100,000 and $300,000.

Table 2.4-24 provides information on the physical parameters of housing units (Reference 2.4-83).

- In the region, 1979 was the median build year for housing units. The largest numbers of units were built from 1970 to 1979 (22,826 units) and from 2000 to 2009 (20,515 units). Post 2009, 11,589 units were built.
- Sixty-nine percent of the housing units in the expanded economic region had three or more bedrooms, with the largest number having three bedrooms.
- Most householders in the expanded economic region purchased and moved into housing units after 1989, primarily in Bannock and Bonneville Counties.
- The largest number of householders in the region moved in between 2015 and 2018.
- The majority of units had heating fuel with only a small number that did not.
- Bannock and Bonneville Counties had the largest numbers of units with one or fewer bedrooms and the largest number that lacked complete plumbing, complete kitchens, and available telephone service.

Table 2.4-25 provides information on the types of housing unit structures (Reference 2.4-82 and Reference 2.4-83).

- Detached single units were the most common housing units in the region, comprising approximately 67 percent of total housing units; attached single units accounted for an additional 4.2 percent.
- Multi-unit structures, such as apartment complexes, comprised approximately 21 percent of the housing units.
- Mobile homes accounted for approximately 7.3 percent.
- The reported types of housing unit structures increased from the 2006 to 2010 period to the 2016 to 2020 period except 2-unit and mobile home types; mobile homes declined by 1300 units between these periods.
- Bannock and Bonneville Counties accounted for approximately 45 percent of the detached single-unit housing.
- Bannock, Bonneville, and Madison Counties had the highest numbers of multi-unit housing.
- Bannock, Bingham, and Bonneville Counties had the highest numbers of mobile homes.
- Bonneville County saw the largest increase in single-unit types and Madison County saw the largest increase in multi-unit types, partially related to expansion of the university in Rexburg.

- Butte County had no change or reduced numbers in the types of housing unit structures except those with 20 or more units, which increased from zero to 10 over the period.

Building permits for residential housing units are presented in Table 2.4-6 (Reference 2.4-87). In 2021, 2560 residential building permits were issued, with the majority in Bonneville County. Single-family housing units represented the greatest number of permits, with Bonneville County issuing the majority. Regionally, 323 multi-family unit permits were issued with the greatest number in Bannock County. Butte County had only one issued permit for a single-family unit; the other counties issued at least 200 single-family permits and the majority of counties issued multi-family permits.

The building permits reflect the continued growth of Bannock, Bingham, Bonneville, Jefferson, and Madison Counties, and underpin the importance of these counties to the CFPP site economically. The data for Butte County provide a better understanding of housing challenges closer to the CFPP site and the need for workers to either compete for limited housing in Butte County or to look farther from the site for housing.

2.4.2.3 Economic Base

Table 2.4-27 summarizes employment by industry type in the region. Data included in the table were compiled from the Bureau of Economic Analysis at the county level as data were not available at the CBG level (Reference 2.4-88). In 2021, the region staffed 191,650 employees. From 2010 to 2021, employment of the industry types in the region increased. During this time, health care and social assistance was the fastest growing industry type, adding 5,460 employees. Leading industry types changed over time. In 2010, retail trade employed the most people. By 2021, health care and social assistance employed the most people.

The labor force is the population of people living within an area that is available to work. Based on U.S. Bureau of Labor Statistics Local Area Unemployment Statistics (Reference 2.4-89), the 2021 labor force living in the region comprised 166,926 people (Table 2.4-28). The labor force primarily lived in Bannock and Bonneville Counties with less than 1 percent of the labor force (1447 people) living in Butte County. Approximately 3 percent of the labor force (5010 out of 166,927 people) living in the region were unemployed. From 2011 to 2021, the size of the labor force in the region increased by 22,123 people and the number of unemployed people decreased from 9986 to 5010 or nearly 50 percent.

As shown in Table 2.4-29, during 2021, the regional construction industry sector staffed 8548 employees and the heavy construction industry sector staffed 955 employees based on U.S Bureau of Labor Statistics Quarterly Census of Employment and Wages (Reference 2.4-90). From 2010 to 2021, employment in the construction industry increased from 5938 employees to 8548. In the same period, the heavy construction industry decreased from 1058 employees to 955.

While the construction and heavy construction industry sectors were present in each county, these industries were largely concentrated in Bannock and Bonneville Counties. The most common types of heavy construction were utility system construction and highway, street, and bridge construction. Land subdivision construction and other heavy construction industries were also present. However, their employment could not be fully determined because the Bureau of Labor Statistics did not report some data to avoid disclosure of confidential information.

According to a report on the economic impacts of the five Idaho tribes (Reference 2.4-91) completed in 2015 as an update to the prior 2010 analysis, the Shoshone-Bannock Tribes added more than 4400 jobs and $400 million annually to the eastern Idaho economy. The Shoshone-Bannock Tribes created 1431 jobs through activities such as agriculture, tourism, and construction. Annually during the period, agricultural lands owned by the Shoshone-Bannock Tribes and nontribal Indians generated $125 million in direct crop revenues and created more than 900 jobs. In addition, approximately 40 percent of visitor traffic to the 3 casinos owned by the Shoshone-Bannock Tribes (the Bannock Peak Casino, Sage Hill Casino, and Shoshone-Bannock Casino Hotel) came from outside of Idaho.

2.4.2.4 Government Structure

Political jurisdictions located in the region include six counties, 27 incorporated cities, and the Fort Hall Reservation and Off-Reservation Trust Land (Table 2.4-2 and Figure 2.4-7).

The Local Land Use Planning Act (Reference 2.4-92) is the governing planning legislation that authorizes local governments to prepare comprehensive plans for their communities. Those plans adopted by the counties of the region identify the following primary planning and administrative organizations:

- Board of county commissioners - manage and oversee county administrations, county plans and ordinances, and county budgets.
- Planning and zoning commission - oversee land development in unincorporated areas of their respective county.
- Planning and zoning department - provide services and implement county codes and ordinances.

The Shoshone-Bannock Tribes are a sovereign nation governed by the Fort Hall Business Council that oversees land development, manages natural resources, and handles matters of self-government. The Shoshone-Bannock Tribes Land-Use Department manages trust assets and implements the land-use ordinance (Reference 2.4-93). This ordinance outlines policy regarding the management of natural resources on the Fort Hall Indian Reservation and the land owned by the Shoshone-Bannock Tribes.

Table 2.4-30 identifies the taxes collected by the state of Idaho and applicable tax rates from the Idaho State Tax Commission 2021 Annual Report (Reference 2.4-94). Idaho's tax revenues primarily come from individual income tax, sales and use tax, motor fuel taxes, and corporate income tax. Tax information is reported by the state at the county (not CBG) level.

Tax revenues could be affected by the proposed construction, operation, and decommissioning of the CFPP site. The tax categories most likely to be affected include

- Franchise taxes on corporate profits
- Sales and use taxes on purchases related to construction and operation of the CFPP site
- Sales and use taxes on purchases made by construction workers and operations workers of the CFPP site
- Property taxes collected on nonexempt property of construction workers and operations workers
- State income taxes

Table 2.4-31 summarizes the state and local taxes collected for fiscal year 2021 following refunds (Reference 2.4-94). Sales, individual income, and property tax accounted for the majority (90 percent) of the net collections.

Employees working in the state of Idaho are required to pay state income tax. According to the Idaho State Tax Commission (Reference 2.4-95), Idaho has a graduated individual income tax rate that ranges from 1 percent to 6.5 percent. Based on Reference 2.4-95, Idaho residents who are employed in the state are required to pay income tax if their income is greater than $12,500. Part-time residents and nonresidents of Idaho who are employed in the state are required to pay state income tax if their income is greater than $2500.

Businesses are required to pay a corporate income tax rate of 6.5 percent, according to the Idaho State Tax Commission (Reference 2.4-96). Businesses pay corporate income tax to the state if they

- Conduct business in Idaho
- Are registered with the Idaho Secretary of State to conduct business in Idaho
- Have income that can be attributed to Idaho
- Are a fiduciary

The Office of State Controller indicated in the comprehensive financial report (Reference 2.4-97) that Idaho collected approximately $2.7 billion in individual and corporate tax revenues in 2021.

The government levies sales tax and use tax on the sale of goods and services. In Idaho, sales and use tax are collected by retailers and transferred to the state.

Currently, both the sales tax rate and use tax rate are 6 percent, as stated on the Idaho State Tax Commission web page (Reference 2.4-98). Some local jurisdictions in Idaho impose local sales and use tax in addition to state tax. Local governments received 11.5 percent of Idaho sales tax revenue. Cities received 5.29 percent of the revenue and were eligible for a minimum increase of 1 percent more than the prior year's distribution. Counties received 5.52 percent of the revenue with each county receiving a guaranteed annual amount of $30,000. The remainder was distributed to cities and counties according to population based on a complex calculation. According to the Sales Tax Handbook (Reference 2.4-99), the 6-percent sales and use tax rate is applicable to jurisdictions in the expanded economic region.

The state of Idaho allocates sales and use tax revenues throughout the state to support a variety of services. In 2021, Idaho collected approximately $2.5 billion in sales and use tax revenues, as stated in the annual report (Reference 2.4-94). Approximately $11 million in sales and use tax revenue were distributed among the six counties in the region for local taxing districts. Except for Butte County, the regional counties received more than $1 million each for taxing districts (Table 2.4-32).

According to the Idaho State Tax Commission Understanding Property Tax (Reference 2.4-100), Idaho counties collect property tax on nonexempt property to provide local services and support for local taxing districts. A total of 167 independent taxing districts are identified for the regional counties. Taxing district categories and numbers of districts vary by county, ranging from nine taxing districts in Butte County to 41 in Bingham County (Table 2.4-33). Data about the distribution of property tax revenues to taxing districts in individual counties were not reported by the Idaho State Tax Commission. However, the commission did report the total amount of property taxes levied by taxing districts in Idaho counties (Reference 2.4-101). As shown in Table 2.4-33, taxing districts in Idaho counties levied a total of approximately $2.1 billion in property taxes in 2021. Taxing districts can adjust property tax rates on an annual basis.

Property taxes in Idaho counties consist of an urban tax rate and a rural tax rate. Urban tax rates apply to property within city limits and rural tax rates apply to property outside city limits. In the region in 2021, the average urban tax rate was 1.588 percent, and the average rural tax rate was 0.968 percent. According to the Idaho State Tax Commission (Reference 2.4-94), urban tax rates in the region ranged from 1.402 percent in Bonneville County to 1.922 percent in Bingham County (Table 2.4-34). Rural tax rates ranged from 0.883 percent in Jefferson County to 1.155 percent in Madison County.

Table 2.4-35 provides tax data from the Idaho State Department of Education (Reference 2.4-102) about the 14 public school districts (excluding charter schools) located in the expanded economic region during the 2021-2022 school year. In 2022, tax rates of school districts ranged from 0.16 percent for Firth District to 0.55 percent for Aberdeen District. In 2022, a total of $80 billion in taxes were levied by the school districts in the expanded economic region.

The Shoshone-Bannock Tribes is a sovereign nation that exercise the right to tax. In 1991, the Shoshone-Bannock Tribes passed the Tribal Tax Code (Reference 2.4-93) that provides a revenue stream to support the tribal government, provide necessary government services, and develop the economy of the Fort Hall Reservation. In 2015, the Shoshone-Bannock Tribal tax revenue was approximately $3.4 million. Table 2.4-36 summarizes the taxes imposed by the Shoshone-Bannock Tribes on the Fort Hall Reservation and the revenue support provided by those taxes.

As indicated previously, the proposed CFPP site is located in Butte County on the INL site. According to the construction and operation economic impact report (Reference 2.4-103), the DOE is exempt from property tax for the following reasons:

- The INL is federal government property
- The property includes more than $400 million of projects
- The property includes capital investments greater than $1 billion

The DOE makes payments in lieu of taxes to local governments to compensate for their inability to levy property taxes on the INL site. Formal tax arrangements for proposed construction and operation of the CFPP have yet to be finalized.

2.4.2.5 Education

The region includes 146 public schools organized into 27 public school districts (Table 2.4-37). Approximately 78 percent, or 114 of the 146 public schools, are located in Bannock, Bingham, and Bonneville Counties. Public schools within the region include the following:

- Title I schools - public schools that receive federal financial assistance from Title I, Part A of the Elementary and Secondary Education Act because a large percentage of children are from low-income families. The region has 103 Title I schools.
- Regular public schools - public schools that receive the largest source of funding from state government aid, local contributions (primarily property and school taxes), along with a small amount of federal funding. The region has 40 regular public schools.
- Charter schools - public schools that receive government funding; not part of the state school system but are operated by independent boards while following the same rules and regulations as other public schools. The region has 13 charter schools.
- Magnet schools - public schools that receive government funding; mandated by the district school board but have a specific instructional theme, curriculum, or instruction method. The region has three magnet schools, located in Bonneville County.

According to National Center for Education Statistics (NCES) data (Reference 2.4-104), during the 2021 to 2022 school year, public schools within the expanded economic region had a student enrollment of about 62,542 students and employed 3190 teachers, resulting in a student-teacher ratio for public schools of 19.6 students for every teacher (Table 2.4-37). These data include prekindergarten students and teachers. The following are highlights of Table 2.4-37 that provides details regarding the individual public schools located in the region:

- Title I schools (excluding charter and magnet schools) have the highest percentage of students and teachers at 55.7 and 58 percent, respectively.
- Magnet and Title I schools have the lowest student-teacher ratios of 18.5 percent and 18.8 percent, respectively, which are lower than the total student teacher ratio of 19.6 percent.
- Magnet schools have the lowest number of students and teachers with 2.0 percent and 2.1 percent, respectively.

Private schools comprise elementary and secondary schools that do not receive government financial support. Parents of private school students pay for their children to attend the school. The region has 12 private schools (Table 2.4-38). During the 2019 to 2020 school year, private schools had a total student enrollment of 1757 students with 491 enrolled in prekindergarten. The NCES does not provide data for the number of teachers for prekindergarten students in private schools; thus, student-teacher ratios are not available. According to NCES data (Reference 2.4-105), private schools employed 112 teachers in kindergarten through grade 12 for 1266 students, resulting in a student-teacher ratio of 11.4.

The number of public students is greatest in Bonneville, Bannock, and Bingham Counties at 25,328; 13,293; and 10,574, respectively, which is 78.7 percent of the total public school student body. Similarly for private schools, Bonneville and Bannock Counties have 861 and 786 students respectively, which is 93.7 percent of the total private school students, including prekindergarten. The difference between the student-teacher ratio for public schools (19.6) and private schools (11.4:1) is 41.8 percent. Public school student-teacher ratios include prekindergarten whereas private schools exclude prekindergarten data.

According to NCES data (Reference 2.4-106), postsecondary education in the region includes three universities with four campuses, offering undergraduate and graduate degrees (Table 2.4-39):

- Idaho State University with a main campus in Pocatello and a satellite campus in Idaho Falls
- University of Idaho, Idaho Falls, which shares a campus with ISU
- The BYU-Idaho, located in Rexburg, the only private university in the region.

The region also has Provo College, Idaho Falls Campus, an extension of Provo College in Utah, providing 4-yr degrees; College of Eastern Idaho in Idaho Falls, the only public community college; and six private, not-for-profit technical schools with 2-yr or less programs. The BYU-Idaho is the largest postsecondary institution with 44,481 students, including remote students, followed by Idaho State University in Pocatello with 11,766. These postsecondary institutions within the expanded economic region can provide education and training opportunities that align with the construction and operations needs of the CFPP.

Capacity and utilization of the education facilities are both variable and flexible. While the number of enrolled students and employed teachers is easily accessible, school districts have improvement plans in place to adapt to fluctuating needs. Some students are home schooled or taught virtually, thus decreasing the capacity needs of school facilities. For an increase in student populations, supplemental portable classrooms can be added to existing facilities. Capacity and utilization of schools are affected by the availability of teachers, funding, or both. With a recent decline in available teachers, student-to-teacher ratios are likely to trend upward.

Expected trends regarding the education resources are discussed relative to construction and operations of the CFPP in Section 4.4 and the Combined License Application.

2.4.2.6 Land Use and Zoning

Land use in the expanded economic region includes undeveloped land; DOE mission activities related to the INL site; agriculture; livestock grazing; recreation (e.g., camping, hiking, skiing, wildlife viewing, parks, forests, boating); utility rights-of-way and roads; wilderness study areas and candidate conservation areas; hunting; and Federal, state, and tribal lands. Figure 2.4-8 presents agriculture land use in the region. Figure 2.4-9 highlights the Federal, state, and tribal lands in the region. Additional information on land use is provided in LWA ER Section 2.1.

Idaho statutes (Reference 2.4-92) require each county to generate and adopt a comprehensive plan to guide county planning and zoning. These plans reflect historic, current, and future conditions of a county and consider population growth, housing, and land-use changes within a county. Additionally, county zoning must be in accordance with comprehensive plans as required by Reference 2.4-92. The comprehensive plans for the six counties in the region vary in recency and specific details. LWA ER Section 2.1, Table 2.1-2, provides a summary of each plan and evaluates the effects from the CFPP relative to each county's land use and zoning approach. Given the rural nature, natural environment, agriculture, and vast recreational opportunities of the area, several common goals appear in the comprehensive plans:

- Protect the rural and agricultural environment
- Prevent urban sprawl by zoning residential and industrial growth to existing or planned expansion areas

- Place high value on protecting the natural environment
- Encourage industry and job growth consistent with the other objectives, keeping industry in areas currently used for this purpose and preventing industry growth into agricultural and natural environments

Land use specific to the CFPP site is defined by the DOE use permit, (Reference 2.4-107) and the INL site comprehensive land-use plan (Reference 2.4-108). The INL land-use plan is maintained in recurring INL comprehensive land-use and environmental stewardship reports, the latest released in 2021 (Reference 2.4-1).

Because the proposed CFPP site location is on the INL site, which is under Federal control, the land use and zoning of the regional counties have minimal impact on the CFPP site. However, the land use and zoning of these counties affect CFPP workers in areas such as housing, recreation, public services, education, and transportation.

2.4.2.7 Social Services and Public Facilities

Social services and public facilities include

- Water treatment facilities
- Wastewater treatment facilities (WWTFs)
- Law enforcement
- Fire departments
- Medical facilities
- Specialized health facilities

Social services and public facilities are primarily located within municipalities or near population centers.

Table 2.4-40 provides information on 199 individual community and non-transient, non-community public water systems for the counties in the region obtained from the Idaho Department of Environmental Quality Public Water System Switchboard (Reference 2.4-109). The database provides the system number, name, population served, and water source. Each system is classified based on complexity and population served. Additionally, where applicable, the systems are further classified based on a point matrix associated with population, primary source type, and treatment processes used in public water system treatment plants.

Table 2.4-41 summarizes the public water systems for the counties and the region. These systems service 279,210 people in the region with 160, or 80 percent, of the systems classified as very small water systems servicing fewer than 500 people. Only Bannock and Bonneville Counties have systems classified as Class IV, servicing more than 50,000 people; these systems are associated with Pocatello and Idaho Falls.

Four systems in Bannock County and one system in Butte County also have treatment system classification at Treatment Class I (DWT1), which has a point range from 0 to 30 points. Chubbuck is the largest treatment classified system with more than 15,000 people. The other Bannock County treatment classified systems are small. The Butte County treatment classified system is located at the INL Radioactive Waste Management Facility and supports about 500 people conducting cleanup activities at the site.

The U.S. Environmental Protection Agency (EPA) Safe Drinking Water Information System (Reference 2.4-110) contains information on public water systems that support transient, non-community populations. These are smaller systems mainly associated with single buildings or facilities. The EPA system provides the list of names and sources but no information on capacity or populations served. Because these are smaller and more focused on specific applications (e.g., churches, convenience stores, and boat access) and not on housing and other support more aligned with construction and operations work forces, these systems are not listed in the ER.

Wastewater comprises used water from homes, communities, farms, and businesses, including domestic sewage and industrial waste from manufacturing. Wastewater treatment within the region is provided by local jurisdictions and regulated by the EPA or Idaho Department of Environmental Quality. Twenty-one WWTFs are located in the region (Table 2.4-42) based on EPA data from the Clean Watersheds Needs Survey (Reference 2.4-111). The design flow rates of WWTFs vary from approximately 20,000 gallons per day to 17 million gallons per day. Future expansions or modifications are planned for WWTFs located in the following cities:

- Aberdeen - According to Keller Associates City of Aberdeen Wastewater Improvements (Reference 2.4-112), the Aberdeen Wastewater Treatment Plant cannot remove enough phosphorus from wastewater to comply with its National Pollutant Discharge Elimination System (NPDES) permit. To satisfy requirements set forth in its NPDES permit, the City of Aberdeen stops discharging treated wastewater into Hazard Creek and use the treated wastewater to irrigate nearby farmlands. The total project costs of the modifications to the Aberdeen plant are estimated to be $9 - $10 million.
- Firth - The U.S. Army Corps of Engineers report on wastewater system improvements for Firth, Idaho (Reference 2.4-113) discusses possible alternatives to the Firth wastewater system improvements project that requires increased capacity to handle wastewater from both Firth and neighboring Basalt. The current system is aging and not compliant with the NPDES permit. Reference 2.4-113 found no significant impacts from the preferred alternative of adding equalization basins to the Firth system.

- Pocatello - The water pollution control plant located northwest of Pocatello currently treats 7.5 million gallons per day of combined wastewater from Pocatello and Chubbuck. The plant removes more than 98 percent of the organic matter and suspended solids, 95 percent of ammonia, and 80 percent of incoming phosphorous. The collection and transport system includes more than 250 miles of sanitary sewer lines and 23 sewer lift stations. The department employs 24 full-time and 4 seasonal employees according to the Water Pollution Control Department (Reference 2.4-114). Pocatello is preparing a multi-year facility and capital improvement plan through 2030 to accommodate growth and treatment limits (Reference 2.4-115).
- Rigby - According to Rigby city council meeting minutes, (Reference 2.4-116), improvements are made to the Rigby waste water treatment plant. The two-year construction project was awarded in August 2022. The plant is being upgraded to meet the 2040 ammonia standard set by the EPA.

Law enforcement in the region includes county sheriffs' offices and municipal police departments. Table 2.4-43 identifies law enforcement agencies, including the Fort Hall Reservation, as identified through the Federal Bureau of Investigation Crime Data Explorer (Reference 2.4-117). In total, the region is served by 501 sworn officers and 466 civilian officers. Law enforcement staffing varies depending on county and city populations. A total of 727 of 967 law enforcement officers (approximately 75 percent) in the expanded economic region serve Bannock, Bonneville, and Madison Counties. The Shoshone-Bannock Tribes and Fort Hall Indian Reservation are served by the Fort Hall Police Department, which staffs 14 sworn officers and 14 civilian officers. Additionally, the Idaho State Police provide highway patrol and investigation services and the INL site employs a federal physical security force.

Fire protection resources for the region, identified through the Idaho State Fire Marshal 2021 Annual Report (Reference 2.4-118), include 18 fire departments and districts with 730 firefighters protecting 273,304 people, as shown in Table 2.4-44. The INL site has a fire department that provides 24-hour coverage of the site workers, facilities, and property. In addition, the Fort Hall Fire and Emergency Medical Services District, which staffs 24 firefighters, provides services to the Shoshone-Bannock Tribes and the Fort Hall Reservation.

Per the American Hospital Association (Reference 2.4-119), The Centers for Medicare & Medicaid Services (Reference 2.4-120), Grove Creek Medical Center website (Reference 2.4-121), and the Idaho Department of Health & Welfare (Reference 2.4-122), the region includes eight hospitals with 581 medical doctors and 806 hospital beds (Table 2.4-45). Grove Creek Medical Center specializes in labor and delivery services. The Center has eight team doctors and five consulting medical doctors; the consulting doctors are not included in the medical doctor count for this facility. Jefferson County has no public hospitals. Bannock, Bingham, and Bonneville Counties provide 479 medical doctors, or 82 percent in the region, consistent with the higher populations of the principal cities in these counties.

Specialized health facilities in the economic region include:

- Dialysis facilities - According to medicare.gov (Reference 2.4-123), five dialysis centers are present in the region (Table 2.4-46). Dialysis centers are located in Bannock, Bingham, Bonneville, and Madison Counties. The region has a total of 78 hemodialysis stations, located in the principal cities of the expanded economic region.
- Hospice care facilities - Twelve hospice care facilities are present in the region (Table 2.4-47) (Reference 2.4-123). Hospice care facilities are available in Bannock, Bonneville, Jefferson, and Madison Counties. These 12 facilities provide daily care for an average of 447 patients collectively. Hospice care facilities are mainly located in or near principal cities of the expanded economic region, consistent with population distributions. Bonneville County has half of the available hospice care facilities within the metropolitan area of Idaho Falls.
- Nursing homes - A total of 12 nursing homes are present in the region (Table 2.4-48) (Reference 2.4-123). No nursing homes are present in either Butte County or Jefferson County. Overall, regional nursing homes have 901 patient beds. Approximately 72 percent of nursing home beds (or 648 beds) are located in nursing homes in Bannock and Bonneville Counties.
- Inpatient rehab facilities - Two inpatient rehab facilities are located in the region (Table 2.4-49), one each in Bannock and Bonneville Counties in the principal cities of Pocatello and Idaho Falls (Reference 2.4-123).
- Home health care agencies - A total of 15 home health care agencies are present in the region (Table 2.4-50) in Bannock, Bonneville, and Madison Counties (Reference 2.4-123). Ten of the 15 home health care agencies are located in Bonneville County, and are located in principal cities.

2.4.2.8 Access Routes

The CFPP site is bounded on the northwest corner by State Highway 33, which is about one mile from the site. Access to the site is via INL site secondary road T-11 that connects State Highway 33 to the CFPP site.

CFPP regional transportation infrastructure includes two interstate highways (Interstate 15 and Interstate 86), four U.S. routes (20, 26, 91, and 93), four state highways (22, 28, 33, and 39), and the INL on-site road systems (Figure 2.4-10). The INL site contains an on-site road system of approximately 170 miles of paved roads, including public highways that pass through INL. Security personnel, fences, and signage strictly control access to INL Site properties from these highways according to a 2016 DOE environmental impact statement (Reference 2.4-124).

Interstate 15, approximately 44 miles away, is the main artery into Idaho from larger U.S. cities and west coast ports. Interstate 15 extends north from Salt Lake City through Idaho and Montana and southwest to southern California. Interstate 86 begins in Pocatello, running west from Interstate 15 towards Boise, Idaho. U.S. Routes 20 (approximately four miles from the CFPP site) and 26 (approximately 12 miles from the CFPP site) are the main access routes to the southern portion of the INL and CFPP sites. The CFPP site is accessed from State Highway 33, which also provides access to northern portions of the INL site. U.S. Route 20 intersects Interstate 15 near Idaho Falls and connects Idaho Falls with Butte City and Arco, running south of the CFPP site. U.S. Route 26 runs from Blackfoot to northwest of Atomic City, where it merges with U.S. Route 20. U.S. Route 20/26 crosses the INL site, turning southwest at Arco. The two highways diverge at the city of Carey at the outer southwestern edge of the CFPP region. U.S. Route 93 begins at Arco and proceeds northwest through Moore and MacKay up the Big Lost River valley. State Highway 22 runs from State Highway 33, near INL's Test Area North, north and northwest to Dubois, where it intersects Interstate 15. State Highway 28 joins Rexburg to Mud Lake, then proceeds north up the Birch Creek valley west to Leadore, located outside the CFPP region. U.S. Route 91 parallels Interstate 15 from the Pocatello area to the Idaho Falls area. Interstate 15, U.S. Routes 20 and 26, and State Highway 33 are expected to be the main service roads for the CFPP construction activities and operations.

According to the Idaho Transportation Department projects web page (Reference 2.4-125) and I-15/US-20 connector web page (Reference 2.4-126), 10 roadway projects are planned for regional highways, most projected to start in 2022 and four slated to complete the same year (Table 2.4-51). The U.S. Route 20 Rexburg interchanges project is slated to start in either 2024 or 2025. Projected start dates for the Interstate 15/U.S. Route 20 connector and U.S. Route 26/25th East (Hitt Rd.) projects are currently unknown. The Interstate 15/U.S. Route 86 system interchange complex project is planned to complete in 2025. Completion dates for several projects are currently unknown.

The CFPP region has several railways, but no rail lines currently provide direct access to the CFPP site. In southeast Idaho, the Union Pacific Railroad provides access to most of the cities in the region (Figure 2.4-11). The Union Pacific Railroad main line includes more than 200 road crossings and supports abundant transcontinental traffic (Figure 2.4-12) with connections to Salt Lake City, Los Angeles, San Francisco, and Portland. Numerous feeder rail lines are located in the region to support agriculture. A Union Pacific Railroad terminal in Pocatello supports branch-line activities and crew change points (Reference 2.4-127).

The Eastern Idaho Railroad traffics grain and agricultural products, food products, coal, limestone, aggregates, and chemicals with terminals in Idaho Falls and Minidoka, Idaho. The railroad includes 116 miles in the region running from a Union Pacific Railroad connection at Idaho Falls northeast to Ucon, Rigby, and St. Anthony. Connecting branch lines run east to Ammon, Iona, and Ririe and from Ucon to Lewisville and Menan.

An INL rail spur is located approximately 6 miles southeast of the CFPP site. This rail line intersects roadways at 16 locations and includes 16 crossings, as indicated by the U.S. Department of Transportation, Bureau of Transportation Statistics (Reference 2.4-128). The INL rail spur connects to a Union Pacific rail line approximately 9 miles south of the CFPP site. The Union Pacific rail line provides access to the INL site from Blackfoot into the southern portion of the INL site where it terminates. That rail line intersects multiple roadways and includes approximately 30 rail crossings (Reference 2.4-128).

No waterway infrastructure such as a freshwater or ocean barge facility is located in the region.

2.4.2.9 Visual Resources

Visual resources are a combination of physical, biological, and man-made features that give an area its visual and aesthetic quality. The landscape surrounding the proposed CFPP site consists of sagebrush-dominated terrain with an understory of grasses. A viewshed is a geographic area that is visible from a given location. The viewshed from the air-cooled condensers, the expected highest substantial structure of the facility at 124 feet tall, covers much of the INL site and higher elevation areas, such as (Figure 2.4-13)

- Lost River Range
- Lemhi Range
- Pioneer Mountains
- Antelope Butte
- Big Southern Butte
- Circular Butte
- East Butte
- Middle Butte
- Cedar Butte

The 300-foot tall communications tower is actually higher but is a thin, lattice-metal framed structure that is not be visible except near the CFPP. These topographic areas are used for recreational purposes and are home to wildlife, such as bats, birds, and ungulates, that fall within the viewshed. Two nearby towns, Howe to the north and Atomic City to the southeast, are within the viewshed and could experience visual changes from the current INL site and regional visual conditions. The INL site facilities are the most prominent existing man-made features within the CFPP viewshed, which are mainly contained within the area of the INL site, the western part of the Snake River Plain, and the foothills of the Lost River and Lemhi Ranges. The remainder of the expanded economic region is outside the CFPP viewshed, with little expected visual impact from the facility structures and location.

The Experimental Breeder Reactor-1, also known as EBR-1, is the world's first nuclear power plant and is located on the INL site approximately 9 miles from the center of CFPP and roughly 18 miles southeast of Arco, Idaho. The EBR-1, listed on the National Park Service's National Register of Historic Places on

October 15, 1966 (Reference 2.4-129), is located within the viewshed of the CFPP site as shown on Figure 2.4-13. Figure 2.4-14 is an artist rendering view from EBR-1 looking northwest towards CFPP that is slightly visible from an elevated view. The EBR-1 is discussed in more detail in LWA ER Section 2.6, Historic and Cultural Resources.

The Craters of the Moon National Monument and Preserve, located approximately 15 miles southwest of the proposed CFPP site, is not in the viewshed of the CFPP site. In 2017, Craters of the Moon was designated as a silver-tiered international dark sky site (Reference 2.4-130). The dark skies environment includes constellations and solar and lunar movements. Dark skies are valued as natural and cultural assets with economic value. Because of the remoteness, dark skies can be considered an important visual resource as future developments on the INL site and the surrounding area. Dark skies are also an important consideration for the Shoshone-Bannock Tribes. A silver-tiered designation indicates the Milky Way must be visible during summer and winter, and minor to moderate amounts of light pollution are allowed by the International Dark Sky Association (Reference 2.4-131). Research conducted as part of the environmental impact statement for the Versatile Test Reactor (Reference 2.4-132) states light pollution from the INL site and nearby cities affects visibility of both the dark skies and the nocturnal visual landscape at Craters of the Moon. More details on dark skies are included in LWA ER Section 2.6, Historic and Cultural Resources.

2.4.2.10 Parks and Recreation, Protected Lands, and Visitor Attractions

The region provides numerous recreational opportunities, including national forests, rivers, lakes, mountains, parks, and other nature experiences. Parks within and near the region range from national monuments and wilderness areas drawing large numbers of visitors daily and annually to small neighborhood parks used by local residents and infrequent visitors. Table 2.4-13 includes larger local parks and other public venues, while Table 2.4-20 lists the national and state parks and recreation areas. Further details are located in Section 2.4.1.7, Transient Populations.

Protected lands include federal, state, and tribal lands. Fort Hall Reservation is a protected land of the Shoshone-Bannock Tribes, and a distinctive community explained in further detail in Section 2.4.2.11, Distinctive Communities. Figure 2.4-9 shows the protected lands within the CFPP region.

The region provides an array of visitor attractions ranging from public venues (Table 2.4-13), stadiums and arenas (Table 2.4-15), national and state parks and recreation areas (Table 2.4-20), and historic districts and places (Table 2.4-52). Additional information regarding these is examined in Section 2.4.2.11, Distinctive Communities.

2.4.2.11 Distinctive Communities

Distinctive communities present in the economic region include the following:

- Historic districts and places
- Tourist attractions
- Cultural resources
- American Indian lands and resources

As shown in Table 2.4-52, the region has 14 historic districts and 75 historic places (either buildings, trails, or sites) identified by the National Park Services National Register of Historic Places (Reference 2.4-129). Historic districts in the economic region are located in Bannock, Bingham, and Bonneville counties. Table 2.4-52 includes the dates listed on the National Register of Historic Places and the driving distance from CFPP. Eighty-four of the eighty-nine historic districts and places listed are located 50 or more miles from the CFPP site. The closest historical places to the CFPP site are the EBR-1 on the INL site about 9 miles from the site and the Arco Baptist Community Church in Arco, approximately 13 miles from the site.

The region provides a variety of tourist attractions ranging from public venues (Table 2.4-13), stadiums and arenas (Table 2.4-15), national and state parks and recreation areas (Table 2.4-20), and historic districts and places (Table 2.4-52).

According to the Natural Resources Conservation Services (Reference 2.4-133), cultural resources are tangible remains of past human activity. These may include buildings; structures; prehistoric sites; historic or prehistoric objects or collection; rock inscription; and earthworks, canals, or landscapes. These nonrenewable resources may yield unique information about past societies and environments and provide answers for modern day social and conservation problems. In addition to historic districts and places, some public venues, like museums that contain artifacts, historic items, and other cultural resources in the region, are included in Table 2.4-13.

A federal Indian reservation is land designated by the federal government as a tribal reservation or held in trust for tribal use (Reference 2.4-134). Indian reservations are coordinated with the Bureau of Indian Affairs. Fort Hall Reservation is protected American Indian land belonging to the Shoshone-Bannock Tribes in southeastern Idaho (Figure 2.4-9). The tribes consist of Shoshone and Bannock Indians indigenous to Idaho and surrounding states (Reference 2.4-91). The Fort Hall Reservation, which occupies 544,000 acres of land, is almost completely owned by the Shoshone-Bannock Tribes and individual tribal members. As of 2016, the Shoshone-Bannock Tribes comprised 5866 tribal members, with 3710 living on the Fort Hall Reservation. The Shoshone-Bannock Tribes are a sovereign nation with their own constitution and bylaws for self-government established by provisions of the Indian Reorganization Act of 1934 (Reference 2.4-91). The Fort Hall Business Council is the official governing body of the Shoshone-Bannock Tribes.

Ross Fork Oregon Short Lines Railroad Depot on the Fort Hall Reservation is a historic building, which was listed on the National Register of Historic Places in 1984 (Reference 2.4-129). The depot is managed by the Bureau of Indian Affairs.

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Table 2.4-1: Census Block Groups in Expanded Demographic Region by County

County	# of Census Block Groups in Expanded Demographic Region and Total Census Block Groups in County	Reference Locations on Figure 2.4-2 through Figure 2.4-6	Census Block Group GeoIDs Included in Extended Demographic Region
Bannock	55 of 64 total	1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 62, 63, 64	160050002001, 160050003011, 160050003012, 160050003013, 160050003021, 160050003022, 160050003023, 160050004001, 160050004002, 160050004003, 160050005001, 160050006002, 160050007001, 160050007002, 160050007003, 160050008001, 160050008002, 160050009001, 160050009002, 160050010001, 160050010002, 160050010003, 160050011021, 160050011022, 160050011023, 160050011031, 160050011032, 160050011033, 160050011041, 160050011042, 160050012001, 160050012002, 160050012003, 160050013001, 160050013002, 160050013003, 160050014001, 160050014002, 160050014003, 160050014004, 160050015001, 160050015002, 160050015003, 160050015004, 160050015005, 160050016011, 160050016012, 160050016021, 160050016022, 160050016023, 160050016031, 160050016032, 160059400001, 160059400002, 160059818001
Bingham	32 of 32 total	65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96	160119400001, 160119400002, 160119501011, 160119501012, 160119501021, 160119501022, 160119501023, 160119502001, 160119502002, 160119502003, 160119503001, 160119503002, 160119503003, 160119503004, 160119503005, 160119504001, 160119504002, 160119504003, 160119504004, 160119504005, 160119505011, 160119505012, 160119505021, 160119505022, 160119505023, 160119506001, 160119506002, 160119506003, 160119506004, 160119507001, 160119507002, 160119507003
Blaine	2 of 20 total	97, 107	160139601011, 160139602023

Table 2.4-1: Census Block Groups in Expanded Demographic Region by County (Continued)

County	# of Census Block Groups in Expanded Demographic Region and Total Census Block Groups in County	Reference Locations on Figure 2.4-2 through Figure 2.4-6	Census Block Group GeoIDs Included in Extended Demographic Region
Bonneville	77 of 77 total	117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193	160199701001, 160199701002, 160199701003, 160199701004, 160199703001, 160199703002, 160199703003, 160199703004, 160199704011, 160199704012, 160199704021, 160199704022, 160199704041, 160199704042, 160199704043, 160199704051, 160199704052, 160199704053, 160199705021, 160199705022, 160199705023, 160199705031, 160199705032, 160199705033, 160199705041, 160199705042, 160199705051, 160199705052, 160199706011, 160199706012, 160199706013, 160199706021, 160199706022, 160199706023, 160199706024, 160199706031, 160199707001, 160199707002, 160199707003, 160199707004, 160199708001, 160199708002, 160199708003, 160199708004, 160199709001, 160199709002, 160199709003, 160199710001, 160199710002, 160199710003, 160199710004, 160199710005, 160199710006, 160199711001, 160199711002, 160199711003, 160199711004, 160199712001, 160199712002, 160199712003, 160199712004, 160199713011, 160199713012, 160199713013, 160199713014, 160199713015, 160199713021, 160199713022, 160199713023, 160199713024, 160199714011, 160199714012, 160199714021, 160199714022, 160199714023, 160199715001, 160199715002
Butte	3 of 3 total	194, 195, 196	160239701001, 160239701002, 160239701003
Clark	1 of 1 total	197	160339501001
Custer	2 of 4 total	200, 201	160379602003, 160379602004
Fremont	3 of 25 total	816, 823, 824	160439701001, 160439703013, 160439703014
Jefferson	16 of 16 total	202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217	160519601001, 160519601002, 160519601003, 160519602001, 160519602002, 160519602003, 160519603011, 160519603021, 160519603022, 160519603023, 160519604011, 160519604012, 160519604013, 160519604021, 160519604022, 160519604023
Lemhi	1 of 8 total	223	160599703001
Lincoln	1 of 4 total	226	160639501001

Table 2.4-1: Census Block Groups in Expanded Demographic Region by County (Continued)

County	# of Census Block Groups in Expanded Demographic Region and Total Census Block Groups in County	Reference Locations on Figure 2.4-2 through Figure 2.4-6	Census Block Group GeoIDs Included in Extended Demographic Region
Madison	29 of 32 total	230, 231, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 257, 258, 259, 260, 261	160659501011, 160659501012, 160659501031, 160659501032, 160659502001, 160659502002, 160659502003, 160659503011, 160659503012, 160659503013, 160659503014, 160659503015, 160659503016, 160659503031, 160659503032, 160659503033, 160659503034, 160659503035, 160659503041, 160659503042, 160659503043, 160659503044, 160659504011, 160659504012, 160659504022, 160659505011, 160659505012, 160659505021, 160659505022
Minidoka	1 of 16 total	268	160679703001
Power	4 of 7 total	278, 279, 280, 284	160779601001, 160779601002, 160779602001, 160779602005
Total	227 of 309		

Source: Reference 2.4-7

Table 2.4-2: Principal and Incorporated Cities and Unincorporated Communities by County Expanded Demographic Region

		Expanded Demographic Region						
County	**Total Area in County (mi^2)[1]**	**Expanded Area and Percentage in County (mi^2, %)[1]**	**Principal Cities**	**Distance - Principal Cities to CFPP Site (mi)[2]**	**Incorporated Cities[3]**	**Distance - Incorporated Cities to CFPP Site (mi)[2]**	**Unincorporated Communities[3]**	**Distance - Unincorporated Communities to CFPP Site (mi)[2]**
Bannock	1,148.5	407.5 35.5%	Pocatello	61.2	Chubbuck	57.7	Tyhee	55.9
Bingham	2,120.9	2,120.9 100%	Blackfoot	47.2	Aberdeen Atomic City Basalt Firth Shelley	49.1 18.0 50.0 49.5 50.0	Fort Hall Reservation and Off-Reservation Trust Land Goshen Liberty Pingree Springfield Wapello Woodville	44.5 53.8 41.0 42.7 42.7 48.4 48.3
Blaine	2,654.8	1,233.3 45.5%			Carey	50.2		
Bonneville	1,901.9	1,901.9 100%	Idaho Falls	52.6	Ammon Iona Ucon	55.8 56.8 54.8	Beachs Corner Bone Coltman Osgood	55.1 67.2 52.3 48.0
Butte	2,238.5	2,238.5 100%			Arco Butte City Moore	12.3 9.7 17.0	Howe	10.4
Clark	1,764.7	1,764.7 100%			Dubois	55.4		
Custer	4,938.3	2,344.9 47.5%			Lost River Mackay	28.3 33.9		
Fremont	1,897.9	1,527.7 80.5%						

Table 2.4-2: Principal and Incorporated Cities and Unincorporated Communities by County Expanded Demographic Region (Continued)

		Expanded Demographic Region						
County	Total Area in County (mi^2)[1]	Expanded Area and Percentage in County (mi^2, %)[1]	Principal Cities	Distance - Principal Cities to CFPP Site (mi)[2]	Incorporated Cities[3]	Distance - Incorporated Cities to CFPP Site (mi)[2]	Unincorporated Communities[3]	Distance - Unincorporated Communities to CFPP Site (mi)[2]
Jefferson	1,106.1	1,106.1 100%			Hamer Lewisville Menan Mud Lake Rigby Ririe Roberts	46.9 52.5 53.7 32.2 57.2 64.2 46.9	Annis Garfield Grant Monteview Terreton	56.4 54.7 52.2 34.7 34.0
Lemhi	4,568.8	1,352.5 29.6%			None			
Lincoln	1,205.7	619.6 51.4%			None			
Madison	473.7	153.8 32.5%	Rexburg	64.6	None		Archer Burton Hibbard	64.0 60.9 62.7
Minidoka	762.3	459.9 99.6%			None			
Power	1,442.3	1,436.8 66%			None		Fairview	

Sources-

[1] Reference 2.4-6

[2] Reference 2.4-8

[3] Reference 2.4-9 and Reference 2.4-10. Distances are measured from the CFPP center point to the Reference 2.4-10 point location.

Table 2.4-3: Total and Race Populations by County within Expanded Demographic Region

County	Total County Population[1]	Expanded Demographic Region Population[2]	White[2]	Black or African American[2]	American Indian or Alaska Native[2]	Asian[2]	Native Hawaiian or Other Pacific Islander[2]	Some Other Race[2]	Two or More Races[2]
Bannock	86,742	73,482	63,784	552	2,209	1,687	106	1,755	3,389
Bingham	46,246	46,246	37,658	102	2,941	187	40	3,378	1,940
Blaine	22,729	2,450	1,860	0	0	0	0	14	576
Bonneville	116,970	116,970	103,903	542	771	1,080	139	6,633	3,902
Butte	2,603	2,603	2,590	3	0	0	0	0	10
Clark	885	885	749	8	41	0	0	87	0
Custer	4,193	2,842	2,333	1	18	0	0	63	427
Fremont	3,909	3,909	3,690	6	7	0	0	118	88
Jefferson	29,238	29,238	26,351	4	352	144	5	1,543	839
Lemhi	7,929	542	510	0	0	0	2	23	7
Lincoln	5,342	1,227	1,158	0	9	2	0	27	31
Madison	39,725	35,752	32,654	77	65	573	69	951	1,363
Minidoka	20,817	526	370	0	3	0	0	0	153
Power	7,635	3,279	2,852	2	226	0	0	14	185
Total	**394,963**	**319,951**	**280,462**	**1,297**	**6,642**	**3,673**	**361**	**14,606**	**12,910**
Idaho Total	**1,754,367**								

Sources-

[1] Reference 2.4-5

[2] Reference 2.4-13

Table 2.4-4: Total Populations and Growth Rates, Expanded Demographic Region, 2000 to 2020

	Decennial				American Community Survey				Is Decennial Rate Higher than American Community Survey Rate?
County	2020[1]	2000[2]	Delta 2000 to 2020	Annual Growth Rate 2000 to 2020	2016-2020[3]	2009-2013[4]	Delta 2009-2013 to 2016-2020	American Community Survey rate 2009-20013 to 2016-2020	
Bannock	87,018	75,565	11,453	1.007	86,742	83,091	3,651	1.006	Yes
Bingham	47,992	41,735	6,257	1.007	46,246	45,485	761	1.002	Yes
Blaine	24,272	18,991	5,281	1.012	22,729	21,294	1,435	1.009	Yes
Bonneville	123,964	82,522	41,442	1.021	116,970	105,580	11,390	1.015	Yes
Butte	2,574	2,899	-325	0.994	2,603	2,786	-183	0.990	Yes
Clark	790	1,022	-232	0.987	885	751	134	1.024	No
Custer	4,275	4,342	-67	0.999	4,193	4,331	-138	0.995	Yes
Fremont	13,388	11,819	1,569	1.006	13,111	13,088	23	1.000	Yes
Jefferson	30,891	19,155	11,736	1.024	29,238	26,389	2,849	1.015	Yes
Lemhi	7,974	7,806	168	1.001	7,929	7,853	76	1.001	N/A
Lincoln	5,127	4,044	1,083	1.012	5,342	5,221	121	1.003	Yes
Madison	52,913	27,467	25,446	1.033	39,725	37,542	2,183	1.008	Yes
Minidoka	21,613	20,174	1,439	1.003	20,817	20,104	713	1.005	No
Power	7,878	7,538	340	1.002	7,635	7,756	-121	0.998	Yes
EXPANDED ECONOMIC REGION	430,669	325,079	105,590	1.014	404,165	381,271	22,894	1.008	Yes
IDAHO	1,839,106	1,293,953	545,153	1.018	1,754,367	1,583,364	171,003	1.015	Yes

Sources-
[1] Reference 2.4-5
[2] Reference 2.4-12
[3] Reference 2.4-13
[4] Reference 2.4-14

Table 2.4-5: Population Projections for CFPP License Period for the Expanded Demographic Region

County	Annual Growth Rate	2020 Population[1]	Population Projection						
			2025	2030	2040	2050	2060	2070	2073
Bannock	1.007	73,482	76,121	78,854	84,619	90,806	97,445	104,569	106,806
Bingham	1.007	46,246	47,890	49,592	53,179	57,027	61,152	65,576	66,965
Blaine	1.012	2,450	2,605	2,770	3,131	3,540	4,002	4,524	4,694
Bonneville	1.021	116,970	129,496	143,363	175,712	215,359	263,953	323,511	343,873
Butte	0.994	2,603	2,527	2,453	2,311	2,178	2,052	1,934	1,899
Clark	0.987	885	830	778	684	601	529	465	447
Custer	0.999	2,842	2,831	2,820	2,798	2,776	2,755	2,734	2,727
Fremont	1.006	3,909	4,033	4,160	4,428	4,713	5,016	5,338	5,439
Jefferson	1.024	29,238	32,948	37,130	47,152	59,879	76,041	96,566	103,742
Lemhi	1.001	542	545	548	554	560	566	572	573
Lincoln	1.012	1,227	1,302	1,382	1,556	1,752	1,972	2,221	2,301
Madison	1.033	35,752	42,120	49,622	68,873	95,593	132,679	184,153	203,185
Minidoka	1.003	526	535	544	564	583	604	625	631
Power	1.002	3,279	3,315	3,352	3,427	3,503	3,581	3,661	3,686
TOTAL		319,951	347,097	377,368	448,988	538,869	652,346	796,448	846,969

Source-
[1] Reference 2.4-7

Table 2.4-6: Total and Ethnic Populations in Expanded Demographic Region by County

County	Expanded Demographic Region	Hispanic or Latino	Not Hispanic or Latino	White (Not Hispanic or Latino)	Aggregate Minority
Bannock	73,482	7,219	66,263	59,598	13,884
Bingham	46,246	8,401	37,845	34,129	12,117
Blaine	2,450	635	1,815	1,766	684
Bonneville	116,970	15,543	101,427	96,597	20,373
Butte	2,603	102	2,501	2,489	114
Clark	885	347	538	489	396
Custer	2,842	276	2,566	2,298	544
Fremont	3,909	221	3,688	3,602	307
Jefferson	29,238	3,077	26,161	25,327	3,911
Lemhi	542	36	506	504	38
Lincoln	1,227	160	1,067	1,029	198
Madison	35,752	2,827	32,925	31,367	4,385
Minidoka	526	309	217	199	327
Power	3,279	522	2,757	2,496	783
Expanded Demographic Region - Total	319,951	39,675	280,276	261,890	58,061
State of Idaho - Total	1,754,367				

Source -
Reference 2.4-34

Table 2.4-7: Current and Historical Race Data for the Expanded Demographic Region

Jurisdiction	Total Population	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race	Two or More Races
BANNOCK COUNTY								
Population 2016-2020[1]	86,742	76,349	575	2254	1738	116	2004	3706
Population 2011-2015[2]	83,604	75,609	625	2650	1093	158	1063	2406
Population 2006-2010[3]	80,701	73,194	487	2761	883	211	1221	1944
Annual Growth Rate 2006 - 2020	0.72%	0.42%	1.67%	-2.01%	7.01%	-5.81%	5.08%	6.66%
Annual Growth Rate 2006 - 2015	0.71%	0.65%	5.12%	-0.82%	4.36%	-5.62%	-2.73%	4.36%
Annual Growth Rate 2011 - 2020	0.74%	0.19%	-1.65%	-3.19%	9.72%	-5.99%	13.52%	9.02%
BINGHAM COUNTY								
Population 2016-2020	46,246	37,658	102	2941	187	40	3378	1940
Population 2011-2015	45,407	39,257	133	2485	321	17	1944	1250
Population 2006-2010	44,496	38,068	200	2479	306	0	2234	1209
Annual Growth Rate 2006 - 2020	0.39%	-0.11%	-6.51%	1.72%	-4.81%	--	4.22%	4.84%
Annual Growth Rate 2006 - 2015	0.41%	0.62%	-7.84%	0.05%	0.96%	--	-2.74%	0.67%
Annual Growth Rate 2011 - 2020	0.37%	-0.83%	-5.17%	3.43%	-10.24%	18.66%	11.68%	9.19%
BLAINE COUNTY								
Population 2016-2020	22,729	20,518	141	212	117	52	665	1024
Population 2011-2015	21,309	19,136	19	5	265	58	1568	258
Population 2006-2010	21,329	19,619	12	271	96	178	954	199
Annual Growth Rate 2006 - 2020	0.64%	0.45%	27.94%	-2.43%	2.00%	-11.58%	-3.54%	17.80%
Annual Growth Rate 2006 - 2015	-0.02%	-0.50%	9.63%	-55.00%	22.52%	-20.09%	10.45%	5.33%
Annual Growth Rate 1011 - 2020	1.30%	1.40%	49.31%	111.58%	-15.08%	-2.16%	-15.76%	31.75%
BONNEVILLE COUNTY								
Population 2016-2020	116,970	103,903	542	771	1080	139	6633	3902
Population 2011-2015	107,788	97,250	491	470	903	86	5822	2766
Population 2006-2010	100,213	92,998	689	886	853	78	2888	1821
Annual Growth Rate 2006 - 2020	1.56%	1.11%	-2.37%	-1.38%	2.39%	5.95%	8.67%	7.92%
Annual Growth Rate 2006 - 2015	1.47%	0.90%	-6.55%	-11.91%	1.15%	1.97%	15.05%	8.72%

Table 2.4-7: Current and Historical Race Data for the Expanded Demographic Region (Continued)

Jurisdiction	Total Population	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race	Two or More Races
Annual Growth Rate 2011 - 2020	1.65%	1.33%	2.00%	10.41%	3.64%	10.08%	2.64%	7.12%
BUTTE COUNTY								
Population 2016-2020	2603	2590	3	0	0	0	0	10
Population 2011-2015	2653	2465	53	7	13	0	20	95
Population 2006-2010	2842	2787	0	0	24	2	8	21
Annual Growth Rate 2006 - 2020	-0.87%	-0.73%	--	--	-100.00%	-100.00%	-100.00%	-7.15%
Annual Growth Rate 2006 - 2015	-1.37%	-2.43%	--	--	-11.54%	-100.00%	20.11%	35.24%
Annual Growth Rate 2011 - 2020	-0.38%	0.99%	-43.69%	-100.00%	-100.00%	--	-100.00%	-36.25%
CLARK COUNTY								
Population 2016-2020	885	749	8	41	0	0	87	0
Population 2011-2015	901	855	0	0	0	0	34	12
Population 2006-2010	857	709	0	18	0	0	130	0
Annual Growth Rate 2006 - 2020	0.32%	0.55%	--	8.58%	--	--	-3.94%	--
Annual Growth Rate 2006 - 2015	1.01%	3.82%	--	-100.00%	--	--	-23.53%	--
Annual Growth Rate 2011 - 2020	-0.36%	-2.61%	--	--	--	--	20.67%	-100.00%
CUSTER COUNTY								
Population 2016-2020	4193	3629	6	23	3	0	63	469
Population 2011-2015	4234	4127	0	24	1	18	17	47
Population 2006-2010	4277	4181	0	43	0	0	18	35
Annual Growth Rate 2006 - 2020	-0.20%	-1.41%	--	-6.07%	--	--	13.35%	29.63%
Annual Growth Rate 2006 - 2015	-0.20%	-0.26%	--	-11.01%	--	--	-1.14%	6.07%
Annual Growth Rate 1011 - 2020	-0.19%	-2.54%	--	-0.85%	24.57%	-100.00%	29.95%	58.42%
FREMONT COUNTY								
Population 2016-2020	13,111	12,340	31	27	21	73	230	389
Population 2011-2015	12,945	12,128	46	80	11	0	364	316
Population 2006-2010	13,062	12,645	0	92	72	0	68	185
Annual Growth Rate 2006 - 2020	0.04%	-0.24%	--	-11.54%	-11.59%	--	12.96%	7.72%
Annual Growth Rate 2006 - 2015	-0.18%	-0.83%	--	-2.76%	-31.32%	--	39.87%	11.30%

Table 2.4-7: Current and Historical Race Data for the Expanded Demographic Region (Continued)

Jurisdiction	Total Population	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race	Two or More Races
Annual Growth Rate 2011 - 2020	0.26%	0.35%	-7.59%	-19.53%	13.81%	--	-8.77%	4.24%
JEFFERSON COUNTY								
Population 2016-2020	29,238	26,351	4	352	144	5	1543	839
Population 2011-2015	26,792	25,012	52	119	2	65	871	671
Population 2006-2010	24,523	23,003	14	232	49	29	829	367
Annual Growth Rate 2006 - 2020	1.77%	1.37%	-11.77%	4.26%	11.38%	-16.12%	6.41%	8.62%
Annual Growth Rate 2006 - 2015	1.79%	1.69%	30.01%	-12.50%	-47.26%	17.52%	0.99%	12.83%
Annual Growth Rate 2011 - 2020	1.76%	1.05%	-40.13%	24.22%	135.22%	-40.13%	12.12%	4.57%
LEMHI COUNTY								
Population 2016-2020	7929	7434	2	36	8	2	93	354
Population 2011-2015	7790	7462	27	64	32	0	32	173
Population 2006-2010	7861	7615	48	7	32	0	1	158
Annual Growth Rate 2006 - 2020	0.09%	-0.24%	-27.23%	17.79%	-12.94%	--	57.34%	8.40%
Annual Growth Rate 2006 - 2015	-0.18%	-0.41%	-10.87%	55.67%	0.00%	--	100.00%	1.83%
Annual Growth Rate 2011 - 2020	0.35%	-0.08%	-40.58%	-10.87%	-24.21%	--	23.78%	15.40%
LINCOLN COUNTY								
Population 2016-2020	5342	4731	0	33	30	0	156	392
Population 2011-2015	5260	4661	0	79	12	0	404	104
Population 2006-2010	5021	4613	50	39	20	0	231	68
Annual Growth Rate 2006 - 2020	0.62%	0.25%	-100.00%	-1.66%	4.14%	--	-3.85%	19.15%
Annual Growth Rate 2006 - 2015	0.93%	0.21%	-100.00%	15.16%	-9.71%	--	11.83%	8.87%
Annual Growth Rate 1011 - 2020	0.31%	0.30%	--	-16.02%	20.11%	--	-17.33%	30.39%
MADISON COUNTY								
Population 2016-2020	39,725	36,497	100	67	579	101	998	1383
Population 2011-2015	37,916	36,140	263	3	417	95	367	631
Population 2006-2010	36,413	34,994	157	139	309	0	137	677
Annual Growth Rate 2006 - 2020	0.87%	0.42%	-4.41%	-7.04%	6.48%	--	21.97%	7.40%
Annual Growth Rate 2006 - 2015	0.81%	0.65%	10.87%	-53.57%	6.18%	--	21.78%	-1.40%

Table 2.4-7: Current and Historical Race Data for the Expanded Demographic Region (Continued)

Jurisdiction	Total Population	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race	Two or More Races
Annual Growth Rate 2011 - 2020	0.94%	0.20%	-17.58%	86.12%	6.78%	1.23%	22.15%	16.99%
MINIDOKA COUNTY								
Population 2016-2020	20,817	18,546	29	175	79	35	812	1141
Population 2011-2015	20,279	18,121	59	195	75	12	1414	403
Population 2006-2010	19,524	16,017	13	175	128	13	2525	653
Annual Growth Rate 2006 - 2020	0.64%	1.48%	8.35%	0.00%	-4.71%	10.41%	-10.73%	5.74%
Annual Growth Rate 2006 - 2015	0.76%	2.50%	35.33%	2.19%	-10.14%	-1.59%	-10.95%	-9.20%
Annual Growth Rate 2011 - 2020	0.53%	0.46%	-13.24%	-2.14%	1.04%	23.87%	-10.50%	23.14%
POWER COUNTY								
Population 2016-2020	7635	6096	2	491	0	0	848	198
Population 2011-2015	7731	6585	25	316	1	2	736	66
Population 2006-2010	7633	6814	16	360	0	19	322	102
Annual Growth Rate 2006 - 2020	0.00%	-1.11%	-18.77%	3.15%	--	-100.00%	10.17%	6.86%
Annual Growth Rate 2006 - 2015	0.26%	-0.68%	9.34%	-2.57%	--	-36.25%	17.98%	-8.34%
Annual Growth Rate 2011 - 2020	-0.25%	-1.53%	-39.66%	9.21%	-100.00%	-100.00%	2.87%	24.57%
EXPANDED DEMOGRAPHIC REGION								
Population 2016-2020	404,165	357,391	1545	7423	3986	563	17,510	15,747
Population 2011-2015	384,609	348,808	1793	6497	3146	511	14,656	9198
Population 2006-2010	368,752	337,257	1686	7502	2772	530	11,566	7439
Annual Growth Rate 2006 - 2020	0.92%	0.58%	-0.87%	-0.11%	3.70%	0.61%	4.23%	7.79%
Annual Growth Rate 2006 - 2015	0.85%	0.68%	1.24%	-2.84%	2.56%	-0.73%	4.85%	4.34%
Annual Growth Rate 2011 - 2020	1.00%	0.49%	-2.93%	2.70%	4.85%	1.96%	3.62%	11.35%

Table 2.4-7: Current and Historical Race Data for the Expanded Demographic Region (Continued)

Jurisdiction	Total Population	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race	Two or More Races
IDAHO								
Population 2016-2020	1,754,367	1,550,979	11,536	23,029	24,501	3174	66,052	75,096
Population 2011-2015	1,616,547	1,482,914	9900	20,504	21,711	1921	38,371	41,226
Population 2006-2010	1,526,797	1,407,354	8674	18,951	17,939	2284	34,225	37,370
Annual Growth Rate 2006 - 2020	1.40%	0.98%	2.89%	1.97%	3.17%	3.35%	6.80%	7.23%
Annual Growth Rate 2006 - 2015	1.15%	1.05%	2.68%	1.59%	3.89%	-3.40%	2.31%	1.98%
Annual Growth Rate 2011 - 2020	1.65%	0.90%	3.11%	2.35%	2.45%	10.56%	11.47%	12.74%

Sources-

[1] Reference 2.4-13

[2] Reference 2.4-37

[3] Reference 2.4-35

-- = no result; equation resulted in division by zero

Table 2.4-8: Current and Historical Ethnicity Data for the Expanded Demographic Region

Jurisdiction	Total Population	Hispanic or Latino	Not Hispanic or Latino	White (Not Hispanic or Latino)[1]	Aggregate Minority[2]
BANNOCK COUNTY					
Population 2016-2020[1]	86,742	7707	79,035	71,994	14,748
Population 2011-2015[2]	83,604	6442	77,162	71,284	12,320
Population 2006-2010[3]	80,701	5242	75,459	70,108	10,593
Annual Growth Rate 2006 - 2020	0.72%	3.93%	0.46%	0.27%	3.36%
Annual Growth Rate 2006 - 2015	0.71%	4.21%	0.45%	0.33%	3.07%
Annual Growth Rate 2011 - 2020	0.74%	3.65%	0.48%	0.20%	3.66%
BINGHAM COUNTY					
Population 2016-2020	46,246	8401	37,845	34,129	12,117
Population 2011-2015	45,407	8034	37,373	33,834	11,573
Population 2006-2010	44,496	7290	37,206	33,705	10,791
Annual Growth Rate 2006 - 2020	0.39%	1.43%	0.17%	0.13%	1.17%
Annual Growth Rate 2006 - 2015	0.41%	1.96%	0.09%	0.08%	1.41%
Annual Growth Rate 2011 - 2020	0.37%	0.90%	0.25%	0.17%	0.92%
BLAINE COUNTY					
Population 2016-2020	22,729	5210	17,519	16,820	5909
Population 2011-2015	21,309	4362	16,947	16,468	4841
Population 2006-2010	21,329	3937	17,392	16,871	4458
Annual Growth Rate 2006 - 2020	0.64%	2.84%	0.07%	-0.03%	2.86%
Annual Growth Rate 2006 - 2015	-0.02%	2.07%	-0.52%	-0.48%	1.66%
Annual Growth Rate 2011 - 2020	1.30%	3.62%	0.67%	0.42%	4.07%
BONNEVILLE COUNTY					
Population 2016-2020	116,970	15,543	101,427	96,597	20,373
Population 2011-2015	107,788	13,316	94,472	90,653	17,135
Population 2006-2010	100,213	10,501	89,712	86,452	13,761
Annual Growth Rate 2006 - 2020	1.56%	4.00%	1.23%	1.12%	4.00%
Annual Growth Rate 2006 - 2015	1.47%	4.86%	1.04%	0.95%	4.48%

Table 2.4-8: Current and Historical Ethnicity Data for the Expanded Demographic Region (Continued)

Jurisdiction	Total Population	Hispanic or Latino	Not Hispanic or Latino	White (Not Hispanic or Latino)[1]	Aggregate Minority[2]
Annual Growth Rate 2011 - 2020	1.65%	3.14%	1.43%	1.28%	3.52%
BUTTE COUNTY					
Population 2016-2020	2603	102	2501	2489	114
Population 2011-2015	2653	162	2491	2323	330
Population 2006-2010	2842	110	2732	2715	127
Annual Growth Rate 2006 - 2020	-0.87%	-0.75%	-0.88%	-0.87%	-1.07%
Annual Growth Rate 2006 - 2015	-1.37%	8.05%	-1.83%	-3.07%	21.04%
Annual Growth Rate 2011 - 2020	-0.38%	-8.84%	0.08%	1.39%	-19.15%
CLARK COUNTY					
Population 2016-2020	885	347	538	489	396
Population 2011-2015	901	373	528	524	377
Population 2006-2010	857	416	441	441	416
Annual Growth Rate 2006 - 2020	0.32%	-1.80%	2.01%	1.04%	-0.49%
Annual Growth Rate 2006 - 2015	1.01%	-2.16%	3.67%	3.51%	-1.95%
Annual Growth Rate 2011 - 2020	-0.36%	-1.43%	0.38%	-1.37%	0.99%
CUSTER COUNTY					
Population 2016-2020	4193	299	3894	3571	622
Population 2011-2015	4234	113	4121	4031	203
Population 2006-2010	4277	94	4183	4105	172
Annual Growth Rate 2006 - 2020	-0.20%	12.27%	-0.71%	-1.38%	13.72%
Annual Growth Rate 2006 - 2015	-0.20%	3.75%	-0.30%	-0.36%	3.37%
Annual Growth Rate 2011 - 2020	-0.19%	21.48%	-1.13%	-2.39%	25.10%
FREMONT COUNTY					
Population 2016-2020	13111	1600	11,511	11,167	1944
Population 2011-2015	12945	1598	11,347	11,039	1906
Population 2006-2010	13062	1553	11,509	11,162	1900
Annual Growth Rate 2006 - 2020	0.04%	0.30%	0.00%	0.00%	0.23%
Annual Growth Rate 2006 - 2015	-0.18%	0.57%	-0.28%	-0.22%	0.06%

Table 2.4-8: Current and Historical Ethnicity Data for the Expanded Demographic Region (Continued)

Jurisdiction	Total Population	Hispanic or Latino	Not Hispanic or Latino	White (Not Hispanic or Latino)[1]	Aggregate Minority[2]
Annual Growth Rate 2011 - 2020	0.26%	0.03%	0.29%	0.23%	0.40%
JEFFERSON COUNTY					
Population 2016-2020	29,238	3077	26,161	25,327	3911
Population 2011-2015	26,792	2771	24,021	23,372	3420
Population 2006-2010	24,523	2434	22,089	21,523	3000
Annual Growth Rate 2006 - 2020	1.77%	2.37%	1.71%	1.64%	2.69%
Annual Growth Rate 2006 - 2015	1.79%	2.63%	1.69%	1.66%	2.66%
Annual Growth Rate 2011 - 2020	1.76%	2.12%	1.72%	1.62%	2.72%
LEMHI COUNTY					
Population 2016-2020	7929	264	7665	7408	521
Population 2011-2015	7790	226	7564	7297	493
Population 2006-2010	7861	154	7707	7467	394
Annual Growth Rate 2006 - 2020	0.09%	5.54%	-0.05%	-0.08%	2.83%
Annual Growth Rate 2006 - 2015	-0.18%	7.97%	-0.37%	-0.46%	4.59%
Annual Growth Rate 2011 - 2020	0.35%	3.16%	0.27%	0.30%	1.11%
LINCOLN COUNTY					
Population 2016-2020	5342	1653	3689	3510	1832
Population 2011-2015	5260	1557	3703	3551	1709
Population 2006-2010	5021	1186	3835	3708	1313
Annual Growth Rate 2006 - 2020	0.62%	3.38%	-0.39%	-0.55%	3.39%
Annual Growth Rate 2006 - 2015	0.93%	5.59%	-0.70%	-0.86%	5.41%
Annual Growth Rate 2011 - 2020	0.31%	1.20%	-0.08%	-0.23%	1.40%
MADISON COUNTY					
Population 2016-2020	39,725	3066	36,659	35,023	4702
Population 2011-2015	37,916	2515	35,401	34,054	3862
Population 2006-2010	36,413	2009	34,404	33,257	3156
Annual Growth Rate 2006 - 2020	0.87%	4.32%	0.64%	0.52%	4.07%
Annual Growth Rate 2006 - 2015	0.81%	4.60%	0.57%	0.47%	4.12%

Table 2.4-8: Current and Historical Ethnicity Data for the Expanded Demographic Region (Continued)

Jurisdiction	Total Population	Hispanic or Latino	Not Hispanic or Latino	White (Not Hispanic or Latino)[1]	Aggregate Minority[2]
Annual Growth Rate 2011 - 2020	0.94%	4.04%	0.70%	0.56%	4.01%
MINIDOKA COUNTY					
Population 2016-2020	20,817	7331	13,486	12,856	7961
Population 2011-2015	20,279	6775	13,504	12,970	7309
Population 2006-2010	19,524	6013	13,511	12,931	6593
Annual Growth Rate 2006 - 2020	0.64%	2.00%	-0.02%	-0.06%	1.90%
Annual Growth Rate 2006 - 2015	0.76%	2.42%	-0.01%	0.06%	2.08%
Annual Growth Rate 2011 - 2020	0.53%	1.59%	-0.03%	-0.18%	1.72%
POWER COUNTY					
Population 2016-2020	7635	2596	5039	4682	2953
Population 2011-2015	7731	2435	5296	4941	2790
Population 2006-2010	7633	2075	5558	5170	2463
Annual Growth Rate 2006 - 2020	0.00%	2.27%	-0.98%	-0.99%	1.83%
Annual Growth Rate 2006 - 2015	0.26%	3.25%	-0.96%	-0.90%	2.52%
Annual Growth Rate 2011 - 2020	-0.25%	1.29%	-0.99%	-1.07%	1.14%
EXPANDED DEMOGRAPHIC REGION					
Population 2016-2020	404,165	57,196	346,969	326,062	78,103
Population 2011-2015	384,609	50,679	333,930	316,341	68,268
Population 2006-2010	368,752	43,014	325,738	309,615	59,137
Annual Growth Rate 2006 - 2020	0.92%	2.89%	0.63%	0.52%	2.82%
Annual Growth Rate 2006 - 2015	0.85%	3.33%	0.50%	0.43%	2.91%
Annual Growth Rate 2011 - 2020	1.00%	2.45%	0.77%	0.61%	2.73%

Table 2.4-8: Current and Historical Ethnicity Data for the Expanded Demographic Region (Continued)

Jurisdiction	Total Population	Hispanic or Latino	Not Hispanic or Latino	White (Not Hispanic or Latino)[1]	Aggregate Minority[2]
IDAHO					
Population 2016-2020	1,754,367	222,967	1,531,400	1,427,529	326,838
Population 2011-2015	1,616,547	191,314	1,425,233	1,342,562	273,985
Population 2006-2010	1,526,797	161,337	1,365,460	1,292,746	234,051
Annual Growth Rate 2006 - 2020	1.40%	3.29%	1.15%	1.00%	3.40%
Annual Growth Rate 2006 - 2015	1.15%	3.47%	0.86%	0.76%	3.20%
Annual Growth Rate 2011 - 2020	1.65%	3.11%	1.45%	1.23%	3.59%

Sources-
[1] Reference 2.4-34
[2] Reference 2.4-31
[3] Reference 2.4-38

Table 2.4-9: Sex Distribution and Median Age for Expanded Demographic Region

Jurisdiction	Total Population	Number of Females[1]	% of Females	Number of Males[1]	% of Males	Median Age of Total Population (Years)[2]	Median Age of Females (Years)[2]	Median Age of Males (Years)[2]
US	326,569,308	165,750,778	50.8%	160,818,530	49.2%	38.2	39.6	37
Idaho	1,754,367	874,604	49.9%	879,763	50.1%	36.6	37.4	35.9
Bannock	73,482	36,703	49.9%	36,779	50.1%	33.3	34.8	32.7
Bingham	46,246	23,098	49.9%	23,148	50.1%	34.45	34.2	32.7
Blaine	2450	1162	47.4%	1288	52.6%	41.9	41.05	44.3
Bonneville	116,970	58,394	49.9%	58,576	50.1%	32	32.7	33.4
Butte	2603	1199	46.1%	1404	53.9%	43.3	40.7	43.4
Clark	885	395	44.6%	490	55.4%	37.7	33	42.1
Custer	2842	1390	48.9%	1452	51.1%	47.2	46.35	47.35
Fremont	3909	1996	51.1%	1913	48.9%	33.35	35.95	34
Jefferson	29,238	14,405	49.3%	14,833	50.7%	50.7	47.6	53.4
Lemhi	542	233	43.0%	309	57.0%	37.4	38	35.5
Lincoln	1227	599	48.8%	628	51.2%	24	23.5	24.4
Madison	35,752	17,618	49.3%	18,134	50.7%	29.6	28.8	31.8
Minidoka	526	244	46.4%	282	53.6%	42.85	44.05	40.6
Power	3279	1457	44.4%	1822	55.6%	41.3	42.7	36.3
Total or Percentage	319,951	158,893	49.7%	161,058	50.3%	37.55	36.975	35.9

Sources-

[1] Reference 2.4-39

[2] Reference 2.4-40

Table 2.4-10: Age Distribution for Expanded Demographic Region

Jurisdiction	Total Population	Younger than 5 Years		5 to 14 Years		15 to 24 Years		25 to 44 Years		45 to 64 Years		65 Years and Older	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
US	326,569,308	19,650,192	6.0%	41,086,949	12.6%	42,995,333	13.2%	86,831,842	26.6%	83,642,175	25.6%	52,362,817	16.0%
Idaho	1,754,367	114,332	6.5%	253,429	14.4%	241,262	13.8%	451,494	25.7%	416,106	23.7%	277,744	15.8%
Bannock	73,482	5267	7.2%	10,646	14.5%	11,356	15.5%	21,003	28.6%	15,402	21.0%	9808	13.3%
Bingham	46,246	3522	7.6%	8269	17.9%	6575	14.2%	10,973	23.7%	10,450	22.6%	6457	14.0%
Blaine	2450	81	3.3%	291	11.9%	408	16.7%	650	26.5%	614	25.1%	406	16.6%
Bonneville	116,970	9803	8.4%	20,347	17.4%	15,748	13.5%	31,339	26.8%	24,366	20.8%	15,367	13.1%
Butte	2603	150	5.8%	358	13.8%	133	5.1%	620	23.8%	767	29.5%	575	22.1%
Clark	885	69	7.8%	109	12.3%	143	16.2%	193	21.8%	247	27.9%	124	14.0%
Custer	2842	110	3.9%	353	12.4%	466	16.4%	409	14.4%	734	25.8%	770	27.1%
Fremont	3909	231	5.9%	537	13.7%	420	10.7%	807	20.6%	993	25.4%	921	23.6%
Jefferson	29,238	2397	8.2%	5710	19.5%	4281	14.6%	7427	25.4%	6145	21.0%	3278	11.2%
Lemhi	542	24	4.4%	66	12.2%	42	7.7%	85	15.7%	181	33.4%	144	26.6%
Lincoln	1227	73	5.9%	196	16.0%	151	12.3%	294	24.0%	375	30.6%	138	11.2%
Madison	35,752	3521	9.8%	4263	11.9%	13,211	37.0%	8271	23.1%	4168	11.7%	2318	6.5%
Minidoka	526	54	10.3%	20	3.8%	88	16.7%	217	41.3%	97	18.4%	50	9.5%
Power	3279	192	5.9%	588	17.9%	349	10.6%	610	18.6%	934	28.5%	606	18.5%
Total or Average Percentage	319,951	25,494	8.0%	51,753	16.2%	53,371	16.7%	82,898	25.9%	65,473	20.5%	40,962	12.8%

Source-
Reference 2.4-39

Table 2.4-11: Migrant Farm Labor in the Expanded Demographic Region

County	Total Number of Farms	Number of Farms with Workers	Number of Farm Workers	Number of Farms with Migrant Workers	Number of Migrant Workers
Bannock					
2017[1]	757	173	625	6	19
2012[2]	819	175	665	13	24
Delta	-62	-2	-40	-7	-5
Bingham					
2017	1177	418	3452	67	417
2012	1265	493	4259	67	357
Delta	-88	-75	-807	0	60
Blaine					
2017	190	88	351	10	39
2012	186	81	392	14	44
Delta	4	7	-41	-4	-5
Bonneville					
2017	1109	288	1127	34	117
2012	893	292	1384	31	210
Delta	216	-4	-257	3	-93
Butte					
2017	189	73	196	2	NA
2012	214	84	276	NA	NA
Delta	-25	-11	-80	NA	NA
Clark					
2017	68	28	133	8	41
2012	72	26	174	5	NA
Delta	-4	2	-41	3	NA
Custer					
2017	267	90	259	1	NA
2012	272	83	267	NA	NA
Delta	-5	7	-8	NA	NA
Fremont					
2017	513	191	1189	18	198
2012	601	194	1506	22	356
Delta	-88	-3	-317	-4	-158
Jefferson					
2017	750	245	1596	29	445
2012	776	250	1552	23	335
Delta	-26	-5	44	6	110
Lemhi					
2017	351	117	315	4	5
2012	350	98	243	NA	NA

Table 2.4-11: Migrant Farm Labor in the Expanded Demographic Region (Continued)

County	Total Number of Farms	Number of Farms with Workers	Number of Farm Workers	Number of Farms with Migrant Workers	Number of Migrant Workers
Delta	1	19	72	NA	NA
Lincoln					
2017	276	126	637	NA	NA
2012	310	122	612	22	86
Delta	-34	4	25	NA	NA
Madison					
2017	454	214	1534	25	113
2012	472	213	1644	22	149
Delta	-18	1	-110	3	-36
Minidoka					
2017	620	253	2331	65	430
2012	622	230	2513	40	380
Delta	-2	23	-182	25	50
Power					
2017	295	115	1595	24	206
2012	308	130	1799	11	147
Delta	-13	-15	-204	13	59
Expanded Demographic Region					
2017	7016	2419	15,340	293	2030
2012	7160	2471	17,286	270	2088
Delta	-144	-52	-1946	23	-58

Sources-

[1] Reference 2.4-42

[2] Reference 2.4-41

Table 2.4-12: Household Income Distribution within Expanded Demographic Region

Income Range	State of Idaho	Expanded Demographic Region	Bannock	Bingham	Blaine	Bonneville	Butte	Clark	Custer	Fremont	Jefferson	Lemhi	Lincoln	Madison	Minidoka	Power
Household Median Income[2]	58,915	52,165	46,775	57,889	96,956	61,448	36,750	36,429	41,210	69,397	64,973	39,297	54,250	52,550	38,261	51,780
Total Number of Households[3]	649,299	109,960	26,937	15,612	843	40,946	966	332	1209	1339	8825	235	400	10,877	170	1269
Less than $10,000[3]	32,425	5704	1711	648	34	1760	76	2	99	47	279	4	17	953	6	68
$10,000 to $14,999	25,981	4700	1511	638	4	1268	92	9	101	5	153	25	11	849	6	28
$15,000 to $19,999	28,203	5900	1528	910	42	1790	58	5	161	52	238	14	12	1029	7	54
$20,000 to $24,999	31,293	6294	1452	801	13	2288	82	15	147	37	390	16	7	961	4	81
$25,000 to $29,999	29,437	5158	1336	715	1	1705	123	98	83	39	385	31	9	572	3	58
$30,000 to $34,999	33,402	5322	1430	850	5	1663	27	33	18	139	237	12	68	554	45	241
$35,000 to $39,999	30,233	5317	1634	745	114	1887	33	19	52	70	274	20	23	374	46	26
$40,000 to $44,999	32,445	5236	1443	620	26	2063	26	6	82	34	485	15	20	375	4	37
$45,000 to $49,999	28,275	4972	1311	628	23	1937	22	20	44	58	355	0	21	512	0	41
$50,000 to $59,999	58,977	10,083	2348	1569	13	3489	82	54	26	27	1114	23	35	1215	8	80
$60,000 to $74,999	76,701	11,764	2841	1768	93	4701	69	13	100	238	1100	17	37	611	0	176
$75,000 to $99,999	84,774	14,576	3338	2057	36	5810	92	30	131	233	1582	36	50	1032	13	136
$100,000 to $124,999	60,414	9682	2066	1561	38	3803	52	15	57	176	878	14	64	862	7	89
$125,000 to $149,999	33,665	5631	1197	771	79	2559	49	2	50	57	413	3	4	412	0	35
$150,000 to $199,999	32,234	5317	1265	824	190	2103	52	11	50	72	493	2	6	193	6	50

Table 2.4-12: Household Income Distribution within Expanded Demographic Region (Continued)

Income Range	State of Idaho	Expanded Demographic Region	Bannock	Bingham	Blaine	Bonneville	Butte	Clark	Custer	Fremont	Jefferson	Lemhi	Lincoln	Madison	Minidoka	Power
$200,000 or more	30,840	4304	526	507	132	2120	31	0	8	55	449	3	16	373	15	69
Number of Families[4]	441,391	77,605	1630	908	41	2142	128	8	120	63	460	10	30	2067	49	83
Percentage of Families below Poverty Level[4]	8.12%	9.97%	9.78%	7.82%	7.40%	7.44%	20.65%	4.47%	16.62%	5.46%	6.52%	6.21%	9.87%	23.34%	35.00%	10.56%

Sources-

[1] Data reported at Census Block Group level based on the CBGs included for the expanded demographic region as defined in Figure 2.4-2 through Figure 2.4-6 and Table 2.4-1.

[2] Reference 2.4-44

[3] Reference 2.4-43

[4] Reference 2.4-45

Table 2.4-13: List of Public Venues in the Expanded Demographic Region

Public Venue	Type	City	County	Driving Distance[9] (mi)
American Falls Reservoir[1]	Outdoor Activities	Chubbuck	Bannock	75
Blackrock Canyon[1]	Outdoor Activities	Chubbuck	Bannock	75
Capell City Park[1]	Sports Park	Chubbuck	Bannock	75
Cotent Park[1]	Sports Park	Chubbuck	Bannock	75
Lakeside Rink[1]	Ice Rink	Chubbuck	Bannock	75
My World Discovery Museum[2]	Museum	Chubbuck	Bannock	75
Portneuf Wellness Complex[1]	Recreation Center	Chubbuck	Bannock	75
Stuart Park Splash Pad[1]	Water Park	Chubbuck	Bannock	75
Fort Hall Skatepark[3]	Skatepark	Fort Hall	Bannock	65
Shoshone-Bannock Casino Hotel[3]	Casino	Fort Hall	Bannock	65
Bannock County Event Center[4]	Fairgrounds	Pocatello	Bannock	78
Bannock County Historical Museum[2]	Museum	Pocatello	Bannock	78
Bannock Peak Casino[4]	Casino	Pocatello	Bannock	78
Bengal Ridge Disc Golf Course[4]	Disc Golf	Pocatello	Bannock	78
City Creek Trail System[4]	Trail	Pocatello	Bannock	78
Deleta Skating & Family Fun Center[4]	Roller Skating	Pocatello	Bannock	78
East Fork Mink Creek Nordic Center[4]	Ski & Snowshoe	Pocatello	Bannock	78
Eli M. Oboler Library[4]	Library	Pocatello	Bannock	78
Fort Hall Commemorative Trading Post[4]	Museum	Pocatello	Bannock	78
Fort Hall Replica[2]	Museum	Pocatello	Bannock	78
Games Center[4]	Bowling	Pocatello	Bannock	78
Heber Hatchets Axe Throwing[3]	Axe Throwing	Pocatello	Bannock	78
Highland Golf Course[4]	Golf Course	Pocatello	Bannock	78
Idaho Museum of Natural History[2]	Museum	Pocatello	Bannock	78
Idaho State Civic Symphony[4]	Performing Arts	Pocatello	Bannock	78
Juniper Hills Country Club[4]	Golf Course	Pocatello	Bannock	78
L.E. and Thelma E. Stephens Performing Arts Center[4]	Performing Arts	Pocatello	Bannock	78
Museum of Clean[2]	Museum	Pocatello	Bannock	78
Old Town Actors Studio[4]	Performing Arts	Pocatello	Bannock	78
Oregon Trail Shooting Range[4]	Shooting Range	Pocatello	Bannock	78
Outer Limits Fun Zone[3]	Recreation Center	Pocatello	Bannock	78
Pebble Creek Ski Area[3]	Ski	Pocatello	Bannock	78
Pocatello Community Recreation Center[4]	Recreation Center	Pocatello	Bannock	78

Table 2.4-13: List of Public Venues in the Expanded Demographic Region (Continued)

Public Venue	Type	City	County	Driving Distance[9] (mi)
Pocatello Field Archers[3]	Archery Range	Pocatello	Bannock	78
Pocatello Model Railroad and Historical Society[2]	Museum	Pocatello	Bannock	78
Pocatello Raceway[3]	Raceway	Pocatello	Bannock	78
Pocatello Ross Park Aquatic Complex[4]	Aquatic Facility	Pocatello	Bannock	78
Pocatello Skatepark[4]	Skatepark	Pocatello	Bannock	78
Pocatello Trap Club Inc[4]	Shooting Range	Pocatello	Bannock	78
Portneuf Health Trust Amphitheatre[4]	Amphitheatre	Pocatello	Bannock	78
Riverside Golf Course[4]	Golf Course	Pocatello	Bannock	78
Shoshone Bannock Tribal Museum[2]	Museum	Pocatello	Bannock	78
Sister City Park[4]	Park	Pocatello	Bannock	78
Snake River Doodle’s Therapy Animals & Petting Zoo[4]	Zoo	Pocatello	Bannock	78
The Palace Theatre[3]	Performing Arts	Pocatello	Bannock	78
Tough Guy Bowling Lanes[3]	Bowling	Pocatello	Bannock	78
Upper Ross Park Disc Golf Course[4]	Disc Golf	Pocatello	Bannock	78
Westside Players[3]	Performing Arts	Pocatello	Bannock	78
Zoo Idaho[3]	Zoo	Pocatello	Bannock	78
Hazard Creek Golf Course[3]	Golf Course	Aberdeen	Bingham	76
Atomic Motor Raceway[3]	Raceway	Atomic City	Bingham	25
Bingham County Historical Museum[2]	Museum	Blackfoot	Bingham	54
Blackfoot Golf Course[5]	Golf Course	Blackfoot	Bingham	54
Blackfoot Performing Arts Center[5]	Performing Arts	Blackfoot	Bingham	54
Blackfoot River Bowmen Archery Range[3]	Archery Range	Blackfoot	Bingham	54
Blackfoot Skatepark[5]	Skatepark	Blackfoot	Bingham	54
Cedar Hills Gun Club[3]	Shooting Range	Blackfoot	Bingham	54
Eastern Idaho State Fairgrounds[5]	Fairgrounds	Blackfoot	Bingham	54
Idaho Potato Museum & Potato Station Café[2]	Museum	Blackfoot	Bingham	54
Nuart Theater-Blackfoot Community Players[5]	Performing Arts	Blackfoot	Bingham	54
Pindale Lanes[5]	Bowling	Blackfoot	Bingham	54
Sage Hill Casino[3]	Casino	Blackfoot	Bingham	54
John Simpson Skatepark[5]	Skatepark	Shelley	Bingham	67
Journey’s End Golf Course[3]	Golf Course	Shelley	Bingham	67
NBC Historical Park[2]	Museum	Shelley	Bingham	54

Table 2.4-13: List of Public Venues in the Expanded Demographic Region (Continued)

Public Venue	Type	City	County	Driving Distance[9] (mi)
North Bingham County Library[5]	Library	Shelley	Bingham	67
Shelley Community Swimming Pool[5]	Pool	Shelley	Bingham	67
Virginia Theater[3]	Performing Arts	Shelley	Bingham	67
Ammon City Swimming Pool[3]	Pool	Ammon	Bonneville	69
Idaho Falls Family YMCA Indoor Sports Arena[3]	Recreation Center	Ammon	Bonneville	69
Performing Arts Center[3]	Performing Arts	Ammon	Bonneville	69
Actors' Repertory Theatre of Idaho[3]	Performing Arts	Idaho Falls	Bonneville	63
Archery Idaho[3]	Archery Range	Idaho Falls	Bonneville	63
Art Museum of Eastern Idaho[2]	Museum	Idaho Falls	Bonneville	63
Artitorium on Broadway[3]	Art Center	Idaho Falls	Bonneville	63
Bonneville County Fairgrounds[6]	Fairgrounds	Idaho Falls	Bonneville	63
Bowl-Ero Lanes[3]	Bowling	Idaho Falls	Bonneville	63
Bunker Village Paintball Idaho Falls[3]	Paintball	Idaho Falls	Bonneville	63
Civic Center for the Performing Arts[6]	Performing Arts	Idaho Falls	Bonneville	63
Collectors Corner Museum[2]	Museum	Idaho Falls	Bonneville	63
Downwind Archery[3]	Archery Range	Idaho Falls	Bonneville	63
Eagle Rock Gun School and Range[3]	Shooting Range	Idaho Falls	Bonneville	63
Eagle Rock Outlaws[3]	Shooting Range	Idaho Falls	Bonneville	63
Eastern Idaho Aquarium[6]	Aquarium	Idaho Falls	Bonneville	63
Freeman Park[6]	Disc Golf	Idaho Falls	Bonneville	63
Ida Racing[3]	Horse Racing	Idaho Falls	Bonneville	63
Idaho Falls Community Center[6]	Community Center	Idaho Falls	Bonneville	63
Idaho Falls Country Club[6]	Golf Course	Idaho Falls	Bonneville	63
Idaho Falls Family YMCA[6]	Recreation Center	Idaho Falls	Bonneville	63
Idaho Falls Public Library[6]	Library	Idaho Falls	Bonneville	63
Idaho Falls Raceway/Noise Park[3]	Raceway	Idaho Falls	Bonneville	63
Idaho Falls Skatepark[3]	Skatepark	Idaho Falls	Bonneville	63
Idaho Falls Symphony[3]	Performing Arts	Idaho Falls	Bonneville	63
Idaho Falls Youth Arts Centre[6]	Performing Arts	Idaho Falls	Bonneville	63
Idaho Falls Zoo[3]	Zoo	Idaho Falls	Bonneville	63
iJump Trampoline Park[3]	Gymnastics	Idaho Falls	Bonneville	63
Iona ID Historical Museum[2]	Museum	Idaho Falls	Bonneville	63
Japanese Friendship Garden[6]	Park	Idaho Falls	Bonneville	63
Joe Marmo/Wayne Lehto Ice Arena[6]	Ice Rink	Idaho Falls	Bonneville	63

Table 2.4-13: List of Public Venues in the Expanded Demographic Region (Continued)

Public Venue	Type	City	County	Driving Distance[9] (mi)
Museum of Idaho[2]	Museum	Idaho Falls	Bonneville	63
On Target Axe Throwing[3]	Axe Throwing	Idaho Falls	Bonneville	63
Pinecrest Golf Course[6]	Golf Course	Idaho Falls	Bonneville	63
Recreation Center[6]	Recreation Center	Idaho Falls	Bonneville	63
Reinhart Park[6]	Park	Idaho Falls	Bonneville	63
River Walk[6]	Trail	Idaho Falls	Bonneville	63
Sage Lakes Golf Course[6]	Golf Course	Idaho Falls	Bonneville	63
Sage Raceway[3]	Raceway	Idaho Falls	Bonneville	63
Sand Creek Golf Course[6]	Golf Course	Idaho Falls	Bonneville	63
Sandy Downs[3]	Archery Range	Idaho Falls	Bonneville	63
Snake River Landing[6]	Park	Idaho Falls	Bonneville	63
South East Idaho Practical Shooters[3]	Shooting Range	Idaho Falls	Bonneville	63
South Forks Archers Archery Range[3]	Archery Range	Idaho Falls	Bonneville	63
Tautphaus Park[6]	Park	Idaho Falls	Bonneville	63
The Colonial Theater[3]	Performing Arts	Idaho Falls	Bonneville	63
The Gem[3]	Performing Arts	Idaho Falls	Bonneville	63
Wes Deist Aquatic Center[6]	Aquatic Facility	Idaho Falls	Bonneville	63
Iona Library[3]	Library	Iona	Bonneville	70
Steele-n-Jo's Bone[3]	Amphitheatre	Iona	Bonneville	70
Mega-Peace Museum[2]	Museum	Arco	Butte	11
Blizzard Mountain Ski Hill[3]	Ski	Moore	Butte	18
Heritage Hall Museum[2]	Museum	Dubois	Clark	67
River Park Golf Course[3]	Golf Course	Mackay	Custer	37
Jefferson County Library District[3]	Library	Menan	Jefferson	73
Cedar Park Golf Course[3]	Golf Course	Rigby	Jefferson	76
Farnsworth TV & Pioneer Museum[2]	Museum	Rigby	Jefferson	76
Jefferson County Museum[2]	Museum	Rigby	Jefferson	76
Rigby Fairgrounds[3]	Fairgrounds	Rigby	Jefferson	76
Rigby Skatepark[3]	Skatepark	Rigby	Jefferson	76
Rigby South Park[3]	Park	Rigby	Jefferson	76
Heise Hills Golf Course[3]	Golf Course	Ririe	Jefferson	80
Kelly Canyon Resort[3]	Ski	Ririe	Jefferson	80
Ririe Library[3]	Library	Ririe	Jefferson	80
Roberts City Library[3]	Library	Roberts	Jefferson	66

Table 2.4-13: List of Public Venues in the Expanded Demographic Region (Continued)

Public Venue	Type	City	County	Driving Distance[9] (mi)
Western Wings Birds & Clays[3]	Shooting Range	Roberts	Jefferson	67
Mud Lake Museum[2]	Museum	Terreton	Jefferson	45
Beaver Dick Park[7]	Park	Rexburg	Madison	78
BYU Idaho Apple Orchard Museum[2]	Museum	Rexburg	Madison	78
BYU-Idaho Hart Swimming Pool[7]	Pool	Rexburg	Madison	78
Center Stage[3]	Performing Arts	Rexburg	Madison	78
Donjo Sports Complex[7]	Outdoor Activities	Rexburg	Madison	78
Eliza R. Snow Performing Arts Center[7]	Performing Arts	Rexburg	Madison	78
Evergreen Park[7]	Park	Rexburg	Madison	78
Fat Cats Rexburg[7]	Recreation Center	Rexburg	Madison	78
Geology Museum[8]	Museum	Rexburg	Madison	78
Heber Hatchets Axe Throwing[3]	Axe Throwing	Rexburg	Madison	78
Twin Bridges Park[7]	Park	Rexburg	Madison	78
Idaho Centennial Carousel[7]	Carousel	Rexburg	Madison	78
Legacy Flight Museum[2]	Museum	Rexburg	Madison	78
Life Science Museum[2]	Museum	Rexburg	Madison	78
Madison County Fairgrounds[7]	Fairgrounds	Rexburg	Madison	78
McKay Quad Amphitheatre[3]	Amphitheatre	Rexburg	Madison	78
Museum of Rexburg[2]	Museum	Rexburg	Madison	78
Nature Park North[7]	Park	Rexburg	Madison	78
Porter Park[7]	Park	Rexburg	Madison	78
Rexburg Community Theatre[7]	Performing Arts	Rexburg	Madison	78
Rexburg Municipal Golf Course[7]	Golf Course	Rexburg	Madison	78
Rexburg Rapids[3]	Water Park	Rexburg	Madison	78
Rexburg Skatepark[3]	Skatepark	Rexburg	Madison	78
Riverside Park[7]	Sports Park	Rexburg	Madison	78
Smith Park[7]	Park	Rexburg	Madison	78
Snow Recital Hall[3]	Performing Arts	Rexburg	Madison	78
Strike Zone Bowling Alley[3]	Bowling	Rexburg	Madison	78
Teton Lakes Golf Course[7]	Golf Course	Rexburg	Madison	78
The Zone[3]	Recreation Center	Rexburg	Madison	78
Unified Sportsmen's Club[3]	Shooting Range	Rexburg	Madison	78

Table 2.4-13: List of Public Venues in the Expanded Demographic Region (Continued)

Public Venue	Type	City	County	Driving Distance[9] (mi)
Upper Snake River Valley Historical Society[2]	Museum	Rexburg	Madison	78
Yellowstone Bear World[3]	Zoo	Rexburg	Madison	78

Sources-

[1] Reference 2.4-47

[2] Reference 2.4-48

[3] Reference 2.4-49

[4] Reference 2.4-50

[5] Reference 2.4-51

[6] Reference 2.4-52

[7] Reference 2.4-53

[8] Reference 2.4-54

[9] Driving distance calculated from center of CFPP to the nearest city limit (not the actual location)

Table 2.4-14: Public Venues by Type and County

Venue Type	Bannock	Bingham	Bonneville	Butte	Clark	Custer	Jefferson	Madison	Total
Amphitheatre	1		1					1	3
Aquarium			2						2
Aquatic Facility	1		1						2
Archery Range	1	1	4						6
Art Center			1						1
Axe Throwing	1		1					1	3
Bowling	2	1	1					1	5
Carousel								1	1
Casino	2	1							3
Community Center			1						1
Disc Golf	2		1						3
Fairgrounds	1	1	1				1	1	5
Golf Course	3	3	4			1	2	2	15
Gymnastics			1						1
Horse Racing			1						1
Ice Rink	1		1						2
Library	1	1	2				3		7
Museum	8	3	4	1	1		3	6	26
Outdoor Activities	2							1	3
Paintball			1						1
Park	1		4				1	6	12
Performing Arts	5	3	7					4	19
Pool		1	1					1	3
Raceway	1	1	2						4
Recreation Center	3		3					2	8
Roller Skating	1								1
Shooting Range	2	1	3				1	1	8
Skatepark	2	2	2				1	1	8
Ski	1			1			1		3
Ski & Snowshoe	1								1
Sports Park	2							1	3

Table 2.4-14: Public Venues by Type and County (Continued)

Venue Type	Bannock	Bingham	Bonneville	Butte	Clark	Custer	Jefferson	Madison	Total
Trail	1		1						2
Water Park	1							1	2
Zoo	2		1					1	4
Total	**50**	**19**	**52**	**2**	**1**	**1**	**13**	**32**	**170**

Table 2.4-15: Stadiums and Arenas in the Expanded Demographic Region

Stadium & Arenas	Type	City	County	Driving Distance[3] (mi)	Capacity	Activities
Holt Arena[1]	Multi-Purpose Athletic Stadium	Pocatello	Bannock	78	12,000	Football - Home to Idaho State Bengals, Graduations, Rodeos, and Concerts
Mountain America Center and Hero Arena	Multi-purpose Athletic Stadium	Idaho Falls	Bonneville	64	6000	Conventions, concerts, ice hockey
Snake River Arena[2]	Equestrian Facility	Blackfoot	Bingham	54	---	Equestrian Events
Butte County High Stadium[2]	Multi-Purpose Athletic Stadium	Arco	Butte	11	---	High School Football
Ravsten Stadium[1]	Multi-Purpose Athletic Stadium	Idaho Falls	Bonneville	63	4140	High School Football and Track and Field
Iron Horse Stadium[1]	Multi-Purpose Athletic Stadium	Pocatello	Bannock	78	3000	High School Football
Trojan Stadium[1]	Multi-Purpose Athletic Stadium	Rigby	Jefferson	76	1730	High School Football
Thunder Stadium[2]	Multi-Purpose Athletic Stadium	Idaho Falls	Bonneville	63	---	High School Football
BYU-Idaho Stadium Field[2]	Multi-Purpose Athletic Stadium	Rexburg	Madison	78	15,000	Football, Track, Soccer, and Frisbee
BYU-Idaho Upper Fields[2]	Multi-Purpose Athletic Stadium	Rexburg	Madison	78	---	Recreational Sports - Volleyball, Flag Football, Frisbee, and Dances
BYU-Idaho Sports Complex Fields[2]	Multi-Purpose Athletic Stadium	Rexburg	Madison	78	---	Soccer, Softball, Lacrosse, and Ultimate Frisbee
Bobcat Stadium[2]	Multi-Purpose Athletic Stadium	Rexburg	Madison	78	4500	High School Football and Soccer
Hills Arena[2]	Equestrian Facility	Rexburg	Madison	78	---	Equestrian Events
Melaleuca Field[2]	Baseball	Idaho Falls	Bonneville	63	3659	Baseball - Home to Idaho Falls Chukars, Minor League Baseball
Craner Field at Tautphaus Park[2]	Softball	Idaho Falls	Bonneville	63	---	Softball and Tennis Courts

Table 2.4-15: Stadiums and Arenas in the Expanded Demographic Region (Continued)

Stadium & Arenas	Type	City	County	Driving Distance[3] (mi)	Capacity	Activities
Larry Wilson Field[2]	Football	Rigby	Jefferson	76	---	High School Football
Wind River Arena & Stables[2]	Equestrian Facility	Rigby	Jefferson	76	---	Equestrian Events
Cowboy Warrior Ranch[2]	Equestrian Facility	Idaho Falls	Bonneville	63	---	Equestrian Events
Halliwell Park[2]	Baseball	Pocatello	Bannock	78	2580	Baseball
Davis Field[2]	Soccer and Track & Field	Pocatello	Bannock	78	4000	Soccer - Home to Idaho State University Bengals Soccer
Diamond Stables and Arena[2]	Equestrian Facility	Fort Hall	Bannock	65	---	Equestrian Events
Sandy Downs Arena[2]	Equestrian Facility	Idaho Falls	Bonneville	63	---	Equestrian Events

Sources-
[1] Reference 2.4-55
[2] Reference 2.4-49
[3] Driving distance calculated from center of the CFPP to the city limit (not the actual location)

Table 2.4-16: Resident Camps in the Expanded Demographic Region

Resident Camp	Nearest City	County	Number of Sites	Facility Use	Driving Distance[1] (mi)	Agency
Budget RV Park	Chubbuck	Bannock	24	Year Round	75	Private
Bannock County Fairgrounds RV Park	Pocatello	Bannock	122	Summer	74	County/City
Batise Springs RV Park	Pocatello	Bannock	12	Spring - Fall	79	Private
Cowboy RV Park	Pocatello	Bannock	41	Year Round	80	Private
Pocatello KOA	Pocatello	Bannock	58	Year Round	76	Private
Scout Mountain Campground	Pocatello	Bannock	28	Spring - Fall	95	National Forest Service
Buffalo Meadows RV Park	Fort Hall	Bannock	45	Spring - Fall	66	Private
Sportsman's Park on American Falls Reserve	Aberdeen	Bingham	42	Spring - Fall	77	Bureau of Reclamation
Fairway RV Park	Blackfoot	Bingham	109	Spring - Summer	55	County/City
North Bingham County Recreation Area	Shelley	Bingham	13	Summer	69	County/City
Shady Rest RV Park	Idaho Falls	Bonneville	46	Year Round	66	Private
Snake River RV Park and Campground	Idaho Falls	Bonneville	160	Year Round	63	Private
Sunnyside Acres RV Park	Idaho Falls	Bonneville	25	Year Round	64	Private
Teton West RV Park	Idaho Falls	Bonneville	90	Year Round	75	Private
Craters of the Moon National Monument and Preserve	Arco	Butte	51	Spring - Fall	35	National Park Service
Craters of the Moon/Arco KOA	Arco	Butte	65	Spring - Fall	10	Private
Garden Creek Campsite	Arco	Butte	5	Year Round	66	LM
Mountain View RV Park	Arco	Butte	35	Year Round	12	Private
Summit Creek	Howe	Butte	12	Spring - Fall	48	BLM
Iron Bog	Mackay	Custer	21	Summer - Fall	47	National Forest Service
Mackay Reservoir Campground	Mackay	Custer	57	Year Round	39	BLM
Moose Crossing RV Park	Mackay	Custer	45	Spring - Fall	28	Private
Phi Kappa	Mackay	Custer	21	Summer - Fall	78	National Forest Service
River Park Golf Course and Campground	Mackay	Custer	39	Spring - Fall	37	Private
Star Hope	Mackay	Custer	21	Summer - Fall	76	National Forest Service
Wagon Wheel Motel and RV Park	Mackay	Custer	17	Year Round	37	Private
White Knob Motel and RV Park	Mackay	Custer	57	Summer - Fall	35	Private
Wildhorse Campground	Mackay	Custer	13	Summer - Fall	79	National Forest Service

Table 2.4-16: Resident Camps in the Expanded Demographic Region (Continued)

Resident Camp	Nearest City	County	Number of Sites	Facility Use	Driving Distance[1] (mi)	Agency
Birch Creek Campground	Mud Lake	Jefferson	25	Spring - Fall	36	BLM
Haven Motel and Trailer Park	Mud Lake	Jefferson	13	Year Round	32	Private
Jefferson County Lake Campground	Rigby	Jefferson	---	Summer - Fall	79	County/City
7N Ranch	Ririe	Jefferson	---	Summer - Fall	87	Private
Heise Hot Springs	Ririe	Jefferson	14	Year Round	86	Private
Juniper Campground	Ririe	Jefferson	99	Spring - Fall	84	Bureau of Reclamation
Kelly Island Campground	Ririe	Jefferson	14	Summer	89	BLM
Mountain River Ranch/Sportsman RV Park	Ririe	Jefferson	131	Spring - Fall	85	Private
Table Rock	Ririe	Jefferson	9	Spring - Fall	93	National Forest Service
Erehwon Lodge	Roberts	Jefferson	---	Spring - Fall	81	Private
Sheffield RV Park	Rexburg	Madison	31	Year Round	80	Private
Thompson's RV Park	Rexburg	Madison	25	Spring - Fall	79	Private
Wakeside Lake RV Park	Rexburg	Madison	60	Year Round	78	Private

Source- Reference 2.4-56

[1] Driving distance from resident camp to the CFPP

--- Data unknown

Table 2.4-17: Resident Camps Summary by County, Use Season, and Number of Sites

Season of Use	Number of Resident Camps	Number of Sites per Camp
Bannock County	**7**	**330**
Spring - Fall	3	85
Summer	1	122
Year Round	3	123
Bingham County	**3**	**164**
Spring - Fall	1	42
Spring - Summer	1	109
Summer	1	13
Bonneville County	**4**	**321**
Year Round	4	321
Butte County	**5**	**168**
Spring - Fall	3	128
Year Round	2	40
Custer County	**9**	**291**
Spring - Fall	2	84
Summer - Fall	5	133
Year Round	2	74
Jefferson County	**10**	**305**
Spring - Fall	5	264
Summer	1	14
Summer - Fall	2	0
Year Round	2	27
Madison County	**3**	**116**
Spring - Fall	1	25
Year Round	2	91
Expanded Demographic Region	**41**	**1695**
Spring - Summer	1	109
Spring - Fall	15	628
Summer	3	149
Summer - Fall	7	133
Year Round	15	676

Table 2.4-18: Large Employers in the Expanded Demographic Region

Employer	Ownership	Employment Range	County
Battelle Energy Alliance	Private	5000	Butte[1]
Idaho State University	State Government	1000 - 2499	Bannock[2]
Pocatello/Chubbuck School District	Local Government	1000 - 2499	Bannock
Portneuf Medical Center	Private	1000 - 2499	Bannock
Idaho Central Credit Union	Private	1000 - 2499	Bannock
Bonneville Joint School District	Local Government	1000 - 2499	Bonneville[3]
Melaleuca	Private	1000 - 2499	Bonneville
Eastern Idaho Regional Medical Center	Private	1000 - 2499	Bonneville
Idaho Falls School District	Local Government	1000 - 2499	Bonneville
Walmart	Private	1000 - 2499	Bonneville
Fluor Idaho	Private	1000 - 2499	Butte
Fluor Marine Propulsion	Private	1000 - 2499	Butte
Brigham Young University - Idaho	Private	1000 - 2499	Madison[4]
Amy's Kitchen	Private	500 - 999	Bannock
City of Pocatello	Local Government	500 - 999	Bannock
On Semiconductor	Private	500 - 999	Bannock
Allstate Insurance Company	Private	500 - 999	Bannock
Basic American Foods	Private	500 - 999	Bingham[5]
Shoshone Bannock Tribes	Local Government	500 - 999	Bingham
Bingham Memorial Hospital	Private	500 - 999	Bingham
Sun Valley Resort	Private	500 - 999	Blaine[6]
Blaine County School District	Local Government	500 - 999	Blaine
City of Idaho Falls	Local Government	500 - 999	Bonneville
Bonneville County	Local Government	500 - 999	Bonneville
Jefferson County School District	Local Government	500 - 999	Jefferson[7]
Madison School District	Local Government	500 - 999	Madison
Madison Memorial Hospital	Local Government	500 - 999	Madison
Walmart	Private	500 - 999	Madison
Minidoka County Joint School District	Local Government	500 - 999	Minidoka[8]
Amalgamated Sugar Company	Private	500 - 999	Minidoka
Lamb Weston	Private	500 - 999	Power[9]
Bannock County	Local Government	250 - 499	Bannock
Walmart	Private	250 - 499	Bannock
Blackfoot School District	Local Government	250 - 499	Bingham
Idaho Department of Health and Welfare	State Government	250 - 499	Bingham
Shelley Joint School District	Local Government	250 - 499	Bingham
Premier Technology	Private	250 - 499	Bingham
Shoshone Bannock Tribes Gaming	Local Government	250 - 499	Bingham
Walmart	Private	250 - 499	Bingham
Bingham County	Local Government	250 - 499	Bingham

Table 2.4-18: Large Employers in the Expanded Demographic Region (Continued)

Employer	Ownership	Employment Range	County
Has	Private	250 - 499	Bonneville
Idaho Falls Community Hospital	Private	250 - 499	Bonneville
College of Eastern Idaho	Local Government	250 - 499	Bonneville
Fremont County Joint School District	Local Government	250 - 499	Fremont[10]
Idahoan Foods	Private	250 - 499	Jefferson
Melaleuca	Private	250 - 499	Madison
Progrexion	Private	250 - 499	Madison
City of Rexburg	Local Government	250 - 499	Madison
Progressive Behavior Systems	Private	250 - 499	Minidoka
Minidoka Memorial County Hospital	Local Government	250 - 499	Minidoka
J.R. Simplot	Private	250 - 499	Power
America Falls Joint School District	Local Government	250 - 499	Power
Atkinsons' Market	Private	100 - 249	Blaine
Power Engineers	Private	100 - 249	Blaine
Blaine County	Local Government	100 - 249	Blaine
Webb Landscape	Private	100 - 249	Blaine
Albertsons	Private	100 - 249	Blaine
Sun Valley Community School	Private	100 - 249	Blaine
Ieg Zenergy	Private	100 - 249	Blaine
U.S. Forest Service	Federal Government	100 - 249	Custer[11]
Fremont County	Local Government	100 - 249	Fremont
Idaho Department of Juvenile Correction	State Government	100 - 249	Fremont
Idaho Gold Corporation	Private	100 - 249	Jefferson
Jefferson County	Local Government	100 - 249	Jefferson
Broulim's Foodtown	Private	100 - 249	Jefferson
West Jefferson School District	Local Government	100 - 249	Jefferson
Steele Memorial Medical Center	Local Government	100 - 249	Lemhi[12]
U.S. Forest Service	Federal Government	100 - 249	Lemhi
Salmon School District	Local Government	100 - 249	Lemhi
Glanbia Foods	Private	100 - 249	Lincoln[13]
Sugar-Salem School District	Local Government	100 - 249	Madison
Madison County	Local Government	100 - 249	Madison
The Homestead Assisted Living Center	Private	100 - 249	Madison
Loves Travel Stops and Country Store	Private	100 - 249	Minidoka
Minidoka County	Local Government	100 - 249	Minidoka
City of Rupert	Local Government	100 - 249	Minidoka
Lance & Lisa Funk Partnership	Private	100 - 249	Power
The Valley Club	Private	50 - 99	Blaine
Lost Rivers Medical Center	Private	50 - 99	Butte
Butte County School District	Local Government	50 - 99	Butte
Challis Joint School District	Local Government	50 - 99	Custer

Table 2.4-18: Large Employers in the Expanded Demographic Region (Continued)

Employer	Ownership	Employment Range	County
Ashton Memorial	Private	50 - 99	Fremont
Idaho Transportation Department	State Government	50 - 99	Jefferson
Heise Hot Springs	Private	50 - 99	Jefferson
Jefferson Central Fire district	Local Government	50 - 99	Jefferson
Lemhi County	Local Government	50 - 99	Lemhi
Saveway Market	Private	50 - 99	Lemhi
Idaho Department of Fish and Game	State Government	50 - 99	Lemhi
Q B Corporation	Private	50 - 99	Lemhi
Dahle Construction	Private	50 - 99	Lemhi
Sawtooth Healthcare	Private	50 - 99	Lemhi
Idaho Transportation Department	State Government	50 - 99	Lincoln
Shoshone Joint School District	Local Government	50 - 99	Lincoln
U.S. Department of The Interior	Federal Government	50 - 99	Lincoln
Best Western/Perkins - Burley	Private	50 - 99	Minidoka
The Sprinkler Shop	Private	50 - 99	Minidoka
Kloepfer	Private	50 - 99	Minidoka
Power County	Local Government	50 - 99	Power

[1] Reference 2.4-57
[2] Reference 2.4-58
[3] Reference 2.4-59
[4] Reference 2.4-60
[5] Reference 2.4-61
[6] Reference 2.4-62
[7] Reference 2.4-63
[8] Reference 2.4-64
[9] Reference 2.4-65
[10] Reference 2.4-66
[11] Reference 2.4-67
[12] Reference 2.4-68
[13] Reference 2.4-69
Only employers that permit Idaho Department of Labor to release employment range data are included.

Table 2.4-19: Large Employer Summary by Employment Type and County

Employer and Employment Range	County													
	Bannock	**Bingham**	**Blaine**	**Bonneville**	**Butte**	**Custer**	**Fremont**	**Jefferson**	**Lemhi**	**Lincoln**	**Madison**	**Minidoka**	**Power**	**Total**
Federal Government						1			1	1				3
100 - 249						1			1					2
50 - 99										1				1
Local Government	3	5	2	5	1	1	2	4	3	1	5	4	2	38
1,000 - 2,499	1			2										3
100 - 249			1				1	2	2		2	2		10
250 - 499	1	4		1			1				1	1	1	10
50 - 99					1	1		1	1	1			1	6
500 - 999	1	1	1	2				1			2	1		9
Private	6	4	8	5	4		1	4	4	1	5	6	3	51
5000					1									1
1,000 - 2,499	2			3	2						1			8
100 - 249			6					2		1	1	1	1	12
250 - 499	1	2		2				1			2	1	1	10
50 - 99			1		1		1	1	4			3		11
500 - 999	3	2	1								1	1	1	9
State Government	1	1					1	1	1	1				6
1,000 - 2,499	1													1
100 - 249							1							1
250 - 499		1												1
50 - 99								1	1	1				3
TOTAL	10	10	10	10	5	2	4	9	9	4	10	10	5	98

Table 2.4-20: National and State Parks and Recreation Areas in the Expanded Demographic Region

Type of Park and Recreation Area	Park and Recreation Area	2020 Annual Visitors	Size (ac)	Driving Distance[1] (mi)	Counties in the Demographic Region	Managed By
National Forest	Salmon-Challis National Forest	160,000	4,300,000	2	Bannock, Bonneville, Butte, Clark, Fremont, Jefferson, Lemhi, Madison, Minidoka, Power	U.S. Forest Service
	Caribou-Targhee National Forest	1,370,000	3,000,000	18	Bannock, Bonneville, Power	U.S. Forest Service
	Sawtooth National Forest	1,190,000	2,100,000	39	Blaine, Bonneville, Custer, Fremont, Power	U.S. Forest Service
Research Natural Area	Middle Canyon Research Natural Area	---	---	17	Butte	U.S. Forest Service
	Iron Bog Research Natural Area	---	---	35	Custer	U.S. Forest Service
	Smiley Mountain Research Natural Area	---	---	37	Custer	U.S. Forest Service
	Copper Mountain Research Natural Area	---	---	39	Custer	U.S. Forest Service
	Meadow Canyon Research Natural Area	---	---	41	Lemhi	U.S. Forest Service
	Merriam Lake Basin Research Natural Area	---	---	48	Custer	U.S. Forest Service
	Surprise Valley Research Natural Area	---	---	49	Custer	U.S. Forest Service
US National Monument & Natural Preserve	Craters of the Moon National Monument & Wilderness Area	251,000	410,000	15	Blaine, Butte, Lincoln, Minidoka, Power	National Park Service and BLM
Federal Refuge	Camas National Wildlife Refuge	---	11,000	69	Jefferson	U.S. Fish and Wildlife

Table 2.4-20: National and State Parks and Recreation Areas in the Expanded Demographic Region (Continued)

Type of Park and Recreation Area	Park and Recreation Area	2020 Annual Visitors	Size (ac)	Driving Distance[1] (mi)	Counties in the Demographic Region	Managed By
Wilderness Study Area	Great Rift Wilderness Study Area	---	---	15	Blaine	BLM
	Black Canyon Wilderness Study Area	---	---	16	Butte	BLM
	Cedar Butte Wilderness Study Area	---	---	18	Bingham	BLM
	Appendicitis Hill Wilderness Study Area	---	---	18	Butte	BLM
	China Cup Butte Wilderness Study Area	---	---	25	Blaine	BLM
	White Knob Mountains Wilderness Study Area	---	---	25	Custer	BLM
	Hell’s Half Acre Wilderness Study Area	---	---	29	Bingham, Bonneville	BLM
	Hawley Mountain Wilderness Study Area	---	---	31	Butte	BLM
	Friedman Creek Wilderness Study Area	---	---	34	Blaine	BLM
	Bear Den Butte Wilderness Study Area	---	---	37	Blaine, Minidoka	BLM
	Burnt Creek Wilderness Study Area	---	---	39	Custer	BLM
	Little Deer Wilderness Study Area	---	---	39	Blaine, Lincoln, Minidoka	BLM
	Raven’s Eye Wilderness Study Area	---	---	43	Blaine, Lincoln	BLM
	Little Wood River Wilderness Study Area	---	---	46	Blaine	BLM
	Borah Peak Wilderness Study Area	---	---	46	Custer	BLM
Area of Critical Environmental Concern	China Cup Butte Research Natural Area, Area of Critical Environmental Concern	---	---	25	Blaine	BLM
	Donkey Hills Area of Critical Environmental Concern	---	---	44	Custer	BLM
	Elk Mountain Area of Critical Environmental Concern	---	---	45	Blaine	BLM
	Snake River Area of Critical Environmental Concern	---	---	47	Jefferson	BLM
	Summit Creek Research Area of Critical Environmental Concern	---	---	49	Custer	BLM
	Thousand Springs Area of Critical Environmental Concern	---	---	49	Custer	BLM
State Recreation Area	Little Lost River Access Site			34	Butte	Idaho Fish and Game

Table 2.4-20: National and State Parks and Recreation Areas in the Expanded Demographic Region (Continued)

Type of Park and Recreation Area	Park and Recreation Area	2020 Annual Visitors	Size (ac)	Driving Distance[1] (mi)	Counties in the Demographic Region	Managed By
State Conservation Area	Mud Lake Wildlife Management Area	---	11,468	35	Jefferson	Idaho Fish and Game
	Market Lake Wildlife Management Area	19,000	6062	45	Jefferson	Idaho Fish and Game
	Sterling Wildlife Management Area	---	4106	45	Bingham	Idaho Fish and Game
	Carey Lake Wildlife Management Area	---	400	48	Blaine	Idaho Fish and Game
	Deer Parks Wildlife Management Units	---	3101	75	Jefferson and Madison	Idaho Fish and Game
	Tex Creek Wildlife Management Area	---	35,218	83	Bonneville	Idaho Fish and Game

[1] Driving distance to the CFPP
---Data unknown

Table 2.4-21: Counties in the Expanded Economic Region

County	Included in Expanded Economic Region	Justification
Bannock	Yes	Includes Pocatello and other communities that are likely sources of workers, materials and equipment, housing, and recreation for the CFPP Site construction and operations. Major transportation routes run through the county and Pocatello via Interstates 15 and 86, expected to be main arteries to obtain CFPP construction resources. A portion of the Fort Hall Reservation is located in Bannock County, potentially providing minority workers and an area for potential minority impacts. Idaho State University is located in Pocatello with science, technology, engineering, and mathematics curriculums that may provide a pipeline of skilled workers for CFPP. (Reference 2.4-16)
Bingham	Yes	Includes Blackfoot, a likely source of workers, housing, and support services for the CFPP Site. Major transportation routes run through Blackfoot to the INL and CFPP sites. A portion of the Fort Hall Reservation is within the county, potentially providing minority workers and an area for potential minority impacts. (Reference 2.4-17)
Blaine	No	Blaine County population centers are more than 50 direct miles from the CFPP site with existing roads that increase travel to the site to more than 80 miles. The population areas are located in a mountainous region with higher than average housing purchase/rental rates with a large percentage of housing devoted to second vacation homes. Blaine County provides minimal work force to the INL site (Reference 2.4-18). In 2020, only 1.5 percent of the workers were employed outside the county. (Reference 2.4-81)
Bonneville	Yes	Includes Idaho Falls and surrounding communities expected to be significant source of workers, including specialized skill sets; materials and equipment; housing; and support services. Principle off-site INL administration offices are in Idaho Falls. Major transportation routes run through Idaho Falls to the INL and CFPP sites. (Reference 2.4-28)
Butte	Yes	County where CFPP Site and INL Site are located; county is sparsely populated but has closest towns to the CFPP Site that could provide some workers, housing, recreation, and support systems. The INL Site is likely to be a source of specialty skilled nuclear workers and technical support to CFPP. (Reference 2.4-29)
Clark	No	Very sparsely populated county with a single CBG and no population centers near or within the expanded demographic region. The largest city in the expanded demographic area is Dubois at just over 500 people (approximately 55 driving miles from CFPP site). The entire county has less than 1000 people. (Reference 2.4-19)
Custer	No	Large, sparsely populated county with only two of four CBGs partially within the 50-mile radius from the CFPP Site. Three communities within the demographic region each have fewer than 1000 people with less than 5000 people for the county. Mountainous area used for recreation with sparse populations along river valleys that are mainly agricultural areas. (Reference 2.4-30)

Table 2.4-21: Counties in the Expanded Economic Region (Continued)

County	Included in Expanded Economic Region	Justification
Fremont	No	Only a small portion of Fremont County is within the expanded demographic region. No cities or communities are located within the expanded demographic region (Reference 2.4-20).
Jefferson	Yes	Fast growing county that provides significant resources to the INL Site. Existing road system convenient to the INL and CFPP sites. (Reference 2.4-31)
Lemhi	No	Very sparsely populated, mountainous county with only a small portion of one of seven CBGs within the 50-mile radius; no cities are located within the 50-mile radius. The closest city of Leadore, nearly 100 miles from the CFPP site, has a population around 100 people. (Reference 2.4-32)
Lincoln	No	Only a small portion of the county is within the 50-mile radius with only a single CBG and no cities within the expanded demographic region. Population within the expanded demographic area is just over 1,200 people. (Reference 2.4-21)
Madison	Yes	Rexburg provides a potential source of workers, housing, recreation, and support services. The county hosts a university with specific ties to the INL site, providing technical resources, internships, and technical support; similar resources are likely for the CFPP site. (Reference 2.4-22)
Minidoka	No	Only a small portion of the county is within the 50-mile radius with only a single CBG and no cities within the expanded demographic region. Population within the expanded demographic area is below 1,000 people. (Reference 2.4-23)
Power	No	Only a small portion of the county is within the 50-mile radius. No cities are located within the expanded economic region. Population for the four CBGs is low. Impacts related to the Fort Hall Reservation are more effectively addressed in Bannock and Bingham Counties. (Reference 2.4-24)

Table 2.4-22: Housing Occupancy in the Expanded Economic Region

County	Housing Units: Total[1]	Occupied[1]	Owner-Occupied[1]	Renter-Occupied[1]	Total Vacant[2]	Available for Rent[2]	Rented Not Occupied[2]	For Sale Only[2]	Sold Not Occupied[2]	For Seasonal, Recreational, or Occasional Use[2]	For Migrant Workers[2]	Other Vacant Units[2]	Homeowner Vacancy Rate	Rental Vacancy Rate	Median Home Value[1,3]	Median Gross Rent[1,4]
BANNOCK																
2016-2020	34,550	31,669	21,681	9988	2881	785	142	277	64	635	0	978	1.3	7.2	$167,300	$703
2006-2010	32,697	29,860	21,267	8593	2837	696	72	494	124	514	0	937	2.3	7.4	$135,500	$576
Difference	1853	1809	414	1395	44	89	70	-217	-60	121	0	41	-1.0	-0.2	$31,800	$127
BINGHAM																
2016-2020	16,895	15,612	12,216	3396	1283	210	86	206	68	203	97	413	1.6	5.7	$168,200	$680
2006-2010	15,873	14,319	11,447	2872	1554	246	9	127	135	68	104	865	1.1	7.9	$125,300	$541
Difference	1022	1293	769	524	-271	-36	77	79	-67	135	-7	-452	0.5	-2.2	$42,900	$139
BONNEVILLE																
2016-2020	43,734	40,946	28,568	12378	2788	626	126	282	154	848	0	752	1.0	4.8	$202,100	$814
2006-2010	38,626	35,358	26,203	9155	3268	687	325	883	336	605	3	429	3.2	6.8	$153,400	$674
Difference	5108	5588	2365	3223	-480	-61	-199	-601	-182	243	-3	323	-2.2	-2.0	$48,700	$140
BUTTE																
2016-2020	1292	966	762	204	326	57	10	33	21	23	0	182	4.0	21.0	$146,600	$683
2006-2010	1415	1149	953	196	266	94	0	45	0	21	0	106	4.5	32.4	$108,500	$452
Difference	-123	-183	-191	8	60	-37	10	-12	21	2	0	76	-0.5	-11.4	$38,100	$231
JEFFERSON																
2016-2020	9586	8825	7162	1663	761	9	5	28	52	42	161	464	0.4	0.5	$223,900	$853
2006-2010	8337	7781	6369	1412	556	55	18	251	8	89	5	130	3.8	3.7	$154,000	$639
Difference	1249	1044	793	251	205	-46	-13	-223	44	-47	156	334	-3.4	-3.2	$69,900	$214
MADISON																
2016-2020	14,680	11,858	4944	6914	2822	1978	254	138	96	30	26	300	2.7	21.6	$229,800	$775
2006-2010	10,987	9868	5129	4739	1119	80	583	30	25	157	0	244	0.6	1.5	$169,700	$595
Difference	3693	1990	-185	2175	1703	1898	-329	108	71	-127	26	56	2.1	20.1	$60,100	$180
EXPANDED ECONOMIC REGION																
2016-2020	120,737	109,876	75,333	34,543	10,861	3665	623	964	455	1781	284	3089	1.8	10.1	$185,150	$4508
2006-2010	107,935	98,335	71,368	26,967	9600	1858	1007	1830	628	1454	112	2711	2.6	10.0	$144,450	$3477
Difference	12,802	11,541	3965	7576	1261	1807	-384	-866	-173	327	172	378	-0.7	0.2	$40,700	$1031

Sources-
[1] Reference 2.4-83 for 2016-2020 data; Reference 2.4-82 for 2006-2010 data
[2] Reference 2.4-85 for 2016-2020 data; Reference 2.4-84 for 2006-2010 data
[3] Median home values pertain to owner-occupied housing units.
[4] Median gross rent pertains to occupied housing units where rent is paid.

Table 2.4-23: Listing Price of Vacant Housing Units in the Expanded Economic Region

Characteristic[1]	County						
	Region[2]	**Bannock**	**Bingham**	**Bonneville**	**Butte**	**Jefferson**	**Madison**
Total Vacant Housing Units	1419	341	274	436	54	80	234
LISTING OR SOLD PRICE							
Less than $100,000	355	62	72	144	30	37	10
$100,000 - $199,999	502	153	172	60	24	24	69
$200,000 - $299,999	441	64	30	232	0	0	115
$300,000 - $399,999	121	62	0	0	0	19	40
Greater than $400,000	0	0	0	0	0	0	0

Source- Reference 2.4-86
1 - Characteristics pertain to vacant housing units that are either for sale or have been sold.
2 - Region refers to the expanded economic region on a county-level basis.

Table 2.4-24: Physical Parameters of Housing Units in the Expanded Economic Region

Characteristic	Expanded Economic Region	County					
		Bannock	Bingham	Bonneville	Butte	Jefferson	Madison
Total Housing Units	120,737	34,550	16,895	43,734	1292	9586	14,680
Occupied Housing Units	109,876	31,669	15,612	40,946	966	8825	11,858
YEAR STRUCTURE BUILT[1]							
Built 2014 or Later	7152	1045	557	2725	8	595	2222
Built 2010 to 2013	4437	1077	478	1341	24	290	1227
Built 2000 to 2009	20,515	3913	2031	8294	102	2359	3816
Built 1990 to 1999	16,048	4527	2088	6213	86	1040	2094
Built 1980 to 1989	11,328	3098	1755	4087	198	1087	1103
Built 1970 to 1979	22,826	7348	4016	7252	254	1731	2225
Built 1960 to 1969	10,565	3207	1586	4253	116	484	919
Built 1950 to 1959	11,158	3813	1512	4822	195	489	327
Built 1940 to 1949	5578	2574	706	1559	161	403	175
Built 1939 or Earlier	11,130	3948	2166	3188	148	1108	572
Median Year Built	1979	1975	1976	1982	1971	1985	2000
NUMBER OF ROOMS[1]							
1 Room	2486	946	81	949	14	55	441
2 Rooms	3100	830	254	1171	26	36	783
3 Rooms	7635	2497	709	2278	132	343	1676
4 Rooms	17,845	4956	2341	6214	145	833	3356
5 Rooms	19,397	5223	3487	5973	302	1875	2537
6 Rooms	13,929	4392	2239	4579	268	1259	1192
7 Rooms	13,145	4385	1845	4764	142	900	1109
8 Rooms	13,627	4100	1764	5571	132	1035	1025
9 Rooms or more	29,573	7221	4175	12,235	131	3250	2561
Median Number of Rooms	6.2	6.1	6.2	6.6	5.6	6.9	4.9

Table 2.4-24: Physical Parameters of Housing Units in the Expanded Economic Region (Continued)

Characteristic	Expanded Economic Region	County					
		Bannock	Bingham	Bonneville	Butte	Jefferson	Madison
NUMBER OF BEDROOMS[1]							
No Bedrooms	2642	1066	81	975	14	65	441
1 Bedroom	8137	2460	906	2879	136	258	1498
2 Bedrooms	26,356	7787	3221	9153	361	1402	4432
3 Bedrooms	38,499	11,548	5998	12,514	478	3528	4433
4 Bedrooms	24,199	7061	4158	8677	246	2086	1971
5 or More Bedrooms	20,904	4628	2531	9536	57	2247	1905
YEAR HOUSEHOLDER MOVED INTO UNIT[1]							
Moved in 2019 or Later	7474	2124	894	2335	68	382	1671
Moved in 2015 to 2018	35,098	10,452	3497	13488	172	1803	5686
Moved in 2010 to 2014	18,488	5054	2459	7646	176	1890	1263
Moved in 2000 to 2009	23,880	6562	3688	9249	233	2445	1703
Moved in 1990 to 1999	11,778	3422	2052	4374	116	1049	765
Moved in 1989 and Earlier	13,158	4055	3022	3854	201	1256	770
HOUSE HEATING FUEL[2]							
Units with Heating Fuel	109,496	31,605	15,546	40,827	954	8769	11,795
Units with No Heating Fuel	380	64	66	119	12	56	63
SELECTED CHARACTERISTICS[2]							
Lacking Complete Plumbing	505	105	41	192	0	118	49
Lacking Complete Kitchen	1370	389	27	596	11	138	209
No Telephone Service Available	2084	573	290	679	33	103	406

Source- Reference 2.4-83

1 - Characteristic pertains to all housing units.

2 - Characteristic pertains to occupied housing units.

Table 2.4-25: Structures in Housing Units in the Expanded Economic Region

County	Total Housing Units	Single Units (Detached)	Single Units (Attached)	2 Units	3 or 4 Units	5 to 9 Units	10 to 19 Units	20+ Units	Mobile Home
BANNOCK									
2016-2020[1]	34,550	22,891	1340	1742	2229	1243	800	1310	2869
2006-2010[2]	32,697	21,794	1577	1630	2263	820	543	1106	2964
Delta	1853	1097	-237	112	-34	423	257	204	-95
BINGHAM									
2016-2020	16,895	12,877	218	395	549	381	89	114	2272
2006-2010	15,873	11,873	187	288	688	312	66	173	2286
Delta	1022	1004	31	107	-139	69	23	-59	-14
BONNEVILLE									
2016-2020	43,734	31189	2326	611	3365	1507	855	1931	1923
2006-2010	38,626	27437	1968	1025	2862	1248	459	1117	2510
Delta	5108	3752	358	-414	503	259	396	814	-587
BUTTE									
2016-2020	1292	1030	10	7	35	4	36	10	158
2006-2010	1415	1030	15	19	91	24	36	0	200
Delta	-123	0	-5	-12	-56	-20	0	10	-42
JEFFERSON									
2016-2020	9586	7834	504	44	176	74	35	52	862
2006-2010	8337	6451	70	92	220	14	22	26	1438
Delta	1249	1383	434	-48	-44	60	13	26	-576
MADISON									
2016-2020	14,680	5298	703	476	1635	930	1662	3268	708
2006-2010	10,987	5325	317	486	1110	796	1117	1136	694
Delta	3693	-27	386	-10	525	134	545	2132	14

Table 2.4-25: Structures in Housing Units in the Expanded Economic Region (Continued)

County	Total Housing Units	Single Units (Detached)	Single Units (Attached)	2 Units	3 or 4 Units	5 to 9 Units	10 to 19 Units	20+ Units	Mobile Home
EXPANDED ECONOMIC REGION									
2016-2020	120,737	81,119	5101	3275	7989	4139	3477	6685	8792
2006-2010	107,935	73,910	4134	3540	7234	3214	2243	3558	10,092
Delta	12,802	7209	967	-265	755	925	1234	3127	-1300

Sources-

[1] Reference 2.4-83

[2] Reference 2.4-82

Table 2.4-26: Building Permits for Residential Housing Units in the Expanded Economic Region

Type of Housing Structure	Region	County[1,2]					
		Bannock	Bingham	Bonneville	Butte	Jefferson	Madison
Total Housing Units	2560	489	251	1100	1	377	342
Single-Family Housing Units	2237	364	205	1056	1	373	238
Multi-Family Housing Units	323	125	46	44	0	4	104

Source- Reference 2.4-87

[1] Values represent the number of residential building permits in 2021.

[2] Data about residential building permits were not available for every city of the economic region. Only the cities that had data about residential building permits are included in this table.

Table 2.4-27: Current and Historical Employment by Industry for the Expanded Economic Region

NAICS Industry Name	Expanded Economic Region			County																	
				Bannock			Bingham			Bonneville			Butte			Jefferson			Madison		
	2001	2010	2020	2001	2010	2020	2001	2010	2020	2001	2010	2020	2001	2010	2020	2001	2010	2020	2001	2010	2020
Total employment (number of jobs)	146,064	163,888	191,650	43,013	43,978	47,604	19,910	21,672	22,249	49,711	60,131	74,577	9612	9408	9680	8118	10,513	12,739	15,700	18,186	24,801
EMPLOYMENT TYPE																					
Wage and salary employment	115,933	123,166	146,252	34,773	34,013	37,412	14,766	15,407	15,800	39,258	45,133	57,169	9067	8867	9151	5251	6323	7811	12,818	13,423	18,909
Proprietors employment	30,131	40,722	45,398	8240	9965	10,192	5144	6265	6449	10,453	14,998	17,408	545	541	529	2867	4190	4928	2882	4763	5892
Farm proprietors employment	4641	4147	4061	975	798	727	1281	1205	1195	930	827	811	206	194	199	794	742	725	455	381	404
Nonfarm proprietors employment[1]	25,490	36,575	41,337	7265	9167	9465	3863	5060	5254	9523	14,171	16,597	339	347	330	2073	3448	4203	2427	4382	5488
BY INDUSTRY TYPE																					
Farm employment	7442	6342	6651	1110	920	904	2455	2119	2283	1485	1192	1258	295	263	279	1286	1185	1178	811	663	749
Nonfarm employment	138,622	157,546	184,999	41,903	43,058	46,700	17,455	19,553	19,966	48,226	58,939	73,319	9317	9145	9401	6832	9328	11,561	14,889	17,523	24,052
PRIVATE NONFARM EMPLOYMENT																					
Total private nonfarm employment	116,450	134,797	160,895	32,673	34,639	38,001	13,394	15,426	15,789	42,586	52,665	66,266	9069	8834	9170	5584	7850	10,049	13,144	15,383	21,620
Forestry, fishing, and related activities	466	631	1493	(D)	(D)	(D)	(D)	(D)	661	466	(D)	(D)	(D)	(D)	(D)	(D)	631	579	(D)	(D)	253
Mining, quarrying, and oil and gas extraction	23	50	86	(D)	(D)	(D)	(D)	(D)	34	(D)	(D)	(D)	10	19	(D)	13	31	27	(D)	(D)	25
Utilities	30	276	353	(D)	130	125	(D)	64	77	(D)	56	115	(D)	1	1	30	25	35	(D)	(D)	(D)
Construction	9522	10,094	12,522	2619	2663	2851	1340	1441	1746	3975	4119	5215	(D)	38	(D)	862	950	1506	726	883	1204
Manufacturing	9677	9070	11,380	2910	2344	2550	2398	2431	2166	2500	2437	4182	(D)	28	(D)	726	1020	1331	1143	810	1151
Wholesale trade	7804	7809	6742	1261	1125	1292	1623	1393	985	3564	3590	3196	27	(D)	25	355	356	500	974	1345	744
Retail trade	17,735	18,794	21,109	5712	5315	5431	1980	1956	1850	7309	8368	9745	153	143	128	861	939	1211	1720	2073	2744
Transportation and warehousing	235	4148	5152	(D)	1386	1460	(D)	578	692	(D)	1770	2486	(D)	(D)	44	235	414	470	(D)	(D)	(D)
Information	2036	2180	1262	754	534	303	157	93	(D)	1025	1375	672	(D)	(D)	24	(D)	53	72	100	125	191
Finance and insurance	4788	6714	6909	1789	2175	1964	503	709	787	1918	2816	3133	(D)	54	(D)	210	348	366	368	612	659
Real estate and rental and leasing	3874	7242	8675	1156	1663	1899	355	723	816	1684	3197	3903	(D)	42	(D)	220	601	751	459	1016	1306
Professional, scientific, and technical services	13,141	14,718	9096	1933	1768	1915	451	(D)	628	2527	3644	4221	7996	8053	(D)	234	(D)	464	(D)	1253	1868
Management of companies and enterprises	368	337	1611	221	226	1136	56	(D)	34	80	111	409	11	(D)	(D)	(D)	(D)	(D)	(D)	(D)	32
Administrative and support and waste management and remediation services	7258	6482	10,137	2829	2463	2746	376	590	646	2567	3148	4891	21	(D)	(D)	(D)	281	(D)	1465	(D)	1854
Educational services	752	1321	2478	286	522	723	68	192	288	392	607	1310	6	(D)	(D)	(D)	(D)	157	(D)	(D)	(D)

Table 2.4-27: Current and Historical Employment by Industry for the Expanded Economic Region (Continued)

NAICS Industry Name	Expanded Economic Region			County																				
				Bannock			Bingham			Bonneville			Butte			Jefferson			Madison		
	2001	2010	2020	2001	2010	2020	2001	2010	2020	2001	2010	2020	2001	2010	2020	2001	2010	2020	2001	2010	2020
Health care and social assistance	10,562	16,197	21,657	3764	5825	6773	968	1856	2028	5830	8516	11,981	(D)	(D)	(D)	(D)	(D)	875	(D)	(D)	(D)
Arts, entertainment, and recreation	1929	2629	2786	650	845	934	199	201	228	696	955	1032	(D)	8	2	188	290	241	196	330	349
Accommodation and food services	8617	9776	12,166	3267	3316	3575	748	781	877	3647	4278	5801	(D)	81	62	204	315	344	751	1005	1507
Other services (except government and government enterprises)	6742	7788	7387	2079	2187	2147	1001	1110	(D)	2789	3166	3568	(D)	(D)	69	398	623	717	475	702	886
GOVERNMENT AND GOVERNMENT ENTERPRISES																					
Total government and government enterprises employment	22,172	22,749	24,104	9230	8419	8699	4061	4127	4177	5640	6274	7053	248	311	231	1248	1478	1512	1745	2140	2432
Federal civilian	1729	1904	1733	508	577	595	320	254	210	764	826	740	39	117	64	45	64	54	53	66	70
Military	1019	1163	1021	308	315	266	170	176	143	337	402	390	18	27	8	78	101	92	108	142	122
State government	5799	5607	5918	4468	4335	4581	406	363	460	726	711	643	12	12	8	143	140	178	44	46	48
Local government	13,625	14,075	15,432	3946	3192	3257	3165	3334	3364	3813	4335	5280	179	155	151	982	1173	1188	1540	1886	2192

Source- Reference 2.4-88
(D) - Indicates data were not reported by the Bureau of Economic Analysis to avoid disclosure of confidential information.
[1]Nonfarm proprietors employment does not include limited partners.
NAICS - North American Industry Classification System

Table 2.4-28: Labor Force Statistics of the Expanded Economic Region

Year	Population in Labor Force	Population Employed	Population Unemployed	Unemployment Rate
BANNOCK COUNTY				
2021	42,735	41,215	1520	3.6
2019	42,950	41,720	1230	2.9
2017	41,785	40,502	1283	3.1
2015	41,928	40,372	1556	3.7
2013	41,765	39,047	2718	6.5
2011	41,010	37,992	3018	7.4
Delta (2011 and 2021)	1725	3223	-1498	NA
BINGHAM COUNTY				
2021	24,278	23,503	775	3.2
2019	23,979	23,330	649	2.7
2017	23,189	22,496	693	3.0
2015	22,072	21,234	838	3.8
2013	22,488	21,020	1468	6.5
2011	22,816	21,226	1590	7.0
Delta (2011 and 2021)	1462	2277	-815	NA
BONNEVILLE COUNTY				
2021	60,471	58,722	1749	2.9
2019	57,575	56,173	1402	2.4
2017	53,921	52,459	1462	2.7
2015	51,063	49,414	1649	3.2
2013	49,346	46,351	2995	6.1
2011	49,274	45,938	3336	6.8
Delta (2011 and 2021)	11,197	12,784	-1587	NA
BUTTE COUNTY				
2021	1447	1392	55	3.8
2019	1386	1349	37	2.7
2017	1341	1301	40	3.0
2015	1278	1224	54	4.2
2013	1309	1209	100	7.6
2011	1322	1217	105	7.9
Delta (2011 and 2021)	125	175	-50	NA
JEFFERSON COUNTY				
2021	14,673	14,274	399	2.7
2019	14,107	13,774	333	2.4
2017	13,169	12,833	336	2.6
2015	12,484	12,089	395	3.2
2013	12,233	11,536	697	5.7
2011	12,494	11,648	846	6.8
Delta (2011 and 2021)	2179	2626	-447	NA

Table 2.4-28: Labor Force Statistics of the Expanded Economic Region (Continued)

Year	Population in Labor Force	Population Employed	Population Unemployed	Unemployment Rate
MADISON COUNTY				
2021	23,322	22,810	512	2.2
2019	22,187	21,774	413	1.9
2017	21,323	20,918	405	1.9
2015	19,808	19,315	493	2.5
2013	18,563	17,717	846	4.6
2011	17,887	16,965	922	5.2
Delta (2011 and 2021)	5435	5845	-410	NA
EXPANDED ECONOMIC REGION				
2021	166,926	161,916	5010	3.1
2019	162,184	158,120	4064	2.5
2017	154,728	150,509	4219	2.7
2015	148,633	143,648	4985	3.4
2013	145,704	136,880	8824	6.2
2011	144,803	134,986	9817	6.9
Delta (2011 and 2021)	22,123	26,930	-4807	NA

Source- Reference 2.4-89
NA = Not applicable

Table 2.4-29: Construction and Heavy Construction Industries in the Expanded Economic Region

County	Construction (NAICS 23)	Heavy and Civil Engineering Construction (NAICS 237)	Utility System Construction (NAICS 2371)	Land Subdivision (NAICS 2372)	Highway, Street, & Bridge Construction (NAICS 2373)	Other Heavy Construction (NAICS 2379)
BANNOCK						
2021	2024	233	79	(D)	132	(D)
2010	1662	(D)	(D)	0	(D)	(D)
Delta	362	NA	NA	NA	NA	NA
BINGHAM						
2021	1102	88	31	(D)	57	(D)
2010	754	78	38	0	(D)	(D)
Delta	348	10	-7	NA	NA	NA
BONNEVILLE						
2021	3744	519	178	(D)	273	(D)
2010	2678	863	84	(D)	0	(D)
Delta	1066	-344	94	NA	273	NA
BUTTE						
2021	37	(D)	(D)	(D)	(D)	(D)
2010	14	(D)	(D)	0	0	0
Delta	23	NA	NA	NA	NA	NA
JEFFERSON						
2021	982	10	(D)	(D)	(D)	(D)
2010	459	14	(D)	0	(D)	0
Delta	523	-4	NA	NA	NA	NA
MADISON						
2021	659	105	79	(D)	(D)	(D)
2010	371	103	79	(D)	(D)	(D)
Delta	288	2	0	NA	NA	NA

Table 2.4-29: Construction and Heavy Construction Industries in the Expanded Economic Region (Continued)

County	Construction (NAICS 23)	Heavy and Civil Engineering Construction (NAICS 237)	Utility System Construction (NAICS 2371)	Land Subdivision (NAICS 2372)	Highway, Street, & Bridge Construction (NAICS 2373)	Other Heavy Construction (NAICS 2379)
EXPANDED ECONOMIC REGION						
2021	8548	955	367	0	462	0
2010	5938	1058	201	0	0	0
Delta	2610	-103	166	0	462	0

Source- Reference 2.4-90
(D) - Data not reported by Bureau of Labor Statistics to avoid disclosing confidential information.
NA - not applicable
NAICS - North American Industry Classification System

Table 2.4-30: Idaho State Taxes, Rates, and 2021 Revenue

Tax	Tax Rate	FY2021 Revenue
Beer tax	15 cents/gallon 45 cents/gallon strong beer >5% alcohol	$4,775,217
Boise Auditorium District tax	5%	$6,077,209
Cigarette tax	57 cents (package of 20)	$33,879,928
Corporate income tax	6.5% (minimum $20)	$384,855,368
E911 fee	2.5% pf wholesale price	$1,605,307
Electricity (kilowatt hour tax)	0.5 mill per kilowatt hour	$1,960,866
Idaho Falls Auditorium District tax	5%	$1,910,120
Illegal drug tax	Not provided in source	0
Individual income tax	1% to 6.5%	$2,746,282,904
Mine license tax	1%	$36,322
Miscellaneous revenues	Not provided in source	$316,700
Motor fuels taxes	Aggregate of 101 cents for liquid fuels Aggregate of 66.9 cents per gallon of gasoline or diesel equivalent	$395,072,005
Oil and gas production tax	2.50%	$136,935
Pocatello-Chubbuck Auditorium District tax	5%	$1,038,797
Railroad car company's property tax	Not provided in source	$5,064
Sales/Use tax	6%	$2,508,871,275
Suspense (source not identified)	Not provided in source	$5,369,629
Tobacco tax	40% of wholesale price (doesn't include cigarettes or vaping products)	$14,850,749
Travel & convention tax	2%	$14,868,097
Wine direct shipper fee	Not provided in source	$21,538
Wine tax	46 cents/gallon	$6,525,613
Total Gross Receipts		$6,128,459,644

Source- Reference 2.4-94

Table 2.4-31: Idaho State and Local Taxes Collected

Tax	Percentage	Net Collection After Refunds
Sales	32	$2,501,835,452
Individual income	31	$2,457,359,748
Property	27	$2,112,732,781
Motor fuels	5	$378,340,816
Corporate income	4	$351,479,279
Other	1	$93,217,754

Source- Reference 2.4-94

Table 2.4-32: Distribution of Sales and Use Tax Revenue for County Taxing Districts in the Extended Economic Region - 2021

County	Total[1]
Bannock	$3,064,018
Bingham	$2,252,529
Bonneville	$2,855,369
Butte	$238,330
Jefferson	$1,160,570
Madison	$1,444,142
EXPANDED ECONOMIC REGION	$11,014,958

Source- Reference 2.4-94

[1] Total represents sales and use tax revenue distributed to counties for local taxing districts on a county (not CBG) basis.

Table 2.4-33: Categories of Taxing Districts and Property Taxes Levied by Taxing Districts

Category[1, 6]	Property Tax Levied[2]	County						
		Region[3]	Bannock	Bingham	Bonneville	Butte	Jefferson	Madison
Ambulance	$33,122,488	5	1	1	1	0	1	1
Auditorium[4]	$17,786	0	0	0	0	0	0	0
Cemetery	$7,903,138	33	0	10	9	1	7	6
City	$571,220,393	30	7	5	6	3	7	2
City Bond[5]	---	1	1	0	0	0	0	0
Community College	$37,632,310	1	0	0	1	0	0	0
Community Infrastructure[5]	$1,461,475	0	0	0	0	0	0	0
County	$560,115,518	6	1	1	1	1	1	1
Fire	$113,002,016	19	7	3	3	1	4	1
Flood	$889,067	3	0	2	0	0	1	0
Highway	$129,525,419	6	1	1	1	1	1	1
Hospital[4]	$10,006,705	0	0	0	0	0	0	0
Levee	---	1	0	0	0	0	1	0
Library	$32,859,949	10	2	4	0	1	1	2
Mosquito Abatement	$9,034,683	6	1	1	0	0	3	1
Pest Control[5]	$1,155,459	0	0	0	0	0	0	0
Port[4]	$405,000	0	0	0	0	0	0	0
Recreation[4]	$6,996,276	0	0	0	0	0	0	0
School	$593,294,026	15	1	5	3	0	3	3
Sewer	$546,532	2	0	0	1	0	0	1
Sewer and Water	$3,224,293	6	0	5	1	0	0	0
Urban Renewal	---	20	6	3	5	0	1	5
Water[5]	$190,248	0	0	0	0	0	0	0
Watershed	$130,000	3	0	0	0	1	1	1

Table 2.4-33: Categories of Taxing Districts and Property Taxes Levied by Taxing Districts (Continued)

Category[1, 6]	Property Tax Levied[2]	County						
		Region[3]	Bannock	Bingham	Bonneville	Butte	Jefferson	Madison
Total	$2,112,732,781	167	28	41	32	9	32	25

Sources:

[1] Reference 2.4-101

[2] Reference 2.4-94

[3] Data are reported at county level to align with the property tax levied data, which reflects property taxes levied at the state level;

[4] Property tax leveled for county other than Bannock, Bingham, Bonneville, Butte, Jefferson, or Madison, counties in the expanded economic region

[5] Counties in the expanded economic region have identified taxing districts; however, no property tax was levied against the district in 2021.

[6] The following taxing districts were not included in the counties of the expanded economic region and were removed from the table: City Bond, Community Infrastructure, Drainage, Fire Bond, Library Bond, Pest Control, Port, Recreation, School Bond, Solid Waste, Weather Modification, and Weed Control.

--- Data not available

Table 2.4-34: Urban, Rural, and Average Property Tax Rates

County	Urban Tax Rate	Rural Tax Rate	Average Property Tax Rate[1]
Bannock	1.631%	0.841%	1.236%
Bingham	1.922%	1.104%	1.513%
Bonneville	1.402%	0.790%	1.096%
Butte	1.675%	1.033%	1.354%
Jefferson	1.483%	0.883%	1.183%
Madison	1.412%	1.155%	1.284%
Expanded Economic Region[2]	1.588%	0.968%	1.278%

Source- Reference 2.4-94
Data are reported at the county level.

[1] Combined urban and rural property tax rates.

[2] Property tax rate is the average of the property tax rates for the counties in the economic region.

Table 2.4-35: Tax Rates of Public School Districts in the Expanded Economic Region

Public School District Name[1]	City	Tax Rate[1]	Taxes Levied
BANNOCK COUNTY			
Pocatello District	Pocatello	0.293%	$15,670,671
BINGHAM COUNTY			
Aberdeen District	Aberdeen	0.551%	$1,474,338
Blackfoot District	Blackfoot	0.358%	$3,750,000
Snake River District	Blackfoot	0.414%	$2,300,000
Firth District	Firth	0.156%	$422,904
Shelley Joint District	Shelley	0.300%	$2,372,127
BONNEVILLE COUNTY			
Bonneville Joint District	Idaho Falls	0.413%	$18,600,000
Idaho Falls District	Idaho Falls	0.309%	$16,258,717
Swan Valley Elementary District	Irwin	0.113%	$333,077
BUTTE COUNTY			
Butte County Joint District	Arco	0.139%	$283,351
JEFFERSON COUNTY			
Jefferson County Joint District	Rigby	0.424%	$7,929,986
Ririe Joint District	Ririe	0.170%	$426,303
West Jefferson District	Terreton	0.325%	$863,704
MADISON COUNTY			
Madison District	Rexburg	0.425%	$9,760,469
EXPANDED ECONOMIC REGION			$80,445,647

Source- Reference 2.4-102

[1] Tax rates for 2022.

Table 2.4-36: Taxes Levied by the Shoshone-Bannock Tribes

Type	Description	Rate	Supports
Possessory Interest Tax	Tax on real and personal property. Applies to beneficial interests and rights or interests in land located within the Fort Hall Reservation.	---	Fire, police, solid waste, and fish and game.
Tobacco Tax	Tax on cigarettes and other tobacco products.	$0.015 per cigarette stick; 10% on other tobacco products	Health programs and police
Fuels Excise Tax	Tax on motor fuels.	$0.32 per gallon	Transportation and underground storage tank monitoring program
Occupancy Tax	Tax applied to lodging and sales/use.	8% lodging and 4% sales and use	---

Source- Reference 2.4-93
--- Information not available

Table 2.4-37: Public Schools in the Expanded Economic Region

School Name	School District	City	Total Number of Schools[1]	Charter	Magnet	Title I School	Regular Public Schools	Grade Span	Students	Teachers	Student-Teacher Ratio
BANNOCK COUNTY	**---**	**---**	**28**	**4**	**0**	**21**	**7**	**---**	**13293**	**678.32**	**19.6**
Alameda Middle School	Pocatello District	Pocatello	---	No	No	Yes	No	6 - 8	622	33.46	18.6
Century High School	Pocatello District	Pocatello	---	No	No	No	Yes	9 - 12	1183	55.81	21.2
Chief Tahgee Elementary Academy	Chief Tahgee Elementary Academy Inc.	Fort Hall	---	Yes	No	Yes	No	KG - 7	109	7.55	14.4
Chubbuck Elementary School	Pocatello District	Chubbuck	---	No	No	Yes	No	PK - 5	476	22.89	20.8
Claude A Wilcox Elementary School	Pocatello District	Pocatello	---	No	No	Yes	No	KG - 5	501	25.88	19.4
Connor Academy	The Academy Inc.	Chubbuck	---	Yes	No	Yes	No	PK - 8	540	24	22.5
Edahow Elementary School	Pocatello District	Pocatello	---	No	No	No	Yes	KG - 5	287	14.76	19.4
Franklin Middle School	Pocatello District	Pocatello	---	No	No	No	Yes	6 - 8	714	36.52	19.6
Gate City Elementary School	Pocatello District	Pocatello	---	No	No	No	Yes	KG - 5	437	20.17	21.7
Gem Prep- Pocatello School	Gem Prep- Pocatello LLC	Chubbuck	---	Yes	No	Yes	No	KG - 11	414	18.89	21.9
Greenacres Elementary School	Pocatello District	Pocatello	---	No	No	Yes	No	KG - 5	284	15.83	17.9
Hawthorne Middle School	Pocatello District	Pocatello	---	No	No	Yes	No	6 - 8	706	36.33	19.4
Highland High School	Pocatello District	Pocatello	---	No	No	No	Yes	9 - 12	1534	70.98	21.6
Indian Hills Elementary School	Pocatello District	Pocatello	---	No	No	Yes	No	KG - 5	497	26.38	18.8
Irving Middle School	Pocatello District	Pocatello	---	No	No	Yes	No	6 - 8	684	34.43	19.9
Jefferson Elementary School	Pocatello District	Pocatello	---	No	No	Yes	No	PK - 5	334	19.78	16.9
Kinport Middle School	Pocatello District	Pocatello	---	No	No	Yes	No	6 - 8	9	4.73	1.9
Lewis & Clark Elementary School	Pocatello District	Pocatello	---	No	No	Yes	No	KG - 5	450	25.38	17.7
Lincoln Preschool Center	Pocatello District	Pocatello	---	No	No	No	Yes	PK - 6	139	5	27.8
New Horizon High School	Pocatello District	Pocatello	---	No	No	Yes	No	9 - 12	121	14.31	8.5
Pocatello Community Charter	The Pocatello Community Charter School Inc.	Pocatello	---	Yes	No	Yes	No	PK - 8	345	15	23
Pocatello High School	Pocatello District	Pocatello	---	No	No	Yes	No	9 - 12	1168	54.95	21.3
Pocatello Juvenile Detention	Pocatello District	Pocatello	---	No	No	No	Yes	1 - 12	8	1	8
Rulon M Ellis Elementary School	Pocatello District	Chubbuck	---	No	No	Yes	No	PK - 5	384	20.33	18.9
Syringa Elementary School	Pocatello District	Pocatello	---	No	No	Yes	No	PK - 5	401	20.38	19.7
Tendoy Elementary School	Pocatello District	Pocatello	---	No	No	Yes	No	KG - 5	218	15.15	14.4
Tyhee Elementary School	Pocatello District	Pocatello	---	No	No	Yes	No	PK - 5	502	24.75	20.3
Washington Elementary School	Pocatello District	Pocatello	---	No	No	Yes	No	KG - 5	226	13.68	16.5
BINGHAM COUNTY	**---**	**---**	**32**	**3**	**0**	**28**	**4**	**---**	**10574**	**565.9**	**18.7**
A W Johnson Elementary School	Firth District	Firth	---	No	No	Yes	No	PK - 4	281	15	18.7
Aberdeen Elementary School	Aberdeen District	Aberdeen	---	No	No	Yes	No	PK - 5	302	20	15.1

Table 2.4-37: Public Schools in the Expanded Economic Region (Continued)

School Name	School District	City	Total Number of Schools[1]	Charter	Magnet	Title I School	Regular Public Schools	Grade Span	Students	Teachers	Student-Teacher Ratio
Aberdeen High School	Aberdeen District	Aberdeen	---	No	No	Yes	No	9 - 12	222	15.34	14.5
Aberdeen Middle School	Aberdeen District	Aberdeen	---	No	No	Yes	No	6 - 8	164	10.27	16
Bingham Academy	Idaho Stem Academy Inc.	Blackfoot	---	Yes	No	Yes	No	9 - 12	114	9.2	12.4
Blackfoot Charter Community	Blackfoot Charter Community Learning Center Inc.	Blackfoot	---	Yes	No	Yes	No	PK - 8	437	27	16.2
Blackfoot Heritage Sixth Grade	Blackfoot District	Blackfoot	---	No	No	Yes	No	6 - 6	260	12.28	21.2
Blackfoot High School	Blackfoot District	Blackfoot	---	No	No	Yes	No	9 - 12	1220	62.6	19.5
Donald D Stalker Elementary	Blackfoot District	Blackfoot	---	No	No	Yes	No	PK - 5	201	13	15.5
Donald J Hobbs Middle School	Shelley Joint District	Shelley	---	No	No	Yes	No	7 - 8	377	21.95	17.2
Firth High School	Firth District	Firth	---	No	No	Yes	No	7 - 12	245	14	17.5
Firth Middle School	Firth District	Firth	---	No	No	Yes	No	5 - 8	290	15.89	18.3
Fort Hall Elementary School	Blackfoot District	Pocatello	---	No	No	Yes	No	PK - 5	126	9	14
Groveland Elementary School	Blackfoot District	Blackfoot	---	No	No	Yes	No	PK - 5	223	15.5	14.4
Hazel Stuart Elementary School	Shelley Joint District	Shelley	---	No	No	Yes	No	5 - 6	361	17.39	20.8
I T Stoddard Elementary School	Blackfoot District	Blackfoot	---	No	No	Yes	No	PK - 5	365	18	20.3
Idaho Science And Technology Charter School	Idaho Science And Technology Charter School Inc.	Blackfoot	---	Yes	No	Yes	No	KG - 9	311	23.63	13.2
Independence Alternative High School	Blackfoot District	Blackfoot	---	No	No	Yes	No	7 - 12	157	9	17.4
Moreland Elementary School	Snake River District	Moreland	---	No	No	Yes	No	PK - 1	265	13	20.4
Mountain View Middle School	Blackfoot District	Blackfoot	---	No	No	Yes	No	6 - 8	539	30.25	17.8
Ridge Crest Elementary School	Blackfoot District	Blackfoot	---	No	No	Yes	No	PK - 5	356	18	19.8
Riverside Elementary School	Snake River District	Blackfoot	---	No	No	Yes	No	2 - 3	243	12	20.3
Riverview Elementary School	Shelley Joint District	Shelley	---	No	No	Yes	No	3 - 4	373	16	23.3
Rockford Elementary School	Snake River District	Blackfoot	---	No	No	Yes	No	4 - 4	122	7	17.4
Shelley Senior High School	Shelley Joint District	Shelley	---	No	No	Yes	No	9 - 12	667	36.9	18.1
Snake River High School	Snake River District	Blackfoot	---	No	No	No	Yes	9 - 12	582	30.98	18.8
Snake River Jr High School	Snake River District	Blackfoot	---	No	No	No	Yes	7 - 8	286	17.1	16.7
Snake River Middle School	Snake River District	Blackfoot	---	No	No	Yes	No	5 - 6	277	12.13	22.8
Snake River Online	Snake River District	Blackfoot	---	No	No	No	Yes	KG - 12	496	8	62
Sunrise Elementary School	Shelley Joint District	Shelley	---	No	No	Yes	No	KG - 2	470	20	23.5
Vaughn Hugie Family Ed Center	Blackfoot District	Blackfoot	---	No	No	No	Yes	PK - PK	39	2	19.5
Wapello Elementary School	Blackfoot District	Blackfoot	---	No	No	Yes	No	KG - 5	203	13.49	15

Table 2.4-37: Public Schools in the Expanded Economic Region (Continued)

School Name	School District	City	Total Number of Schools[1]	Charter	Magnet	Title I School	Regular Public Schools	Grade Span	Students	Teachers	Student-Teacher Ratio
BONNEVILLE COUNTY	**---**	**---**	**54**	**6**	**3**	**31**	**20**	**---**	**25328**	**1287.76**	**19.7**
3B Juvenile Detention Center	Idaho Falls District	Idaho Falls	---	No	No	No	Yes	4 - 12	5	1	5
A H Bush Elementary School	Idaho Falls District	Idaho Falls	---	No	Yes	Yes	No	PK - 6	312	20	15.6
Alturas International Academy	Alturas International Academy Inc.	Idaho Falls	---	Yes	No	Yes	No	KG - 8	579	29.6	19.6
Alturas Preparatory Academy	Alturas Preparatory Academy Inc	Idaho Falls	---	Yes	---	---	---	6 - 10	---	---	---
American Heritage Charter School	American Heritage Charter School Inc.	Idaho Falls	---	Yes	No	Yes	No	KG - 12	446	22	20.3
Ammon Elementary School	Bonneville Joint District	Ammon	---	No	No	No	Yes	PK - 6	311	14	22.2
Black Canyon Middle School	Bonneville Joint District	Idaho Falls	---	No	---	---	---	7 - 8	---	---	---
Bonneville High School	Bonneville Joint District	Idaho Falls	---	No	No	No	Yes	9 - 12	1036	47.37	21.9
Bonneville Online Elementary	Bonneville Joint District	Idaho Falls	---	No	No	No	Yes	PK - 8	545	13.02	41.9
Bonneville Online School	Bonneville Joint District	Idaho Falls	---	No	No	No	Yes	6 - 12	338	16.07	21
Bridgewater Elementary School	Bonneville Joint District	Idaho Falls	---	No	No	Yes	No	PK - 6	419	21.25	19.7
Career & Technical Education Center	Idaho Falls District	Idaho Falls	---	No	No	No	Yes	10 - 12	0	5.06	---
Cloverdale Elementary School	Bonneville Joint District	Idaho Falls	---	No	No	Yes	No	PK - 6	530	26.5	20
Compass Academy	Idaho Falls District	Idaho Falls	---	No	Yes	No	Yes	9 - 12	474	23.3	20.3
D91 Online Academy - Elementary	Idaho Falls District	Idaho Falls	---	No	No	No	Yes	KG - 6	410	15.68	26.1
D91 Online Academy - Secondary	Idaho Falls District	Idaho Falls	---	No	No	No	Yes	7 - 12	131	---	---
Discovery Elementary School	Bonneville Joint District	Idaho Falls	---	No	No	Yes	No	PK - 6	569	30	19
Dora Erickson Elementary School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	PK - 6	367	21	17.5
Eagle Rock Middle School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	7 - 8	749	45.47	16.5
Edgemont Gardens Elementary School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	PK - 6	407	18.5	22
Emerson High School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	9 - 12	157	10	15.7
Ethel Boyes Elementary School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	PK - 6	492	23.5	20.9
Fairview Elementary School	Bonneville Joint District	Idaho Falls	---	No	No	Yes	No	PK - 6	289	14.5	19.9
Falls Valley Elementary School	Bonneville Joint District	Idaho Falls	---	No	No	Yes	No	PK - 6	376	21	17.9
Fox Hollow Elementary School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	PK - 6	349	18.5	18.9
Hawthorne Elementary School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	PK - 6	331	16	20.7
Hillcrest High School	Bonneville Joint District	Ammon	---	No	No	No	Yes	9 - 12	1122	51.86	21.6
Hillview Elementary School	Bonneville Joint District	Ammon	---	No	No	Yes	No	PK - 6	437	23	19
Idaho Falls Senior High School	Idaho Falls District	Idaho Falls	---	No	No	No	Yes	9 - 12	1171	63.73	18.4

Table 2.4-37: Public Schools in the Expanded Economic Region (Continued)

School Name	School District	City	Total Number of Schools[1]	Charter	Magnet	Title I School	Regular Public Schools	Grade Span	Students	Teachers	Student-Teacher Ratio
Iona Elementary School	Bonneville Joint District	Iona	---	No	No	No	Yes	PK - 6	567	24	23.6
Lincoln High School	Bonneville Joint District	Idaho Falls	---	No	No	Yes	No	6 - 12	119	9	13.2
Linden Park Elementary School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	PK - 6	338	17	19.9
Longfellow Elementary School	Idaho Falls District	Idaho Falls	---	No	No	No	Yes	PK - 6	499	22	22.7
Monticello Montessori Charter School	Monticello Montessori Charter School Inc.	Ammon	---	Yes	No	Yes	No	PK - 8	210	12	17.5
Mountain Valley Elementary School	Bonneville Joint District	Ammon	---	No	Yes	Yes	No	PK - 6	439	23	19.1
Rimrock Elementary	Bonneville Joint District	Ammon	---	No	No	No	Yes	PK - 6	488	20.5	23.8
Rocky Mountain Middle School	Bonneville Joint District	Idaho Falls	---	No	No	Yes	No	7 - 8	1114	52.75	21.1
Sandcreek Middle School	Bonneville Joint District	Idaho Falls	---	No	No	No	Yes	7 - 8	891	42.92	20.8
Skyline Senior High School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	9 - 12	1163	60.47	19.2
Special Services Center	Bonneville Joint District	Idaho Falls	---	No	No	Yes	No	PK - 12	19	9.74	2
Summit Hills Elementary School	Bonneville Joint District	Idaho Falls	---	No	No	Yes	No	KG - 6	560	29	19.3
Sunnyside Elementary School	Idaho Falls District	Idaho Falls	---	No	No	No	Yes	PK - 6	625	27.98	22.3
Swan Valley Elementary School	Swan Valley Elementary District	Irwin	---	No	No	No	Yes	PK - 8	72	4.7	15.3
Taylors Crossing Charter School	Taylor's Crossing Public Charter School Inc.	Idaho Falls	---	Yes	No	Yes	No	PK - 12	348	17.61	19.8
Taylorview Middle School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	7 - 8	787	44.63	17.6
Technical Careers High School	Bonneville Joint District	Idaho Falls	---	No	No	No	Yes	9 - 12	94	11	8.5
Temple View Elementary School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	PK - 6	355	17	20.9
Theresa Bunker Elementary School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	PK - 6	255	13.51	18.9
Thunder Ridge High School	Bonneville Joint District	Idaho Falls	---	No	No	No	Yes	9 - 12	1556	71.4	21.8
Tiebreaker Elementary School	Bonneville Joint District	Idaho Falls	---	No	No	Yes	No	PK - 6	450	23.5	19.1
Ucon Elementary School	Bonneville Joint District	Idaho Falls	---	No	No	Yes	No	PK - 6	416	20.5	20.3
Westside Elementary School	Idaho Falls District	Idaho Falls	---	No	No	Yes	No	PK - 6	436	20	21.8
White Pine Charter School	White Pine Charter School Inc.	Ammon	---	Yes	No	Yes	No	KG - 11	630	30.54	20.6
Woodland Hills Elementary	Bonneville Joint District	Ammon	---	No	No	No	Yes	PK - 6	545	21.5	25.3
BUTTE COUNTY	**---**	**---**	**3**	**0**	**0**	**3**	**0**	**---**	**367**	**25.5**	**14.4**
Arco Elementary School	Butte County Joint District	Arco	---	No	No	Yes	No	PK - 6	190	12	15.8
Butte County Middle/High School	Butte County Joint District	Arco	---	No	No	Yes	No	7 - 12	174	13	13.4
Howe Elementary School	Butte County Joint District	Howe	---	No	No	Yes	No	KG - 3	3	0.5	6

Table 2.4-37: Public Schools in the Expanded Economic Region (Continued)

School Name	School District	City	Total Number of Schools[1]	Charter	Magnet	Title I School	Regular Public Schools	Grade Span	Students	Teachers	Student-Teacher Ratio
JEFFERSON COUNTY	**---**	**---**	**18**	**0**	**0**	**12**	**6**	**---**	**7611**	**373.39**	**20.4**
Cottonwood Elementary	Jefferson County Joint District	Rigby	---	No	No	No	Yes	KG - 5	619	27.7	22.3
Farnsworth Middle School	Jefferson County Joint District	Rigby	---	No	No	Yes	No	6 - 8	568	32.22	17.6
Hamer Elementary School	West Jefferson District	Hamer	---	No	No	Yes	No	KG - 4	38	2	19
Harwood Elementary School	Jefferson County Joint District	Rigby	---	No	No	Yes	No	PK - 5	351	18.42	19.1
Jefferson Elementary School	Jefferson County Joint District	Rigby	---	No	No	No	Yes	KG - 5	489	26.51	18.4
Jefferson High School	Jefferson County Joint District	Menan	---	No	No	Yes	No	6 - 12	68	5.17	13.2
Jefferson School District 251 Early Childhood Center	Jefferson County Joint District	Rigby	---	No	No	No	Yes	PK - PK	91	3	30.3
Midway Elementary School	Jefferson County Joint District	Menan	---	No	No	Yes	No	PK - 5	365	18.53	19.7
Rigby High School	Jefferson County Joint District	Rigby	---	No	No	No	Yes	9 - 12	1785	78.59	22.7
Rigby Middle School	Jefferson County Joint District	Rigby	---	No	No	Yes	No	6 - 8	887	51.95	17.1
Rigby Virtual Academy	Jefferson County Joint District	Rigby	---	No	No	No	Yes	KG - 8	251	6	41.8
Ririe Elementary School	Ririe Joint District	Ririe	---	No	No	Yes	No	PK - 6	347	17.16	20.2
Ririe Jr/Sr High School	Ririe Joint District	Ririe	---	No	No	No	Yes	7 - 12	366	22.34	16.4
Roberts Elementary School	Jefferson County Joint District	Roberts	---	No	No	Yes	No	PK - 5	148	7.67	19.3
South Fork Elementary School	Jefferson County Joint District	Rigby	---	No	No	Yes	No	PK - 5	665	28.08	23.7
Terreton Elementary School	West Jefferson District	Terreton	---	No	No	Yes	No	PK - 6	263	13.07	20.1
West Jefferson High School	West Jefferson District	Terreton	---	No	No	Yes	No	9 - 12	189	14.98	12.6
West Jefferson Middle School	West Jefferson District	Terreton	---	No	No	Yes	No	6 - 8	121	6.28	19.3
MADISON COUNTY	**---**	**---**	**11**	**0**	**0**	**8**	**3**	**---**	**5369**	**258.71**	**20.8**
Adams Elementary School	Madison District	Rexburg	---	No	No	Yes	No	KG - 4	248	13.29	18.7
Burton Elementary School	Madison District	Rexburg	---	No	No	Yes	No	PK - 4	553	25.29	21.9
Central High School	Madison District	Rexburg	---	No	No	Yes	No	6 - 12	232	8	29
Hibbard Elementary School	Madison District	Rexburg	---	No	No	Yes	No	KG - 4	214	10.17	21
Kennedy Elementary School	Madison District	Rexburg	---	No	No	Yes	No	KG - 4	356	18.79	18.9

Table 2.4-37: Public Schools in the Expanded Economic Region (Continued)

School Name	School District	City	Total Number of Schools[1]	Charter	Magnet	Title I School	Regular Public Schools	Grade Span	Students	Teachers	Student-Teacher Ratio
Lincoln Elementary School	Madison District	Rexburg	---	No	No	Yes	No	KG - 4	380	17.29	22
Madison Junior High School	Madison District	Rexburg	---	No	No	No	Yes	7 - 9	1179	55.5	21.2
Madison Middle School	Madison District	Rexburg	---	No	No	Yes	No	4 - 6	797	37.13	21.5
Madison Online Elementary	Madison District	Rexburg	---	No	---	---	Yes	KG - 6	---	---	---
Madison Senior High School	Madison District	Rexburg	---	No	No	No	Yes	10 - 12	1119	57.86	19.3
South Fork Elementary	Madison District	Rexburg	---	No	No	Yes	No	KG - 4	291	15.39	18.9
EXPANDED ECONOMIC REGION	**---**	**---**	**146**	**13**	**3**	**103**	**40**	**---**	**62542**	**3189.58**	**19.6**
Bannock County	---	---	28	4	0	21	7	---	13293	678.32	19.6
Bingham County	---	---	32	3	0	28	4	---	10574	565.9	18.7
Bonneville County	---	---	54	6	3	31	20	---	25328	1287.76	19.7
Butte County	---	---	3	0	0	3	0	---	367	25.5	14.4
Jefferson County	---	---	18	0	0	12	6	---	7611	373.39	20.4
Madison County	---	---	11	0	0	8	3	---	5369	258.71	20.8

Source- Reference 2.4-104
[1] Total number of schools includes magnet, Title 1 (includes all charter schools), and regular public schools
--- Data not available
Data for 2021-2022 school year.

Table 2.4-38: Private Schools in the Expanded Economic Region

Private School Name	County	City	Grade Span	Students PK	Students Non PK	Teachers Non PK	Student-Teacher Ratio (excluding PK)
Calvary Chapel Christian School	Bannock	Pocatello	PK - 12	5	25	6	4.16
Grace Lutheran School	Bannock	Pocatello	PK - 12	102	392	23.3	16.82
Holy Spirit Catholic School	Bannock	Pocatello	PK - 8	26	124	11.6	10.68
Pocatello Valley Montessori School	Bannock	Pocatello	PK - 3	91	21	4	5.25
Lillian Vallely School	Bingham	Blackfoot	KG - 5	0	32	4	8
Holy Rosary Catholic School	Bonneville	Idaho Falls	PK - 6	44	136	9.5	14.31
Hope Lutheran School	Bonneville	Idaho Falls	PK - 5	16	33	4.3	7.67
Lighthouse Montessori School	Bonneville	Idaho Falls	PK - 5	43	39	9.3	4.19
Little Peoples Academy	Bonneville	Idaho Falls	PK - KG	73	24	2	12
Snake River Montessori School	Bonneville	Ammon	PK - 6	31	61	5	12.2
Watersprings School	Bonneville	Idaho Falls	PK - 12	60	301	27.4	10.98
Shumway Academy	Madison	Rexburg	KG - 8	0	78	5	15.6
EXPANDED ECONOMIC REGION				**491**	**1266**	**111.4**	**11.36**
	Bannock	---	---	224	562	44.9	12.52
	Bingham	---	---	0	32	4	8
	Bonneville	---	---	267	594	57.5	10.33
	Madison	---	---	0	78	5	15.6

Source- Reference 2.4-105
PK - Prekindergarten
KG - Kindergarten
Data are for the 2019-2020 school year

Table 2.4-39: Postsecondary Institutions in the Expanded Economic Region

Postsecondary Institution[1]	County	City	Type	Number of Students	Number of Teachers	Student-Teacher Ratio
Idaho State University-Main Campus	Bannock	Pocatello	4-year, public not-for-profit	11,766	905	13
Nathan Layne Institute of Cosmetology	Bannock	Chubbuck	<2-year, private for-profit	18	1	13
College of Massage Therapy	Bingham	Blackfoot	<2-year, private for-profit	11	2	6
Austin Kade Academy	Bonneville	Idaho Falls	<2-year, private for-profit	89	8	11
College of Eastern Idaho	Bonneville	Idaho Falls	2-year, public not-for-profit	1803	164	11
Idaho State University - Idaho Falls[2,3,4]	Bonneville	Idaho Falls	4-year, public not-for-profit	600 - 1000	---	---
Provo College-Idaho Falls Campus	Bonneville	Idaho Falls	4-year, private for-profit	16	2	8
University of Idaho - Idaho Falls[2,3]	Bonneville	Idaho Falls	4-year, public not-for-profit	1200	60	20
Brigham Young University-Idaho	Madison	Rexburg	4-year, private not-for-profit	44,481	2224	20
Evan Hairstyling College-Rexburg	Madison	Rexburg	2-year, private for-profit	72	9	8
Paul Mitchell the School-Rexburg	Madison	Rexburg	<2-year, private for-profit	180	9	20
Rexburg College of Massage Therapy	Madison	Rexburg	<2-year, private for-profit	50	10	5
EXPANDED ECONOMIC REGION[4]				59,686	3394	18
	Bannock	---	---	11,784	906	13
	Bingham	---	---	11	2	6
	Bonneville[4]	---	---	3108	234	13
	Madison	---	---	44,783	2252	20

Source- Reference 2.4-106

[1] Data pertain to the year 2020.

[2] Data are from 2022

[3] Data obtained from direct communication with university administration

4 Idaho State University - Idaho Falls was not included in the Bonneville County or the Economic Region totals due to lack of data

--- Data not available

Table 2.4-40: Public Water Systems in the Expanded Economic Region

PWS #	Name	Distribution Classification	Capacity	Treatment Classification	Population Served	Source Type
BANNOCK COUNTY						
ID6030002	Arimo, City of	VSWS	<500		368	GW
ID6030005	Caribou Acres			DWT1	120	GW
ID6030008	Chubbuck, City of	DWD3	15,001 to 50,000	DWT1	15,570	GW
ID6030010	D and M Water Association	VSWS	<500		142	GW
ID6030012	Downey, City of	DWD1	501 to 1500		625	GW
ID6030073	Equestrian Estates			DWT1	88	GW
ID6030015	Evergreen Acres Subdivision	VSWS	<500		25	GW
ID6030065	Idaho Materials and Construction	VSWS	<500		33	GW
ID6030025	Inkom, City of	DWD1	501 to 1500	DWT1	792	GW
ID6030070	Intermountain Gas Company	VSWS	<500		28	GW
ID6030029	Laceys Vista Acres Water Corporation	VSWS	<500		200	GW
ID6030030	Lava Hot Springs City of	VSWS	<500		442	GW
ID6030038	McCammon City of	DWD1	501 to 1500		800	GW
ID6030040	Mink Creek Mountain Estates	VSWS	<500		27	GW
ID6030089	Moose Mountain	VSWS	<500		27	GW
ID6030043	Pocatello, City of	DWD4	50,001 and greater		56,266	GW
ID6030049	Smith Road Water Users Association	VSWS	<500		58	GW
ID6030050	Space Acres Water Users Association	VSWS	<500		34	GW
ID6030068	Thunder Canyon Estates Homeowners Association	VSWS	<500		35	GW
ID6030026	Twin Pines Mobile Park	VSWS	<500		86	GW
ID6030044	Tyhee and S and N Estates Water Association	VSWS	<500		300	GW
ID6030055	Tyhee Elementary School	DWD1	501 to 1500		675	GW
ID6030057	Valley View Estates	VSWS	<500		74	GW
ID6030058	Whitewater Subdivision	VSWS	<500		106	GW
ID6030081	Wildhorse Ridge Subdivision	VSWS	<500		85	GW
BINGHAM COUNTY						
ID6060017	A W Johnson Elementary School	VSWS	<500		330	GW
ID6060001	Aberdeen, City of	DWD2	1501 to 15,000		1994	GW

Table 2.4-40: Public Water Systems in the Expanded Economic Region (Continued)

PWS #	Name	Distribution Classification	Capacity	Treatment Classification	Population Served	Source Type
ID6060003	Atomic City	VSWS	<500		35	GW
ID6060004	Basalt, City of	VSWS	<500		425	GW
ID6060033	Basic American Potato, Inc. Packers	VSWS	<500		160	GW
ID6060020	Basic American Food Shelley	VSWS	<500		300	GW
ID6060002	Basic American Foods Blackfoot	VSWS	<500		500	GW
ID6060007	Blackfoot, City of	DWD2	1501 to 15,000		11,922	GW
ID6060119	Cedar Point Subdivision	VSWS	<500		63	GW
ID6060013	Country Haven Utilities	VSWS	<500		150	GW
ID6060123	Fedex Distribution Center Blackfoot	VSWS	<500		45	GW
ID6060016	Firth, City of	DWD1	501 to 1500		511	GW
ID6060019	Four Seasons Water Company	VSWS	<500		96	GW
ID6060102	GPOD of Idaho	VSWS	<500		100	GW
ID6060026	Greenfield Water and Sewer	VSWS	<500		240	GW
ID6060028	Groveland Elementary School District 55	VSWS	<500		350	GW
ID6060095	Groveland Water and Sewer District	VSWS	<500		265	GW
ID6060034	Idaho Supreme	VSWS	<500		250	GW
ID6060035	Idle Wheels MBH Cat LLC	VSWS	<500		85	GW
ID6060036	INL MFC	DWD1	501 to 1500		1098	GW
ID6060118	Journeys End	VSWS	<500		180	GW
ID6060049	Moreland Country Court	VSWS	<500		60	GW
ID6060048	Moreland School	VSWS	<500		360	GW
ID6060117	Moreland Water and Sewer District	VSWS	<500		364	GW
ID6060056	Pioneer Acres	VSWS	<500		110	GW
ID6060060	Riverside Elementary School	VSWS	<500		300	GW
ID6060059	Riverside Estates	VSWS	<500		90	GW
ID6060121	Riverstone Subdivision	VSWS	<500		50	GW
ID6060062	Riverview Acres 2	VSWS	<500		29	GW
ID6060063	Riverview Acres Water Association 1	VSWS	<500		33	GW
ID6060057	Riverview Villa	VSWS	<500		200	GW
ID6060065	Rockford Elementary	VSWS	<500		217	GW

Table 2.4-40: Public Water Systems in the Expanded Economic Region (Continued)

PWS #	Name	Distribution Classification	Capacity	Treatment Classification	Population Served	Source Type
ID6060067	Rose Garden Mobile Home Park	VSWS	<500		84	GW
ID6060071	Shelley, City of	DWD2	1501 to 15,000		4409	GW
ID6060074	Snake River High School	DWD1	501 to 1500		745	GW
ID6060075	Snake River Jr High School	VSWS	<500		300	GW
ID6060077	Snake River Middle School	VSWS	<500		300	GW
ID6060099	Snake River View Estates	VSWS	<500		175	GW
ID6060078	South Park Water and Sewer	VSWS	<500		125	GW
ID6060080	Springfield, City of	VSWS	<500		35	GW
ID6060082	Sunset Subdivision	VSWS	<500		43	GW
ID6060113	Thresher Artisan Wheat	VSWS	<500		56	GW
ID6060085	Town and Country Mobile Home Park	VSWS	<500		80	GW
ID6060097	USDA Germ Plasm	VSWS	<500		55	GW
ID6060098	Wada Farms Potatoes Inc	VSWS	<500		190	GW
ID6060088	Wapello Elementary School	VSWS	<500		253	GW
ID6060089	Woodville	VSWS	<500		225	GW
BONNEVILLE COUNTY						
ID7100201	3D Water Association	DWD1	501 to 1500		642	GW
ID7100219	American Heritage Charter School	VSWS	<500		330	GW
ID7100004	Ammon, City of	DWD3	15,001 to 50,000		17,338	GW
ID7100194	Andco Management	VSWS	<500		83	GW
ID7100125	Andersen Manufacturing Inc	VSWS	<500		80	GW
ID7100013	Autumn Cove Mobile Home Court	VSWS	<500		38	GW
ID7100207	Blackhawk Estates/Iron Rim	VSWS	<500		230	GW
ID7100059	Bonneville Acres Water Users Association Inc	VSWS	<500		100	GW
ID7100010	Bonneville High School	DWD1	501 to 1500		1354	GW
ID7100047	Broadway Apartments	VSWS	<500		72	GW
ID7100012	Brookhaven Water Association	VSWS	<500		33	GW
ID7100020	Comore Loma	DWD1	501 to 1500		1295	GW
ID7100192	Cottonwood Acres 3 & 5	VSWS	<500		60	GW
ID7100022	Cottonwood Acres Division 4	VSWS	<500		43	GW

Table 2.4-40: Public Water Systems in the Expanded Economic Region (Continued)

PWS #	Name	Distribution Classification	Capacity	Treatment Classification	Population Served	Source Type
ID7100024	Country Life Estates	VSWS	<500		300	GW
ID7100218	Cross-Roads Subdivision	DWD1	501 to 1500		825	GW
ID7100187	D&A Warehousing LLC	VSWS	<500		140	GW
ID7100200	DJ Park Well	VSWS	<500		38	GW
ID7100038	Eagle Farms	VSWS	<500		100	GW
ID7100213	Evolution Plaza	VSWS	<500		90	GW
ID7100028	Fairview North	VSWS	<500		350	GW
ID7100208	Falcon Ridge Subdivision	VSWS	<500		75	GW
ID7100030	Falls Water Company Inc	DWD3	15,001 to 50,000		19,975	GW
ID7100224	Frazier Industrial Company	VSWS	<500		75	GW
ID7100225	Gem Lake Industrial Park	VSWS	<500		90	GW
ID7100220	Gem Lake Water System	VSWS	<500		25	GW
ID7100035	Highway Estates Water Association	VSWS	<500		65	GW
ID7100190	HK Contractors	VSWS	<500		30	GW
ID7100037	Honey Bee Acres Wells	VSWS	<500		30	GW
ID7100039	Idaho Falls, City of	DWD4	50,001 and greater		61,500	GW
ID7100083	Idahoan Foods Idaho Falls Plant	VSWS	<500		200	GW
ID7100041	Iona Water Department	DWD2	1501 to 15,000		2541	GW
ID7100044	J and K Water Corporation	VSWS	<500		370	GW
ID7100081	Karey Lane Well Inc	VSWS	<500		38	GW
ID7100178	KJs Travel Center	VSWS	<500		50	GW
ID7100215	Lazy Eight Estates	VSWS	<500		60	GW
ID7100221	Lighthouse Montessori School	VSWS	<500		125	GW
ID7100203	Melaleuca Warehouse Facility	DWD1	501 to 1500		1397	GW
ID7100184	Miller Country Estates	VSWS	<500		83	GW
ID7100222	New Phase Investments LLC	VSWS	<500		50	GW
ID7100060	Northside Estates Well	VSWS	<500		30	GW
ID7100061	Nur Water Association	VSWS	<500		60	GW
ID7100063	Osgood School	VSWS	<500		73	GW
ID7100067	Panorama Hills Water Company	VSWS	<500		150	GW

Table 2.4-40: Public Water Systems in the Expanded Economic Region (Continued)

PWS #	Name	Distribution Classification	Capacity	Treatment Classification	Population Served	Source Type
ID7100071	Pinewood Estates	VSWS	<500		450	GW
ID7100144	Pioneer Equipment	VSWS	<500		26	GW
ID7100149	Rancho Via Well Users Association Inc	VSWS	<500		32	GW
ID7100126	Recreational Sports and Imports	VSWS	<500		120	GW
ID7100075	Reeds Dairy Inc	VSWS	<500		40	GW
ID7100191	Rio Products	VSWS	<500		65	GW
ID7100011	Rocky Mountain Middle School	DWD1	501 to 1500		813	GW
ID7100106	Shady Rest RV Park and Campground	VSWS	<500		167	GW
ID7100086	Sohns Mobile Home Park Inc	VSWS	<500		38	GW
ID7100070	St Leon Ind Park	VSWS	<500		75	GW
ID7100100	Starting Line	VSWS	<500		35	GW
ID7100196	Sunnyside Park Utilities Inc	VSWS	<500		100	GW
ID7100088	Sunset Trailer Ranch	VSWS	<500		150	GW
ID7100042	Swan Valley Elementary	VSWS	<500		70	GW
ID7100023	Taylor Mountain Water and Sewer District	DWD1	501 to 1500		528	GW
ID7100128	Telford	VSWS	<500		40	GW
ID7100175	Telford Park	VSWS	<500		150	GW
ID7100226	The Centre at Rainey Creek	VSWS	<500		129	GW
ID7100155	Township Park Water Company	VSWS	<500		43	GW
ID7100094	Ucon, City of	DWD1	501 to 1500		1161	GW
ID7100148	Westwood Water Association	VSWS	<500		41	GW
ID7100074	Woodland Furniture LLC	VSWS	<500		35	GW
ID7100107	Woodland Heights Water Association #1	VSWS	<500		54	GW
ID7100188	Yellowstone Plastics	VSWS	<500		150	GW
BUTTE COUNTY						
ID6120001	Arco, City of	DWD1	501 to 1500		1080	GW
ID6120002	Butte, City of	VSWS	<500		59	GW
ID6120006	Howe Townsite	VSWS	<500		55	GW
ID6120020	INL Advanced Test Reactor Complex	DWD1	501 to 1500		554	GW
ID6120008	INL Central Facilities Area	DWD1	501 to 1500		523	GW

Table 2.4-40: Public Water Systems in the Expanded Economic Region (Continued)

PWS #	Name	Distribution Classification	Capacity	Treatment Classification	Population Served	Source Type
ID6120012	INL Idaho Nuclear Technology and Engineering Center	DWD1	501 to 1500		807	GW
ID6120016	INL Naval Reactors Facility	DWD2	1501 to 15,000		1635	GW
ID6120018	INL Radioactive Waste Management Complex	DWD1	501 to 1500	DWT1	547	GW
ID6120013	INL Test Area North Containment Test Facility	VSWS	<500		307	GW
ID6120022	Moore Water and Sewer Association	VSWS	<500		196	GW
JEFFERSON COUNTY						
ID7260001	Ball Brothers Produce	VSWS	<500		35	GW
ID7260002	Bear Island Water Association	VSWS	<500		100	GW
ID7260082	Challenger Pallet and Supply Inc	VSWS	<500		60	GW
ID7260047	Country Living Center	VSWS	<500		30	GW
ID7260007	Country Squire Estates	DWD1	501 to 1500		501	GW
ID7260070	Elk Meadows	VSWS	<500		100	GW
ID7260090	Fedex Distribution Center Rigby	VSWS	<500		35	GW
ID7260012	Hamer School	VSWS	<500		35	GW
ID7260084	Hillman Trailer Court	VSWS	<500		45	GW
ID7260030	Idaho Pacific Corp	VSWS	<500		225	GW
ID7260067	Idahoan Foods Lewisville Office & Packaging	VSWS	<500		170	GW
ID7260016	Idahoan Foods Lewisville Plant	VSWS	<500		250	GW
ID7260017	Ireland Acres 1	VSWS	<500		54	GW
ID7260053	Jefferson Alternative School	VSWS	<500		30	GW
ID7260075	Jefferson Greens Estates	VSWS	<500		175	GW
ID7260018	Jenco Acres	VSWS	<500		105	GW
ID7260087	Klim	VSWS	<500		125	GW
ID7260026	M and T Water and Sewer District	VSWS	<500		358	GW
ID7260023	Midway Elementary School	VSWS	<500		384	GW
ID7260063	Morning View Water Company	VSWS	<500		440	GW
ID7260029	Parkwood Acres Water Company	VSWS	<500		88	GW
ID7260080	Pepperwood Crossing/Rocky Mountain Utilities	VSWS	<500		336	GW
ID7260032	Rigby, City of	DWD2	1501 to 15,000		4016	GW

Table 2.4-40: Public Water Systems in the Expanded Economic Region (Continued)

PWS #	Name	Distribution Classification	Capacity	Treatment Classification	Population Served	Source Type
ID7260055	Rigby Produce Hamer Division	VSWS	<500		125	GW
ID7260034	Ririe, City of	DWD1	501 to 1500		656	GW
ID7260035	Roberts, City of	DWD1	501 to 1500		600	GW
ID7260027	Rocky Mountain Produce	VSWS	<500		38	GW
ID7260081	Rolling Hills Acres	VSWS	<500		141	GW
ID7260079	Sunbrook Estates Division # 2	VSWS	<500		144	GW
ID7260038	Terreton Elementary High ALS Schools	DWD1	501 to 1500		730	GW
ID7260037	Terreton Pump 2	VSWS	<500		50	GW
ID7260039	Walker Produce	VSWS	<500		50	GW
MADISON COUNTY						
ID7330023	Basic American Foods Rexburg	VSWS	<500		150	GW
ID7330005	Bench Mark Potato Company	VSWS	<500		30	GW
ID7330067	Cedar Butte Subdivision	VSWS	<500		300	GW
ID7330061	Dickinson Frozen Foods	VSWS	<500		190	GW
ID7330009	Hibbard Elementary	VSWS	<500		209	GW
ID7330011	Hillview Subdivision	VSWS	<500		50	GW
ID7330065	Liberty Estates	VSWS	<500		300	GW
ID7330014	Meadow Lark Court LLC	VSWS	<500		45	GW
ID7330064	Mountain West Products	VSWS	<500		30	GW
ID7330022	Rexburg, City of	DWD3	15,001 to 50,000		39,409	GW
ID7330077	Safety Provisions	VSWS	<500		30	GW
ID7330071	South Fork Elementary School	VSWS	<500		359	GW
ID7330026	Sugar City, City of	DWD2	1501 to 15,000		1567	GW
ID7330027	Sun Glo of Idaho North	VSWS	<500		92	GW
ID7330028	Syringa Park Subdivision	VSWS	<500		35	GW
ID7330055	The Occasions Group	VSWS	<500		202	GW

Table 2.4-40: Public Water Systems in the Expanded Economic Region (Continued)

PWS #	Name	Distribution Classification	Capacity	Treatment Classification	Population Served	Source Type
ID7330076	UPS - Rexburg	VSWS	<500		80	GW

Source: Reference 2.4-109
PWS - Public water system
Distribution System Classification is based on complexity and population served as follows:
Very Small Water System (VSWS) - A community or non-transient non-community public water system that serves 500 persons or less and has no treatment other than disinfection ** or has only treatment, which does not require chemical treatment, process adjustment, backwashing, or media regeneration by an operator. (e.g., calcium carbonate filters, granular activated carbon filters, cartridge filters, ion exchangers.)
Disinfection - Introduction of chlorine or other agent or process approved by DEQ, insufficient concentration and for the time required to kill or inactivate pathogenic and indicator organisms.
DWD1 - Distribution Class I - 501 to 1,500
DWD2 - Distribution Class II - 1,501 to 15,000
DWD3 - Distribution Class III - 15,001 to 50,000
DWD4 - Distribution Class IV - 50,001 and greater
Treatment System Classification is based on a point matrix associated with population, primary source type, and treatment processes associated with public water system treatment plants that are tracked in DEQ's Safe Drinking Water Information System:
DWT1 - Treatment Class I - 0 to 30 points
DWT2 - Treatment Class II - 31 to 55 points
DWT3 - Treatment Class III - 56 to 75 points
DWT4 - Treatment Class IV - 76 points and greater

Table 2.4-41: County and Regional Summary of Public Water Systems

Public Water System Classification by County	Population Served	Number of Public Water Systems by Classification
BANNOCK COUNTY	**77,006**	**25**
DWD1 (501 to 1,500 people)	2892	4[1]
DWD3 (15,001 to 50,000 people)	15,570	1[1]
DWD4 (50,001 and greater)	56,266	1
VSWS (<500 people)	2070	17
DWT1 (0 to 30 treatment points)	208	2
BINGHAM COUNTY	**27,987**	**47**
DWD1 (501 to 1,500 people)	2354	3
DWD2 (1,501 to 15,000 people)	18,325	3
VSWS (<500 people)	7308	41
BONNEVILLE COUNTY	**115,145**	**68**
DWD1 (501 to 1,500 people)	8015	8
DWD2	2541	1
DWD3 (15,001 to 50,000 people)	37,313	2
DWD4 (50,001 and greater)	61,500	1
VSWS (<500 people)	5776	56
BUTTE COUNTY	**5763**	**10**
DWD1 (501 to 1,500 people)	3511	5[1]
DWD2	1635	1
VSWS (<500 people)	617	4
JEFFERSON COUNTY	**10,231**	**32**
DWD1 (501 to 1,500 people)	2487	4
DWD2 (1,501 to 15,000 people)	4016	1
VSWS (<500 people)	3728	27
MADISON COUNTY	43,078	17
DWD2 (1,501 to 15,000 people)	1567	1
DWD3 (15,001 to 50,000 people)	39,409	1
VSWS (<500 people)	2102	15
EXPANDED ECONOMIC REGION	**279,210**	**199**
DWD1 (501 to 1,500 people)	19,259	24
DWD2 (1,501 to 15,000 people)	28,084	7
DWD3 (15,001 to 50,000 people)	92,292	4
DWD4 (50,001 and greater)	117,766	2
VSWS (<500 people)	21,601	160

Table 2.4-41: County and Regional Summary of Public Water Systems (Continued)

Public Water System Classification by County	Population Served	Number of Public Water Systems by Classification
DWT1 (0 to 30 treatment points)	208	2

Source: Reference 2.4-109
DWD1 - Distribution Class I - 501 to 1,500
DWD2 - Distribution Class II - 1,501 to 15,000
DWD3 - Distribution Class III - 15,001 to 50,000
DWD4 - Distribution Class IV - 50,001 and greater
DWT1 - Treatment Class I - 0 to 30 points
[1] Systems also have DWT1 treatment system classifications (Table 2.4-40) - two systems in Bannock County and one in Butte County.

Table 2.4-42: Wastewater Treatment Facilities in the Expanded Economic Region

Facility Name[1]	Authority Name	Permit Number	Permit Type	County	Watershed	Existing Total Flow (millions of gallons per day)	Present Design Total Flow (millions of gallons per day)	Projected Design Total Flow millions of gallons per day)
Aberdeen S/T Facility	Aberdeen, City of	ID0020176	Individual Permit	Bingham	American Falls	0.421	0.65	0.65
Arco S/T Facility	City of Arco	---	---	Butte	Big Lost	0.2	0.27	0.27
Basalt Lagoon/Collection System	Basalt, City of	---	---	Bingham	American Falls	0.038	0.058	0.058
Blackfoot S/T Facility,	Blackfoot, City of	ID0020044	Individual Permit	Bingham	American Falls	1.49	5.1	5.1
Country Haven Estates Lagoons	County Haven Estates HOA	---	---	Bingham	American Falls	0.02	0.02	0.02
Downey Sewage Lagoon System	Downey, City of	---	---	Bannock	Portneuf	0.08	0.08	0.08
Firth S/T Facility	Firth, City of	ID0024988	Individual Permit	Bingham	American Falls	0.07	0.08	0.08
Idaho Falls STP	Idaho Falls, City of	ID0021261	Individual Permit	Bonneville	Idaho Falls	10.66	17.0	17.0
Inkom S/T Facility	Inkom, City of	ID0020249	Individual Permit	Bannock	Portneuf	0.05	0.11	0.11
Lava Hot Springs S/T Facility	Lava Hot Springs, City of	ID0021822	Individual Permit	Bannock	Portneuf	0.13	0.2	0.2
McCammon S/T Facility	McCammon, City of	---	---	Bannock	Portneuf	0.16	0.18	0.18
Menan S/T Facility	Menan, City of	---	---	Jefferson	Idaho Falls	0.15	0.29	0.29
Moore Water & Sewer Association	Moore Water & Sewer Association	---	---	Butte	Big Lost	0.011	0.02	0.02
Mud Lake STP	M&T Sewer District[2]	---	---	Jefferson	Medicine Lodge	0.043	0.058	0.058
Pocatello STP	Pocatello, City of	ID0021784	Individual Permit	Bannock	Portneuf	7.02	11	11
Rexburg Treatment Facility	Rexburg, City of	ID0023817	Individual Permit	Madison	Teton	2.44	3.6	3.6
Rigby STP	Rigby, City of	ID0020010	Individual Permit	Jefferson	Idaho Falls	0.384	0.9	0.9
Ririe Sewage Lagoons	Ririe, City of	ID0026174	Individual Permit	Jefferson	Idaho Falls	0.2	0.3	0.3
Roberts S/T Facility	Roberts, City of	ID0026913	Individual Permit	Jefferson	Idaho Falls	0.04	0.1	0.1
Shelley S/T Facility	E ID Regional Wastewater Authority[3]	ID0020133	Individual Permit	Bingham	American Falls	1.8	3.0	3.0

Table 2.4-42: Wastewater Treatment Facilities in the Expanded Economic Region (Continued)

Facility Name[1]	Authority Name	Permit Number	Permit Type	County	Watershed	Existing Total Flow (millions of gallons per day)	Present Design Total Flow (millions of gallons per day)	Projected Design Total Flow millions of gallons per day)
South Park Utilities-Water & Sewer	South Park Estates Utilities HOA	---	---	Bingham	American Falls	0.011	0.02	0.02

Source- (Reference 2.4-111)

[1] Data pertain to the year 2012.

[2] Mud Lake-Terreton Sewer District

[3] Eastern Idaho Wastewater Treatment Authority

HOA - homeowners association

S/T - sewer/treatment

STP - sewer treatment plant

Table 2.4-43: Law Enforcement in the Expanded Economic Region

Department/Office Name	City	Number of Sworn Officers	Number of Civilian Officers	Total Number of Officers
BANNOCK COUNTY				
Bannock County Sheriff's Office	Pocatello	43	83	126
Chubbuck Police Department	Chubbuck	22	13	35
Pocatello Police Department	Pocatello	91	37	128
BINGHAM COUNTY				
Aberdeen Police Department	Aberdeen	5	0	5
Bingham County Sheriff's Office	Blackfoot	35	52	87
Blackfoot Police Department	Blackfoot	27	3	30
Fort Hall Police Department	Fort Hall Reservation	14	14	28
Shelley Police Department	Shelley	8	0	8
BONNEVILLE COUNTY				
Bonneville County Sheriff's Office	Idaho Falls	79	114	193
Idaho Falls Police Department	Idaho Falls	89	45	134
BUTTE COUNTY				
Butte County Sheriff's Office	Arco	7	7	14
JEFFERSON COUNTY				
Jefferson County Sheriff's Office	Rigby	22	38	60
Rigby Police Department	Rigby	7	1	8
MADISON COUNTY				
Madison County Sheriff's Office	Rexburg	20	50	70
Rexburg Police Department	Rexburg	32	9	41
EXPANDED ECONOMIC REGION		501	466	967

Source- Reference 2.4-117

Table 2.4-44: Fire Departments in the Expanded Economic Region

Name	County	City	Career Firefighters	Volunteers	Total Firefighters	Population Protected
BANNOCK COUNTY			94	37	131	76,856
Chubbuck Fire Department	Bannock	Chubbuck	10	20	30	15,000
North Bannock Fire District	Bannock	Chubbuck	1	17	18	6663
Pocatello Fire Department	Bannock	Pocatello	83	0	83	55,193
BINGHAM COUNTY			49	90	139	42,257
Aberdeen-Springfield Fire District	Bingham	Aberdeen	0	25	25	4196
Atomic City Fire Department	Bingham	Atomic City	0	11	11	26
Blackfoot Fire Department	Bingham	Blackfoot	29	10	39	18,999
Firth Fire District	Bingham	Firth	0	20	20	2536
Fort Hall Fire and EMS District	Bingham	Fort Hall Reservation	20	4	24	6500
Shelley Rural Fire District	Bingham	Shelley	0	20	20	10,000
BONNEVILLE COUNTY			112	56	168	77,760
Ammon Fire Department	Bonneville	Ammon	5	35	40	15,540
Idaho Falls Fire Department	Bonneville	Idaho Falls	107	0	107	61,076
Ucon Fire Department	Bonneville	Ucon	0	21	21	1144
BUTTE COUNTY			85	25	110	8500
Arco Fire Department	Butte	Arco	0	13	13	1500
Idaho National Laboratory Fire Department	Butte	Idaho Falls[1]	85	0	85	5000
Lost River Fire Protection District	Butte	Moore	0	12	12	2000
JEFFERSON COUNTY			2	110	112	27,931
Central Fire District	Jefferson	Rigby	2	85	87	24,431
West Jefferson Fire Control District	Jefferson	Terreton	0	25	25	3500
MADISON COUNTY			20	50	70	40,000
Madison Fire Department	Madison	Rexburg	20	50	70	40,000
EXPANDED ECONOMIC REGION	---	---	**362**	**368**	**730**	**273,304**

Source- Reference 2.4-118
1 Address of department is in Idaho Falls. However, department is located at INL.

Table 2.4-45: Medical Hospitals and Medical Doctors in the Expanded Economic Region

Hospital Name[1]	City	County	Medical Doctors[2]	Staffed Beds[1]	Personnel[1]	Admissions[1]
Bingham Memorial Hospital	Blackfoot	Bingham	143	85	574	2100
Eastern Idaho Medical Center	Idaho Falls	Bonneville	142	280	1127	10,148
Grove Creek Medical Center	Blackfoot	Bingham	8[3]	8	36	51
Lost Rivers Medical Center	Arco	Butte	35	43	186	613
Madison Memorial Hospital	Rexburg	Madison	67	58	476	3446
Mountain View Hospital	Idaho Falls	Bonneville	3	22	254	1287
Portneuf Medical Center	Pocatello	Bannock	191	175	1093	7722
State Hospital South[4]	Blackfoot	Bingham	0	135	352	471
EXPANDED ECONOMIC REGION			589	806	4098	25,838

Sources-

[1] Reference 2.4-119; data are from 2022

[2] Reference 2.4-120; data are from 2020

[3] Reference 2.4-121. Grove Creek Medical Center Specializes in labor and delivery services. The Center has 8 team doctors and five consulting medical doctors; the consulting doctors are not included in the medical doctor count for this facility.

[4] Reference 2.4-122

Table 2.4-46: Dialysis Facilities in the Expanded Economic Region

Facility	County	City	Number of Hemodialysis Stations
Idaho Kidney Center - Pocatello	Bannock	Pocatello	20
Idaho Kidney Center - Blackfoot	Bingham	Blackfoot	13
Gem State Regional Dialysis Center	Bonneville	Idaho Falls	13
Liberty Dialysis - Idaho Falls	Bonneville	Idaho Falls	20
Yellowstone Dialysis Center	Madison	Rexburg	12
EXPANDED ECONOMIC REGION			78

Source- Reference 2.4-123

Table 2.4-47: Hospice Care Facilities in the Expanded Economic Region

Facility	County	City	Average Daily Number of Patients Cared For
Encompass Health Hospice of Eastern Idaho	Bannock	Pocatello	112
Heritage Hospice	Bannock	Pocatello	79
Symbii Hospice	Bannock	Chubbuck	54
Alliance Hospice of Idaho	Bonneville	Idaho Falls	24
Aspen Hospice	Bonneville	Idaho Falls	57
Brio Idaho Hospice LLC	Bonneville	Idaho Falls	12
Eden Hospice	Bonneville	Ammon	N/A
Hands of Hope Hospice	Bonneville	Idaho Falls	31
Hospice of Eastern Idaho	Bonneville	Idaho Falls	12
Onesource Hospice	Bonneville	Idaho Falls	25
Solace Healthcare	Jefferson	Rigby	28
Homestead Home Health & Hospice LLC	Madison	Rexburg	13
ECONOMIC REGION			447

Source- Reference 2.4-123
N/A - Not available

Table 2.4-48: Nursing Homes in the Expanded Economic Region

Facility	County	City	Number of Beds
Gateway Transitional Care Center	Bannock	Pocatello	88
Idaho State Veterans Home - Pocatello	Bannock	Pocatello	66
Monte Vista Hills Healthcare Center	Bannock	Pocatello	113
Quinn Meadows Rehabilitation And Care Center	Bannock	Pocatello	41
Bingham Memorial Skilled Nursing & Rehabilitation	Bingham	Blackfoot	70
Syringa Chalet Nursing Facility	Bingham	Blackfoot	29
Good Samaritan Society - Idaho Falls Village	Bonneville	Idaho Falls	113
Life Care Center of Idaho Falls	Bonneville	Idaho Falls	109
Promontory Point Rehabilitation	Bonneville	Ammon	30
Teton Post Acute Care & Rehabilitation	Bonneville	Idaho Falls	88
Madison Carriage Cove Short Stay Rehabilitation	Madison	Rexburg	35
Temple View Transitional Care Center	Madison	Rexburg	119
EXPANDED ECONOMIC REGION			901

Source- Reference 2.4-123

Table 2.4-49: Inpatient Rehabilitation Facilities in Expanded Economic Region

Name	County	City
Portneuf Medical Center	Bannock	Pocatello
Eastern Idaho Regional Medical Center	Bonneville	Idaho Falls

Source- Reference 2.4-123

Table 2.4-50: Home Health Care Agencies in the Expanded Economic Region

Name	County	City
Heritage Home Health	Bannock	Pocatello
Home Helpers Home Health	Bannock	Pocatello
Symbii Home Health	Bannock	Chubbuck
Advanced Home Health	Bonneville	Idaho Falls
Alliance Home Health Care	Bonneville	Idaho Falls
Aspen Home Health Services	Bonneville	Idaho Falls
Brio Idaho Home Health LLC	Bonneville	Idaho Falls
Eden Home Health - Idaho Falls	Bonneville	Idaho Falls
Enhabit Home Health Of Eastern Idaho	Bonneville	Idaho Falls
Hands Of Hope Home Health, Inc	Bonneville	Idaho Falls
Integricare Of Eastern Idaho	Bonneville	Idaho Falls
Just 4 Kids Home Health & Hospice	Bonneville	Idaho Falls
Onesource Home Health	Bonneville	Idaho Falls
Homestead Home Health & Hospice, LLC	Madison	Rexburg
Rexburg Home Health	Madison	Rexburg

Source- Reference 2.4-123

Table 2.4-51: Access Road Projects in the Expanded Economic Region

Roadway Projects[1]	Description	Start Date	End Date
Interstate 15 Bridge Repairs	Numerous bridge repairs along Interstate 15 from Pocatello to Blackfoot.	April 2022	June 2022
Interstate 15, Fort Hall Interchange	Replacement of Fort Hall Interchange on Interstate15 (Exit 80).	Summer 2022	TBD
Interstate 15, Exit 113 Interchange	Add roundabouts and lengthen ramps to improve safety and mobility on Interstate 15, Exit 113 interchange.	Fall 2022	TBD
Interstate 15/U.S. Route 86 Junction to Fort Hall Boundary Road Reconstruction	Improve Interstate 15 from the junction with Interstate 86 north to the Fort Hall Reservation.	April 2022	July 2022
Interstate 15/US Route 86 System Interchange Complex	Includes (1) road construction and reconfiguration of interchange; (2) bridge repair and construction; and (3) construction of bicycle/pedestrian pathways that run east of Interstate 15.	mid 2022	2025
Interstate 15/U.S. Route 20 Connector[2]	Address safety, congestion, mobility, and travel time near Idaho Falls. Includes addition of pedestrian and bicycle travel.	TBD	TBD
State Highway 33-Newdale to U.S. Route 20 Junction Reconstruction	Reconstruction of a section of State Highway 33 from the U.S. Route 20/State Highway 33 junction to Newdale.	Summer 2022	Fall 2022
U.S. Route 20 Rexburg Interchanges	Improve U.S. Route 20/University Boulevard interchange and U.S. Route 20/ State Highway 33 interchange in Rexburg to address safety, travel times, and mobility.	2024/2025	TBD
U.S. Route 26 Swan Valley to Wyoming Mill and Overlay	Construction from Swan Valley to Wyoming state line. Project area consists of more than 25 miles of construction.	June 2022	August 2022
U.S. Route 26/25th East (Hitt Rd.)	Improvements to increase mobility and safety at U.S. Route 26 and 25th East. Public hearings regarding proposed project ongoing.	TBD	TBD

Sources-

[1] Reference 2.4-125

[2] Reference 2.4-126. Proposed project currently in environmental impact statement development with projected publication in 2024.

TBD - To be determined

Table 2.4-52: Historic Districts and Places in the Expanded Economic Region

Property Name	Category of Property	City	County	Listed Date	Driving Distance[1] (mi)
Fort Hall	Place	Fort Hall	Bannock	10/15/1966	68
Pocatello Westside Residential Historic District	District	Pocatello	Bannock	3/17/2003	78
Lincoln-Johnson Avenues Residential Historic District	District	Pocatello	Bannock	3/15/2006	78
Old Town Residential Historic District	District	Pocatello	Bannock	4/2/2008	78
Pocatello Carnegie Library	Place	Pocatello	Bannock	7/2/1973	79
Standrod House	Place	Pocatello	Bannock	1/18/1973	78
Pocatello Federal Building	Place	Pocatello	Bannock	10/5/1977	78
Sullivan-Kinney House	Place	Pocatello	Bannock	11/9/1977	78
Hood, John, House	Place	Pocatello	Bannock	12/14/1978	78
St. Joseph’s Catholic Church	Place	Pocatello	Bannock	8/29/1978	78
Trinity Episcopal Church	Place	Pocatello	Bannock	2/17/1978	78
Brady Memorial Chapel	Place	Pocatello	Bannock	5/1/1979	80
Church of the Assumption	Place	Pocatello	Bannock	5/1/1979	78
Pocatello Historic District	District	Pocatello	Bannock	6/3/1982	78
Hyde, William A., House	Place	Pocatello	Bannock	6/23/1983	77
Idaho State University Neighborhood Historic District	District	Pocatello	Bannock	9/7/1984	77
Quinn Apartments	Place	Pocatello	Bannock	1/11/1985	78
Rice-Packard House	Place	Pocatello	Bannock	9/12/1985	78
Woolley Apartments	Place	Pocatello	Bannock	10/31/1985	78
A. F. R. Building	Place	Pocatello	Bannock	11/15/1990	78
Idaho State University Administration Building	Place	Pocatello	Bannock	9/23/1993	77
East Side Downtown Historic District	District	Pocatello	Bannock	11/25/1994	78
Pocatello Warehouse Historic District	District	Pocatello	Bannock	9/3/1996	78
Bethel Baptist Church	Place	Pocatello	Bannock	9/30/2021	77
Eastern Idaho District Fair Historic District	District	Blackfoot	Bingham	8/10/2001	55
Blackfoot Railway Depot	Place	Blackfoot	Bingham	11/20/1974	55
Blackfoot LDS Tabernacle	Place	Blackfoot	Bingham	9/19/1977	55
Nuart Theater	Place	Blackfoot	Bingham	10/19/1978	54
Blackfoot I.O.O.F. Hall	Place	Blackfoot	Bingham	5/15/1979	54
Idaho Republican Building	Place	Blackfoot	Bingham	10/16/1979	55

Table 2.4-52: Historic Districts and Places in the Expanded Economic Region (Continued)

Property Name	Category of Property	City	County	Listed Date	Driving Distance[1] (mi)
North Shilling Historic District	District	Blackfoot	Bingham	8/29/1979	55
St. Paul's Episcopal Church	Place	Blackfoot	Bingham	5/15/1979	55
Standrod Bank	Place	Blackfoot	Bingham	8/30/1979	55
Jones, J. W., Building	Place	Blackfoot	Bingham	11/17/1982	55
Shilling Avenue Historic District	District	Blackfoot	Bingham	8/18/1983	55
US Post Office-Blackfoot Main	Place	Blackfoot	Bingham	3/16/1989	54
Just, Nels and Emma, House	Place	Firth	Bingham	7/17/2020	69
Lincoln Creek Day School	Place	Fort Hall	Bingham	4/9/2010	81
Fort Hall Site	Place	Fort Hall	Bingham	11/21/1974	50
Ross Fork Episcopal Church	Place	Fort Hall	Bingham	1/3/1983	67
Ross Fork Oregon Short Lines Railroad Depot	Place	Fort Hall	Bingham	9/7/1984	67
Fish Creek Dam	Place	Carey	Blaine	12/29/1978	52
Beckman, Andrew and Johanna M., Farm	Place	Idaho	Bonneville	11/6/1992	62
Holy Rosary Church	Place	Idaho Falls	Bonneville	7/17/2002	64
Art Troutner Houses Historic District	District	Idaho Falls	Bonneville	9/10/2008	65
Eagle Rock Ferry	Place	Idaho Falls	Bonneville	6/7/1974	63
Wasden Site (Owl Cave)	Place	Idaho Falls	Bonneville	5/24/1976	---
Trinity Methodist Church	Place	Idaho Falls	Bonneville	12/16/1977	63
First Presbyterian Church	Place	Idaho Falls	Bonneville	3/29/1978	63
Bonneville County Courthouse	Place	Idaho Falls	Bonneville	7/10/1979	63
U.S. Post Office	Place	Idaho Falls	Bonneville	5/31/1979	63
Bonneville Hotel	Place	Idaho Falls	Bonneville	8/30/1984	63
Douglas-Farr Building	Place	Idaho Falls	Bonneville	8/30/1984	63
Farmers and Merchants Bank Building	Place	Idaho Falls	Bonneville	8/30/1984	67
Hasbrouck Building	Place	Idaho Falls	Bonneville	8/30/1984	63
Hotel Idaho	Place	Idaho Falls	Bonneville	8/30/1984	63
I.O.O.F. Building	Place	Idaho Falls	Bonneville	8/30/1984	63
Idaho Falls City Building	Place	Idaho Falls	Bonneville	8/30/1984	63
Idaho Falls Public Library	Place	Idaho Falls	Bonneville	8/30/1984	63
Kress Building	Place	Idaho Falls	Bonneville	8/30/1984	63

Table 2.4-52: Historic Districts and Places in the Expanded Economic Region (Continued)

Property Name	Category of Property	City	County	Listed Date	Driving Distance[1] (mi)
Montgomery Ward Building	Place	Idaho Falls	Bonneville	8/30/1984	63
Rocky Mountain Bell Telephone Company Building	Place	Idaho Falls	Bonneville	8/30/1984	63
Shane Building	Place	Idaho Falls	Bonneville	8/30/1984	63
Underwood Hotel	Place	Idaho Falls	Bonneville	8/30/1984	63
Beckman, Oscar and Christina, Farmstead	Place	Idaho Falls	Bonneville	11/19/1991	64
New Sweden School	Place	Idaho Falls	Bonneville	11/19/1991	61
Sealander, Carl S. and Lizzie, Farmstead	Place	Idaho Falls	Bonneville	5/5/1992	63
Ridge Avenue Historic District	District	Idaho Falls	Bonneville	5/20/1993	63
Eleventh Street Historic District	District	Idaho Falls	Bonneville	8/8/1997	63
Idaho Falls Airport Historic District	District	Idaho Falls	Bonneville	9/10/1997	63
Iona Meetinghouse	Place	Iona	Bonneville	5/7/1973	71
Shelton L.D.S. Ward Chapel	Place	Ririe	Bonneville	8/30/1979	80
Arco Baptist Community Church	Place	Arco	Butte	11/29/2001	13
Aviator’s Cave	Place	Arco	Butte	7/22/2010	---
Experimental Breeder Reactor No. 1	Place	Arco	Butte	10/15/1966	9
Goodale’s Cutoff	Place	Arco	Butte	5/1/1974	28
Birch Creek Rock Shelters	Place	Blue Dome	Clark	12/2/1974	---
St. James’ Episcopal Mission Church	Place	Dubois	Clark	5/14/1993	68
Mackay Episcopal Church	Place	Mackay	Custer	11/17/1982	37
Mackay Methodist Episcopal Church	Place	Mackay	Custer	9/7/1984	37
Scott, Josiah, House	Place	Annis	Jefferson	11/8/1982	76
Jefferson County Courthouse	Place	Rigby	Jefferson	9/27/1987	78
Ririe A Pegram Truss Railroad Bridge	Place	Ririe	Jefferson	7/25/1997	88
Ririe B Pegram Truss Railroad Bridge	Place	Ririe	Jefferson	7/25/1997	88
Ririe Community Hall	Place	Ririe	Jefferson	5/8/2019	81
Hotel Patrie	Place	Roberts	Jefferson	11/7/1978	66
Rexburg Stake Tabernacle	Place	Rexburg	Madison	5/3/1974	78
Madison County Courthouse	Place	Rexburg	Madison	9/22/1987	78

Table 2.4-52: Historic Districts and Places in the Expanded Economic Region (Continued)

Property Name	Category of Property	City	County	Listed Date	Driving Distance[1] (mi)
Spori, Jacob, Building	Place	Rexburg	Madison	4/20/1989	78

Source- Reference 2.4-129

[1] Driving distance from CFPP

--- Address restricted

Figure 2.4-1: Expanded Demographic Region of the CFPP

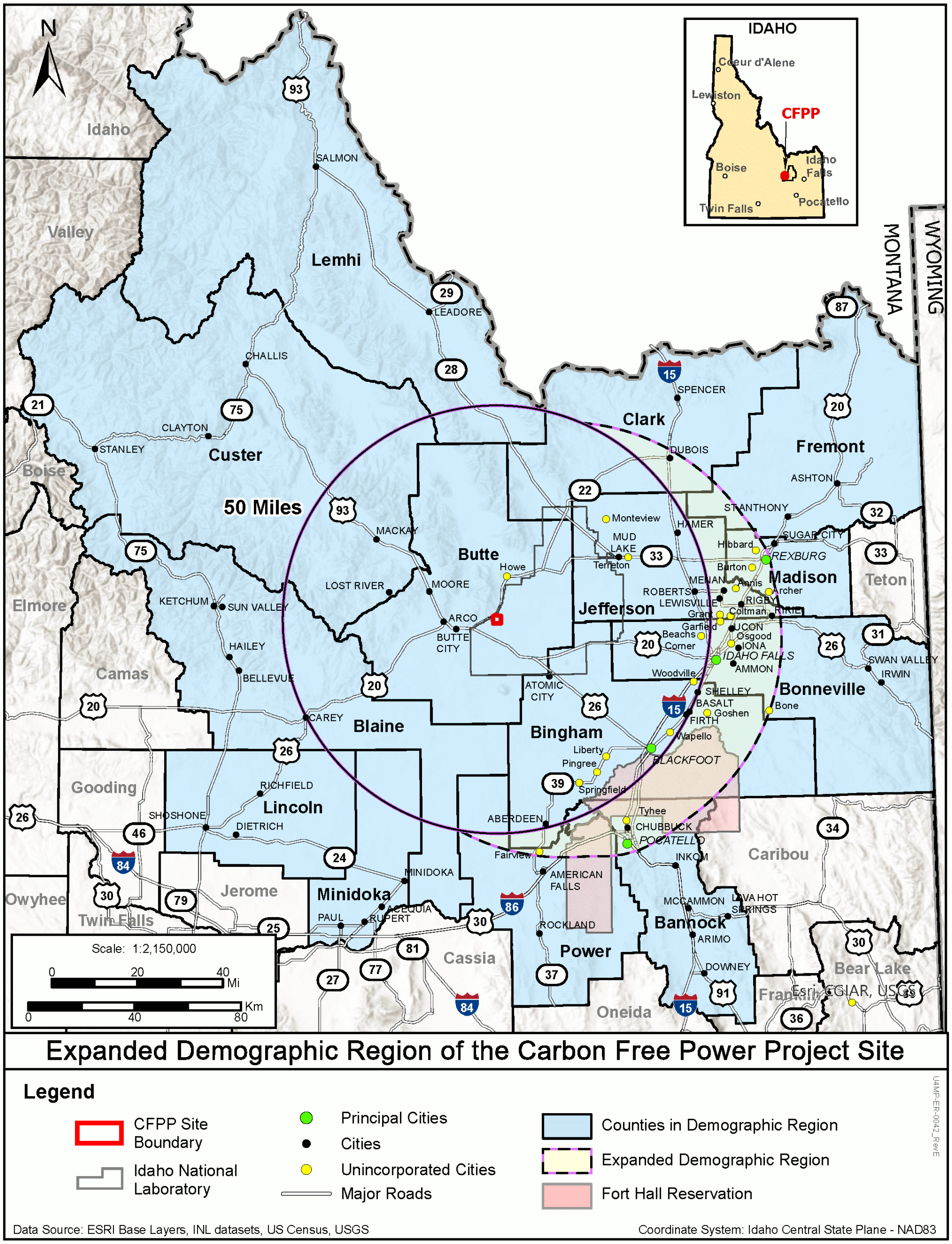


Figure 2.4-2: Regional U.S. Census Block Groups

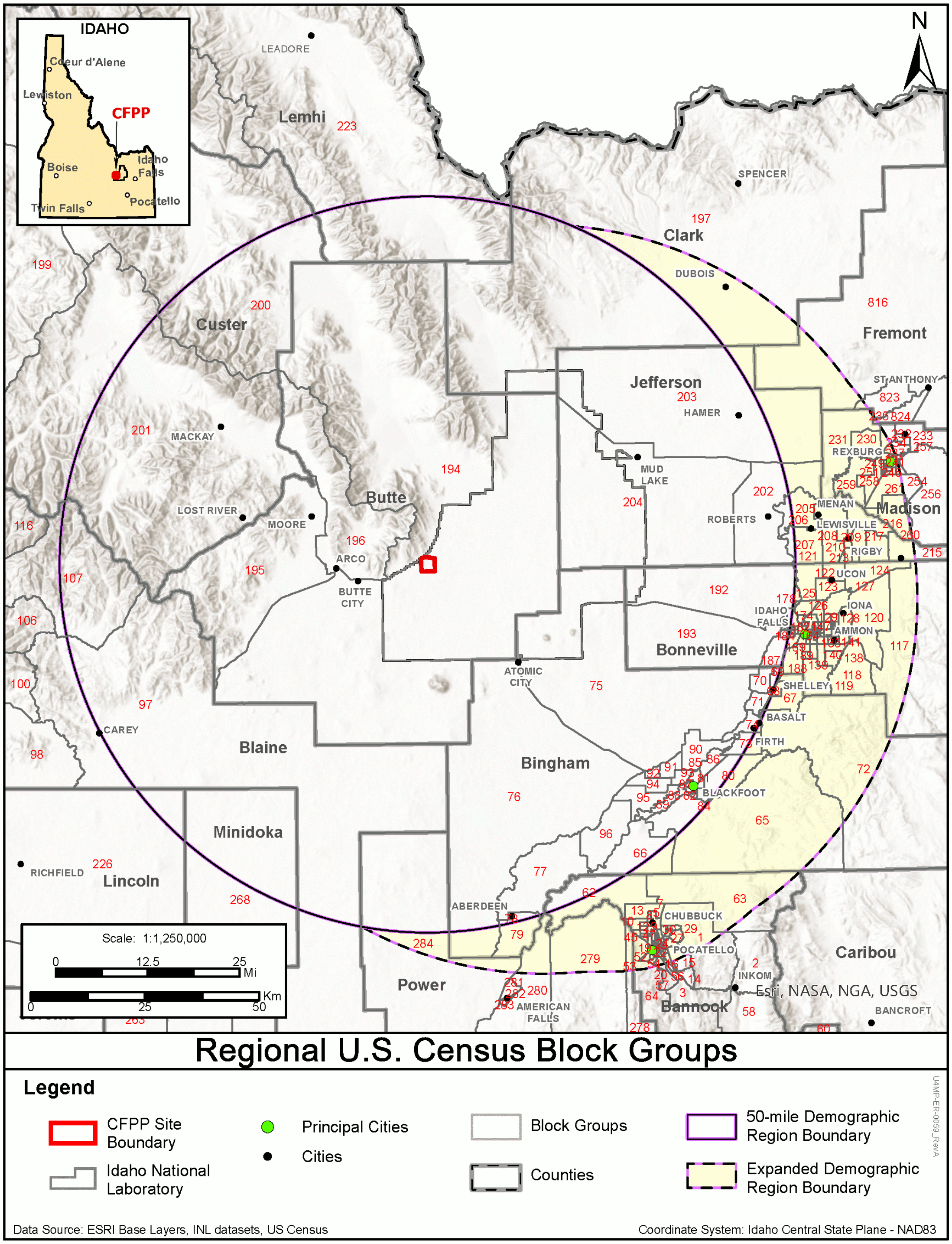


Figure 2.4-3: U.S. Census Block Groups - Bannock County

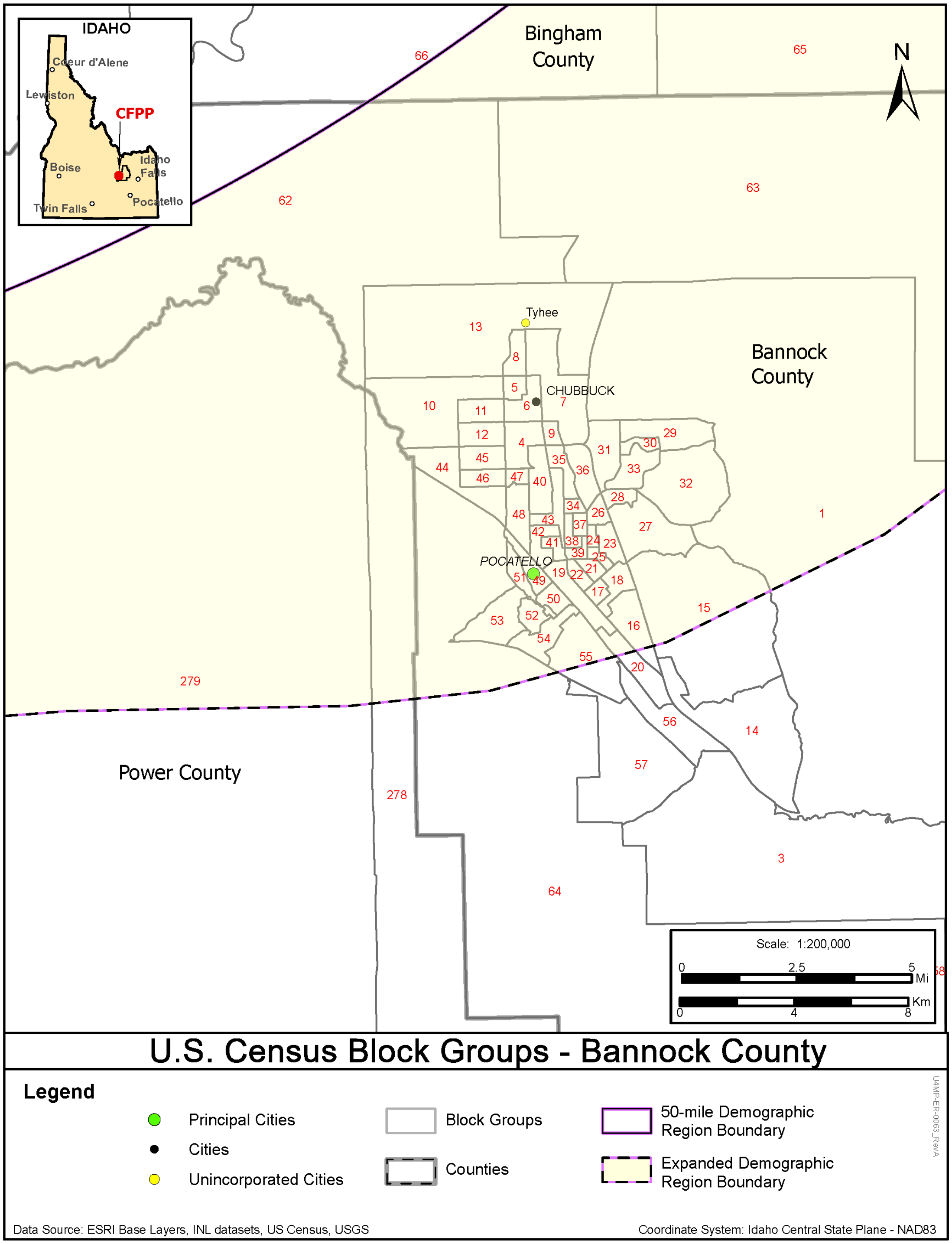


Figure 2.4-4: U.S Census Block Groups - Bingham County

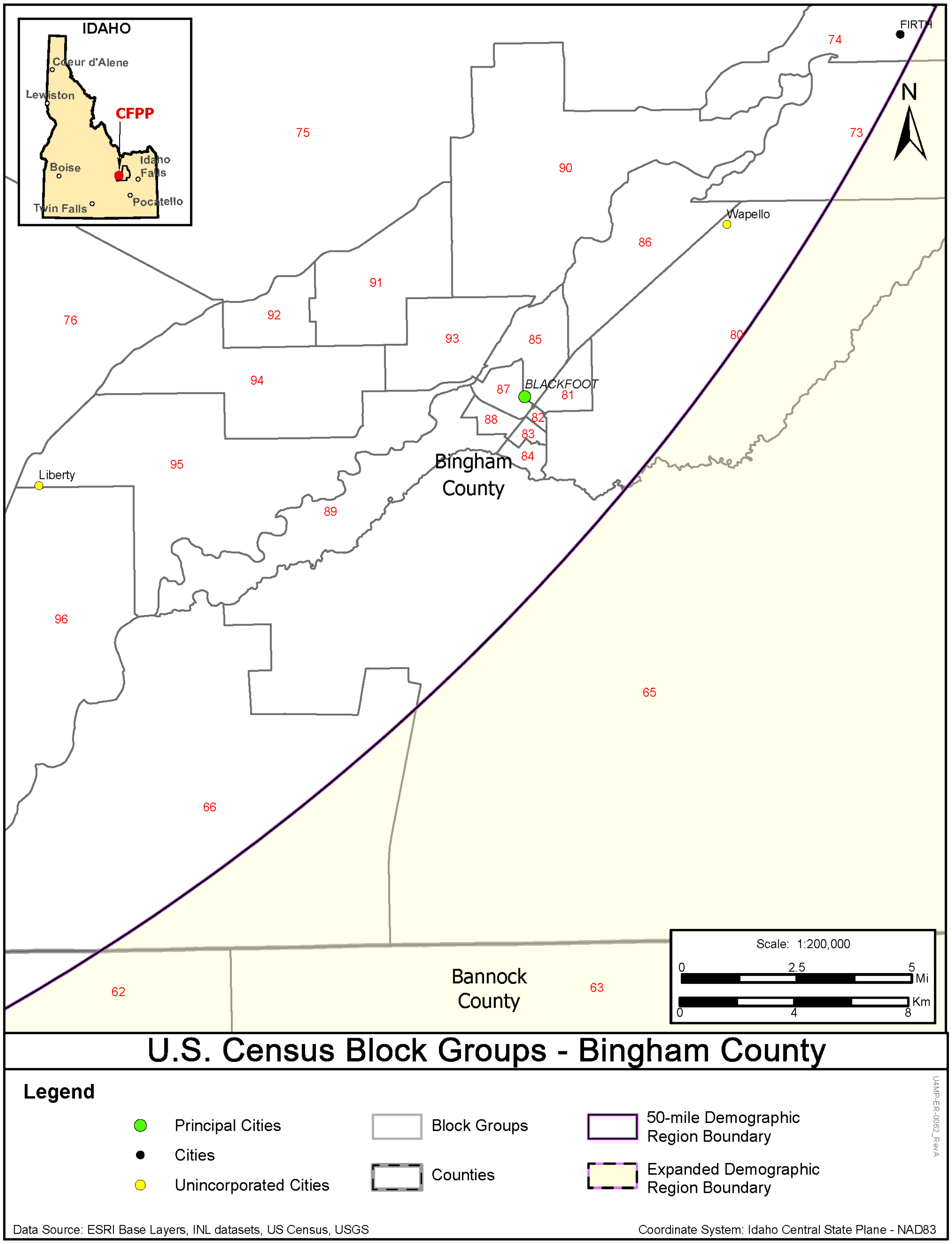


Figure 2.4-5: U.S. Census Block Groups - Bonneville County

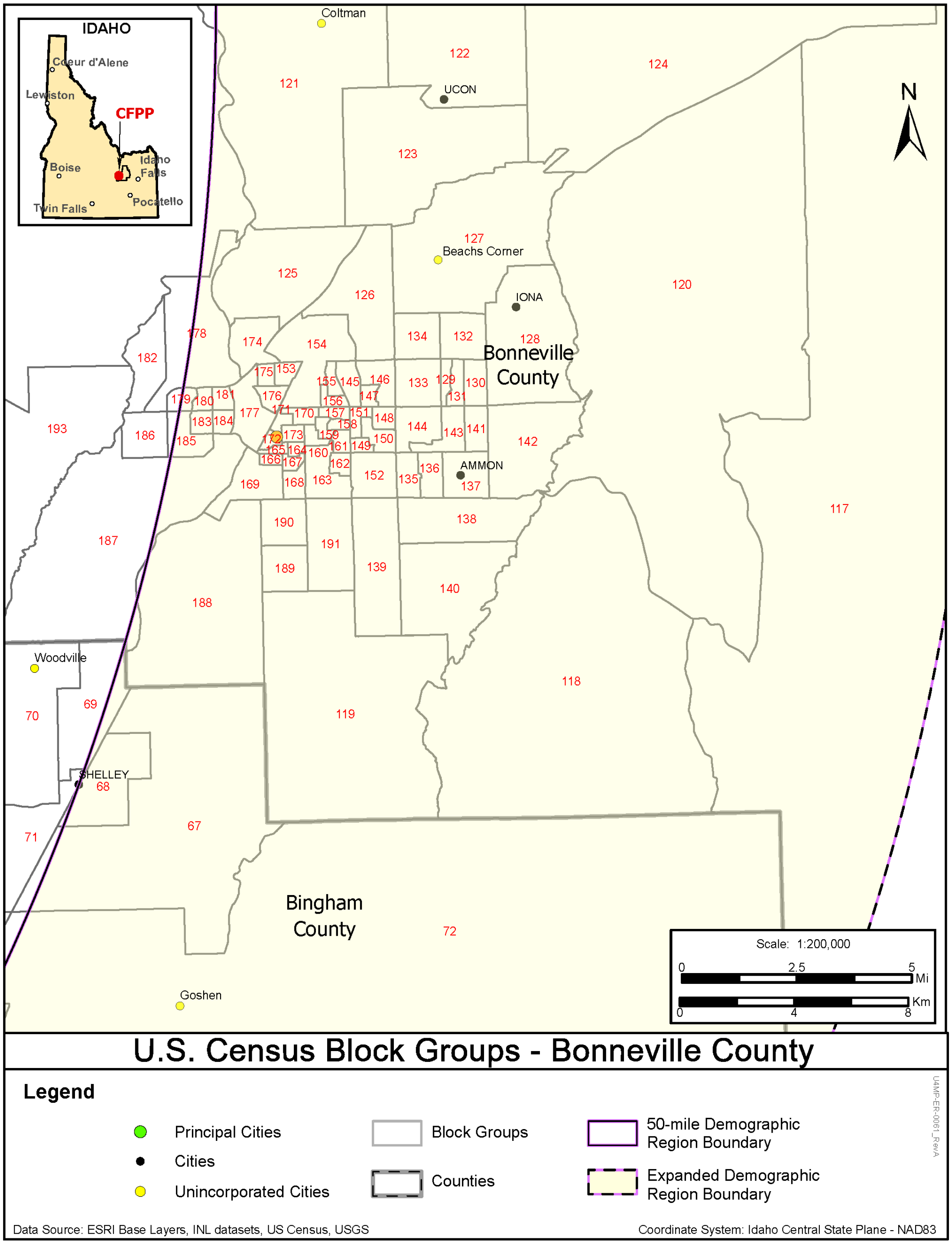


Figure 2.4-6: U.S. Census Block Groups - Madison County

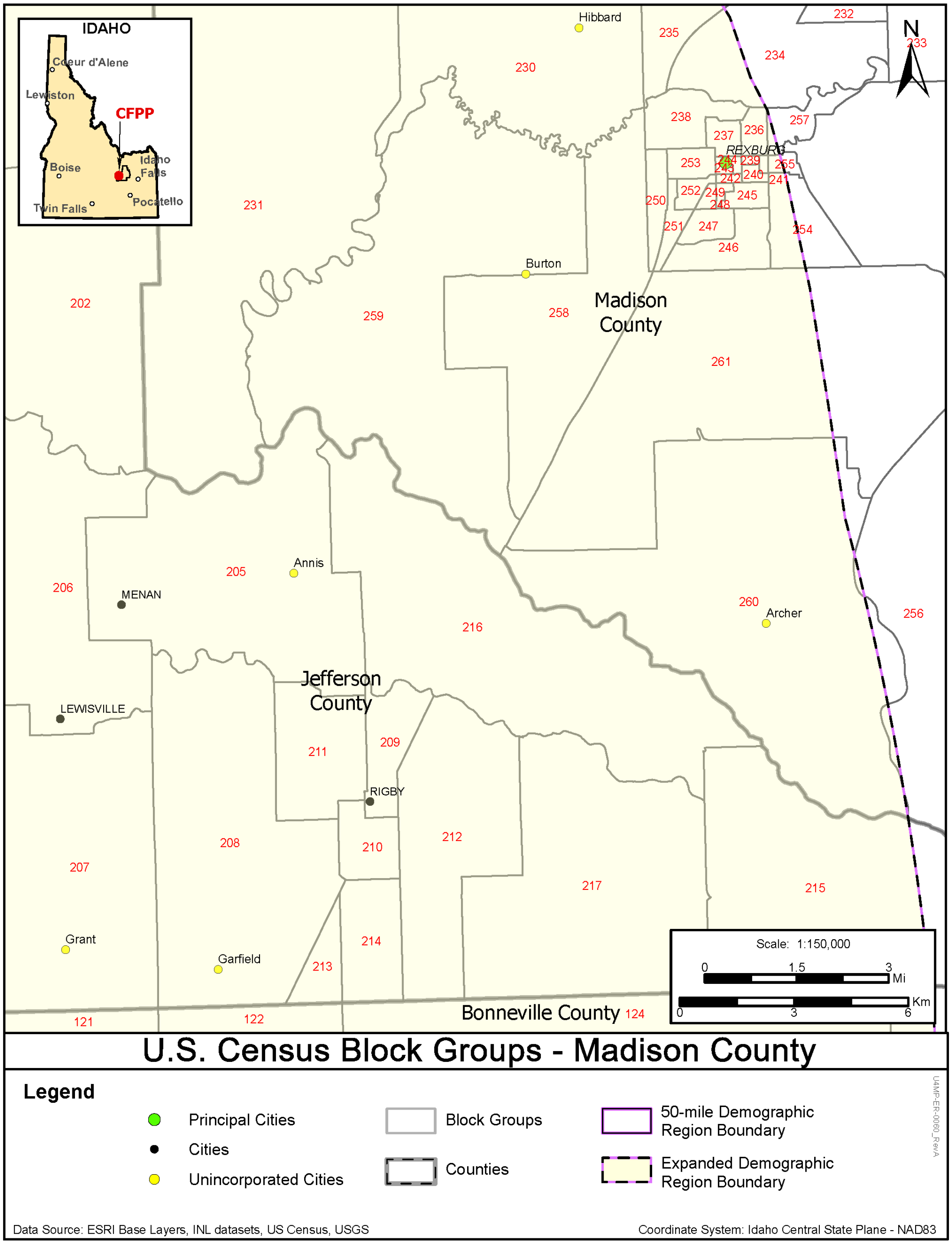


Figure 2.4-7: Expanded Economic Region of the CFPP

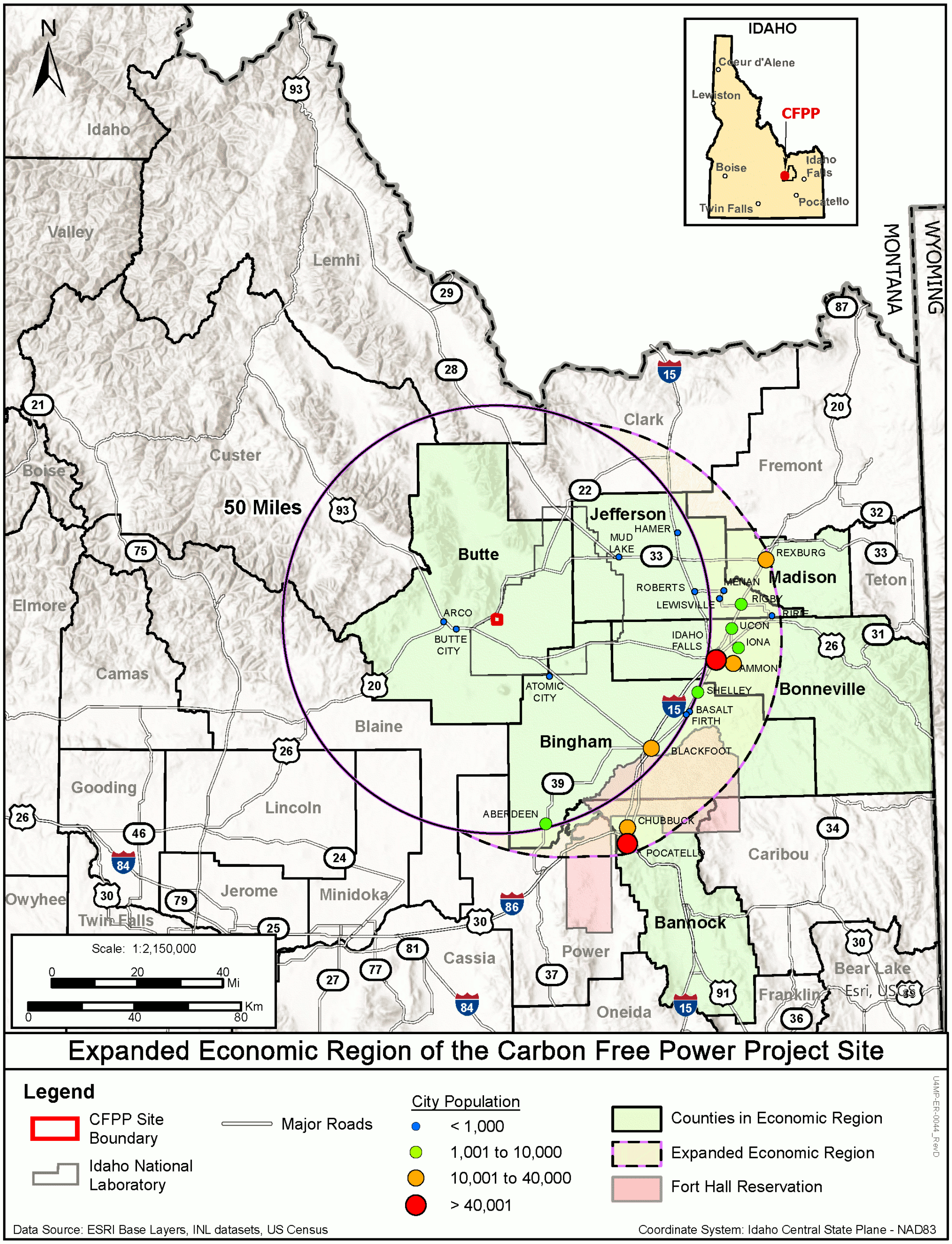


Figure 2.4-8: Agriculture in the CFPP Region

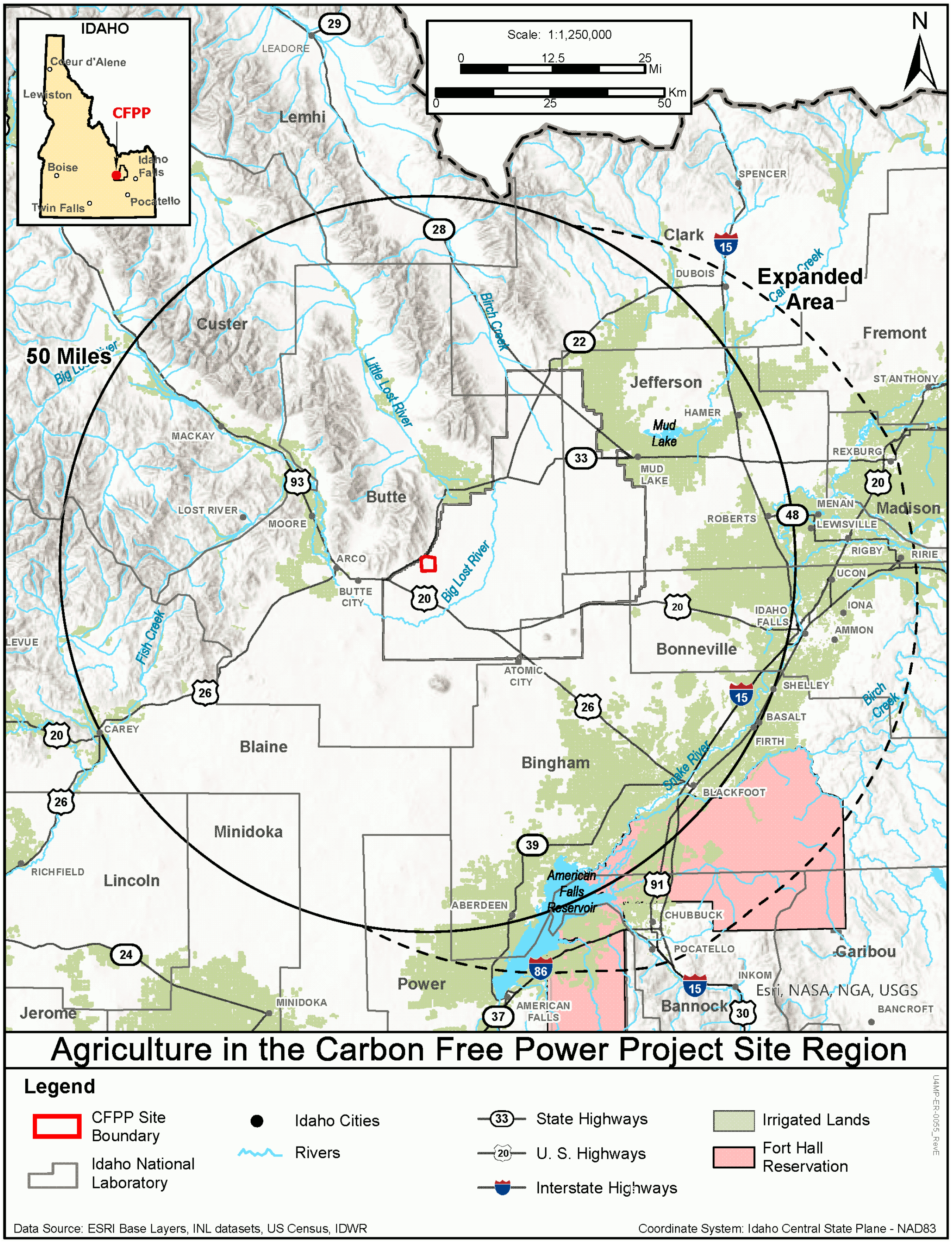


Figure 2.4-9: Federal, State, and Tribal Land Use for the Expanded Economic Region

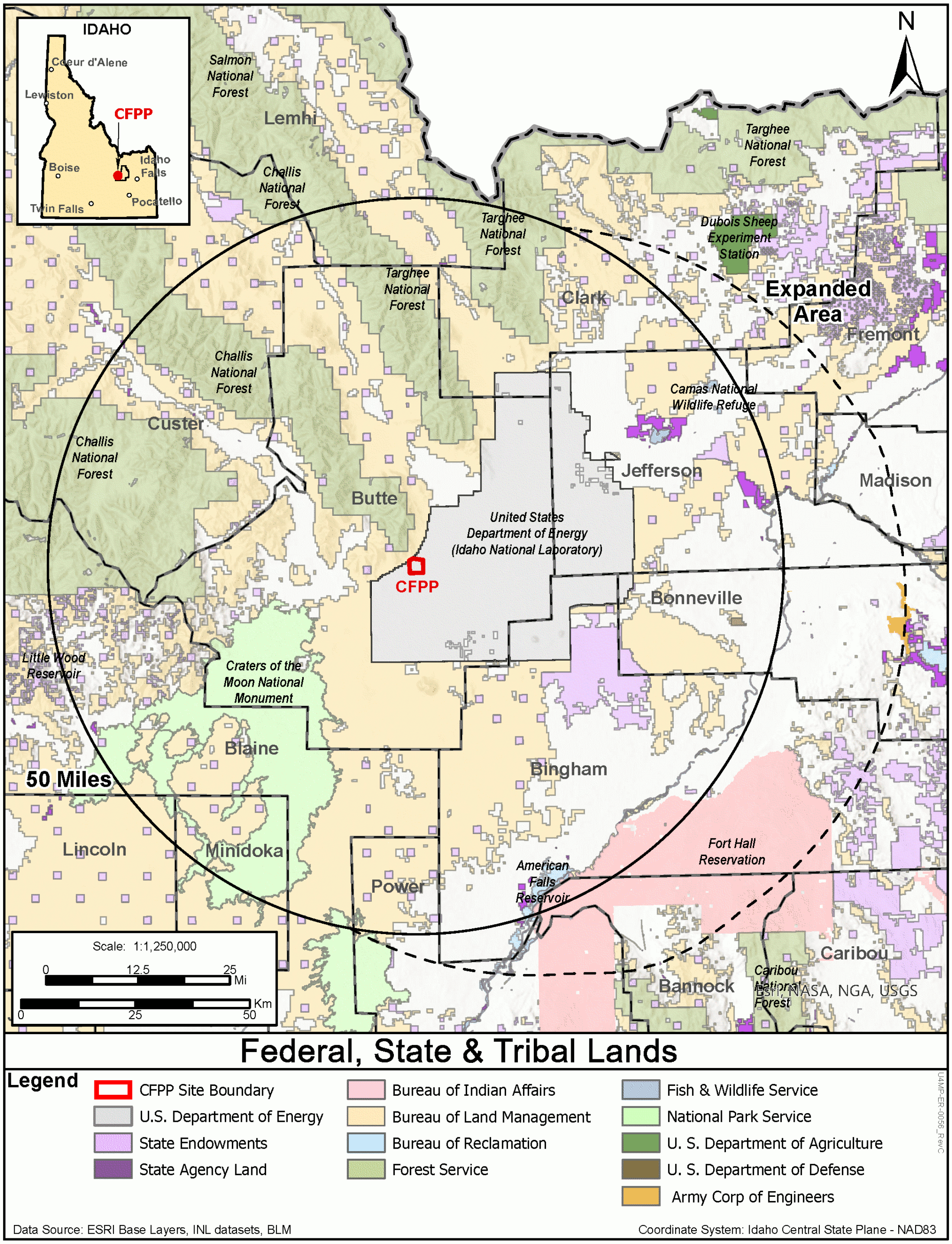


Figure 2.4-10: Roadways in the CFPP Region

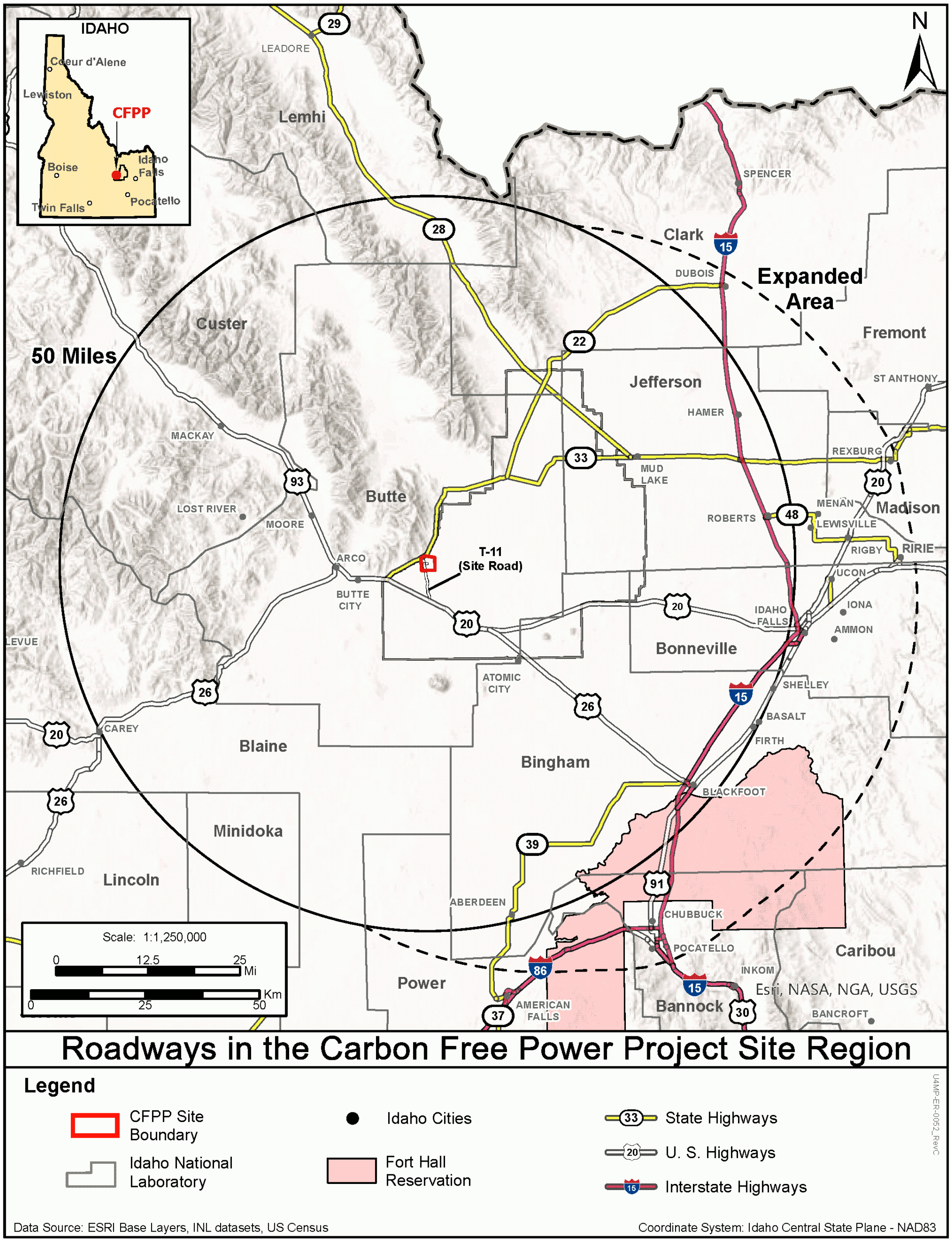


Figure 2.4-11: Railroads in the CFPP Region

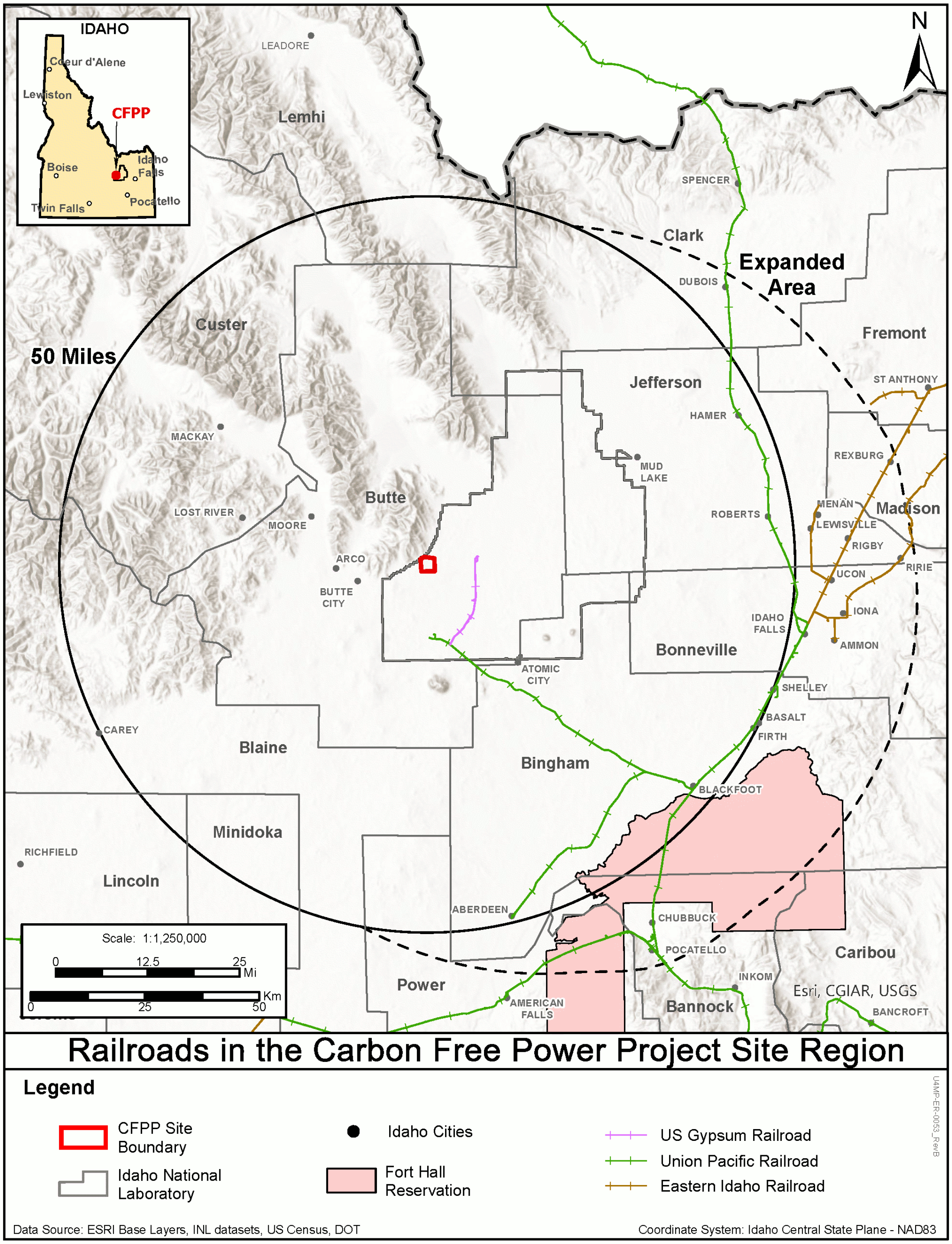


Figure 2.4-12: Railroad Crossings in the CFPP Region

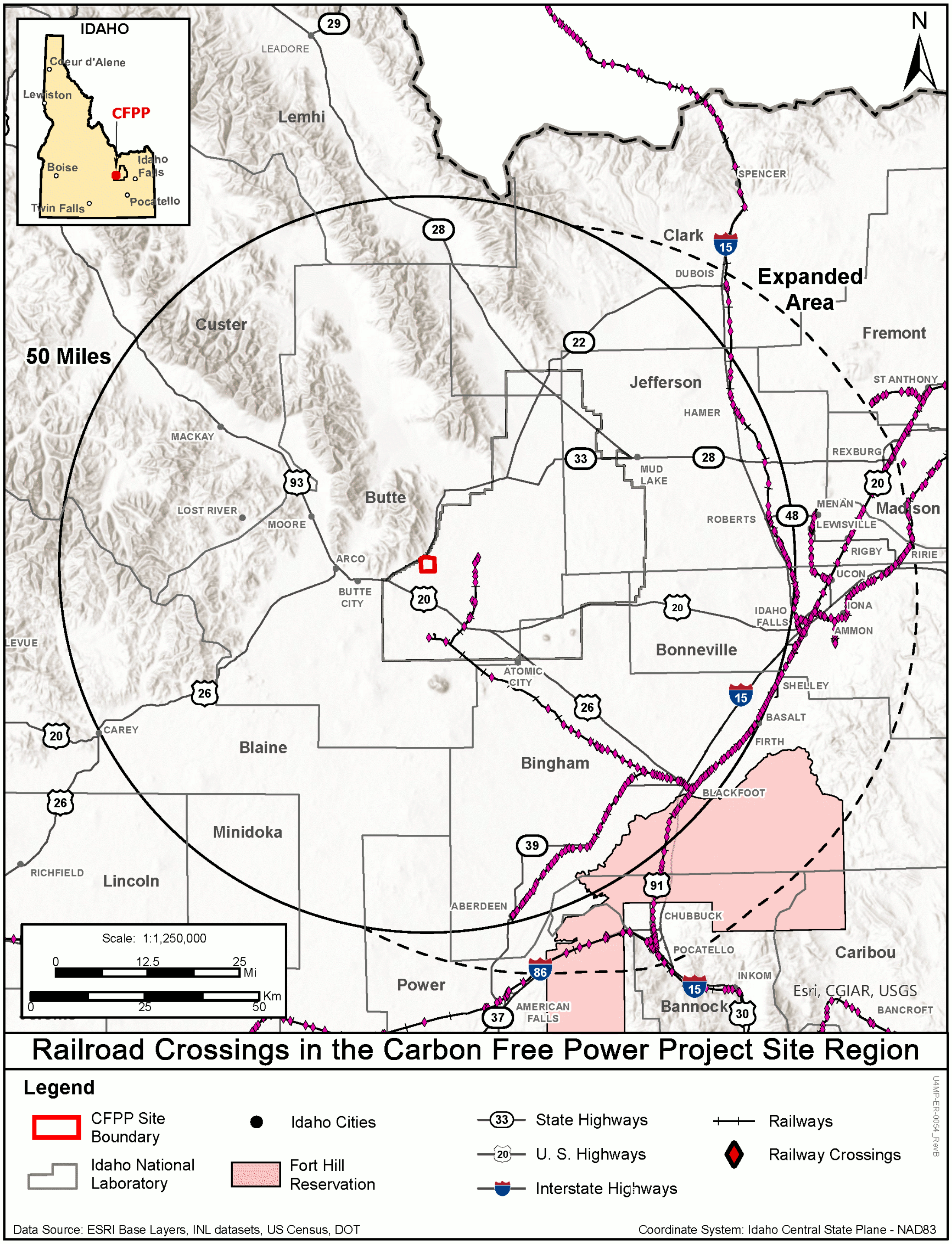


Figure 2.4-13: CFPP Air-Cooled Condensers Viewshed

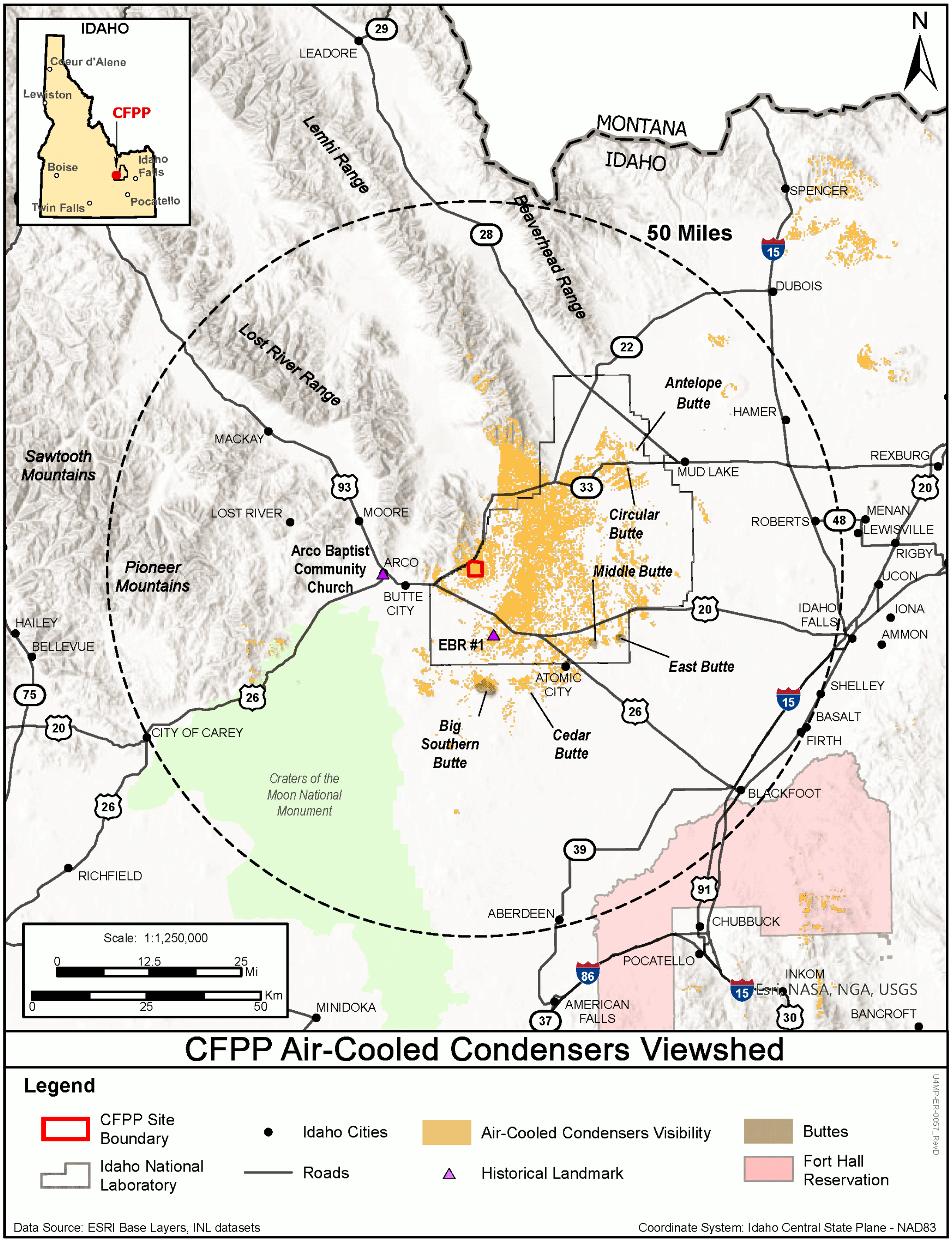
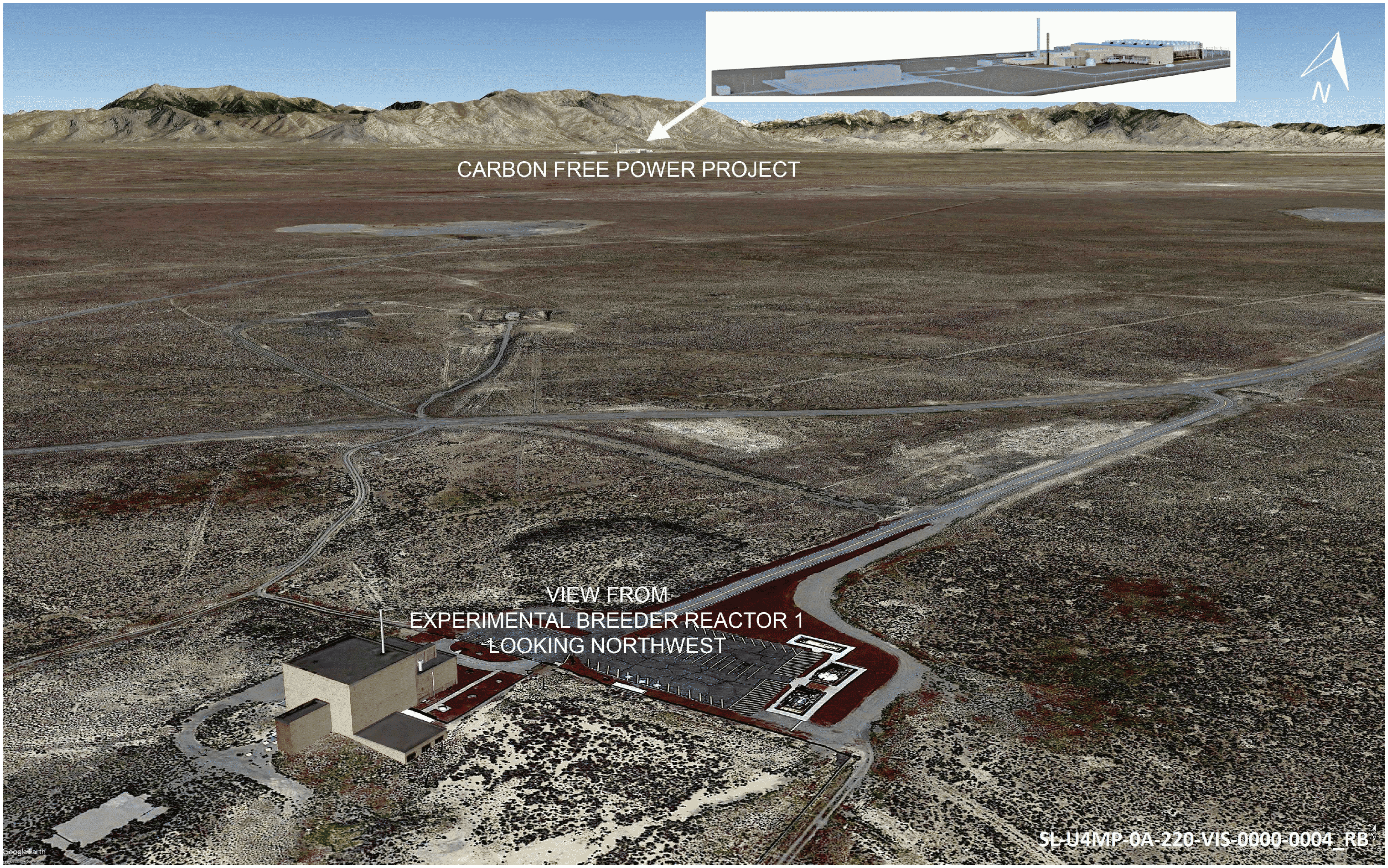


Figure 2.4-14: View of CFPP from the Experimental Breeder Reactor-1



2.5 Environmental Justice

This section identifies and describes minority and low-income populations to support evaluating potential Environmental Justice (EJ) impacts from construction and operation of the CFPP as follows:

- Identification of Potentially Affected EJ Populations - Section 2.5.1
- Identification of Potential Pathways and Communities with Unique Characteristics - Section 2.5.2

Environmental justice refers to a federal policy established by Executive Order 12898, Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations (Reference 2.5-1). The order directs federal agencies to make EJ part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. While independent agencies such as the Nuclear Regulatory Commission (NRC) are requested, not required, to comply with the Executive Order, the NRC voluntarily commits to undertake EJ reviews in licensing activities through the NRC National Environmental Policy Act review and approval process (Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions [Reference 2.5-2]). The Council on Environmental Quality provides guidance for addressing EJ in Environmental Justice: Guidance Under the National Environmental Policy Act (Reference 2.5-3).

2.5.1 Identification of Potentially Affected Environmental Justice Populations

LWA ER Section 2.4 presents information on demographic parameters that support the EJ evaluation in Section 2.5. The following LWA ER Section 2.4 tables and associated figures provide baseline demographic data that serve as the starting point for identifying the Census Block Groups (CBGs) that contain minority, low-income, or both populations:

- Table 2.4-1: Census Block Groups in Expanded Demographic Region by County, presents the CBGs included in the expanded demographic region, which comprises 12 counties located in or partially in a 50-mi radius from the CFPP center point and two additional counties included due to their significance to the potential CFPP labor force. Table 2.4-1 aligns with Figure 2.4-2, which identifies the CBGs in the expanded demographic region, and Figure 2.4-3 through Figure 2.4-6, which provide a more detailed identification of the CBGs in Bannock, Bingham, Bonneville, and Madison counties. Table 2.4-1 provides the CBGs included in the region by county and includes a relational designator that ties the CBGs to 2.4-2 through Figure 2.4-6.
- Table 2.4-3: Total and Race Populations by County within Expanded Demographic Region, provides minority populations within the expanded demographic region.
- Table 2.4-6: Total and Ethnic Populations in Expanded Demographic Region by County, provides data on ethnicity and aggregate minorities within the CFPP expanded demographic region.

- Table 2.4-12: Household Income Distribution within Expanded Demographic Region, provides income data and the percentage of families below poverty level for each county.

These tables and related figures present data consistent with the CBGs in the expanded demographic region as described in LWA ER Section 2.4.1 and summarized in Section 2.5.1.1.

2.5.1.1 Methodology and Analysis

Data on minority and low-income populations in the CFPP region are obtained from the United States Census Bureau (USCB) American Community Survey (ACS). The most recent ACS 5-yr data (2016 to 2020 5-yr period) on race, ethnicity, and poverty available at the time of preparation for this section are used to identify potential EJ populations at the CBG level, as follows:

- Race, USCB Table B02001 (Reference 2.5-4)
- Hispanic or Latino Origin by Race, USCB Table B03002 (Reference 2.5-5)
- Poverty Status in the Past 12 Months of Families by Family Type by Presence of Related Children Under 18 Years of Age of Related Children, USCB Table B17010 (Reference 2.5-6)
- Poverty Status in the Past 12 Months of Individuals by Living Arrangement, USCB Table B17021 (Reference 2.5-7)

The CBGs for each county in the 50-mi CFPP region are identified in LWA ER Section 2.4, Table 2.4-1. As discussed in LWA ER Section 2.4.1, the CFPP defined an expanded demographic region (hereinafter referred to as region in this section) that incorporates an area to the east of the 50-mi radius, as shown in LWA ER Figure 2.4-1.

The region includes portions of 12 counties (Bannock, Bingham, Blaine, Bonneville, Butte, Clark, Custer, Jefferson, Lemhi, Lincoln, Minidoka, and Power counties) within the 50-mi regional radius and adds two counties, Fremont and Madison, located outside the 50-mi radius, for a total of 14 counties. The region includes 27 incorporated cities, 4 of which are principal cities; 21 unincorporated communities; and the Fort Hall Reservation, home to the Shoshone-Bannock Tribes, as shown in LWA ER Table 2.4-2 and Figure 2.4-1.

The NRC guidance provides a methodology to identify CBGs with potentially affected EJ populations through the following quantitative screening of minority and low-income populations:

- a CBG having a minority or low-income population with 50 percent or more of the total population in the CBG
- a CBG having a minority or low-income population with a proportion 20 or more percentage points greater than the same minority or low-income proportion measured at the state level

The demographic data are used in conjunction with geographic information system software (ArcGIS), as described in LWA ER Section 2.1.1.14, to determine the minority and income characteristics of resident populations by each CBG. If a part of a CBG is included within the region, the entire CBG is included in the analysis. The 227 CBGs within the region are evaluated in this analysis. The analysis indicated 46 CBGs meet or exceed the NRC criteria for minority populations, low-income populations, or both.

According to the USCB, Hispanic or Latino ethnicity is not a race. Therefore, a Hispanic or Latino individual can be counted in any of the race categories and in the Hispanic or Latino origin category. Each minority category is evaluated separately, and the total of all minority categories combined is evaluated as the Aggregate Minority population. The Aggregate Minority population is calculated as the total population minus people who identified themselves as White, Not Hispanic or Latino.

2.5.1.2 Minority Populations

For each of the 227 CBGs within the region, CFPP calculated the percent of the CBG population represented by each minority category and the low-income population, which are defined in Regulatory Guide 4.2 and COL-ISG-026. The CFPP selected the entire state of Idaho as the geographic area for comparative analysis and calculated the percentage of each minority category for the state. If a CBG minority percentage exceeded its corresponding state percentage by more than 20 percentage points or exceeded 50 percent of the CBG total, the CBG was identified as containing a minority population.

The ACS 5-yr data for the 2016 to 2020 period identifies the following minority percentages for Idaho:

- Black or African American - 0.66 percent
- American Indian or Alaskan Native - 1.31 percent
- Asian - 1.4 percent
- Native Hawaiian or other Pacific Islander - 0.18 percent
- Some Other Race - 3.77 percent
- Two or More Races - 4.28 percent
- Aggregate Minority - 18.63 percent
- Hispanic or Latino - 12.71 percent
- Low-Income - 8.12 percent as families; 11.94 percent as individuals

For the 227 CBGs within the region, 27 CBGs met the criteria for minority populations. These CBGs are located in Bannock, Bingham, Blaine, Bonneville, Clark, Jefferson, Madison, Minidoka, and Power Counties. Table 2.5-1 and Figure 2.5-1 through Figure 2.5-5 present the results of the minority population analysis. Figure 2.5-1 covers the entire region; Figure 2.5-2 through Figure 2.5-5 provide additional focus on the more highly populated Bannock, Bingham, Bonneville, and Madison Counties, respectively. Table 2.5-2 provides additional details on the criteria screening.

The following summarizes the evaluation against the NRC minority populations criteria of 50 percent of the total CBG or 20 percentage points greater than the state percentage:

- Butte, Lemhi, and Lincoln Counties did not have a CBG that met the criteria for minority populations.
- No CBG met the criteria for Black or African American, Asian, or Native Hawaiian or Other Pacific Islander minority populations.
- Five CBGs (approximately 2.2 percent of the 227 CBGs in the region) met the criteria for American Indian or Alaska Native minority populations. The limiting criterion for two CBGs was the 20 percentage points greater than the state average. The limiting criteria for three CGBs were both the 50 percentage points and 20 percentage points greater than the state average.
- Eight CBGs (about 3.5 percent) met the criteria for Some Other Race minority populations. The limiting criterion for the eight CBGs was the 20 percentage points greater than the state average.
- Four CBGs (about 1.8 percent) met the criteria for Two or More Races. The limiting criterion for the four CBGs was the 20 percentage points greater than the state average.
- Twenty-one CBGs (about 9.3 percent) met the NRC criteria for minority populations for the Aggregate Minority category; 20 percentage points greater than the state average was the limiting criterion for 11 CBGs and 10 CBGs had both the greater than 50 percent and the 20 percentage points greater than the state average as limiting criteria. Six CBGs met the NRC criteria for minority populations but not for Aggregate Minority (i.e., CBGs 97 and 181 for Two or More Races, CBGs 150 and 192 for Some Other Race, and CBGs 126 and 180 for Hispanic or Latino). These CBGs are included in Figure 2.5-1 and Figure 2.5-4 that show minority population CBGs.
- Sixteen CBGs (about 7 percent) met the NRC criteria for minority populations for the Hispanic or Latino category; 20 percentage points greater than the state average was the limiting criterion for 12 CBGs and 4 CBGs had both the greater than 50 percent and the 20 percentage points greater than the state average as limiting criteria.

The LWA ER Section 2.4.2 defines the expanded economic region as those CBGs within the region that are also in Bannock, Bingham, Bonneville, Butte, Jefferson, and Madison Counties. The expanded economic region has a total of 212 CBGs. Bannock, Bingham, and Bonneville Counties account for 22 of the 27 minority population CBGs.

Potential impacts to minority populations from CFPP construction and operation are discussed in LWA ER Section 4.5 and the Combined License Application.

2.5.1.3 Low-Income Populations

The low-income evaluation uses the expanded demographic and economic regions used in Section 2.5.1.2. The ACS census data for poverty status are used for the identification of low-income populations. The USCB determines poverty status for the ACS by comparing a person's total family income in the last 12 months with the appropriate poverty threshold for that person's family size and composition (i.e., number of family members under 18 years old). For individuals not living with anyone related, the person's own income is compared with his or her poverty threshold (How the Census Measures Poverty [Reference 2.5-8]).

The low-income analysis addresses both household poverty and individual poverty. The number of low-income households in each CBG is divided by the total number of households in the CBG to obtain the percentage of low-income households. Similarly, the number of low-income individuals in each CBG is divided by the total number of individuals within that CBG to obtain the percentage of low-income persons. These percentages are compared to the NRC criteria of 50 percent of the CBG population or 20 percentage points higher than the Idaho percentages to determine each CBG with low-income populations. This provides a conservative approach to understanding the low-income populations and avoiding underestimating the low-income condition of the region.

Table 2.5-1 and Figure 2.5-1 through Figure 2.5-5 illustrate the number and distribution of low-income CBGs within the region based on the screening against NRC criteria. For the 227 CBGs within the region, a total of 26 CBGs met the criteria for low-income populations. These CBGs are located in Bannock, Bingham, Bonneville, Butte, Custer, Jefferson, Madison, and Minidoka Counties. Lemhi and Lincoln Counties do not have CBGs that meet the criteria for low-income populations. Two counties, Bannock (6) and Madison (11), account for 17 of the 26 CBGs. The low-income CBGs in Madison County are reflective of the college student population in that area.

Butte County, where CFPP is located, has one low-income population CBG, as shown on Figure 2.5-1. This CBG is located west and northwest of the CFPP site and includes the towns of Arco and Butte City, Idaho. This CBG is the closest low-income population to the CFPP site. Butte City is approximately 10 mi west and Arco is approximately 12 mi west of the CFPP site (as measured from the CFPP center point to the city point location).

Six CBGs had both minority and low-income populations. These CBGs are located in Bannock, Bingham, Bonneville Jefferson, Madison, and Minidoka Counties and shown on Figure 2.5-1 through Figure 2.5-5.

Potential impacts to low-income workers from CFPP construction are discussed in LWA ER Section 4.5 and the Combined License Application.

Migrant agricultural workers may make up a portion of the minority or low-income populations within the region. Information on migrant workers is collected by the

United States Department of Agriculture (USDA), Census of Agriculture (Reference 2.5-9). Per the USDA, migrant agricultural farm workers are individuals whose employment requires travel that prevents the worker from returning to his or her permanent place of residence the same day. These workers may or may not have permanent residences. Some migrant workers may follow the planting, tending, and harvesting of crops, particularly fruits and vegetables, throughout rural areas of states and regions of the western United States. Others may be permanent residents near the CFPP site who travel from farm to farm for seasonal work.

Data for Reference 2.5-9 were collected in 2017 and reported in 2019, the most recent Census of Agriculture. LWA ER Table 2.4-11 provides information on farms in the region that employ migrant workers.

According to Reference 2.5-9, as shown on LWA ER Table 2.4-11, the 7016 farms in the 14 counties in the demographic region employed 2030 migrant workers. These data represent county-level information as specific data were not collected at the CBG level. Jefferson County employed the greatest number of migrant workers, 445 workers at 750 farms. Bingham and Minidoka counties each had more than 400 migrant workers in their respective number of farms. As shown in LWA ER Figure 2.4-8, the majority of farming in Minidoka County is located outside the 50-mi radius from the CFPP center point. This implies minimal to no impacts to migrant farm workers in Minidoka County relative to the CFPP. Potential impacts to migrant workers from CFPP construction and operation are discussed in LWA ER Section 4.5 and the Combined License Application.

2.5.2 Identification of Potential Pathways and Communities with Unique Characteristics

To identify minority or low-income populations that may not be identified using census data, relevant organizations were contacted to identify uniquely vulnerable minority or low-income communities located near the CFPP site. LWA ER Table 2.5-3 lists the agencies, organizations, academic institutions, and businesses contacted. Contacts included telephone calls and in-person visits to local and county agencies and organizations in the 14 counties located within the region from October to December 2022 and January 2023. Organizations were asked to identity concentrations of minority or low-income populations within a compact area and to provide information on those populations that historically obtain or supplement their food supply through planting, hunting, or fishing.

2.5.2.1 Subsistence

While hunting and fishing are commonly practiced in southeastern Idaho, none of the agencies contacted indicated subsistence as the reason. They indicated hunting and fishing tend to be recreational in nature. The Shoshone-Bannock is one group that may rely more heavily on hunting and fishing. Tribal members have rights to travel between the Fort Hall Reservation and public lands on the Salmon River and its tributaries to the north (approximately 150 mi) to collect fish during salmon and steelhead spawning runs from May to November. The percentage of their diet from fish was not provided by the Tribal member contacted. In recent decades the total number of spawning salmon in this watershed has been fewer than 5000 fish and take by Native Americans (including tribes other than the Shoshone-Bannock) has typically been a few hundred fish at most. The Shoshone-Bannock Tribes also have treaty rights to hunt and gather plants in some areas surrounding the Idaho National Laboratory site, especially up the Little Lost River valley.

2.5.2.2 Organization Input on Environmental Justice Issues

Based on input received from the organizations identified in LWA ER Table 2.5-3, poverty, homelessness, and elderly care are the main EJ issues in the expanded economic region. Bannock and Madison Counties have low-income populations associated with students and student families at the universities. Butte, Clark, Custer, Fremont, Jefferson, and Lemhi Counties also identified poverty as an issue.

Elderly care is identified as an issue in Bannock, Butte, Custer, and Fremont counties. Bannock County has active elderly programs and church involvement in providing services. The other three counties have limited elderly services.

The Fort Hall Reservation, home to the Shoshone-Bannock Tribes, is located in Bannock, Bingham, and Power Counties. Poverty is the main EJ issue for the Tribes; the Tribes are also concerned with establishing and maintaining their treaty rights. The Reservation has an extensive health and human services program, including a modern staffed health center, senior programs, schools, and religious groups. Their representative identified employment opportunities and respect for Tribal land rights as main EJ issues with the CFPP.

2.5.2.3 Potential Pathways of Disproportionate Impacts to Environmental Justice Population

Public health districts for eastern, southeastern, and south central Idaho were contacted to identify pre-existing health conditions in minority or low-income populations that could result in disproportionately adverse effects associated with CFPP. Eastern Idaho Public Heath covers seven of the counties in the region: Bonneville, Clark, Custer, Fremont, Jefferson, Lemhi, and Madison. Southeastern Idaho Public Heath covers four of the counties: Bannock, Bingham, Butte, and Power Counties. South Central Public Health District covers three of the counties: Blaine, Lincoln, and Minidoka Counties.

Input from Eastern Idaho Public Health representatives indicated a surge in workers could theoretically cause issues in housing and other services. However, the district has been able to address housing and other issues related to significant growth over the past few years and do not expect the CFPP worker influx to substantially impact EJ populations. Migrant workers have not been and are not expected to be an issue for housing and other public services. Mental health is identified as the biggest issue in the district due to a shortage of counselors, facilities, and other resources. Mental health is not expected to be an EJ pathway for CFPP.

Information from the following national and state online sources of public health-related information is used to evaluate health issues in the region that might disproportionately impact minority and low-income populations:

- Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report for November 22, 2013, CDC Health Disparities and Inequalities Report - United States, 2013 (Reference 2.5-10)
- CDC, Morbidity and Mortality Weekly Report for January 14, 2011, CDC Health Disparities and Inequalities Report - United States, 2011 (Reference 2.5-11)
- Agency for Healthcare Research and Quality (AHRQ) 2022 National Healthcare Quality and Disparities Report (Reference 2.5-12).
- Idaho Department of Health and Welfare, Get Healthy Idaho 2020-2024 (Reference 2.5-13)
- Idaho Department of Health and Welfare, Get Healthy Idaho 2020-2024, 2021 Update (Reference 2.5-14)
- University of Wisconsin Population Health Institute
  - 2022 County Health Rankings National Findings Report (Reference 2.5-15)
  - County Health Rankings & Roadmaps 2022 State Report Idaho (Reference 2.5-16)

The CDC and AHRQ provide national data that identify examples of health disparities in racial and ethnic minority populations. Reference 2.5-11 and Reference 2.5-10 identify and evaluate key factors that affect health and lead to health disparities in the United States. Of the factors identified in the national data, the ones potentially relevant to the CFPP include inadequate and unhealthy housing, unhealthy air quality, residential proximity to major highways, motor vehicle-related deaths, and asthma based on the CFPP location relative to minority and low-income populations and the CFPP construction and operational activities.

Demand for housing associated with the CFPP construction workers may impact housing availability from home, rentals, and recreational vehicle sites. However, the anticipated increase from construction workers is expected to be within the projected population growth of the region. Further, available housing data suggest limited impacts as housing and rental availability in the region exceed the expected construction-related increase in workers to the area. Additional analysis in LWA ER Section 4.5 addresses potential housing impacts to minority and low-income populations relative to construction. Impacts from operations are not anticipated due to the minimal number of required workers to operate the CFPP.

The CFPP maintenance outages may result in short-term worker increases, but impacts are expected to be minimal due to the short outage duration.

Air quality is discussed in detail in LWA ER Section 2.7and Section 2.8. Census block group 196 is located within Butte County (as shown on Figure 2.5-1) and meets the criteria for a low-income population CBG. This is the closest minority or low-income CBG to the CFPP. This CBG extends from the corner of the INL site, located to the southwest of the CFPP site, up the Big Lost River valley. Butte County has a population of 2603 people (based on Reference 2.5-4); CBG 196 has a population of 987 people. The communities of Arco and Butte City are located within the CBG and represent the main populations with 879 and 78 people, respectively. Minimal air quality impacts are anticipated for this CBG due to the location relative to prevailing wind directions and the location of the Lost River Range relative to CFPP and these communities. Limited air impacts correspond to limited asthma impacts in communities near CFPP.

Wildfire smoke contains a mixture of gases, chemical, and fine particles and can adversely impact air conditions, contributing to health risks, especially in people with heart or lung conditions (e.g., asthma or chronic obstructive pulmonary disease), older adults, infants and children, and pregnant women (Southeastern Idaho Public Health [Reference 2.5-17]).

United States Routes 20 and 26 and State Highway 33 are expected to be the main access highways to the CFPP site. Limited CFPP-related traffic is expected on U.S. Route 93 that runs northwest from Arco after branching off from U.S. Routes 20 and 26 west of the CFPP site. Increases in highway use related to CFPP construction and operations could increase minority and low-income population exposure to traffic-related air pollution. No minority or low-income populations are identified along the main access roads to the CFPP site. Minimal impacts are likely for the low-income population in CBG 196 due to the short road section potentially used to access the CFPP site and the small rural population in the area.

While Blaine, Clark, Minidoka, and Power Counties have CBGs with minority or low-income populations, these counties are not expected to contribute appreciable workers to the CFPP. For Blaine County, travel times to CFPP are long; Clark County communities are located long distances from CFPP; and Minidoka and Power communities are located farther south in their respective counties, outside the region.

The remainder of the minority and low-income populations are within Bannock, Bingham, Bonneville, and Madison Counties, with communities located at the outer edge of the region. Air quality and transportation impacts to minority and low-income populations in these counties are not expected due to the distance from CFPP and the lack of residences along the main access roads from these areas to CFPP.

The Idaho Department of Environmental Quality monitors real-time air quality at Idaho Falls, Pocatello, and Ketcham communities located in or near the expanded demographic area. These three locations show historically good air quality conditions (Idaho Department of Environmental Quality - Real-Time Air Monitoring [Reference 2.5-18]).

The Idaho public health districts maintain data on population health issues. Priority environmental health factors that align with the CFPP activities include air pollutants, drinking water, land development, and vectors, particularly mosquitoes carrying West Nile virus.

Per the CDC (West Nile Virus [Reference 2.5-19]), mosquitoes contract West Nile virus by exposure to contaminated birds or animals that can be spread to humans through mosquito bites. Ponds at the CFPP could provide breeding grounds for mosquitoes. Minority populations are not expected to be disproportionately impacted as mosquitoes generally only travel 1–3 miles from their birthplace, much shorter than the distance to the closest potential minority or low-income populations at Butte City and Arco. Idaho had 3 cases of West Nile virus in 2022, 16 in 2021, and a total of 60 from 2017 through 2020 for the state. County-specific data were not provided by the CDC. The CFPP takes necessary control measures to mitigate mosquito populations around stormwater and operational ponds.

County health rankings (Reference 2.5-16) provide measures of the current overall health (health outcomes) of U.S. counties, including the counties in the region except Clark County, which was not reported. Rankings data include a variety of measures, such as high school graduation rates, access to nutritious foods, and the percent of children living in poverty, which impact the future health of communities (health factors). The ranking criteria judged most applicable to the CFPP are physical environmental parameters of Air and Water Quality and Housing and Transit. Bingham, Butte, Custer, Fremont, Jefferson, and Power Counties ranked in the first quartile of the state, indicating the healthiest quartile of the state counties for these environmental parameters. Bannock, Lemhi, and Lincoln Counties are in the second quartile; Blaine, Bonneville, and Minidoka Counties are in the third quartile; and Madison is in the fourth quartile.

Other health conditions exist in the region based on input from the organizations contacted about EJ issues and their associated web sites. Many of these health issues are not affected by the CFPP construction or operations, such as diabetes, heart disease, or drug use.

Overall, EJ impacts are expected to be small from the CFPP construction and operation due mainly to the distances from the project site to minority and low-income populations. The LWA ER Section 4.5 provides analyses of potential EJ impacts.

2.5.3 References

2.5-1 United States, Executive Office of the President (William J. Clinton), Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994, Federal Register, Vol 59, No. 32, February 16, 1994, pp. 7629.

2.5-2 Nuclear Regulatory Commission, "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions," August 18, 2004, Federal Register, Vol. 69, No. 163, August 24, 2004, pp. 52040.

2.5-3 Council on Environmental Quality, "Environmental Justice: Guidance Under the National Environmental Policy Act," Executive Office of the President, Washington, D.C., December 10, 1997.

2.5-4 U.S. Census Bureau, American Community Survey. American Community Survey 5-Year Estimates 2016-2020, Table B02001, Race, accessed August 5, 2022 from https://data.census.gov/cedsci/.

2.5-5 U.S. Census Bureau, American Community Survey. American Community Survey 5-Year Estimates 2016-2020, Table B03002, Hispanic or Latino Origin by Race, accessed August 5, 2022 from https://data.census.gov/cedsci/.

2.5-6 U.S. Census Bureau, American Community Survey. American Community Survey 5-Year Estimates 2016-2020, Table B17010, Poverty Status in the Past 12 Months of Families by Family Type by Presence of Related Children Under 18 Years by Age of Related Children, accessed August 5, 2022 from https://data.census.gov/cedsci/.

2.5-7 U.S. Census Bureau, American Community Survey. American Community Survey 5-Year Estimates 2016-2020, Table B17021, Poverty Status of Individuals in the Past 12 Months of Individuals by Living Arrangement, accessed August 5, 2022 from https://data.census.gov/cedsci/.

2.5-8 U.S. Census Bureau. How the Census Measures Poverty, accessed June 21, 2022 from https://www.census.gov/topics/income-poverty/poverty/guidance/poverty-measures.html.

2.5-9 U.S. Department of Agriculture, National Agricultural Statistics Service. 2017 Census of Agriculture, Volume 1, Geographic Area Series, Part 51, AC-17-A-51, April 2019, Washington, D.C.

2.5-10 Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report; "CDC Health Disparities and Inequalities Report - United States, 2013"; Center for Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention; Atlanta, Georgia; Volume 62, Number 3, November 22, 2013.

2.5-11 Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report; "CDC Health Disparities and Inequalities Report - United States, 2011"; Epidemiology and Analysis Program, Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention; Atlanta, Georgia; Volume 60, January 14, 2011.

2.5-12 Agency for Healthcare Research and Quality, "2022 National Healthcare Quality and Disparities Report," Agency for Healthcare Research and Quality; Rockville, Maryland; October 2022; AHRQ Pub. No. 22(23)-0030.

2.5-13 Idaho Department of Health & Welfare, Division of Public Health, "Get Healthy Idaho 2020-2024," accessed January 1, 2023 from https://www.gethealthy.dhw.idaho.gov/copy-of-introduction.

2.5-14 Idaho Department of Health & Welfare, Division of Public Health, "Get Healthy Idaho 2020-2024, 2021 Update," accessed January 1, 2023 from https://www.gethealthy.dhw.idaho.gov/copy-of-introduction.

2.5-15 University of Wisconsin Population Health Institute, Reports, 2022 County Health Rankings National Findings, accessed December 28, 2022 from https://www.countyhealthrankings.org/reports.

2.5-16 University of Wisconsin Population Health Institute, Rankings Data & Documentation, Idaho Data and Resources, County Health Rankings & Roadmaps 2022 State Report Idaho, accessed January 3, 2023 from https://www.countyhealthrankings.org/explore-health-rankings/idaho/data-and-resources.

2.5-17 Southeastern Idaho Public Health, Wildfire Smoke, accessed January 3, 2023 from https://www.siphidaho.org/environmental-health/wildfire-smoke.php.

2.5-18 Idaho Department of Environmental Quality, Real-time Air Monitoring, accessed January 3, 2023 from https://airquality.deq.idaho.gov/home/map.

2.5-19 Centers for Disease Control and Prevention, West Nile Virus, Statistics & Maps, accessed January 9, 2023 from https://www.cdc.gov/westnile/statsmaps/index.html.

Table 2.5-1: Census Block Groups in the Demographic Region by Environmental Justice Status

County	Total CBGs in Expanded Demographic Region[1]	Number and Percentage of Census Block Groups with Potentially Affected Minority Populations											
		American Indian or Native Alaskan[1]		Some Other Race[1]		Two or More Races[1]		Aggregate Minority[1]		Hispanic or Latino[2]		Low-Income[3]	
		Number of CBGs	% of Total	Number of CBGs	% of Total	Number of CBGs	% of Total	Number of CBGs	% of Total	Number of CBGs	% of Total	Number of CBGs	% of Total
Bannock	55	2	3.6	0	0	0	0	3	5.5	0	0	6	11
Bingham	32	2	6.3	2	6.3	0	0	7	22	4	12.5	2	6.3
Blaine	2	0	0	0	0	1	50	0	0	1	50	0	0
Bonneville	77	0	0	5	6.5	1	1.3	5	6.5	6	7.8	3	3.9
Butte	3	0	0	0	0	0	0	0	0	0	0	1	33
Clark	1	0	0	0	0	0	0	1	100	1	100	0	0
Custer	2	0	0	0	0	0	0	0	0	0	0	1	50
Fremont	3	0	0	0	0	0	0	0	0	0	0	0	0
Jefferson	16	0	0	1	6.3	0	0	1	6.3	1	6.3	1	6.3
Lemhi	1	0	0	0	0	0	0	0	0	0	0	0	0
Lincoln	1	0	0	0	0	0	0	0	0	0	0	0	0
Madison	29	0	0	0	0	0	0	1	3.4	1	3.4	11	38
Minidoka	1	0	0	0	0	1	100	1	100	1	100	1	100
Power	4	1	25	0	0	1	25	2	50	1	25	0	0
Total – Expanded Demographic Region	227	5	2.2	8	3.5	4	1.8	21	9.3	16	7.0	26	11

Source:
[1] Reference 2.5-4
[2] Reference 2.5-5
[3] Reference 2.5-6 and Reference 2.5-7

Table 2.5-2: Environmental Justice Screening Results

Populations	Greater than 50 Percent Minority or Low-Income Populations In CBG			20 Percentage Points or More Greater than Idaho Populations		
	Number of CBGs	CBG IDs	County	Number of CBGs	CBG IDs	County
Black or African American	0	N/A	N/A	0	N/A	N/A
American Indian or Alaska Native	3	63	Bannock	5	62	Bannock
		65	Bingham		63	Bannock
		66	Bingham		65	Bingham
					66	Bingham
					279	Power
Asian	0	N/A	N/A	0	N/A	N/A
Native Hawaiian or Other Pacific Islander	0	N/A	N/A	0	N/A	N/A
Some Other Race	0	N/A	N/A	8	78	Bingham
					82	Bingham
					129	Bonneville
					150	Bonneville
					164	Bonneville
					184	Bonneville
					192	Bonneville
					209	Jefferson
Two or More Races	0	N/A	N/A	4	97	Blaine
					181	Bonneville
					268	Minidoka
					284	Power
Hispanic or Latino	4	78	Bingham	16	78	Bingham
		79	Bingham		79	Bingham
		184	Bonneville		82	Bingham
		268	Minidoka		88	Bingham
					97	Blaine
					126	Bonneville
					129	Bonneville
					155	Bonneville
					164	Bonneville
					180	Bonneville
					184	Bonneville
					197	Clark
					209	Jefferson
					249	Madison
					268	Minidoka
					284	Power

Table 2.5-2: Environmental Justice Screening Results (Continued)

Populations	Greater than 50 Percent Minority or Low-Income Populations In CBG			20 Percentage Points or More Greater than Idaho Populations		
	Number of CBGs	CBG IDs	County	Number of CBGs	CBG IDs	County
Aggregate Minority	10	62	Bannock	21	6	Bannock
		63	Bannock		62	Bannock
		65	Bingham		63	Bannock
		66	Bingham		65	Bingham
		78	Bingham		66	Bingham
		79	Bingham		78	Bingham
		129	Bonneville		79	Bingham
		155	Bonneville		82	Bingham
		184	Bonneville		87	Bingham
		268	Minidoka		88	Bingham
					129	Bonneville
					155	Bonneville
					164	Bonneville
					183	Bonneville
					184	Bonneville
					197	Clark
					209	Jefferson
					249	Madison
					268	Minidoka
					279	Power
					284	Power
Low-Income, Families	5	209	Jefferson	18	24	Bannock
		242	Madison		38	Bannock
		244	Madison		39	Bannock
		245	Madison		62	Bannock
		252	Madison		149	Bonneville
					164	Bonneville
					180	Bonneville
					196	Butte
					209	Jefferson
					236	Madison
					237	Madison
					242	Madison
					244	Madison
					245	Madison
					249	Madison
					251	Madison
					252	Madison
					268	Minidoka

Table 2.5-2: Environmental Justice Screening Results (Continued)

Populations	Greater than 50 Percent Minority or Low-Income Populations In CBG			20 Percentage Points or More Greater than Idaho Populations		
	Number of CBGs	CBG IDs	County	Number of CBGs	CBG IDs	County
Low-Income, Individuals	7	237	Madison	23	19	Bannock
		241	Madison		22	Bannock
		242	Madison		24	Bannock
		244	Madison		38	Bannock
		245	Madison		39	Bannock
		248	Madison		88	Bingham
		252	Madison		89	Bingham
					149	Bonneville
					164	Bonneville
					196	Butte
					200	Custer
					209	Jefferson
					236	Madison
					237	Madison
					239	Madison
					241	Madison
					242	Madison
					244	Madison
					245	Madison
					248	Madison
					249	Madison
					251	Madison
					252	Madison

See Figure 2.5-1 through Figure 2.5-5 for CBG ID locations.

Table 2.5-3: Organizations Contacted Concerning Environmental Justice

Altura Community Consulting & Business Finance
American Red Cross – Idaho (office in Pocatello area)
Bannock County Planning & Development
Bingham County Indigent Assistance
Bonneville County Social Services
Butte County Economic Development
Catholic Charities of Idaho
Church of Jesus Christ of Latter-Day Saints (LDS) Charities
City of Rupert and Minidoka County govts
Clark County Planning & Zoning
Custer County Economic Development
Eastern Idaho Community Action Partnership (EICAP)
Eastern Idaho Public Health
Farmworker Services, Idaho Dept of Labor
Fort Hall Reservation – Shoshone-Bannock Tribes Social Services
Fort Hall Reservation Community Health Center, Shoshone-Bannock Tribes
Fremont County Social Services (County Clerk office)
Greater Idaho Falls Chamber of Commerce
Headwaters Economics
Idaho Department of Health and Welfare
Idaho Falls Rescue Mission
Idaho Hunters Feeding the Hungry
Idaho Office for Refugees
Jefferson County Social Services
LDS Spanish Language Ward
Lemhi County Social Services
Lincoln County Welfare Office
Lovell & Cook Farms, Inc.
Madison County Planning & Zoning
Pocatello-Chubbuck Chamber of Commerce
Power County Special Needs Office
Regional Economic Development for Eastern Idaho (REDI)
Rexburg Chamber of Commerce
South Central Idaho Public Health
Southeast Idaho Council of Governments (SICOG), Idaho Dept of Commerce
Southeastern Idaho Public Health
Sun Valley Economic Development (Blaine County)
The Idaho Foodbank
United Way of Idaho Falls
United Way of Southeastern Idaho (Pocatello)
University of Idaho Extension Service
USDA Rural Development – Idaho

Figure 2.5-1: Environmental Justice Populations - Expanded Demographic Region

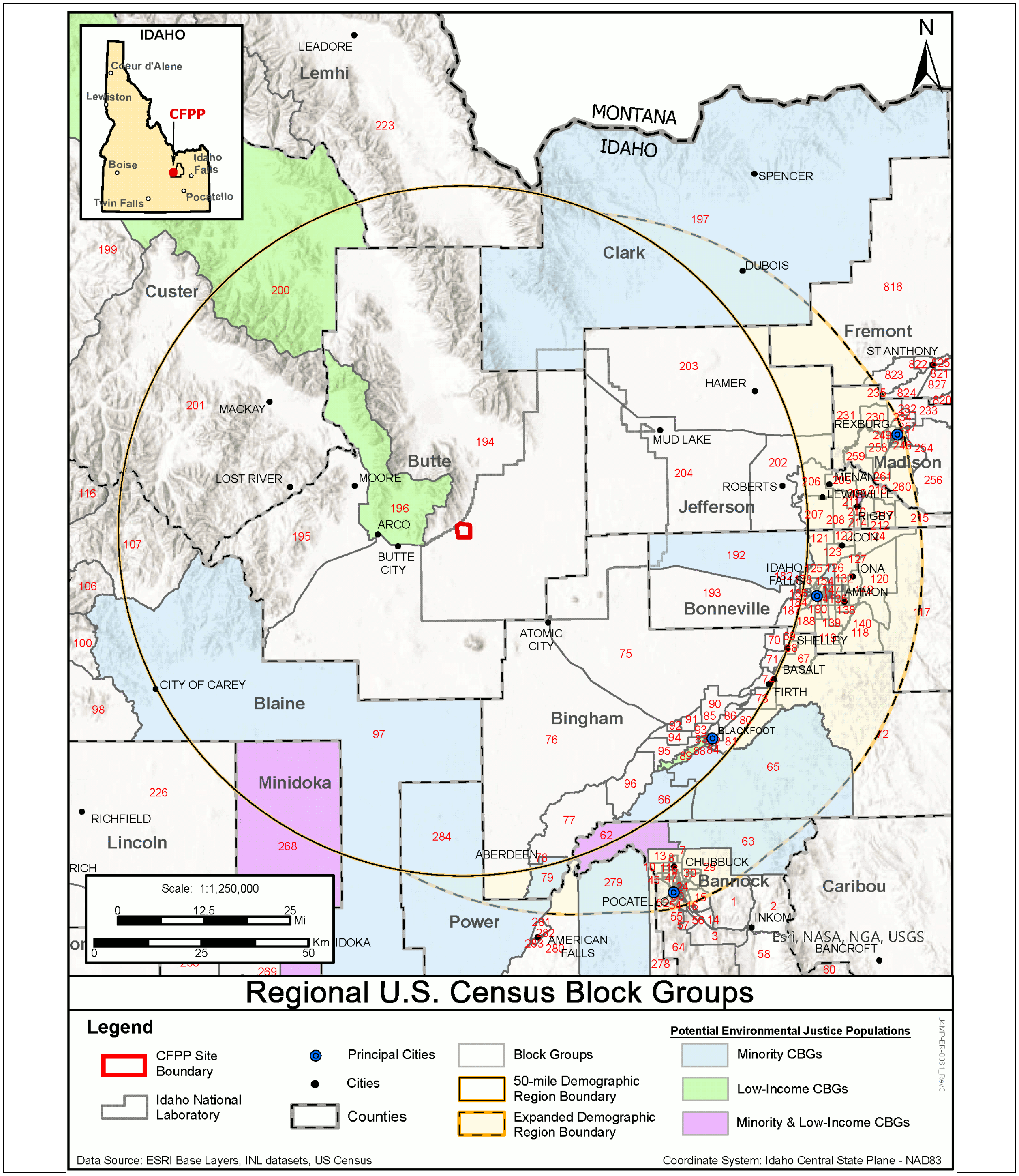


Figure 2.5-2: Environmental Justice Populations - Bannock County

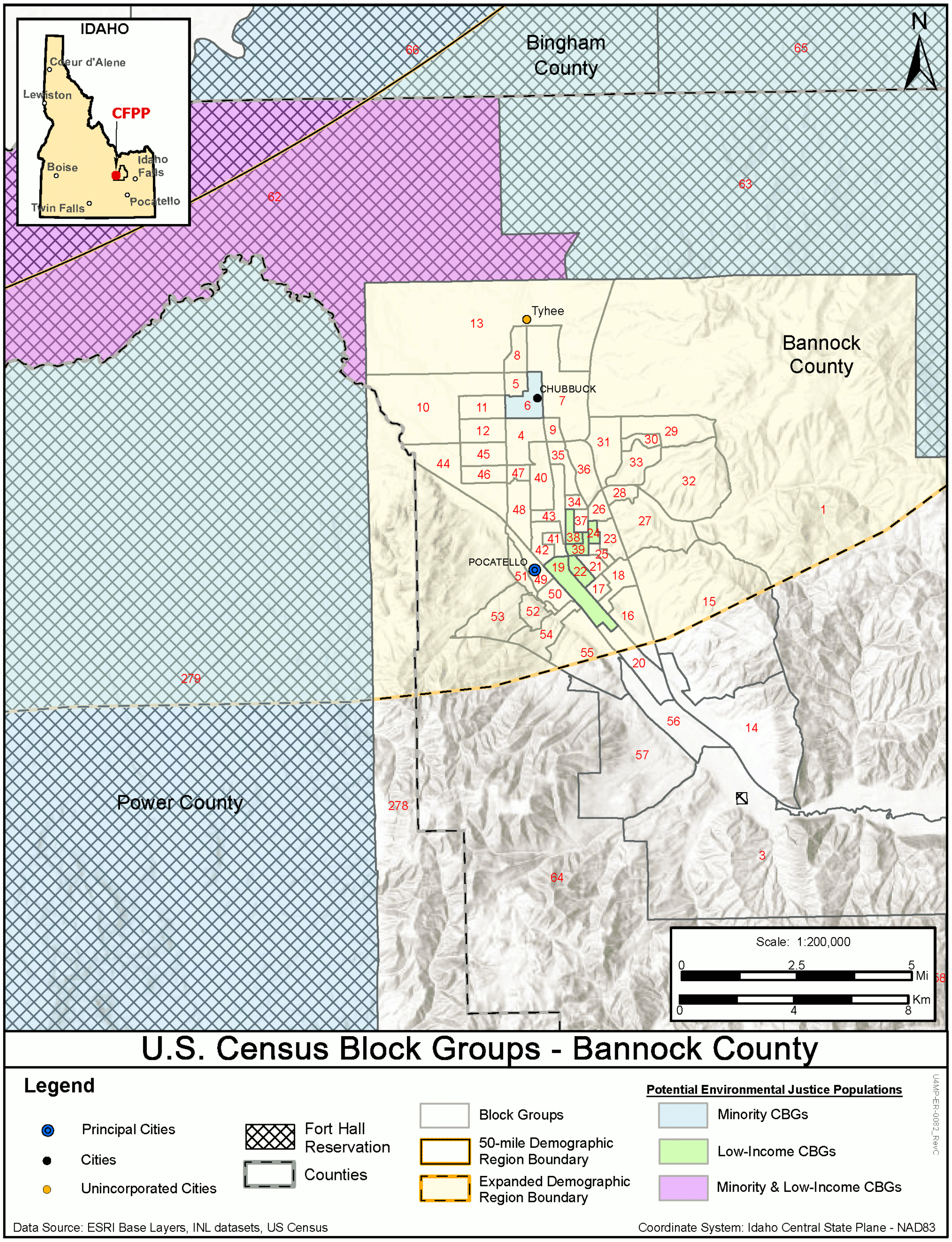


Figure 2.5-3: Environmental Justice Populations - Bingham County

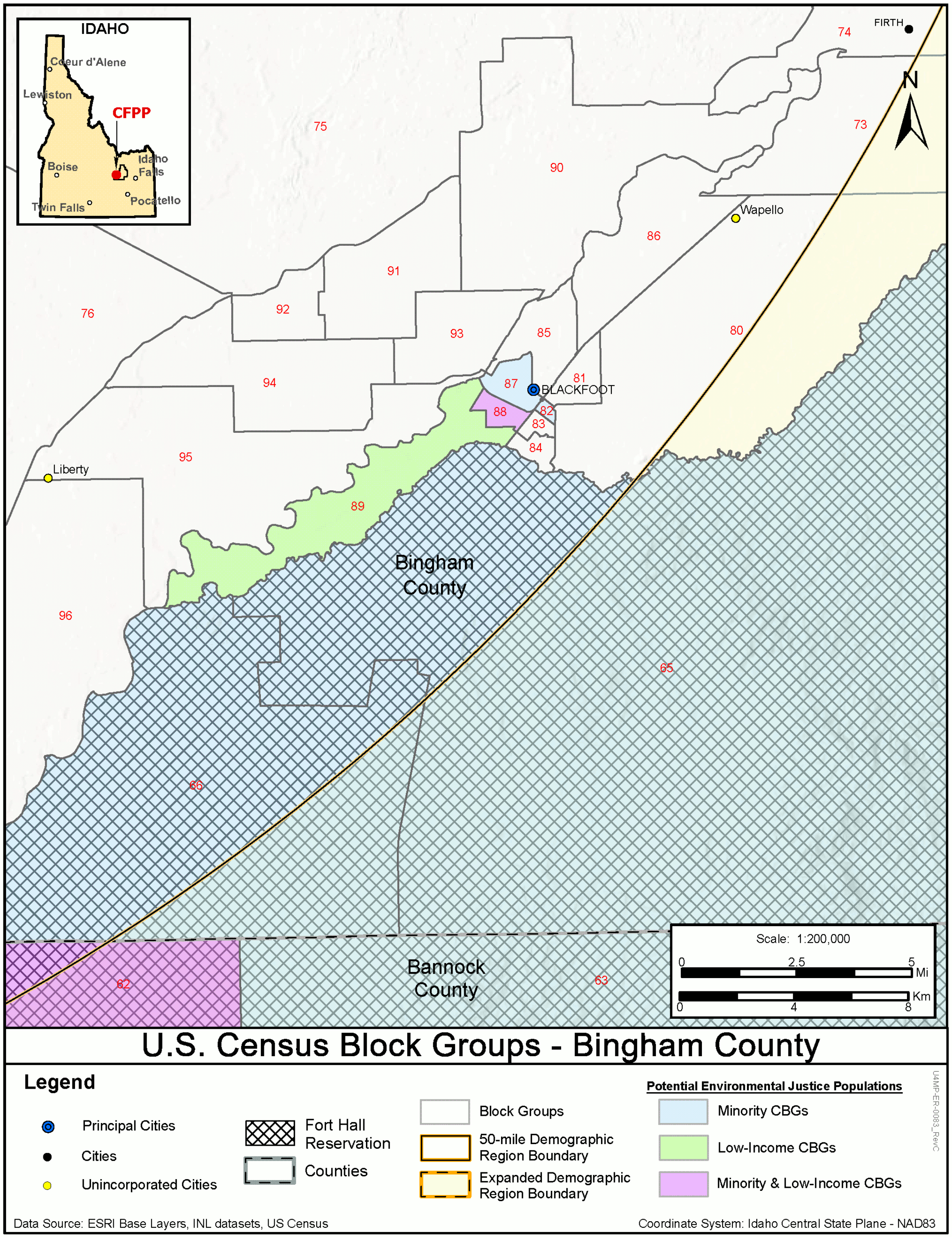


Figure 2.5-4: Environmental Justice Populations - Bonneville County

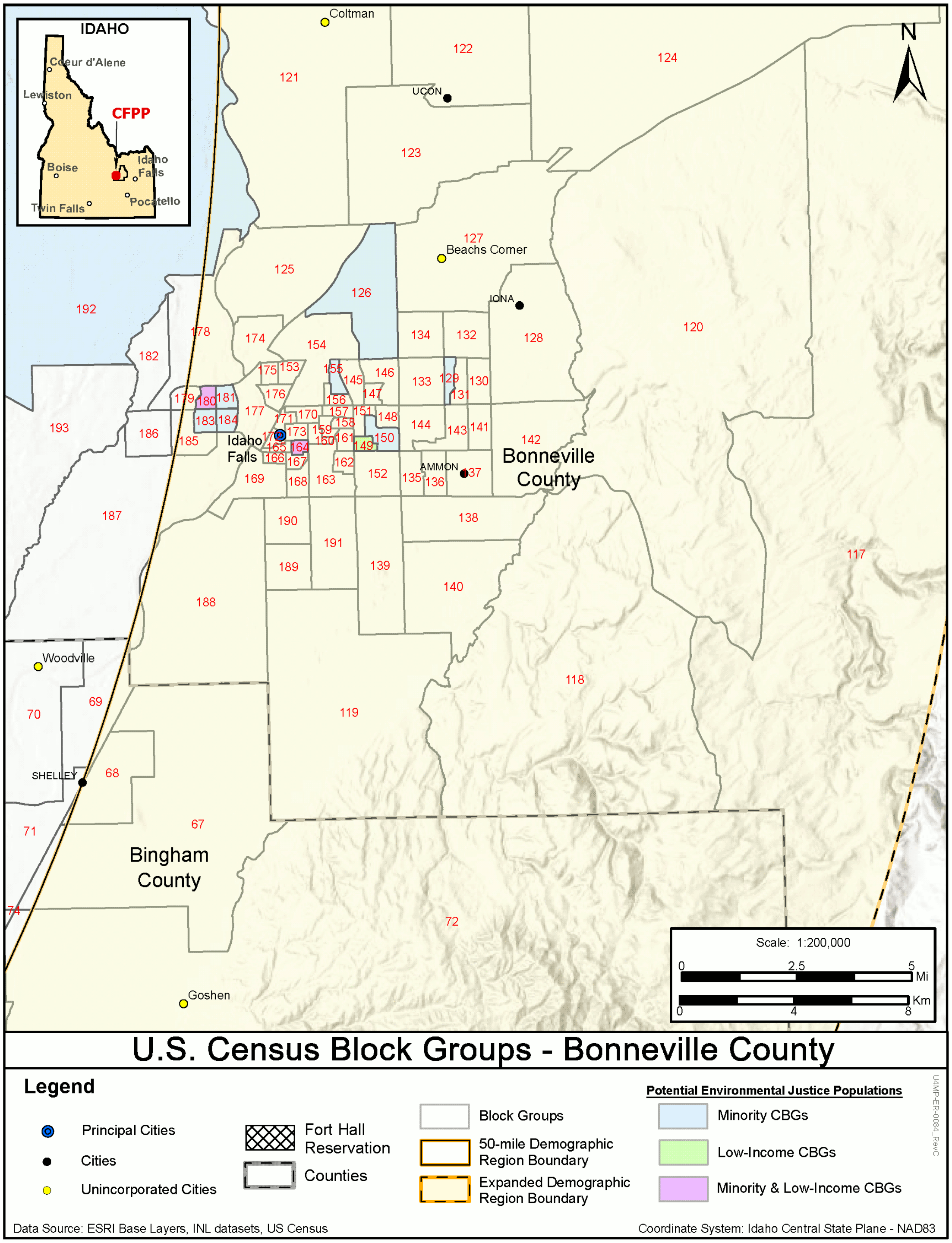
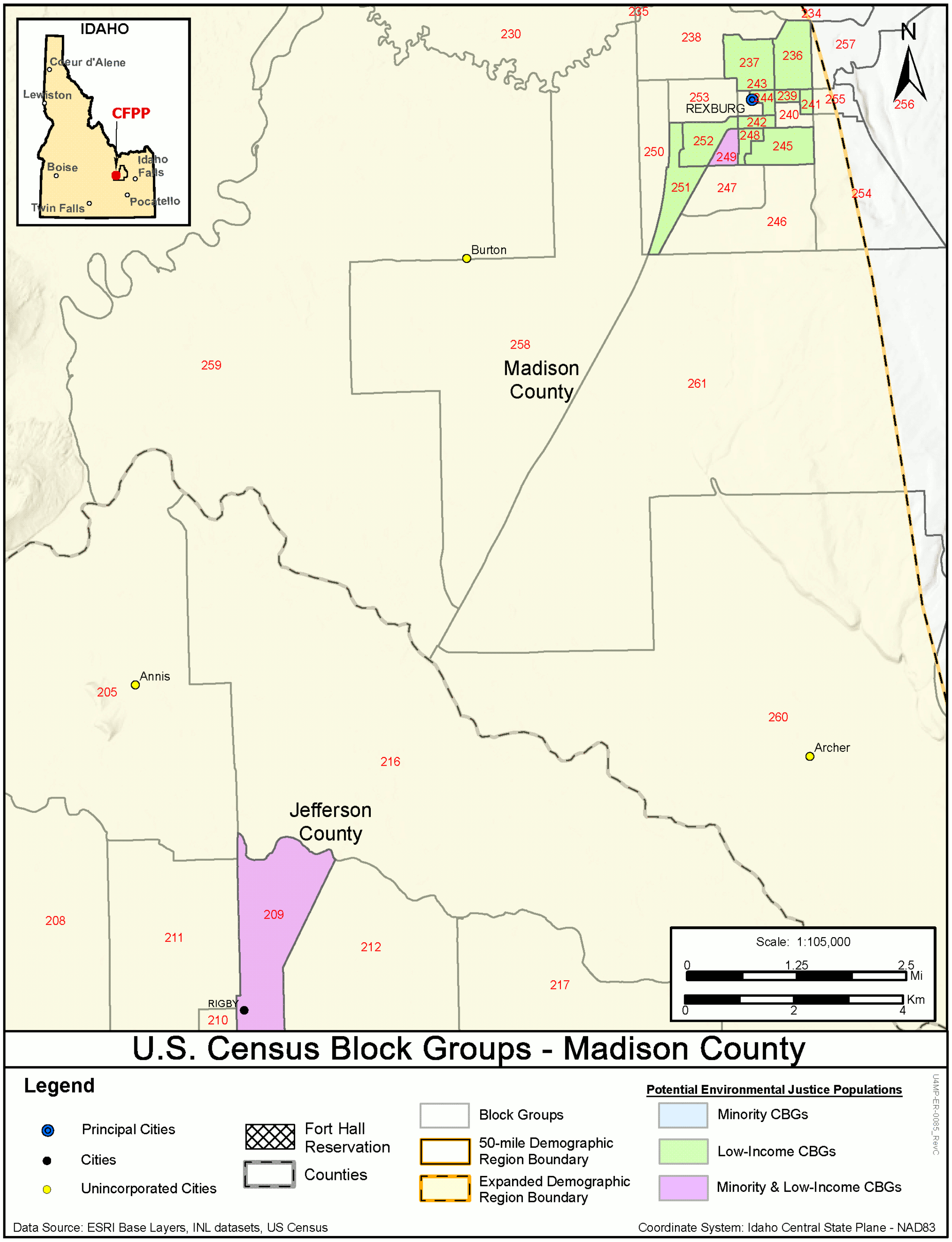


Figure 2.5-5: Environmental Justice Populations - Madison County



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2.6 Historical and Cultural Resources

Information related to Cultural Resources (location and specifics of the artifacts) is protected by the National Historic Preservation Act and the Battelle Energy Alliance/Fluor/CFPP LLC Nondisclosure Agreement, and is exempt from the Freedom of Information Act, Exemption 3.I

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2.7 Air Resources

This section of the LWA Environmental Report (ER) provides a description of the climate, meteorology, and air quality of the site and surrounding region, summarizes atmospheric dispersion characteristics at the site, and provides details of the on-site meteorological monitoring program. Information presented in this section is intended to support independent assessments of the impacts of construction and operation of the CFPP on the environment.

The detailed overview of the air resources in the vicinity of the CFPP site are in the following sections:

- Climate - Section 2.7.1
- Air Quality - Section 2.7.2
- Atmospheric Dispersion - Section 2.7.3
- Meteorological Monitoring - Section 2.7.4

2.7.1 Climate

This section identifies sources of climatological data used to characterize various aspects of the climate representative of the region around the CFPP site. Climate is a term used to describe the long-term (30-year) averages and patterns of weather for a region. An exhaustive description and assessment of the climate of the INL and the Eastern Snake River Plain (ESRP) (considered here, effectively, as the CFPP site region) is provided in National Oceanic and Atmospheric Administration (NOAA) Technical Memorandum No. OAR ARL-278, "Climatography of the Idaho National Laboratory" (Reference 2.7-1). This joint NOAA Office of Oceanic and Atmospheric Research (OAR) and Air Resources Laboratory (ARL) report largely informs (i.e., forms the basis of) the summary provided.

2.7.1.1 Data Sources

Several sources of data are used to characterize local and regional climatological conditions pertinent to the CFPP site.This includes data collected by the National Weather Service (NWS) monitoring systems located within the boundaries of INL. The objective of selecting nearby and off-site climatological monitoring stats is to determine monthly and annual values, as measured at those locations, that are reasonable representative conditions that might be expected to be observed at the CFPP site. The identification of stations to be included is based on the following general considerations:

- proximity to the site (i.e., within the nominal 50-mile radius, to the extent practical)
- coverage surrounding the site (to the extent possible)
- more than one station exists for a given direction relative to the site, a station was included if it contributed one or more extreme conditions (e.g., rainfall,

snowfall, maximum or minimum temperatures) for that general direction or added context for variation of conditions over the site region

Presently, NOAA's ARL Field Research Division (FRD) maintains a network of 13 weather stations (with a total of 34 instrumentation towers) located within the boundaries of the INL. These INL sites (Figure 2.7-1) and another 21 weather stations located strategically across the wider ESRP (Figure 2.7-2) collectively form the so-named NOAA/INL mesoscale meteorological monitoring network (NOAA/INL MESONET). Details related to the MESONET station locations and instrumentation are provided in Table 2.7-1, Table 2.7-2, Table 2.7-3, and Table 2.7-4. Three of the NOAA/INL MESONET stations feature instrumentation towers with heights in excess of 50 feet; namely the stations at the Idaho Nuclear Technical and Engineering Center (INTEC), the Materials and Fuels Complex (MFC), and the Specific Manufacturing Capability (SMC) facility. The INTEC, MFC, and SMC stations are located approximately 6.7 miles, 20.5 miles, and 22.2 miles, respectively from the CFPP site.

The NOAA/INL MESONET station located nearest to the CFPP is at Dead Man Canyon (DEA) (approximately 0.9 miles southwest of the CFPP). The next closest station is the Base of Howe Peak (BAS) tower (located about 3.7 miles northeast of the CFPP). Both towers are 50 feet in height and have been active since 1993.

Overlapping the NOAA/INL MESONET stations maintained by the FRD, the NWS currently operates a further 93 observational systems within a 100-mile radius of the CFPP site, as shown on Figure 2.7-3. NOAA's National Centers for Environmental Information (NCEI) provides climate normal data for many of these sites, including the most recent 30-year normal period (i.e., January 1, 1991 to December 31, 2020). Discussion is limited to stations located in a 50-mile radius of the CFPP site, as shown in Figure 2.7-4 and Figure 2.7-5.

2.7.1.2 General Climate Description

The CFPP site in Butte County, Idaho is located in the north-central ESRP. Climate conditions in this region are influenced by a northerly latitude, high elevation, proximity to central Idaho mountain ranges, and a position on the lee side of the Coastal and Cascade mountain ranges in Oregon and Washington states. The geographic orientation of the ESRP and adjacent mountains sets up a prevailing wind direction from the southwest and results in the introduction of both maritime (moist) and continental (dry) weather systems throughout the year. However, much of the moisture in the maritime air masses is precipitated during transport over more westerly mountains (i.e., the Coastal and Cascade ranges). This orographic effect results in arid to semi-arid conditions on the ESRP. Precipitation events can occur in every month, but the heaviest accumulations (intense rainfall associated with thunderstorms) typically happen in the spring (May) or early summer (June).

Maritime air masses (from the Pacific Ocean to the west) provide a moderating influence on ESRP climate, producing warmer winter (and cooler summer) conditions relative to more continental locations of similar latitude. Mountain ranges located to the north of the ESRP generally also serve as a barrier to the southward movement of most polar air masses. However, winter pressure gradients occasionally become strong enough to promote cold air overflows from the mountains. The ESRP then experiences below normal temperatures and surface air temperature inversions lasting (typically) for a few days (or perhaps a week). In the summertime and early autumn, generally clear skies result in intense solar heating of the ground during the day and rapid radiational cooling at night and a corresponding large variation in diurnal temperature.

Select ESRP climatological data for the 30-year period from 1981 to 2010 (from Reference 2.7-1) are provided in Table 2.7-5. Locations for the stations identified in Table 2.7-5 are shown on Figure 2.7-4. These data show an average annual air temperature for the ESRP of roughly 44 degrees Fahrenheit (°F) with temperature extremes from -48°F to 108°F. Annual average precipitation at these stations is 11.4 inches, with snowfall ranging from approximately 14 inches to 96 inches.

For comparison purposes, Table 2.7-6 provides a further set of climate normals for a 30-year period extending from 1991 to 2020 (i.e., for a more recent period) for NWS stations located within a 50-mile radius of the CFPP site, as shown in Figure 2.7-5. These data from the NCEI "U.S. Climate Normals" database (Reference 2.7-2) indicate an average annual air temperature of approximately 43°F, an average annual precipitation of 15.1 inches, and average snowfall levels ranging from 11.1 inches to 80.3 inches.

Further description of regional wind, temperature, precipitation, relative humidity patterns, and solar radiation and energy balance are provided, with specific reference to the climatology of the INL site (i.e., emphasizing data from Reference 2.7-1). Special climate phenomena and severe weather are also described.

2.7.1.2.1 Wind

The physiography of the INL gives rise to three distinct micro-climatic zones, as shown in Figure 2.7-6 (Reference 2.7-1). The northwestern climate zone is largely influenced by down-canyon winds and up-valley flows originating in adjacent southeast-to-northwest trending mountain valleys. The southwestern climate zone (encompassing the CFPP site) is similarly influenced by down-canyon winds, and also by strong pre-frontal southwesterly winds and frequent southwesterly afternoon winds resulting from diurnal temperature changes. The southeasterly climate zone, in contrast, is isolated from the channeled flows affecting the northwest and southwest zones. Instead, surface winds in the southeasterly zone are controlled largely by topographic effects, namely higher terrain present along the southeastern edge of the INL.

Wind roses for the northwestern, southwestern, and southeastern INL micro-climatic zones are provided in Figure 2.7-7 to Figure 2.7-12, as taken from Reference 2.7-1. Corresponding average wind speed and peak wind gust values for these micro-climatic zones are presented in Table 2.7-7 and Table 2.7-8.

Cluster analysis of wind data specifically reveals eight unique wind patterns accounting for 99.9 percent of the wind fields observed on the INL (Reference 2.7-1):

- Drainage flow, characterized by light wind speeds from the northeast, with a frequency of occurrence of 26.6 percent;
- Weak flow, characterized by light wind speeds and variable directions, with a frequency of occurrence of 24.4 percent;
- Moderate up-valley flow, characterized by relatively gentle wind speeds from the south-southwest, with a frequency of occurrence of 12.5 percent;
- Decreasing up-valley flow near sunset or moderate synoptically-forced flow, characterized by gentle to moderate wind speeds from the southwest with light wind speeds and variable directions in the north, with a frequency of occurrence of 11.5 percent;
- Well-developed up-valley flow, characterized by moderate winds speeds from the southwest, with a frequency of occurrence of 8.6 percent;
- Down-canyon flow, characterized by gentle to moderate wind speeds from the northwest, with a frequency of occurrence of 6.6 percent;
- Strong synoptically-forced southwest flow, characterized by high wind speeds from the southwest, with a frequency of occurrence of 5.6 percent; and
- Strong synoptically-forced north-northeast flow, characterized by high wind speeds from the north-northeast, with a frequency of occurrence of 4.1 percent.

Maps of the representative wind patterns for the eight clusters are provided in Figure 2.7-13 through Figure 2.7-20, as excerpted from Reference 2.7-1. In particular, these maps were created using data for a period of record extending from January 1994 through December 2015.

2.7.1.2.2 Air Temperature

The longest continuous air temperature record for the INL is available from the Central Facilities Area (CFA) MESONET station (Reference 2.7-1). For the portion of the CFA record extending from 1950 through 2015, average daily air temperature ranges from a low of approximately 12°F in January to a high of about 70°F in July, as shown in Figure 2.7-21. Figure 2.7-21 also shows that the smallest and largest average diurnal temperature variations (20°F and 40°F) occur in winter and summer months, respectively. Daily air temperature extremes data for the CFA for a period extending from 1950 to 2020, as presented in Table 2.7-9, indicate a maximum measured air temperature of 105°F and a minimum measured air temperature of -47°F (Reference 2.7-1 and Reference 2.7-3). These extreme temperatures were recorded on July 13, 2002 and December 23, 1983, respectively (Reference 2.7-1). Data in Table 2.7-9 indicate that the CFA station has recorded at least one day with below freezing temperatures in every month of the year.

Data collected since 1993 shows only about a 1°F difference in average temperatures across the three INL micro-climatic zones (Reference 2.7-1). However, simultaneous spatial differences between the INL micro-climate zones have been observed to vary by as much as about 33°F. These larger differences are most commonly observed during winter months and are typically associated with strong temperature inversions.

2.7.1.2.3 Precipitation

The type of precipitation that occurs at the INL varies as a function of season. During summer months, precipitation most often falls as rain showers or thunderstorms. In the spring and fall, rain showers or periods of rain and snow may occur. Most precipitation in the winter comes as snow. As previously introduced, precipitation can fall in any month, but the heaviest accumulations typically occur in the spring or early summer, as shown in Table 2.7-10. Also as shown in Table 2.7-10, total annual average precipitation at the INL is low, averaging 8.38 inches for the period of record for the CFA extending from January 1950 through December 2015 (Reference 2.7-1) and 8.41 inches for the period of record extending from January 1950 through December 2022 (Reference 2.7-4). For the climate normal period spanning January 1981 through December 2010, total annual rainfall averages 8.66 inches.

For the period extending from January 1950 to December 2022, daily total precipitation at the CFA MESONET station has equaled or exceeded 1-inch on 16 occasions (Reference 2.7-5). The greatest daily precipitation value during this period of record was 1.64 inches, measured on June 10, 1969. The greatest monthly precipitation total measured at CFA was 4.64 inches, in June 1995 (Reference 2.7-1).

With respect to snowfall, a total of 43 events with snowfall totals equaling or exceeding 5-inches are recorded at the CFA for the period of record extending from 1950 to 2022 (Reference 2.7-6). Twelve events exceed 7-inches, with the largest daily snowfall event total reaching 9-inches (on January 2, 2006). A summary of monthly and annual average, maximum, minimum, and normal snowfall totals (and daily extreme totals) for the CFA is provided in Table 2.7-11, per Reference 2.7-1 and Reference 2.7-7. A graph of average daily snow depth at the CFA is provided in Figure 2.7-22, for the period extending from 1950 to 2015. Probability curves for CFA snow depths greater than 1-, 3-, 5-, and 10-inches are in turn provided in Figure 2.7-23, as normalized for the period of 1981 to 2010.

2.7.1.2.4 Relative Humidity

Graphs of diurnal variations in relative humidity at the CFA are shown in Figure 2.7-24, for each of the four seasons, as represented by data for the months of January (winter), April (spring), July (summer), and October (fall). In general, highest diurnal relative humidity values are observed near sunrise at the INL, whereas lowest values are observed in mid-afternoon (Reference 2.7-1). These highs and lows generally occur in conjunction with minimum and maximum diurnal air temperatures, respectively.

Annual averages for daily maximum and minimum relative humidity values for the CFA for a period of record extending from January 1994 through December 2015 are 83 percent and 37 percent, respectively (Reference 2.7-1). Monthly averages of daily maximum relative humidity values for the same period range from 94 percent (in January and December) to a low of 65 percent (in August). Average monthly minimum relative humidity values range from 70 percent in January to a low of 14 percent in July and August. These data are shown in Table 2.7-12.

2.7.1.2.5 Solar Radiation and Energy Balances

Graphs of hourly average, maximum, minimum, theoretical maximum, and non-diffuse/direct beam solar radiation at the INL for the data period of January 1994 through December 2015 are shown in Figure 2.7-25 for winter, spring, summer and fall, as represented by data for January, April, July, and October, respectively. As shown in Figure 2.7-25, midday solar radiation in January is roughly 350 Watts per square meter (W/m^2) on average, whereas peak summer (July) solar radiation is nearly 880 W/m^2 (Reference 2.7-1). Spring (April) and fall (October) solar radiation averages approximately 670 W/m^2 and 540 W/m^2, respectively.

Total daily solar radiation on the INL ranges from just under 30 megajoules per square meter per day ($MJ/m^2/d$) in summer months (June and July) to 7 $MJ/m^2/d$ or less in winter months (December and January), as shown in Table 2.7-13 (Reference 2.7-1 and Reference 2.7-8). Net solar radiation is consequently highest during summer months and lowest in winter months, resulting in commensurate changes in soil temperatures and soil heat flux, as shown in Figure 2.7-26 (Reference 2.7-1).

Relatedly, monthly average evapotranspiration from sagebrush and evaporation from bare soil and ponds has been estimated for the INL using total daily net radiation and soil heat flux values (among other variables) (Reference 2.7-1). These estimates, based on climate normals from 1979 to 2008, are provided in Table 2.7-14 and are equated to total annual evapotranspiration and evaporation values of 18.82 ± 1.37 inches, 12.79 ± 1.70 inches, and 33.14 ± 2.03 inches for sagebrush, bare soil, and ponds, respectively. Considering precipitation totals from 1979 to 2008, these values reflect precipitation deficits of -0.59 ± 0.82 inches, -0.06 ± 0.23 inches, and +24.62 ± 4.27 inches; that is, precipitation is estimated to slightly exceed evapotranspiration and evaporation losses from sagebrush and bare soil, but fall significantly short of evaporation from ponds.

2.7.1.2.6 Severe Weather Phenomena

Severe weather phenomena are known to occur in the INL and CFPP site region and include (but are not limited to) thunderstorms, lightning, and tornadoes. A summary of relevant severe weather occurrences in the CFPP site region is provided in Table 2.7-15, as compiled from the NCEI "Storm Events Database" (Reference 2.7-9). The NCEI's database specifically documents:

- Weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, or disrupt commerce;
- Rare or unusual weather phenomena generating media attention; and
- Extreme meteorological events such as record maximum or minimum temperatures or precipitation occurring in connection with a significant event.

Table 2.7-15 includes database events for Bingham, Bonneville, Butte, Clark, and Jefferson counties (i.e., those counties encompassing or surrounding the INL) and is considered representative of the INL and conditions at the CFPP site.

Per Table 2.7-15, only five severe weather phenomena occur at frequencies corresponding to more than one event per year, on average; namely, thunderstorm winds, wildfires, high winds, winter storms, and heavy snow. Thunderstorms (and related high winds) have been observed over the INL during every month of the year, but occur most commonly from June through August (Reference 2.7-1). These storms are usually much less severe relative to storms in the mountains surrounding the ESRP or east of the Rocky Mountains, and usually result in little or no measurable precipitation. Thunderstorms over the INL are commonly accompanied by cloud-to-ground and cloud-to-cloud lightning. On average, lightning strikes occur on the INL approximately 1400 times per year. The largest number of annual strikes recorded is 2504. This extreme value was recorded in 2009, and included nearly 1400 strikes in June alone.

For the period between 1994 and 2019, the INL has averaged roughly five wildland fire events involving 15,000 acres or more per year (Reference 2.7-10). Particularly large fires occurred in 2010 (the Jefferson Fire, at 92,287 acres) and in 2019 (the Sheep Fire, at 112,106 acres). Importantly, one relatively large fire has occurred at the CFPP, in 1994. This fire, identified as the Butte City Fire, burned a total area of approximately 18,170 acres, as shown in Figure 2.7-27 (Reference 2.7-11). Ignited via a fire on a flat tire on a horse trailer, the fire rapidly spread by strong winds (Reference 2.7-12).

Although rare, severe conditions related to hail, icing, and fog events are also known to occur at the INL. Hail has been observed during many thunderstorm events, but has not led to reports of damage at the INL (Reference 2.7-1). Icing has similarly been reported during winter months, but accumulations have been insufficient to damage power lines or communication cables at the INL. Wintertime valley fog is relatively common on the INL, often lasting for several days and reducing visibility to potentially dangerous levels. Typically, these fog events are the result of temperature inversions caused by settling cold air with warm air aloft.

2.7.1.2.7 Climate change

National, state, and local greenhouse gas (GHG) emissions have collectively contributed to global GHG emissions and, consequently, global climate changes. Such changes include an approximate 2.0°F increase in global surface temperatures relative to pre-industrial baseline (1850 to 1900) levels, a virtually certain (i.e., a 99 percent to 100 percent likelihood) increase in the intensity and frequency of heat extremes across most land regions since 1950, and a corresponding reduction in the frequency and severity of cold extremes, at least as documented in the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) (Reference 2.7-13). The frequency and intensity of heavy precipitation events has also increased over most land areas since 1950, as have instances of drought due to increased evapotranspiration.

Long-term temperature changes in Idaho and the wider northwestern U.S. have largely mirrored global trends, exhibiting a post-industrial increase of roughly 1.6°F and 1.8°F (Figure 2.7-28 and Figure 2.7-29, respectively) (Reference 2.7-14 and Reference 2.7-15). No prominent trend in precipitation is observed in Idaho or the northwestern U.S. for the same period, as shown in Figure 2.7-30 and Figure 2.7-31, but the number of extreme precipitation events in Idaho has been reported to be trending upward since 2000 (Figure 2.7-32) (Reference 2.7-16). U.S. historical climatological network data also indicate a prominent shift toward greater winter rainfall (precipitation falling as rain, rather than snow) since roughly 1950 (Reference 2.7-17 and Reference 2.7-18). Coupled with increasing temperatures, this shift in precipitation has resulted in declining spring snowpack across much of the northwestern U.S. and in most locations in Idaho (Figure 2.7-33) (Reference 2.7-40).

Climate data from Butte County (Figure 2.7-34) (Reference 2.7-20) suggest a long-term, post-industrial temperature increase of approximately 1.3°F in the immediate vicinity of the CFPP. These same data further suggest a long-term increase in cooling degree days and a long-term decrease in heating degree days (Figure 2.7-35 and Figure 2.7-36) indicative of more frequent heat extremes and less severe cold. However, no clear trend in precipitation is apparent in time series data for Butte County (Figure 2.7-37).

Continued warming is predicted for Butte County (i.e., for the CFPP site) under lower (moderate) and higher GHG emission projection scenarios developed by the IPCC for use in global and regional climate modeling. In particular, using emissions scenarios reflecting increased trapped energy levels of 4.5 W/m^2 and 8.5 W/m^2 (by 2100) for the lower and higher emissions estimates, respectively, mean temperatures in Butte County are projected to warm by 6.2°F and 11.2°F on average (Figure 2.7-38) (Reference 2.7-21). These radiative forcing estimates, developed under the IPCC's Fifth Assessment Report are identified as representative concentration pathways (RCPs) 4.5 and 8.5. By design, RCP 8.5 effectively assumes limited efforts to mitigate GHG emissions, continued use of fossil fuel reserves, and continued exponential population growth. In contrast, RCP 4.5 assumes increased use of non-carbon-based energy sources, reduced land-use GHG emissions, and increased carbon capture and storage efforts. Climate models forced by RCP 4.5 and RCP 8.5 generally yield global mean surface temperatures changes ranging from 2.5°F to 5.6°F and 4.7°F to 8.6°F by 2100, respectively, relative to a period extending from 1986 to 2005 (Reference 2.7-22).

INL analysis (Reference 2.7-23) suggests that the aforementioned warming is likely to increase drought occurrences in the wider site area, as well as strong wind and heavy rain event occurrences, and is almost certain to increase heat wave and wildfire frequencies. Comparable data for Butte County (and hence the CFPP site) (Reference 2.7-24) also suggest increasing drought occurrences, heat waves, and wildfire risk over the next century, as indicated by climatic water deficit projection data (Figure 2.7-39 and Figure 2.7-40) and projected counts of days with an excessive heat index (Figure 2.7-41 and Figure 2.7-42) or a high fire danger (Figure 2.7-43 and Figure 2.7-44). Rainfall extremes projections for Butte County (Reference 2.7-45) show less of a significant (prominent) increase over the next century (Figure 2.7-45) relative to drought and heat indices, but a marked increase in upper bound estimates for both lower and higher GHG emissions scenarios (warming scenarios) is apparent.

2.7.2 Air Quality

This section addresses air quality conditions in the site area and region, that are impacted by CFPP site construction and operation.

2.7.2.1 Regional and Site Air Quality Conditions

The federal Clean Air Act (CAA) (42 USC § 7401) regulates air emissions from stationary and mobile sources and provides a framework to improve air quality nationwide through management and reduction of air pollutant emissions. In general, air quality is described in terms of the type and amounts of pollutants present in the atmosphere, and is expressed as a regional emission rate in units of tons per year (tons/year) or as a concentration in units of parts per million (ppm), parts per billion (ppb), or micrograms per cubic meter ($\mu g/m^3$).

Factors that affect air quality and thereby human, animal, and plant health include local and regional air emissions (e.g., point sources, mobile sources, and fugitive emissions), the geographic size of a given air basin, air basin topography, and prevailing meteorological conditions. Air emissions in particular can occur from human activities (e.g., industrial processes, fuel combustion, construction activities, agriculture) and natural events (e.g., wildfires, wind-blown dust). Meteorological conditions, including temperature, wind speed, wind direction, sunshine, and temperature inversions, in turn influence the extent to which air pollutants are dispersed and transported both vertically and horizontally within the atmosphere.

2.7.2.1.1 Criteria Air Pollutants

Under provisions of the CAA, the U.S. Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants (CAPs). These pollutants include carbon monoxide, lead, ozone, nitrogen dioxide, sulfur dioxide, and particulate matter (PM) of two sizes; namely, particulates less than or equal to 10 micrometers (microns) in diameter (PM_{10}) and particulates less than or equal to 2.5 micrometers ($PM_{2.5}$). The NAAQS represent maximum concentration levels for these pollutants that are considered safe for public health and the environment, protecting the most sensitive populations, such as children, elderly, and asthmatics.

In Idaho, the EPA delegates air quality monitoring and thereby NAAQS enforcement authority to the Idaho Department of Environmental Quality under a state implementation plan. Idaho's state implementation plan includes a framework for implementing new or revised NAAQS, plans for attaining and/or maintaining NAAQS, and specifically adopts the Environmental Protection Agency’s NAAQS via Idaho Administrative Procedures Act (IDAPA) 58.01.01, "Rules for the Control of Air Pollution in Idaho." Table 2.7-26 provides a listing of the Environmental Protection Agency’s NAAQS values for CAPs as adopted in the Idaho Administrative Procedures Act 58.01.01 (Reference 2.7-26).

Inventories of CAPs for the wider CFPP site and INL site region are provided in Table 2.7-17, as derived from the EPA's 2020 National Emissions Inventory (NEI) (Reference 2.7-27). In particular, Table 2.7-17 provides CAP inventories for 2020 for each of the five counties encompassing or surrounding the INL: Bingham, Bonneville, Butte, Clark, and Jefferson counties.

The INL proper has seven major facility areas considered to be potential sources of CAPs:

- Radioactive Waste Management Complex (RWMC)

- Advanced Test Reactor (ATR) Complex
- MFC
- CFA
- INTEC
- Naval Reactors Facility
- Test Area North (including the SMC facility)

In 2018, emissions of carbon monoxide, sulfur dioxide, and particulate matter ($PM_{2.5}$ and PM_{10} combined) from INL facilities totaled 11.6 tons, 2.2 tons, and 3.5 tons, respectively, as shown in Table 2.7-18 (Reference 2.7-28). For the same year, facility emissions of nitrogen oxides and various photochemically-reactive volatile organic compounds (ozone precursors) totaled 35.7 tons.

Predicted CAP background concentrations for the CFPP site (relative to national standards) are presented in Table 2.7-19, as estimated using the Northwest International Air Quality Environmental Science and Technology Consortium's "background concentration lookup" tool (i.e., the NW-AIRQUEST criteria pollutant design values tool) (Reference 2.7-29). Developed in large part by the Laboratory for Atmospheric Research at Washington State University and the Idaho Department of Environmental Quality, this tool uses model and monitoring data for a three-year period extending from July 2014 through June 2017 to estimate background concentrations of CAPs for use as design values in air permit applications (Reference 2.7-30). Output from the NW-AIRQUEST tool suggests that baseline CAP concentrations in the vicinity of the CFPP are well within NAAQS limits.

2.7.2.1.2 Hazardous Air Pollutants

The EPA has identified 188 pollutants as having the potential to cause cancer or other serious health effects (reproductive issues, birth defects, etc.) or as having potentially adverse environmental or ecological effects. These hazardous air pollutants (HAPs) are emitted from a variety of sources on the ESRP including (but not limited to) agricultural and industrial activities, residential wood burning, wind-blown dust, and automobile exhaust. At the INL, thermal processing operations, non-thermal chemical processing and boiler operations, emergency generator usage, and waste management activities produce HAPS.

Monthly HAPs emissions for the INL in 2018 are listed in Table 2.7-20. The emissions levels presented in Table 2.7-20 are assumed to be generally representative of background conditions at or near the CFPP site.

2.7.2.2 Regional Air Quality Control Designations

The EPA is specifically responsible for establishing air quality control regions (AQCR) and for characterizing and designating an AQCR's status with respect to the NAAQS. This status can be described as:

- In "attainment," wherein pollutant concentrations are below (i.e., in compliance with) the NAAQS;
- In "nonattainment," wherein a pollutant concentration has exceeded or not met a given NAAQS;
- In "maintenance," wherein a previous classification of nonattainment has been rectified under a plan to continue reducing emissions and improve air quality; or
- As "unclassified," wherein no monitoring data are available and, by default, the concentrations are considered in attainment.

Generally, a regional designation (attainment, nonattainment, or maintenance) is made for each criteria pollutant based on ambient air monitoring data, as collected and verified by state environmental agencies.

The CFPP site is located in the Eastern Idaho Intrastate ACQR. This ACQR includes Bannock County, Bear Lake County, Bingham County, Bonneville County, Butte County, Caribou County, Clark County, Franklin County, Fremont County, Jefferson County, Madison County, Oneida County, Power County, and Teton County. Butte County, Idaho, wholly-containing the CFPP site, is classified by the EPA as being in NAAQS attainment (Reference 2.7-31). Moreover, no nonattainment designations are present in the other counties encompassing or abutting the wider INL site; namely, Bingham, Bonneville, Clark, and Jefferson counties (Reference 2.7-32). The EPA nonattainment and maintenance areas located nearest to the INL are located approximately 60 miles southeast of the CFPP. These include the federal Fort Hall Reservation PM_{10} nonattainment area in Power and Bannock counties, and the Portneuf Valley PM_{10} maintenance area surrounding the towns of Pocatello and Chubbuck.

2.7.2.3 Regional Haze

Under the CAA's Prevention of Significant Deterioration program, the EPA has been tasked to improve air quality and visibility in national parks and wilderness areas (Class I areas), and at national monuments. In particular, the Regional Haze Rule requires states, in coordination with the EPA, the National Park Service, the U.S. Fish and Wildlife Service, and the U.S. Forest Service to develop and implement air quality protection plans to reduce pollution leading to visibility impairment.

Presently, Craters of the Moon National Monument and Wilderness Area is the closest Class I area to the CFPP site. The nearest entrance to the National Monument is less than 30-miles east-southeast from the CFPP, and the nearest

Craters of the Moon wilderness and/or management area boundary (i.e., a potential receptor for air quality impacts) is located less than 20-miles from the site.

2.7.2.4 Greenhouse Gases

GHGs such as carbon dioxide, methane, and nitrous oxide are released by many of the same processes or sources resulting in CAPs and HAPs emissions. Production and combustion of fossil fuels (coal, natural gas, oil) for energy and transportation are particularly significant non-natural sources of GHGs, as are agricultural and industrial processes (especially with respect to methane and nitrous oxides). Industrial activities also emit heat-trapping fluorinated gases such as hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride that are much more potent GHGs than carbon dioxide.

Federal air quality standards for GHG emissions have not been enacted. However, some EPA control over mobile sources is achieved via fuel economy and emission standards, and large stationary sources are regulated in part by requirements for best available control technologies and mandatory reporting. Reporting requirements for stationary sources have specifically been implemented (since 2010) under 40 CFR 98. Under 40 CFR 98, the EPA's Greenhouse Gas Reporting Program (GHGRP) requires direct emitters such as power plants, large industrial facilities, and landfills to report GHG output levels on a yearly basis, using a value of 25,000 metric tons or more of carbon dioxide equivalent (CO_2e) units as a threshold value for reporting (Reference 2.7-33). Fossil fuel and industrial gas suppliers are similarly required to provide estimates of GHG quantities to the GHGRP, not as direct emissions but as emission quantities likely to result from the use or release of provided supplies. Most GHG emissions associated with the transportation, residential, and commercial sectors are accounted for by fuel and industrial gas suppliers (Reference 2.7-34).

In 2021, GHG output from direct emitters in the U.S. (7608 unique GHGRP reporting facilities) totaled 2.71 billion metric tons of CO_2e (Table 2.7-21) (Reference 2.7-35; Reference 2.7-36). Fuel and industrial gas suppliers (966 unique GHGRP reporters) in turn accounted for a further 3.32 billion metric tons of CO_2e in 2021 (Table 2.7-22). Collectively, large facility sources of direct and indirect emissions (6.03 billion metric tons of CO_2e) accounted for approximately 95 percent of total U.S. GHG emissions in 2021 (6.34 billion metric tons of CO_2e). For comparison, total U.S. GHG emissions data for 2021 (and select preceding years) are detailed in Table 2.7-23, per the EPA's "Inventory of U.S. Greenhouse Gas Emissions and Sinks" (Reference 2.7-37).

Summaries of GHGRP direct emissions reporting and EPA total emissions inventories for 2021 for the state of Idaho are provided in Table 2.7-24 and Table 2.7-25, as developed using the EPA's Facility Level Information on Greenhouse Gases Tool (Reference 2.7-38) and the EPA's "Greenhouse Gas Inventory Data Explorer" (Reference 2.7-39). Table 2.7-24 presents only direct

GHG-emitter data, as no Idaho-based fuel or industrial gas suppliers or carbon sequestration/injection facilities report emission levels to the GHGRP (i.e., no large CO_2e supplier sources operate in Idaho). Because Table 2.7-24 includes only emissions from large suppliers of GHG-emitting or GHG-containing products or facilities that emit more than 25,000 metric tons of CO_2e per year, summary totals are slightly less than inventory totals presented in Table 2.7-25.
Table 2.7-25 indicates that the largest contributors to Idaho's full inventory of GHG emissions are agriculture and transportation, accounting for approximately 40.3 percent and 30.1 percent, respectively, of gross emissions in 2020. Industrial, commercial, and residential activities (combined) are the next largest contributors, accounting for a further 24.5 percent of gross emissions in 2020. Emissions from electrical production account for the remaining 5.1 percent of 2020 gross emissions.

In the wider CFPP site region of Bingham, Bonneville, Butte, Clark, and Jefferson counties, only seven facilities currently report (or previously reported) GHG emissions information to the GHGRP (Figure 2.7-46); i.e., only seven facilities in the vicinity of the CFPP generate (or have generated) GHG emissions nearing or exceeding 40 CFR 98 reporting thresholds of 25,000 metric tons of CO_2e per year. Over the full period of GHGRP data collection, reported emissions from these sites (including the INL) totals much less than 200,000 metric tons of CO_2e per year (Table 2.7-26 and Table 2.7-27) or no more than approximately four percent of Idaho's average annual GHG output from large direct emitters.

GHG inventories for the INL are provided in Table 2.7-28 and Table 2.7-29, for a period extending from 2008 to 2016 (with the exception of missing data for 2011) as derived from annual reporting completed in compliance with GHGRP and predecessor rulings (Reference 2.7-40, Reference 2.7-41, Reference 2.7-42, Reference 2.7-43, Reference 2.7-44, Reference 2.7-45, and Reference 2.7-46). The INL's GHGRP reporting to the EPA was ultimately discontinued in 2017, as the INL GHG emissions had not exceeded the GHGRP reporting threshold of 25,000 metric tons of CO_2e in five consecutive years.

INL GHG output reporting, as maintained before 2017 and presented in Table 2.7-28 and Table 2.7-29, includes several discrete scopes:

- Emissions produced directly by stationary or mobile combustion and by fugitive emissions (Scope 1);
- Emissions generated by entities providing electrical power to the INL (Scope 2); and
- Emissions generated outside of INL's organizational boundaries, but as a consequence of INL activities (i.e., outsourced activities benefitting the INL [upstream and downstream GHG emissions]) (Scope 3).

For the last year of the INL's GHGRP compliance reporting, Scope 2 emissions (i.e., power-related emissions) represented the largest portion of the INL's GHG inventory (roughly 53 percent of total emissions). Emissions from employee commuting, mobile and stationary combustion sources, and fugitive emissions from landfills within INL's boundaries form the next largest emission sources, reflecting approximately 11.2 percent, 8.1 percent and 7.2 percent, and 7.3 percent of total emissions, respectively.

2.7.3 Atmospheric Dispersion

Transport and diffusion modeling (dispersion modeling) studies for the INL were first published by NOAA's ARL FRD in 1996 (Reference 2.7-47) and were significantly revised/updated in 2001 (Reference 2.7-48) and 2003 (Reference 2.7-49). Figure 2.7-47 provides representative excerpts from the latter study, showing modeled contours of total integrated concentration for hypothetical surface releases from four INL facilities, INTEC, RWMC, SMC, and the ATR. For both INTEC and the ATR, the contours shown in Figure 2.7-47 are elongated in a southwest-to-northeast direction, reflecting a channeling of winds along the axis of the ESRP. This suggests that an assumption of relatively straight-line transport may be a reasonable assumption for pollutant dispersion from the CFPP site, at least to distances on the order of 3 miles to 6 miles. Transport from the RWMC, in contrast, shows a secondary eastward dispersion pathway, likely resulting from westerly drainage winds exiting the Big Lost River Valley in the vicinity of the RWMC (Reference 2.7-1). Modeled transport from the SMC also differs from INTEC and the ATR insofar as greater dispersion concentrations are shown in areas extending to the south of the facility. This redistribution is attributed to stronger down-valley winds and a greater prevalence of local drainage winds in the vicinity of the SMC.

As a supplement to Figure 2.7-47, Figure 2.7-48 shows transport patterns using a larger domain model, extending out approximately 40 miles from release points at INTEC and the ATR.

Further discussion of atmospheric dispersion is included in ER Section 2.7 of the CFPP COL application, with reference to the evaluation of radiological impacts from operations. No radiological sources are projected for preconstruction or pre-COL construction activities at the CFPP site.

2.7.3.1 Short-Term Dispersion Estimates

Short-term dispersion estimates are described in the CFPP COL application ER Section 2.7.

2.7.3.2 Long-Term Dispersion Estimates

Long-term dispersion estimates are described in the CFPP COL application ER Section 2.7.

2.7.4 Meteorological Monitoring

This section provides information on the CFPP on-site meteorological program, including details on the tower location, instrumentation, data reduction, and data compilation. One full year of meteorological data is presented. Additional years of data are expected to be provided as post-COL application submittal supplements.

2.7.4.1 On-Site Meteorological Measurements Program

Pre-operational meteorological monitoring at the CFPP site was initiated in December 2021, in accordance with the NRC Regulatory Guide 1.23. Initiation of the pre-operational monitoring program specifically included construction of a 197.9-foot NRG Systems XHD TallTower™ and subsequent installation of redundant (i.e., paired) temperature sensors and wind speed and direction sensors at tower heights of approximately 32.8 feet and 196.9 feet, paired relative humidity sensors (with temperature elements) and solar radiation monitors at a height of approximately 6.6 feet, and paired rain gauges at a height of approximately 1.6 feet.

This TallTower™ and instrumentation system is expected to remain in use during construction and operations.

2.7.4.1.1 CFPP Tower Location Details and Construction

The CFPP meteorological monitoring tower is located at North (N) 43.649090 and West (W) 113.065694, at an elevation of 5143.2 feet North American Vertical Datum of 1988. Maps of the tower location are provided in Figure 2.7-49, Figure 2.7-50, and Figure 2.7-51. Representative photographs of the tower and the surrounding landscape and topography are provided in Figure 2.7-52, Figure 2.7-53, and Figure 2.7-54. The CFPP tower is located on level, open terrain and is appropriately distanced from structures or topographical features so as to avoid airflow modifications.

The NRG Systems XHD TallTower™ at the CFPP consists of a total of 32 galvanized steel tubes guyed at 6 levels in 4 directions. Each section is flared and connects via sliding/insertion and requires no bolting or clamping. The TallTower™ base is approximately 10.2-feet square and consists of 4 flat-lying steel plates and 2 vertical plates connected via 2 steel gussets. A pivot pipe and paired holes in the TallTower™ base tube and the vertical pieces of the baseplate form a hinge and facilitate tower tilting (i.e., tower lowering and re-erection, for instrumentation access).

2.7.4.1.2 CFPP Tower Instrumentation Specifics

Instrumentation installed on the tower, as previously introduced, includes paired temperature and wind speed and direction sensors positioned at heights of approximately 32.8 feet and 196.9 feet, paired relative humidity and solar radiation monitors at heights of approximately 6.6 feet, and paired rain gauges with top heights of approximately 1.6 feet. Both rain gauges are located on the ground next to the tower (Figure 2.7-54). The aforementioned relative humidity and solar radiation sensors are similarly mounted separately from the tower, on a separate riser and cross-bar structure immediately adjacent to the tower (Figure 2.7-54). Pairing (collocation) of sensors is intended to minimize the potential for hourly data losses, should one of the sensors become inoperative or otherwise impaired.

The instrumentation inventory for the CFPP meteorological monitoring tower more specifically includes the following sensors:

- Four R.M. Young Model 4132 platinum temperature probes;
- Four R.M. Young Model 05305 wind sensors;
- Two Hukseflux SR05 series pyranometers;
- Two E+E Elektronic EE181 relative humidity probes; and
- Two R.M Young Model 52203 tipping bucket rain gauges.

Each of the tower sensors is wired directly to a Campbell Scientific CR1000X measurement and control data logger and a corresponding Campbell Scientific Volt 108 (GRANITE™ series) multiplexed analog measurement module, fully powered by a system of solar panels and batteries. Data storage and access is cloud-based and can be readily accessed via web-based and mobile applications.

Instrumentation specifications and information on sensor sampling frequency, averaging period, and measurement range and resolution are provided in Table 2.7-30 and Table 2.7-31. Specifications for the sensors meet or exceed performance requirements listed in the EPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications (Reference 2.7-50) and are consistent with criteria in NRC Regulatory Guide 1.23. Calibration of the sensors occurs semi-annually and, individually, following completion of repairs or maintenance requirement sensor disassembly or replacement.

2.7.4.1.3 CFPP Data Reduction and Compilation

Data from the CFPP meteorological monitoring tower is downloaded and screened daily, and reviewed weekly. Daily screenings, in particular, are completed using a programmed data management system that compares CFPP observations to the meteorological screening criteria shown in Table 2.7-32. Based on this comparison, an automated process assigns a screening quality control (QC) code to each monitored data value, as follows:

- 0, indicating the value passes all screening criteria;
- 4, indicating the value is impacted by maintenance, calibration, or audit activities;
- 6, indicating the value does not pass all screening criteria and further review is required; and
- 9, indicating the value is missing.

Following initial screening, values flagged with a code of 6 are further evaluated for reasonable agreement with independent concurrent observations from either the CFPP backup sensors or other meteorological stations located within an approximate 10-mile radius of the CFPP site.

Final QC codes are then assigned either automatically by the system or manually after further review, to indicate the following:

- 0, valid, passing all screening criteria and subsequent review;
- 1, valid, gap-filled value (from backup sensor or using data from other nearby stations);
- 3, valid, with review showing reasonable agreement with independent observations;
- 4, invalid, as impacted by maintenance, calibration, or audit activities;
- 7, invalid, failed screening and a cause for the inaccuracy could not be determined;
- 8, invalid, failed screening and a cause for the inaccuracy was identified; and
- 9, missing.

During review, measurements deemed to be valid by means of fully passing the Table 2.7-30 screening criteria or by demonstration of reasonable agreement with independent observations are assigned final QC codes of 0, 1, or 3. In contrast, data values confirmed to have been impacted by on-site maintenance, equipment malfunctions, or deemed to be unreconcilable with independent observations (with redundant sensor or independent station observations) are assigned final QC codes of 4, 7, 8, or 9 (i.e., as invalid or missing).

For reference, daily screening statistics and final QC code assignments for one full year of meteorological monitoring at the CFPP are provided in Table 2.7-33 and Table 2.7-34, respectively. As shown in Table 2.7-33 and Table 2.7-34, numerous measurements did not pass automated screening; however, final review reconciled most as acceptable (i.e., valid) primarily by comparison with observations from redundant sensors. Irreconcilable values are typically related to issues such as power outages or suspected icing (winter months).

2.7.4.1.4 CFPP Data Completeness

The NRC Regulatory Guide 1.23 recommends routine meteorological sensor inspection and servicing to ensure data recovery and completeness of at least 90 percent on an annual basis. This objective applies to each monitored parameter individually and to joint recovery variables (e.g., stability class data).

Completeness statistics for one year of meteorological monitoring at the CFPP are presented in Table 2.7-35, calculated as the quotient of the number of valid and verified hours of data collected and the total number of hours in the respective monitoring period. As shown in Table 2.7-33, the lowest completion percentage for a single parameter was 97.53 percent, for wind direction data collected between December 4, 2021 and March 5, 2022. The lowest completion percentage for joint recovery was 97.25 percent, for the same period. In general, completion percentages of less than 100 percent largely reflect hours invalidated during calibration and audit activities (when the tower is temporarily lowered, and the sensors are handled). Nonetheless, the statistics demonstrate that the data quality objective of greater than 90 percent completion has been achieved for all parameters and for joint recovery parameters.

2.7.4.2 CFPP Site Meteorological Data

Critical summary statistics for one full year of meteorological monitoring data from the CFPP (i.e., a one-year weather summary) are provided in Table 2.7-36. Descriptions of individual monitoring parameter observations are provided below, in Section 2.7.4.2.1 through Section 2.7.4.2.5.

2.7.4.2.1 Precipitation

Figure 2.7-55 and Figure 2.7-56 show graphs of hourly and running total water-equivalent precipitation (i.e., rainfall plus melted snow) for one year of monitoring at the CFPP site. Based on these graphs and data presented in Table 2.7-36, total precipitation for the year of monitoring is observed to equal 8.86 inches. Maximum 1-hour and 24-hour precipitation are observed to be 0.8 inches and 1.17 inches respectively. For comparison, during the 66-year period of record for the CFA, extending from 1950 through 2015, daily total precipitation equaled or exceeded 1-inch on 13 occasions (Reference 2.7-1). The greatest daily precipitation value during the CFA period of record is 1.64 inches, recorded on June 10, 1969.

Total precipitation for the period of the CFPP record is generally consistent with total annual average precipitation reported for the CFA for the period extending from 1950 to 2015 (8.38 inches) and with the normal value reported for the CFA (8.66 inches) as previously described (in Section 2.7.1). Total monthly precipitation distributions also generally match norms reported for the CFA, excepting relatively high precipitation at the CFPP in August 2022 (Figure 2.7-57).

Cumulative precipitation at the CFPP from December 3, 2021 to December 4, 2022 is observed to be relatively consistent with cumulative precipitation recorded at nearby MESONET monitoring sites, namely at Arco, Howe, and the INL's ATR (Figure 2.7-58) (Reference 2.7-50).

2.7.4.2.2 Relative Humidity

Figure 2.7-59 shows a graph of hourly relative humidity for one year of CFPP monitoring. The average relative humidity for this period, approximately 55 percent, is generally consistent with the average annual relatively humidity reported for the CFA for a data period of record extending from January 1994 through December 2015 (60 percent) (Reference 2.7-1). Average annual relative humidity values for morning hours and afternoon hours at the CFPP (67 percent and 45 percent, respectively) similarly compare well with average daily maximum and minimum at the CFA (83 percent and 37 percent, respectively) and with actual daily data from nearby MESONET site (e.g., the Dead Man Canyon Station, as shown in Figure 2.7-60).

2.7.4.2.3 Temperature and Delta Temperature

Figure 2.7-61 through Figure 2.7-63 show graphs of hourly temperature at the CFPP site at measurement heights of 2-meter (m) (surface), 10-m (intermediate), and 60-m (upper). As shown in the figures, extreme maximum and minimum temperatures at the CFPP range from approximately 99°F to approximately -9°F for all measurement heights. This range is equated with mean annual high temperatures of 55°F, 54°F, and 52°F for surface, intermediate, and upper measurement heights, and with average annual low temperatures of 32°F, 34°F, and 36°F for surface, intermediate, and upper measurement heights. By comparison, normal annual high and low temperatures at the CFA are approximately 57°F and 28°F, respectively.

In general, large monthly variations in temperature occur at both the CFPP and at the CFA (representative of wider, regional conditions) with nearly constant below freezing temperatures in the winter months (Figure 2.7-64). At the CFPP, extended nighttime cold and snow cover during winter months contribute to more frequent large surface layer temperature inversions (colder air beneath warmer air) as evidenced by temperature deltas (Figure 2.7-65). Conversely, during the warmer months, extended daylight and corresponding solar heating allow for a moderation in temperatures and increased mixing in the surface layer (i.e., generally lower temperature differences) and less frequent large surface layer temperature inversions.

2.7.4.2.4 Wind Speed and Direction

Quarterly and annual summary wind roses for 10-m and 60-m measurement heights at the CFPP site are provided in Figure 2.7-66 to Figure 2.7-73. These roses show a consistent (year-round) pattern of southwesterly- and northeasterly-prevailing light to moderate winds. Approximately one percent of the measurements at both 10-m and 60-m heights show calm conditions, as defined by wind speeds less than 0.5 meters per second (m/s).

Daily winds range from a mean of approximately 2.5 m/s to 5.5 m/s at the 10-m level and 2.9 m/s to 6.7 m/s at the 60-m level, with the lightest average winds occurring during the colder months, as shown in Figure 2.7-74 and Figure 2.7-74.

2.7.4.2.5 Atmospheric Stability

Based on the first year of delta temperature data from the CFPP meteorological monitoring, unstable atmospheric conditions (category A, B, and C) occurred 20.3% of the time, neutral conditions (category D) occurred 20.2% of the time, and stable atmospheric conditions (category, E, F, G) occurred 59.5% of the time (Reg Guide 1.23).

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Table 2.7-1: Siting Information for Existing NOAA/INL MESONET Stations Located on INL

Station Name	Station Identification	Latitude (dd.mmmmm)	Longitude (dd.mmmmm)	Elevation (feet)
Advanced Test Reactor Complex	ATR	43.58463	112.96867	4937
Base of Howe Peak	BAS	43.67753	113.00603	4900
Central Facilities Area Building 690	CFA	43.53262	112.94773	4950
Critical Infrastructure Test Range Complex	CIT	43.54748	112.86968	4910
Dead Man Canyon	DEA	43.62507	113.05978	5108
Grid 3/Idaho Nuclear Technical and Engineering Center	GRI	43.58970	112.93993	4897
Lost River Rest Area	LOS	43.54868	113.00990	4983
Materials and Fuels Complex	MFC	43.59413	112.65173	5143
Naval Reactor Facility	NRF	43.64787	112.91123	4847
Radioactive Waste Management Complex	RWM	43.50343	113.04603	5025
Rover	ROV	43.72060	112.52957	5008
Sand Dunes	SAN	43.77967	112.75818	4820
Specific Manufacturing Capability	SMC	43.85977	112.73027	4790

Reference 2.7-1
dd:mmmmm - decimal degrees minutes

Table 2.7-2: Instrumentation Details for NOAA/INL MESONET Stations Located on INL

Station Name[1]	Instrumentation and Installation Levels[2] (feet)					
	6	33	50	150	200	250
Advanced Test Reactor Complex	t,r,p,s,b	-	w,T	-	-	-
Base of Howe Peak	t,r,s,b	-	w,T	-	-	-
Central Facilities Area Building 690	t,r,p,s,b,d	-	w,T	-	-	-
Critical Infrastructure Test Range Complex	t,r,p,s,b	-	w,T	-	-	-
Dead Man Canyon	t,r,s,b	-	w,T	-	-	-
Grid 3/Idaho Nuclear Technical and Engineering Center	w,t,r,p,s,b,l	w,T	w,T	w,T	w,T	-
Lost River Rest Area	t,r,p,s,b	-	w,T	-	-	-
Materials and Fuels Complex	w,t,r,p,s,b,l,d	w,T	w,T	w,T	-	w,T
Naval Reactor Facility	t,r,p,s,b	-	w,T	-	-	-
Radioactive Waste Management Complex	t,r,p,s,b	-	w,T	-	-	-
Rover	t,r,s,b	-	w,T	-	-	-
Sand Dunes	t,r,p,s,b,d	-	w,T	-	-	-
Specific Manufacturing Capability	w,t,r,p,s,b,l	w,T	w,T	w,T	-	-

Reference 2.7-1.

[1] Siting/location information in Table 2.7-1.

[2] Sensor/measurement levels; w - Wind (mean speed, peak 3-second wind gust, mean direction, direction standard deviation); T - Air temperature (mean); t - Air temperature (mean, maximum, and minimum); s - Solar radiation (mean); r - Relative humidity (mean); p - Precipitation (total); l - Soil temperature and moisture (mean); d - Snow depth; b - Barometric pressure (mean).

Table 2.7-3: Siting Information for NOAA/INL MESONET Stations Located Outside of the INL

Station Name	Station Identification	Latitude (dd.mmmmm)	Longitude (dd.mmmmm)	Elevation (feet)
Aberdeen	ABE	42.954933	112.824533	4392
Arco	ARC	43.624550	113.297100	5290
Atomic City	ATO	43.443733	112.815650	5058
Blackfoot	BLK	43.189850	112.333200	4520
Blue Dome	BLU	44.075000	112.842033	5680
Cox's Well	COX	43.294167	113.181283	5200
Craters of the Moon	CRA	43.429183	113.538300	5996
Dubois	DUB	44.242383	112.201833	5465
Fort Hall	FOR	43.022000	112.411983	4452
Hamer	HAM	44.007417	112.238833	4843
Howe	HOW	43.784117	112.977317	4815
Idaho Falls	IDA	43.504133	112.050133	4709
Kettle Butte	KET	43.547567	112.326250	5190
Minidoka	MIN	42.804417	113.589650	4285
Monteview	MON	44.015367	112.535917	4797
Richfield	RIC	43.060600	114.134583	4315
Roberts	ROB	43.743517	112.121117	4760
Sugar City	SUG	43.896583	111.737617	4895
Big Southern Butte Summit	SUM	43.396333	113.021850	7576
Taber	TAB	43.318683	112.691800	4730
Terreton	TER	43.841683	112.418250	4792

Reference 2.7-1.

dd:mmmmm - decimal degrees minutes

Table 2.7-4: Instrumentation Details for NOAA/INL MESONET Stations Located Outside of the INL

Station Name[1]	Instrument Levels[2] at Different Heights (feet)			
	6	20	30	50
Aberdeen	w,t,r,p,s,b,l	-	-	w,T
Arco	t,r,p,s	-	-	w,T
Atomic City	t,r,p,s,b	-	-	w,T
Blackfoot	t,r,p,s,b	-	-	w,T
Blue Dome	t,r,p,s	-	-	w,T
Cox's Well	t,r,s	-	-	w,T
Craters of the Moon	t,r,s,b	-	w,T	-
Dubois	t,r,p,s,b	-	-	w,T
Fort Hall	t,r,p,s,b	-	-	w,T
Hamer	t,r,p,s	-	-	w,T
Howe	t,r,p,s	-	-	w,T
Idaho Falls	t,r,p,s,b	-	-	w,T
Kettle Butte	w,t,r,p,s,b	-	-	w,T
Minidoka	t,r,p,s,b	-	-	w,T
Monteview	w,t,r,p,s,b	-	-	w,T
Richfield	t,r,p,s,b	-	-	w,T
Roberts	t,r,p,s	-	-	w,T
Sugar City	t,r,p,s,b	-	-	w,T
Big Southern Butte Summit	t,r,s,b	w	-	-
Taber	t,r,p,s	-	-	w,T
Terreton	t,r,p,s,b	-	-	w,T

Reference 2.7-1.

[1] Siting/location information in Table 2.7-3.

[2] Sensor/measurement levels; w - Wind (mean speed, peak 3-second wind gust, mean direction, direction standard deviation); T - Air temperature (mean); t - Air temperature (mean, maximum, and minimum); s - Solar radiation (mean); r - Relative humidity (mean); p - Precipitation (total); l - Soil temperature and moisture (mean); d - Snow depth; b - Barometric pressure (mean).

Table 2.7-5: Temperature and Precipitation Norms (1981 to 2010) for Select Stations on or Surrounding the INL

Station ID[1]	Data Start[2] (year)	Elevation[3] (feet)	Air Temperature[4] (°F)			Precipitation[5] (inches)		Snowfall[6] (inches)
			Maximum	Minimum	Average	Maximum	Average	Average
100010	1914	4405	104	-42	45	2.4	9.1	24.5
100375	1914	5325	102	-46	44	2.4	10.4	30.8
100915	1895	4536	108	-40	47	2.1	11.3	22.8
102260	1958	5897	101	-37	43	3.0	15.6	95.7
102707	1925	5450	103	-31	43	2.6	12.9	47.7
103964	1948	4791	105	-48	44	2.1	9.6	25.5
104384	1914	4820	103	-38	44	2.5	7.8	14.5
104455	1952	4765	104	-34	46	1.7	14.3	27.1
104457	1948	4730	102	-38	44	1.7	10.4	36.9
104460	1952	4938	105	-47	42	1.6	8.7	25.0
105980	1947	4164	108	-41	47	1.5	9.5	23.4
107211	1939	4449	104	-33	46	4.3	12.1	43.4
107644	1977	4920	102	-36	44	1.8	13.4	54.9
107673	1910	4306	105	-40	45	2.0	11.1	32.2
108022	1895	4950	100	-40	42	2.0	14.5	42.9
Average	1933	4830	104	-39	44	2.3	11.4	36.5

Reference 2.7-1.

[1] 10001, Aberdeen Experimental Station; 100375, Arco 3 SW; 100915, Blackfoot 2 SSW; 102260, Craters of the Moon; 102707, Dubois Experimental Station; 103964, Hamer 4 NW; 104384, Howe; 104455, Idaho Falls 2 ESE; 104457, Idaho Falls FAA AP (Idaho Falls Airport); 104460, Idaho Falls 46 W; 105980, Minidoka Dam; 107211, Pocatello WSO AP; 107644, Rexburg BYU?Idaho; 107673, Richfield; 108022, St. Anthony 1 WNW.

[2] Earliest year of data collection for a given site. However, normal data are presented for the period of record extending from 1981 to 2010.

[3] Elevation above sea level.

[4] Absolute maximum, absolute minimum, and annual average temperature (°F - degrees Fahrenheit) for a 30-year normal period extending from 1981 through 2010.

[5] Daily maximum and annual average precipitation (in inches) for a 30-year normal period extending from 1981 through 2010.

[6] Annual average snowfall for a 30-year normal period extending from 1981 through 2010.

°F - degrees Fahrenheit

Table 2.7-6: Temperature and Precipitation Norms (1991 to 2020) for National Weather Service Sites Located in a 50-Mile Radius of the CFPP

Station Name	Latitude (dd.mmmm)	Longitude (dd.mmmm)	Elevation (feet)	Temperature (°F)	Precipitation (inches)	Snow (inches)
Aberdeen Experimental Station	42.9536	-112.8253	1342.6	45.4	9.6	25.2
Arco	43.6356	-113.2997	1623.1	43.7	8.8	23.8
Arco 17 SW	43.4622	-113.5561	1804.4	43.0	15.5	-
Bear Canyon	43.7400	-113.9400	2407.9	-	27.3	-
Blackfoot Fire Department	43.1917	-112.3453	1371.3	47.2	12.1	14.7
Chilly Barton Flat	43.9778	-113.8292	1908.0	41.0	8.0	18.3
Craters Of The Moon	43.4628	-113.5600	1802.6	39.1	15.0	80.3
Garfield Research Station	43.6100	-113.9300	1999.5	-	20.9	-
Hamer 4 NW	43.9664	-112.2642	1460.0	43.8	8.9	20.4
Hilts Creek	44.0200	-113.4700	2438.4	-	23.2	-
Howe	43.7828	-113.0033	1469.1	44.0	7.3	11.1
Idaho Falls 46 W	43.5317	-112.9422	1505.1	42.7	8.2	24.8
Mackay Lost River Research Station	43.9178	-113.6153	1797.4	42.2	9.9	-
Monteview	44.0303	-112.5667	1467.6	41.6	10.2	-
Smiley Mountain	43.7300	-113.8300	2901.7	-	31.5	-
Swede Peak	43.6300	-113.9700	2328.7	-	25.7	-
Average	-	-	-	43.1	15.1	27.3

Reference 2.7-2

dd.mmmmm - decimal degrees minutes
°F - degrees Fahrenheit
SW - south west
NW - north west
W - west

Table 2.7-7: Monthly Mean Wind Speed for Individual Micro-Climate Zones at the INL

	Mean Wind Speed at Multiple Heights (mph)					
	Southwest INL		North INL		Southeast INL	
Month	33 feet	200 feet	33 feet	200 feet	33 feet	200 feet
January	6.6	9.4	5.7	7.4	7.2	10.9
February	7.7	10.9	7.1	9.1	8.2	12.1
March	9.9	13.7	9.2	12.2	10.3	14.7
April	10.6	14.4	10.5	13.7	11.0	15.4
May	10.9	14.6	10.4	13.6	11.0	15.3
June	10.8	14.5	10.2	13.3	10.9	15.2
July	10.0	13.7	9.5	12.5	10.1	14.2
August	9.5	13.2	8.8	11.8	9.6	13.7
September	8.8	12.5	8.2	11.2	9.0	13.2
October	8.7	12.4	8.4	11.2	9.1	13.4
November	8.1	11.7	7.2	9.7	8.6	12.8
December	7.1	10.3	6.6	8.8	8.0	12.1
Annual	9.1	12.6	8.5	11.2	9.4	13.6

Reference 2.7-1.

mph - miles per hour

Table 2.7-8: Monthly Peak Wind Speed for Individual Micro-Climate Zones at the INL

Month	Peak Wind Speed at Multiple Heights (mph)					
	Southwest INL		North INL		Southeast INL	
	33 feet	200 feet	33 feet	200 feet	33 feet	200 feet
January	63.2	73.3	61.1	68.7	65.3	77.8
February	70.4	81.1	59.8	65.8	73.5	75.3
March	66	73.7	74.9	73.1	62	69.2
April	76.5	93.1	66.1	78.4	71.3	84.7
May	71.4	68.8	65.8	77.6	73.8	75.2
June	77.2	86.2	71.6	80.2	67.4	82.5
July	81.6	89.6	69.1	72.6	65.5	74.4
August	66.6	75.1	69.6	78.8	70.4	75.7
September	65.4	76.8	65.9	72.8	61.1	68.6
October	65.2	70.3	64.3	74.9	62.4	69.4
November	58.4	66.9	68.5	77.5	62.4	73.1
December	57.3	68	59.9	68.9	63.5	72.5
Annual	81.6	93.1	74.9	80.2	73.8	84.7

Reference 2.7-1.

mph - miles per hour

Table 2.7-9: Daily Air Temperature Extremes at the INL by Month

Month	Temperature[1] (°F)			
	Highest Daily Maximum	Lowest Daily Minimum	Highest Daily Average	Lowest Daily Average
January	55	-40	44	-20
February	60	-36	46	-23
March	73	-28	55	-6
April	86	6	63	22
May	96	13	76	30
June	101	22	83	39
July	105	28	83	49
August	102	24	83	46
September	96 (99)	12	74 (78)	30
October	89	-6 (-8)	64 (67)	10
November	67 (70)	-24	57	-9
December	57	-47	47	-28

Reference 2.7-1 and Reference 2.7-3.

[1] Non-parenthetical numbers represent the highest or lowest daily maximum, minimum, or average temperature for the INL's Central Facilities Area MESONET station from 1950 to 2015, as reported in Reference 2.7-1. The parenthetical number is the same statistic, but for a period of record extending from 1950 to 2022, per Reference 2.7-3. Only one value is reported if no difference exists between the 1950 to 2015 and 1950 to 2022 records.

°F - degrees Fahrenheit

Table 2.7-10: Average Total Monthly Water Equivalent Precipitation at the INL

Month	1950 to 2015 (and 1950 to 2022)[1] (inches)			1981 to 2010[2] (inches)
	Average	Highest	Lowest	Normal
January	0.66	2.56	0.00	0.72
February	0.57 (0.56)	2.40	0.00	0.55
March	0.60 (0.61)	2.03	0.00	0.65
April	0.77 (0.78)	2.50	0.00	0.93
May	1.19 (1.21)	4.42	0.02	1.23
June	1.11 (1.06)	4.64	0.00	1.07
July	0.47 (0.45)	2.29	0.00	0.59
August	0.54 (0.55)	4.05	0.00	0.35
September	0.61 (0.66)	3.52	0.00	0.63
October	0.57 (0.60)	1.88 (2.60)	0.00	0.62
November	0.60 (0.59)	1.74	0.00	0.61
December	0.73 (0.72)	3.43	0.00	0.71
Annual	8.38 (8.41)	14.40	3.04	8.66

Reference 2.7-1 and Reference 2.7-4.

[1] Non-parenthetical numbers represent the average, highest, or lowest total monthly precipitation at the INL's CFA monitoring station from 1950 to 2015, as reported in Reference 2.7-1. The parenthetical number is the same statistic, but for a period of record extending from 1950 to 2022, as per Reference 2.7-4. Only one value is provided if no difference exists between the 1950 to 2015 and 1950 to 2022 records.

[2] Period of record spans January 1981 through December 2010, per Reference 2.7-1.

Table 2.7-11: Average, Maximum, Minimum, and Daily Extreme Snowfall Totals for the INL

Month	1950 to 2015 (and 1950 to 2022)[1] (inches)				1981 to 2010[2] (inches)
	Average	Maximum	Minimum	Daily Maximum	Normal
January	6.1 (6.3)	18.1 (22.5)	0.0	9.0	6.1
February	4.6 (4.6)	16.1	0.0	7.5	4.4
March	2.8 (2.7)	10.2	0.0	8.6	2.2
April	1.8 (1.6)	16.5 (16.5)	0.0	6.7	1.2
May	0.4	8.3	0.0	4.4	0.0
June	0.0	0.0	0.0	0.0	0.0
July	0.0	0.0	0.0	0.0	0.0
August	0.0	0.0	0.0	0.0	0.0
September	0.0	1.0	0.0	1.0	0.0
October	0.5	7.2	0.0	4.5	0.4
November	3.0	12.3	0.0	6.5	3.6
December	6.5 (6.7)	22.3 (22.5)	0.0	8.0	7.1
Annual	25.5 (25.7)	59.7	6.8	9.0	25.0

Reference 2.7-1 and Reference 2.7-7.

[1] Non-parenthetical numbers represent the average, maximum, minimum, or daily extreme (maximum) snowfall totals for the INL's CFA MESONET station from 1950 to 2015, as reported in Reference 2.7-1. The parenthetical number is the same statistic, but for a period of record extending from 1950 to 2022, per Reference 2.7-7. Only one value is reported if no difference exists between the 1950 to 2015 and 1950 to 2022 records.

[2] Data period of record spans January 1981 through December 2010 (Reference 2.7-1).

Table 2.7-12: Averages of Daily Maximum and Minimum Relative Humidity for the INL

Month	Average (%)		Highest Average (%)		Lowest Average (%)	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
January	94	70	99	81	89	50
February	93	62	100	77	87	40
March	91	43	99	61	79	22
April	86	29	96	37	74	20
May	82	26	97	44	66	15
June	76	21	96	43	54	13
July	66	14	87	22	42	10
August	65	14	87	29	54	11
September	72	20	90	29	48	14
October	83	30	93	39	65	18
November	92	48	99	65	86	36
December	94	67	99	82	87	44
Annual	83	37	92	44	77	32

Reference 2.7-1.
% - percent

Table 2.7-13: Monthly and Annual Averages of Total Daily Solar (MJ/m2/d)

Month	Average Total Daily Solar Radiation		
	CFA[1]	SMC	MFC
January	7.0	6.9	6.7
February	11.2	10.9	10.7
March	15.9 (16.1)	15.5	15.5
April	19.8 (19.6)	19.7	19.4
May	23.6 (23.3)	23.0	23.1
June	27.1 (26.6)	26.2	26.5
July	27.9 (27.6)	26.8	26.9
August	24.1	22.9	23.0
September	19.1	18.2	18.2
October	13.0	12.4	12.4
November	8.0	7.8	7.6
December	5.7 (5.8)	5.6	5.3
Annual	16.9 (16.8)	16.4	16.4

Source: Reference 2.7-1 and Reference 2.7-8.

[1]Non-parenthetical numbers represent average values from the INL's CFA MESONET station for a period of record extending from April 1996 through December 2022, as reported in Reference 2.7-8. The parenthetical number is the same statistic, but for a period of record extending from January 1994 through December 2015, per Reference 2.7-1. Only one value is reported if no difference exists between the 1996 to 2022 and 1994 to 2015 records.

$MJ/m^2/d$ - Mega Joules per square meter per day

Table 2.7-14: Evapotranspiration and Evaporation from Sagebrush, Bare Soil, and Ponds at the INL

Month	Sagebrush Evapotranspiration (inches)	Bare Soil Evaporation (inches)	Ponds Evaporation (inches)
January	0.26 ± 0.08	0.37 ± 0.12	0.47 ± 0.09
February	0.43 ± 0.13	0.61 ± 0.20	0.74 ± 0. 15
March	0.81 ± 0.21	1.12 ± 0.34	1.79 ± 0.37
April	1.37 ± 0.42	1.51 ± 0.39	3.16 ± 0.40
May	3.04 ± 0.60	1.89 ± 0.65	4.22 ± 0.46
June	3.67 ± 0.38	1.75 ± 0.61	4.94 ± 0.49
July	3.57 ± 0.40	1.48 ± 0.50	5.67 ± 0.43
August	2.81 ± 0.28	1.22 ± 0.34	4.89 ± 0.29
September	1.60 ± 0.50	1.15 ± 0.44	3.44 ± 0.34
October	0.73 ± 0.27	0.88 ± 0.39	2.42 ± 0.31
November	0.30 ± 0.11	0.41 ± 0.18	0.91 ± 0.20
December	0.24 ± 0.09	0.33 ± 0.15	0.50 ± 0.10

Reference 2.7-1.

Table 2.7-15: Number of Severe Weather Events in the CFPP Site Region

Event[1,2]	Bingham	Bonneville	Butte	Clark	Jefferson	Frequency[3] (Events/year)
Blizzard	17	11	7	5	5	0.35
Cold/Wind Chill	11	9	9	4	8	0.32
Dense Fog	1	2	1	0	2	0.05
Drought	6	4	4	2	2	0.14
Dust Storm	21	26	19	0	26	0.71
Excessive Heat	2	1	0	0	1	0.03
Extreme Cold/Wind Chill	32	22	22	16	13	0.81
Flash Flood	5	5	3	2	1	0.12
Flood	23	20	15	6	16	0.62
Freezing Fog	2	1	0	0	1	0.03
Frost/Freeze	2	1	1	0	1	0.04
Funnel Cloud	11	9	4	1	2	0.21
Hail	41	38	24	10	27	0.42
Heat	10	7	7	2	5	0.24
Heavy Rain	5	8	1	2	1	0.13
Heavy Snow	220	175	128	177	40	5.69
High Wind	122	91	78	17	74	2.94
Ice Storm	2	0	0	0	0	0.02
Lightning	7	7	0	0	1	0.12
Sleet	1	0	0	0	0	0.01
Thunderstorm Wind	129	97	129	20	105	1.43
Tornado	20	6	8	6	17	0.16
Wildfire	95	59	39	15	28	1.82
Winter Storm	126	124	75	73	52	3.46
Winter Weather	33	26	10	14	18	0.78

Reference 2.7-9.

[1] Listing specifically excludes data on avalanches, debris flows, dense smoke, and volcanic ash. The aforementioned events are not considered direct meteorological phenomena. The listing further excludes coastal phenomena (e.g., high surf) and hurricanes, tropical depressions, and tropical storms.

Table 2.7-15: Number of Severe Weather Events in the CFPP Site Region (Continued)

Event[1,2]	Bingham	Bonneville	Butte	Clark	Jefferson	Frequency[3] (Events/year)

[2] Blizzard - A winter storm that produces (for three consecutive hours or longer) sustained winds or frequent gusts of 35 miles per hour or greater and falling and/or blowing snow reducing visibility frequently to less than 0.25 miles; Cold/Wind Chill - A period of low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined advisory levels, typically -18 degrees Fahrenheit (°F) or colder; Dense Fog - Water droplets reducing visibility to values equal to or below established advisory levels (usually 0.25 miles or less) and impacting transportation or commerce; Drought - A protracted period of deficient precipitation resulting in extensive damage to crops and resulting in a loss of crop yield; Dust Storm - Strong winds that lift particles of dust or sand, reducing visibility below established advisory levels (usually 0.25 miles or less); Excessive Heat - Events wherein heat index values meet or exceed excessive heat warning thresholds and/or events wherein fatalities or major impacts to human health can be directly related to excessive heat; Extreme Cold/Wind Chill - A period of extremely low ambient temperatures or wind chill temperatures reaching or exceeding warning criteria (typical -35°F or colder); Flash Flood - A life-threatening, rapid rise of water into a normally dry area beginning within minutes to multiple hours of the causative event (e.g., intense rainfall); Flood - High flow, overflow, or inundation by water that causes damage; Freezing Fog - Fog freezing on contact with exposed objects and forming a coating of rime and/or glaze, resulting in an impact on transportation, commerce, or individuals; Frost/Freeze - During the locally defined growing season, a surface air temperature of 32°F or lower or the formation of ice crystals on the ground or other surfaces for a period of time long enough to cause human or economic impact; Funnel Cloud - Arotating, visible extension of a cloud pendant from a convective cloud with circulation not reaching the ground; Hail - Frozen precipitation in the form of balls or irregular lumps of ice larger than 0.75-inches in diameter or resulting in accumulations of a measurable depth or causing property and/or crop damage; Heat - Events wherein heat index values meet or exceed established advisory thresholds; Heavy Rain - Unusually large amounts of rain resulting in damage, but not causing flooding; Heavy Snow - Snow accumulations meeting or exceeding locally/regionally defined 12 and/or 24 hour warning criteria, but exclusive of strong winds or other forms of precipitation; High Wind - Sustained non-convective winds of 40 miles per hour or greater lasting for one hour or longer, or gusts of 58 miles per hour or greater for any duration; Ice Storm - Ice accretion meeting or exceeding locally/regionally defined warning criteria (typical 0.25-inches or 0.50-inches or more); Lightning - A sudden electrical discharge from a thunderstorm resulting in a fatality, injury, and/or damage; Sleet - Sleet accumulations meeting or exceeding defined warning criteria of 0.50-inches or more; Strong Wind - Non-convective winds gusting less than 58 miles per hour or sustained winds less than 40 miles per hour resulting in a fatality, injury, or damage; Thunderstorm Wind - Winds arising from convection and occurring within 30 minutes of lightning being observed or detected, with speeds of at least 58 miles per hour or of any speed if producing a fatality, injury, or damage; Tornado - A violently rotating column of air, extending to or from a cumuliform cloud or underneath a cumuliform cloud, to the ground; Wildfire - Significant forest fire, grassland fire, rangeland fire, or wildland-urban interface fire that consumes natural fuels and spreads in response to its environment; Winter Storm - A winter weather event that has more than one significant winter precipitation type and meets or exceeds locally or regionally defined 12 and/or 24 hour warning criteria for at least one of the precipitation elements; Winter Weather - A winter precipitation event that causes a death or injury, or has a significant impact to commerce or transportation but does not meet locally/regionally defined warning criteria.

[3] Annual event frequency, calculated as the quotient of the average number of events for Bingham, Bonneville, Butte, Clark, and Jefferson counties and the total number of reporting years. The total number of reporting years for tornadoes is 72, and includes a period extending from 1950 through 2022. The total number of reporting years for hail and thunderstorm winds is 67 (from 1955 through 2022). The other event frequencies reflect 26 years of reporting (from 1996 through 2022).

Table 2.7-16: National Ambient Air Quality Standards

Air Pollutant	Averaging Period	NAAQS
Carbon Monoxide	1-Hour	35 ppm
Carbon Monoxide	8-Hour	9 ppm
Nitrogen Dioxide	1-hour	0.100 ppm
Nitrogen Dioxide	Annual	0.053 ppm
Particulate Matter (PM_{10})	24-Hour	150 $\mu g/m^3$
Particulate Matter ($PM_{2.5}$)	24-Hour	35 $\mu g/m^3$
Particulate Matter ($PM_{2.5}$)	Annual	12 $\mu g/m^3$
Ozone	8-Hour	0.070 ppm
Sulfur Dioxide	1-Hour	0.075 ppm
Sulfur Dioxide	3-Hour	0.500 ppm
Lead	3-Month Rolling	0.150 $\mu g/m^3$

Reference 2.7-13.
NAAQS - National Ambient Air Quality Standards
ppm - parts per million
$\mu g/m^3$ - micrograms per cubic meter

Table 2.7-17: Criteria Air Pollutant Emissions in Tons for 2020 for the Counties Encompassing or Immediately Surrounding the INL

County	SO_2	NO_x	CO	$PM_{2.5}$	PM_{10}	VOCs
Bingham	101	6102	22,443	8590	49,570	19,292
Bonneville	211	8029	41,276	8665	57,409	28,050
Butte	41	2072	10,808	1983	13,202	10,831
Clark	2	1403	10,784	827	5230	14,279
Jefferson	30	2873	10,948	3496	20,700	11,087
Total	386	20,478	96,259	23,560	146,111	83,539

Reference 2.7-16.

CO - carbon monoxide
NO_x - nitrogen oxide
PM - particulate matter
SO_2 - sulfur dioxide
VOC - volatile organic compounds

Table 2.7-18: Monthly INL Facility-Wide Criteria Air Pollutant Emissions for 2018

Month	Criteria Air Pollutant (tons)				
	SO_2	NO_x	CO	$PM_{2.5}/PM_{10}$	VOCs
January	0.057	2.620	0.747	0.328	0.067
February	0.214	3.430	1.150	0.400	0.248
March	0.199	3.070	1.050	0.376	0.229
April	0.196	2.770	0.995	0.289	0.234
May	0.274	3.840	1.200	0.302	0.339
June	0.201	2.070	0.768	0.188	0.237
July	0.176	2.060	0.689	0.164	0.208
August	0.215	2.910	0.865	0.203	0.261
September	0.176	1.660	0.690	0.146	0.209
October	0.190	2.580	0.922	0.291	0.222
November	0.051	2.340	0.596	0.302	0.060
December	0.207	6.310	1.910	0.516	0.343
Annual	2.156	35.660	11.582	3.505	2.657

Source: Reference 2.7-17.
CO - carbon monoxide
NO_x - nitrogen oxide
PM - particulate matter
SO_2 - sulfur dioxide
VOC - volatile organic compounds
ppm - parts per million
$\mu g/m^3$ - micrograms per cubic meter

Table 2.7-19: Estimated Baseline Concentrations for Criteria Air Pollutants at the CFPP Site

Criteria Air Pollutant	Concentration		Predicted vs. NAAQS[3]
	NAAQS[1]	Predicted[2]	(%)
PM_{10}, 24-Hour ($\mu g/m^3$)	150	80	53.1
CO, 1-Hour (ppm)	35	1.8	5.1
CO, 8-Hour (ppm)	9	1.0	11.1
NO_2, 1-hour (ppm)	0.100	0.0018	1.8
NO_2, Annual (ppm)	0.053	0.0004	0.7
O_3, 8-Hour (ppm)	0.070	0.059	84.6
$PM_{2.5}$, 24-Hour ($\mu g/m^3$)	35	11	30.4
$PM_{2.5}$, Annual ($\mu g/m^3$)	12	3	24.7
SO_2, 1-Hour (ppm)	0.075	0.005	6.2
SO_2, 3-Hour (ppm)	0.500	0.006	1.3
SO_2, 24-Hour (ppm)	-	0.002	-
SO_2, Annual (ppm)	-	0.001	-

Reference 2.7-15.

[1] Table 2.7-14.

[2] Predicted background concentrations obtained from the NW-AIRQUEST criteria pollutant design values tool (Reference 2.7-15). For each pollutant, the predicted value is calculated as the average of the nine grid points located closest to the CFPP.

[3] Calculated as the quotient of a predicted concentration and the corresponding National Ambient air Quality Standards (NAAQS), multiplied by 100.

CO - carbon monoxide
NO_2 - nitrogen dioxide
O_3 - ozone
PM - particulate matter
SO_2 - sulfur dioxide
ppm - parts per million
$\mu g/m^3$ - micrograms per cubic meter

Table 2.7-20: Emissions of Hazardous Air Pollutants from INL Facilities in 2018

Pollutant	Total Emissions (tons)				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1,1,1-Trichloroethane	1.43E-03	1.39E-03	1.38E-03	1.43E-03	5.63E-03
1,1,2,2-Tetrachloroethane	4.36E-05	4.35E-05	4.35E-05	4.33E-05	1.74E-04
1,1,2-Trichloroethane	6.01E-05	6.01E-05	6.00E-05	6.00E-05	2.40E-04
1,1-Dichloroethane	7.32E-05	7.32E-05	7.32E-05	7.32E-05	2.93E-04
1,1-Dichloroethylene	5.18E-05	5.01E-05	5.01E-05	5.01E-05	2.02E-04
1,2,4-Trichlorobenzene	-	-	-	-	-
1,2-Dibromo-3-Chloropropane	-	-	-	-	-
1,2-Dichloroethane	1.46E-04	1.46E-04	1.46E-04	1.46E-04	5.83E-04
1,2-Dichloropropane	7.12E-05	7.12E-05	7.11E-05	7.11E-05	2.85E-04
1,2-Diphenylhydrazine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene	5.90E-05	7.00E-05	5.89E-05	5.19E-05	2.40E-04
1,3-Dichloropropene	1.52E-07	1.17E-07	9.23E-08	5.09E-08	4.13E-07
1,4-Dichlorobenzene	7.95E-05	7.95E-05	7.95E-05	7.95E-05	3.18E-04
1,4-Dioxane	6.27E-06	6.27E-06	6.27E-06	6.27E-06	2.51E-05
2,2,4-Trimethyl Pentane	7.11E-05	7.11E-05	7.11E-05	7.11E-05	2.84E-04
2,4,5-Trichlorophenol	-	-	-	-	-
2,4,6-Trichlorophenol	-	-	-	-	-
2,4-Dinitrophenol	-	-	-	-	-
2,4-Dinitrotoluene	2.08E-04	2.08E-04	2.08E-04	2.08E-04	8.32E-04
4-Nitrophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acetaldehyde	1.12E-03	1.29E-03	1.09E-03	1.00E-03	4.49E-03
Acetophenone	-	-	-	-	-
Acrolein	6.47E-04	6.48E-04	6.19E-04	6.06E-04	2.52E-03
Acrylonitrile	-	-	-	-	-
Aniline	-	-	-	-	-
Antimony	4.71E-09	4.71E-09	4.71E-09	4.71E-09	1.88E-08
Arsenic	3.08E-04	2.21E-04	1.94E-04	3.01E-04	1.02E-03
Benzene	4.02E-03	2.05E-03	1.69E-03	2.26E-03	1.00E-02
Benzidine	-	-	-	-	-
Beryllium	3.06E-04	2.41E-04	2.21E-04	3.02E-04	1.07E-03
bis(2-Chloroethyl)ether	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	4.23E-08	4.23E-08	4.23E-08	4.23E-08	1.69E-07
Bromoform	1.71E-07	1.71E-07	1.71E-07	1.71E-07	6.84E-07
Bromomethane	-	-	-	-	-
Cadmium	1.31E-03	1.24E-03	1.22E-03	1.30E-03	5.07E-03
Carbon Disulfide	1.14E-04	1.14E-04	1.14E-04	1.14E-04	4.56E-04
Carbon Tetrachloride	4.38E-03	4.38E-03	4.38E-03	4.38E-03	1.75E-02
Carbonyl Sulfide	-	-	-	-	-
Chlorobenzene	2.09E-04	2.09E-04	2.09E-04	2.09E-04	8.37E-04
Chloroethane (Ethyl Chloride)	-	-	-	-	-

Table 2.7-20: Emissions of Hazardous Air Pollutants from INL Facilities in 2018 (Continued)

Pollutant	Total Emissions (tons)				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Chloroform	3.99E-04	3.99E-04	3.99E-04	3.99E-04	1.60E-03
Chloromethane	-	-	-	-	-
Chromium	1.48E-04	8.31E-05	6.33E-05	1.44E-04	4.39E-04
Cobalt	-	-	-	-	-
Cresols	1.85E-04	1.85E-04	1.85E-04	1.85E-04	7.40E-04
Cyanide	3.18E-04	3.18E-04	3.18E-04	3.18E-04	1.27E-03
Dibenzofuran	-	-	-	-	-
Dimethyl Phthalate	-	-	-	-	-
Ethyl Benzene	1.47E-04	1.37E-04	1.33E-04	7.41E-04	1.16E-03
Ethylene Dibromide	2.56E-07	1.97E-07	1.55E-07	8.54E-08	6.92E-07
Formaldehyde	1.37E-02	6.13E-03	3.46E-03	1.28E-02	3.61E-02
Hexachlorobenzene	5.52E-07	5.52E-07	5.52E-07	5.52E-07	2.21E-06
Hexachlorobutadiene	2.10E-06	2.10E-06	2.10E-06	2.10E-06	8.40E-06
Hexachlorocyclopentadiene	-	-	-	-	-
Hexachloroethane	8.37E-05	8.37E-05	8.37E-05	8.37E-05	3.35E-04
Hexane	-	-	-	-	-
Hydrochloric Acid	3.89E-01	4.35E-01	2.68E-01	1.67E-01	1.26E+00
Isophorone	-	-	-	-	-
Lead	5.41E-03	5.21E-03	5.16E-03	5.40E-03	2.12E-02
Manganese	1.98E-04	6.79E-05	2.82E-05	1.90E-04	4.84E-04
Mercury	3.48E-04	1.53E-04	1.34E-04	2.14E-04	8.49E-04
Methanol	5.40E-04	5.31E-04	5.25E-04	5.48E-04	2.14E-03
Methyl Isobutyl Ketone	1.31E-05	1.31E-05	1.31E-05	5.10E-05	9.04E-05
Methylene Chloride	6.78E-04	6.78E-04	6.78E-04	6.78E-04	2.71E-03
Naphthalene	7.31E-04	2.03E-04	1.08E-04	4.65E-04	1.51E-03
Nickel	1.10E-03	1.03E-03	1.01E-03	1.09E-03	4.23E-03
Nitrobenzene	2.30E-04	2.30E-04	2.30E-04	2.30E-04	9.22E-04
N-Nitrosodimethylamine	-	-	-	-	-
Polychlorinated Biphenyls	9.39E-03	9.39E-03	9.39E-03	9.39E-03	3.76E-02
Pentachloronitrobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pentachlorophenol	1.14E-03	1.14E-03	1.14E-03	1.14E-03	4.56E-03
Phenol	-	-	-	-	-
Phosphorus	-	-	-	-	-
POM/PAH	1.72E-03	6.36E-04	4.03E-04	1.21E-03	3.97E-03
Selenium	7.01E-04	3.74E-04	2.76E-04	6.78E-04	2.03E-03
Styrene	1.43E-07	1.10E-07	8.65E-08	4.76E-08	3.87E-07
Tetrachloroethylene	1.76E-04	1.76E-04	1.76E-04	1.76E-04	7.06E-04
Toluene	1.43E-02	1.26E-02	1.22E-02	1.41E-02	5.32E-02
Trichloroethylene	3.24E-04	3.24E-04	3.24E-04	3.24E-04	1.30E-03
Vinyl Chloride	9.29E-07	9.09E-07	8.96E-07	8.73E-07	3.61E-06

Table 2.7-20: Emissions of Hazardous Air Pollutants from INL Facilities in 2018 (Continued)

Pollutant	Total Emissions (tons)				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Xylene	2.61E-03	2.13E-03	2.03E-03	4.14E-03	1.09E-02
Total	4.58E-01	4.90E-01	3.18E-01	2.34E-01	1.50E+00

Reference 2.7-17.

Table 2.7-21: Greenhouse Gas Reporting Program Summaries for U.S. Direct Emitters in 2021

Direct Emitter Type/Industrial Sector[1]	Reported CO_2e Quantities[2] (millions of metric tons)	Number of Reports[3]
Power Plants	1589.1	1326
Petroleum and Natural Gas Systems	312.2	2379
Refineries	164.9	137
Chemicals	186.5	459
Waste	103.3	1460
Metals	82.4	299
Minerals	114.3	373
Pulp and Paper	34.9	214
Other/Miscellaneous Combustion	83.0	1102
Underground Coal Mines	29.1	60
Electronics Manufacturing	6.4	47
Electrical Equipment	2.5	95
Total	2708.6	7951

Reference 2.7-20.

[1] Direct emitters included under "Other/Miscellaneous Combustion" include (but are not limited to) food processing facilities, ethanol production facilities, universities, and military facilities.

[2] Data for large direct emitters exceeding a reporting threshold of 25,000 metric tons of carbon dioxide equivalent (CO_2e) per year.

[3] Total sums to more than 7608 because emitters falling into more than one sector are counted multiple times.

Table 2.7-22: Greenhouse Gas Reporting Program Reporting Summaries for Suppliers of Fuels and Industrial Gases in 2021

Supplier[1]	Reported CO_2e Quantities[2] (millions of metric tons)	Number of Reports[3]
Natural Gas and Liquified Natural Gas Distribution Companies	793.4	365
Natural Gas Liquids Fractionators	458.1	119
Petroleum Products (Importers, Exporters, and Refineries)	2309.7	231
Industrial Greenhouse Gases	496.4	142
CO2 Capture, Production, Injection, and Sequestration Facilities	50.9	128
Total	3315.1	985

Reference 2.7-21.

[1] Suppliers of petroleum products includes both oil and coal-based liquid fuels. Suppliers of industrial greenhouse gas (GHG) includes importers and exporters of equipment containing fluorinated GHGs. Underground injection suppliers include facilities using carbon dioxide (CO_2) for enhanced recovery of oil and natural gas, for acid gas injection/ disposal, for carbon storage research and development, or for purposes other than geologic sequestration.

[2] Data for suppliers exceeding a reporting threshold of 25,000 metric tons of carbon dioxide equivalent (CO_2e) per year. Quantities shown for petroleum products excludes some importer, exporter, and refinery data considered to be confidential business information.

[3] Total sums to more than 966 because suppliers falling into more than one category are counted multiple times.

Table 2.7-23: Total U.S. Greenhouse Gas Emission Inventories per Economic Sector or Source

Economic Sector or Source[1]	U.S. Greenhouse Gas Emissions Per Year[2] (Millions of Metric Tons CO_2e)									
	1990	**2000**	**2010**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Transportation	1521	1904	1795	1789	1824	1842	1871	1874	1625	1804
Electric Power Industry	1880	2350	2313	1952	1859	1779	1799	1651	1482	1584
Industry	1677	1650	1489	1518	1463	1495	1558	1568	1465	1487
Agriculture	593	606	639	648	643	654	671	655	637	636
Commercial	447	426	431	452	436	438	454	462	436	439
Residential	346	388	355	350	326	328	376	382	357	366
U.S. Territories	23	47	37	29	27	26	26	25	24	24
Total Gross Emissions (Sources)	6487	7369	7058	6737	6578	6562	6755	6618	6026	6340
LULUCF Net Total	-881	-836	-751	-672	-815	-774	-765	-704	-776	-754
Net Emissions (Sources and Sinks)	5606	6533	6307	6066	5763	5788	5990	5914	5250	5586

Reference 2.7-21.

[1] Total gross emissions values represent the sum of transportation, power, industrial, agricultural, commercial, and residential greenhouse gas (GHG) sources in the U.S. and U.S. territories. Net emissions values represent a summation of total GHG emissions and net GHG sequestration related to land use, land-use change, and forestry (LULUCF).

[2] Total national emissions data from the Environmental Protection Agency's (EPA) "Inventory of U.S. Greenhouse Gas Emissions and Sinks" for select years. The Greenhouse Gas Reporting Program (GHGRP) data, by comparison, include only emissions from large suppliers of GHG-emitting or GHG-containing products or facilities that emit more than 25,000 metric tons of carbon dioxide equivalent (CO_2e) per year. As a consequence, EPA inventory emissions totals are slightly higher than GHGRP emissions totals for any given year

Table 2.7-24: Greenhouse Gas Reporting Program Data for Idaho Direct Emitters

Direct Emitter Type/Industrial Sector[1]	Reported CO_2e Quantities (metric tons) and Number of Reports per Year[2]				
	2017	**2018**	**2019**	**2020**	**2021**
Power Plants	1,148,277 (5)	1,273,828 (5)	1,699,929 (5)	1,643,686 (5)	2,019,888 (5)
Petroleum and Natural Gas Systems	234,768 (3)	288,228 (4)	303,437 (4)	288,456 (4)	287,350 (4)
Refineries	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Chemicals	770,109 (3)	733,151 (3)	756,585 (3)	735,648 (3)	727,648 (3)
Waste	555,804 (13)	524,968 (13)	598,938 (14)	594,135 (14)	517,430 (13)
Metals	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Minerals	776,983 (3)	708,716 (3)	753,219 (3)	740,195 (3)	769,014 (3)
Pulp and Paper	281,641 (1)	226,924 (1)	305,175 (1)	339,038 (1)	285,401 (1)
Other/Miscellaneous Combustion	669,239 (16)	630,794 (15)	721,610 (17)	661,390 (16)	621,593 (15)
Total	4,436,820 (37)	4,386,609 (37)	5,138,893 (39)	5,002,548 (38)	5,228,325 (36)

Reference 2.7-22.

[1] Data are included only for direct emitters exceeding a reporting threshold of 25,000 metric tons of carbon dioxide equivalent (CO_2e) per year. Direct emitters included under "Other/Miscellaneous Combustion" include food processing facilities, ethanol production facilities, universities, and military facilities.

[2] The first number listed for any given year and any given emitter type is a CO_2e emissions level. The second, parenthetical number is the total number of reports received by the Greenhouse Gas Reporting Program (GHGRP) for the given direct emitter type/industrial sector. The total number of reports may be less than the sum of the number of reports in a given source category because some facilities fall within more than one source category. Note also that, although GHGRP reporting began in 2010, data are only shown here for the last five years.

Table 2.7-25: Total Idaho Greenhouse Gas Emission Inventories per Economic Sector or Source

Economic Sector or Source[1]	Idaho GHG Emissions Per Year[2] (Millions of Metric Tons CO_2e)								
	1990	**2000**	**2010**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Transportation	6.65	9.25	9.42	9.67	10.08	10.29	10.22	10.56	10.31
Electric Power Industry	0.43	0.33	0.79	1.58	1.34	1.22	1.37	1.79	1.73
Industry	4.28	5.57	3.41	3.39	3.31	3.30	3.35	3.53	3.68
Agriculture	8.30	10.45	12.48	13.22	13.45	13.54	13.76	13.74	13.77
Commercial	1.30	1.68	1.83	2.27	2.31	2.37	2.28	2.49	2.48
Residential	0.81	1.57	1.71	1.75	1.84	2.13	2.04	2.33	2.24
Total Gross Emissions (Sources)	21.78	28.85	29.63	31.86	32.34	32.85	33.03	34.44	34.21
LULUCF Net Total	0.07	-0.24	-2.44	0.33	0.85	1.66	1.21	1.29	1.16
Net Emissions (Sources and Sinks)	21.85	28.61	27.19	32.19	33.19	34.51	34.24	35.73	35.37

Reference 2.7-26.

[1] Total gross emissions values represent the sum of transportation, power, industrial, agricultural, commercial, and residential greenhouse gas (GHG) sources in Idaho. Net emissions values represent a summation of total GHG emissions and net GHG sequestration related to land use, land-use change, and forestry (LULUCF).

[2] Total emissions data (for select years) for Idaho from the Environmental Protection Agency's "Inventory of U.S. Greenhouse Gas Emissions and Sinks." The Greenhouse Gas Reporting Program (GHGRP) data, as shown in Table 2.7-23, by comparison, include only emissions from large suppliers of GHG-emitting or GHG-containing products or facilities that emit more than 25,000 metric tons of carbon dioxide equivalent (CO_2e) per year. As a consequence, EPA inventory emissions totals are slightly higher than GHGRP emissions totals for any given year.

Table 2.7-26: Greenhouse Gas Emissions Data from Large Direct Emitters in the CFPP Site Region, 2010 to 2015

County[1]	Facility[2]	Greenhouse Gas Emissions (Metric Tons of CO_2e)					
		2010	**2011**	**2012**	**2013**	**2014**	**2015**
Bingham	Basic American Foods (Blackfoot)	31,014	21,952	21,032	28,722	25,858	29,252
	Basic American Foods (Shelley)	53,511	45,212	48,188	51,088	47,484	53,722
	Nonpareil Corporation	34,252	34,362	40,114	32,587	35,273	29,180
Bonneville	Busch Agricultural Resources	37,446	34,105	39,620	43,730	45,745	43,016
Butte	Idaho National Laboratory	25,597	21,509	17,587	20,660	17,078	16,210
Clark	-	-	-	-	-	-	-
Jefferson	Circular Butte Landfill	-	-	10,863	11,306	11,923	-
	Mud Lake Landfill	5164	5062	4893	4796	4701	-

Reference 2.7-26.

[1] Bingham, Bonneville, Butte, Clark, and Jefferson counties fully contain or immediately surround the INL and the CFPP site, and collectively cover roughly two-thirds of the total area within a 50-mile radius of the CFPP site.

[2] Direct emitters in the CFPP/INL site region reporting greenhouse gas output levels to the Greenhouse Gas Reporting Program for the period between 2010 and 2015. No facilities in Clark County qualify as large stationary carbon dioxide equivalent (CO_2e) emitters.

[3] Data reporting for the Circular Butte and Mud Lake landfills in Jefferson County was discontinued in 2015, for valid reasons. Moreover, no data are available for the Circular Butte facility before 2012.

Table 2.7-27: Greenhouse Gas Emissions Data from Large Direct Emitters in the CFPP Site Region, 2016 to 2021

County[1]	Facility[2]	Greenhouse Gas Emissions[3] (Metric Tons CO_2e)					
		2016	2017	2018	2019	2020	2021
Bingham	Basic American Foods (Blackfoot)	24,440	29,505	31,298	26,817	29,227	25,352
	Basic American Foods (Shelley)	58,363	60,916	60,922	57,850	58,954	64,684
	Nonpareil Corporation	26,795	15,432	-	-	-	-
Bonneville	Busch Agricultural Resources	45,004	44,931	48,468	44,652	58,573	43,878
Butte	-	-	-	-	-	-	-
Clark	-	-	-	-	-	-	-
Jefferson	-	-	-	-	-	-	-

Reference 2.7-22.

1 See Table 2.7-24.

2 Direct emitters in the CFPP/INL site region reporting greenhouse gas output levels to the Greenhouse Gas Reporting Program for the period between 2016 and 2021. Since 2016, no facilities in Butte, Clark, or Jefferson counties have qualified as large direct emitters, per 40 CR 98 reporting thresholds (i.e., emitting greater than 25,000 metric tons of carbon dioxide equivalent [CO2e] per year).

3 Data reporting for the Nonpareil Corporation (a potato packer/shipper) was discontinued in 2017, for valid reasons.

Table 2.7-28: Greenhouse Gas Emissions Data for the INL, 2008 to 2012

Scope	Emissions Category	2008	2009	2010	2011	2012
1	Stationary Combustion	15,343	13,381	14,288	-	5682
	Mobile Combustion	10,038	8545	7383	-	6834
	Fugitive Emissions from Refrigerants	245	200	385	-	481
	Fugitive Emissions from Onsite Landfill	10,219	5878	5785	-	5617
	Fugitive Emissions from Onsite Wastewater Treatment	132	130	136	-	131
	Scope 1 Total	35,977	28,134	27,977	-	18,745
2	Purchased Electricity	63,278	58,297	61,364	-	55,570
	Transmission and Distribution Losses (Owned)	-	1450	1470	-	975
	Purchased Green Power (Renewable Energy Certificates)	-3474	-6813	-11,480	-	-14,082
	Scope 2 Total (Market-Based)	59,804	52,934	51,354	-	42,463
3	Transmission and Distribution Losses (Shared)	1141	3937	4141	-	3662
	Employee Commuting	9711	9354	10,171	-	8313
	Business Air Travel	6687	7380	6785	-	4364
	Rental Vehicle Usage for Business Travel	351	337	393	-	300
	Personal Vehicle Usage for Business Travel	516	411	422	-	251
	Contracted Municipal Solid Waste Disposal	12	903	956	-	853
	Contracted Wastewater Treatment	56	201	214	-	13
	Scope 3 Total	18,474	22,523	23,082	-	17,757
-	Total Emissions	114,255	103,591	102,413	-	78,965

Reference 2.7-27, Reference 2.7-28, and Reference 2.7-29.

Emissions calculated in metric tons carbon dioxide equivalent (CO_2e)

Table 2.7-29: Greenhouse Gas Emissions Data for the INL, 2013 to 2016

Scope	Emissions Category	2013	2014	2015	2016	2017
1	Stationary Combustion	5391	8249	5505	6130	-
	Mobile Combustion	5523	5396	6863	6912	-
	Fugitive Emissions from Refrigerants	372	89	764	414	-
	Fugitive Emissions from Onsite Landfill	5532	6480	6381	6282	-
	Fugitive Emissions from Onsite Wastewater Treatment	123	118	148	159	-
	Scope 1 Total	16,940	20,332	19,661	19,897	-
2	Purchased Electricity	56,242	50,198	42,281	65,156	-
	Transmission and Distribution Losses (Owned)	796	919	652	1,003	-
	Purchased Green Power (Renewable Energy Certificates)	-14,722	-15,119	-23,321	-20,831	-
	Scope 2 Total (Market-Based)	42,316	35,998	19,613	45,328	-
3	Transmission and Distribution Losses (Shared)	3759	3367	2786	4294	-
	Employee Commuting	7666	7525	10,248	9617	-
	Business Air Travel	3320	3875	4559	5493	-
	Rental Vehicle Usage for Business Travel	186	286	272	357	-
	Personal Vehicle Usage for Business Travel	185	143	183	232	-
	Contracted Municipal Solid Waste Disposal	677	985	999	295	-
	Contracted Wastewater Treatment	11	10	11	12	-
	Scope 3 Total	15,805	16,191	19,057	20,300	-
-	Total Emissions	75,061	72,521	58,330	85,525	-

Reference 2.7-30, Reference 2.7-31, Reference 2.7-32, and Reference 2.7-33.
Emissions calculated in metric tons carbon dioxide equivalent (CO_2e)

Table 2.7-30: CFPP Meteorological Monitoring Instrumentation Details

Instrument/Sensor	Height (meters)	Sensor Model	Measurement Method
Solar Radiation	2	Hukseflux SR-05-D1A3	Passive Thermal Sensing Element
Temperature	2	E+E Elektronik EE181	Aspirated Thermistor
Temperature	10/60	R.M. Young 41342	Aspirated Thermistor
Wind Speed	10/60	R.M. Young 05305-5	Propeller Anemometer
Wind Direction	10/60	R.M. Young 05305-5	Rotating Magnet Wind Vane, Potentiometer
Precipitation	0.5	R.M. Young 52202	Heated Tipping Bucket Counter with Wind Screen
Relative Humidity	2	E+E Elektronik EE181	Aspirated Thermistor
Aspirated Radiation Shield	10/60	R.M. Young 43502	Shield Fan Tachometer, Revolution Counter

Table 2.7-31: CFPP Sensor Sampling, Range and Resolution Details

Sensor Model	Sampling Frequency	Averaging Period	Range	Resolution
Hukseflux SR-05-D1A3	1 sec	1 hour	0 W/m^2 - 2000 W/m^2	1 W/m^2
E+E Elektronik EE181	1 sec	1 hour	-40°C - +60°C	0.01°C
R.M. Young 41342	1 sec	1 hour	-50°C - +50°C	0.01°C
R.M. Young 05305-5	1 sec	1 hour	0 m/s - 50 m/s	0.01 m/s
R.M. Young 05305-5	1 sec	1 hour	0° - 360°	0.1°
R.M. Young 52202	1 sec	1 hour	0 in/hour - 6 in/hour	0.1 mm
E+E Elektronik EE181	1 sec	1 hour	0% - 100%	0.03%

in - inch
sec - second
° - degrees
°C - degrees Celsius
mm - millimeter
m/s - meters per second
% - percent
W/m^2 - watts per square meter

Table 2.7-32: CFPP Meteorological Data Screening Criteria

Parameter	Screening Test Criteria
Precipitation	≤ 25 mm in 1 hour
	≤ 100 mm in 24 hours
	≥ 50 mm in three consecutive months
Relative Humidity	Between 0% and 100%
	Calculated dew point temperature = 0.5°C variation in 12 consecutive hours
	Calculated dew point temperature = ambient temperature
	Calculated dew point temperature equal to ambient temperature for less than 12 consecutive hours
	Calculated dew point temperature = 5°C change from previous hour
Solar Radiation	For daytime measurements, > 0 and = maximum for date and latitude
	For nighttime measurements, equals 0
Temperature	Between local record low and high (monthly basis)
	≤ 5°C change from previous hour
	> 0.5°C variation in 12 consecutive hours
Temperature Delta	For daytime measurements, = 0.1°C/m
	For nighttime measurements, = -0.1°C/m
	Between -3°C and 5°C
Wind Direction	Between 0° and 360°
	> 1° variation in 3 consecutive hours
	> 10° variation in 12 consecutive hours
Wind Speed	Between 0 m/s and 25 m/s
	> 0.1 m/s variation in 3 consecutive hours
	> 0.5 m/s variation in 12 consecutive hours

°C - degrees Celsius
°C/m - degrees Celsius per meter
mm - millimeter
m/s - meters per second
% - percent

Table 2.7-33: Initial Screening Results and Quality Control Coding for CFPP Data Collected From December 4, 2021 to December 3, 2022

		Initial Screening Quality Control Codes[1]			
		Pass	Maintenance	Review	Missing
		0	4	6	9
Meteorological Parameter	Sensor	Number of Hours			
Solar Radiation	Primary	8658	30	3	69
	Backup	8657	30	4	69
Temperature, 2 m	Primary	8607	31	53	69
	Backup	8601	31	59	69
Temperature, 10 m	Primary	8627	31	33	69
	Backup	8462	33	182	83
Temperature, 60 m	Primary	8639	30	22	69
	Backup	8632	30	29	69
Δ Temperature (60 m to 10 m)	Primary	8609	31	51	69
	Backup	8435	33	209	83
Wind Direction, 10 m	Primary	8616	30	45	69
	Backup	8565	32	94	69
Wind Direction, 60 m	Primary	8592	30	69	69
	Backup	8599	30	62	69
Wind Speed, 10 m	Primary	8587	30	73	70
	Backup	8570	32	89	69
Wind Speed, 60 m	Primary	8623	30	38	69
	Backup	8629	30	32	69
Precipitation	Primary	6620	4	2067	69
	Backup	6596	3	2092	69
Relative Humidity	Primary	8629	31	27	73
	Backup	8635	31	25	69

[1] 0 - Passes all screening criteria; 4 - Impacted by maintenance, calibration, or audit activities; 6 - Does not pass all screening criteria and further review is required; 9 - Missing.

m - meter

Table 2.7-34: Final Quality Control Coding for CFPP Data Collected From December 4, 2021 to December 3, 2022

		Final Quality Control Code[1]						
		Valid			Invalid			Missing
		0	1	3	4	7	8	9
Meteorological Parameter	Sensor	Number of Hours						
Solar Radiation	Primary	8658	0	3	30	0	0	69
	Backup	8657	0	4	30	0	0	69
Temperature, 2 m	Primary	8607	0	53	31	0	0	69
	Backup	8601	0	59	31	0	0	69
Temperature, 10 m	Primary	8627	0	33	31	0	0	69
	Backup	8391	0	38	33	0	229	69
Temperature, 60 m	Primary	8639	0	22	30	0	0	69
	Backup	7990	0	28	30	643	0	69
Δ Temperature (60 m to 10 m)	Primary	8609	0	51	31	0	0	69
	Backup	7736	0	51	33	0	871	69
Wind Direction, 10 m	Primary	8616	0	37	30	8	0	69
	Backup	8487	0	36	32	8	128	69
Wind Direction, 60 m	Primary	8592	0	57	30	12	0	69
	Backup	8598	0	55	30	8	0	69
Wind Speed, 10 m	Primary	8587	0	73	30	0	0	70
	Backup	8466	0	65	30	0	130	69
Wind Speed, 60 m	Primary	8616	0	39	30	6	0	69
	Backup	8623	0	35	30	3	0	69
Precipitation	Primary	6549	71	2067	4	0	0	69
	Backup	6492	0	2088	3	4	104	69
Relative Humidity	Primary	8629	0	27	31	0	0	73
	Backup	8635	0	25	31	0	0	69

1 0 - Passes all screening criteria and subsequent review;1 - Gap-filled value; 3 - Review shows reasonable agreement with independent observations; 4 - Impacted by maintenance, calibration, or audit activities; 7 - Failed screening and a cause for the inaccuracy could not be determined; 8 - Failed screening and a cause for the inaccuracy was identified; 9 - Missing.

m - meter

Table 2.7-35: Completeness Statistics for CFPP Meteorological Monitoring Data, December 4, 2021 to December 3, 2022

Meteorological Parameter[1]	Percent of Valid Data[2]				
	Quarter 01	Quarter 02	Quarter 03	Quarter 04	Full Year
Solar Radiation	97.85	98.86	98.99	99.77	98.87
Temperature, 2 m	97.85	98.86	98.99	99.73	98.86
Temperature, 10 m	97.80	98.86	98.99	99.77	98.86
Temperature, 60 m	97.85	98.86	98.99	99.77	98.87
Δ Temperature (60 m to 10 m)	97.80	98.86	98.99	99.77	98.86
Wind Direction, 10 m	97.57	98.86	98.99	99.77	98.80
Wind Direction, 60 m	97.53	98.86	98.99	99.77	98.79
Wind Direction, 60 m	97.85	98.86	98.99	99.77	98.87
Wind Speed, 60 m	97.71	98.86	98.99	99.77	98.87
Precipitation	97.85	99.95	98.99	99.95	99.19
Relative Humidity	97.85	98.86	98.99	99.73	98.86
Joint Recovery	97.25	98.86	98.99	99.73	98.71

[1] Joint recovery represents a composite for solar radiation, temperature, and wind direction and wind speed, for all measured heights.

[2] Quarter 1 extends from December 4, 2021 through March 5, 2022 and encompasses 2,184 possible hours of operation; Quarter 2 extends from March 6, 2022 through June 3, 2022 and similarly includes 2,184 total hours; Quarter 3 extends from June 4, 2022 through September 3, 2022 and also includes 2,184 hours; Quarter 4 extends from September 4, 2022 through December 3, 2022 and includes a total of 2,208 hours.

m - meter

Table 2.7-36: CFPP Weather Data Summary, December 4, 2021 to December 3, 2022

Parameter/Statistical	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (mm)													
1-Hour Maximum	0.7	0.3	0.3	0.7	7.2	3.3	0.5	20.4	12.4	1.0	2.0	1.4	20.4
24-Hour Maximum	1.2	0.6	1.1	2.1	17.8	14.6	0.5	29.8	16.9	3.4	7.5	7.8	29.8
Total	2.7	0.8	2.2	7.5	39.1	15.5	0.9	78.4	31.7	4.3	21.6	20.4	225.1
Relative Humidity (%)													
Morning	84	86	81	61	63	55	36	58	55	65	82	81	67
Afternoon	75	76	55	37	37	28	15	27	25	35	61	73	45
Temperature, 2 m (°C)													
Extreme Maximum	4	1	20	21	28	34	36	36	37	25	16	10	37
Mean Maximum	-5	-5	7	10	16	24	33	31	26	17	0	-2	13
Mean	-10	-9	1	4	10	17	25	23	18	9	-5	-6	6
Mean Minimum	-14	-14	-5	-2	4	9	14	15	9	1	-10	-10	0
Extreme Minimum	-23	-22	-20	-11	-5	2	9	9	3	-8	-19	-20	-23
Temperature, 10 m (°C)													
Extreme Maximum	5	2	19	20	27	32	34	34	35	23	15	9	35
Mean Maximum	-5	-6	6	9	15	23	32	30	25	16	0	-2	12
Mean	-9	-9	2	4	10	17	25	23	18	10	-4	-5	7
Mean Minimum	-12	-12	-3	-1	5	10	17	16	11	3	-8	-9	1
Extreme Minimum	-22	-20	-15	-10	-4	5	11	11	3	-7	-16	-18	-22
Temperature, 60 m (°C)													
Extreme Maximum	5	2	18	19	26	30	33	33	34	22	14	9	34
Mean Maximum	-5	-5	6	9	14	22	30	29	24	16	-1	-2	11
Mean	-8	-8	2	4	10	17	25	23	19	10	-4	-5	7
Mean Minimum	-11	-11	-2	0	5	11	18	17	12	5	-7	-8	2
Extreme Minimum	-19	-19	-15	-10	-4	5	13	11	7	-6	-15	-17	-19
Temperature Delta (°C)													
Extreme Maximum	7.9	6.8	5.9	3.5	4.1	5.6	7.6	5.0	7.6	6.7	5.8	8.0	8.0
Mean Maximum	3.6	2.9	2.1	1.7	1.5	2.5	2.8	2.3	3.2	2.9	2.0	2.5	2.5
Mean	1.1	0.7	0.3	-0.2	-0.2	0.0	0.0	0.1	0.4	0.4	0.3	0.5	0.3
Mean Minimum	0.0	-0.3	-0.7	-1.2	-1.2	-1.3	-1.4	-1.1	-1.1	-1.0	-0.7	-0.5	-0.9
Extreme Minimum	-0.6	-0.7	-1.3	-1.7	-1.7	-1.7	-1.8	-1.4	-1.5	-1.3	-1.6	-0.9	-1.8
Wind Speed, 10 m (m/s)													
Highest Gust	21.6	14.9	14.8	26.5	25.5	22.1	25.3	22.3	29.6	26.7	25.3	22.5	29.6
Maximum	14.1	10.3	10.5	19.1	15.6	13.0	16.5	14.8	13.9	16.4	16.8	17.3	19.1
Mean	2.5	2.5	3.2	5.0	5.5	4.8	4.3	3.5	3.6	3.0	3.6	4.6	3.8
Minimum	0.0	0.0	0.2	0.5	0.5	0.5	0.5	0.3	0.4	0.2	0.3	0.3	0.0
Prevailing Direction	SW/NE			SW/NE			SW/NE			SW/NE			-

Table 2.7-36: CFPP Weather Data Summary, December 4, 2021 to December 3, 2022 (Continued)

Parameter/Statistical	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Wind Speed, 60 m (m/s)													
Highest Gust	23.9	16.9	16.7	29.1	26.4	26.8	29.0	25.7	33.9	28.8	27.4	24.6	33.9
Maximum	16.3	12.9	13.4	23.7	18.8	15.4	20.4	18.3	16.9	21.5	21.9	20.6	23.7
Mean	3.0	2.9	3.8	6.1	6.8	5.8	5.2	4.3	4.4	3.6	4.4	5.5	4.7
Minimum	0.1	0.2	0.2	0.4	0.3	0.3	0.4	0.3	0.3	0.2	0.1	0.1	0.1
Prevailing	SW/NE			SW/NE			SW/NE			SW/NE			-

SW/NE - southwest north east
°C - Degrees Celsius
m - meter
mm - millimeter
m/s - meters per second
% - percent

Figure 2.7-1: NOAA/INL MESONET Stations Located on INL Grounds

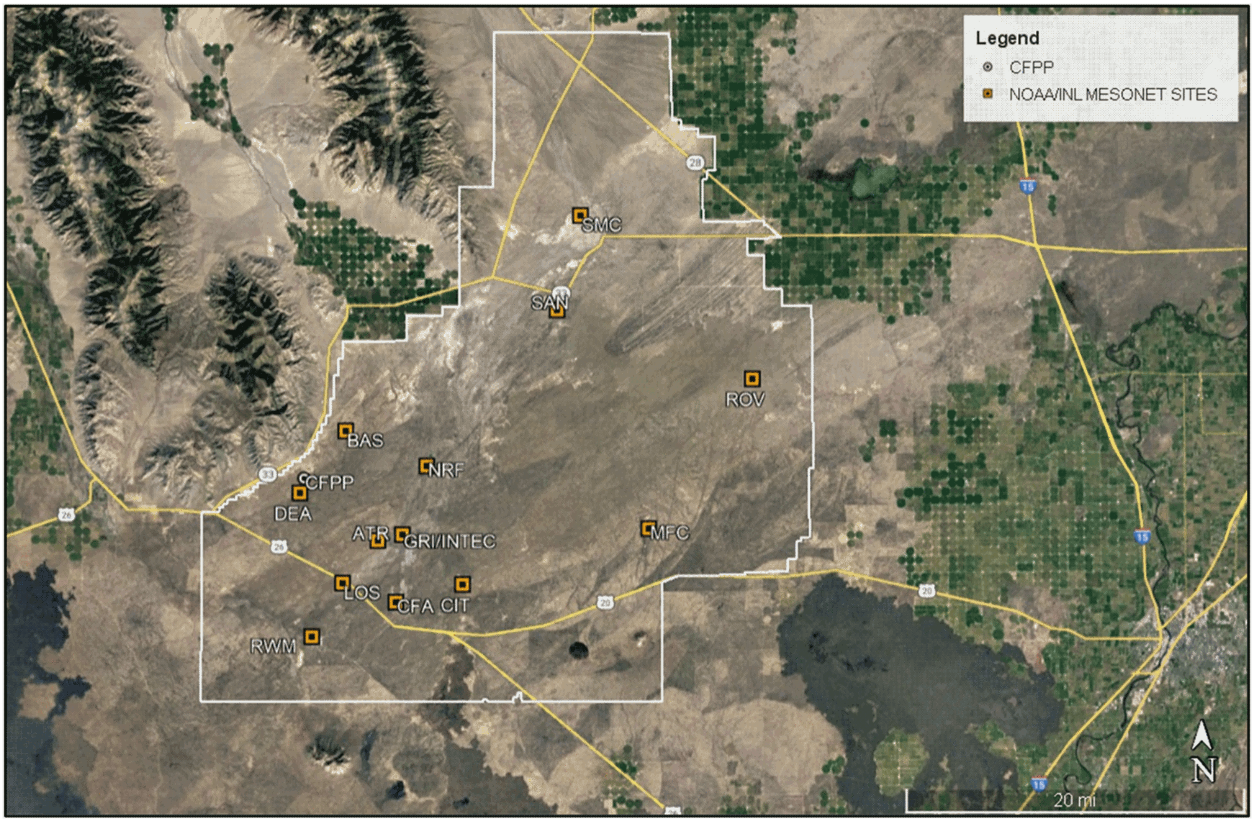


Figure 2.7-2: NOAA/INL MESONET Stations Located Across the Eastern Snake River Plain

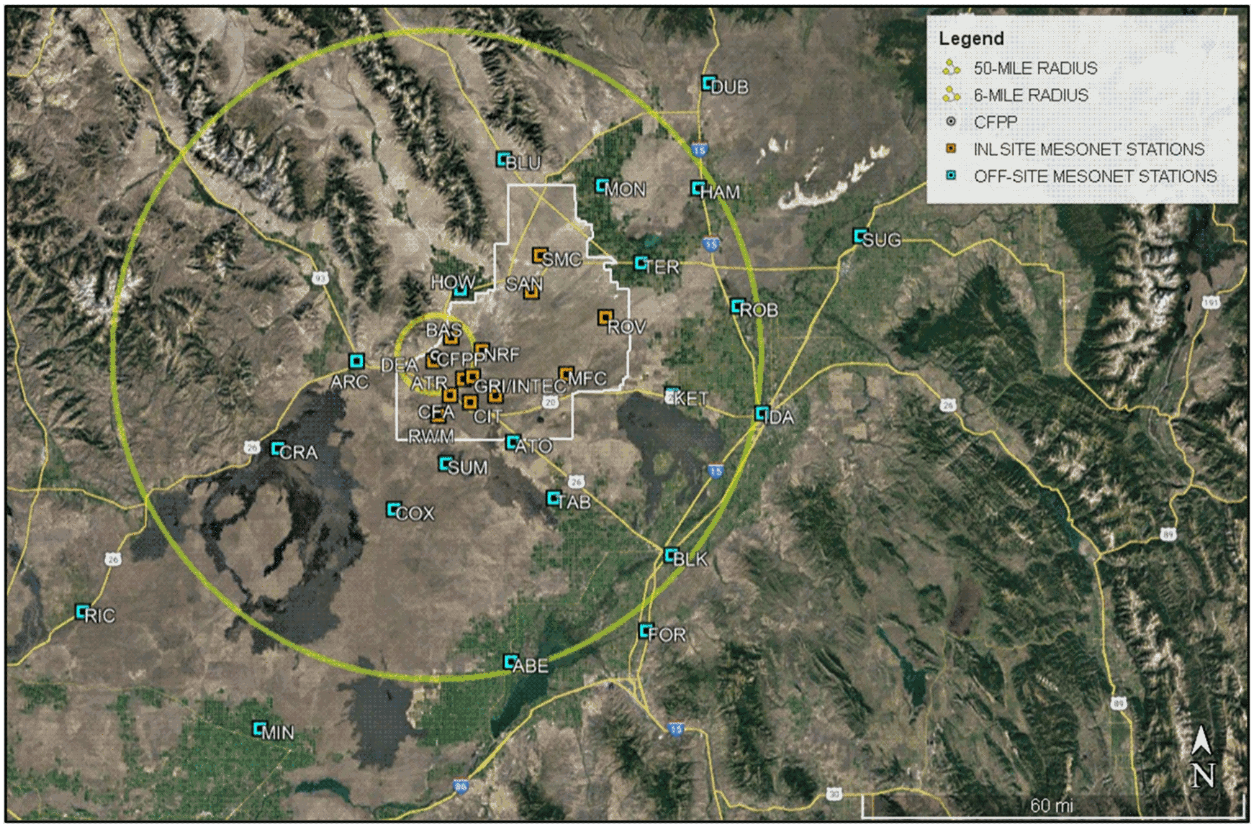
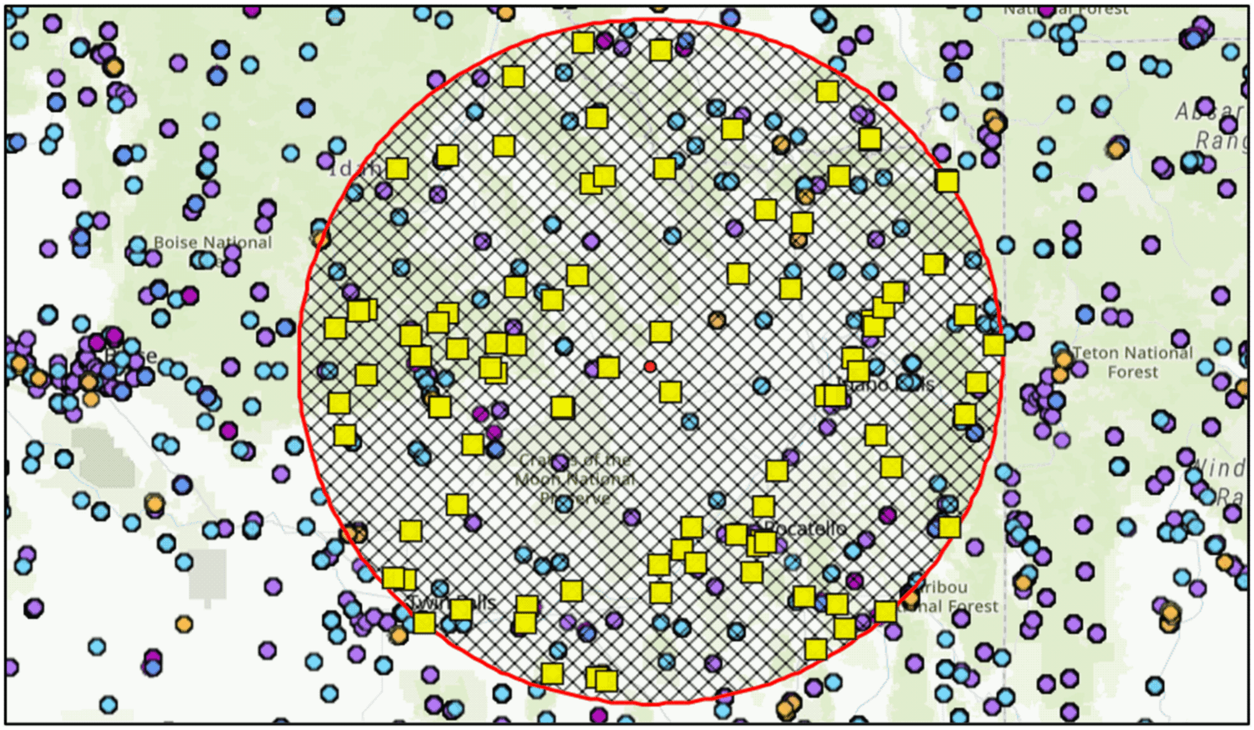


Figure 2.7-3: National Weather Service Observational Stations Located within a 100-Mile Radius of the CFPP Site



Source: National Centers for Environmental Information (https://www.ncei.noaa.gov/maps/alltimes/). Central red dot indicates the approximate center point of the CFPP site. Larger red circle delineates a 100-mile radius of the site. Yellow squares identify NWS stations with climate data for the 1991 to 2020 normal period. The blue, purple, and orange circles show locations of other NWS observational stations (with different normal period records, etc.).

Figure 2.7-4: Locations for the Meteorological Monitoring Stations Identified in Table 2.7-5

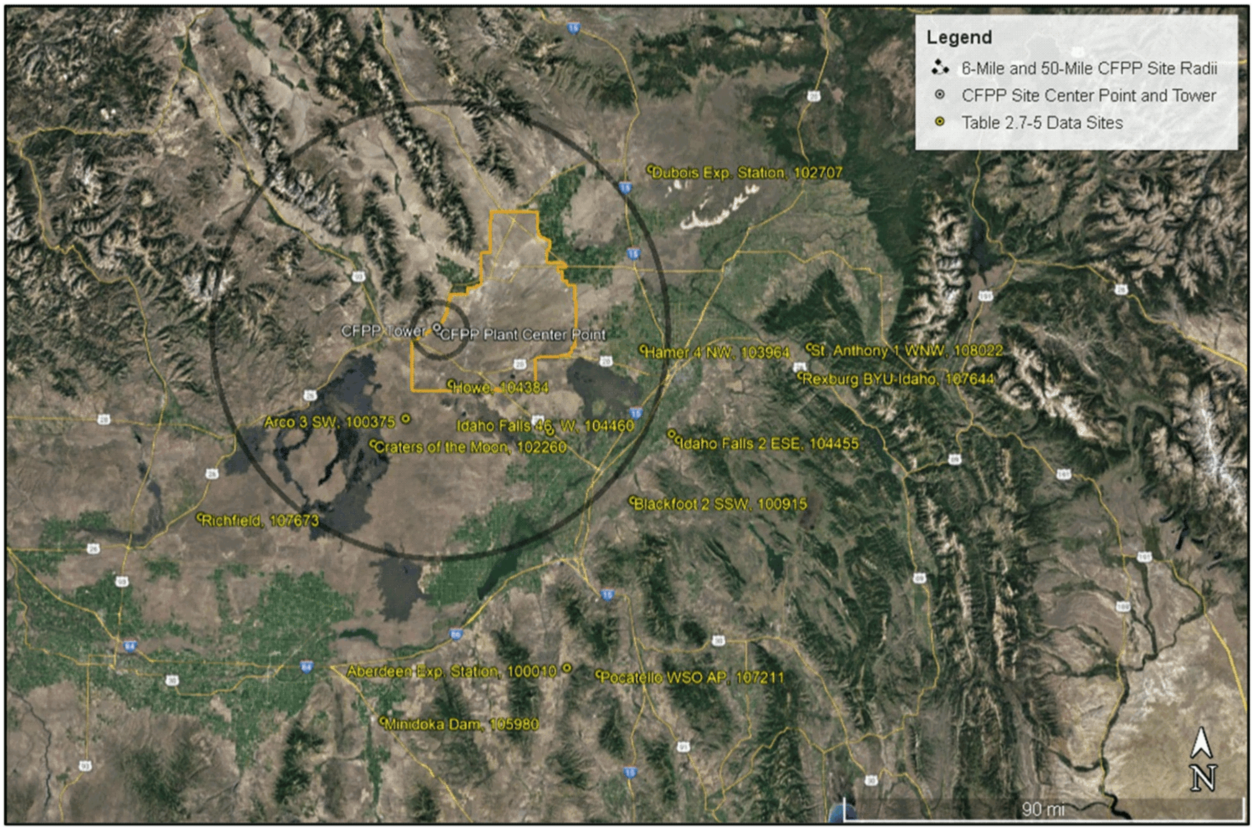


Figure 2.7-5: Locations for the Meteorological Monitoring Stations Identified in Table 2.7-6

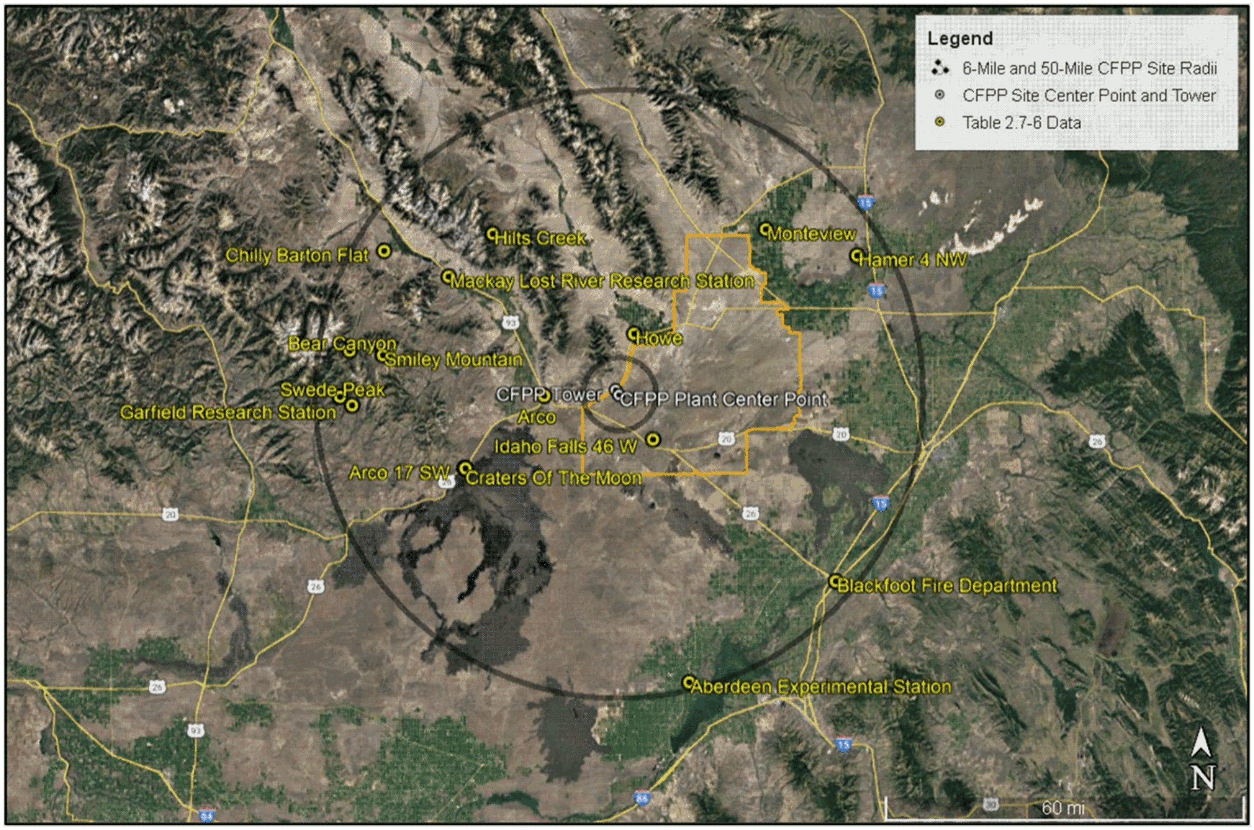
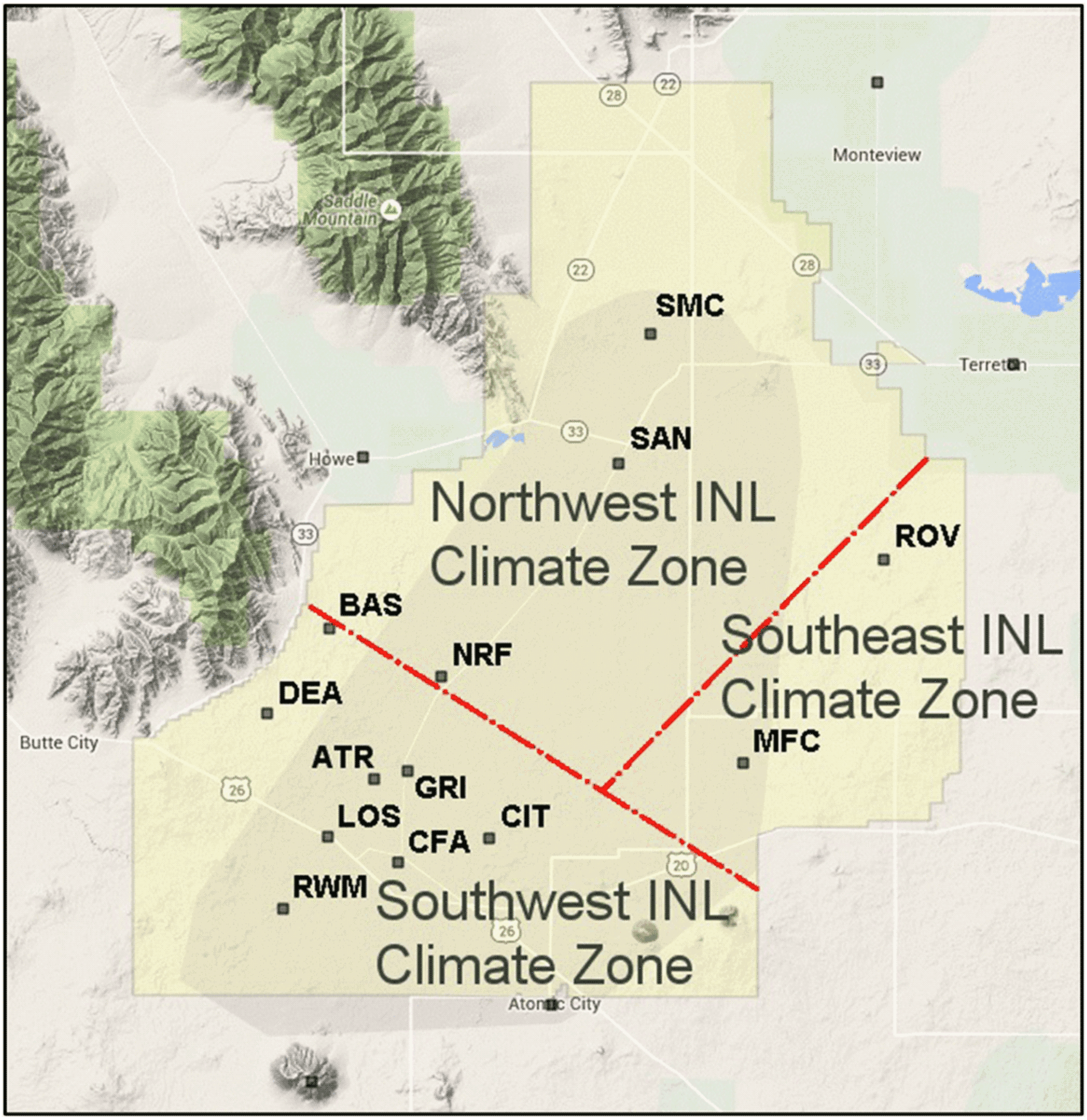
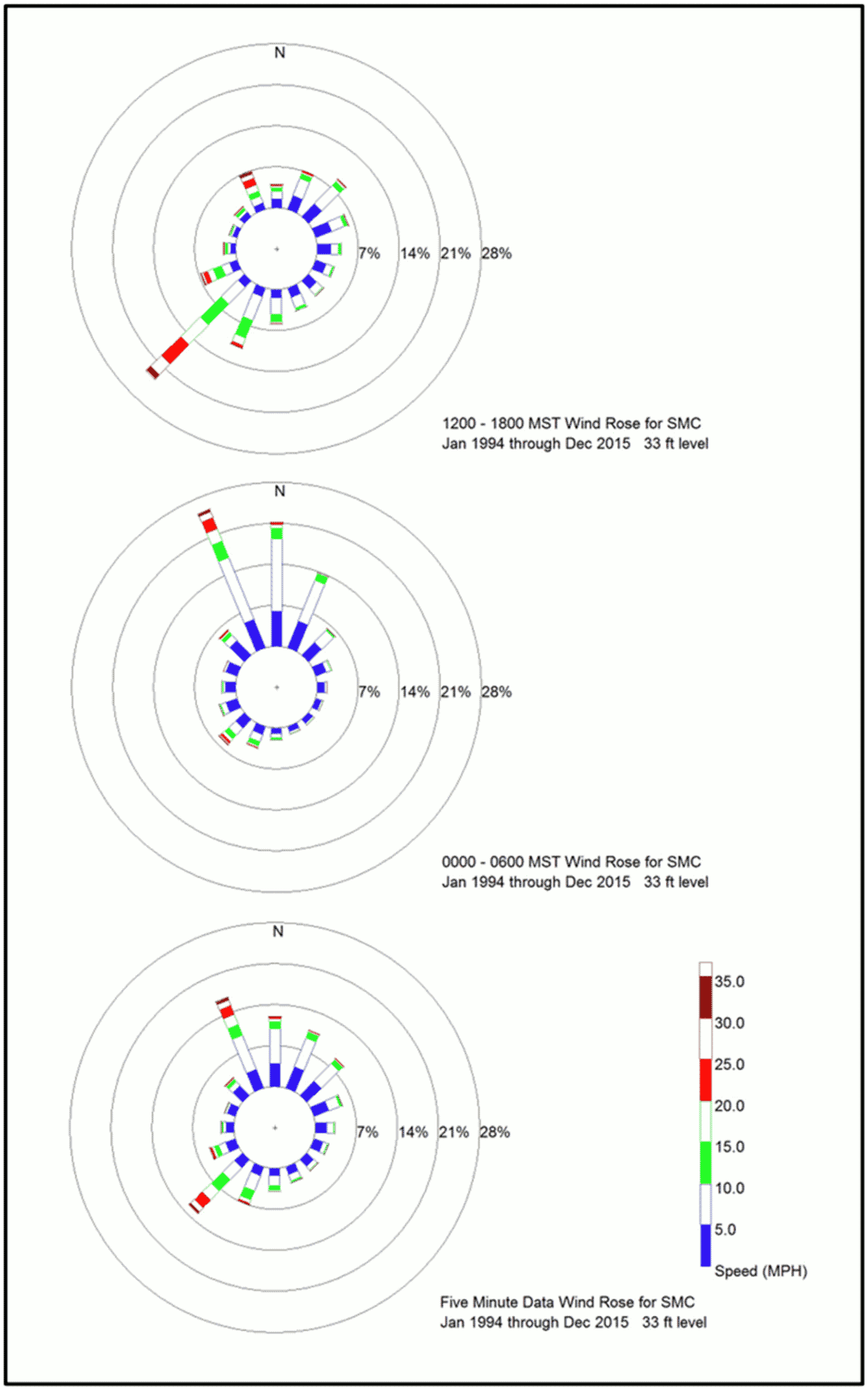


Figure 2.7-6: Micro-Climatic Zones of the INL



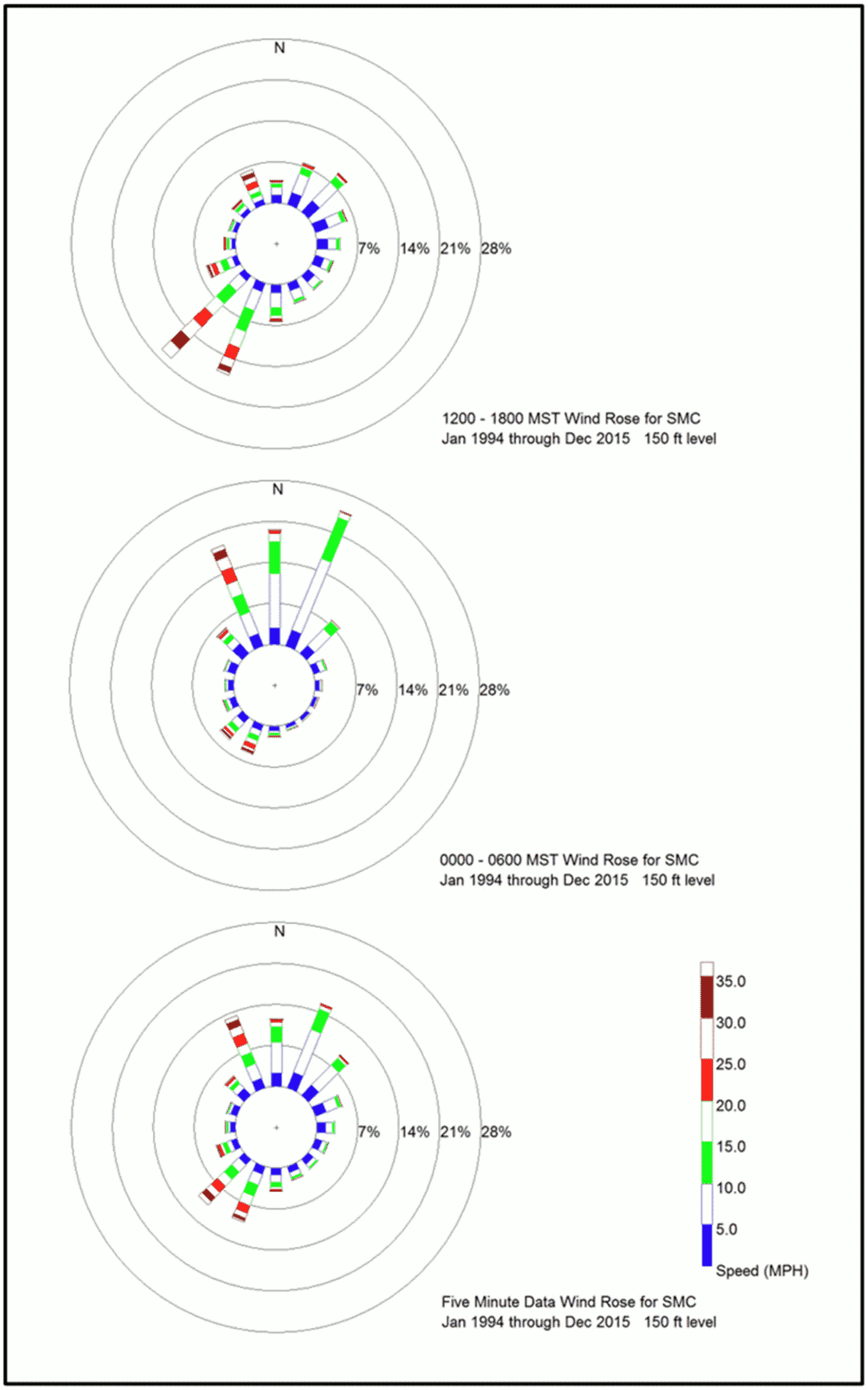
Source: Reference 2.7-1.

Figure 2.7-7: 33-Foot Height Wind Roses for the Northwestern Micro-Climatic Zone



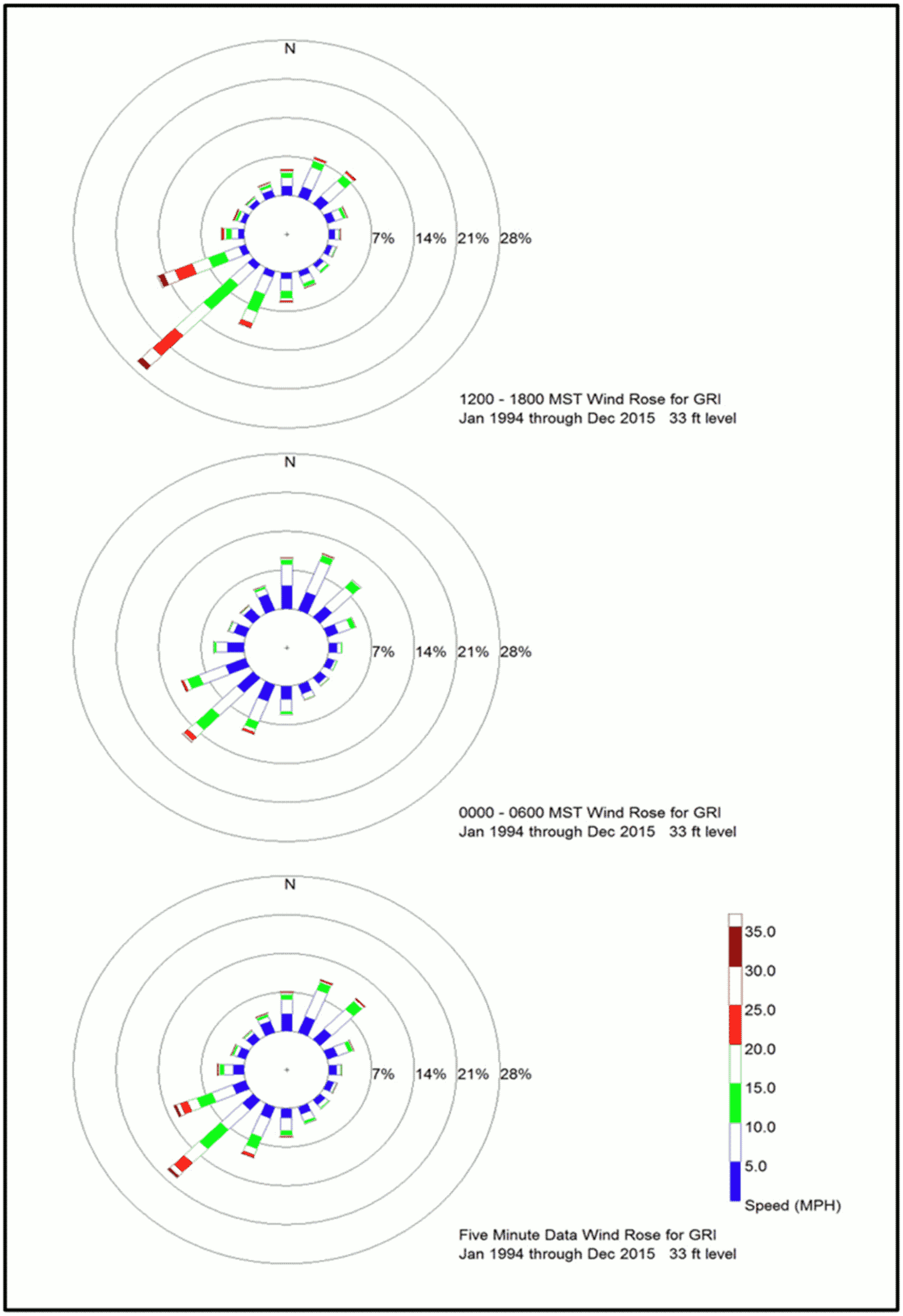
Source: Reference 2.7-1.

Figure 2.7-8: 150-Foot HeightWind Roses for the Northwestern Micro-Climatic Zone



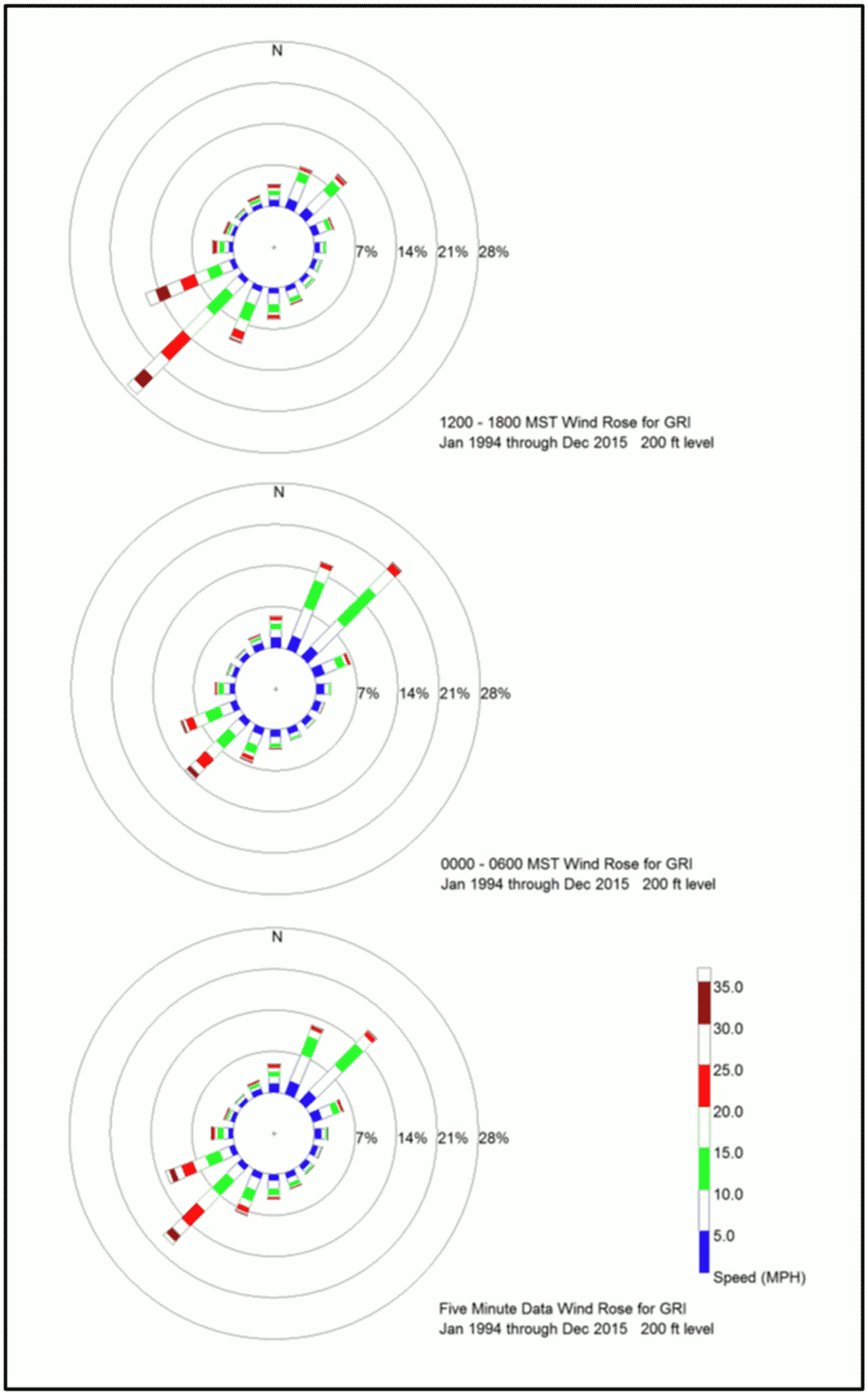
Source: Reference 2.7-1

Figure 2.7-9: 33-Foot Height Wind Roses for the Southwestern Micro-Climatic Zone



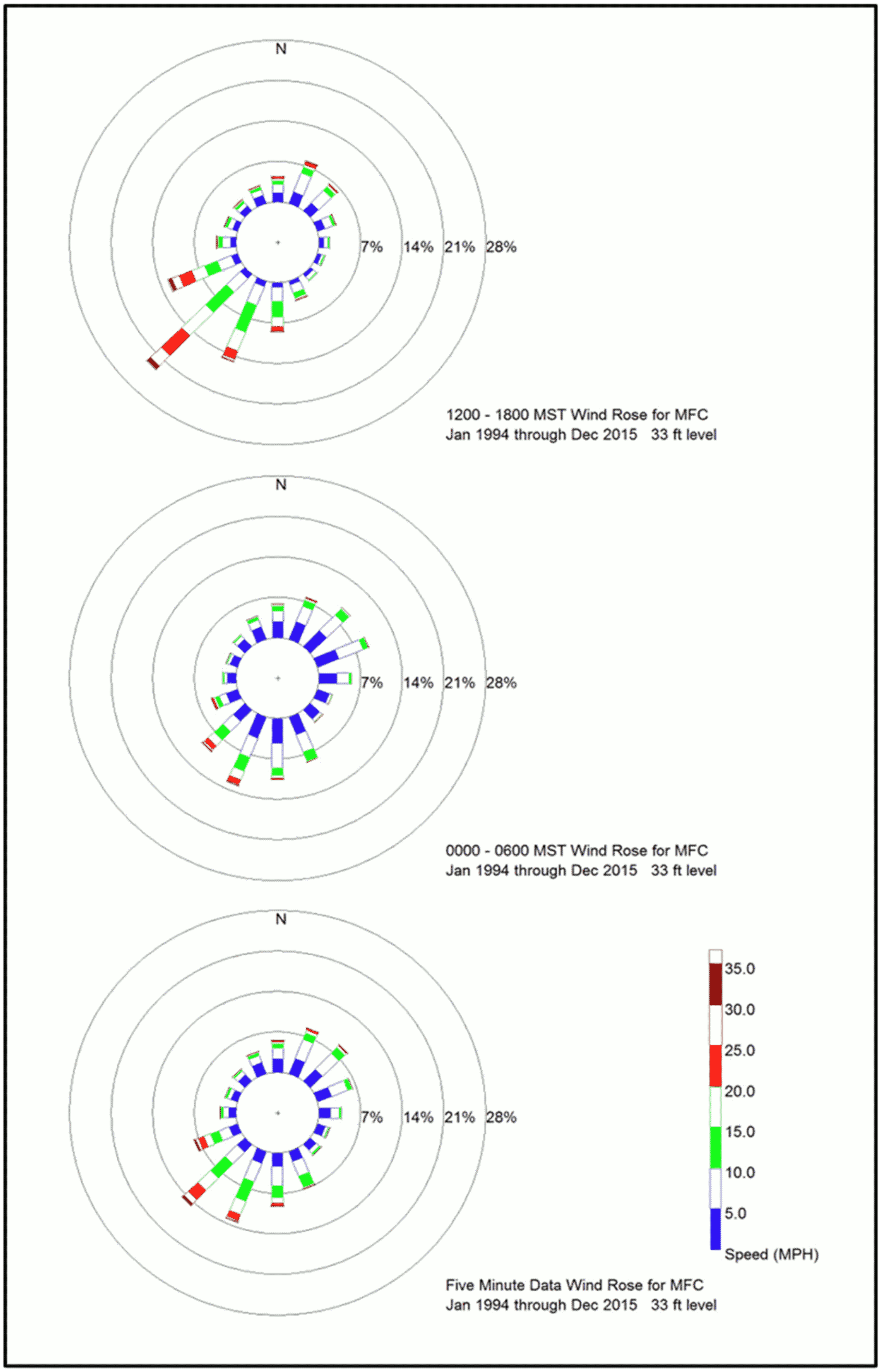
Source: Reference 2.7-1

Figure 2.7-10: 200-Foot Height Wind Roses for the Southwestern Micro-Climatic Zone



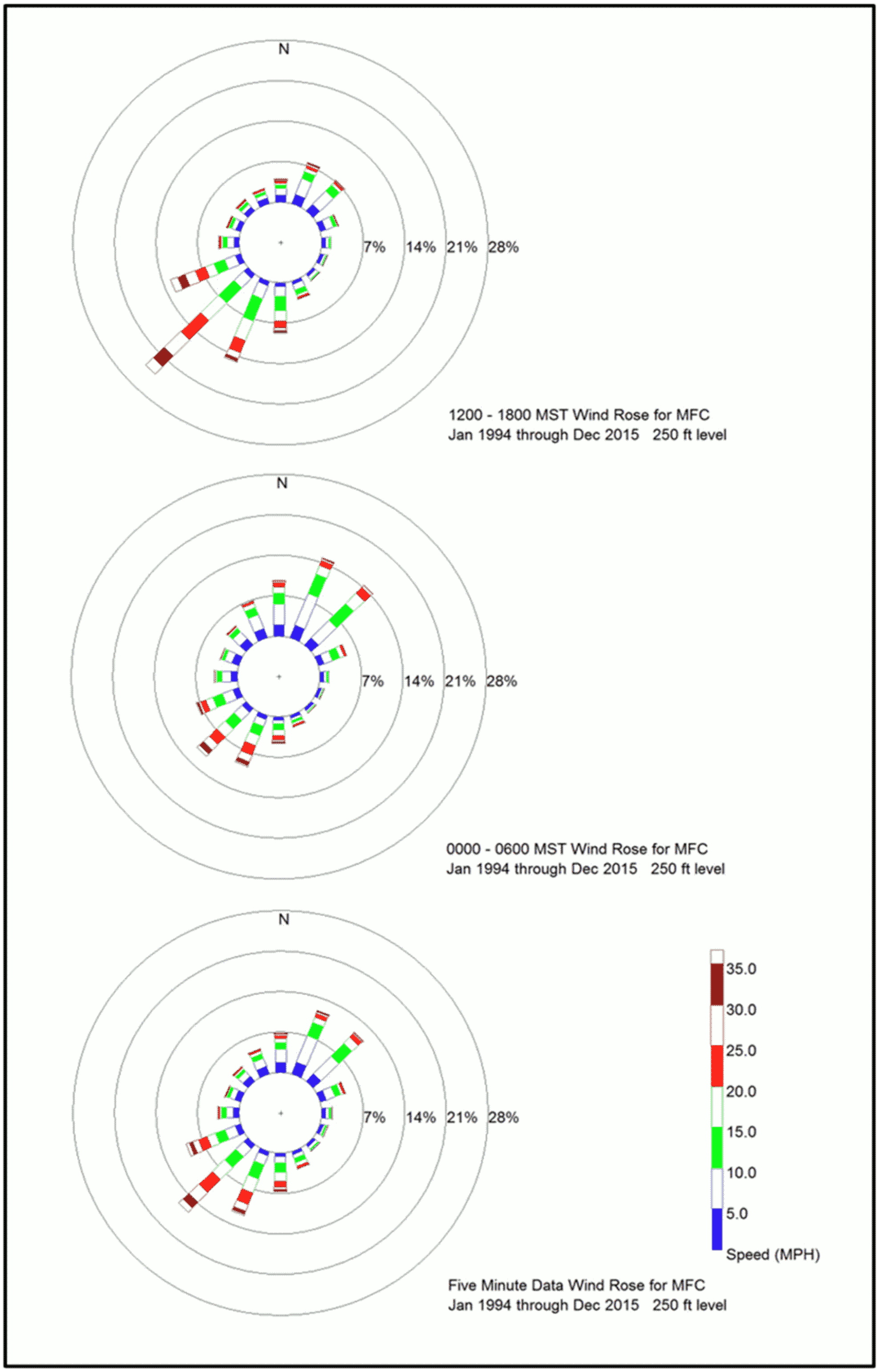
Source: Reference 2.7-1

Figure 2.7-11: 33-Foot Height Wind Roses for the Southeastern Micro-Climatic Zone



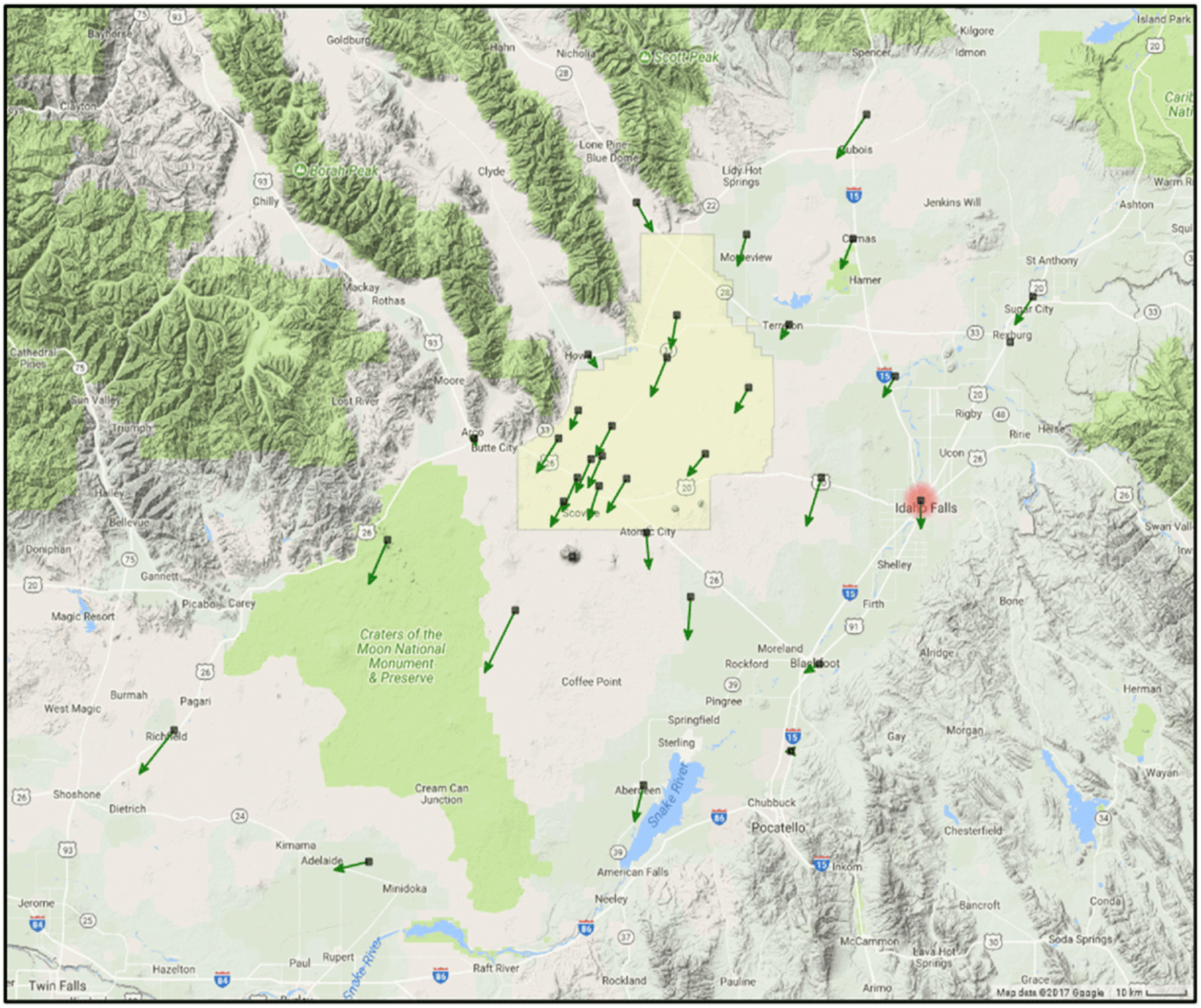
Source: Reference 2.7-1.

Figure 2.7-12: 250-Foot Height Wind Roses for the Southeastern Micro-Climatic Zone



Source: Reference 2.7-1.

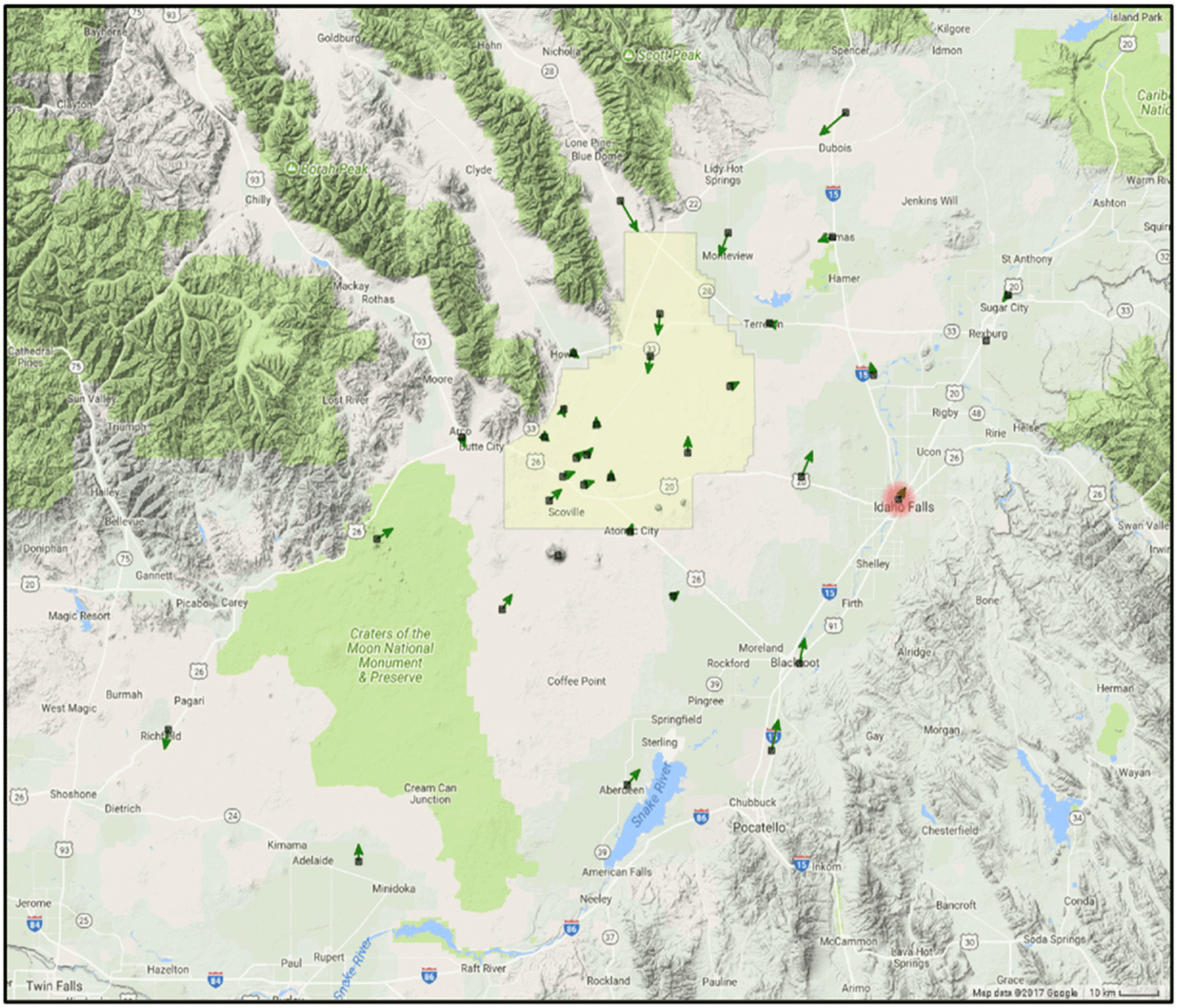
Figure 2.7-13: Typical Wind Vectors for Drainage Flows at the INL



Reference 2.7-1.

Green arrows indicate wind speeds less than 11.2 miles per hour.

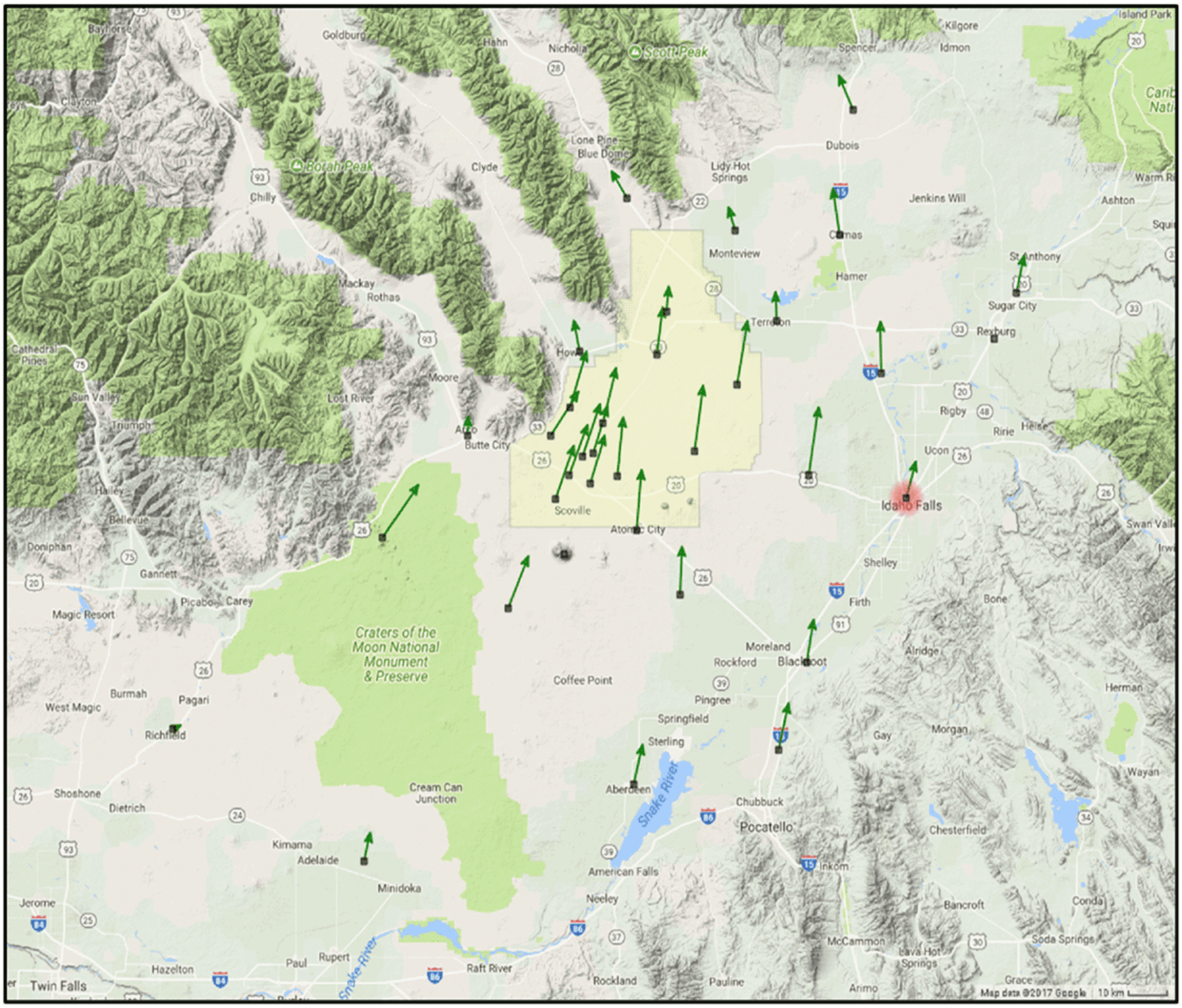
Figure 2.7-14: Typical Wind Vectors for Weak Flow



Reference 2.7-1

Green arrows indicate wind speeds less than 11.2 miles per hour.

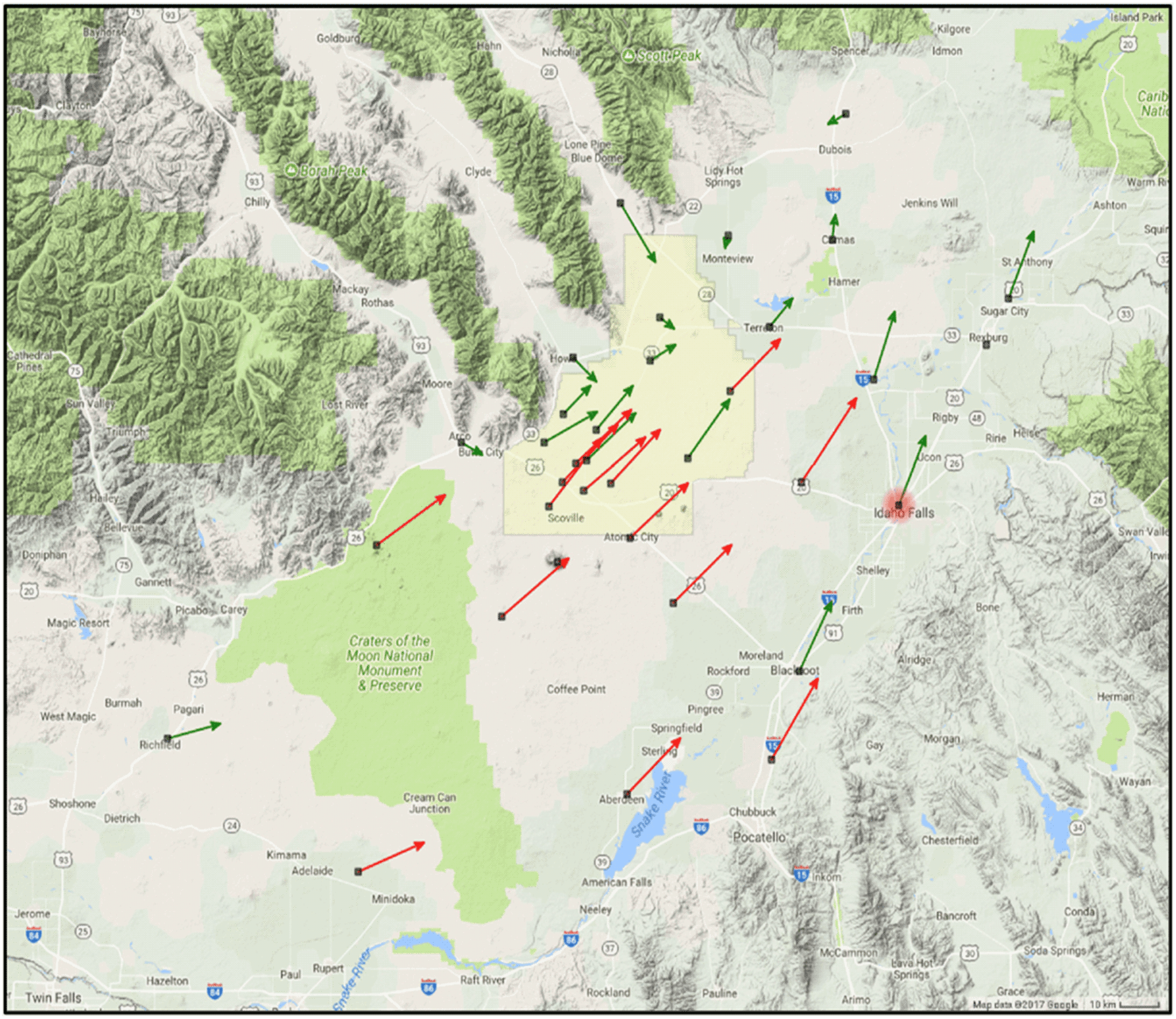
Figure 2.7-15: Typical Wind Vectors for Moderate Up-Valley Flow



Reference 2.7-1

Green arrows indicate wind speeds less than 11.2 miles per hour.

Figure 2.7-16: Typical Wind Vectors for Decreasing Up-Slope Flow Near Sunset or Moderate Synoptically-Forced Flow

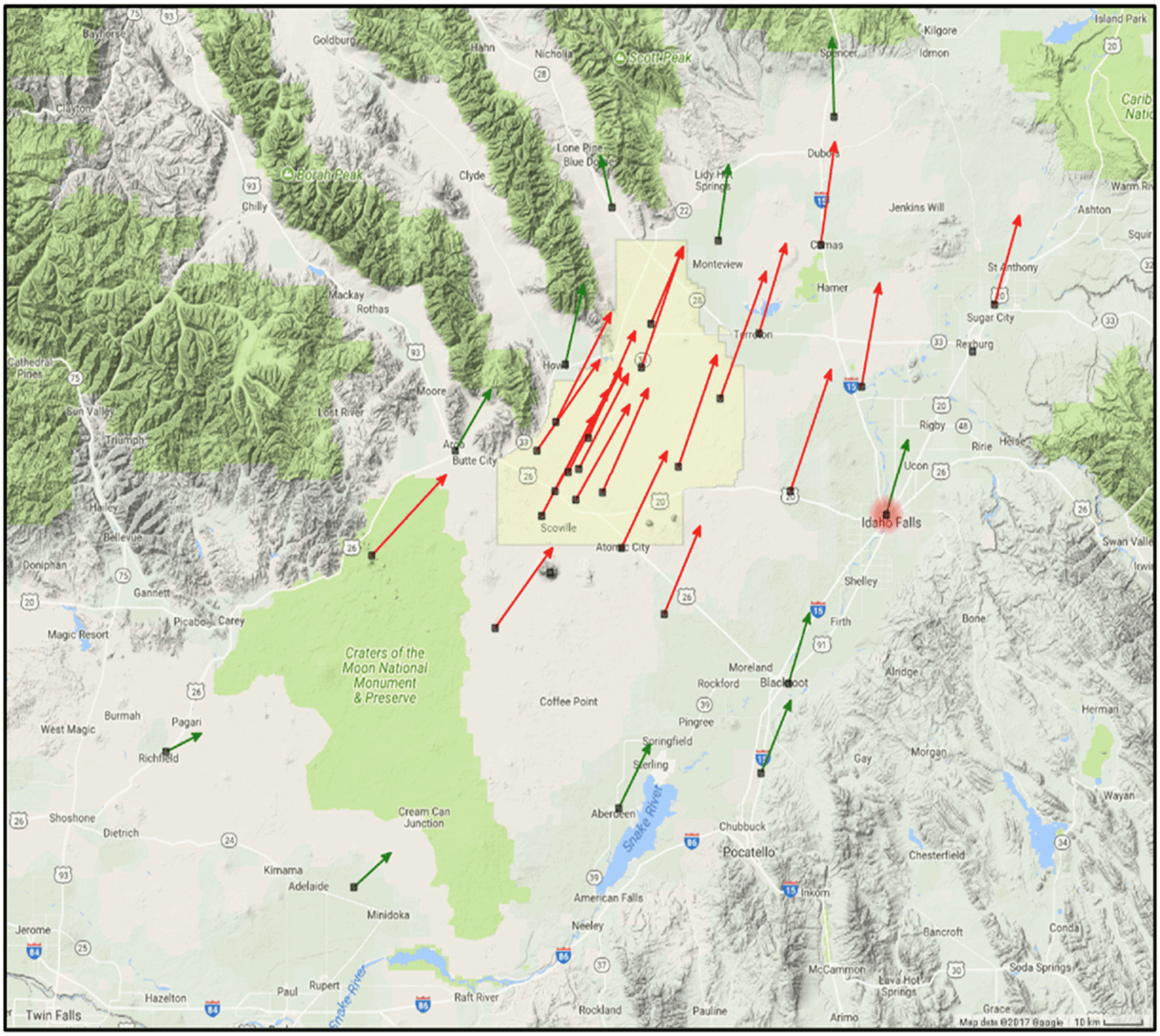


Reference 2.7-1

Green arrows indicate wind speeds less than 11.2 miles per hour

Red arrows indicate wind speeds between 11.2 miles per hour and 22.4 miles per hour.

Figure 2.7-17: Typical Wind Vectors for Well-Developed Up-Valley Flow

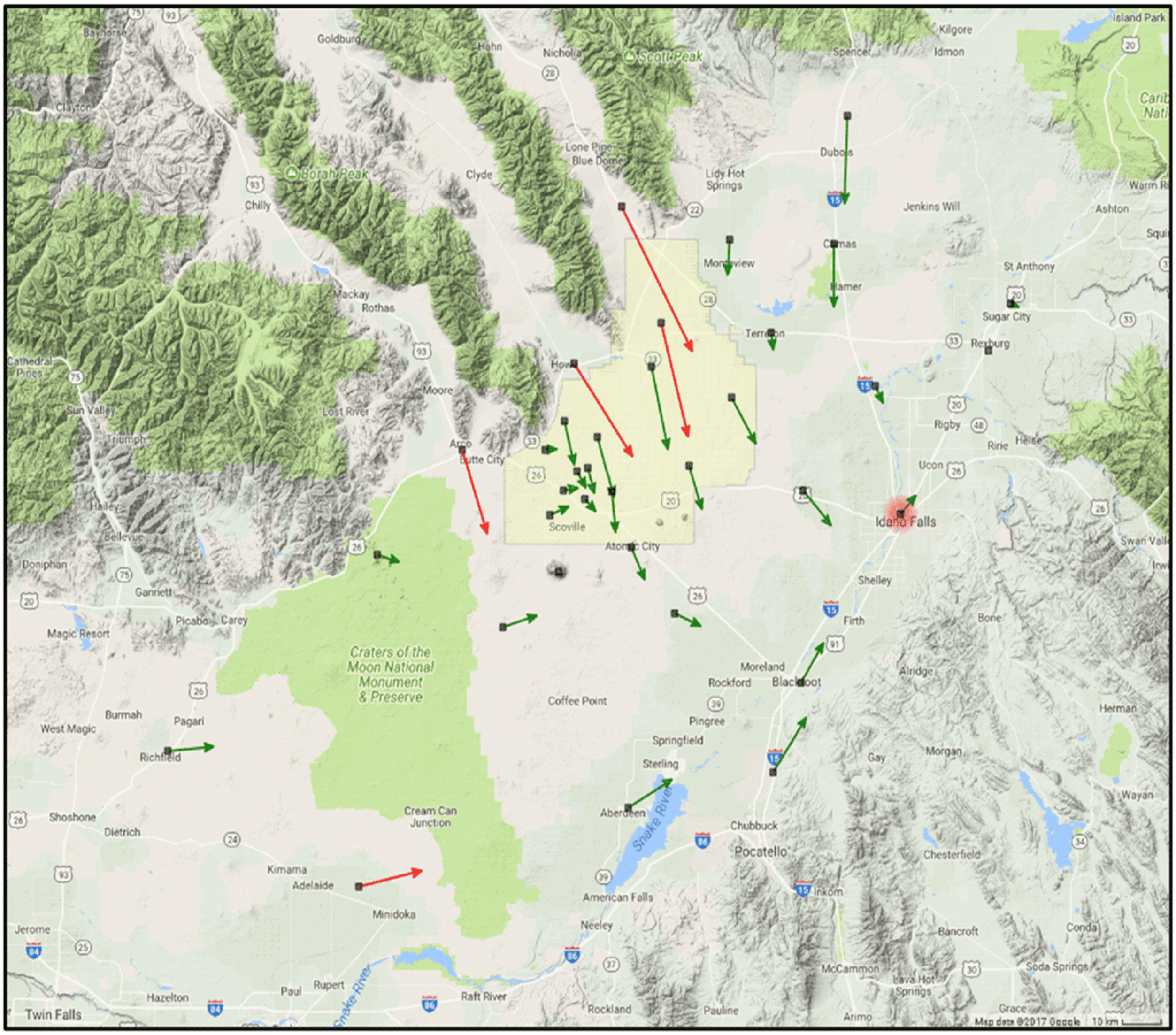


Reference 2.7-1.

Green arrows indicate wind speeds less than 11.2 miles per hour

Red arrows indicate wind speeds between 11.2 miles per hour and 22.4 miles per hour

Figure 2.7-18: Typical Wind Vectors for Down-Canyon Flow

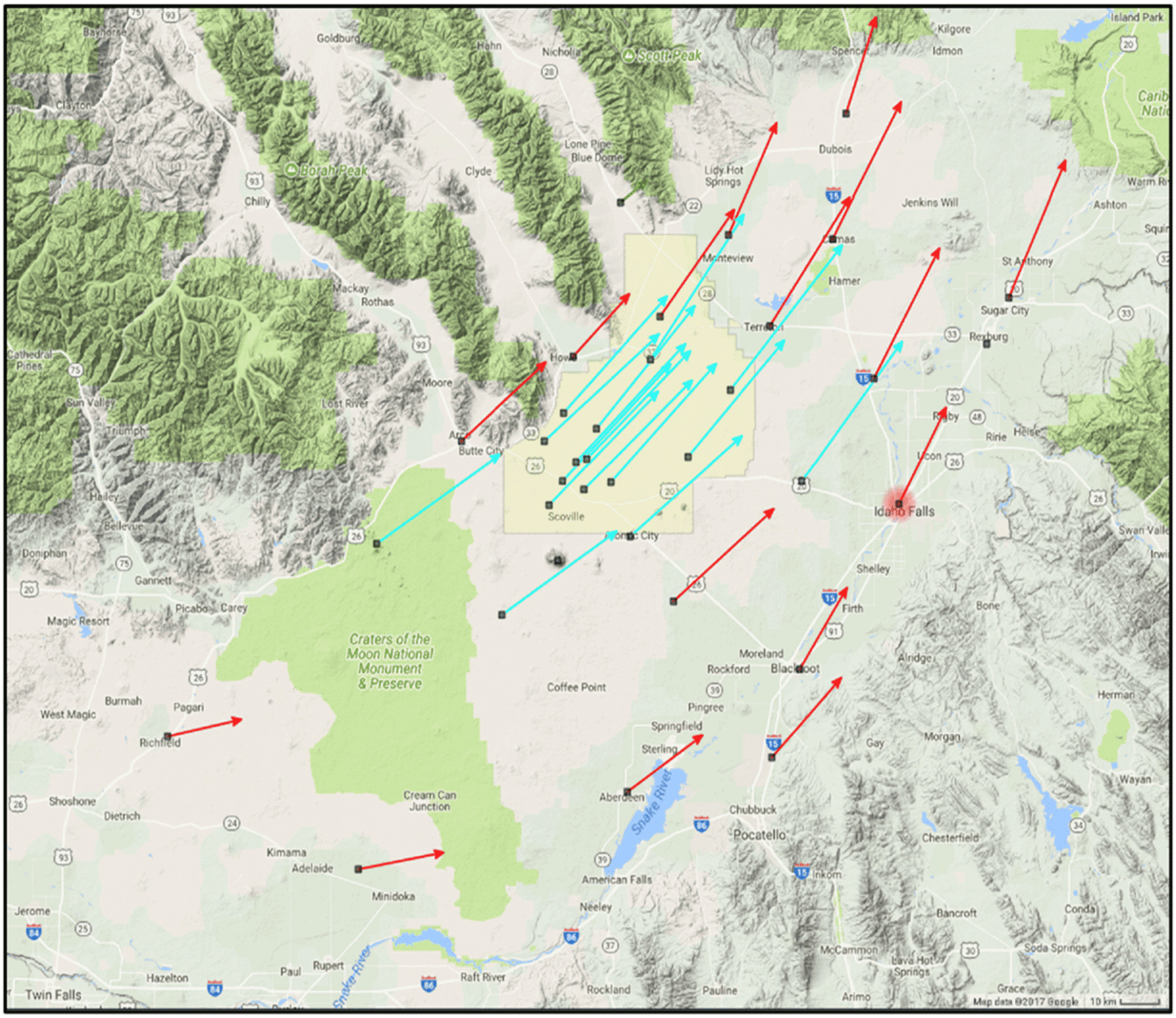


Reference 2.7-1

Green arrows indicate wind speeds less than 11.2 miles per hour

Red arrows indicate wind speeds between 11.2 miles per hour and 22.4 miles per hour

Figure 2.7-19: Typical Vectors for Strong Synoptically-Forced Southwest Flow



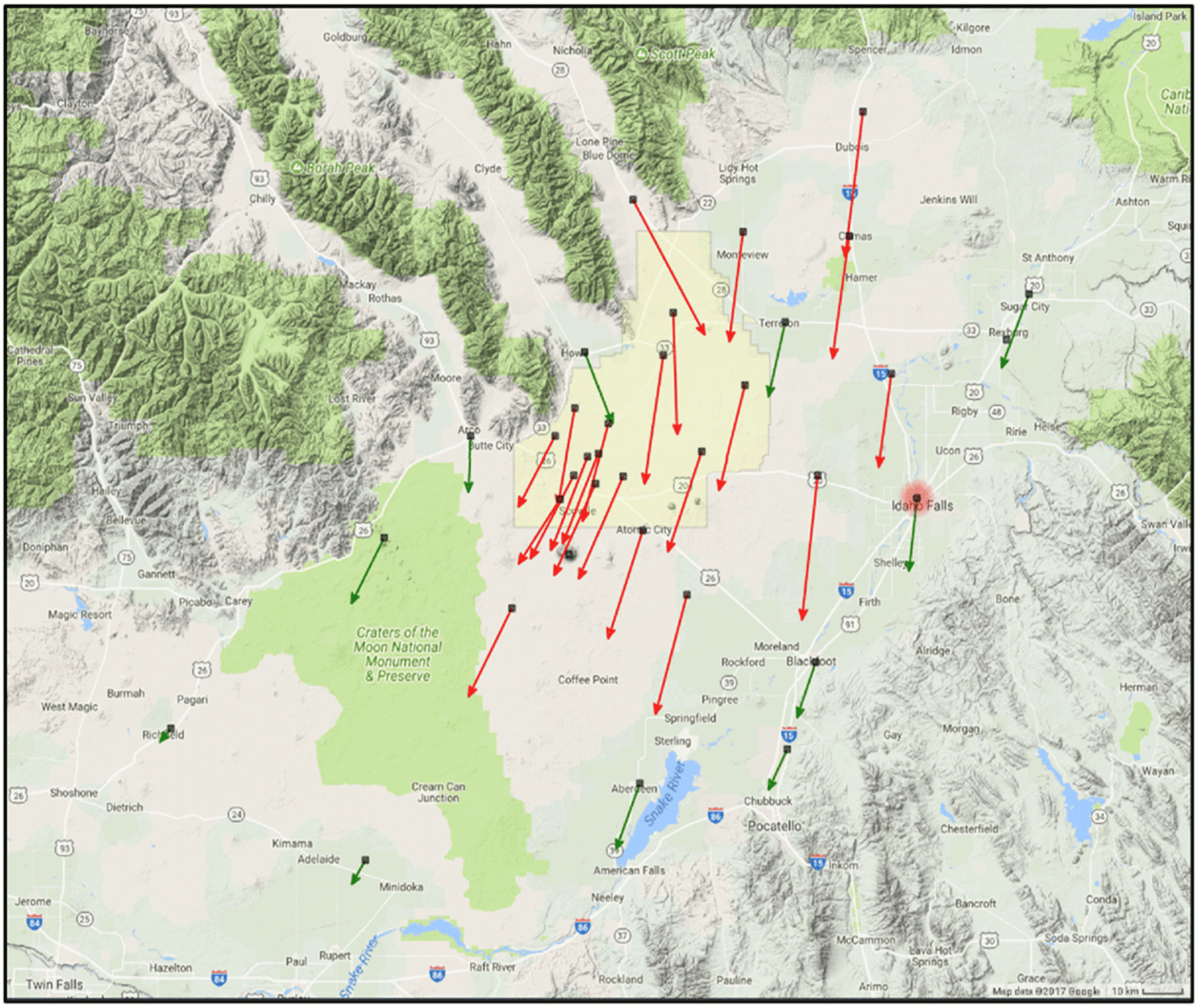
Reference 2.7-1

Green arrows indicate wind speeds less than 11.2 miles per hour

Red arrows indicate wind speeds between 11.2 miles per hour and 22.4 miles per hour

Blue arrows indicate wind speeds greater than 22.4 miles per hour.

Figure 2.7-20: Typical Wind Vectors for Strong Synoptically-Forced North-Northeast Flow

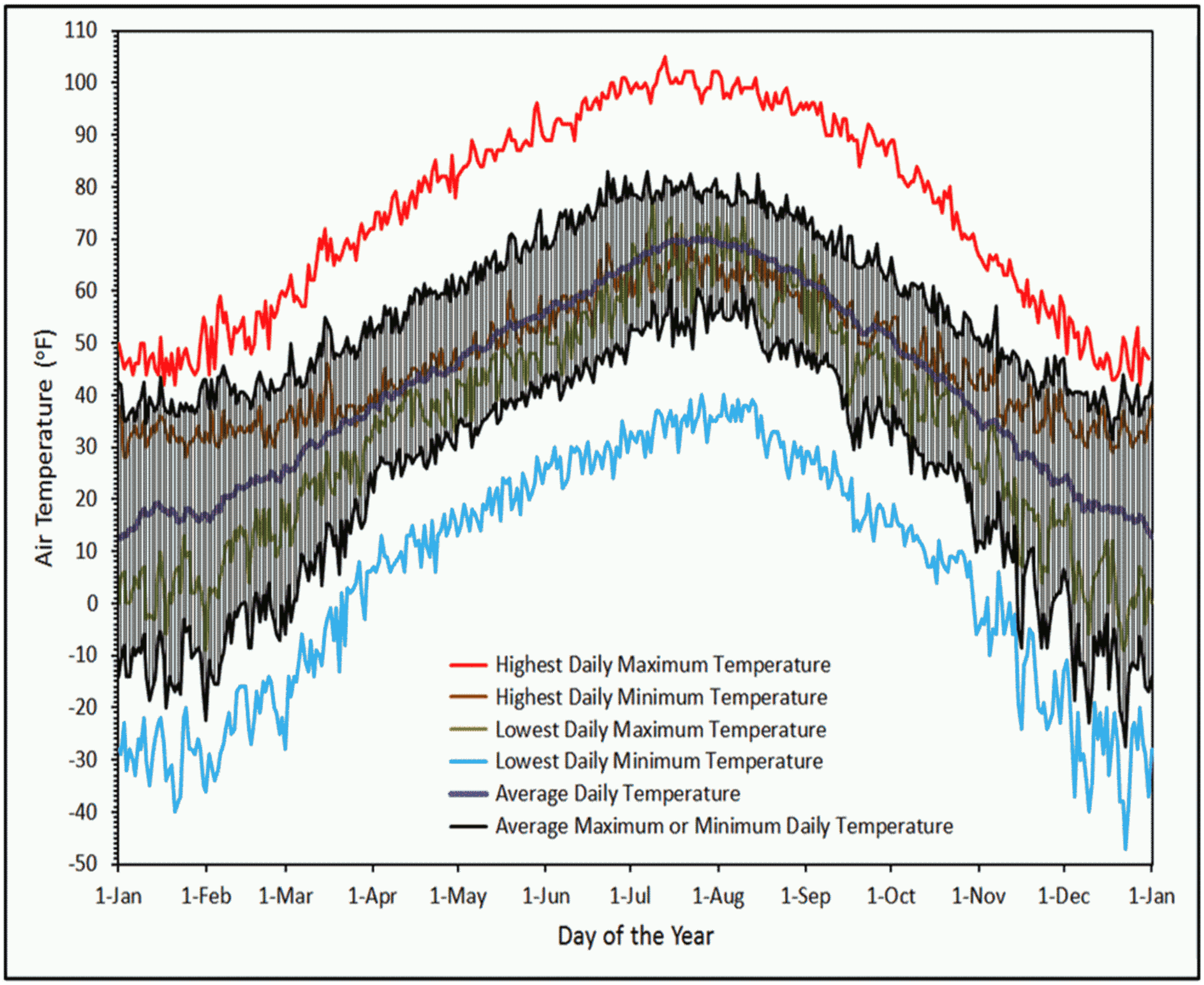


Reference 2.7-1

Green arrows indicate wind speeds less than 11.2 miles per hour

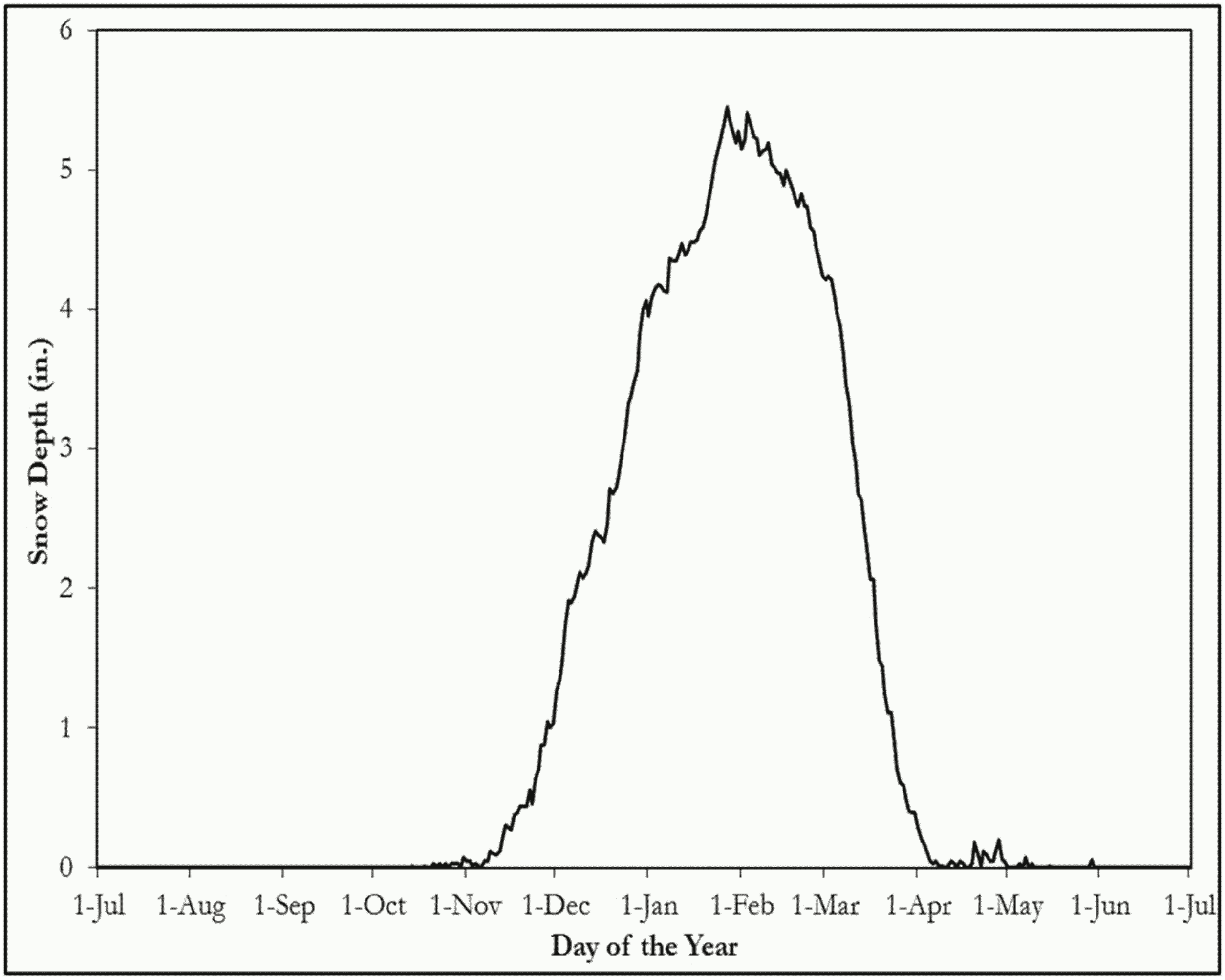
Red arrows indicate wind speeds between 11.2 miles per hour and 22.4 miles per hour.

Figure 2.7-21: Annual Curve of Average Daily Air Temperatures at the Central Facilities Area Building 690 from 1950 to 2015



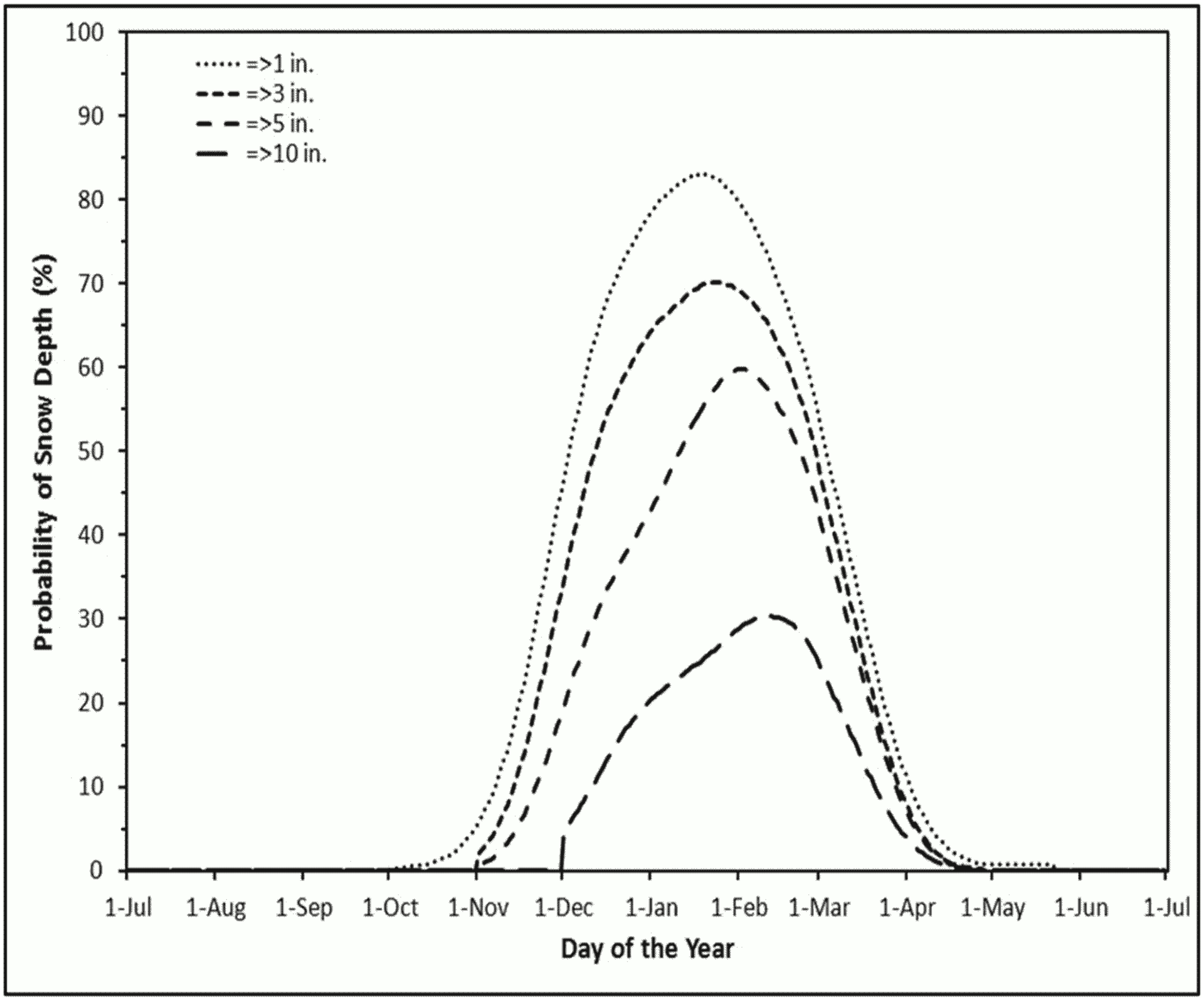
Reference 2.7-1

Figure 2.7-22: Average Daily Snow Depth at the Central Facilities Area Building 690 from 1950 to 2015



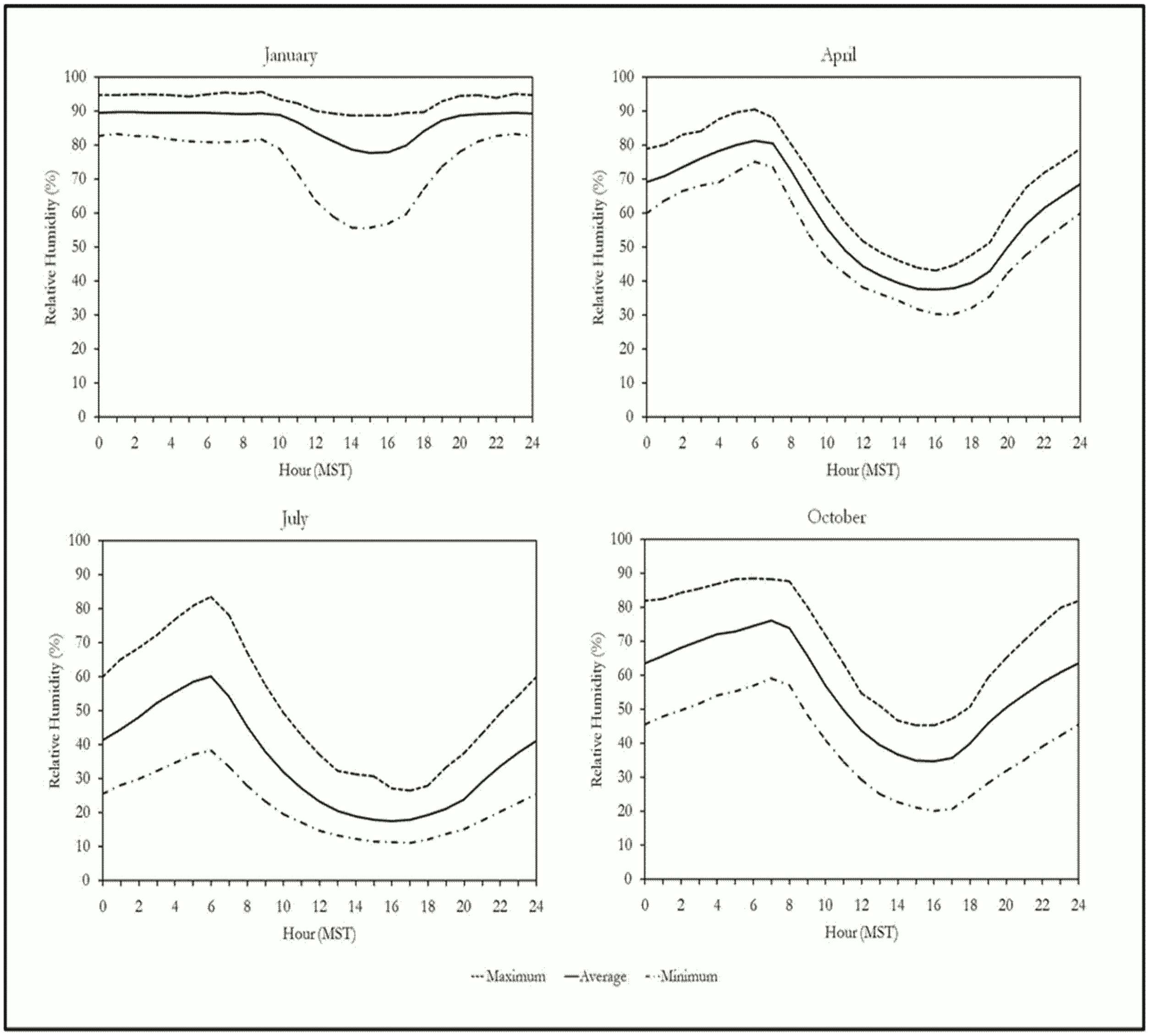
Reference 2.7-1.

Figure 2.7-23: Probability of a Snow Depths Greater Than One, Three, Five, and Ten Inches at the INL



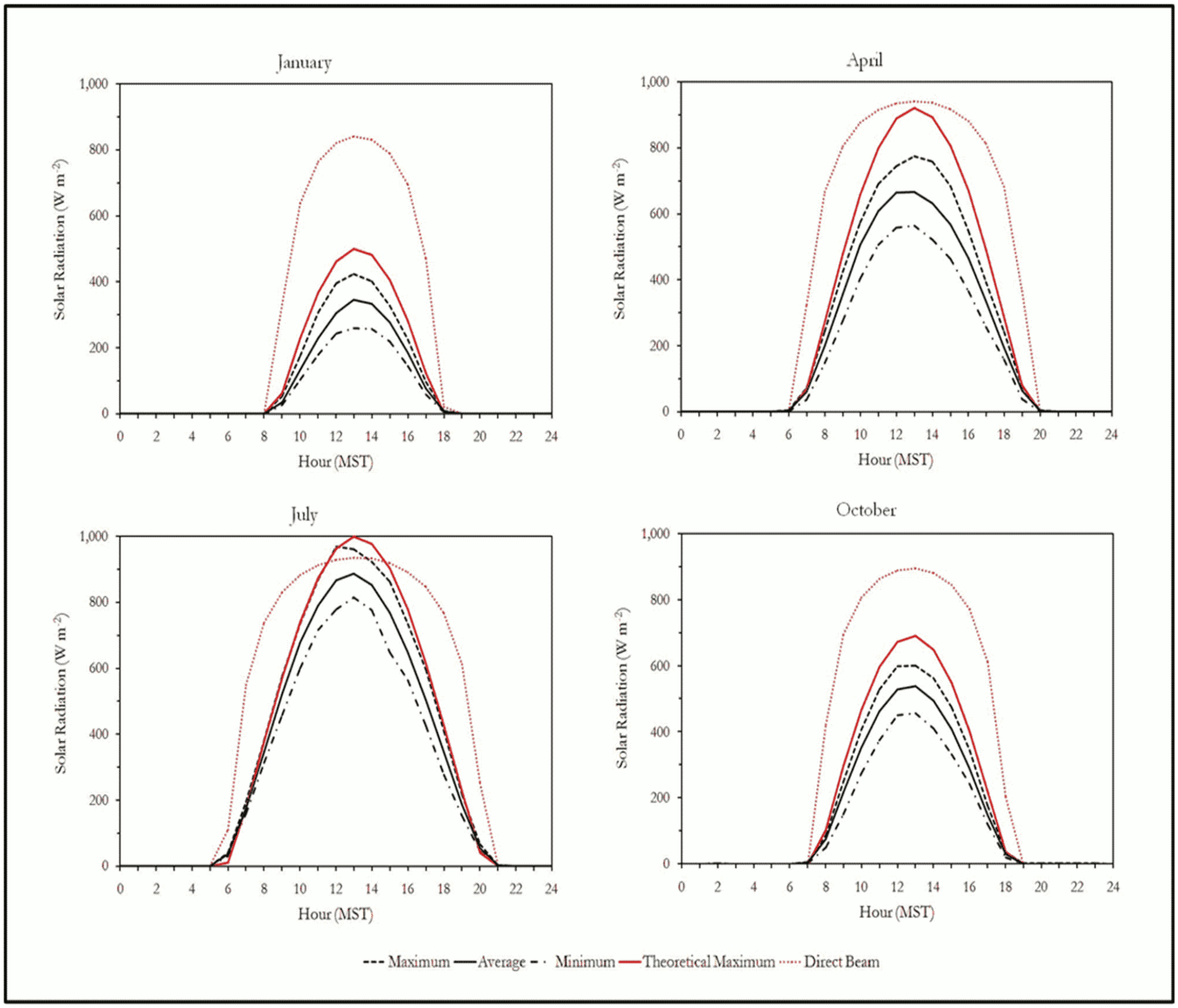
Reference 2.7-1

Figure 2.7-24: Seasonal Variations in Relative Humidity at the INL



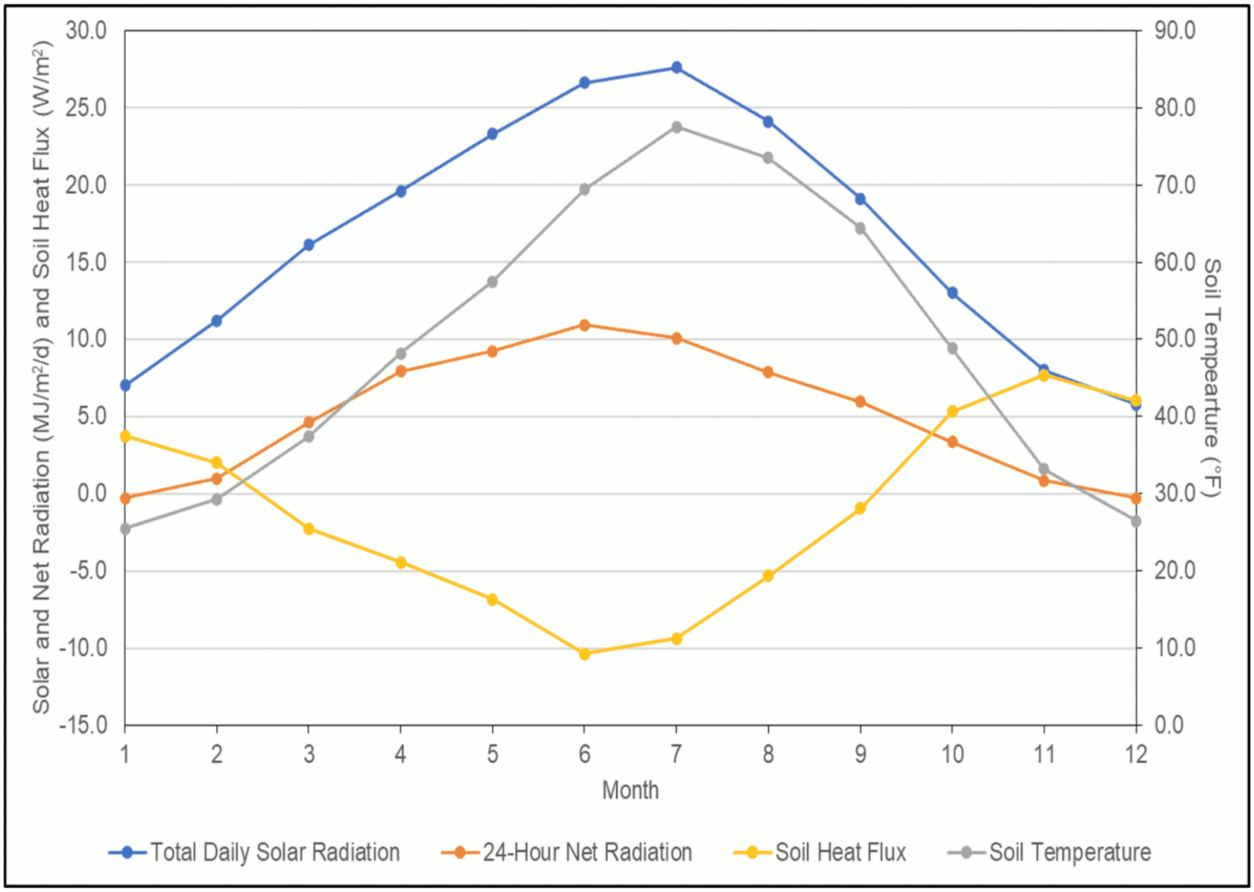
Reference 2.7-1

Figure 2.7-25: Seasonal Solar Radiation Variations at the INL



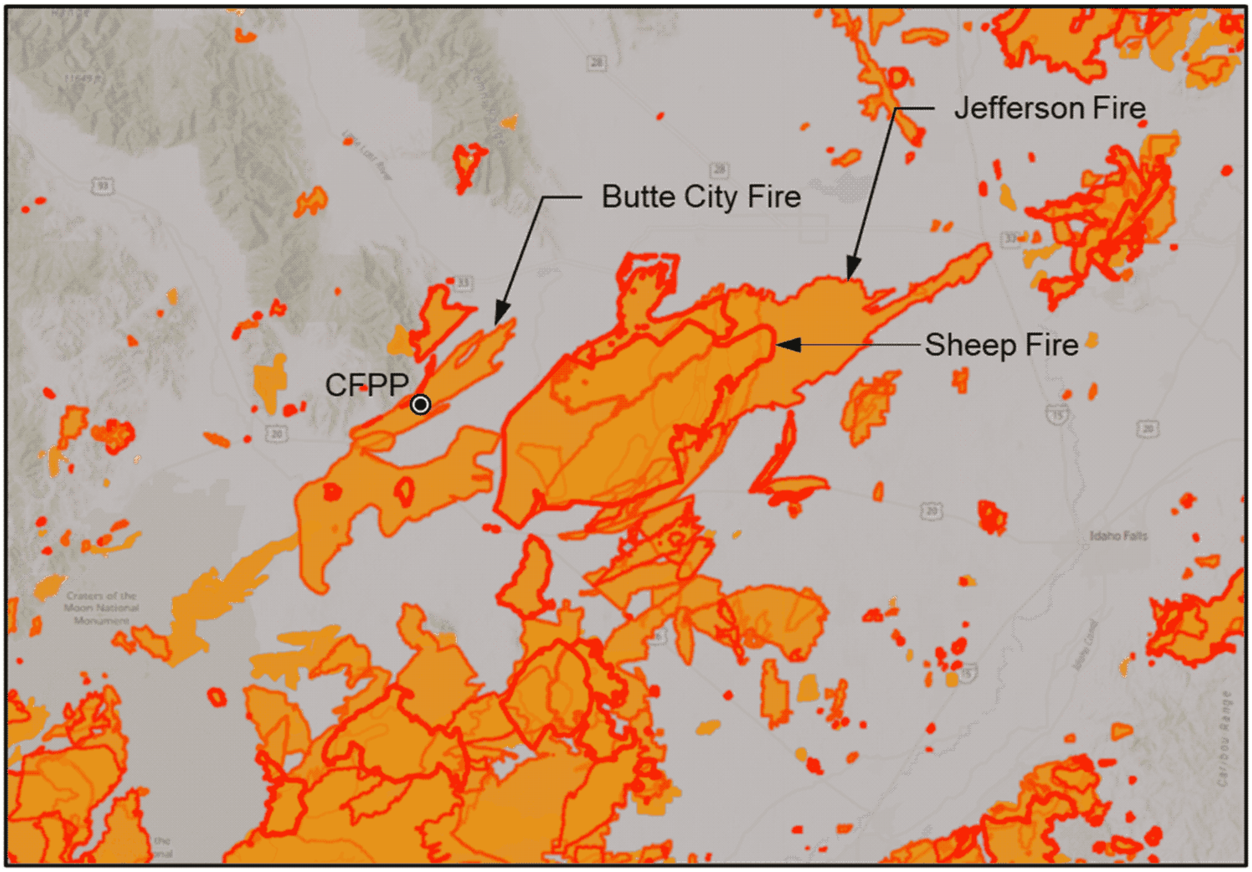
Reference 2.7-1.

Figure 2.7-26: Monthly Solar Radiation, Net Radiation, Soil Temperature, and Soil Heat Flux Variations at the INL



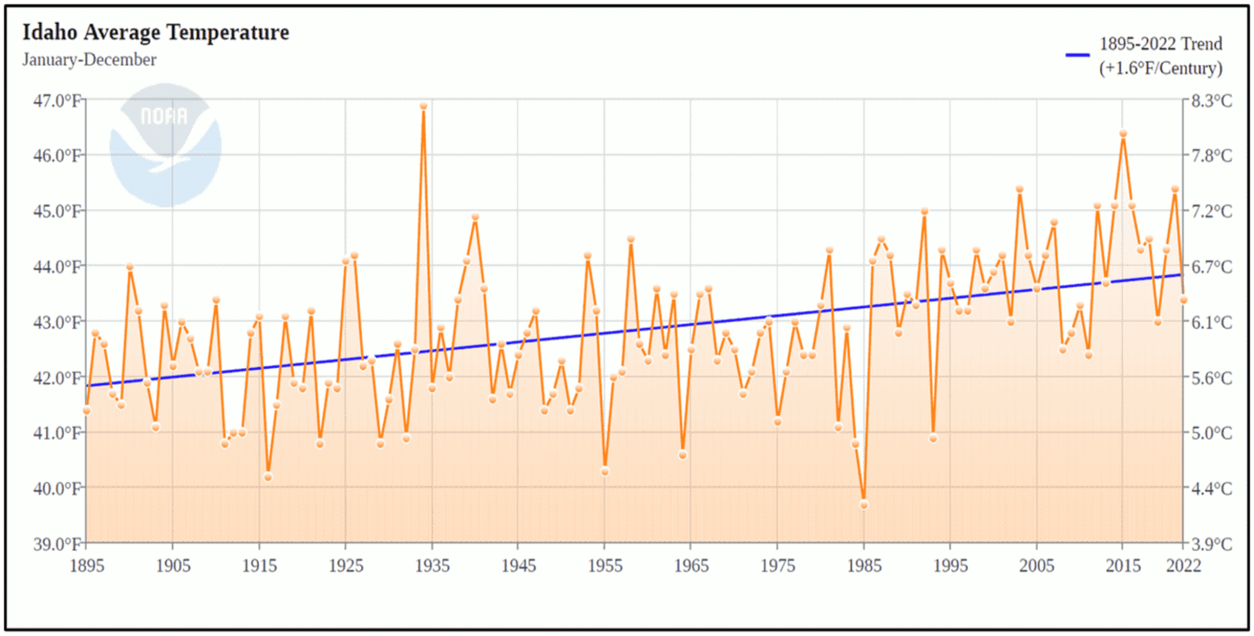
Reference 2.7-1

Figure 2.7-27: Wildland Fire Boundaries in the Vicinity of the CFPP



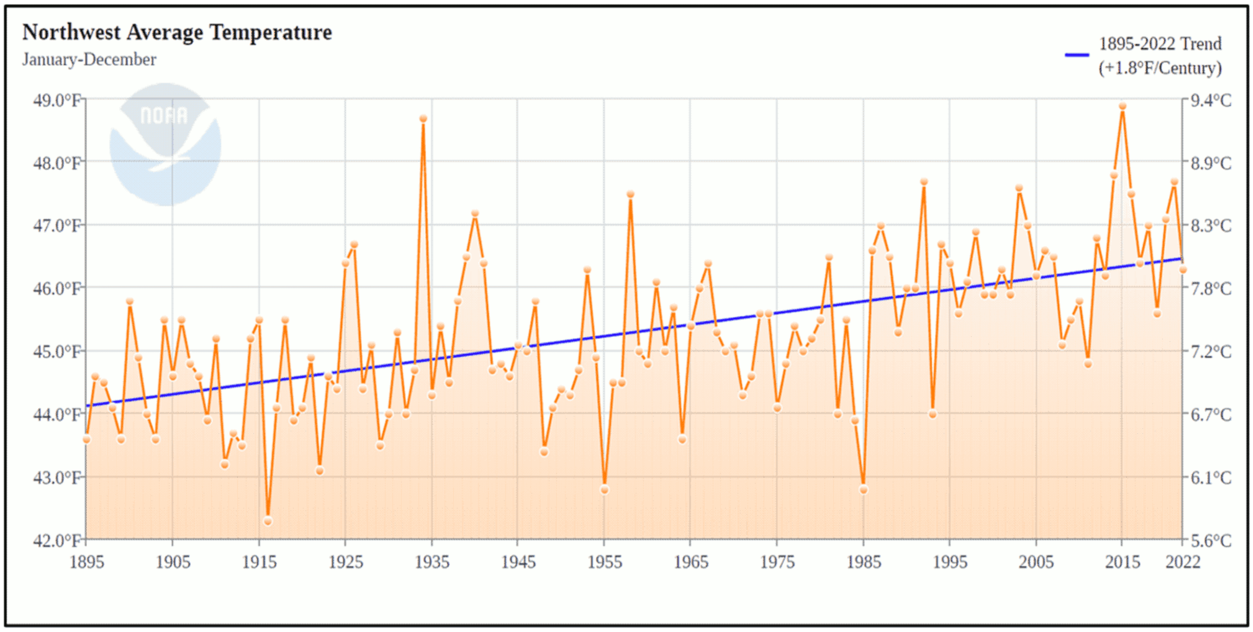
Reference 2.7-11

Figure 2.7-28: Mean Annual Temperature Trends in Idaho from 1895 to 2022



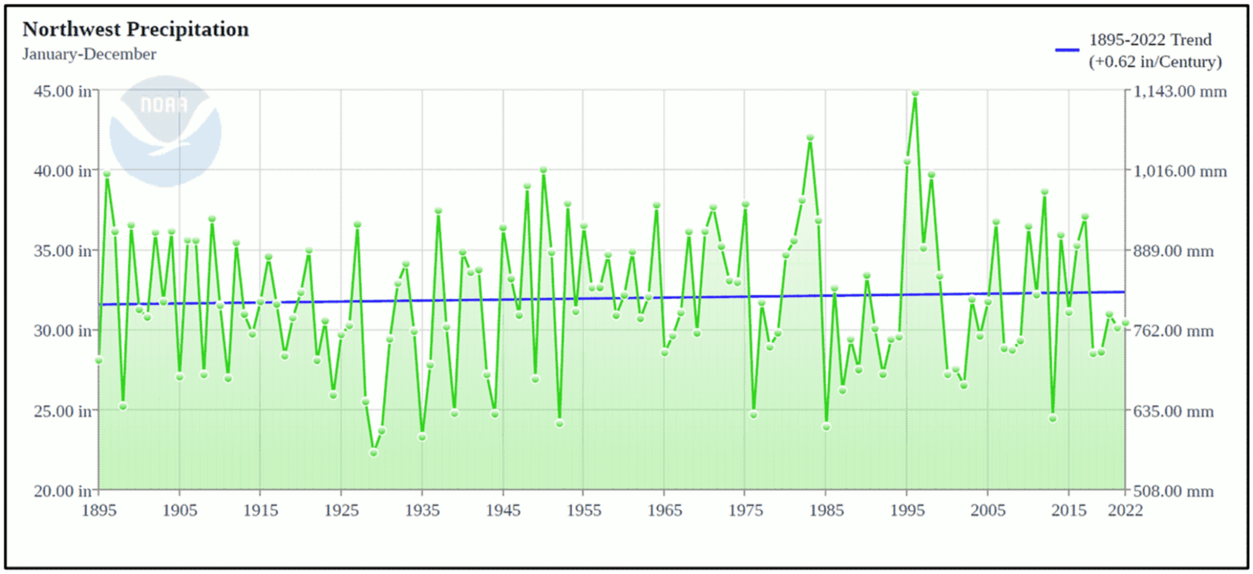
Reference 2.7-33.

Figure 2.7-29: Mean Annual Temperature Trends in the Northwestern United States from 1895 to 2022



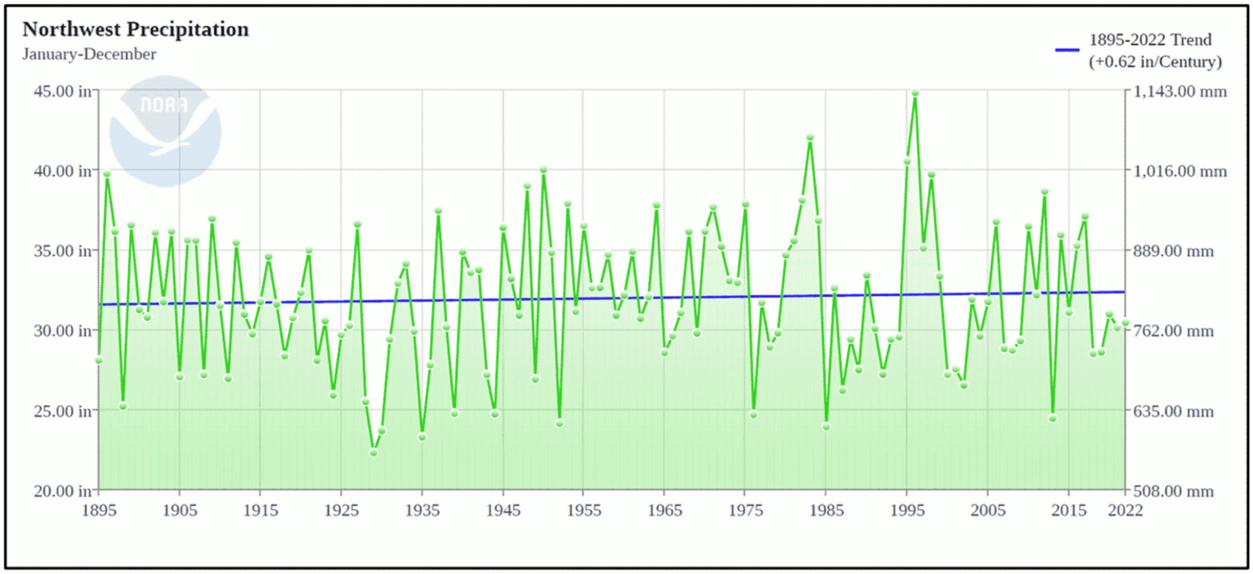
Reference 2.7-34.

Figure 2.7-30: Mean Annual Precipitation Trends in Idaho from 1895 to 2022



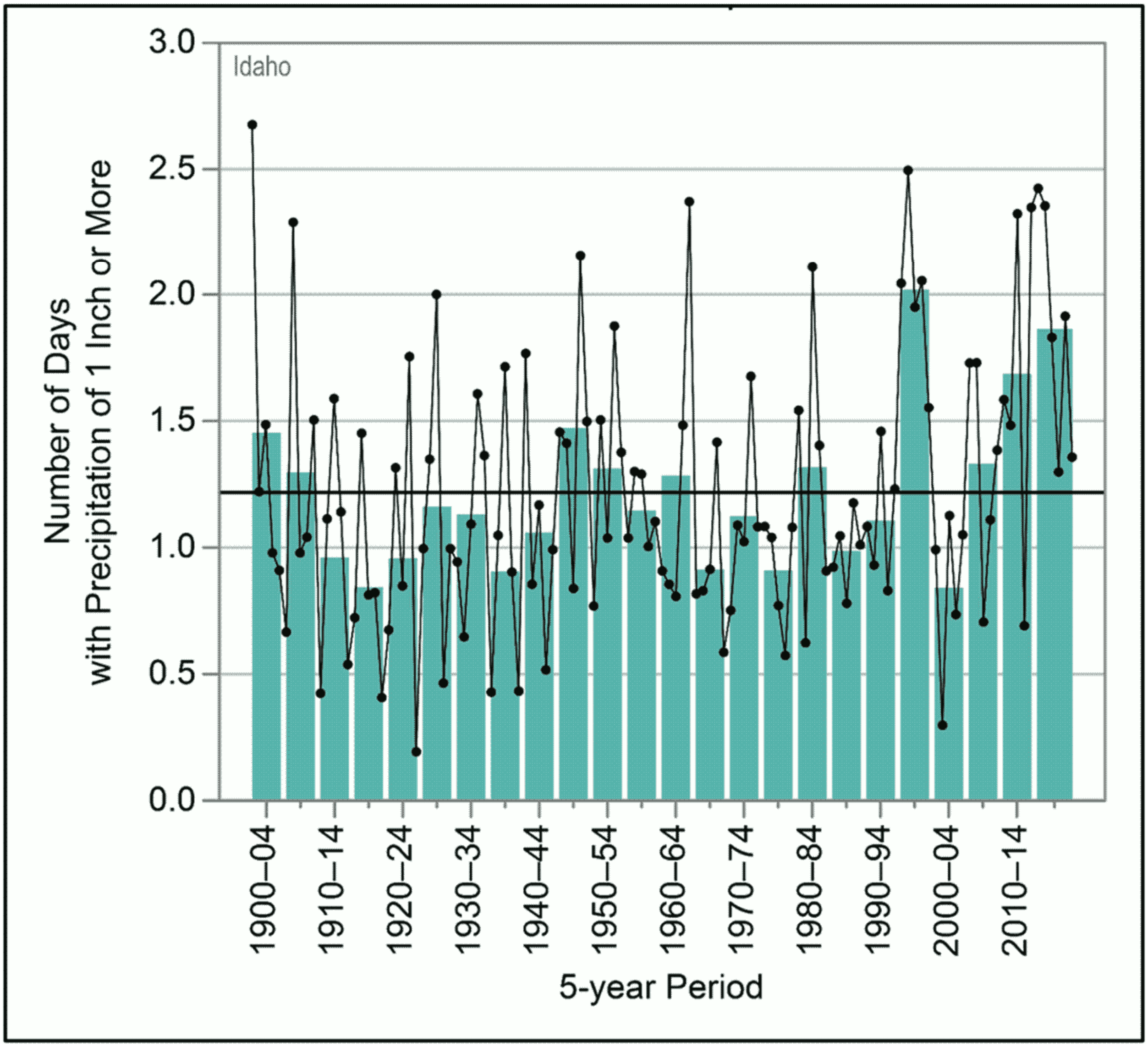
Reference 2.7-33.

Figure 2.7-31: Mean Annual Precipitation Trends in the Northwestern United States from 1895 to 2022



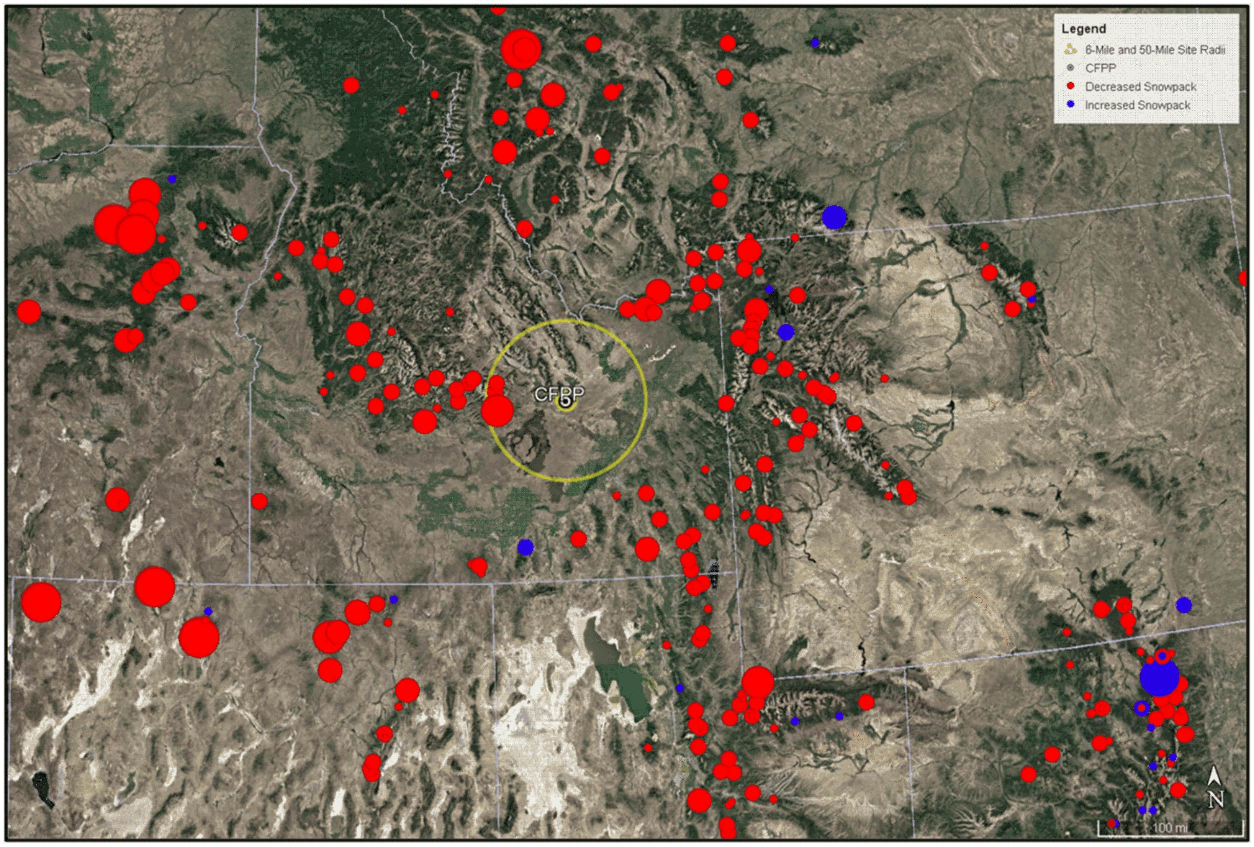
Reference 2.7-34.

Figure 2.7-32: Extreme Precipitation Events in Idaho from 1900 to 2020



Reference 2.7-33.

Figure 2.7-33: Trends in April Snowpack from 1955 to 2022



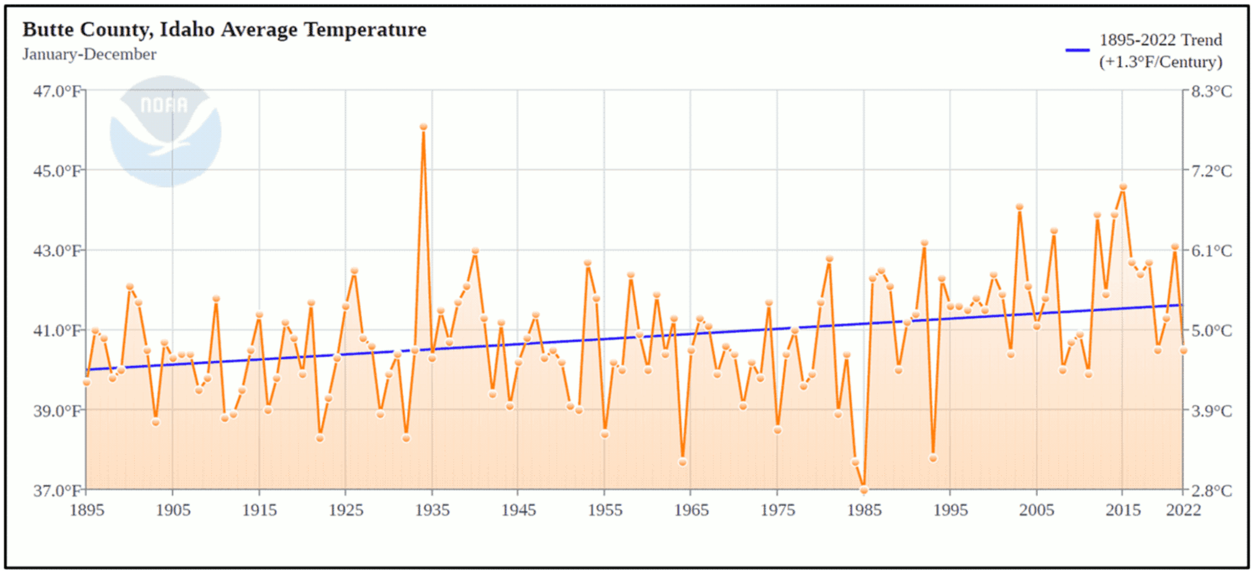
Reference 2.7-35

Largest circles indicate snowpack changes in excess of 80 percent

Smallest circles indicate changes of 0 percent to 20 percent

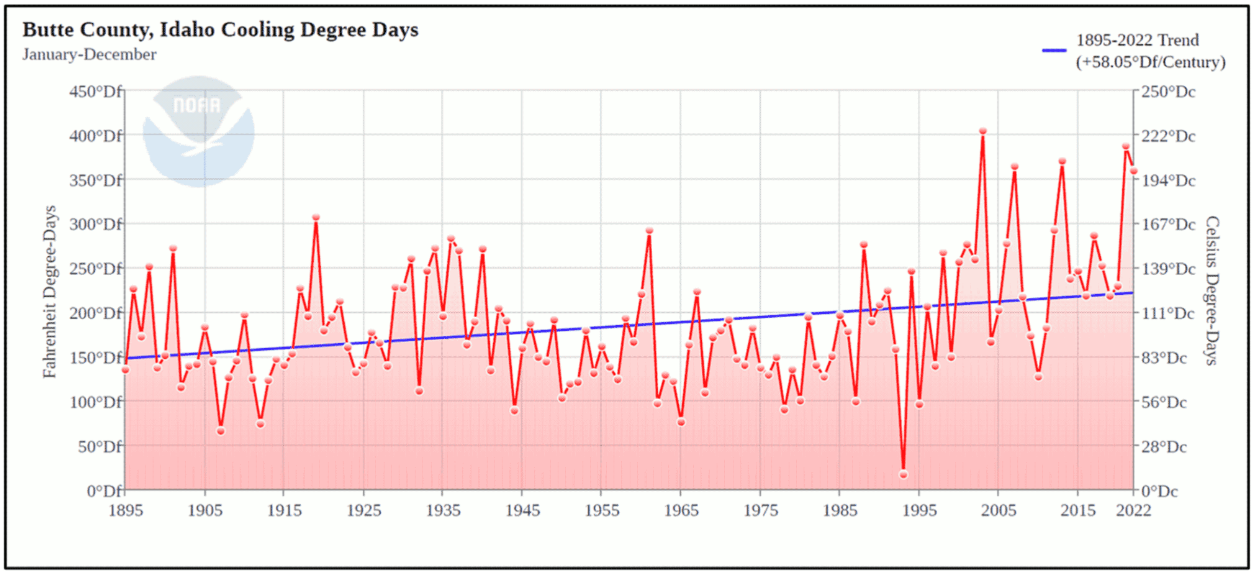
Intermediate circles sizes indicate changes ranging from 20 percent to 40 percent, 40 percent to 60 percent, and 60 percent to 80 percent

Figure 2.7-34: Mean Annual Temperature Trends in Butte County, Idaho, from 1895 to 2022



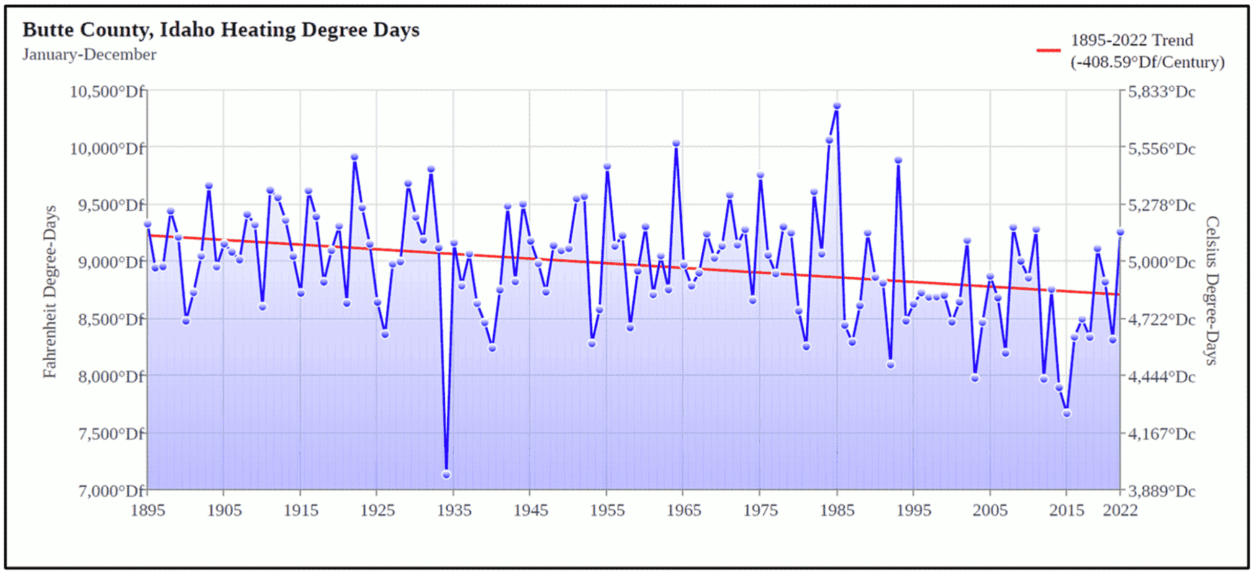
Reference 2.7-39.

Figure 2.7-35: Cooling Degree Day Trends in Butte County, Idaho, from 1895 to 2022



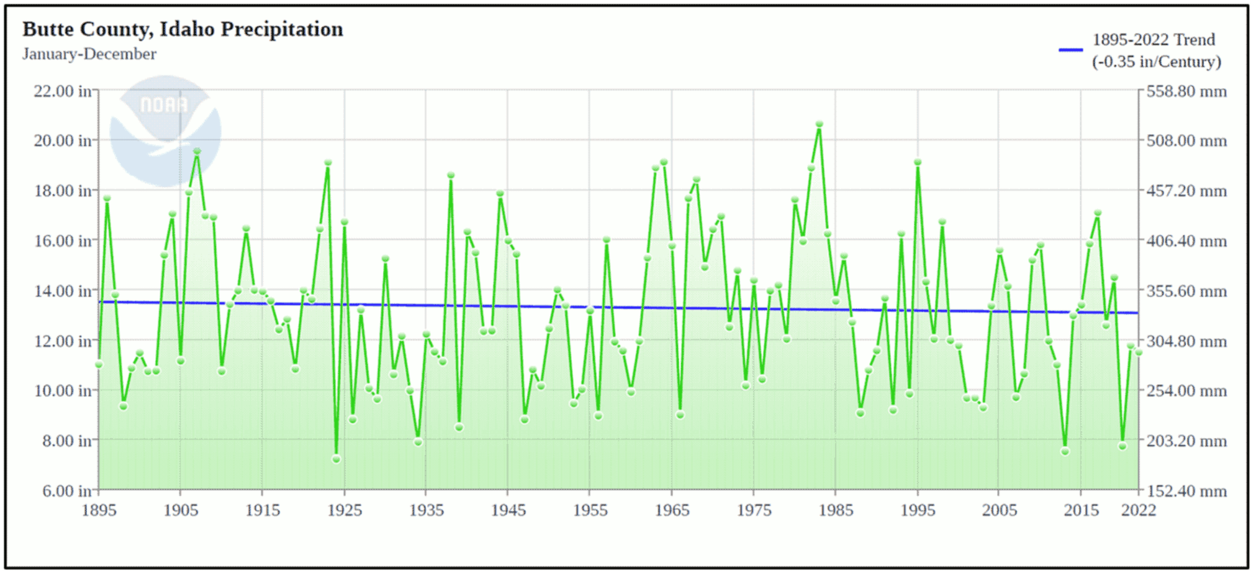
Reference 2.7-39.

Figure 2.7-36: Heating Degree Day Trends in Butte County, Idaho, from 1895 to 2022



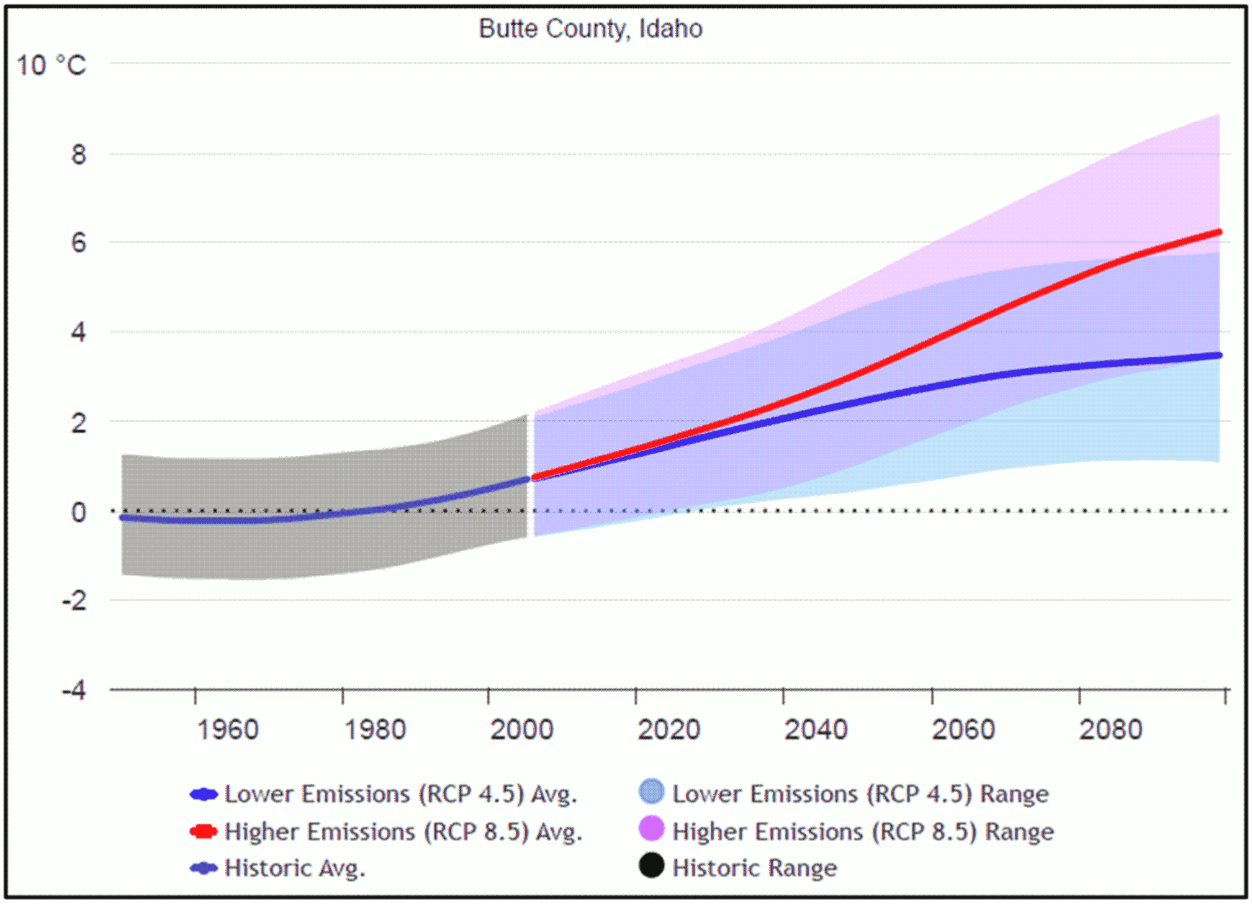
Reference 2.7-39.

Figure 2.7-37: Mean Annual Precipitation Trends in Butte County, Idaho, from 1895 to 2022



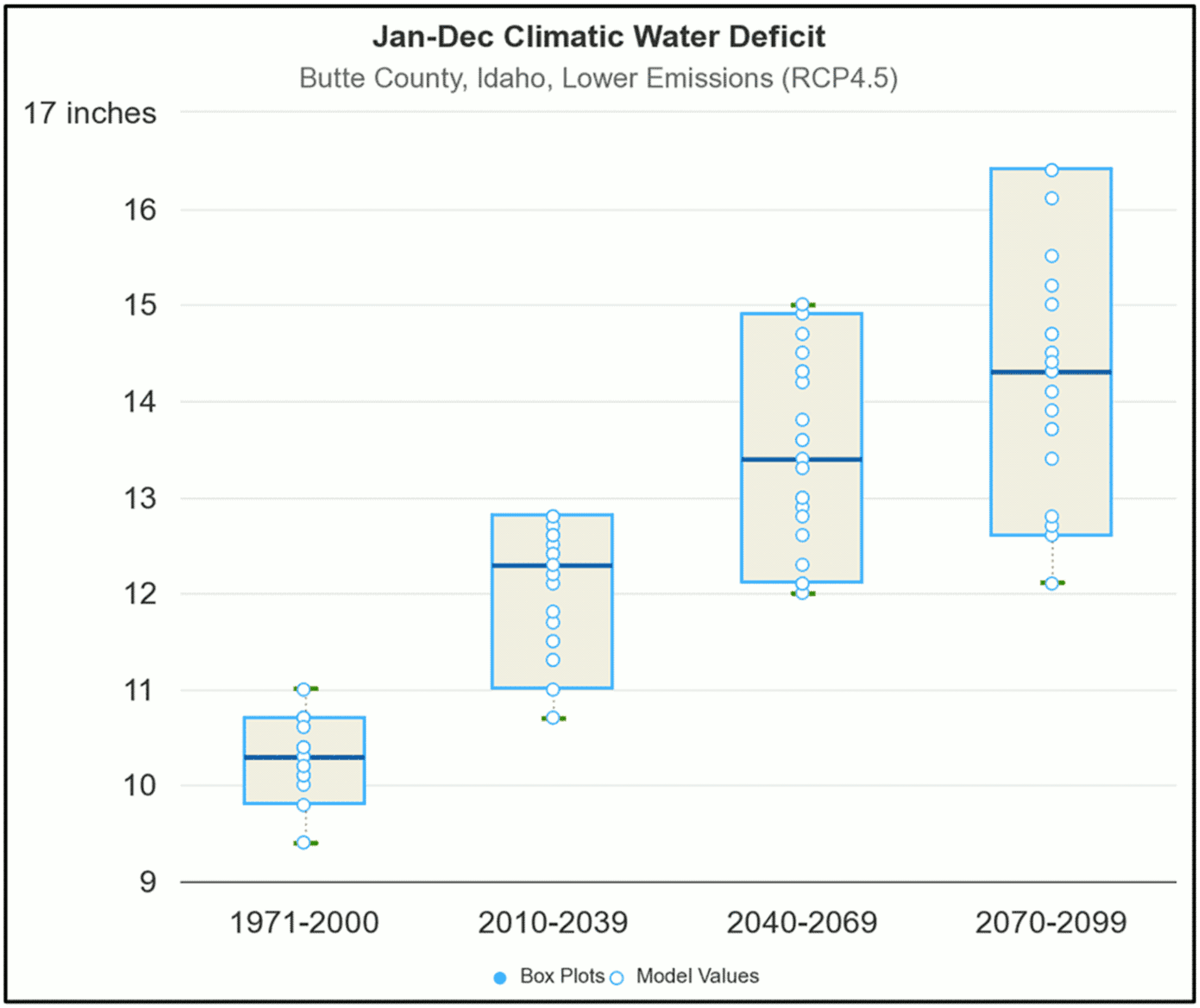
Reference 2.7-39.

Figure 2.7-38: Projected Mean Annual Temperature Anomalies for Butte County



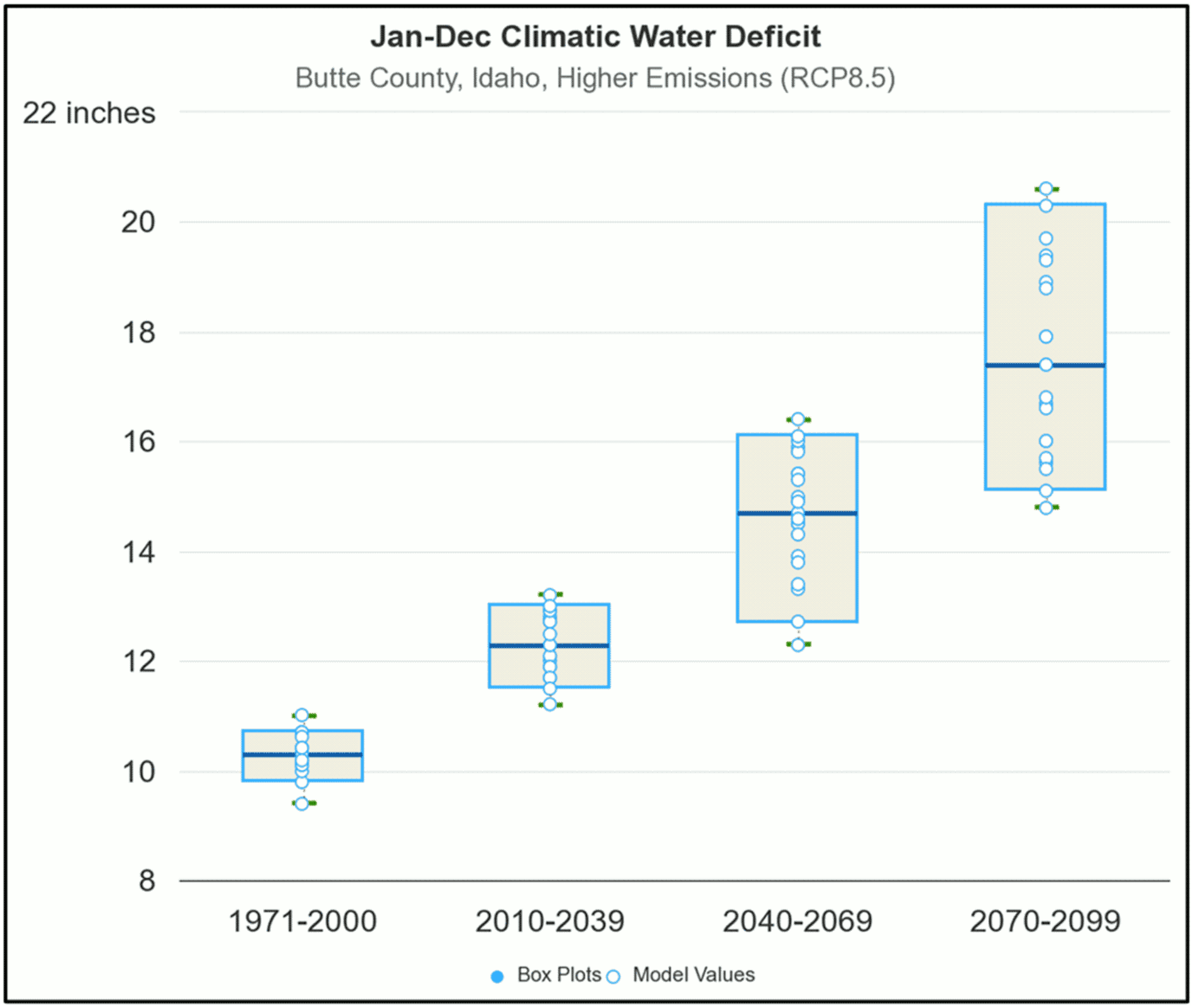
Reference 2.7-39.

Figure 2.7-39: Projected Water Deficit for Butte County Under a Lower Warming Scenario



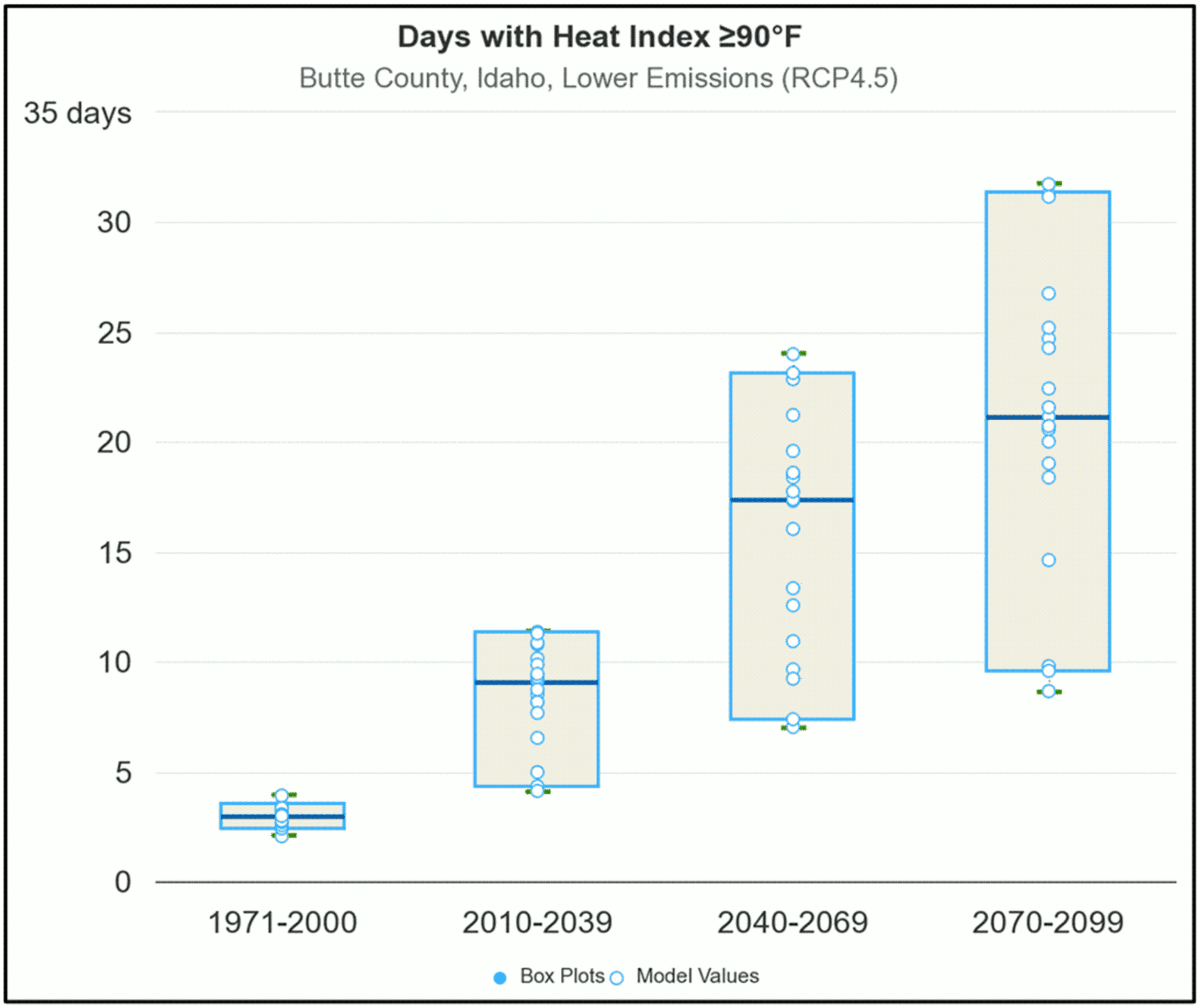
Reference 2.7-45.

Figure 2.7-40: Projected Water Deficit for Butte County Under a Higher Warming Scenario



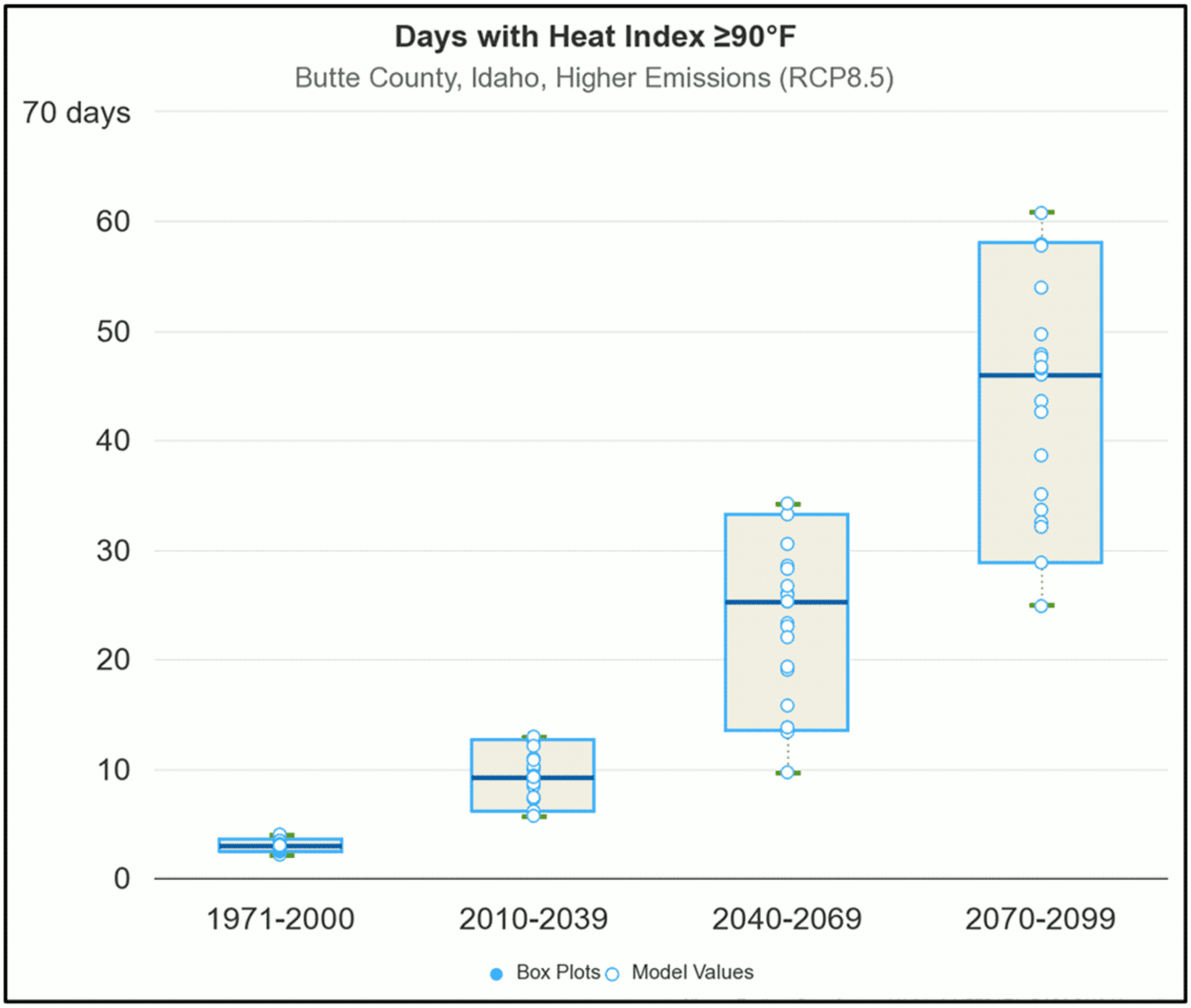
Reference 2.7-45.

Figure 2.7-41: Heat Wave Projections for Butte County Under a Lower Warming Scenario



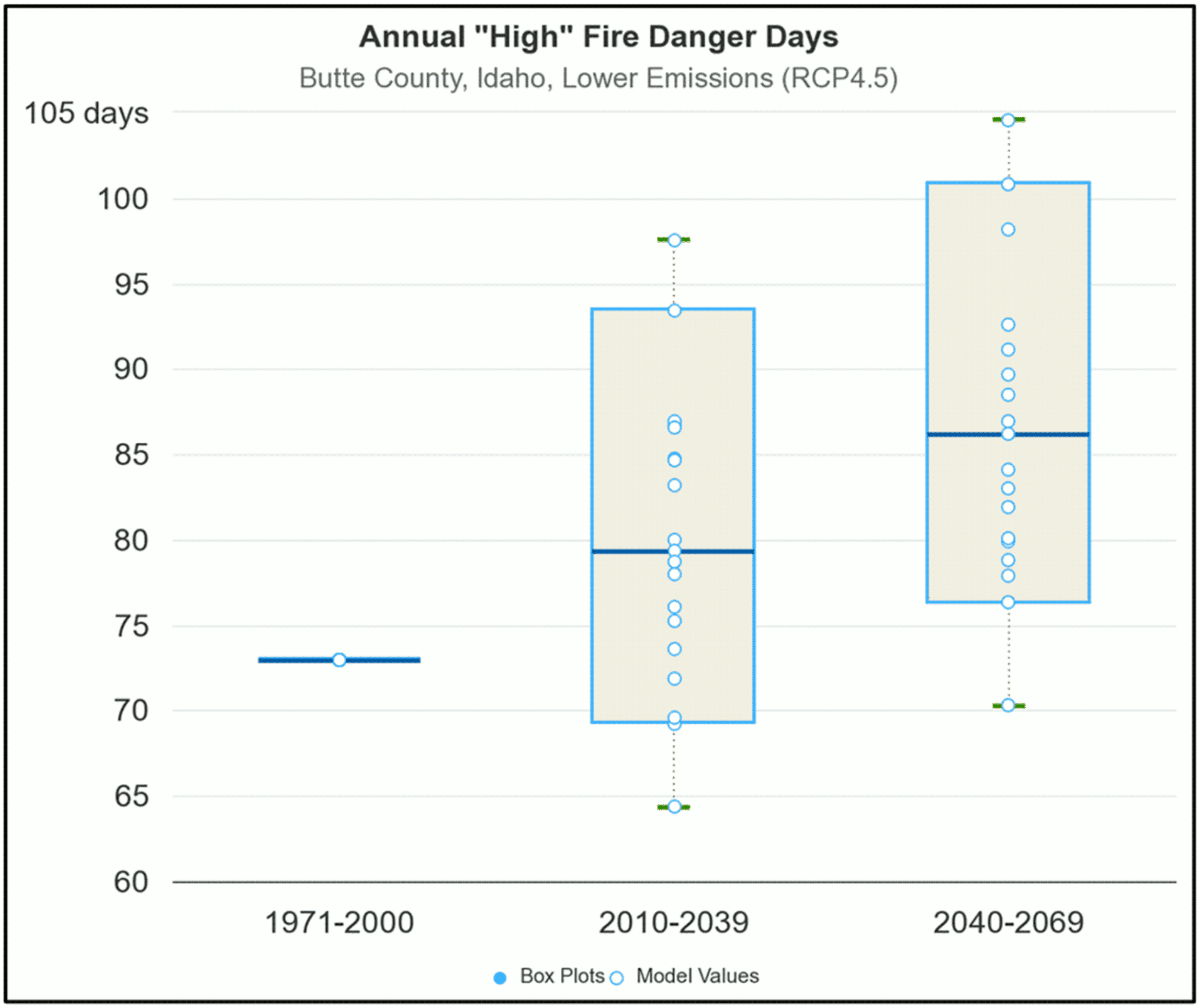
Reference 2.7-45.

Figure 2.7-42: Heat Wave Projections for Butte County Under a Higher Warming Scenario



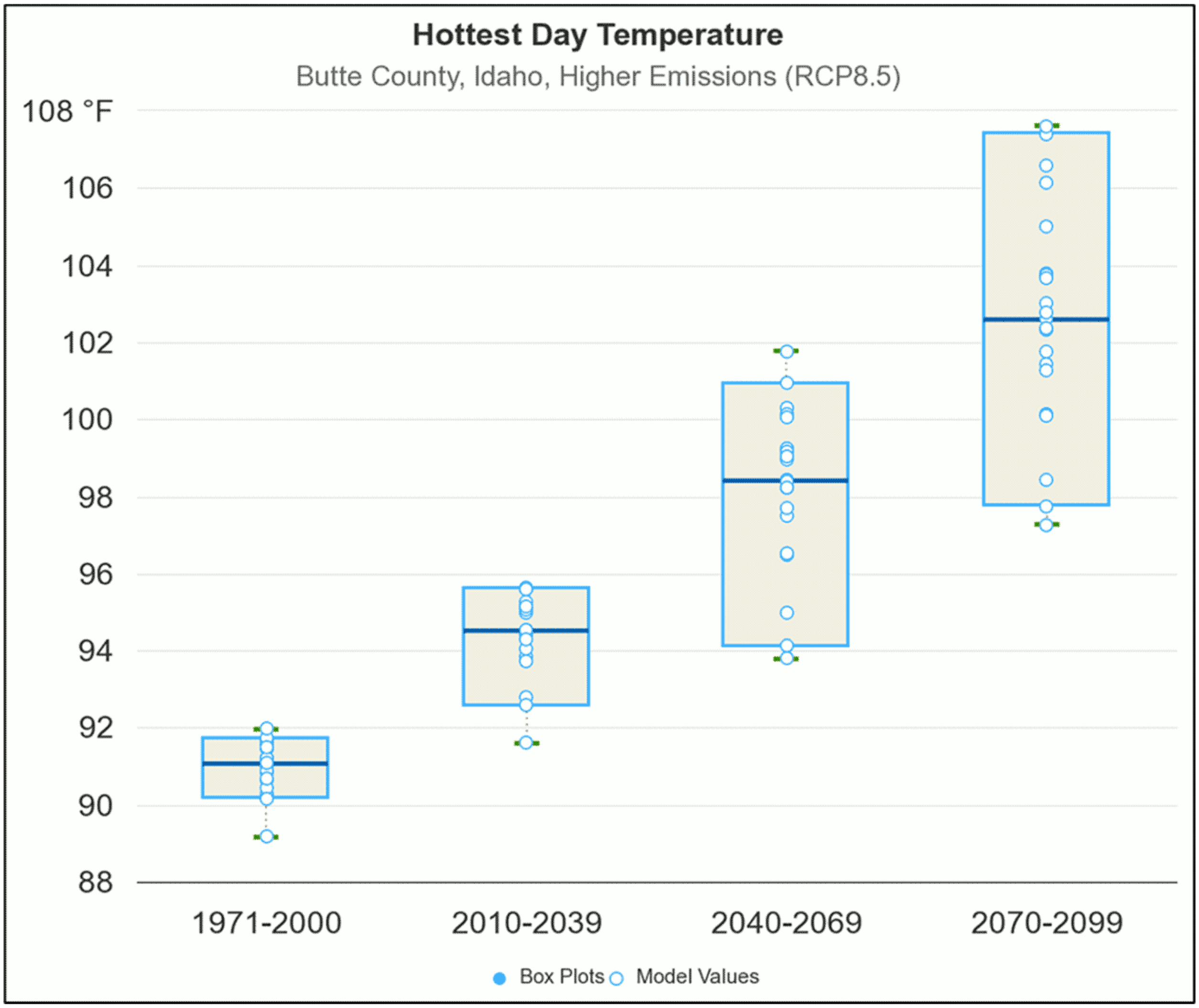
Reference 2.7-45.

Figure 2.7-43: Fire Risk Projections for Butte County Under a Lower Warming Scenario



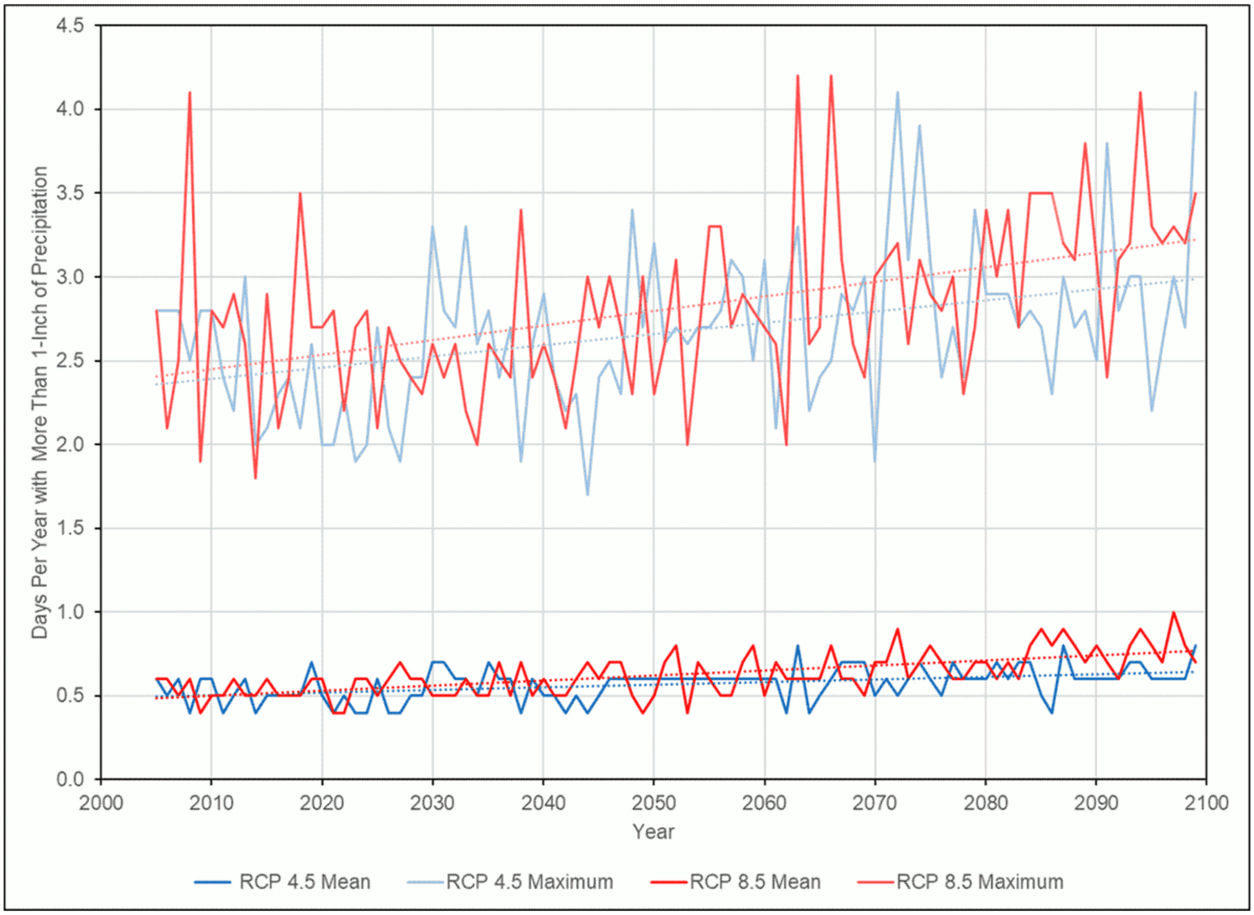
Reference 2.7-45.

Figure 2.7-44: Fire Risk Projections for Butte County Under a Higher Warming Scenario



Reference 2.7-45.

Figure 2.7-45: Projected Precipitation Extremes for Butte County Under Both Lower and Higher Warming Scenarios



Reference 2.7-46.

Figure 2.7-46: Direct Emitters in the CFPP Region Reporting Data to the Greenhouse Gas Reporting Program

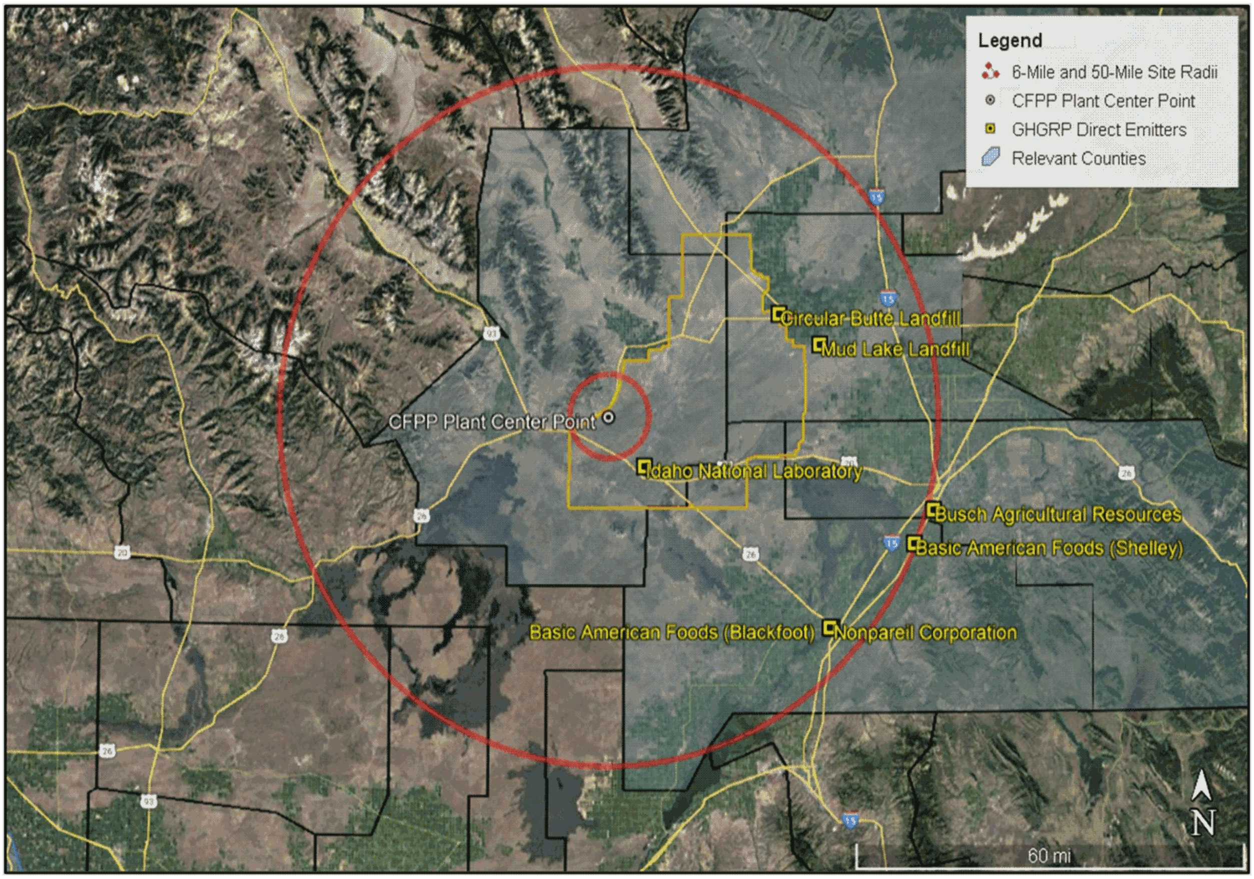
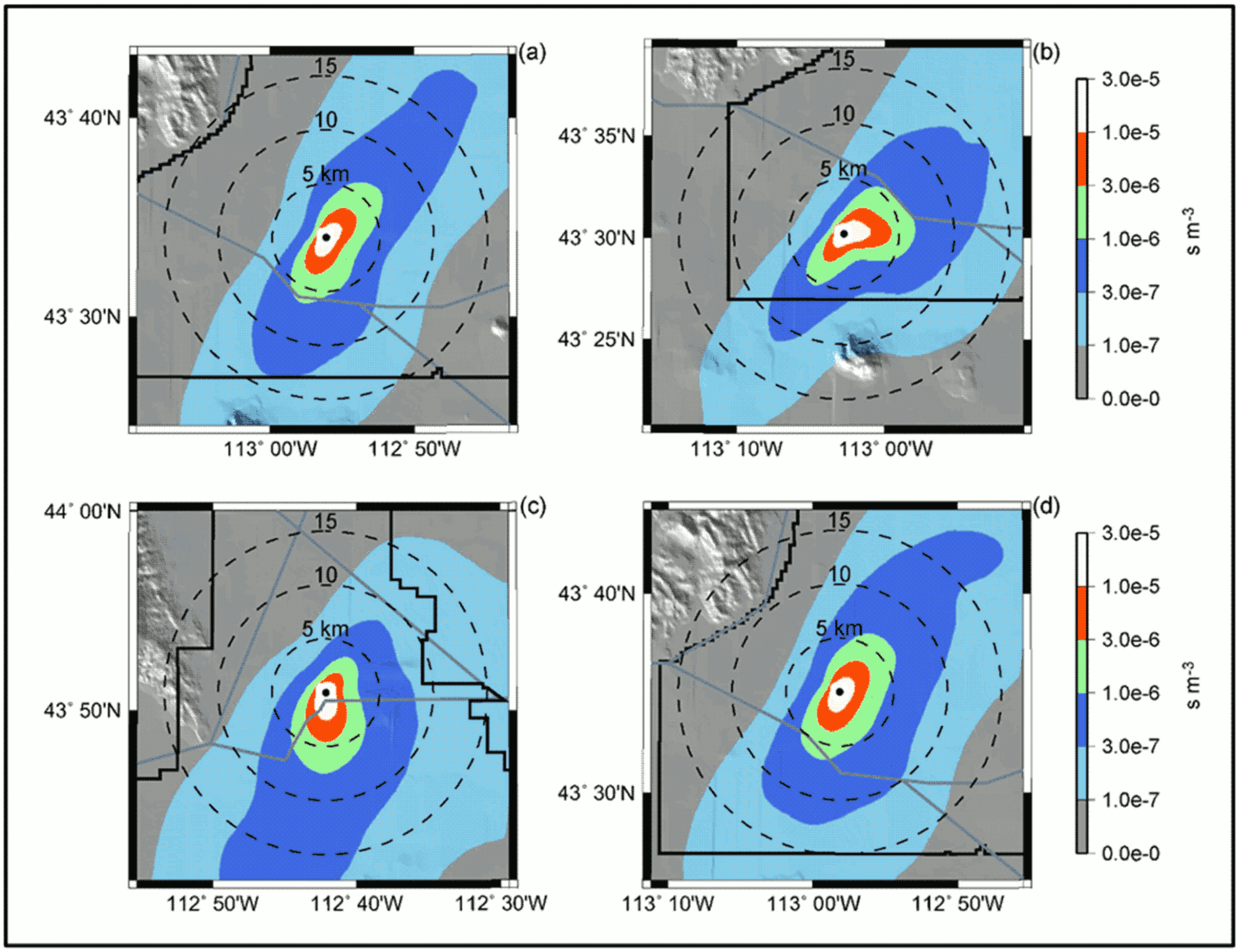


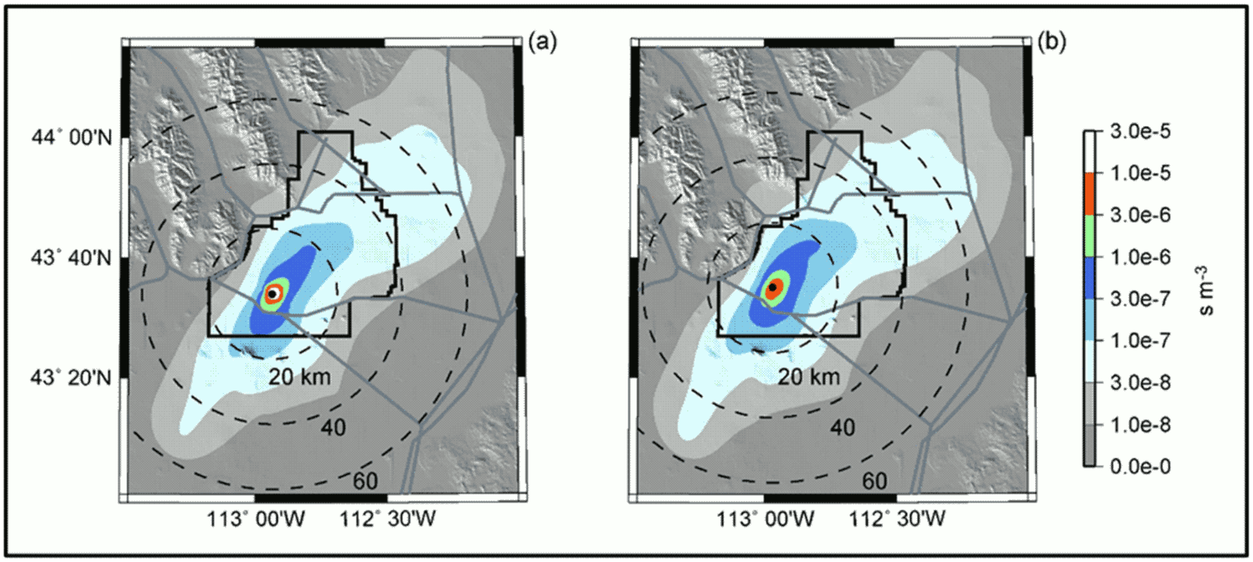
Figure 2.7-47: Dispersion of Surface Releases from Four INL Facilities



Reference 2.7-49

Panels (a) Idaho Nuclear Technology and Engineering Center, (b) Radioactive Waste Management Complex, (c) Test Area North, and (d) Advanced Test Reactor Complex show contours of total integrated concentration in units of seconds per cubic meter (s/m^3) for surface releases

Figure 2.7-48: Dispersion of Surface Releases Using a Larger Grid Domain



Reference 2.7-49

Panels (a) Idaho Nuclear Technology and Engineering Center and (b) the Advanced Test Reactor Complex show contours of total integrated concentration in units of seconds per cubic meter (s/m^3) for surface releases

Figure 2.7-49: Location of the CFPP Meteorological Station

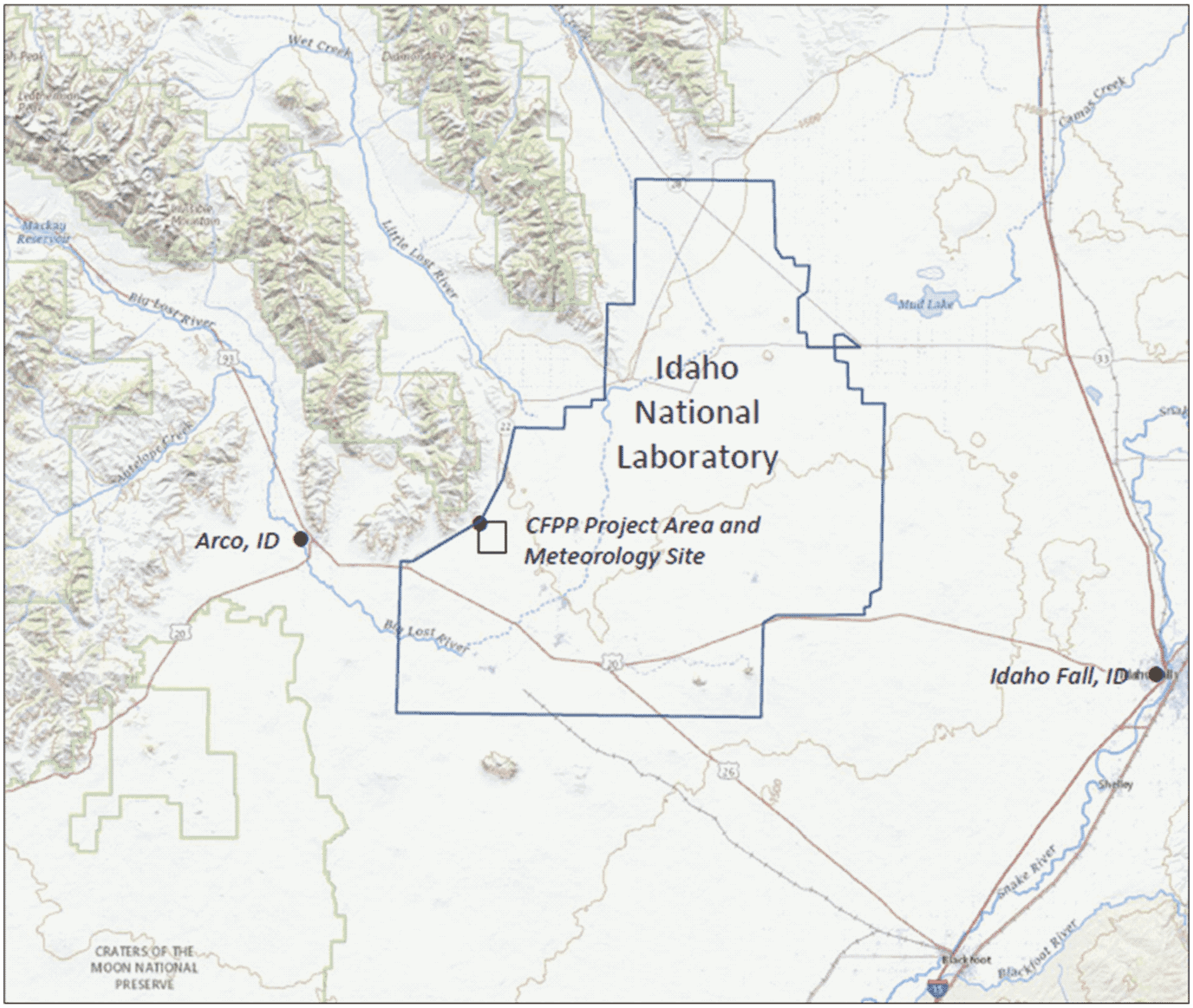


Figure 2.7-50: Topographic Map of the CFPP Tower Location, to a 6-Mile Radius

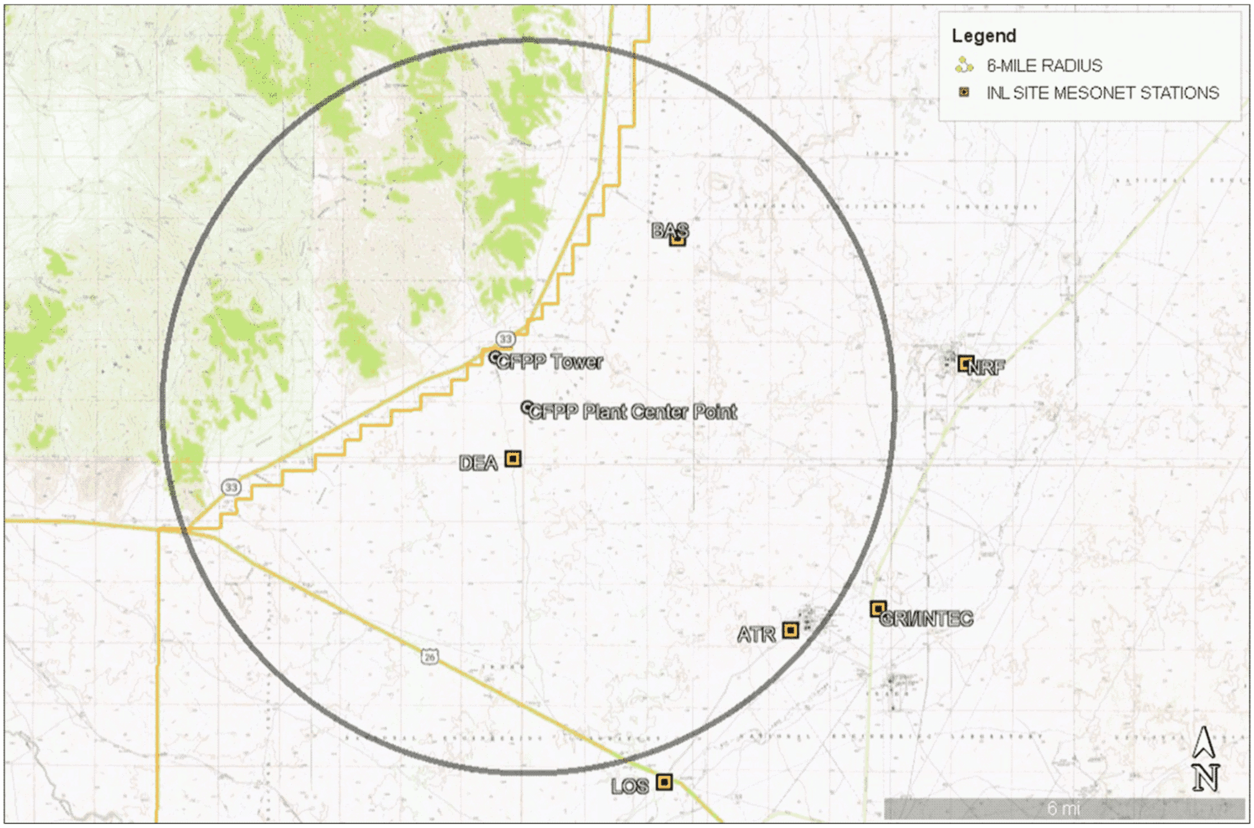


Figure 2.7-51: Topographic Map of the Immediate CFPP Tower Location

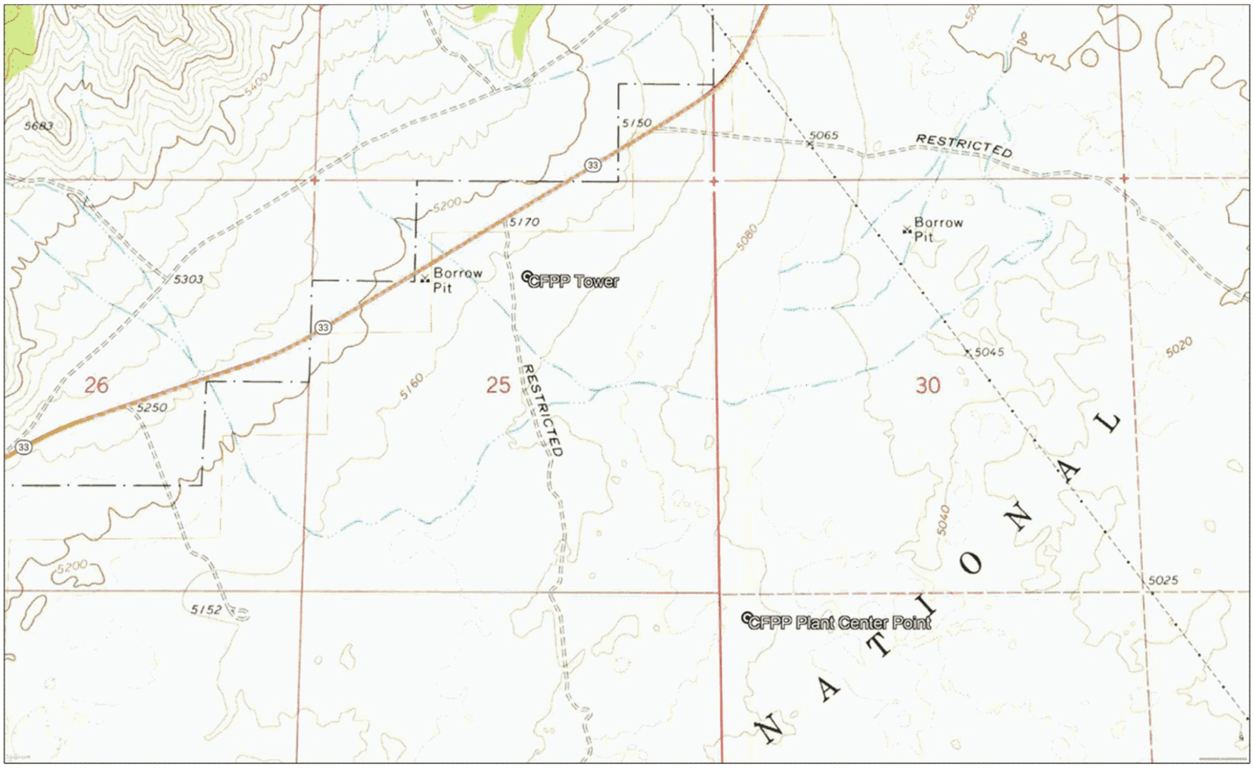


Figure 2.7-52: CFPP Tower, September 2020, View to the West-Northwest

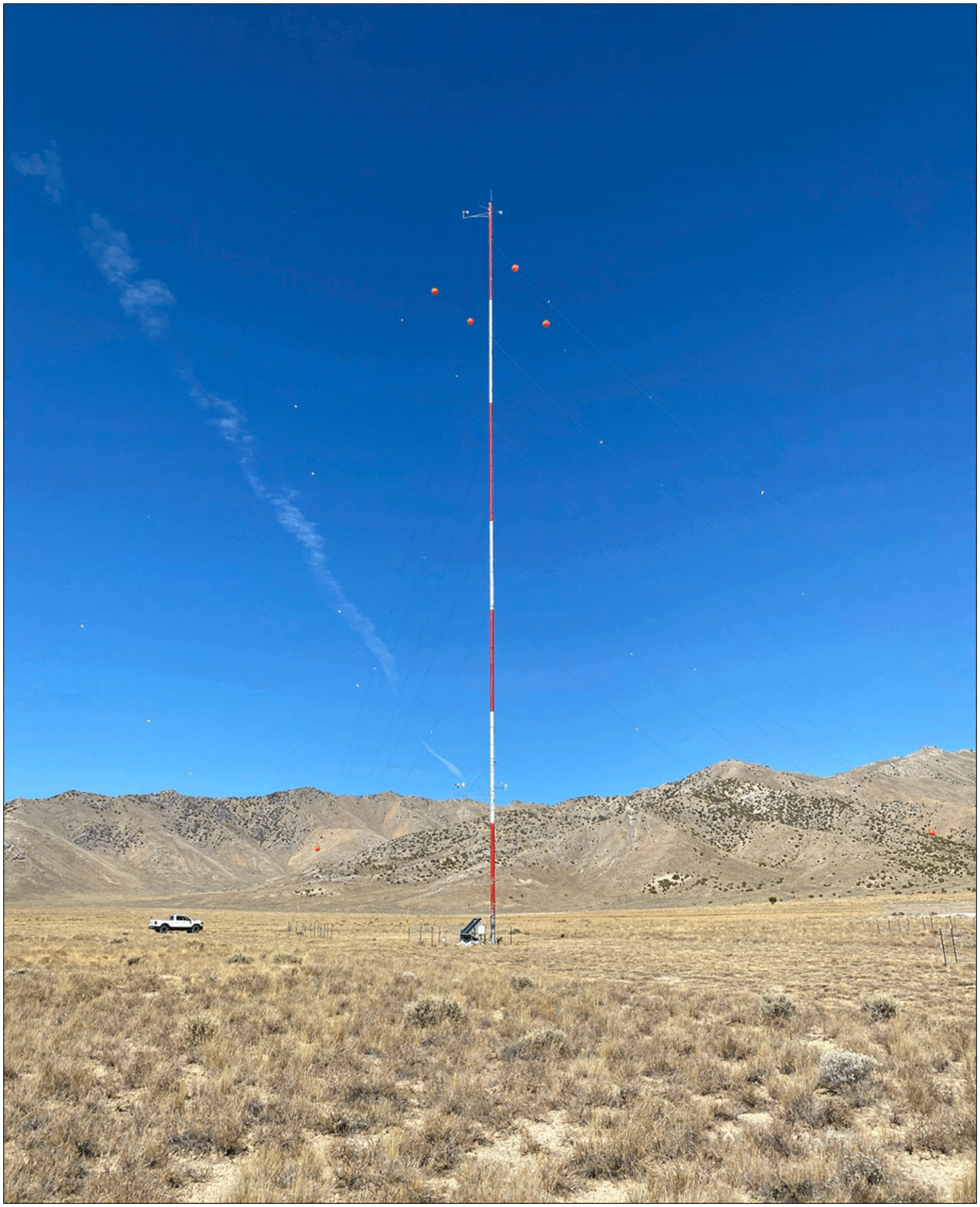


Figure 2.7-53: CFPP Tower, November 2022, View to the East-Southeast

Figure 2.7-54: CFPP Tower and Ground Level Instrumentation and Solar Panels, November 2022, View to the North-Northeast

Figure 2.7-55: Hourly Precipitation Recorded at the CFPP from December 4, 2021 to December 3, 2022

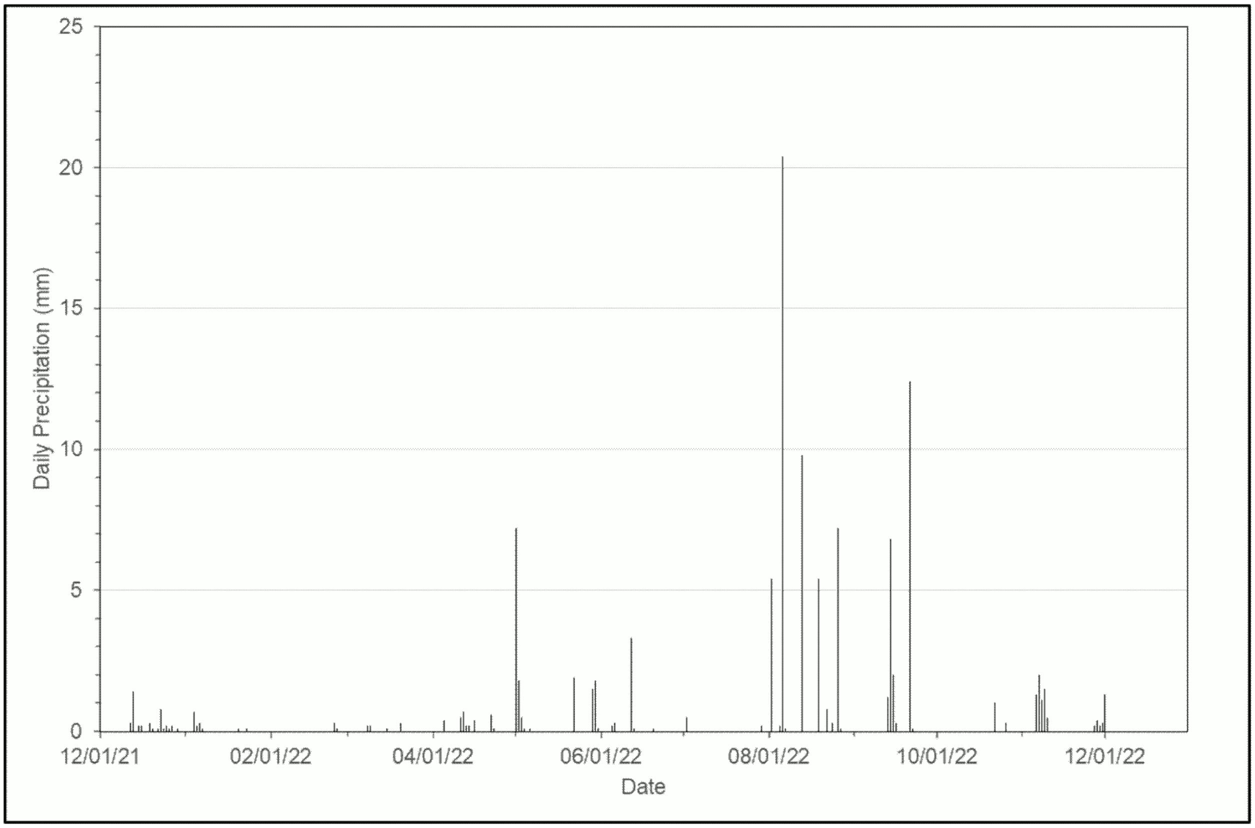


Figure 2.7-56: Cumulative Precipitation at the CFPP from December 4, 2021 to December 3, 2022

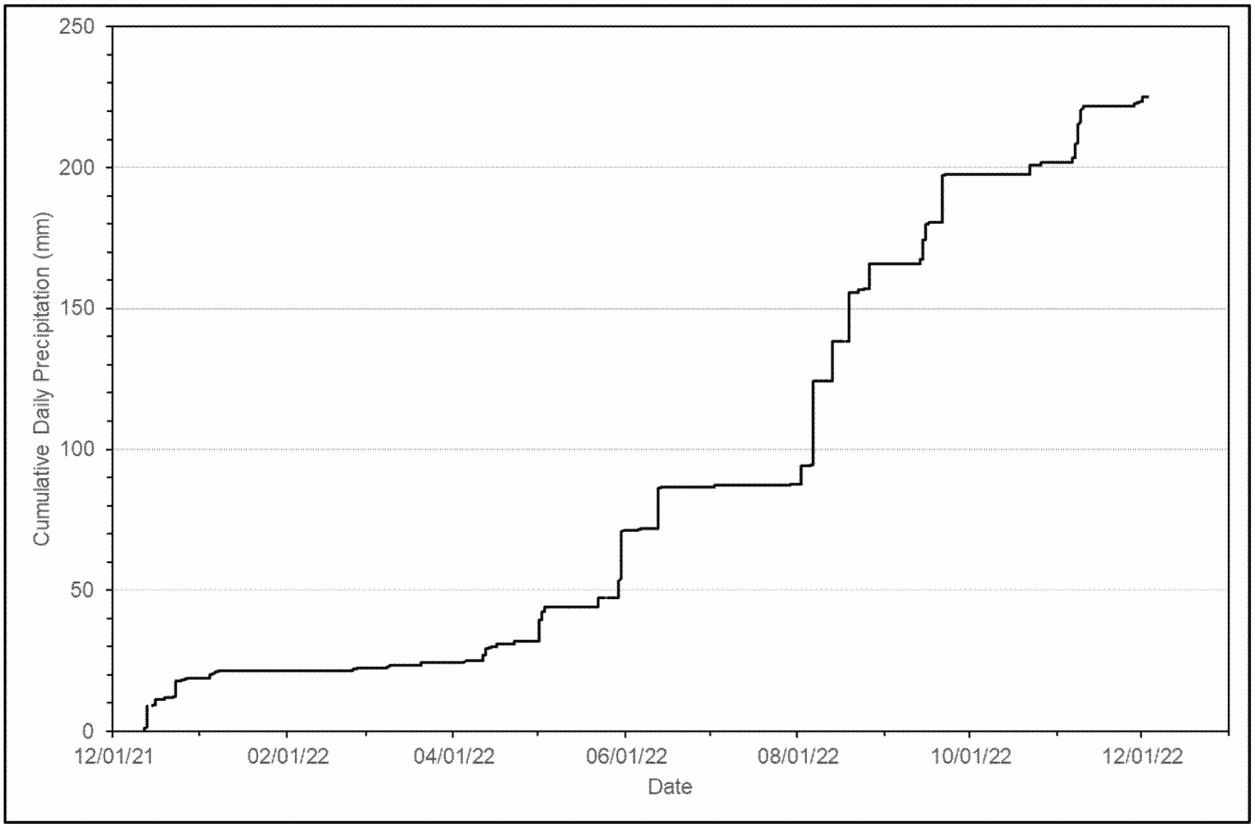
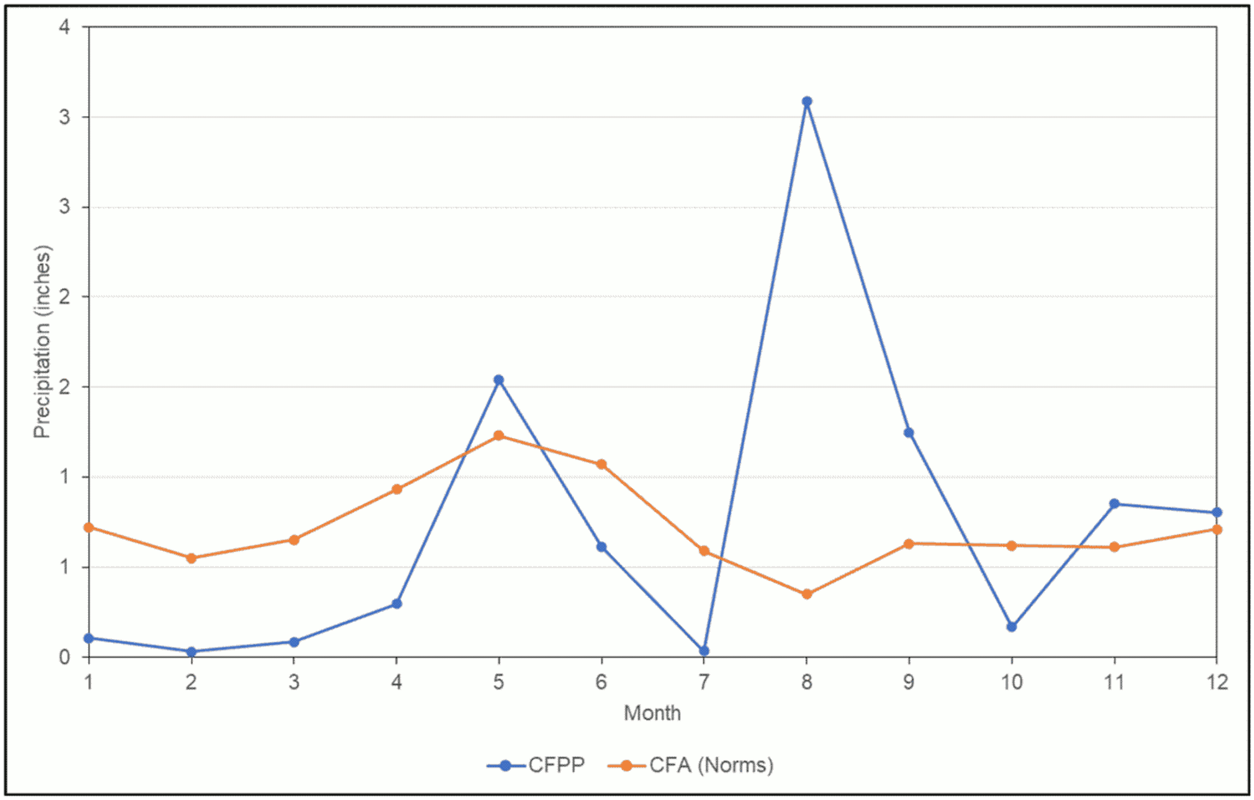


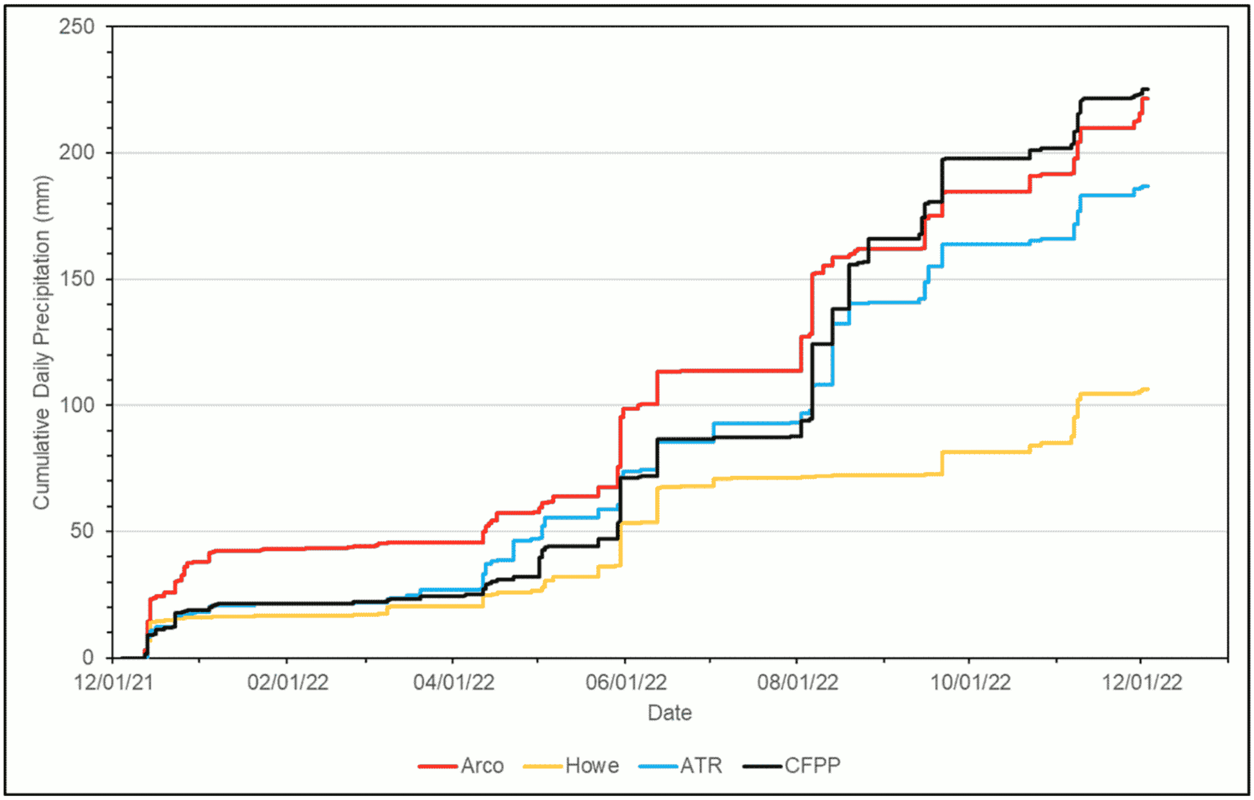
Figure 2.7-57: Comparison of Total Monthly Precipitation at the CFPP and Precipitation Norms for the Central Facilities Area Building 690



CFPP data from Table 2.7-34

Central Facilities Area Building 690 data from Reference 2.7-1

Figure 2.7-58: Comparison of Cumulative Precipitation at the CFPP and Nearby MESONET Monitoring Sites



Reference 2.7-50 for Arco, Howe, and Advanced Test Reactor Complex (ATR) data

Figure 2.7-59: Relative Humidity Recorded at the CFPP from December 4, 2021 to December 3, 2022

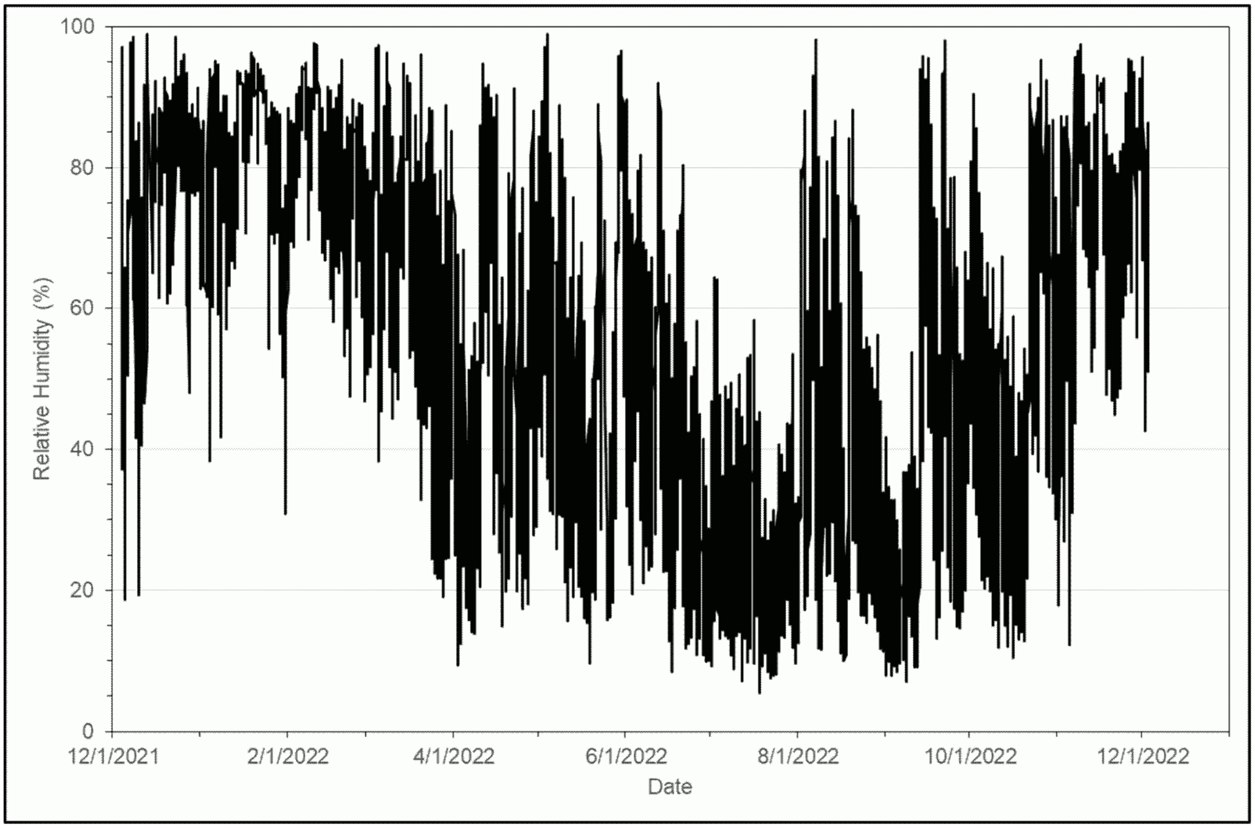


Figure 2.7-60: Comparison of Relative Humidity Data from the CFPP and the MESONET Dead Man Canyon Station

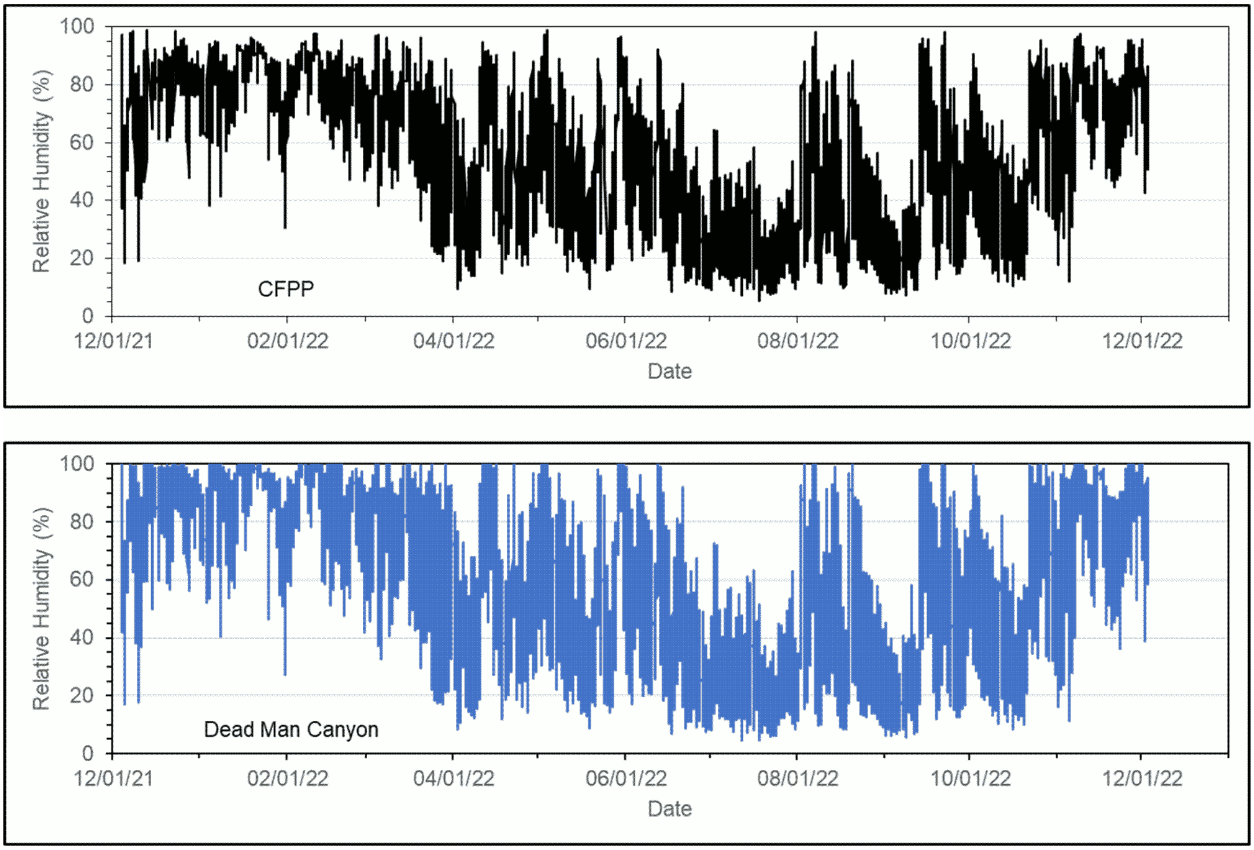


Figure 2.7-61: Temperature Recorded at 2-Meters at the CFPP from December 4, 2021 to December 3, 2022

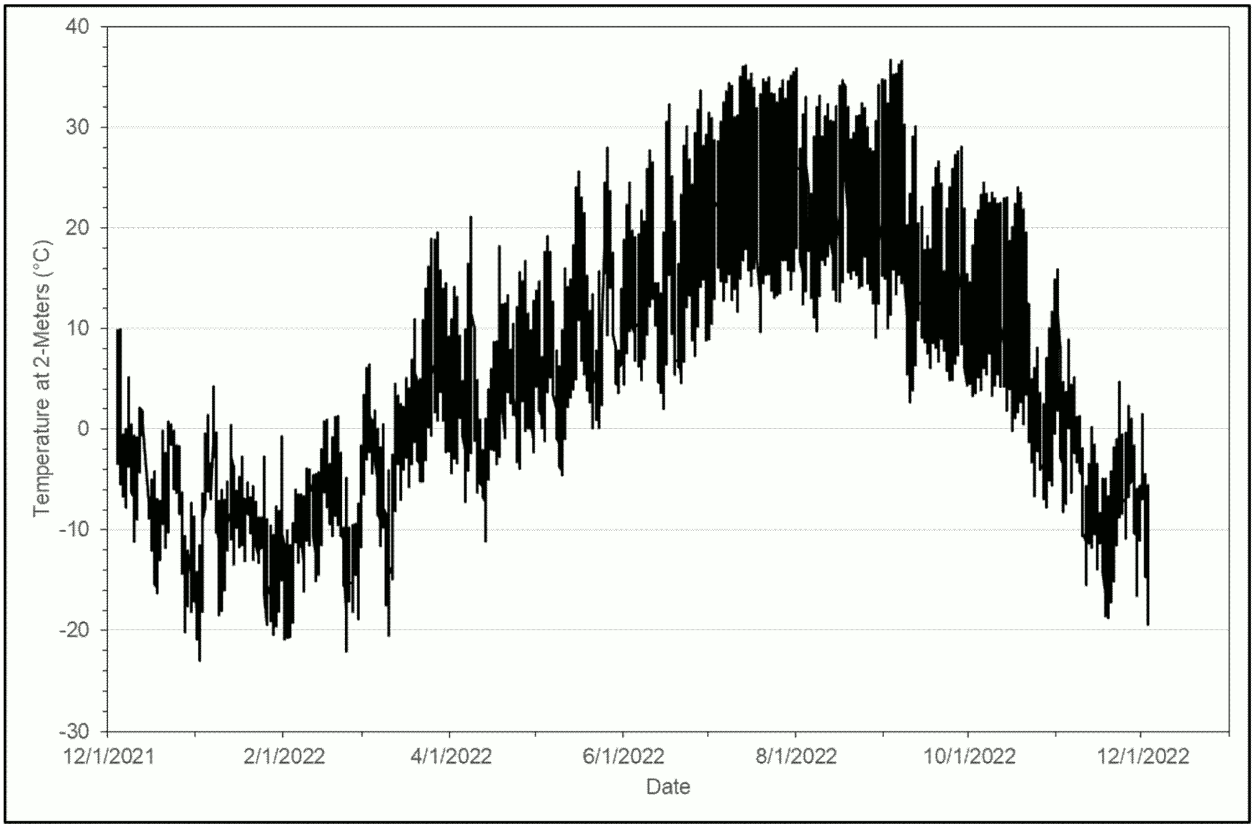


Figure 2.7-62: Temperature Recorded at 10-Meters at the CFPP from December 4, 2021 to December 3, 2022

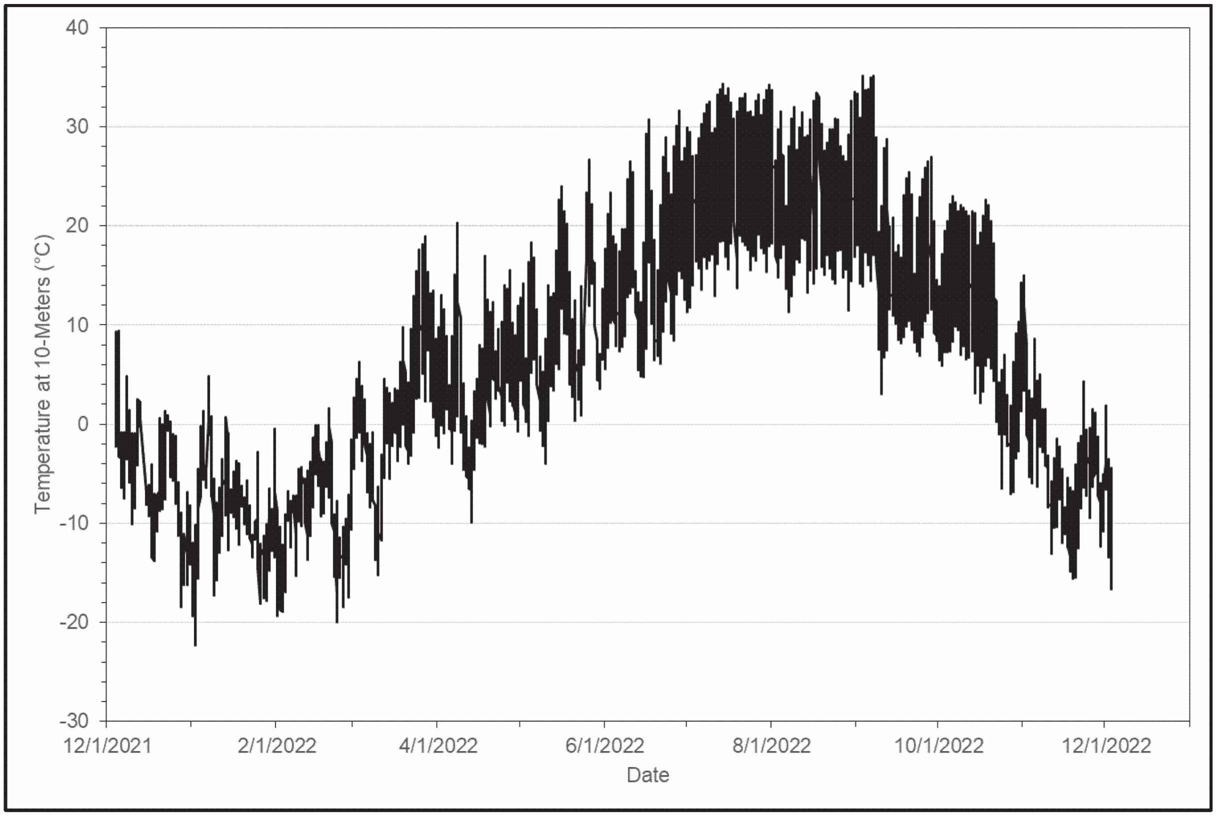


Figure 2.7-63: Temperature Recorded at 60-Meters at the CFPP from December 4, 2021 to December 3, 2022

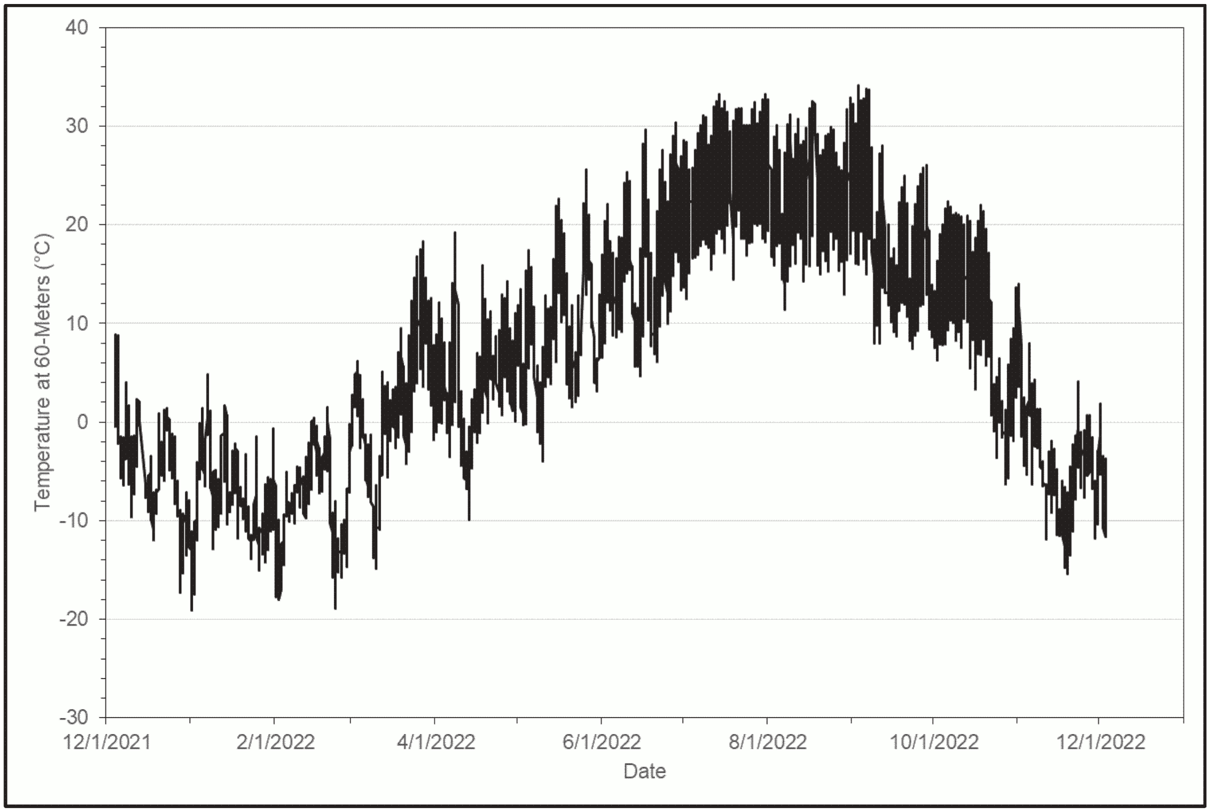


Figure 2.7-64: Comparison of Mean Monthly Temperatures at the CFPP and at the Central Facilities Area Building 690

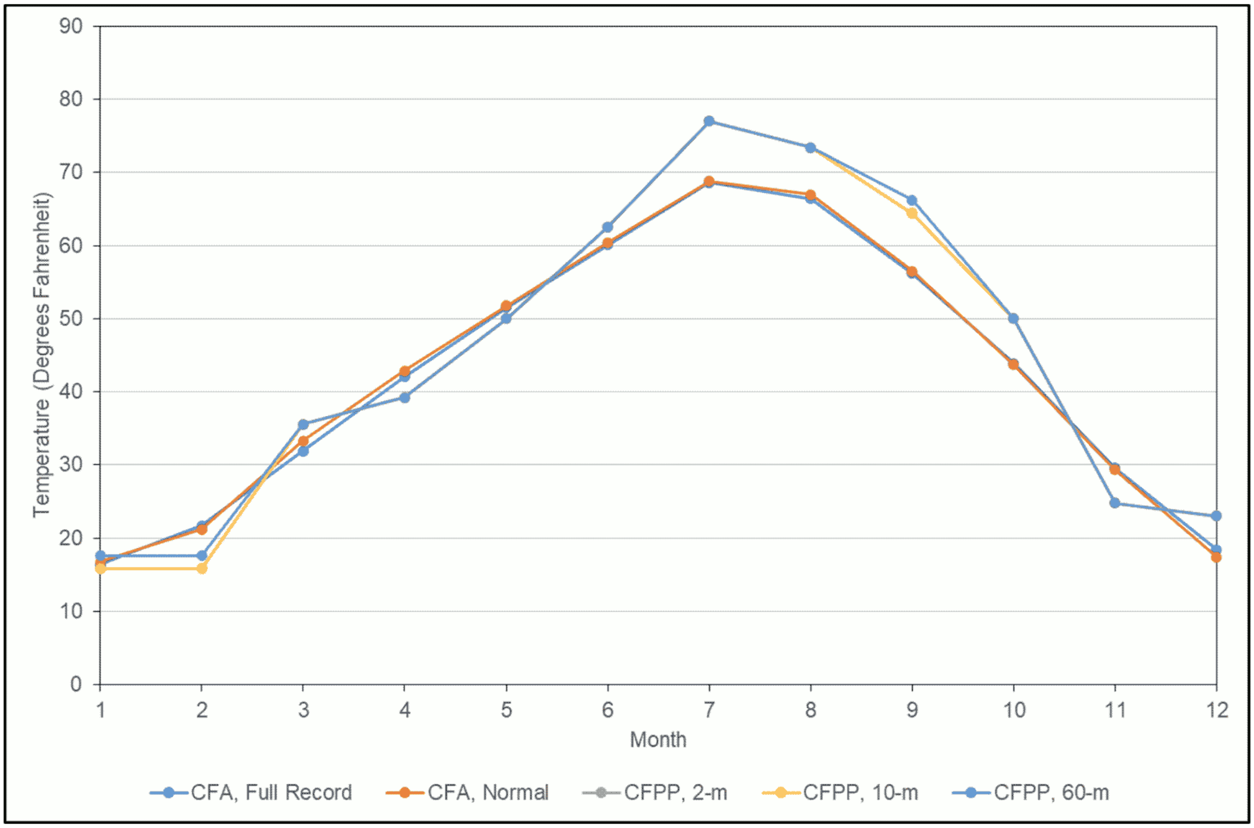


Figure 2.7-65: Mean Monthly Temperature Deltas at the CFPP

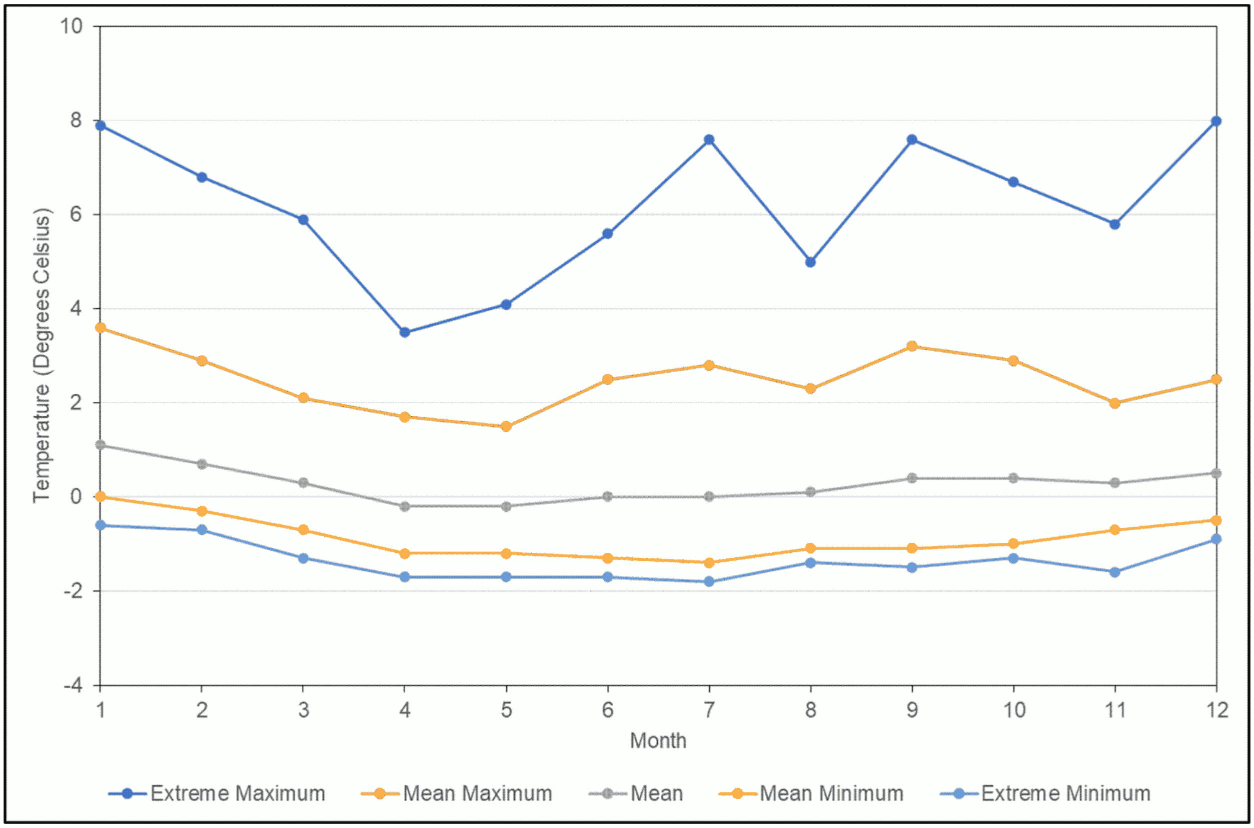


Figure 2.7-66: 10-Meter Level Wind Roses for December 2021 to February 2022

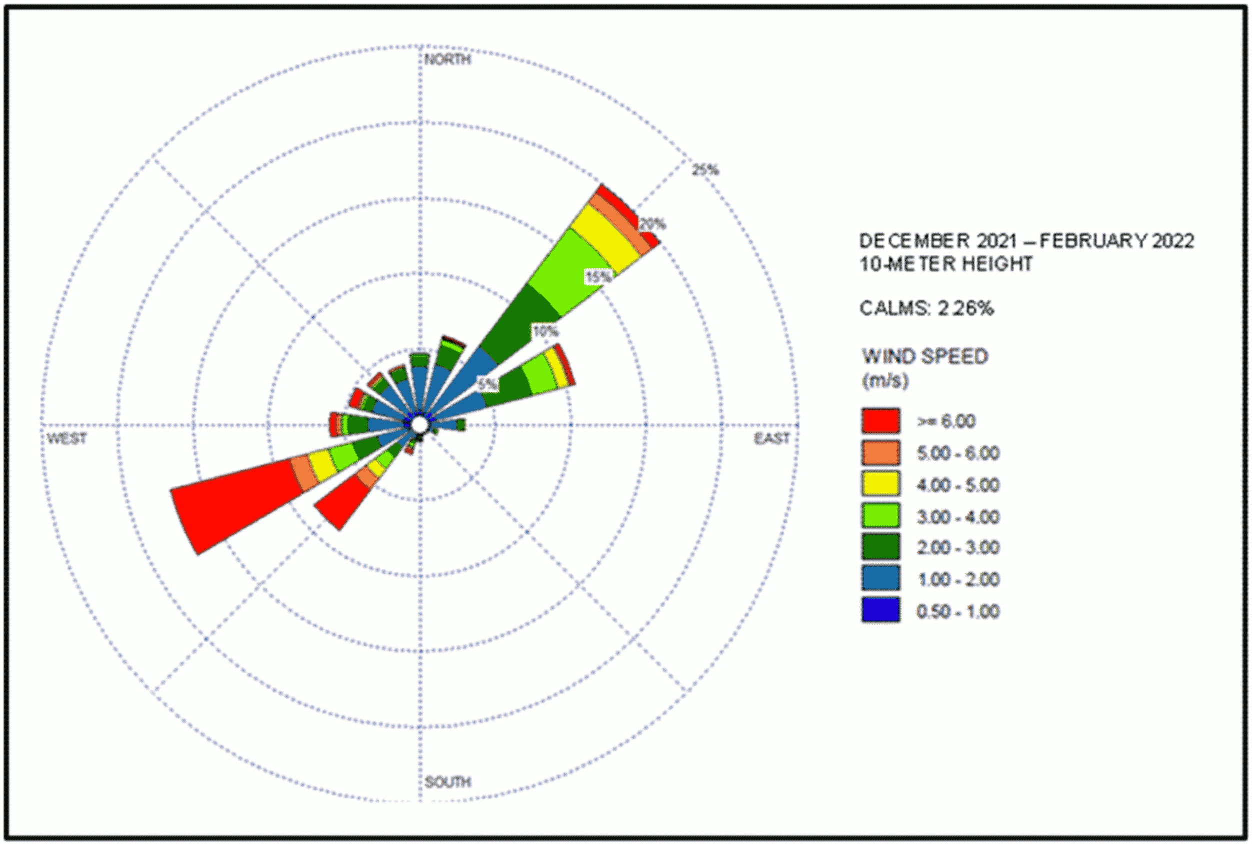


Figure 2.7-67: 10-Meter Level Wind Roses for March 2022 to May 2022

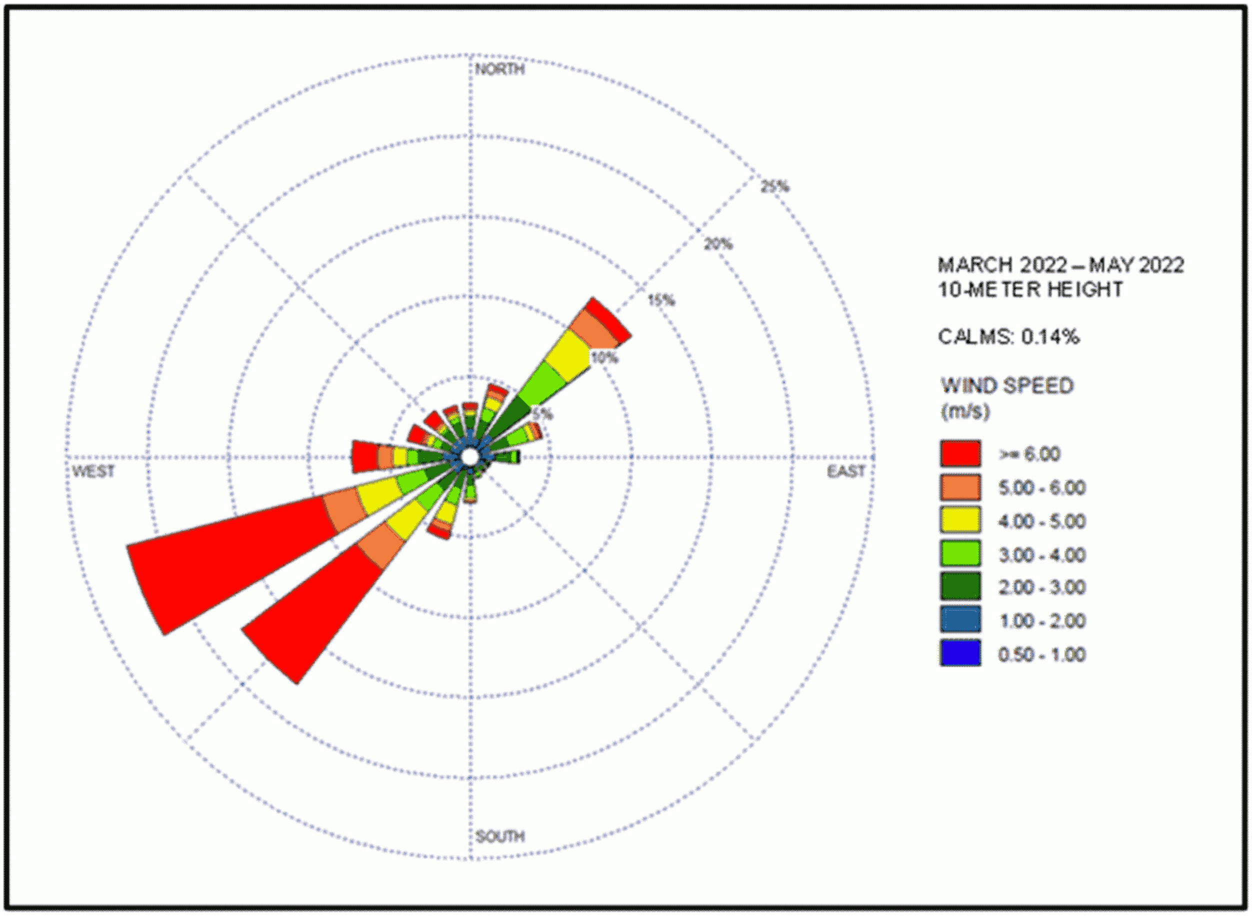


Figure 2.7-68: 10-Meter Level Wind Roses for June 2022 to August 2022

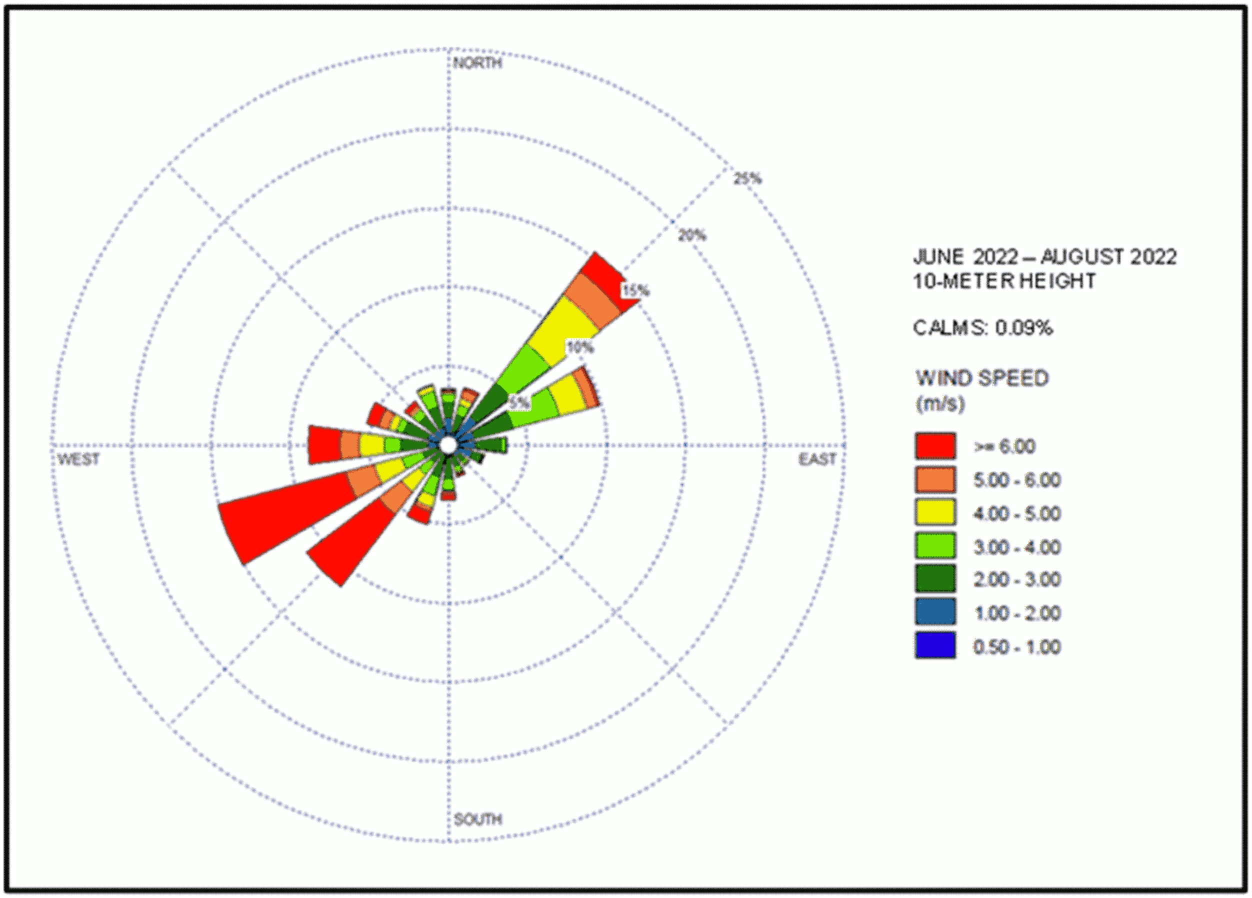


Figure 2.7-69: 10-Meter Level Wind Roses for September 2022 to November 2022

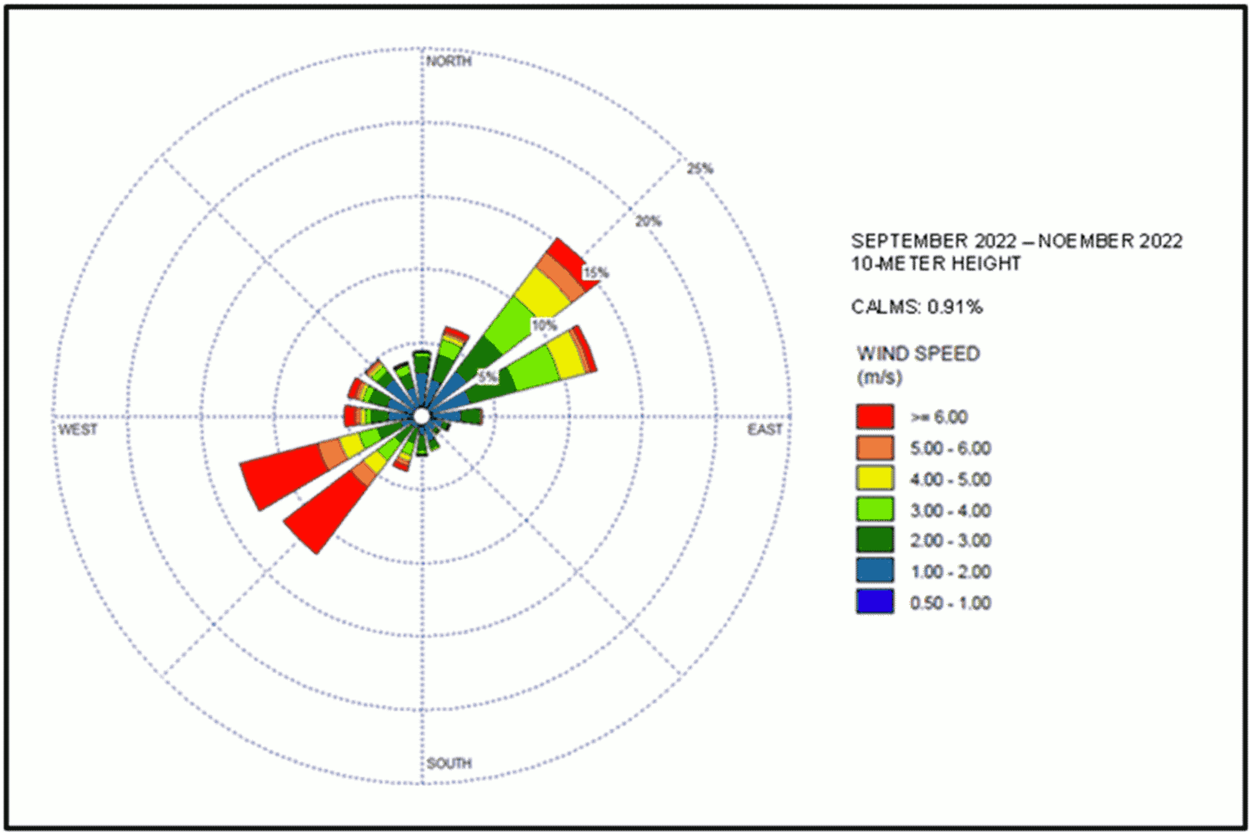


Figure 2.7-70: 60-Meter Level Wind Roses for December 2021 to February 2022

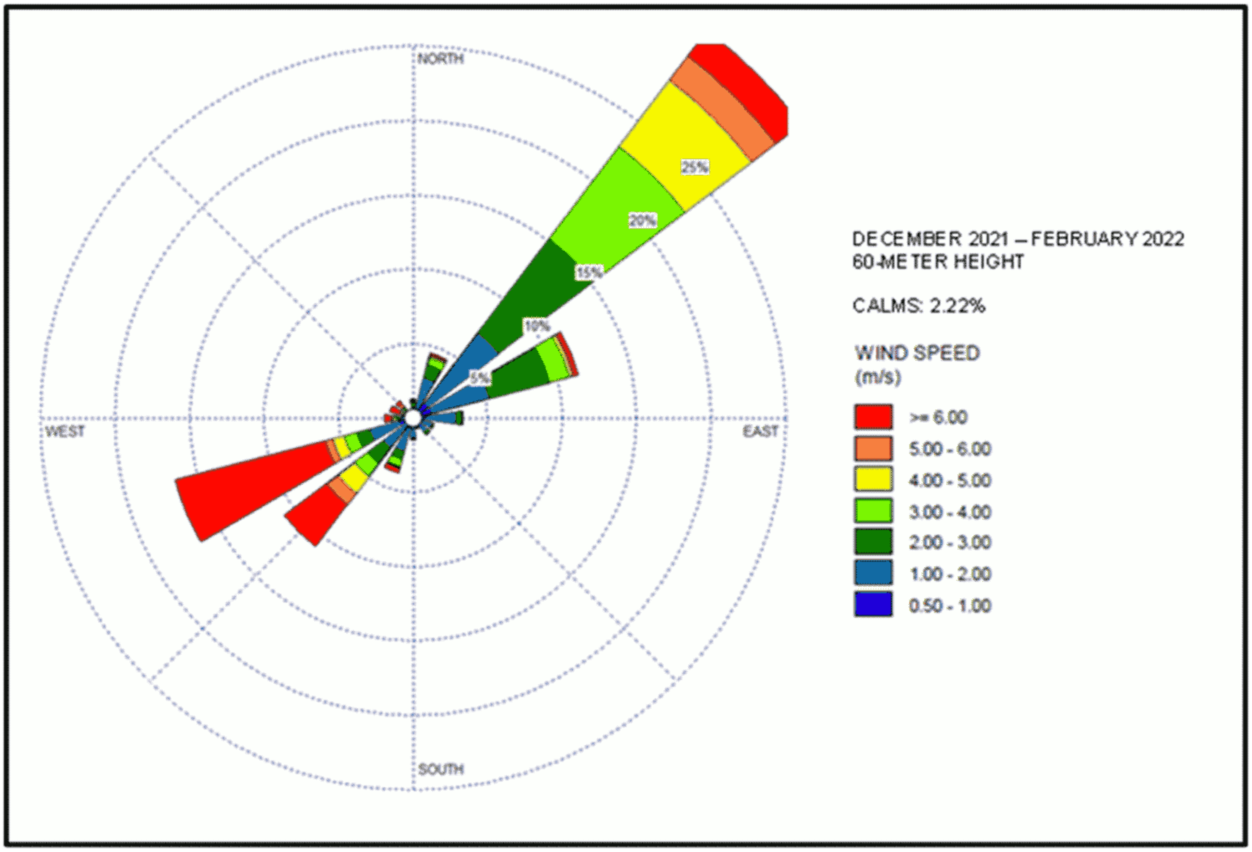


Figure 2.7-71: 60-Meter Level Wind Roses for March 2022 to May 2022

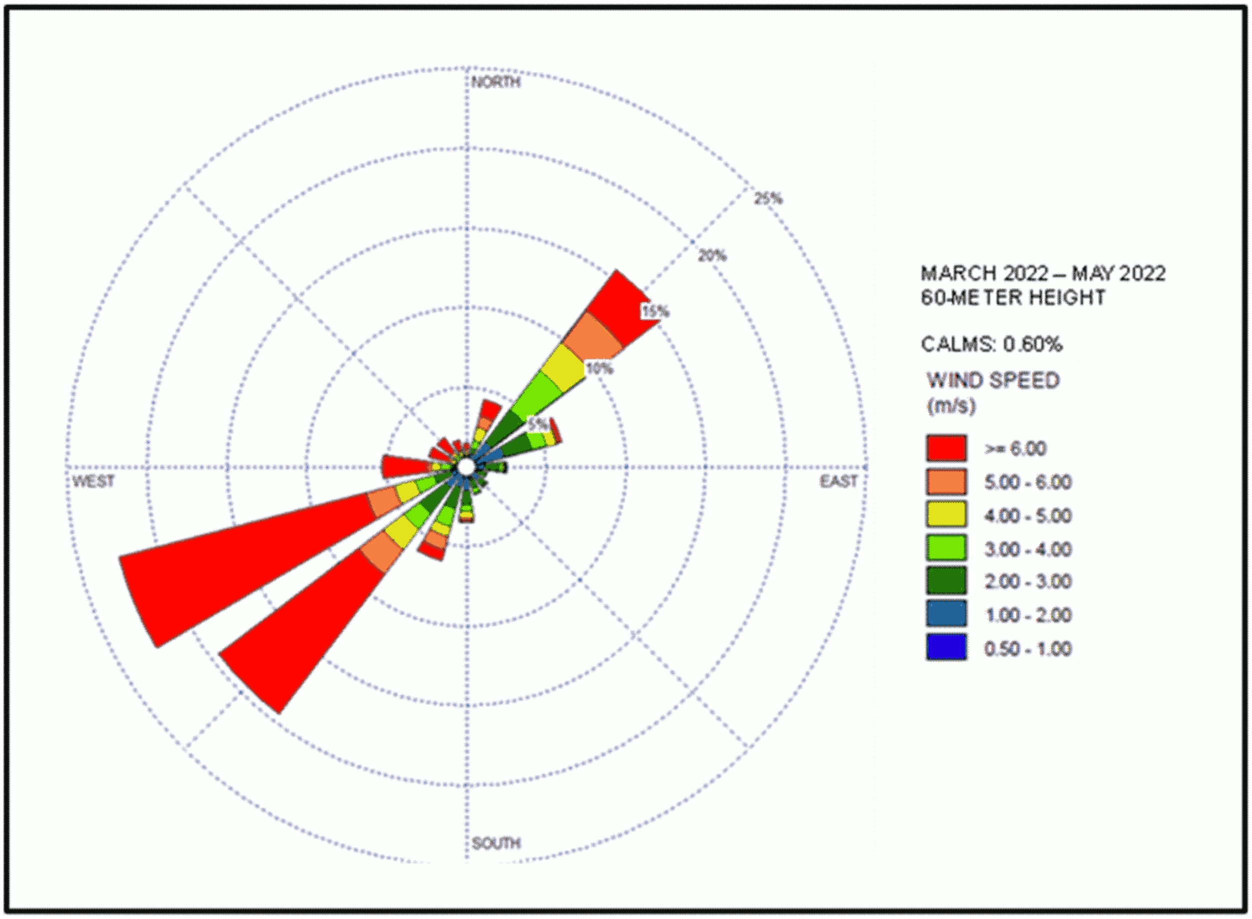


Figure 2.7-72: 60-Meter Level Wind Roses for June 2022 to August 2022

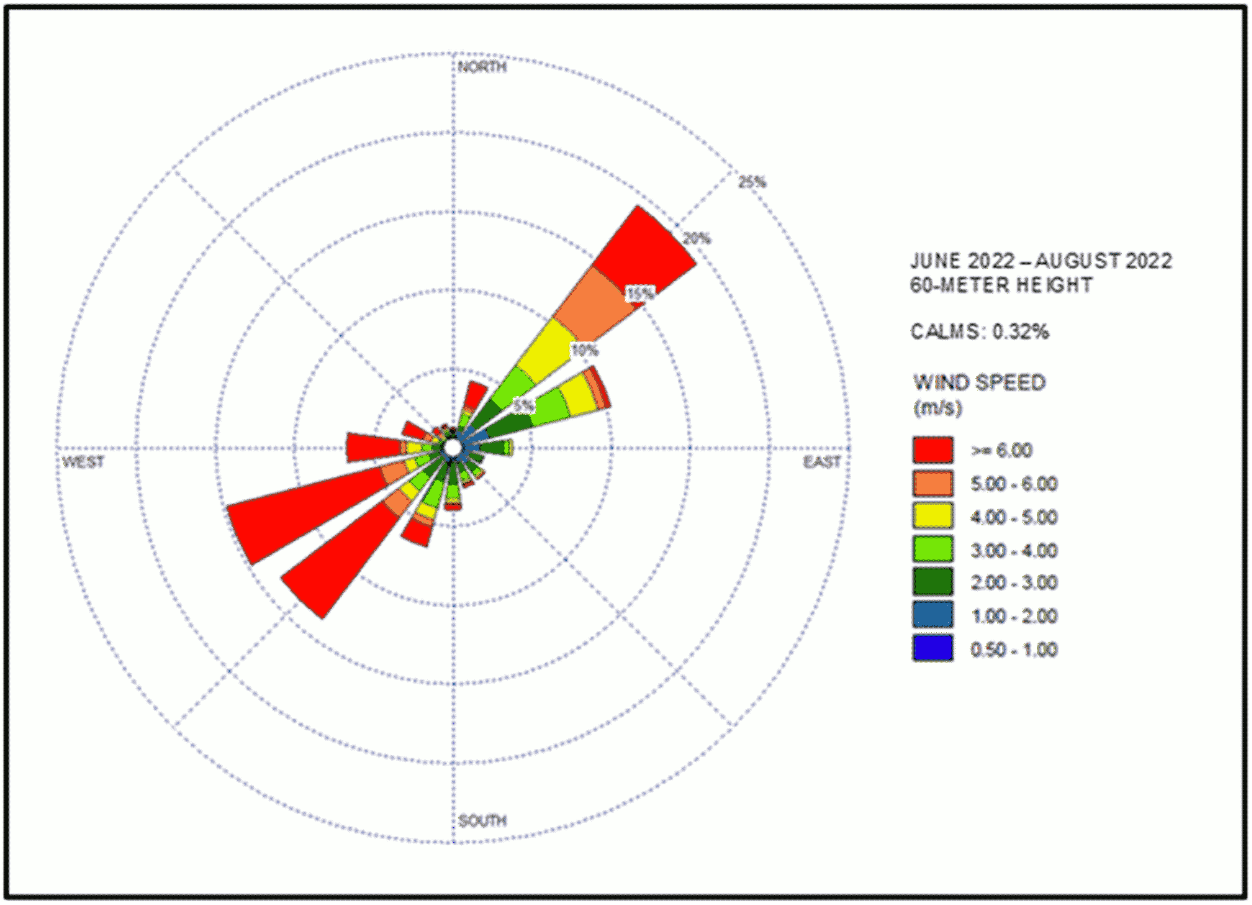


Figure 2.7-73: 60-Meter Level Wind Roses for September 2022 to November 2022

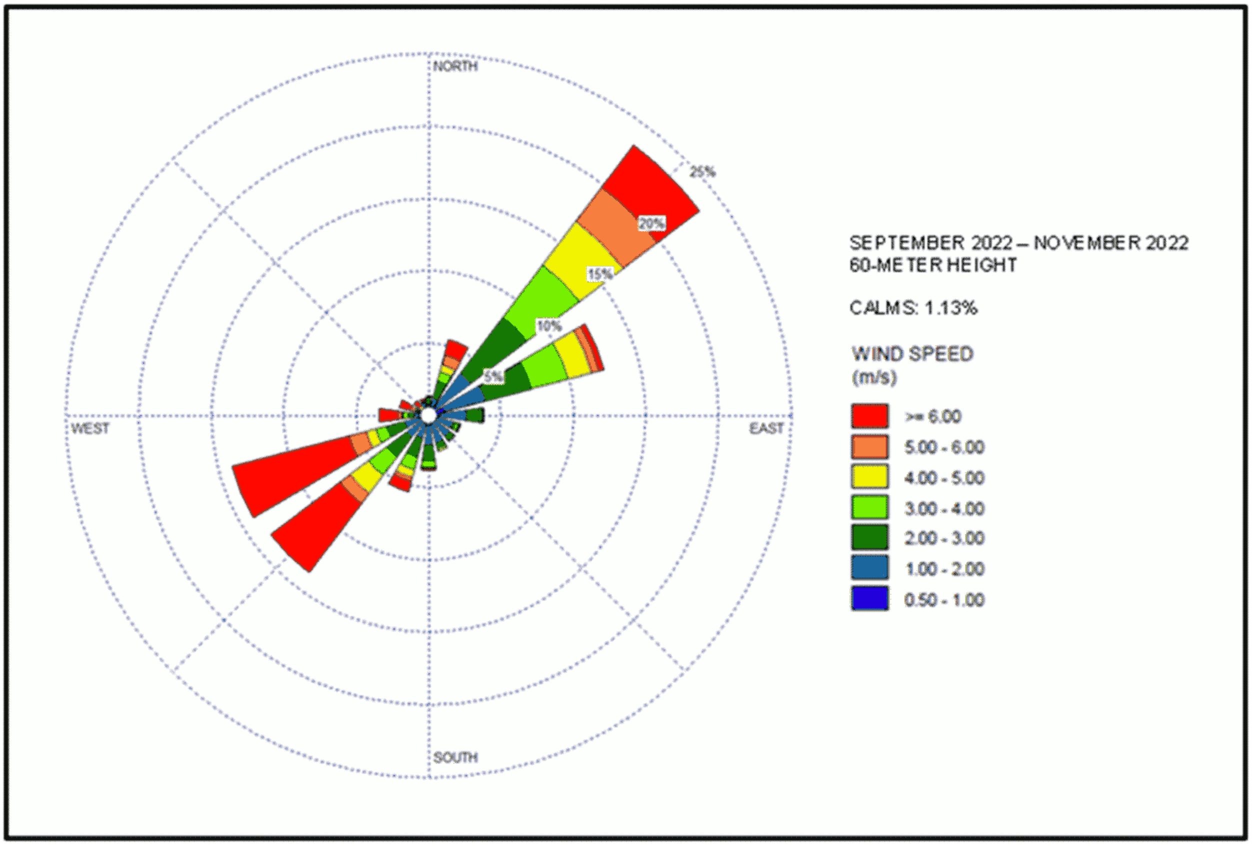


Figure 2.7-74: Daily Winds at the CFPP at the 10-Meter Level from December 3, 2021 to December 4, 2022

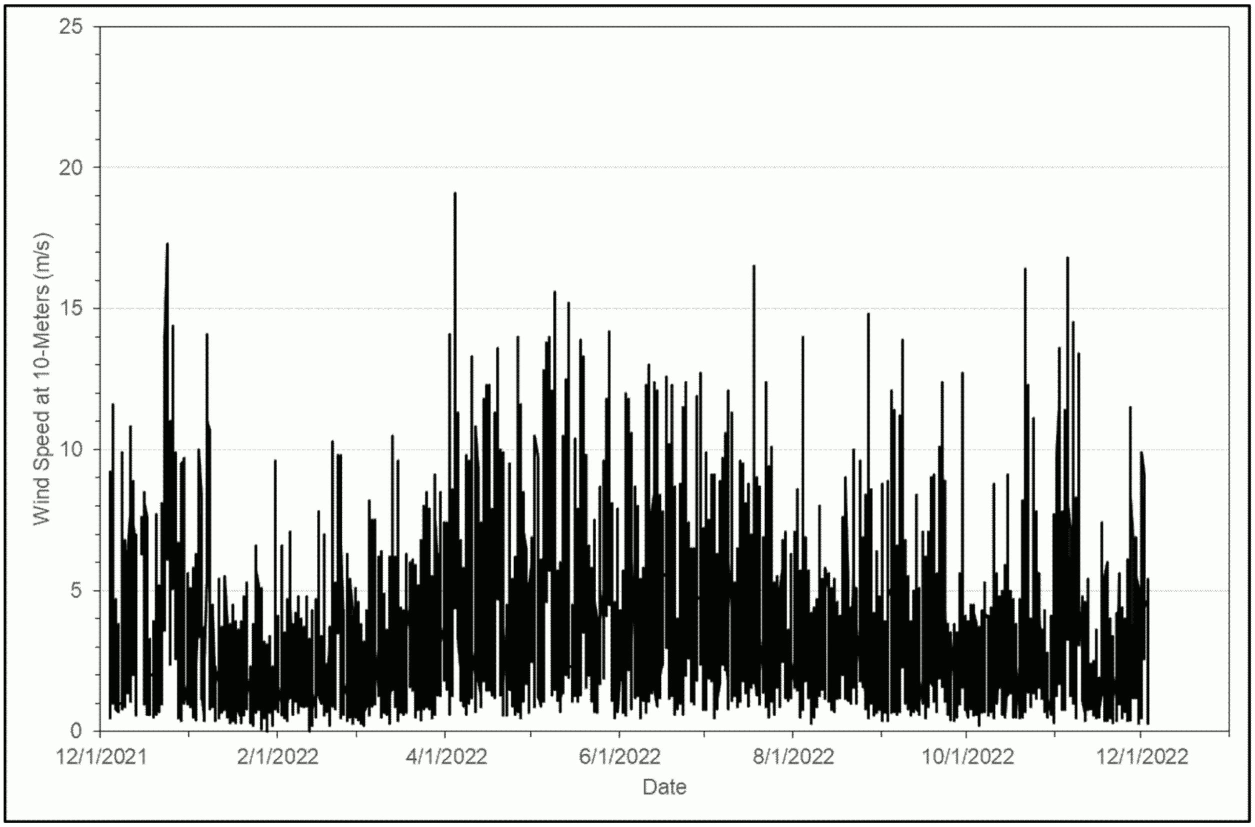
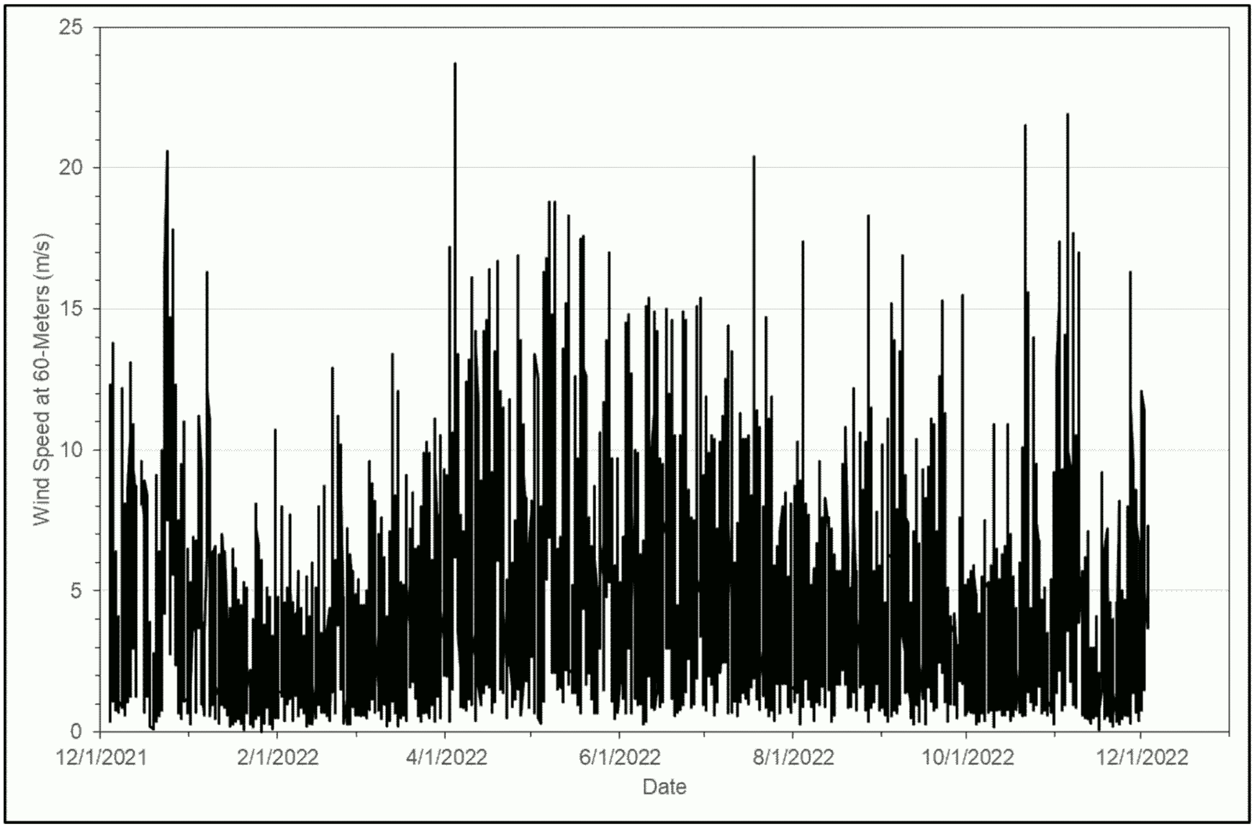


Figure 2.7-75: Daily Winds at the CFPP at the 60-Meter Level from December 3, 2021 to December 4, 2022



2.8 Nonradiological Health

This section provides detailed information or refers to supporting data sources with detailed information for each of the following topic areas for the CFPP:

- Public and Occupational Health - Section 2.8.1
- Noise - Section 2.8.2
- Transportation - Section 2.8.3
- Electromagnetic Fields - Section 2.8.4

Because of the proximity of the CFPP site location on INL, the CFPP is using relevant information associated with the INL to provide a basis of understanding for nonradiological health conditions. Section 2.8 provides the basis for evaluating impacts on nonradiological human health from construction and operation of the proposed project.

2.8.1 Public and Occupational Health

Occupational hazards are managed and minimized by compliance with Occupational Safety and Health Administration (OSHA) regulations. The OSHA's goal is to ensure employers provide their workers a place of employment free from recognized hazards to safety and health, including excessive noise levels, exposure to toxic chemicals, and unsanitary conditions according to the U.S. Environmental Protection Agency (EPA) (Reference 2.8-1). Workplace hazards can be grouped into physical hazards (e.g., slips and trips, falls from height, and those related to transportation, temperature, humidity, and electricity), physical agents (e.g., noise and vibration), chemical agents, biological agents, and psychosocial issues (e.g., work-related stress due to excessive working time and overnight shifts). The public can also be exposed to hazards including etiological agents, chemical contaminants (either in groundwater, drinking water, soil or air), transportation, noise levels, and electromagnetic field (EMF) and electric shock.

2.8.1.1 Regulations

Several federal and state regulations pertain to potential impacts to both public and occupational nonradiological health and the environment at the site and within the vicinity and region of the CFPP site. The CFPP is operated as an independent commercial undertaking and complies with environmental, health, and safety requirements promulgated by the NRC, OSHA, EPA, and the Idaho Department of Environmental Quality (DEQ).

2.8.1.1.1 Federal Regulations

The Clean Air Act (CAA), 42 U.S.C. §7401 et seq. (1970), as amended, is the comprehensive federal law to protect and enhance the quality of the nation's air resources to promote public health and welfare and the productive capacity of its population. The EPA works with federal, state, and tribal regulatory entities to monitor and ensure compliance with the CAA, while DEQ and tribal regulatory partners implement authority (Reference 2.8-2).

The Clean Water Act (CWA), 33 U.S.C. §1251 et seq., establishes the basic structure for regulating discharges of pollutants into the waters of the United States (U.S.) and regulating quality standards for surface waters (Reference 2.8-3). The CWA is the primary federal statute governing the restoration and maintenance of the chemical, physical, and biological integrity of the nation’s water. The EPA works with federal, state, and tribal regulatory entities to monitor and ensure compliance with the CWA, while DEQ implements authority.

Several integrated regulatory standards, programs, and plans established by the CWA apply to the CFPP.

- National Pollutant Discharge Elimination System - establishes an effluent permit system for point source discharges of pollutants into waters of the U.S.
- Sewage Sludge Use and Disposal Program - establishes a permit system covering the use and disposal of sewage sludge by land application, surface disposal, incineration, and disposal in a municipal solid waste landfill.
- Water Quality Management - establishes policies and program requirements for water quality planning, management, and implementation under multiple sections of the CWA.

The Safe Drinking Water Act (SDWA), 42 U.S.C. 300f et seq. (1974), as amended, was established to protect the quality of public water supplies and drinking water sources. The implementing regulations set in 40 CFR 141, The National Primary Drinking Water Regulations, 40 CFR 142, National Primary Drinking Water Regulations Implementation, and 40 CFR 143, Other Safe Drinking Water Act Regulations, are administered by the EPA to protect both surface and groundwater. The EPA determines the national drinking water standards to limit contaminants that may pose health risks in public water supplies and monitors federal, state, and tribal regulatory entities to ensure compliance with the SDWA (Reference 2.8-5). The DEQ implements authority with respect to the SDWA.

The Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6901 et seq. (1976), as amended, provides the EPA the authority to control hazardous waste from cradle to grave including the generation, transportation, treatment, storage, and disposal (Subtitle C) along with regulations for non-hazardous solid waste including solids, liquids, and gases (Subtitle D) (Reference 2.8-6). The RCRA establishes the framework for a national system encompassing hazardous waste, used oil, universal wastes, mixed wastes, land disposal, permitting program, underground storage tanks, and solid waste to protect human health and the environment. The EPA works with federal, state, and tribal regulatory partners to monitor and ensure compliance with RCRA while DEQ implements authority with respect to RCRA with EPA oversight.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42U.S.C. 9601 et seq. (1980), provides the statutory framework for cleanup of waste sites containing hazardous substances and as amended by the Superfund Amendments and Reauthorization Act provides an emergency response program in the event of a release (or threat of a release) of a hazardous substance to the environment (Reference 2.8-7). The CFPP site is located within the INL site, which is considered a CERCLA site, but the CFPP site is on a greenfield location with no known contamination.

The Emergency Planning and Community Right-to-Know Act (EPCRA), 42 U.S.C. 11001 et seq. (1986), is authorized by Title III of the Superfund Amendments and Reauthorization Act and was enacted to help local communities protect public health, safety, and the environment from chemical hazard emergencies. Industries are required to report on the storage, use, and release of hazardous substances to federal, state, and local governments. Per the EPA, EPCRA has four major focus areas (Reference 2.8-8).

- Sections 302 and 303 concentrate on emergency planning. Section 302 requires notification when extremely hazardous substances are present at facilities in quantities at or above the threshold planning quantity established in the EPCRA regulations. Section 303 outlines the required elements of the plans and requires local emergency planning committees to develop initial emergency response plans with annual updates.
- Section 304 requires facilities to immediately report accidental releases of certain chemicals to state and local authorities. Facilities must immediately report accidental releases of extremely hazardous substances and hazardous substances as defined under CERCLA.
- Sections 311 and 312 focus on hazardous chemical storage reporting requirements. Section 311 requires facilities to submit a Safety Data Sheet to the State Emergency Response Commissions, State Emergency Planning Committees, and local fire department for each hazardous chemical, as defined by OSHA, that are handled or stored. Section 312 requires the same facilities to submit a Tier I or Tier II hazardous chemical inventory form to the same recipients to identify the amount, location, and potential hazards of each chemical on-site at the facility during the year.
- Section 313 established the Toxics Release Inventory, which is a publicly available database containing information on the quantities of certain toxic chemicals released annually to air, water, and land, or otherwise managed as waste by industrial and federal facilities. The information is used to support informed decision-making by communities, government agencies, companies, and others.

Transport of hazardous and radioactive materials, substances, and wastes are governed by U.S. Department of Transportation (DOT), NRC, and EPA regulations. These regulations include:

- 49 CFR 100-178 - Transportation of Hazardous Materials, Oil Transportation, and Hazardous Materials Regulations are regulated by DOT.
- 40 CFR 262 - Standards Applicable to Generators of Hazardous Waste are regulated by EPA.
- 10 CFR 71 - Packaging and Transportation of Radioactive Materials are regulated by the NRC and is addressed in the Combined License Application.

The Toxic Substance Control Act (TSCA), 15 U.S.C. 2601 et seq. (1976), authorizes the EPA to require reporting, record keeping and testing requirements, and restrictions relating to chemical substances and mixtures. The production, importation, use, and disposal of specific chemicals, including asbestos, polychlorinated biphenyls, lead-based paint, chlorofluorocarbons, dioxins, hexavalent chromium, and radon is addressed by TSCA. The DEQ implements authority and ensures compliance with statutes and regulations with respect to TSCA.

The Occupational Safety and Health Act, 29 U.S.C. 651 et seq. (1970), authorized the federal government to set and enforce safety and health standards for workers. The Act is administered and enforced by OSHA. While OSHA and the EPA both are mandated to reduce exposures to toxic substances, OSHA's jurisdiction is limited to safety and health conditions that exist in the workplace environment. Specific standards informing employers what must be done to achieve a safe and healthful working environment are established by OSHA regulations in 29 CFR.

The Noise Control Act, 42 U.S.C. 4901 et seq. (1972), is an established national policy to promote an environment free from noise that jeopardizes public health and welfare (Reference 2.8-9). The EPA is authorized to issue noise emission standards, coordinate federal research in noise control, and provide information to the public regarding noise emissions and reduction. The primary responsibility for control of noise remains with state and local governments. Noise regulations and ordinances are examined in Section 2.8.2.

The CFPP complies with applicable federal regulations.

2.8.1.1.2 Idaho Regulations

The Idaho DEQ is a state department created by the Idaho Environmental Protection and Health Act (Idaho Code, Title 39, Chapter 39-101 to 39-130 (Reference 2.8-10) to ensure clean air, water, and land in the state and protect

Idaho citizens from the adverse health impacts of pollution (Reference 2.8-11). The DEQ enforces numerous state environmental regulations and administers several federal environmental protection laws including the CAA, CWA, and RCRA.

Rules for Control of Air Pollution in Idaho, Idaho Administrative Procedures Act (IDAPA) 58.01.01 follows the Federal CAA that provides the framework to protect the nation's air resources and public health and welfare. The EPA has delegated authority to DEQ to issue air quality permits and enforce air quality regulations outside of Indian reservation boundaries (Reference 2.8-12).

The Water Quality Standards, IDAPA 58.01.02, designate uses that are to be protected in and of the waters of the state and establish standards of water quality protective of those uses. Restrictions are placed on the discharge of wastewaters and on human activities that may adversely affect public health and water quality in the waters of the state (Reference 2.8-13).

The Ground Water Quality Rule, IDAPA 58.01.11, designates the DEQ as the primary agency to coordinate and administer ground water quality protection programs for the state. These programs establish minimum requirements for protection of ground water quality through standards and an aquifer categorization process (Reference 2.8-14).

Idaho Rules for Public Drinking Water Systems, IDAPA 58.01.08, controls and regulates the design, construction, operation, maintenance, and quality of public drinking water systems to provide a degree of assurance that such systems are protected from contamination and maintained free from contaminants that may injure the health of the consumer (Reference 2.8-15). The DEQ implements authority with respect to the public drinking water rules.

Individual/Subsurface Sewage Disposal Rules and Rules for Cleaning of Septic Tanks, IDAPA 58.01.03, establishes limitations on construction and use of individual and subsurface sewage disposal systems and establishes requirements for obtaining an installation permit and an installer's registration permit (Reference 2.8-16). Wastewater Rules, IDAPA 58.01.16, establishes the procedures and requirements for planning, design and operation of wastewater facilities and discharge of wastewaters and human activities that may adversely affect public health and water quality in the waters of the state (Reference 2.8-17). The Recycled Water Rules, IDAPA 58.01.17, establishes procedures and requirements for the issuance and maintenance of pollution source permits for reuse facilities, also referred to as reuse permits (Reference 2.8-18).

Idaho Rules and Standards for Hazardous Waste, IDAPA 58.01.05, implements the Idaho Hazardous Waste Management Act, enabling the state to assume primacy over hazardous waste regulation in lieu of the federal government. The rule incorporates by reference federal regulations that govern how hazardous waste is identified, stored, transported, and disposed, and establishes standards and procedures necessary to ensure the safe and adequate management of hazardous waste (Reference 2.8-19). Idaho Solid Waste Management Rules, IDAPA 58.01.06, is regulated by DEQ, the counties, and Idaho's public health districts (Reference 2.8-20). The rule implements an open dumping prohibition, sets standards for non-municipal solid waste facilities, and provides supplemental requirements to the Idaho Solid Waste Facilities Act for commercial solid waste facilities (Reference 2.8-21).

The CFPP complies with applicable state regulations.

2.8.1.1.3 Department of Energy Executive Orders

The CFPP is developed, constructed, and operated as an independent commercial enterprise. Although the CFPP is located on federal land managed by the DOE, it is not subject to DOE Executive Orders. However, the CFPP cooperates with DOE in the fulfillment of DOE obligations.

The CFPP complies with environmental, health, and safety requirements, promulgated by the NRC, OSHA, EPA, and DEQ regulations, to minimize potential impacts to public and occupational health.

2.8.1.2 Vulnerable Populations to Nonradiological Health Impacts

The population within six miles of the CFPP that may be vulnerable to nonradiological health impacts includes the following:

- government, contractor, and subcontractor personnel employed at the CFPP and INL sites
- Shoshone-Bannock tribal members whose aboriginal homelands include the CFPP site area
- ranchers grazing livestock in areas near the CFPP site
- occasional hunters near the CFPP site
- visitors to the CFPP and INL site
- visitors to the Lost River Range area
- highway travelers along U.S. Routes 20 and 26 and State Highway 33
- residential populations in neighboring communities.

No residents are located within the CFPP site boundary or vicinity (Reference 2.8-22). During construction and operations, access to the CFPP site is controlled and limited to workers and official visitors only. Potential health impacts from the CFPP preconstruction, pre-COL construction, and COL construction activities to vulnerable populations are discussed in LWA ER Section 4.8.

2.8.1.3 Hazardous Chemicals

The CFPP site is located on a greenfield site with a uniform landscape of sagebrush-grassland and no prior land disturbance or building; thus, the site has no known history of hazardous chemicals or impacts of hazardous chemicals from surrounding areas or activities.

A survey of potential off-site chemical hazards sources near the CFPP site was performed based on guidance in the NRC Regulatory Guide 1.78, Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release. No fixed facilities, including other facilities on the INL site, or waterways are within five miles of the CFPP site (Figure 2.8-1). According to the survey, the only potential off-site chemicals within five miles of the site are related to transportation on State Highway 33 or U.S. Route 26. The CFPP LLC performed a survey of facilities in Butte County to identify chemicals that could be transported on these two roads. Most of the chemicals were screened out based on criteria from Regulatory Guide 1.78 while other chemicals (acrylic acid, argon, benzene, butane, carbon dioxide, cyclohexanone, cyclohexylamine, ethane, ethanol (ethyl alcohol), gasoline, isopropanol (isopropyl alcohol), kerosene, methane, nitric acid, nitrogen, nitrogen dioxide, and toluene) were analyzed for control room habitability and also screened out. Off-site chemical hazards requiring further analysis include ammonia, chlorine and propane and are addressed in the Combined License Application.

The National Pipeline Mapping System, Public Map Viewer, identified no gas transmission or hazardous liquid pipelines within five miles of the CFPP site. No pipelines were identified within five miles of the CFPP site or within Butte County (Reference 2.8-23). A review using Google Earth Pro showed no railroad lines within five miles of the CFPP site. No gas transmission and hazardous liquid pipelines are constructed on the CFPP site.

With the CFPP being located on the INL site, hazardous chemicals were reviewed because of the widespread diversity of the types and quantities used at the INL facilities. According to the DOE Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement, industrial hygiene monitoring and sampling programs are designed to ensure that personal or the area monitoring strategy is directed toward the chemicals that pose the greatest risks and hazards (Reference 2.8-24). The toxic chemical control program is designed to reduce risks and maintain potential exposures to hazards as low as reasonably achievable. The INL sampling and monitoring programs provide data for characterizing asbestos, lead, cadmium, beryllium, formaldehyde, benzene, hydrogen chloride, nitric acid, sulfuric acid, hydrogen fluoride, sulfur dioxide, welding by-products, coal dust from coal-fired generation plants, solvents, NO_x, and other potentially hazardous substances.

Below are key data points in relation to the INL EPCRA Sections 304, 311, 312, and 313 from 2015 to 2020 (Reference 2.8-25, Reference 2.8-26, Reference 2.8-27, Reference 2.8-28, Reference 2.8-29, and Reference 2.8-30):

- Zero CERCLA reportable chemicals were released from 2015 to 2020.
- From 2018 to 2020 there have been 76, 69, and 59 chemicals, respectively, that exceeded regulatory thresholds showing a decreasing trend. No data are available from 2015 to 2017.
- Extremely hazardous chemicals include a combination of ammonia, chlorine, cyclohexylamine, lithium hydride, nitric acid, nitrogen dioxide, and sulfuric acid from 2018 to 2020. No data are available from 2015 to 2017.
- Chemicals listed on the INL site Toxic Release Inventory include chromium, cumene, ethylbenzene, lead, naphthalene, nickel, nitric acid, nitrate compounds, polycyclic aromatic compounds from 2015 to 2020.
- Zero reportable environmental releases in 2015, 2017, 2018, and 2020.
- In 2019, the INL site had one reportable release and in 2016, two reportable environmental releases.

The CFPP complies with environmental, health, and safety requirements, promulgated by the NRC, OSHA, EPA, and DEQ regulations, to minimize potential impacts from nonradiological hazardous chemicals to public and occupational health.

In addition to public human health impacts related directly to EPCRA, potential impacts from soil, air, groundwater, and surface water contamination, drinking water, and wastewater exist.

2.8.1.4 Soil Contamination

Soil sampling is completed on a five-year rotation at the INL site to evaluate long-term accumulation trends and to estimate environmental radionuclide inventories. Sampling occurred in 2017 and was next scheduled for 2022 (Reference 2.8-25).

The CFPP site is considered a greenfield site; thus, no current soil sampling program exists. Monitoring and sampling programs, toxic chemical control, and proper waste treatment and disposal facilitate CFPP site compliance with hazardous chemical regulatory requirements.

2.8.1.5 Air Contamination

The CAA and the subsequent amendments establish air quality regulations and the National Ambient Air Quality Standards (NAAQS). In Idaho, the EPA has delegated authority to the DEQ to enforce air quality regulations. The CAA establishes air quality planning processes and requires states to develop a state implementation plan that details how NAAQS managed. The INL is currently a major source of criteria air pollutants emissions under Section 109 of the CAA and an area source of hazardous air pollutant (HAP) emissions regulated under Section 112 of the CAA. The INL site environmental surveillance programs emphasize measurement of air contaminants in the environment because air is the most important transport pathway from the INL site to receptors outside the site boundary. According to the INL Site Environmental Report, 2020, reviews of historical environmental data and environmental transport modeling indicate air is a key pathway from INL site releases to members of the public (Reference 2.8-25). Air emissions pertain to operations, construction, or other activities that have the potential to generate air pollutants including chemical and combustion emissions, fugitive dust, asbestos, and refrigerants.

Air quality is the concentration of various air pollutants in the atmosphere at a specific location. Criteria air pollutants and HAPs are the two general types of air pollutants per the EPA. The NAAQS regulates six criteria pollutants including ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and particulate matter, less than or equal to 2.5 microns in diameter ($PM_{2.5}$) or less than or equal to 10 microns in diameter (PM_{10}). The EPA further divided NAAQS into primary and secondary standards. Primary standards provide public health protection, which include protecting the health of “sensitive” populations such as children, the elderly, and asthmatics. Secondary standards provide public welfare protection, including protection against damage to animals, crops, vegetation, and buildings, and decreased visibility (Reference 2.8-31). The primary and secondary standards are shown in Table 2.8-1. These standards represent atmospheric concentrations to protect public health and welfare, and include a reasonable margin of safety to protect the most sensitive individuals in the population.

The EPA regulates HAPs known or suspected to cause serious health or adverse environmental effects. The CAA has identified 187 substances as HAPs (e.g., benzene, formaldehyde, mercury, hydrochloric acid, and toluene). Industrial facilities and vehicles emit HAPs. Reduction of HAP emissions from stationary sources are regulated through the National Emission Standards for Hazardous Air Pollutants by EPA. A “major” source of HAPs is defined as a stationary facility or source that directly emits or has the potential to emit 10 tons per year or more of a HAP or 25 tons per year or more of combined HAPs (Reference 2.8-32).

The DEQ Air Quality Division is responsible for enforcing air pollution regulations in Idaho. It enforces NAAQS by monitoring air quality, developing rules to regulate and to permit stationary sources of air emissions, and managing the air quality attainment planning processes. The DEQ air quality regulations, “Rules for the Control of Air Pollution in Idaho,” are found in the IDAPA Section 58.01.01. The INL site includes sources that emit criteria air pollutants and HAPs and require a permit to construct as outlined in IDAPA 58.01.01.200 through 228.

The main source of nonradiological air emissions at the INL site is oil-fired boilers, but other sources include diesel engines; emergency diesel generators; small gasoline, diesel, and propane combustion sources; and chemical and solvent usages according to the Final Versatile Test Reactor (VTR) Environmental Impact Statement (Reference 2.8-33).

Suspended particulate matter was highest between the end of June through the middle of September because of increased dust particles from the agricultural industry outside the INL site boundary and regional wildfires. In general, as stated in the 2020 INL Environmental Site Report, particulate concentrations were higher at off-site locations because of agricultural activities than at the INL site monitoring stations (Reference 2.8-25). During July through September, the INL site is susceptible to numerous extensive wildland fires in the vicinity of INL and from distant locations that average approximately five fires per year covering 15,000 acres per year. An increase in suspended particulate matter can have negative health effects on public and occupational health including respiratory and cardiovascular issues (Reference 2.8-34). Fugitive dust and on-site burning are discussed in LWA ER Section 4.7 and Section 4.8.

According to DOE, public health risks have been estimated for routine nonradiological air emissions from the INL site (Reference 2.8-24). The estimates considered exposures to an INL maximally exposed off-site public individual and the population within 50 miles of the site. With EPA dose response values being used in the calculations, no adverse health impacts for non-carcinogenic constituents in air emissions (including fluorides, ammonia, and sulfuric, and hydrochloric acids) were projected. Off-site excess cancer risk from carcinogenic emissions (e.g., arsenic, benzene, carbon tetrachloride, and formaldehyde) ranged from 1 in 1.4 million to 1 in 625 million. Risks from chemical carcinogens were estimated at less than one occurrence in one million according to the Idaho High-Level Waste & Facilities Disposition Final Environmental Impact Statement (Reference 2.8-35) and zero for non-carcinogenic chemical contaminants per NUREG-1773, Environmental Impact Statement for the Proposed Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory in Butte County, Idaho.

The CFPP complies with environmental, health, and safety requirements, promulgated by the NRC, OSHA, EPA, and DEQ regulations, to minimize potential impacts from nonradiological air pollution for public and occupational health. The CFPP has sources of nonradiological air emissions during construction and operations, as well as the potential to encounter higher suspended particulate matter from surrounding agricultural activities and probable wildfires in the CFPP region. The CFPP has risks similar for carcinogenic and non-carcinogenic chemical contaminants to the off-site public, as stated above.

2.8.1.6 Groundwater Contamination

Groundwater contamination can potentially impact public and occupational health. Fractured volcanic rock under the INL site, on which CFPP is located, form a portion of the Eastern Snake River Plain (ESRP) aquifer that stretches 199 miles from Island Park to King Hill, which is 6 miles northeast of Glenns Ferry. An estimated 247 to 370 billion cubic meters of water is stored in the aquifer's upper portions. The aquifer is primarily recharged from the Henrys Fork and the South Fork of the Snake River, and to a lesser extent from the Big Lost River, Little Lost River, Birch Creek, and irrigation. Beneath the CFPP and INL site, the aquifer moves laterally southwest at a rate of 5 to 20 feet per day (Reference 2.8-36).

According to the INL Environmental Site Report, 2020, (Reference 2.8-25) the purpose of groundwater monitoring at the INL site and surrounding area is to verify the following:

- The ESRP groundwater is protected from contamination from current INL site activities.
- Areas of known underground contamination from past INL site operations are monitored and trended.
- Drinking water from wells consumed by workers and visitors at the INL site and by the public downgradient of the INL site is safe.
- The Big Lost River, which occasionally flows through the INL site, is not contaminated by INL site activities before entering the aquifer via channel loss and playas on the north end of the INL site.

Multiple applicable regulatory guidelines for groundwater compliance are followed and include:

- State of Idaho groundwater primary and secondary constituent standards (Ground Water Quality Rule, IDAPA 58.01.11).
- The EPA health-based maximum contaminant levels (MCLs) for drinking water (40 CFR 141).

The United States Geological Survey (USGS) INL Project Office, INL contractor, Idaho Cleanup Project contractor, and the Environmental Surveillance, Education and Research contractor monitor the ESRP aquifer. Chemical (organic and inorganic) contamination is present within the vadose zone or aquifer are the result of past operational and disposal practices on the INL site (Reference 2.8-33). Some contaminants that can have a negative effect on public and occupational health, including carcinogenicity, monitored in groundwater on the INL site are listed below.

- Volatile organic compounds (VOCs)
    - Trichloroethene or trichloroethylene
    - Cis-1,2-dichloroethene
    - Trans-1,2-dichloroethene
    - Vinyl chloride
    - Carbon Tetrachloride
    - Chloroform
- Chromium

- Trace metals
  - Arsenic
  - Iron
  - Manganese
  - Selenium
- Anions
  - Chloride
  - Sulfate
  - Nitrate

The DEQ-INL Oversight Program Annual Report 2020, reported the following conclusions from groundwater monitoring at INL (Reference 2.8-37).

- Chloride, sulfate, iron, manganese, nitrate plus nitrite, and some VOCs exceeded federal drinking water standards (MCLs or secondary MCLs) at some DEQ monitoring sites on the INL site in 2020. These sites are not used for drinking water.
- Chromium continues to be detected at concentrations above background in the vicinity of the southern INL site boundary. No sites monitored by DEQ exceed federal drinking water standards for chromium. Concentrations of chromium at the INL site continue to remain comparable to previous years or decline site wide.
- Carbon tetrachloride continues to increase in some of the wells around and downgradient of INL's Radioactive Waste Management Complex.
- Concentrations of other INL contaminants in water remain constant or continue to decrease at most locations because of changes in waste disposal practices.
- The INL impacts to the aquifer are not identifiable in water samples collected at sites distantly downgradient of the INL.

The CFPP site is located a distance away from the contamination plumes and is considered a greenfield site with no groundwater contamination. Results from current CFPP groundwater monitoring are discussed in LWA ER Section 2.2, Section 3.2 and Table 2.2-4.

The CFPP complies with environmental, health, and safety requirements, promulgated by the NRC, OSHA, EPA, and DEQ regulations, to minimize potential impacts from nonradiological groundwater contamination for public and occupational health. The CFPP site is considered a greenfield site with no prior site activity, and thus no contamination is present that could impact the ESRP aquifer and public and occupational health. The impacts to groundwater from construction is discussed in LWA ER Section 4.10.3.

2.8.1.7 Surface Water Contamination

Surface water contamination can potentially impact public and occupational health. According to the DOE Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement, the volume of surface water that flows from the INL site to off-site areas is negligible. There are no liquid discharges from INL operations to the intermittent streams in the vicinity, and therefore, the cumulative impacts from the surface water pathway on public health is negligible (Reference 2.8-24).

The closest water body to the CFPP site is the Big Lost River, approximately 6.3 miles away (LWA ER Figure 2.1-11). The CFPP site has no liquid discharge during construction and operations to waters of the U.S. and intermittent streams in the vicinity. The CFPP site is a near zero liquid discharge facility with nonradiological waste effluent disposed of in evaporation ponds and sanitary wastewater disposed off-site throughout construction and into on-site sewage lagoons during operations. As required under federal and state regulations, effluents are monitored for the presence of nonradiological chemical constituents along with other required parameters.

The CFPP complies with environmental, health, and safety requirements, promulgated by the NRC, OSHA, EPA, and DEQ regulations, to minimize potential impacts from nonradiological surface water contamination for public and occupational health. The impacts from the surface water pathway on public health are negligible because the closest surface water body to the CFPP site is a significant distance away.

2.8.1.8 Drinking Water

Drinking water contamination can potentially impact public and occupational health. Under the authority of the SDWA, drinking water parameters are regulated by the state of Idaho. The highly productive ESRP aquifer has been declared a sole source aquifer by the EPA because of the nearly complete reliance on the aquifer for drinking water supplies in the area serving more than 300,000 eastern Idaho residents. Drinking water at the INL site is routinely monitored to verify it is safe for human consumption and to demonstrate it meets federal and state regulations. In 2020 at the INL site, 362 drinking water samples, from 11 drinking water systems, were tested for multiple constituents including inorganic compounds and VOCs. The INL drinking water systems were below regulatory limits for drinking water or there were no detections from 2015 to 2020 (Reference 2.8-25, Reference 2.8-26, Reference 2.8-27, Reference 2.8-28, Reference 2.8-29, and Reference 2.8-30).

The CFPP complies with environmental, health, and safety requirements, promulgated by the NRC, OSHA, EPA, and DEQ regulations, to minimize potential impacts to drinking water contamination for public and occupational health. The CFPP site is considered a greenfield site with no prior site activity, and thus no present contamination exists that could impact the ESRP aquifer and public and occupational health.

2.8.1.9 Wastewater

Wastewater can potentially impact public and occupational health. Wastewater consists of spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter that may contribute to water pollution. To protect health and prevent pollution of surface and groundwaters, the state of Idaho requires a reuse permit to discharge wastewater to the land surface, which is regulated by DEQ (Section 2.8.1.1.2). Reuse permits consider site-specific conditions and incorporate water quality standards for groundwater protection.

Compliance was maintained for three INL reuse permits from 2015 to 2020 (Reference 2.8-25, Reference 2.8-26, Reference 2.8-27, Reference 2.8-28, Reference 2.8-29, and Reference 2.8-30).

The CFPP complies with environmental, health, and safety requirements, promulgated by the NRC, OSHA, EPA, and DEQ regulations, to minimize potential impacts from wastewater for public and occupational health. Impacts from wastewater during construction is discussed in LWA ER Section 4.10.3.

2.8.1.10 Occupational Injuries

Federal and state statistics for occupational injuries and illness for similar occupations to those of the CFPP are covered below using 2020 data. The North American Industry Classification System (NAICS) is the standard used by federal statistical agencies, including the U.S. Bureau of Labor Statistics (BLS).
The CFPP falls under two industry sector classifications: (1) Construction followed by (2) Utilities for the operational stage.

Table 2.8-2 shows the Construction Industry Sector in 2020 had the highest number of fatalities (1008). Even though Construction had the highest number of fatalities, the rate of fatalities in 2020 in Construction was 10.2 percent compared to the Agriculture, Forestry, Fishing, and Hunting with a rate of 21.5 percent, followed by Transportation and Warehousing at 13.4 percent, according to the BLS (Reference 2.8-38). During construction, the CFPP site falls under NAICS Construction, more specifically the Power and Communication Line and Related Structures Construction Industry sector, NAICS 23713, as shown in Table 2.8-3. The NAICS 23713 comprises establishments primarily engaged in the construction of power lines and towers, power plants, radio, television, and telecommunications transmitting/receiving towers (Reference 2.8-39). Table 2.8-3 is a breakdown of the fatal occupational injuries in the Construction and Utility Industry Sectors. The Highway, Street, and Bridge Construction Industry Sector (NAICS 23731) had almost triple the number of fatalities as NAICS 23713. Approximately 3 percent of construction fatalities in 2020 occurred in NAICS 23713.

Once operational, the CFPP NAICS code changes to the Utilities Industry Sector, Nuclear Electric Power Generation, NAICS 221113. This includes establishments primarily engaged in operating nuclear electric power generation facilities (Reference 2.8-40). Table 2.8-2 shows 19 fatal occupational injuries occurred in the Utilities Industry Sector. Electric Power Generation was responsible for four of those fatalities with the remaining 15 belonging to other sectors within utilities (Table 2.8-3). NAICS 221113 fatality information is not available.

Idaho had 32 fatal occupational injuries in 2020 (Reference 2.8-41). Of these fatalities, according to the BLS, three were in construction and utilities had zero (Reference 2.8-42). More than 50 percent of the occupational fatalities in Idaho were from transportation incidents and close to 30 percent were from contact with objects and equipment. Table 2.8-4 indicates that transportation incidents are the most common cause of fatal occupational injuries in all industry sectors in the U.S. (37 percent), NAICS 23713 (43 percent), and all industry sectors in Idaho (56 percent) (Reference 2.8-42 and Reference 2.8-43). Of the four fatal occupational injuries in NAICS 22111, Electric Power Generation, three were classified as others and one related to a fall, slip, or trip.

Nonfatal occupational injuries and illnesses are classified using NAICS. According to the BLS (Table 2.8-5) in 2020:

- Of the total recordable cases in Construction (174,100) approximately 2 percent (4100) were in the Power and Communication Line and Related Structures Construction Industry Sector.
- Construction had 106,400 total cases with days away from work and job restriction or transfer with 3100 of those occurring in the Power and Communication Line and Related Structures Construction Industry Sector.
- Nuclear Electric Power Generation had 100 total recordable cases, approximately 1 percent of Utilities, which had 8400 total recordable cases, and approximately 6 percent of electric power generation.
- Electric power generation with fossil fuels had 1200 total recordable cases compared to that of nuclear power generation that had 100.
- Nuclear electric power generation had a total of 100 total cases with days away from work, job restriction, or transfer, while fossil fuel electric power generation and all electric power generation had 800 and 1000 cases respectively.

The BLS states that nonfatal occupational injuries and illnesses data by industry are not available for Idaho (Reference 2.8-44).

Discussion of occupational injuries and illnesses in relation to preconstruction, pre-COL construction, and COL construction of the CFPP is in LWA ER Section 4.8.1.3.

Safety standards, practices, and mitigation procedures for avoiding or minimizing the incidence of injuries and illnesses to workers and the public exist and are explained below. The INL site is an administratively controlled area and, in general, access to the INL site and the facilities is permitted only on an official business basis. Public access is only allowed in rights-of-way associated with highways, the Big Lost River rest area, and at the EBR-I visitor center. There are no residential dwellings on INL property (Reference 2.8-33).

During construction and operations, access to the proposed CFPP site is controlled by CFPP and limited to workers and official visitors only; thus, public safety on the site is a non-issue.

Nonradiological occupational exposures at the INL site are controlled through industrial hygiene and occupational safety programs, which track numerous performance indicators that are consistent with those of general industry using OSHA's occupational injury and illness reporting criteria according to The Final Environmental Impact Statement for the Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling (Reference 2.8-45). During construction the CFPP site follows 29 CFR 1926, OSHA's Safety and Health Regulations for Construction and 29 CFR 1910, OSHA's Occupational Safety and Health Standards for general industry. The CFPP workplace hazards are minimized using the hierarchy of controls as detailed in LWA ER Section 4.8.1.2 and Table 4.8-1. Access to work areas is limited to the authorized and adequately protected workforce. Administrative controls and personnel training ensure compliance with industry standards, and observations of these protocols minimize and possibly eliminate exposure of the workers to noise, pollutants, hazardous chemicals, and other workplace hazards for both construction and operations.

2.8.1.11 Etiological Agents and Emerging Contaminants

According to the Centers for Disease Control and Prevention (CDC), etiological agents are infectious pathogens, chemicals, or toxins causing a waterborne disease or outbreak (Reference 2.8-46). The implicated water in these waterborne disease outbreaks may be drinking water, recreational water, water of unknown intent, or water not intended for drinking, such as water used for agricultural purposes or in cooling towers and thermal discharges (Reference 2.8-47). Waterborne infections are caused by ingestion, airborne, or contact with contaminated water by a variety of infectious agents, which include bacteria, viruses, protozoa and helminths according to Microbial Agents Associated with Waterborne Diseases (Reference 2.8-48). Several types of microorganisms associated with cooling tower water, thermal discharges, or wastewater include enteric pathogens (*Salmonella* spp., *Shigella* spp. and *Pseudomonas aeruginosa*), thermophilic fungi/bacteria (*Legionella* spp. and *Vibrio* spp.), dinoflagellates (*Karenia brevis*), blue-green algae (cyanobacteria), and free-living amoeba (*Naegleria fowleri* and *Acanthamoeba* spp.). Exposure to these microorganisms, or in some cases the endotoxins or exotoxins produced by the organisms, can have a negative impact on human health causing illness or death according to NUREG-1555, Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1, Revision 1: Operating License Renewal, Final Report. Maximum contaminant levels of some microorganisms, including

Legionella, in public drinking water systems are regulated by 40 CFR 141.70, Subpart H, National Primary Drinking Water Regulations; however, no regulations associated with microorganisms related to cooling towers or thermal discharges exist. NUREG-1555, Supplement 1, states that OSHA and other agencies do not currently have other legal standards for exposure to microorganisms. The CDC is the source of information for references below unless otherwise specified for the remainder of Section 2.8.1.11.

2.8.1.11.1 Enteric Pathogens

Enteric pathogens are a potential concern for public and occupational health associated with power plants as well as other industries. Enteric pathogens are bacterium that typically enter the body through the mouth. According to the CDC, enteric pathogens are acquired through contaminated food and water, by contact with animals or their environments, by contact with the feces of an infected person, and through other means (Reference 2.8-49). Bacteria can multiply rapidly between 40 and 140 degrees Fahrenheit (Reference 2.8-50). Described below the are common enteric pathogens: *Salmonella* spp., *Shigella* spp. and *Pseudomonas aeruginosa*.

The CDC estimates *Salmonella* bacteria cause about 1.35 million infections, 26,500 hospitalizations, and 420 deaths in the U.S. every year. Food is the primary source for most of these illnesses. *Salmonella* lives in the intestines of people and animals. People can get *Salmonella* infections from a variety of sources, including eating contaminated food, drinking unsanitary water, and touching infected animals, their feces, or their environment. *Salmonella* can also spread from animals to people and from person to person (Reference 2.8-51).

Common strains of *Salmonella* include *Salmonella typhi* and *Salmonella paratyphi*, which both cause life threatening illnesses; typhoid fever and paratyphoid fever, respectively (Reference 2.8-52). According to the CDC, worldwide, typhoid fever affects an estimated 11 to 21 million people and paratyphoid fever affects an estimated 5 million people each year. In the U.S., about 350 people are diagnosed with typhoid fever and 90 people are diagnosed with paratyphoid fever each year. The CDC estimates typhoid fever affects 5700 people in the U.S. each year but has not made estimates for *Salmonella paratyphi*. Most people diagnosed in the U.S. have traveled to places where the diseases are most common where water and food may be unsafe, and sanitation is poor. The most common source of both typhoid and paratyphoid is feces from infected people or animals that get into the water from sewage overflows, sewage systems that are not working properly, polluted stormwater runoff, or agricultural runoff (Reference 2.8-53).

Salmonella spp. is addressed in the Combined License Application.

Shigella causes an estimated 450,000 infections in the U.S. each year and, according to the CDC, spreads easily as it takes just a small number of bacteria to make an individual ill (Reference 2.8-54). The source of *Shigella* is feces from infected people that gets into the water from sewage overflows, sewage systems that are not working properly, or polluted storm water runoff (Reference 2.8-53). Transmission of *Shigella* occurs from ingestion, hand to mouth, and consuming contaminated recreational waters (Reference 2.8-54).

Shigella spp. is addressed in the Combined License Application.

Pseudomonas aeruginosa is considered an opportunist pathogen that requires few nutrients for survival according to Independent Guide - What is Important to Know About Drinking Water Quality: *Pseudomonas aeruginosa* (Reference 2.8-55). The Cooling Tower Water Microbiota: Seasonal Dynamics and Co-occurrence of Bacterial and Protist Phylotypes states that *Pseudomonas* species are ubiquitous environmental bacteria well-known for their capability to form biofilms (Reference 2.8-56). *Pseudomonas aeruginosa* forms biofilms and in drinking water systems can cause problems with color, taste, odor, and turbidity if found in high numbers (Reference 2.8-55). Once established, biofilms can be difficult to eradicate from manmade water systems because they need a biodispersant (i.e., a chemical to breakdown the biofilm) or physical removal before disinfection. Because of sporadic or low water flow rates, the bacteria can attach to the internal pipework surfaces and form a biofilm that protects the organism that then starts to multiply. *Pseudomonas aeruginosa* has not been shown to cause health effects following ingestion. It is more likely to cause problems with the taste and odor of drinking water; however, the biofilms that *Pseudomonas aeruginosa* form could harbor more dangerous bacteria, such as coliform organisms and *E. coli.*

Pseudomonas aeruginosa is addressed in the Combined License Application.

2.8.1.11.2 Thermophilic Fungi or Bacteria

A thermophilic organism, bacteria or fungi, is adapted to live at relatively high temperatures, from about 113 to 252 degrees Fahrenheit, according to Biology Online (Reference 2.8-57). The presence and numbers of these organisms can be increased by the addition of heat and have a negative impact on human health. *Legionella* spp. and *Vibrio* spp. are two types of thermophilic bacteria associated with cooling towers.

Legionella can cause both Legionnaires' disease and Pontiac fever, collectively known as legionellosis (Reference 2.8-58). The CDC describes Legionnaires' disease as a serious type of pneumonia, a lung infection, caused by *Legionella* bacteria when small droplets of infected water are inhaled or accidently aspirated. According to the American Society of Heating, Refrigerating and Air-Conditioning Engineers journal article, Assessing Risk of *Legionella*, (Reference 2.8-59) to become infected with *Legionella*, a susceptible individual must inhale or aspirate aerosols (generally less than 10 micrometers [μm]) containing sufficient numbers of virulent *Legionella* cells. Transmission of *Legionella*, generally does not spread from person to person although there are rare circumstances where this may be the case according to Probable Person to Person Transmission of Legionnaires' Disease (Reference 2.8-60). In 2018, state health departments reported 9933 and 15 cases of Legionellosis in the U.S. and Idaho, respectively (Reference 2.8-61). The Estimate of Burden and Direct Healthcare Cost of Infectious Waterborne Diseases in the United States study, estimates that Legionnaires' disease is likely underdiagnosed and the actual number of cases may be 1.8 to 2.7 times higher than what is reported (Reference 2.8-62).

Pontiac fever differs from Legionnaires' disease as pneumonia is not a result of the infection but rather symptoms are primarily fever and muscles aches, thus making Pontiac fever a milder infection (Reference 2.8-58).

Legionella can be found naturally in freshwater environments, such as lakes and streams, but becomes a health concern when they replicate and thrive in human-made building water systems such as large complex plumbing systems, hot water tanks and heaters, and cooling towers. The most favorable *Legionella* growth range is from 77 to 113 degrees Fahrenheit (Reference 2.8-58). In water, including cooling system water, *Legionella* grows and multiplies within amoeba and ciliated protozoa, which are small one-celled organisms. In addition to providing nutrients for replicating and growing *Legionella*, protozoa also provide a shelter that protects *Legionella* from adverse environmental conditions, such as extreme temperatures and chemicals such as chlorine.

A discussion of *Legionella* and cooling water systems where the ability to thrive exists is addressed in the Combined License Application.

Vibrio spp. do not have an impact on public or occupational health as the CFPP site is not located in a marine, saltwater, or brackish water setting, and sewage lagoons are secured to prevent unauthorized entry.

2.8.1.11.3 Dinoflagellates

The majority of dinoflagellates are most often found in salt water or brackish water, including estuaries, although they can be found in freshwater lakes, rivers and bogs, according to University College London (Reference 2.8-63). Dinoflagellates are the most common cause of algal blooms (Reference 2.8-64).

Karenia brevis does not have an impact on public or occupational health at the CFPP as the site is neither located in a marine setting nor are there freshwater lakes, rivers, or bogs in close proximity to the site.

2.8.1.11.4 Blue-green Algae

In fresh water, such as lakes and ponds, harmful blooms are most commonly caused by cyanobacteria, blue-green algae, called phytoplankton. Some cyanobacteria produce toxins called cyanotoxins. People or animals may become sick when exposed to these toxins. Cyanotoxin exposure can occur by skin contact, drinking water, or breathing in tiny droplets in the air that contain toxins.

The potential for blue-green algae at the CFPP site is addressed in the Combined License Application.

2.8.1.11.5 Free-Living Amoeba

Free-living amoeba are protozoa that normally live in the environment and occasionally infect human or animal hosts, according to the University of Saskatchewan's, Free-Living Amoebae (Reference 2.8-65). *Naegleria fowleri* and *Acanthamoeba* spp. are opportunistic species found in a biofilm layer in a water environment, such as cooling towers, heating ventilation and air conditioning (HVAC) systems, and pipelines.

Naegleria fowleri, commonly referred to as the "brain-eating amoeba," is a free-living thermophilic microscopic single-celled living organism (Reference 2.8-66). *Naegleria fowleri* is typically found in warm fresh water, including lakes, rivers, and hot springs, and soil. Because the organism is thermophilic, it grows best at higher temperatures up to 115 degrees Fahrenheit.

Naegleria fowleri can cause a rare infection of the brain called primary amebic meningoencephalitis (PAM) that leads to the destruction of brain tissue. The microscopic organism characteristically infects people when contaminated water enters the body through the nose. Once the *Naegleria fowleri* enters the nose, it travels to the brain where it causes PAM, which is usually fatal. Infection typically occurs when people swim or dive in warm fresh water, such as lakes and rivers. In very rare instances, *Naegleria* infections may also occur when contaminated water from other sources (such as inadequately chlorinated swimming pool water or heated and contaminated tap water) enters through the nose. After the start of symptoms, the disease progresses rapidly and usually causes death within about one to twelve days (Reference 2.8-66).

The risk of infections by *Naegleria fowleri* is rare and low according to the CDC. There have been 33 reported infections in the U.S. in the ten years from 2010 to 2020, despite hundreds of millions of recreational water exposures each year. Of those cases, 29 individuals were infected by recreational water, 3 people were infected after performing nasal irrigation using contaminated tap water, and 1 person was infected by contaminated tap water used on a backyard slip-n-slide. There are no case reports of PAM from 1962 to 2020 in Idaho (Reference 2.8-66).

If *Naegleria fowleri* has colonized a water system, it may be found in the biofilm layer, which is addressed in the Combined License Application.

Acanthamoeba is a microscopic, single-celled organism, free-living amoeba, that can cause rare, but severe infections of the eye, skin, and central nervous system. The amoeba can be spread to the eyes through contact lens use, cuts, skin wounds, or by being inhaled into the lungs. Most people are exposed to *Acanthamoeba* during their lifetime, but very few become sick from this exposure (Reference 2.8-67). *Acanthamoeba* is found most commonly in soil, dust, fresh-water sources including lakes, rivers, hot springs, and in brackish water such as marshes and seawater. It can also be found in swimming pools, hot tubs, drinking water systems (e.g., slime layers in pipes and taps), as well as in HVAC systems, and humidifiers.

Acanthamoeba can cause three diseases.

- *Acanthamoeba* keratitis is an infection of the eye that typically occurs in healthy persons and can result in permanent visual impairment or blindness. Poor contact lens hygiene or wearing contact lenses during swimming, hot tub use, or showering may increase the risk of *Acanthamoeba* entering the eye and causing a serious infection.
- Granulomatous Amebic Encephalitis is an infection of the brain and spinal cord that typically occurs in persons with a compromised immune system and is most often fatal when the brain is infected.
- Disseminated infection is a widespread infection as the microorganism *Acanthamoeba* enters the skin through a cut, wound, or through the nostrils and then travels through the bloodstream to other parts of the body, especially the lungs, brain, and spinal cord independently or in combination. It is also more common with immunocompromised individuals (Reference 2.8-67).

A discussion of the potential of *Acanthamoeba* spp. at the CFPP site is addressed in the Combined License Application.

2.8.1.11.6 Incidence of Etiological Agents

Etiological agent outbreaks, illnesses, hospitalizations, and deaths in both Idaho (ID) and the U.S. from 2010 to 2020 according to the CDC National Outbreak Reporting System are shown in Table 2.8-6 (Reference 2.8-68). Search criteria included mode of transmission (water, environmental, person-to-person, and indeterminate or unknown and all water types), a description of the venue (for treated and untreated recreational water), water system (for drinking water) or device or structure (e.g., steam cleaner, cooling tower, or ornamental fountain) that was the vehicle for waterborne exposure to microbial pathogens, chemicals, or toxins. The following are key data points summarized from 2010 to 2020 etiological agent outbreaks, illness, hospitalizations, and deaths in ID and the U.S.:

- Zero deaths have occurred in ID compared to 232 throughout the U.S.
- Enteric pathogens are responsible for 89 percent and 97 percent of the etiological agent illnesses in the U.S. and ID, respectively.
- *Shigella* spp. had the highest number of outbreaks (1082) and illnesses (18,609) in the U.S., compared to ID, which had 6 outbreaks and 14 illnesses.
- *Salmonella* spp. caused the highest number of illnesses in ID, 155, which is 86 percent of total illnesses.
- Thermophilic pathogens, specifically *Legionella* spp. caused 5 illnesses and hospitalizations in ID, and 2750 illnesses and 1662 hospitalizations in the U.S.
- *Legionella* spp. are responsible for 91 percent of the etiological deaths in the U.S. Three of the 487 U.S. outbreaks have a confirmed or suspected association with factory or industrial facility cooling towers that included two deaths and 62 illnesses.
- *Legionella* spp. in ID is responsible for one outbreak causing five illnesses and hospitalizations due to water contamination in a hotel, motel, or lodge.
- *Naegleria fowleri* has not caused known outbreaks, illnesses, hospitalizations or deaths in ID or the U.S.
- One outbreak, resulting in two illnesses of *Acanthamoeba* spp. occurred in the U.S. with none in ID.

Cooling towers are suitable environments for microbial growth for many of the organisms listed above with *Legionella* as one of the major public health risks. A complex microbiome also exists in cooling towers associated with biofilm formation between opportunist bacterial pathogens (*Legionella* and *Pseudomonas* spp.) and protists, such as free-living amoeba, which provide the reservoirs for the bacterium. This complex and dynamic relationship is not yet well understood according to The Cooling Tower Microbiota (Reference 2.8-56).

Etiological agents do not create impacts to surface waters as there are no fresh, salt, or brackish water bodies at or near the CFPP site to be used as a water resource or a discharge location. The cooling tower and associated water systems, water pipelines, HVAC systems, nonradiological evaporation ponds, and sewage lagoons can foster the growth and distribution of etiological agents that can cause negative health impacts of which many can be mitigated.

The CFPP complies with environmental, health, and safety requirements, promulgated by the NRC, OSHA, EPA, and DEQ regulations, to minimize potential impacts from etiological agents for public and occupational health. Etiological agents and the impacts are addressed in the Combined License Application.

2.8.2 Noise

Noise is defined as unwanted sound according to EPA's Protective Noise Levels (Reference 2.8-69). In the context of protecting the public health and welfare, noise implies adverse effects on people and the environment. Noise causes hearing loss, interferes with human activities at home and work, and in many ways can cause injury to people's health and well-being. Although hearing loss is the most clearly measurable health hazard, noise is also linked to other physiological and psychological problems. Ambient or background noise is a combination of various sources heard simultaneously (Reference 2.8-33). Noise levels are measured using decibels (dB). A-weighted decibels (dBA) is the relative loudness of sounds as perceived by the human ear. NUREG-1773 states the natural environment of the INL site has relatively low ambient noise levels ranging from 35 to 40 dBA.

The INL site is designated as a National Environmental Research Park to provide protected lands that act as buffers around DOE facilities, and to provide environmental research and education (Reference 2.8-33). The INL site is within and surrounded by a large rural setting, relatively undisturbed expanse of sagebrush steppe with approximately 94 percent of the land open and undeveloped. Lands immediately adjacent to the INL site are open sagebrush steppe, foothills, or agricultural fields. A concentrated area of agriculture is located to the northeast and is bordered on the north and west by mountain ranges and on the south by volcanic buttes and open plains (Reference 2.8-25); LWA ER Figure 2.1.19 provides detail. Both the CFPP and INL sites have similar environmental settings with respect to ambient noise.

The CFPP site is within the confines of INL property and consists mainly of Green Rabbitbrush/Sandberg Bluegrass-Bluebunch Wheatgrass Shrub Grassland (1), Cheatgrass Ruderal Grassland (2), Green Rabbitbrush/Thickspike Wheatgrass Shrub grassland and Needle and Thread Grassland (3/5) and Big Sagebrush - Green Rabbitbrush (Threetip Sagebrush) Shrubland (6) (LWA ER Figure 2.3-5) per the Vegetation Community Classification and Mapping of the INL Site 2019 (Reference 2.8-70). Before land disturbing and building activities commence, no man-made barriers are present on the CFPP site. The natural vegetation acts as a barrier to reduce noise levels (Reference 2.8-33). With very little unvegetated exposed basalt on the CFPP site to reflect noise, a great amount of noise is absorbed by the surrounding natural vegetation.

Noise generated at the INL site is not detectable off-site because existing primary facilities are at least three miles from site boundaries (Reference 2.8-33). The CFPP site is approximately one mile from State Highway 33. Transportation is the principal noise source at the INL site with related activities consisting of transportation of people and materials via buses, trucks, private vehicles, material handling equipment, and freight trains. Other noise sources at the INL site include industrial facilities, equipment, and machines (e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, intercom paging systems). The Federal Interagency Committee on Noise, 1992, states that, in general, plant noise sources are not perceived by many people off-site because the level of noise from the surrounding communities and highways are typically high, approximately 60 to 65 dBA (Reference 2.8-71), but in rural or low-population areas, where background noise levels range from 35 to 45 dBA, plant noises are more noticeable according to NUREG-1437. Because of the CFPP location on the INL site and its characteristics (e.g., rural setting, vegetative ground cover, negligible bare exposed basalt, and relative distance from noise sources) ambient noise levels are relatively low at the CFPP site.

The 2018 U.S. Department of Transportation Federal Transit Administration's Transit Noise and Vibration Impact Assessment maintains that existing noise levels in a particular area are generally based on proximity to nearby major roadways or railroads or on population density (Reference 2.8-72). At the INL site, the land surrounding the proposed VTR site and the existing Materials and Fuel Complex is uninhabited, and the location of the closest noise-sensitive human-receptor is rural. U.S. Route 20 accounts for the majority of potential noise for the closest noise-sensitive human-receptor, but being more than 800 feet away from the proposed VTR, it is not considered a major noise source (Reference 2.8-33).

The CFPP site is uninhabited and surrounded by sparsely populated, rural areas. Butte City and Howe are the closest cities at approximately 9.3 and 10.4 miles, respectively. State Highway 33 is approximately 1.1 miles (5800 feet) from the center point of the CFPP site. State Highway 33 is less frequently traveled than U.S. Route 20 (Reference 2.8-73) but is a commonly used truck route. Table 2.8-7 shows the 2019 average daily traffic on State Highway 33 with 1813 vehicles per day and U.S. Routes 20 and 26 with 4682 and 7720 vehicles per day, respectively. The average daily traffic was calculated within the 50 mile region of the CFPP.

Distances to CFPP noise-sensitive human-receptors with respect to the public and in relation to the INL site are described in Table 2.8-8 and Table 2.8-9, respectively and shown in Figure 2.8-2. The closest noise-sensitive human-receptor is at the intersection of State Highway 33 and T-11 entering the CFPP site, as indicated in Figure 2.8-3. The Big Lost River Rest Area along U.S. Route 20 is the second closest public noise-sensitive human-receptor at approximately 6.5 miles. The closest homes, schools, public venues, and recreation areas are greater than 9 miles from the center of the CFPP site at Butte City and Howe. Experimental Breeder Reactor-1 and Arco Baptist Church, both listed on the National Register of Historic Places, are located approximately 9.1 and 12.6 miles, respectively, from the CFPP site center point and outside the CFPP vicinity. In relation to the INL site, the Advanced Test Reactor Complex and the Remote-Handled Low-Level Waste Complex are the closest industrial facilities within the vicinity of the CFPP at approximately 5.6 and 5.8 miles, respectively.

NUREG-1773 states the natural environment of INL has relatively low ambient noise levels ranging from 35 to 40 dBA. Historical noise measurement data obtained from sites within 50 feet of U.S. Route 20 indicate traffic noise ranges from about 64 to 86 dBA, with buses identified as the primary source, contributing from 71 to 80 dBA (Reference 2.8-33). The noise from traffic on State Highway 33, approximately 5800 feet from the center of the CFPP, would contribute less than 71 to 80 dBA to the CFPP site. Ambient noise studies were not completed for the CFPP site but based on the CFPP site conditions, the CFPP site is considered as having relatively low ambient noise levels ranging from 35 to 40 dBA.

The Noise Control Act, 42 U.S.C. 4901 et seq. (1972), is an established national policy to promote an environment free from noise that jeopardizes public health and welfare (Reference 2.8-9). The EPA is authorized to issue noise emission standards, coordinate federal research in noise control, and provide information to the public regarding noise emissions and reduction. The primary responsibility for control of noise remains with state and local governments under 40 CFR Subchapter G Parts 201 to 211. Aside from the Noise Control Act of 1972, the noise levels associated with the construction and operation of VTR are regulated by 40 CFR 204, Noise Emissions Standards for Construction Equipment (Reference 2.8-33). This applies to the CFPP. Except for the prohibition of nuisance noise, neither the State of Idaho nor local governments have established regulations that specify acceptable community noise levels applicable to the INL or CFPP sites.

Noise ranging from 80 to 95 dBA can be heard at a distance of 50 feet (0.009 miles) from the source according to NUREG-1945, Environmental Impact Statement for the Proposed Eagle Rock Enrichment Facility in Bonneville County, Idaho, Volume 1. If noise levels from the CFPP construction or operations activities were at 95 dBA, then the closest noise-sensitive human-receptor (State Highway 33 & T-11 intersection, approximately 1.1 mile) the noise heard would be approximately 54 dBA through attenuation in a free field. Passengers in vehicles driving past may not hear this noise because of the background noise levels in rural areas ranging from 45 to 55 dBA and the vehicle engine noise. Other noise-sensitive human-receptors of the CFPP are at further distances; thus, noise levels significantly higher than 95 dBA would be necessary to affect these receptors.

Railroad operations are subject to federal noise regulations. Moving locomotives are required to operate at less than 90 dB and railcar noise should not exceed 93 dB (40 CFR 201.12 and 201.13) (Reference 2.8-74). The CFPP site does not have rail service and rail noise is difficult to hear at the CFPP site with the closest rail approximately 7 miles away. With only attenuation by distance in a free environment, the noise level at the center of the CFPP site is approximately 22 dB from the railcar noise.

The CFPP complies with environmental, health, and safety requirements, promulgated by the NRC, OSHA, EPA, and DEQ regulations, to minimize potential impacts from noise to public and occupational health. Noise-sensitive human-receptors and noise levels are discussed specific to construction in LWA ER Section 4.8 and operations is addressed in the Combined License Application.

2.8.3 Transportation

The CFPP site, vicinity, and regional existing road transportation are discussed below. According to the Comprehensive Land Use and Environmental Stewardship Report Update, March 2020, (Reference 2.8-76), approximately 6 percent of the 34,000 acres of land, on the INL site, consists of public roads and utility rights-of-way. U.S. Routes 20 and 26 cross the southern portion of the INL site, while State Highways 22, 28, and 33 cross the northern portion. The paved public highways on the INL site total approximately 90 miles. The INL site has an additional 87 miles of nonpublic paved roads within its boundary, including 18 miles of service roads, and 100 miles of unpaved secondary roads to provide access for emergency, security, monitoring, compliance, research, and service vehicles.

The CFPP site, located within the INL site, is bound on the northwest corner by State Highway 33, which is approximately one mile from the center of the site. Access to the site is via the INL site secondary road, T-11 (Figure 2.8-4). In addition to State Highway 33 and T-11, transportation within the CFPP vicinity includes U.S. Routes 20 and 26, which run southeast to northwest (Figure 2.8-5).

Regional transportation infrastructure of the CFPP site includes Interstate 15, four U.S. Routes (20, 26, 91, and 93), four State Highways (22, 28, 33, and 39) within the expanded economic region (LWA ER Figure 2.4-7). Interstate 15, approximately 44 miles to the east, is the main artery into Idaho from larger U.S. cities. It extends north from Salt Lake City through Idaho and Montana, and southwest to southern California. U.S. Routes 20 and 26, approximately 4 and 12 miles, respectively, from the CFPP site, are the main access routes to the CFPP site. U.S. Route 20 intersects Interstate 15 near Idaho Falls and connects Idaho Falls with Butte City and Arco, south of the CFPP site. U.S. Route 26 extends from Blackfoot to the northwest of Atomic City and merges with U.S. Route 20. U.S. Route 20/26 proceeds through the INL site and turns southwest at Arco. The two highways diverge at the city of Carey at the outer southwestern edge of the CFPP region. U.S. Route 93 begins at Arco at the junction of U.S. Route 20/26 and proceeds northwest towards Moore and MacKay through the Big Lost River valley. State Highway 22 runs from State Highway 33, near the INL Test Area North, north and northeast to Dubois to intersect with Interstate 15. State Highway 28 joins Rexburg to Mud Lake, then proceeds north up the Birch Creek valley to Leadore, located outside the CFPP region. U.S. Route 91 parallels Interstate 15 between the Pocatello and Idaho Falls locale. Interstate 15, U.S. Routes 20 and 26, and State Highway 33 are the main service roads for the CFPP deliveries of equipment, materials, and supplies.

The carrying capacities of roads in the vicinity of the CFPP site are shown in Figure 2.8-7. State Highway 33 and combined U.S. Routes 20 and 26 have the allowable unit weights of single axle, two-axle tandem, and three-axle tandem at 27,000 pounds (lb), 46,000 lb, and 57,000 lb, respectively, according to the Idaho Transportation Department (ITD) (Reference 2.8-77).

Within the CFPP region, Interstate 15 is the only road that has basic allowable units weights of 33,000 lb for single axle, 56,000 lb for two-axle tandem, and 70,500 lb for three-axle tandem vehicles (Figure 2.8-8). U.S. Routes 20 and 26 coming off Interstate 15 and State Highways 22, 28, 39, and a portion of State Highway 33 have the basic allowable unit weight of a single axle of 30,000 lb, two-axle tandem of 51,500 lb, and three-axle of 64,500 lb. A short section of U.S. Route 91 has a lower allowable weight than all other roads within the region.

The Idaho Public Transportation Plan for District Six, which includes Bonneville, Butte, Clark, Custer, Jefferson, Lemhi, and Madison counties explains that Idaho has limited public transportation options in rural areas (Reference 2.8-78). An employment shuttle provides transit to INL employees from Idaho Falls, Pocatello, and Blackfoot during the weekdays. In 2020, approximately 5000 people worked for INL operations managed by Battelle Energy Alliance, both at the INL site and facilities in Idaho Falls. Additionally, more than 700 people work at the Naval Reactor Facility and approximately 1600 people support the environmental cleanup effort, in addition to individuals employed by DOE, USGS, and other contractors. During a typical workweek, the majority of employees take buses to their respective work areas at the INL site, consisting of approximately 70 bus routes. The CFPP is not currently planning on using buses to transport workers for construction or operations activities.

According to the ITD Projects (Reference 2.4-120) and I-15/US-20 Connector web page (Reference 2.4-121), ten roadway projects are planned for regional highways (Table 2.4-51). Projects that could potentially have an impact on traffic flow to and from the CFPP site are

- Interstate 15/U.S. Route 86 System Interchange Complex.
- U.S. Route 20 Rexburg Interchanges.
- Interstate 15/U.S. Route 20 Connector.
- others that have an unknown completion date.

Road performance is measured using level of service (LOS) ratings. The LOSs are qualitative measures used to relate the quality of motor vehicle traffic services. The LOS analyzes roadways and intersections by categorizing traffic flow and assigning quality levels of traffic based on performance measures such as vehicle speed, density, and congestion. The LOS ratings range from “A” to “F,” with “A” being the best travel conditions and “F” being the worst. The LOS ratings for U.S. highways are:

- A: Traffic flows freely at or above the posted speed limit and motorists have complete mobility among lanes. Motorists have a high level of physical and psychological comfort. The effects of incidents or point breakdowns are easily absorbed. A rating of LOS A generally occurs late at night in urban areas and frequently in rural areas.
- B: Speeds are maintained and maneuverability within the traffic stream is slightly restricted. Motorists still have a high level of physical and psychological comfort.
- C: Traffic flow is stable, at, or near free flow. The ability to maneuver through lanes is noticeably restricted and lane changes require more driver awareness. Most experienced drivers are comfortable, roads remain safely below but efficiently close to capacity, and posted speed is maintained. Minor incidents may

still have no effect, but localized service has noticeable effects and traffic delays form behind an incident. A rating of LOS C is considered acceptable for local roads and highways.

- D: Traffic flow is approaching unstable. Speeds slightly decrease as traffic volumes slightly increase. Freedom to maneuver within the traffic stream is much more limited and driver comfort levels decrease. Minor incidents create delays. A rating of LOS D is commonly considered acceptable for urban streets during peak hours because societal impacts and costs of construction (bypasses and lane additions) to attain a LOS C rating would be prohibitive.
- E: Traffic flow is unstable and operating at capacity. Flow becomes irregular, speeds vary rapidly, and there are virtually no usable gaps to maneuver in the traffic stream. Speeds rarely reach the posted limit. A disruption to traffic flow, such as merging ramp traffic or lane changes, create a shock wave affecting traffic upstream. An incident creates serious delays. Drivers' level of comfort becomes poor. A rating of LOS E is a common standard in larger urban areas, where some roadway congestion is inevitable.
- F: Traffic is forced or there is a breakdown in flow. Every vehicle moves in lockstep with the vehicle in front of it. Frequent slowing is required. Travel time cannot be predicted, with generally more demand than capacity. A road in a constant traffic jam is at LOS F.

The LOS is average or typical service rather than a constant state according to Transportation Engineering and Planning (Reference 2.8-79). For example, a highway might be at LOS D for the morning peak hour, but have traffic consistent with LOS C some days, LOS E or F on others, and come to a halt once every few weeks. The majority of road segments in the vicinity of the INL site operate at LOS D or better (i.e., LOS C). However, Interstate 15 and U.S. Route 20 interchange and a portion of U.S. Route 26 (north of E Street in Idaho Falls) becomes an LOS E threshold at certain times (Reference 2.8-33). Traffic LOS for the CFPP vicinity and region currently operate the same as mentioned above.

The U.S. Routes 20 and 26, and State Highway 33 are the main service roads for the CFPP workforce coming from the four principal cities (e.g., Blackfoot, Idaho Falls, Pocatello, and Rexburg) that may house the workforce as listed in LWA ER Table 2.4-2. Traffic data are from 2019 as this is the most recent available full set of data that includes both crash data and annual average daily traffic counts. As shown in Figure 2.8-9 according to the Annual Average Daily Traffic, U.S. Routes 20 and 26 and State Highway 33 had between 10 and 2800 vehicles per day in 2019, except for a short segment around the proximity of a main entrance to INL where the count was between 2801 and 7800.

Road usage in the CFPP site region is illustrated in Figure 2.8-10. Highlights are listed below.

- Interstate 15 ranges from 15,001 to 26,000 vehicles per day between Blackfoot and Idaho Falls with the exception of a segment near Idaho Falls that ranges between 26,001 and 54,500 vehicles per day.

- U.S. Route 20 heading west from Idaho Falls ranges from 2801 to 7800 vehicles per day.
- U.S. Route 26 heading west from Blackfoot ranges from 2801 to 7800 and decreases to 10 to 2800 vehicles per day.
- Interstate 15 between Pocatello (outside the CFPP region) and Blackfoot ranges from 26,001 to 54,500 vehicles per day.

The majority of other roads within the CFPP site region have an annual average daily traffic count from 10 to 2800. Traffic volumes to the INL site currently fluctuate because of operational needs, current projects, and outages. The number of vehicles on the main roads around the CFPP site increases during peak COL construction. During the transition from construction to operations the number of vehicles from the CFPP site decreases. Most of the roads are adequate for the current level of normal transportation activity and can handle an increase in traffic volume (Reference 2.8-33). As with the CFPP, the proposed VTR could cause an increase in the usage of the main service roads as projects along the same transportation route progress.

Analysis on impacts to transportation is provided for the CFPP construction in LWA ER Section 4.8.3 and impacts for operations is addressed in the Combined License Application.

Roadways within the CFPP project site include heavy haul roads that are used for construction purposes. After completion of construction activities some of these roadways may be abandoned if not necessary to plant operations, but many of these roads are re-purposed as plant roadways that service the CFPP plant site during operations.

In 2019, one possible injury accident and seven reports of property damage occurred within the vicinity of the CFPP according to ITD (Figure 2.8-11).

Figure 2.8-12 shows transportation accidents in the region of the CFPP site. The majority of the accidents occured on the eastern side of the region along, but not necessarily on, Interstate 15 around the Idaho Falls and Blackfoot areas in the CFPP expanded economic region. Table 2.8-7 displays the accident statistics for the CFPP regional transportation network during 2019. A summary is provided below.

- Interstate 15 has the highest daily traffic count of 16,245, almost half of the traffic analyzed, vehicles per day and approximately 43 percent of the accidents.
- U.S. Route 20 has 23 percent of the daily traffic levels, of those analyzed, and about 12 percent of the total accidents (30).
- State Highway 93 has the highest number of fatal accidents (2) and 2 fatalities.
- State Highways 22 and 28 are less traveled and had no fatal accidents.
- 71 percent of the accidents were property damage with no injuries or fatalities.

During 2019, 245 accidents occurred within the CFPP transportation network region. The CFPP site is completely within Butte County, which recorded 29 vehicle accidents. This accounts for approximately 12 percent of the total accidents within the CFPP region as shown in Table 2.8-10. Bingham County had the highest number of accidents within the CFPP region at 49 percent. Within the CFPP region, no vehicle accidents occurred in Minidoka or Power Counties during 2019.

The impacts from increased traffic during CFPP construction is discussed in LWA ER Section 4.8.3 and the impacts to operations is addressed in the Combined License Application.

2.8.4 Electromagnetic Fields

Multiple power providers work throughout Idaho, including PacifiCorp and Bonneville Power Administration, within the vicinity of the CFPP site (Figure 2.8-13). In the CFPP region, electric power is provided by PacifiCorp, Bonneville Power Administration, Idaho Power Co., Salmon River Electric COOP Inc., Lost River Electric COOP Inc., and Northwestern Energy LLC (Figure 2.8-14). The CFPP 34.5 kilovolts (kV) and 230 kV transmission lines are discussed in LWA ER Section 3.1.8.

Idaho's electrical power demand is steadily growing as the population and economic activity increase, requiring associated transmission capacity growth. 115 kV to 287 kV and lower voltage transmission lines are within the vicinity (Figure 2.8-13) and region, although a 345 kV transmission line is contained just within the CFPP regional boundary (Figure 2.8-14).

An electromagnetic field (EMF) is a field made up of associated electric and magnetic components that results from the motion of an electric charge. An EMF possesses a definite electromagnetic energy expressed in volts per meter (V/m) or kilovolts per meter (kV/m). EMFs can be associated with high voltage power lines, wireless devices, and household appliances and diminish rapidly with distance from the source. According to the World Health Organization (WHO), electric fields are created by differences in voltage; thus, the higher the voltage, the stronger the electric field. Magnetic fields are created when electric current flows; thus, the greater the current, the stronger the magnetic field (Reference 2.8-80). An electric field may exist even when no current is flowing. If current does flow, the strength of the magnetic field varies with power consumption and the electric field strength is constant. The WHO also states that all populations are now exposed to varying degrees of EMF, with levels increasing as technology advances.

The strength of EMF depends on the current, design of the line, and distance from the line with most of the energy dissipated in the transmission rights-of-way. A very low residual amount is reduced to background levels close to the rights-of-way or energized equipment. Electric and magnetic fields induce voltages and currents in the body. Directly beneath a high voltage transmission line, the induced currents are very small compared to thresholds for producing shock and other electrical effects (Reference 2.8-80).

Impacts from EMFs to the public and occupational health are addressed in the Combined License Application.

2.8.4.1 Chronic Effects of Transmission Lines

In the area of biological effects and medical applications of non-ionizing radiation, approximately 25,000 articles have been published over the past 30 years. Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of health consequences from exposure to low-level EMFs. However, some gaps in knowledge about biological effects exist. Further research is required, according to the WHO, as discussed below (Reference 2.8-82).

With respect to transmission line EMF effects on general health, some members of the public have attributed a diffuse collection of symptoms to low levels of exposure to EMF at home. Reported symptoms include headaches, anxiety, suicide and depression, nausea, fatigue, and loss of libido. To date, scientific evidence does not support a link between these symptoms and exposure to EMF. General eye irritation and cataracts have sometimes been reported in workers exposed to high levels of radiofrequency and microwave radiation, but animal studies do not support the idea that such forms of eye damage can be produced at levels that are not thermally hazardous. No evidence exists that these effects occur at levels experienced by the public.

Some individuals report "hypersensitivity" to an electric or magnetic field, with symptoms such as aches and pains, headaches, depression, lethargy, sleeping disorders, and even convulsions and epileptic seizures, which could be associated with EMF exposure. Little scientific evidence exists to support the idea of electromagnetic hypersensitivity. Recent Scandinavian studies (Reference 2.8-82) found that individuals do not show consistent reactions under properly controlled conditions of EMF exposure.

Many different sources and exposures to EMFs in the living and working environment, including computer screens, water beds and electric blankets, radiofrequency welding machines, diathermy equipment and radar, have been evaluated by the WHO and other organizations. The overall weight of evidence shows that exposure to fields at typical environmental levels does not increase the risk of an adverse outcome, such as spontaneous abortions, malformations, low birth weight, and congenital diseases. Occasional reports associate health problems and presumed exposure to EMFs, such as reports of prematurity and low birth weight in children of workers in the electronics industry. These symptoms have been attributed by the scientific community to factors such as exposure to solvents as opposed to being necessarily caused by the EMF exposures.

Despite many studies, the evidence for effect remains highly controversial. However, data suggest that if EMFs do have an effect on cancer, then increase in risk is extremely small. The results to date contain many inconsistencies, but no large increases in risk have been found for cancer in children or adults (Reference 2.8-82).

Transmission lines operate at a frequency of 60 Hz, which is considered extremely low frequency according to OSHA (Reference 2.8-83). Electric fields found in areas accessible to the public with high voltage transmission lines can typically range up to 3 kV/m for 230 kV lines, 10 kV/m for 500 kV lines, and 12 kV/m for 765 kV lines. The electric field peak levels are considerably higher than the levels found in other public areas but are only in limited areas on rights-of-way. Electric fields are reduced as a result of the presence of vegetation on and at the edge of transmission line rights-of-way, although this does not apply to magnetic fields (Reference 2.8-84).

The magnetic field generated by currents on transmission line conductors extends from the conductors through the air and into the ground. The magnitude of the field at a height of 3.28 feet is frequently used to describe the magnetic field under transmission lines. The most important transmission line parameters that determine the magnetic field at that height are conductor height above ground and magnitude of the currents flowing in the conductors. As distance from the transmission line conductors increases, the magnetic field decreases (Reference 2.8-84).

Two 230 kV lines are located to the southwest of the CFPP site near where the CFPP is proposing to construct a new 230 kV line. This new line exits the CFPP site to the northeast and heads southeast adjacent to the existing PacifiCorp 69 kV transmission line towards the existing Antelope Substation (Figure 2.8-13). The entire CFPP 230 kV transmission corridor lies within the INL boundary, which is access controlled and expected to limit EMF exposure to the public. The CFPP and other INL employees are exposed to near zero electrical fields and minimal magnetic fields outside the rights-of-way of the 230 kV transmission line.

Electrical shock potential is of small significance for transmission lines that are operated in adherence with the National Electrical Safety Code (NESC) as stated in NUREG-1437, Revision 1. The NESC is the basis for design criteria that are intended to limit the risk of shock and other hazards due to transmission lines. The purpose of the NESC is to safeguard persons during the installation, operation, or maintenance of electric supply and communication lines and associated equipment. The NESC contains basic provisions considered necessary for the safety of employees and the public under the specified conditions. Transmission lines are required by the NESC to be designed with minimum vertical clearances to the ground so that the short-circuit current to ground produced from the largest anticipated vehicle or object is limited to less than 5 milliamperes. The CFPP meets NESC requirements to ensure the safety of the public and employees.

Electric shock hazards can occur when voltage-induced metallic objects, such as vehicles, metal buildings, fences, roofs, and irrigation systems near power transmission lines, but away from the high voltage wires, are touched. Grounding or connection to the earth can prevent shocks according to Living and Working Safely Around High-Voltage Power Lines, 2007 (Reference 2.8-85).

The CFPP complies with environmental, health, and safety requirements, promulgated by the NRC, OSHA, EPA, and DEQ regulations, to minimize potential impacts from EMF to occupational health. The CFPP transmission corridors are located on INL property, which are not accessible to the public; thus, there is minimal to potentially no exposure to the public. Operational EMFs are addressed in the Combined License Application.

According to NUREG-1437, because of inconclusive scientific evidence, the chronic health effects of EMF are considered uncertain and no generic impact level is assigned. No new information has become available for a consensus by the appropriate federal health agencies pertaining to the effects of long-term or chronic exposure to EMFs. According to WHO to date, no adverse health effects from low-level, long-term exposure to radiofrequency or power frequency fields have been confirmed, but scientists are actively continuing to research this area (Reference 2.8-82).

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Table 2.8-1: National Ambient Air Quality Standards

Pollutant	Averaging Time	National Standards	
		Primary	Secondary
O_3	8-hour	0.07 ppm	Same as primary
CO	8-hour	9 ppm	Not applicable
	1-hour	35 ppm	Not applicable
NO_2	Annual	53 ppb	Same as primary
	1-hour	100 ppb	Not applicable
SO_2	1-hour	75 ppb	Not applicable
	3-hour	Not applicable	0.5 ppm
	Annual	12 g/m^3	15 g/m^3
$PM_{2.5}$	24-hour	35 g/m^3	35 g/m^3
PM_{10}	24-hour	150 g/m^3	150 g/m^3
Lead	Rolling 3-month period	0.15 g/m^3	0.15 g/m^3

Reference 2.8-31
O_3 - Ozone
CO - Carbon monoxide
NO_2 - Nitrogen oxide
SO_2 - Sulfur dioxide
$PM_{2.5}$ - Particulate matter less than 2.5 microns in diameter
PM_{10} - Particulate matter less than 10 microns in diameter
ppm - parts per million
ppb - parts per billion
g/m^3 - micrograms per cubic meter

Table 2.8-2: Fatal Occupational Injuries by Industry Sector

Industry Sector	Number of Fatalities	Rate[1]
Agriculture, Forestry, Fishing and Hunting	511	21.5
Mining, Quarrying, and Oil and Gas Extraction	78	NA
Construction (NAICS 23)	1008	10.2
Manufacturing	340	2.3
Wholesale Trade	155	4.6
Retail Trade	275	2
Transportation and Warehousing	805	13.4
Utilities (NAICS 221)	19	NA
Information	31	NA
Finance and Insurance	20	NA
Real Estate and Rental and Leasing	73	NA
Professional, Scientific, and Technical Services	62	NA
Administrative and Support and Waste Management and Remediation Services	413	NA
Educational Services	26	0.7
Health Care and Social Assistance	119	
Arts, Entertainment, and Recreation	59	2.5
Accommodation and Food Services	160	
Other Services, Except Public Administration	188	3.3
Government	415	1.8

Reference 2.8-38
[1] per 100,000 full-time equivalent workers
NA - Not Available
Data from 2020

Table 2.8-3: Fatal Occupational Injuries in the Construction and Utilities Industry Sectors

Industry Sector	NAICS[1] Code	Number of Fatalities
Construction	23	1008
Construction of Buildings	236	192
Heavy and Civil Engineering Construction	237	194
Utility System Construction	2371	79
Water and Sewer Line and Related Structures Construction	23711	30
Oil and Gas Pipeline and Related Structures Construction	23712	-
Power and Communication Line and Related Structures Construction	23713	30
Highway, Street, and Bridge Construction	2373	87
Specialty Trade Contractors	238	576
Trade, Transportation, and Utilities	-	1254
Utilities	221	19
Electric Power Generation, Transmission and Distribution	2211	14
Electric Power Generation	22111	4
Fossil Fuel Electric Power Generation	221112	-
Nuclear Electric Power Generation	221113	-
Electric Power Transmission, Control, and Distribution	22112	10
Natural Gas Distribution	2212	1
Water, Sewage and Other Systems	2213	4

Reference 2.8-39

[1] NAICS, 2017.

Note: Because of rounding, components may not add to totals. Dash indicates data do not meet publication guidelines.

Data from 2020

Table 2.8-4: Fatal Occupational Injuries by Event or Exposure

Event or Exposure	U.S. All Industries[1]	U.S. NAICS 23713[1]	U.S. NAICS 22111[1]	Idaho[2]
Violence and Other Injuries by Persons or Animals	705	-	-	-
Transportation Incidents	1778	13	-	18
Falls, Slips, Trips	805	6	1	-
Contact with Objects and Equipment	716	-	-	10
Other	760	11	3	4
Total	**4764**	**30**	**4**	**32**

[1] Reference 2.8-42
[2] Reference 2.8-43
NAICS 23713 - Power and Communication Line and Related Structures
NAICS 22111 - Electric Power Generation
Data from 2020
- No data reported or data does not meet publication criteria

Table 2.8-5: Nonfatal Occupational Injuries and Illnesses by Industry and Case Types

Industry	NAICS Code[1]	Total Recordable Cases[2]	Cases with Days Away from Work, Job Restriction, or Transfer			
			Total[2]	Cases with Days Away from Work	Days of Job Transfer or Restriction[2]	Other Recordable Cases[2]
Construction	-	174.1	106.4	74.5	31.9	67.6
Construction	23	174.1	106.4	74.5	31.9	67.6
Construction of Buildings	236	34.2	19	13.6	5.3	15.3
Heavy and Civil Engineering Construction	237	21.5	14	8.8	5.2	7.5
Utility System Construction	2371	10.1	6.8	4.3	2.5	3.3
Water and Sewer Line and Related Structures Construction	23711	5	3.2	2.2	1	1.8
Oil and Gas Pipeline and Related Structures Construction	23712	1	0.5	0.3	0.2	0.5
Construction	23713	4.1	3.1	1.7	1.4	1
Highway, Street, and Bridge Construction	2373	9.4	5.7	3.2	2.4	3.8
Specialty Trade Contractors	238	118.3	73.4	52.1	21.4	44.9
Trade, Transportation, and Utilities	-	688.6	479	285.2	193.8	209.6
Utilities	22	8.4	5.5	3.4	2.1	2.9
Utilities	221	8.4	5.5	3.4	2.1	2.9
Electric Power Generation, Transmission and Distribution	2211	5.7	3.7	2.4	1.3	2
Electric Power Generation	22111	1.6	1	0.6	0.3	0.6
Fossil Fuel Electric Power Generation	221112	1.2	0.8	0.5	0.3	0.5
Nuclear Electric Power Generation	221113	0.1	0.1	0.1	-	0.1
Electric Power Transmission, Control, and Distribution	22112	4.1	2.7	1.8	0.9	1.4
Natural Gas Distribution	2212	1.7	1.2	0.5	0.6	0.5
Water, Sewage and Other Systems	2213	1	0.7	0.5	0.2	0.4

Reference 2.8-86

[1] NAICS, 2017

[2] Numbers in thousands

[3] Days-away-from-work cases include those that result in days away from work with or without job transfer or restriction.

Note: Because of rounding, components may not add to totals. Dash indicates data do not meet publication guidelines.

Data from 2020

Table 2.8-6: Etiological Data for Idaho and the United States

Etiological Agent	Number of Outbreaks		Number of Illnesses		Number of Hospitalizations		Number of Deaths	
	Idaho	U.S.	Idaho	U.S.	Idaho	U.S.	Idaho	U.S.
Salmonella spp.	8	713	155	5095	7	626	0	17
Shigella spp.	6	1082	14	18,609	2	808	0	1
Pseudomonas aeruginosa	1	26	7	226	0	16	0	2
Legionella spp.	1	487	5	2750	5	1662	0	209
Vibrio spp.	0	3	0	196	0	4	0	0
Karenia brevis	-	-	-	-	-	-	-	-
Naegleria fowleri	0	0	0	0	0	0	0	0
Acanthamoeba spp.	0	1	0	2	0	0	0	0
Total	**16**	**2312**	**181**	**26,878**	**14**	**3116**	**0**	**229**

Reference 2.8-68
Data from 2010 to 2020
- No data available

Table 2.8-7: 2019 Accident Statistics for the CFPP Regional Transportation Networks

Roads	Average Daily Traffic[1]	Total Accidents[2]	Injury Accidents[2]	Injuries[2]	Fatal Accidents[2]	Fatalities[2]	Property Damage[2]
U.S. Route 20	4682	40	12	15	0	0	28
U.S. Route 26	7720	30	15	29	0	0	15
State Highway 33	1813	24	3	3	1	1	20
State Highway 93	1454	34	7	10	2	2	25
State Highway 22	450	2	0	0	0	0	2
State Highway 28	620	9	3	5	0	0	6
Interstate 15	16,245	106	27	37	0	0	79
Totals	**32,984**	**245**	**67**	**99**	**3**	**3**	**175**

Reference 2.8-87
Reference 2.8-88

Table 2.8-8: Noise-Sensitive Human-Receptor Locations with Respect to the Public

Location	Description/Abbreviation	Distance to CFPP[1] (miles)
State Highway 33 & T-11	Public Road	1.1
Security Owner Controlled Area Fence Line	SOCA	Varies
Big Lost River Rest Area	Public Rest Area	6.5
Experimental Breeder Reactor-1[2]	EBR-1	9
Howe Residence	Home Residence	9.3
Butte City Residence	Home Residence	9.5
Howe Community Center	Public Venue	10.5
Howe Park	Recreation Area	10.5
Arco Elementary and Butte City Middle/High Schools	Schools	12.5
Arco Baptist Church[2]	Church	12.6

Reference Figure 2.8-2
[1] Approximate distance from the center of the CFPP site
[2] Listed on the National Register of Historic Places

Table 2.8-9: Noise-Sensitive Human-Receptor Locations at the INL Site

Location	Description/Abbreviation	Distance to CFPP (miles)
State Highway 33 & T-11	Entrance to INL at the CFPP site	1.1
Advanced Test Reactor Complex	ATR	5.6
Remote-Handled Low-Level Waste	RHLLW	5.8
Naval Reactors Facility	NRF	7
Idaho Nuclear Technology and Engineering Center	INTEC	7.6
Experimental Breeder Reactor-1[2]	EBR-1	9.1
Central Facilities Area	CFA	9.1
Radioactive Waste Management Complex	RWMC	9.6
Critical Infrastructure Test Range Complex	CITRC	11.2

Reference Figure 2.8-2

[1] Approximate distance from the center of the CFPP site

[2] Listed on the National Register of Historic Places

Table 2.8-10: Accidents by County in the CFPP Project Region

County	Total Accidents
Bannock	0
Bingham	119
Blaine	4
Bonneville	27
Butte	29
Clark	8
Custer	9
Jefferson	32
Lemhi	2
Lincoln	15
Minidoka	0
Power	0
Total	**245**

Reference 2.8-88
Data from 2019

Figure 2.8-1: CFPP Hazard Evaluation Map

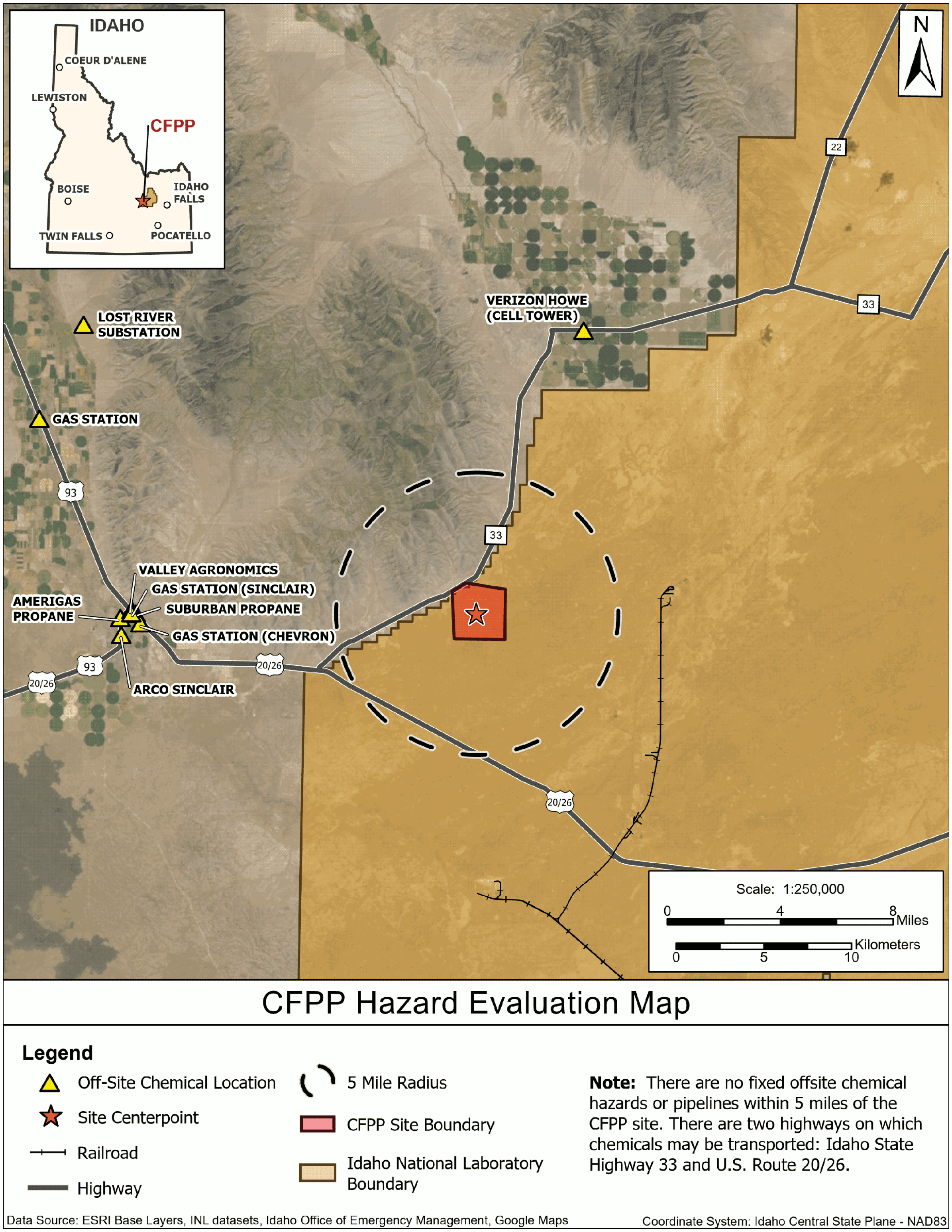


Figure 2.8-2: CFPP Noise-Sensitive Human-Receptor Locations

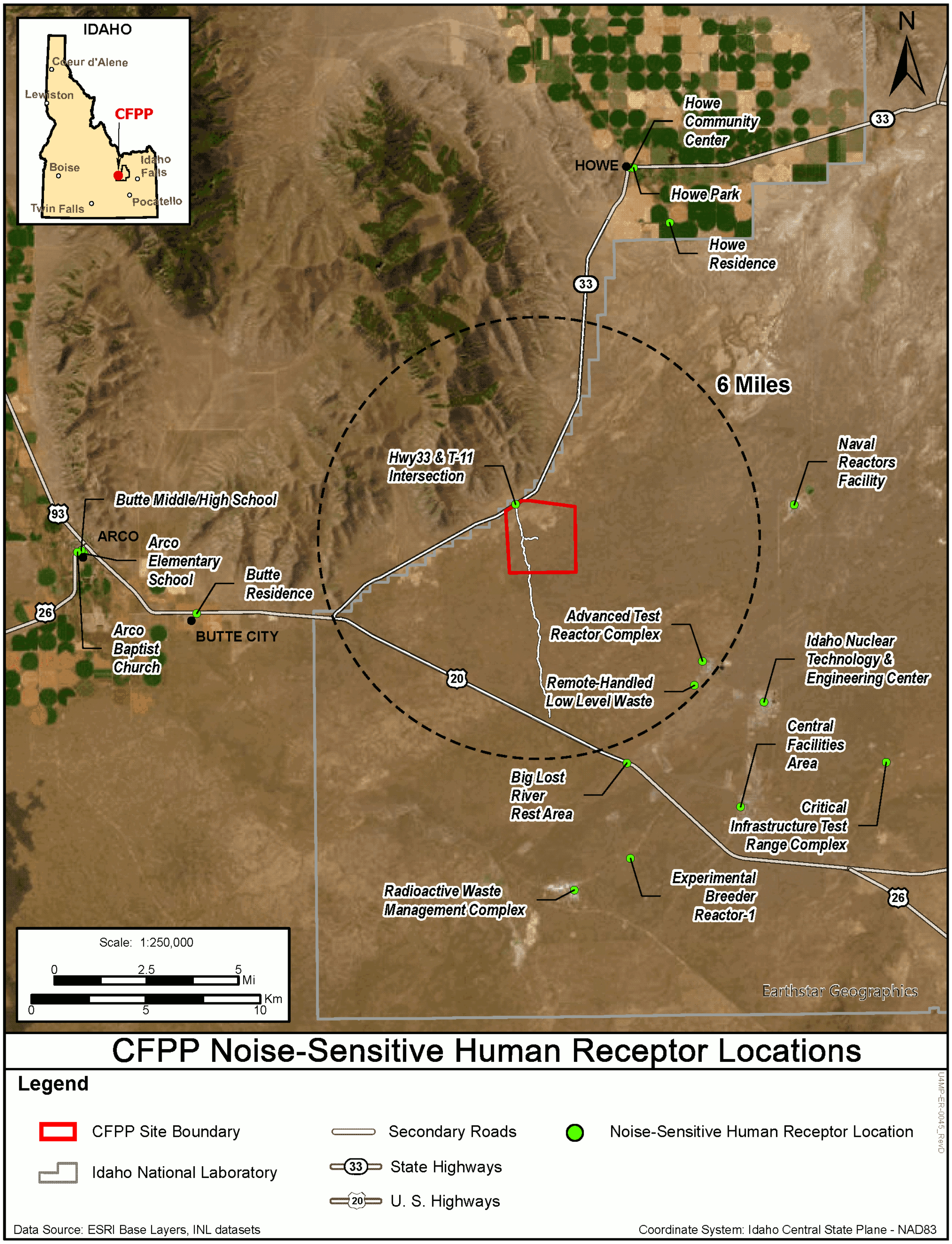


Figure 2.8-3: Artist Rendering View of the CFPP Above State Highway 33

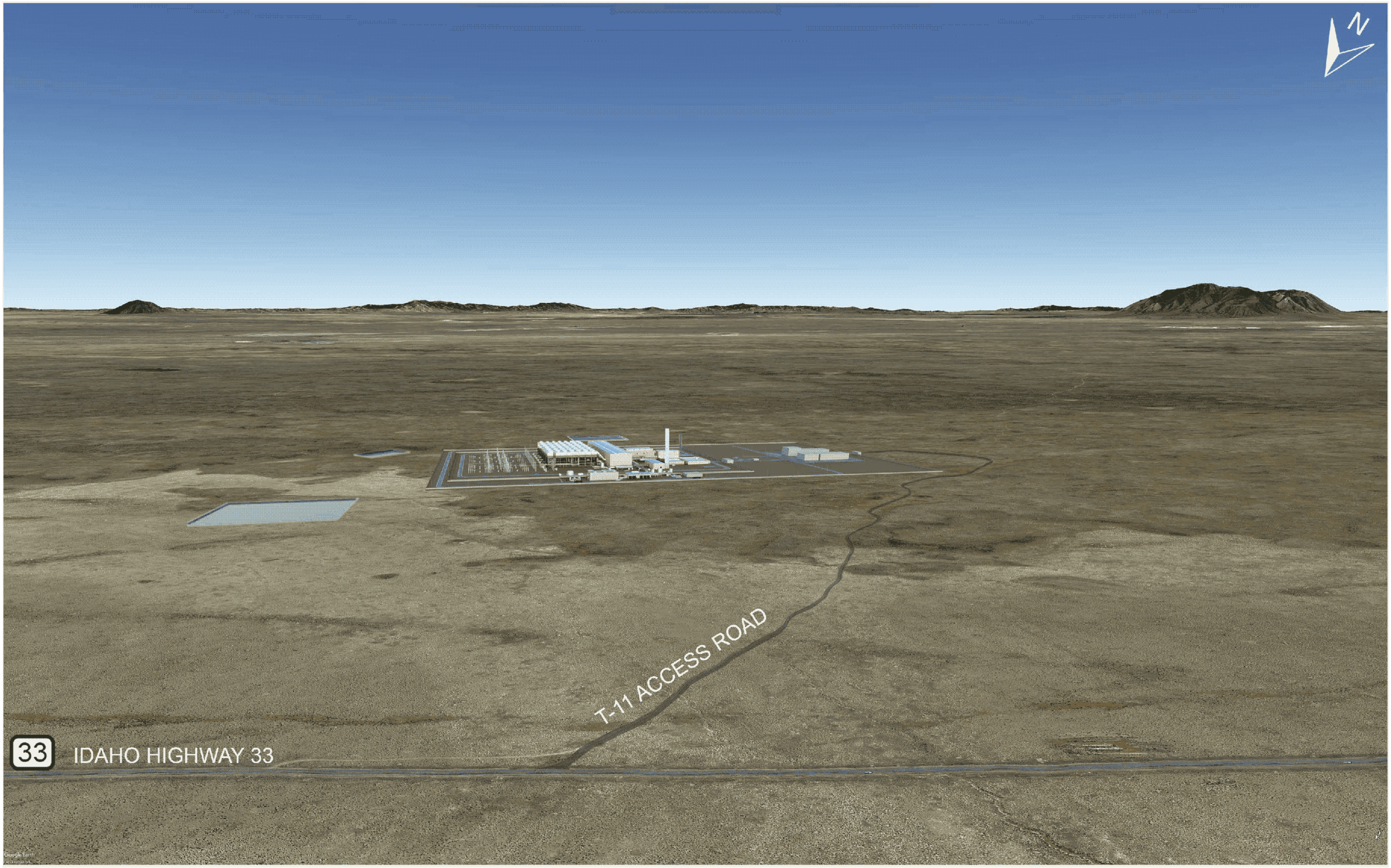


Figure 2.8-4: CFPP Site Roads

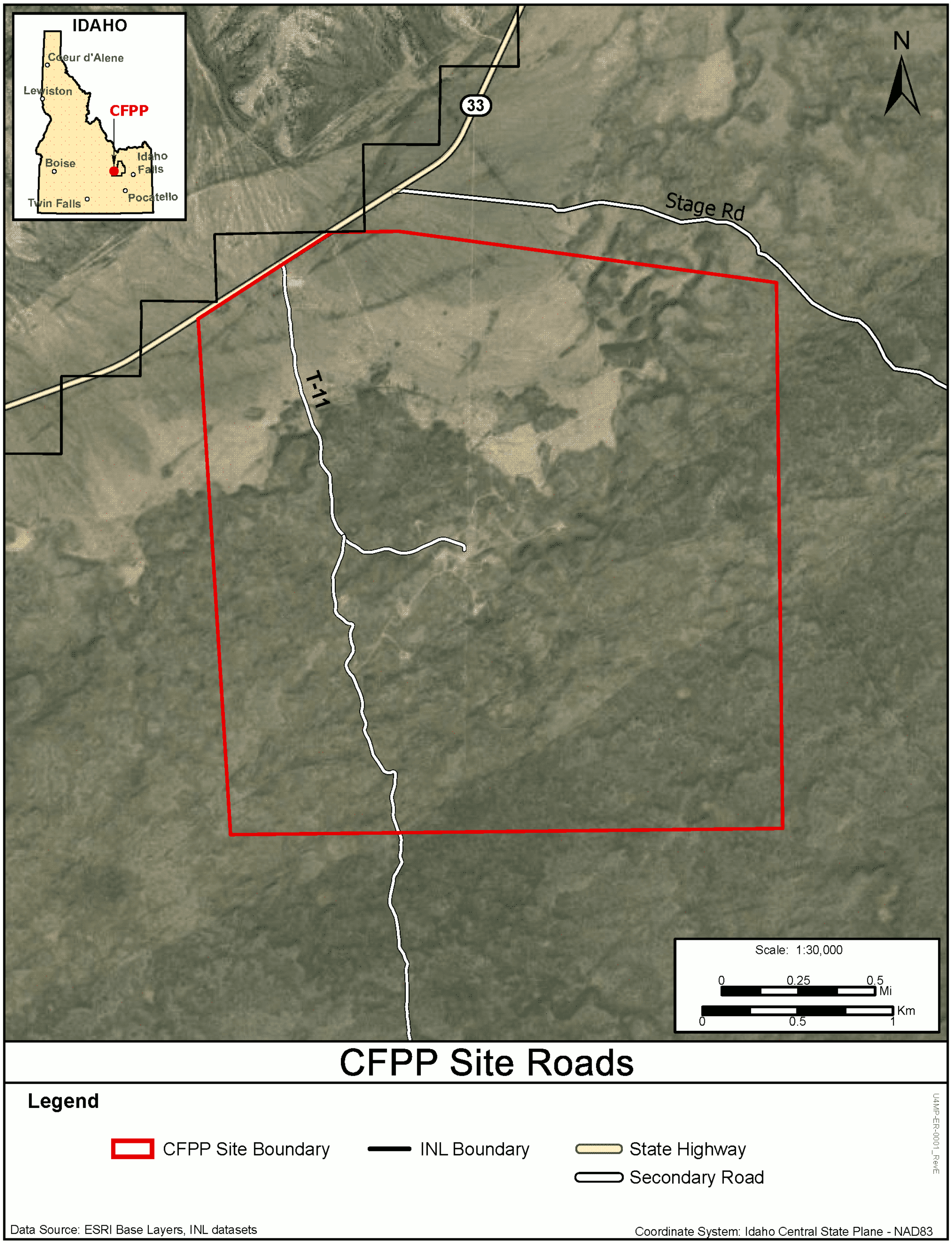


Figure 2.8-5: Roadways in the CFPP Site Vicinity

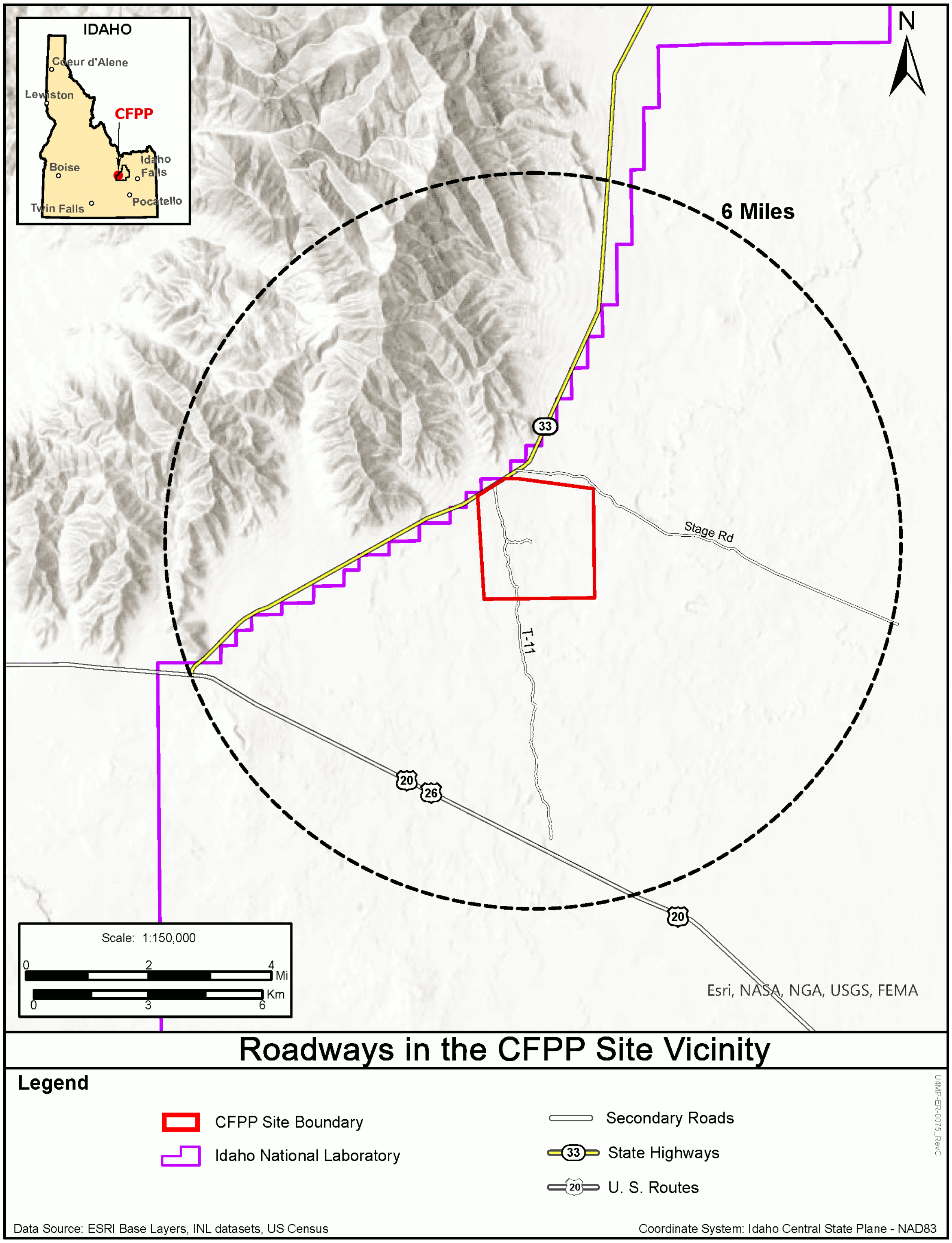


Figure 2.8-6: Roadways in the CFPP Site Region

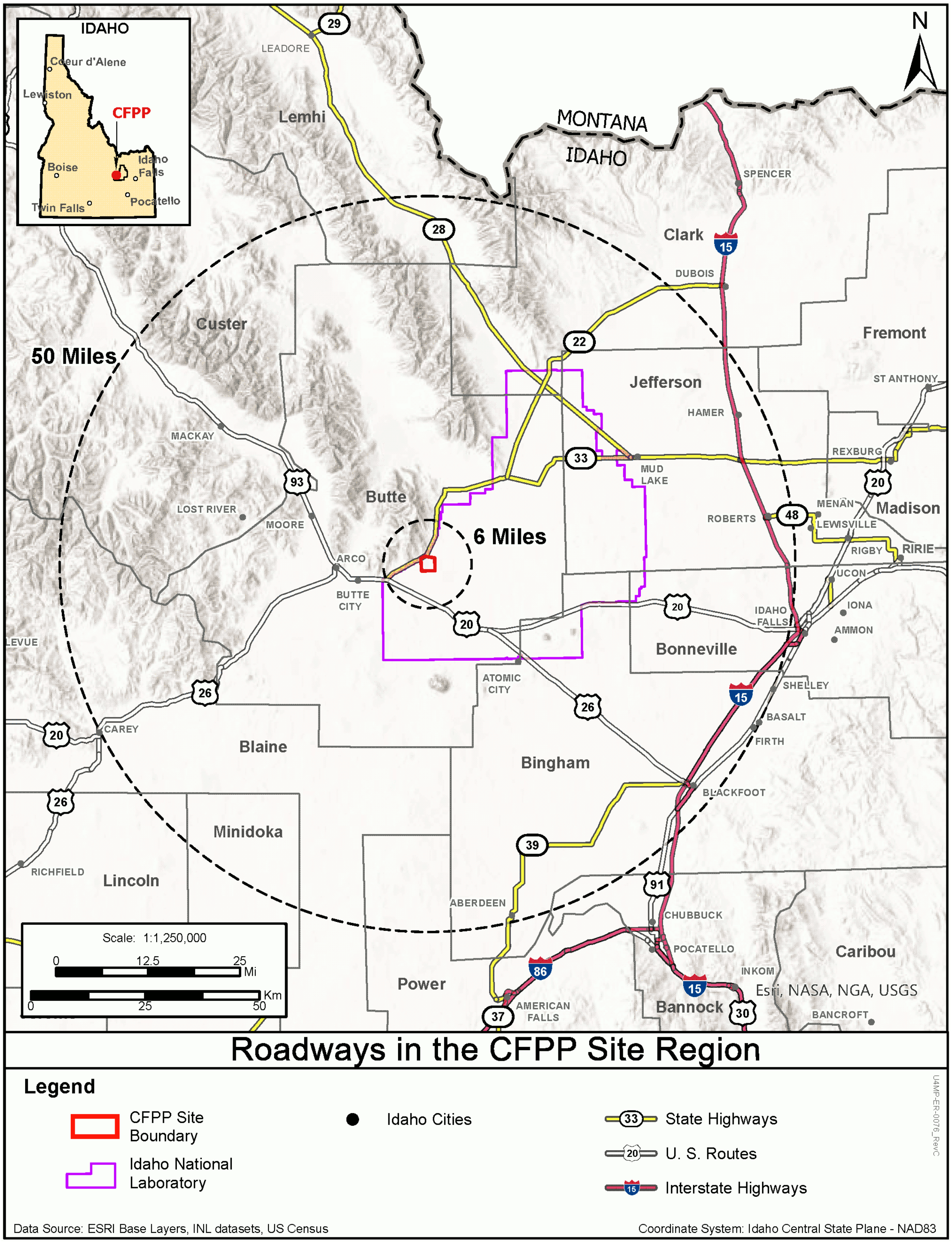


Figure 2.8-7: Road Carrying Capacity in the CFPP Site Vicinity

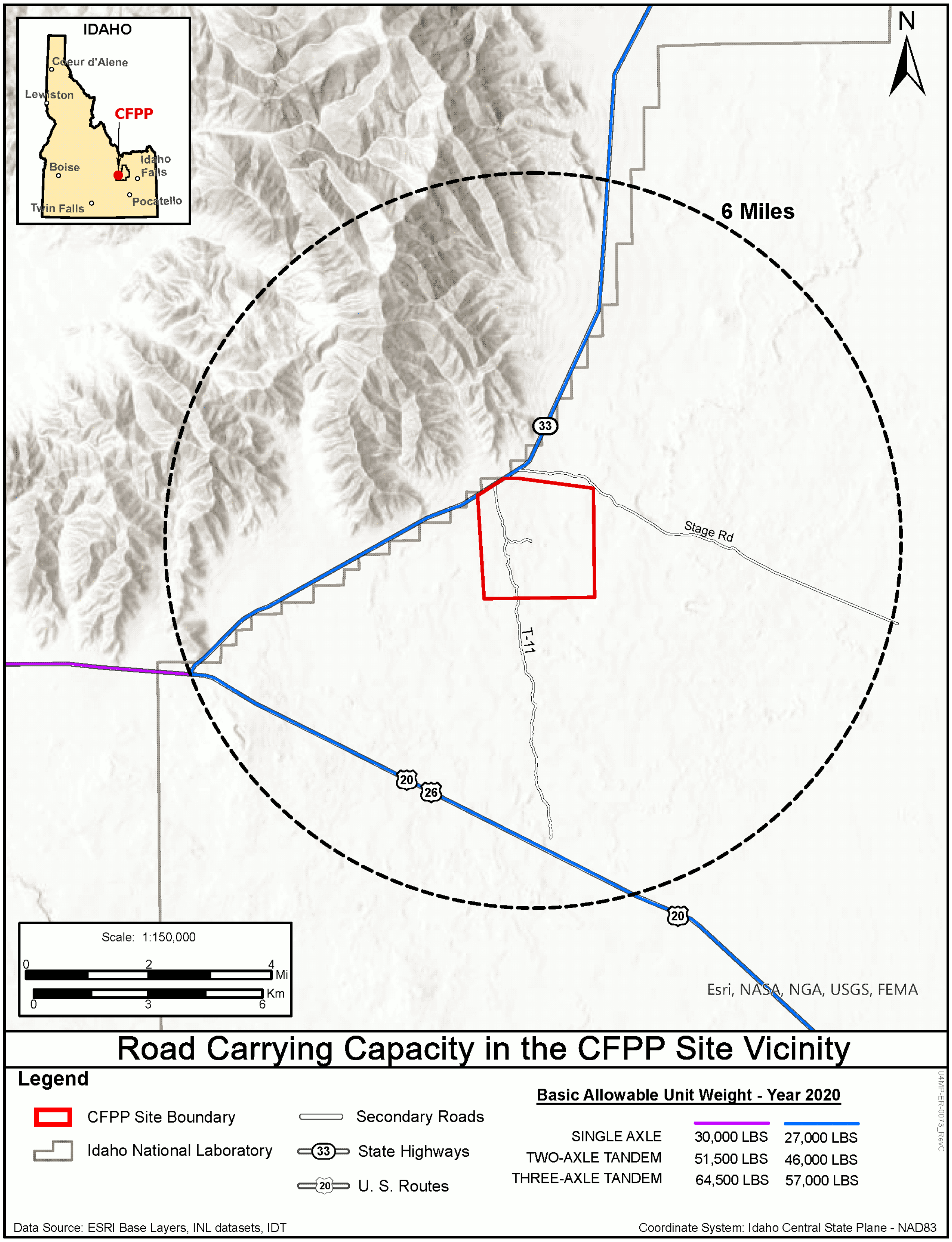


Figure 2.8-8: Road Carrying Capacity in the CFPP Site Region

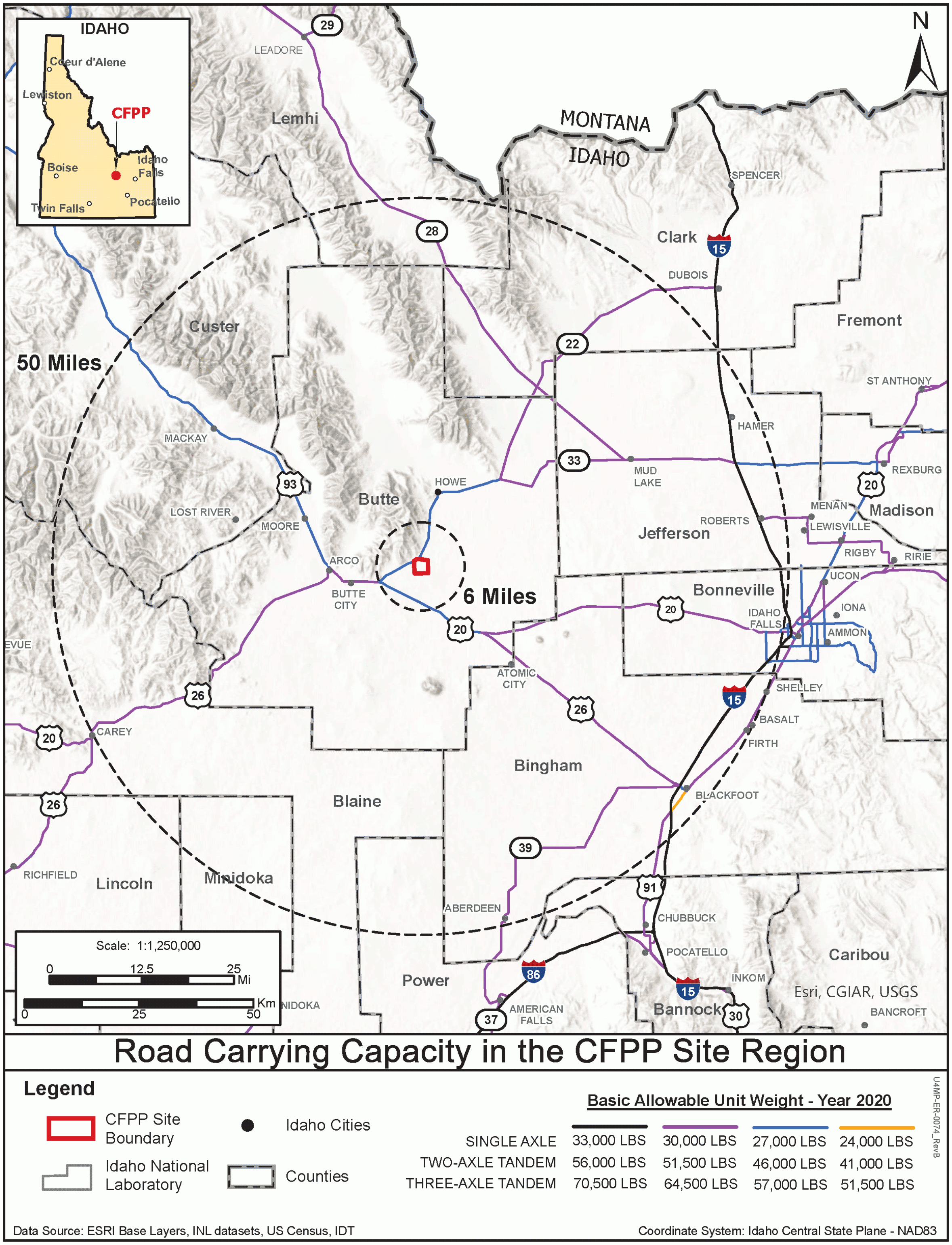


Figure 2.8-9: Road Usage in the CFPP Site Vicinity

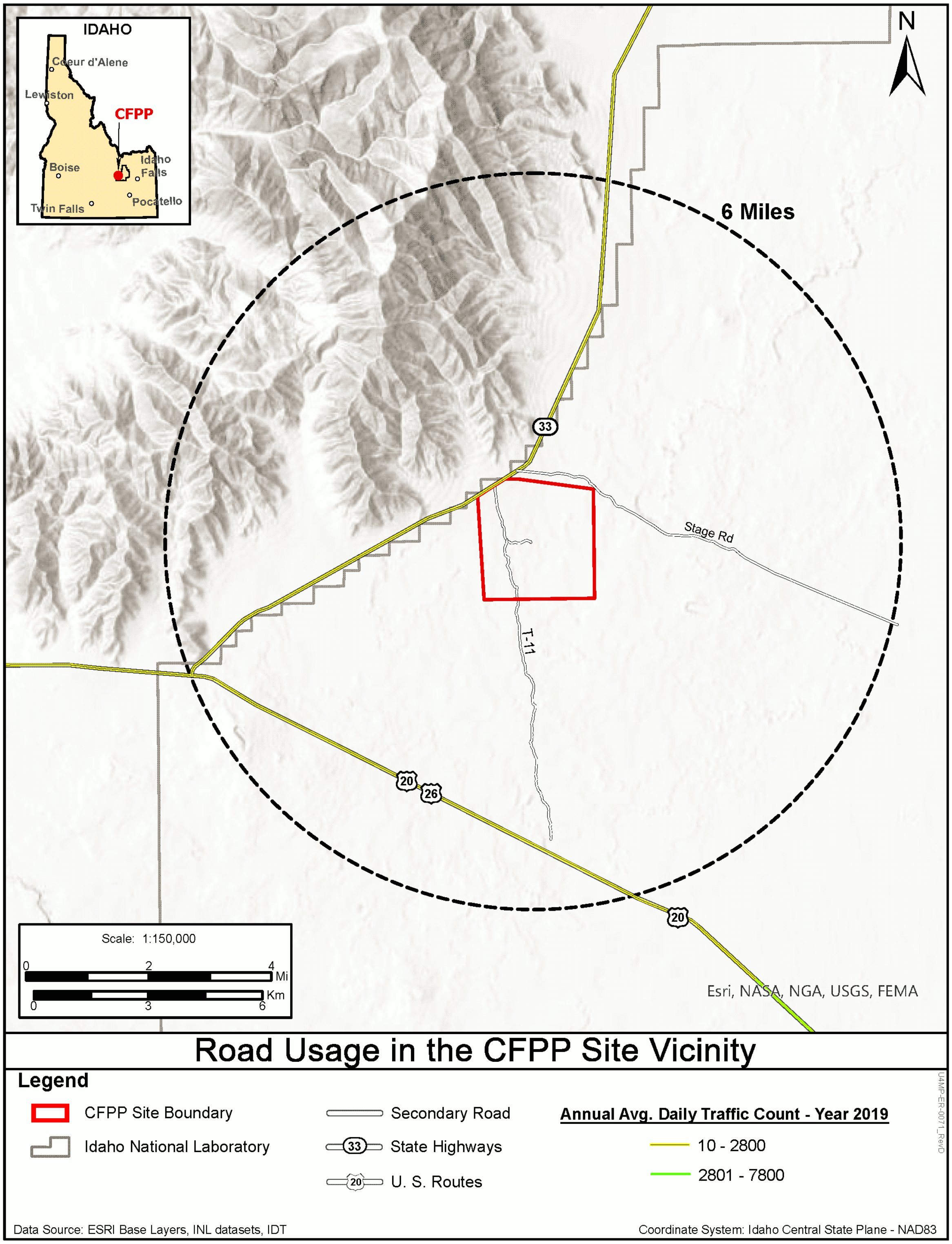


Figure 2.8-10: Road Usage in the CFPP Site Region

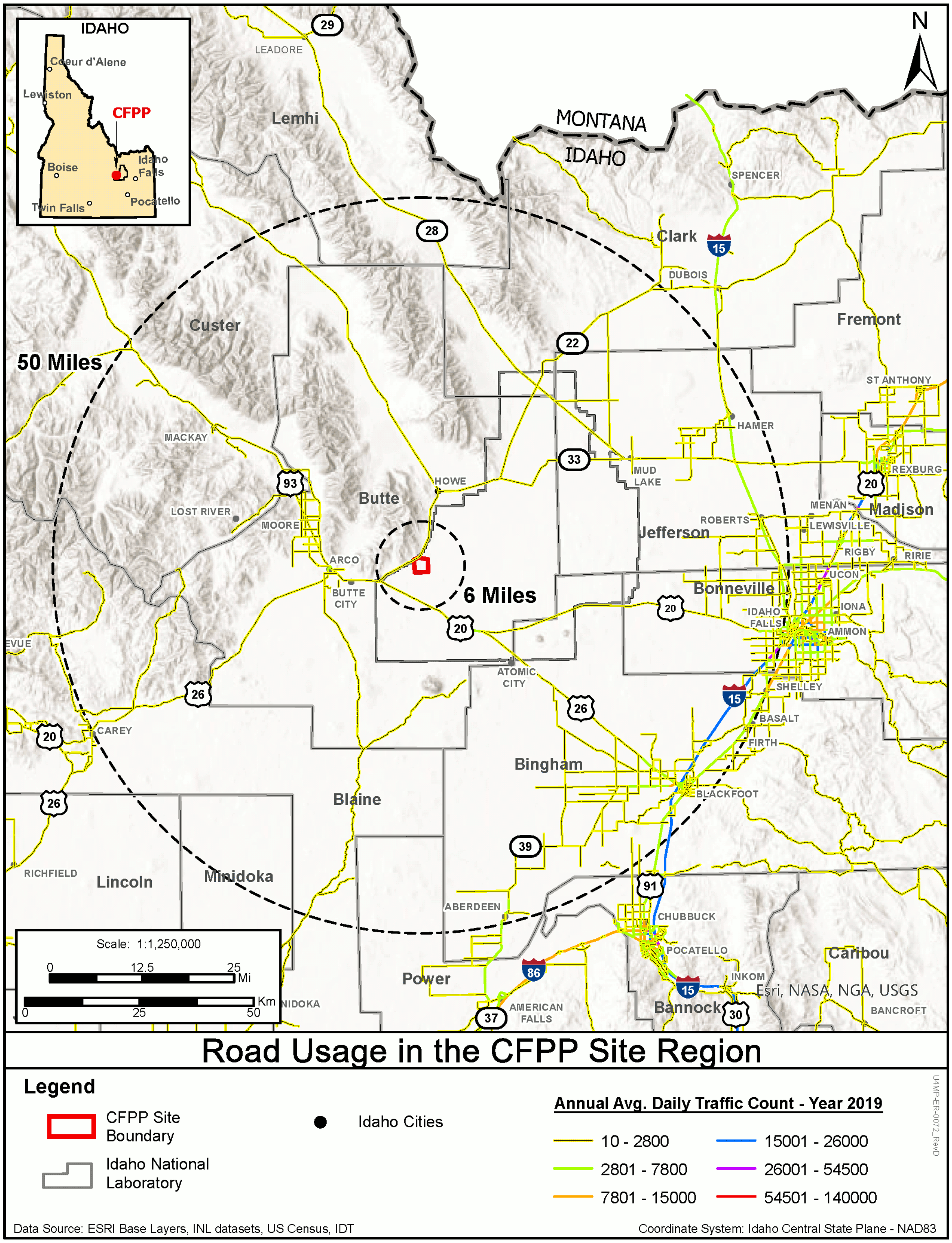


Figure 2.8-11: Transportation Accidents in the CFPP Site Vicinity

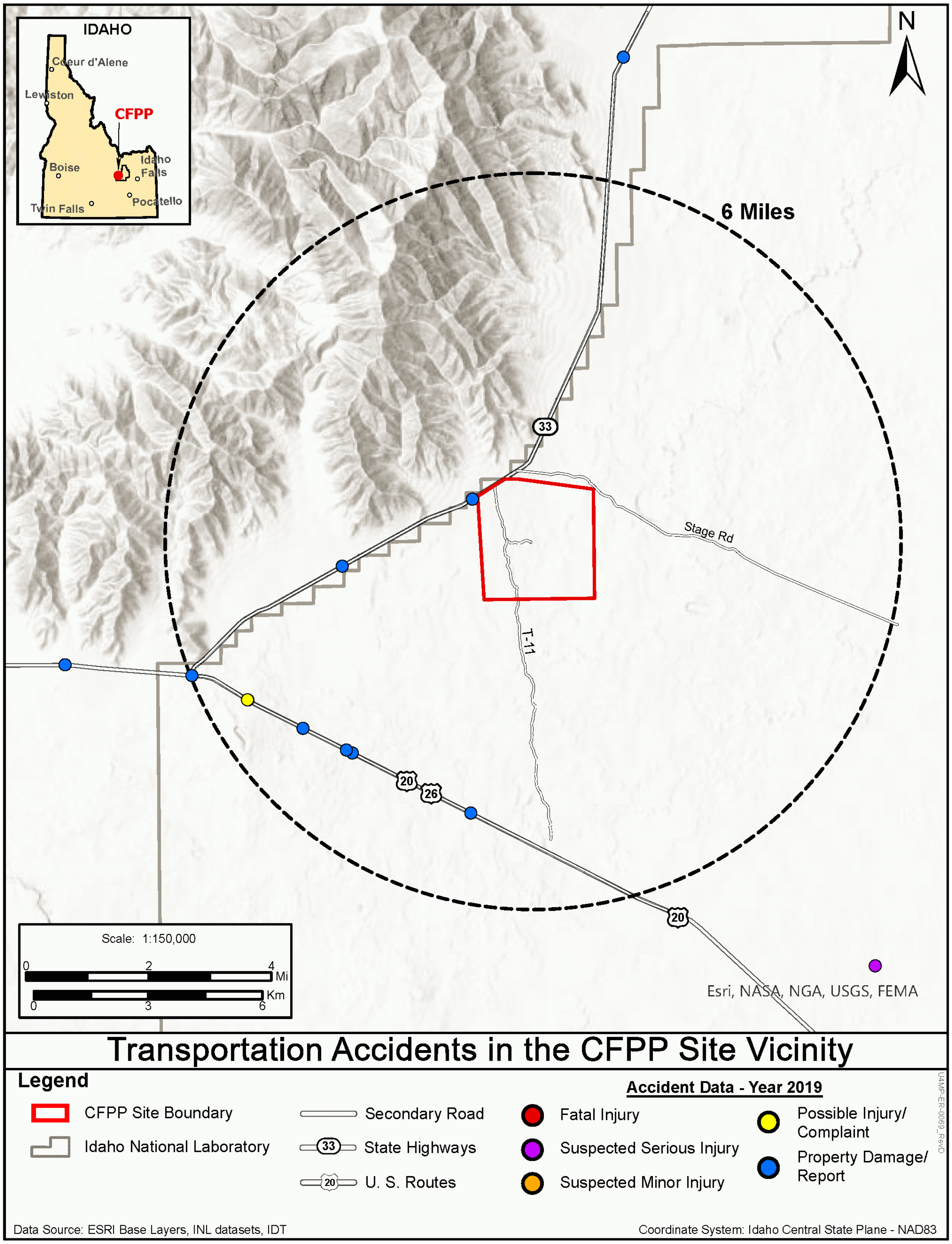


Figure 2.8-12: Transportation Accidents in the CFPP Site Region

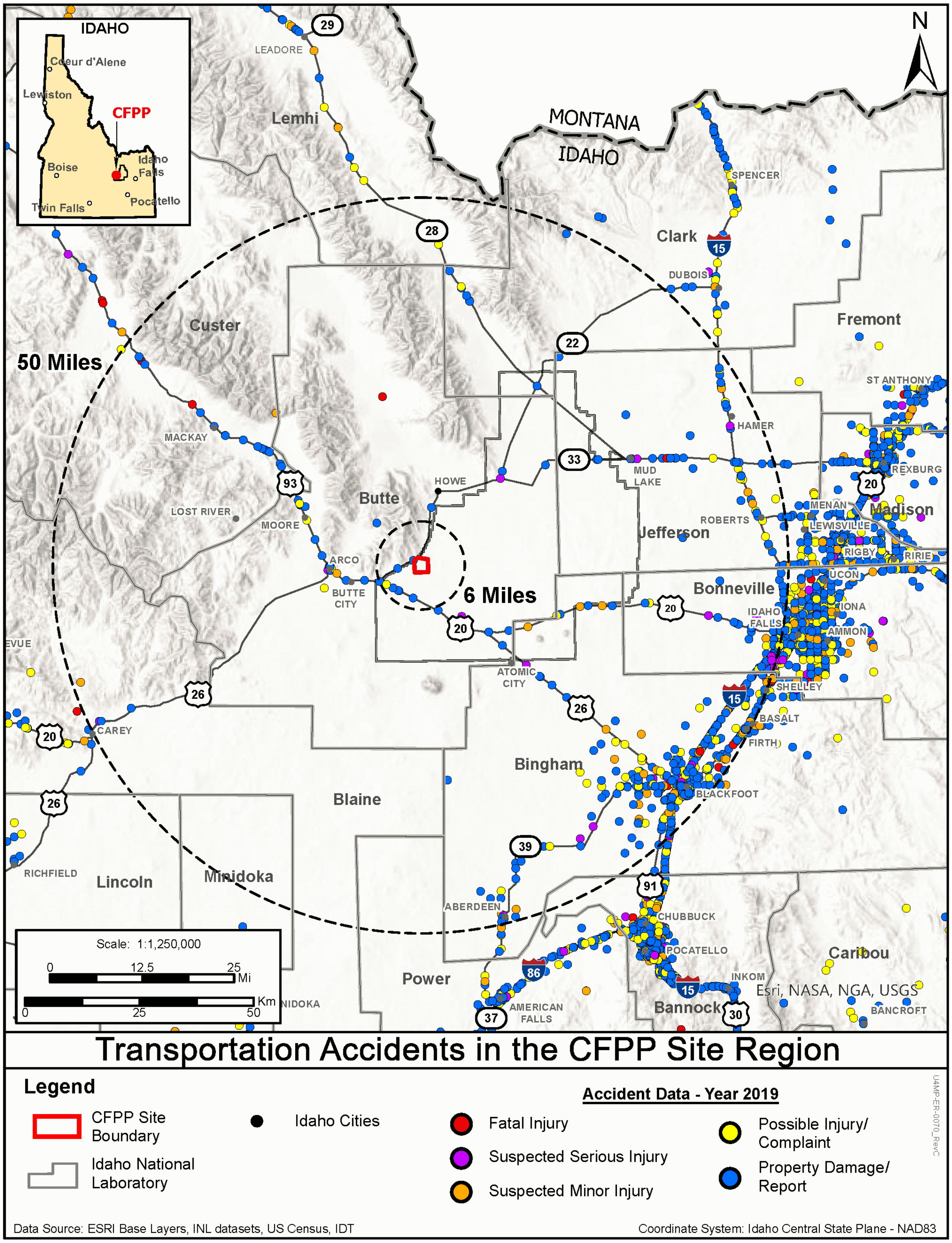


Figure 2.8-13: Existing Power Transmission Lines in the CFPP Site Vicinity

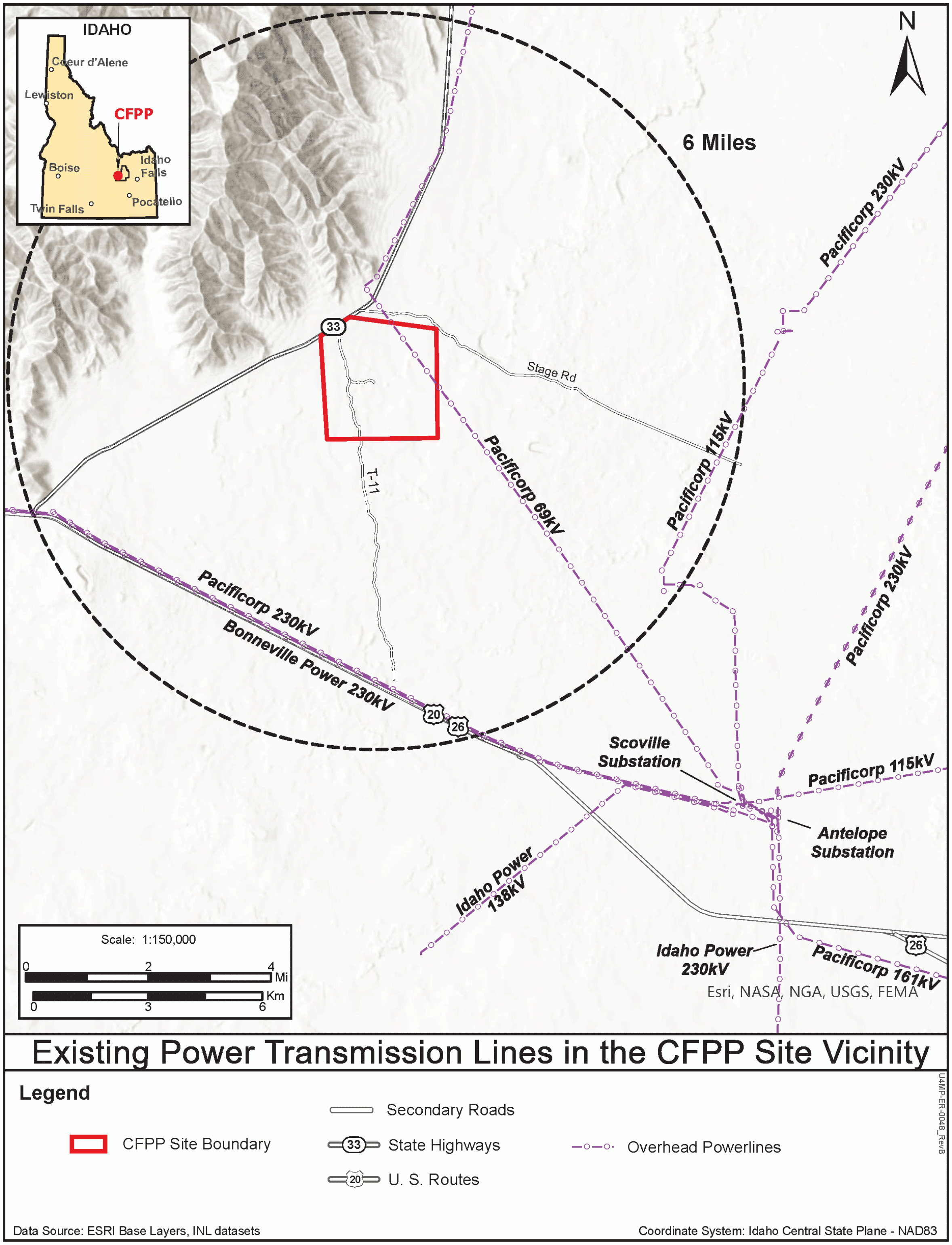
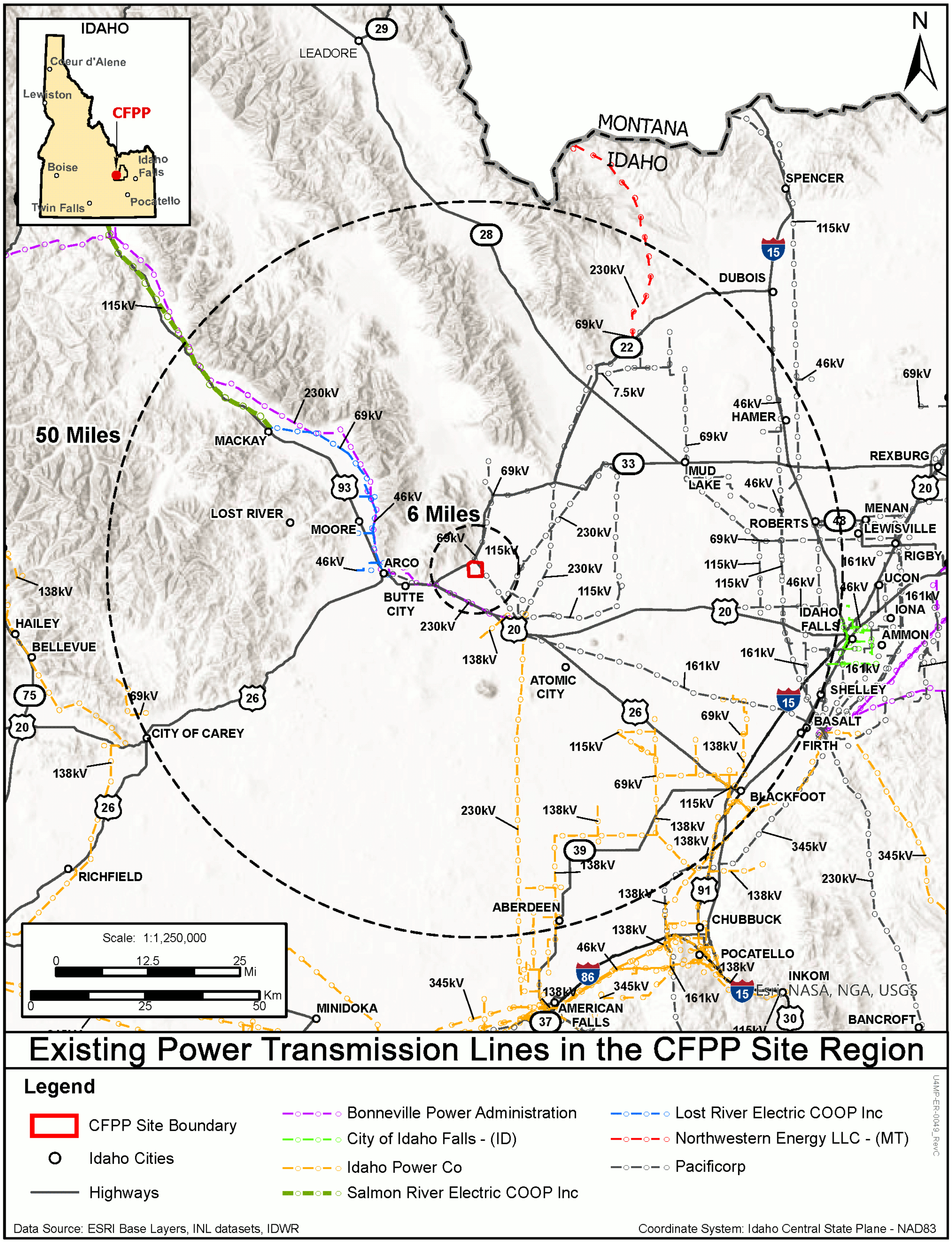


Figure 2.8-14: Existing Power Transmission Lines in the CFPP Site Region



2.9 Radiological Environment and Radiological Monitoring

This section provides information on the current radiological environment and radiological environmental monitoring at and near the CFPP site. The CFPP site is located on an undeveloped parcel of the DOE INL site. The radiological environment is well documented at INL from monitoring sitewide operations. Information is provided in the following topical areas:

- Exposure Pathways - Section 2.9.1.
- Preoperational Radiological Environmental Monitoring - Section 2.9.2.
- Existing Radiological Environmental Monitoring - Section 2.9.3.

2.9.1 Exposure Pathways

The DOE monitors exposures and exposure pathways from its nuclear missions at the INL site, documenting results and potential public and environmental impacts in annual reports. The CFPP evaluated the monitoring information and exposure assessments to help inform potential CFPP exposure pathways, taking into consideration the CFPP-specific design elements, operating envelope, and site and local geography and terrain. The following represent the primary potential environmental exposure pathways associated with the CFPP:

- air exposure pathways from gaseous effluent releases
- water exposure pathways from liquid effluent releases
- direct radiation exposure pathways from normal operation and storage and shipment of radioactive materials

Airborne effluents present the main radiological exposure pathway from CFPP operations based on US460 design as modified for the CFPP to include a near-zero liquid effluent release design. Radioactive material potentially released from a CFPP source into the air could be dispersed by the wind through prevailing weather patterns. National Oceanic and Atmospheric Administration data are summarized in "Climatography of the Idaho National Laboratory" (Reference 2.9-1) evaluating the weather patterns for the INL site. From this study, the wind is expected to flow mainly from the southwest to the northeast along the Snake River Plain with some inversion during night hours changing wind direction to come from the northeast. Members of the public and animals located downwind of these effluent releases have a potential air exposure pathway. The closest resident is in Howe, Idaho, approximately 9.3 miles (mi) from the CFPP site center. Air exposure is typically evaluated by air sampling for particulates, iodine, and tritium (hydrogen-3) according to NRC Regulatory Guide 4.1. Preoperational environmental monitoring is described in Section 2.9.2 and includes information on the CFPP vicinity meteorological trends.

Secondary exposures due to airborne effluents result from radioactive deposition to surface waters, soil, vegetation, and agricultural products with subsequent ingestion of contaminated water, vegetation, agricultural products, and animal products by animals and humans. This exposure pathway is typically evaluated by sampling surface waters, soil, vegetation, agricultural products, animal tissues, and animal products according to Regulatory Guide 4.1.

Direct water exposures to the public are not expected as the CFPP uses a near-zero liquid effluent release design. Following onsite treatment, liquid effluents are released to lined evaporation ponds with no designed interface to the natural water resources of the region. The natural water bodies near the CFPP site include groundwater (greater than 500 feet below ground surface [bgs]) and the Big Lost River (approximately 6 mi away with water flowing only during periods of heavy run off and releases from Mackay Reservoir via the Mackay Dam). A potential direct-water exposure pathway would be through extraction of contaminated groundwater for drinking or other household or outdoor uses. Secondary water exposures may occur through ingestion of plants, animals, or animal products exposed to contaminated groundwater or with access to the future CFPP evaporation ponds. The groundwater depth at the CFPP site, the limitation of water supply wells within the vicinity, and the near-zero liquid effluent release design minimizes the potential of groundwater contamination. Direct and secondary water exposure pathways are typically evaluated by sampling surface waters, groundwaters, sediments, aquatic species, waterfowl, agriculture products, animal tissues, and animal products according to Regulatory Guide 4.1. Preoperational environmental monitoring is described in Section 2.9.2 and provides baseline groundwater sampling results for the CFPP site.

Direct radiation exposure to members of the public is related to their proximity to the radiation source, including storage and transportation of radioactive materials. Members of the public located in the path of airborne effluent releases also have a potential direct exposure pathway through contact with airborne and deposited releases. According to Regulatory Guide 4.1, direct radiation exposure is typically evaluated using area monitoring dosimeters, like thermoluminescent dosimeters (TLDs), and optically stimulated luminescent dosimeters.

Further discussion on radiological impacts to members of the public during operation via these identified exposure pathways are included in the Combined License Application along with information on radioactive waste shipment exposure to members of the public.

2.9.2 Preoperational Radiological Environmental Monitoring

As described above, the CFPP site is located on an undeveloped parcel within the INL site. The INL site is home to more than 50 current and former nuclear reactors, associated research centers, radioactive waste handling areas, and remediation sites according to the 2021 annual site environmental report (ASER), (Reference 2.9-2). The Advanced Test Reactor (ATR), Remote-Handled Low-Level Waste (RHLLW) Disposal Facility, and Naval Reactors Facility are the closest INL facilities to the CFPP, located approximately 5.6 mi, 5.8 mi, and 7 mi from the center point of the CFPP site, respectively.

The preoperational radiological environmental monitoring program establishes a radiological background to understand the CFPP construction and operation impacts on concentrations of radioactive materials and radiation levels in the environment for the CFPP vicinity and region. Existing environmental monitoring by several organizations provides an understanding of the background radiation for the INL site and region as described in Section 2.9.3. In addition, preoperational radiological environmental monitoring for the CFPP site includes a meteorological tower collecting site-specific data consistent with NRC Regulatory Guide 1.23 and groundwater monitoring wells located around the perimeter of the CFPP plant as shown in Figure 2.9-1.

Natural background radiation is the combined radiation exposure to members of the public due to cosmic sources and naturally occurring sources of radiation in the environment. Table 2.9-1 summarizes the average annual doses to individuals residing in southeastern Idaho's Snake River Plain due to natural background radiation sources as found in 2021 (Reference 2.9-2). The five most recent ASERs provide a range of annual exposures to individuals living in the Snake River Plain from a low of 381 millirem per year (mrem/yr) in 2020 to a high of 387 mrem/yr in 2021. The change in the calculated annual numbers is related to snow-cover for adjustments to the estimated terrestrial component, which can reduce the estimated exposure as reported in Reference 2.9-2 and the 2020 to 2017 ASERs (Reference 2.9-3 through Reference 2.9-6, respectively).

As shown in Figure 2.9-1, the meteorological tower is located at the northwest CFPP site boundary. According to Reference 2.9-1, prevailing westerly winds for that latitude are expected with the topography channeling the wind over the Eastern Snake River Plain from the southwest and less often the northeast directions. Preoperational meteorological data collection started December 4, 2021, with results through June 2022 showing prevailing wind for the CFPP site from the northeast during the first quarter of 2022 and from the southwest during the second quarter of 2022. The meteorological data collection includes sensors that meet or exceed U.S. Environmental Protection Agency (EPA) performance requirements and are consistent with Regulatory Guide 1.23. The results from the preoperational meteorological data collection are used to model effluent dispersion and offsite dose calculations for the maximum potential dose to a member of the public and are further discussed in LWA ER Section 2.7.

During the phase I environmental site assessment of the CFPP site (Reference 2.9-7), the closest monitored groundwater wells at the time were identified as INL well numbers 142 and 142A, located one to two miles northeast of the CFPP site. No data were available at that time (2020) to indicate groundwater below the CFPP site had been contaminated with radionuclides from previous INL operations. A search of the U.S. Geological Survey (USGS) online database found only water level results for those two wells without corresponding radiological data (Reference 2.9-8 for well USGS-142A and Reference 2.9-9 for well USGS-142). The geophysical log data for USGS 142 and 142A (Reference 2.9-10) show the wells are approximately 30 feet apart and the average groundwater level is 531 feet below the surface. Groundwater monitoring wells have since been installed around the perimeter of the

CFPP plant to sample the groundwater as part of the preoperational radiological environmental monitoring program.

The preoperational groundwater sampling for CFPP includes one pumping well and nine monitoring wells located around the perimeter of the CFPP plant, as shown in Figure 2.9-1. The monitoring program includes quarterly sampling to evaluate for radiological contamination beginning in February 2022. The contractor providing these services has procedures documented to ensure quality assurance (QA) standards are met. The results determine the preoperational radiological baseline of the groundwater under the CFPP site. Additional groundwater characteristics are described in LWA ER Section 2.2.

2.9.3 Existing Radiological Environmental Monitoring

Environmental surveillance and monitoring, including radionuclides, have been conducted at and around the INL site since 1949 according to the “INL Environmental Monitoring Plan” (Reference 2.9-11). Information in this section helps establish the existing radiological environment at and around the CFPP site from DOE nuclear activities at the INL site. The DOE and the Department of Navy (Navy) via the Naval Reactors Facility both implement radiological environmental monitoring on the INL site as an element of their respective missions and in compliance with DOE Orders 458.1 "Radiation Protection of the Public and the Environment" (Reference 2.9-12) and 435.1 "Contact-Handled and Remote-Handled Transuranic Waste Packaging" (Reference 2.9-13). Monitoring activities and results are included in annual reports prepared by both entities (e.g., Reference 2.9-3 and Naval Reactors Facility environmental report for 2020 [Reference 2.9-14]). The INL sampling program is outlined in Reference 2.9-11 specifying the types of media to sample, frequency and location of sampling, analyses performed, reporting timelines, and standards for QA that must be met by individual contractor processes and procedures. The Naval Reactors Facility monitoring program is summarized in each annual report along with the QA processes used. The state of Idaho Department of Environmental Quality (DEQ) has an INL oversight program that publishes annual reports (Reference 2.9-15, Reference 2.9-16, Reference 2.9-17, and Reference 2.9-18 for 2017 through 2020, respectively) on independently collected and analyzed data. The USGS and the EPA also monitor on and around the INL site.

The information gathered by these monitoring efforts provides an informed basis for understanding the existing radiological environment at the CFPP site and surrounding areas. Figure 2.9-2 and Figure 2.9-3 summarize the overall monitoring programs undertaken within the southeastern region of Idaho where the CFPP is located. Monitoring activities for each of the environmental media are discussed below, including results of the monitoring over the past five years.

2.9.3.1 Air Monitoring and Results

The airborne pathway represents a potentially significant transport pathway from current INL activities to receptors outside the site boundaries. Under the INL site environmental monitoring program, samples of airborne particulates, atmospheric moisture, and precipitation are collected at the INL site, at INL site boundary locations, and at distant communities. As noted in Reference 2.9-3, samples are analyzed for both man-made and natural radioactivity to provide trending. Figure 2.9-4 shows the CFPP region (defined in LWA ER Section 2.1.1) with the existing air monitoring locations for INL activities. A comparison of results from these air monitoring locations provides an understanding of the impacts INL operations have on the surrounding areas.

The INL site and regional ambient air monitoring program specifics are summarized in Table 2.9-2. As discussed in Reference 2.9-2 through Reference 2.9-4, between 2019 and 2021 a total of 38 low-volume air samplers, one high-volume air sampler, eight atmospheric moisture samplers, and four precipitation samplers operated in the network. In 2019, the results of the frequency of detection method were used to identify an improvement to the network by adding a low-volume air sampling monitor at the INL Research Center. As a result, data summarized for 2017 and 2018 are from a total of 37 low-volume air samplers (Reference 2.9-5 and Reference 2.9-6). All other regional ambient air monitoring is the same from 2017 through 2021 (Reference 2.9-2 through Reference 2.9-6). For each of the air media sampled, Table 2.9-2 reports the corresponding analysis performed, frequency of performance, and minimum detectable concentration for the analysis.

Airborne radioactive particulates are evaluated weekly for gross alpha, gross beta, and iodine-131. Gross alpha and gross beta results are used for screening purposes because specific radionuclides are not identified. The results of gross alpha and gross beta are usually dominated by naturally-occurring radionuclides. The weekly results are used to promptly identify changes and take appropriate actions. Discrepancies in the data are noted based on comparisons to existing trends (Reference 2.9-3).

Weekly samples from each location are composited quarterly and analyzed for gamma-emitting radionuclides. Select quarterly composited samples are also analyzed for specific radionuclides of interest that include cesium-137, americium-241, plutonium-238, plutonium-239/240, and strontium-90 for trending. These radionuclides are chosen for analysis because they have historically been detected in air samples due to either site releases or resuspension of soil particles from previous INL site activities or previous global nuclear weapons testing fallout (nuclear weapons have not been tested at INL). The highest results and the corresponding sample locations are presented in Table 2.9-3 for the last five years (Reference 2.9-2 through Reference 2.9-6).

The weekly gross alpha counting results for the last five years fall: (1) within normal trends of the INL environmental monitoring program, (2) below the maximum result reported in previous ASERs from 2008-2021 of 12.0E-15 microcuries per milliliter (μCi/mL) (attributed to disturbance of previously contaminated road materials), and (3) below the DOE established derived concentration standards for plutonium-239/240 in air that is the most conservative radionuclide that could be applied to gross alpha activity (Reference 2.9-2 through

Reference 2.9-6). The "Derived Concentration Technical Standard" (Reference 2.9-19) defines the derived concentration standard as the concentration of a radionuclide that results in an effective dose of 100 millirem (mrem) if a member of the public is exposed continually for a year via ingestion of water, inhalation of air, or immersion in air. The 2017 gross alpha maximum result is the highest reported over the last five years and is attributed to naturally-occurring gross alpha activity in smoke particles from regional wildfires in 2017 during the corresponding sampling period (Reference 2.9-6).

The weekly gross beta concentrations measured in air samples for the last five years fall within normal trends of the INL environmental monitoring program, below the maximum concentration reported in previous ASERs from 2008-2021 (1.3E-13 µCi/mL), and below the derived concentration standard for strontium-90, the most restrictive beta-emitting radionuclide in air (Reference 2.9-2 through Reference 2.9-6).

The median airborne radioactivity for gross alpha and gross beta measured at points within the INL site, at the site boundary, and at distant offsite locations fall within INL expected trends for the last five years and as far back as 2008. Contaminant concentrations measured within and at the INL site boundary are compared to each other and to those measured at offsite locations. Contaminant concentrations statistically greater at the site than at the distant offsite locations would indicate that the INL site is a potential source of radioactivity release. Supplemental reports to the 2021, 2020, and 2019 ASERs describe the statistical methods used (Reference 2.9-20, Reference 2.9-21, and Reference 2.9-22, respectively). These statistical comparisons for gross alpha and gross beta radioactivity data found no statistical differences between annual concentrations determined for the INL site, boundary, and distant locations from 2017 through 2021. Statistical differences observed from 2017 through 2021 were determined to be within normal statistical variation and not the result of INL operations (Reference 2.9-2 through Reference 2.9-6).

Table 2.9-3 shows the maximum results for each of the radionuclides of interest. Cesium-137 and iodine-131 were not detected between 2017 and 2021, and all other results were below their corresponding derived concentration standards (Reference 2.9-2 through Reference 2.9-6). Reference 2.9-5 compares elevated maximum reported alpha-specific radionuclides (americium-241, plutonium-238, plutonium-239/240) in 2018 to historical results back to 2008. The INL considered several potential sources for the elevated activity but found no direct cause. Although each of the alpha-specific radionuclide concentrations were elevated in 2018, the gross alpha concentration for that year is within historical trends, each of the specific radionuclide concentrations is below their corresponding derived concentration standards for that year, and results since 2018 have been back within historical trends (Reference 2.9-2 through Reference 2.9-6).

Another radionuclide of interest from current INL operations is tritium present in air moisture. Air moisture and precipitation are sampled and evaluated for tritium from multiple locations to determine INL operational contributions to the environment and members of the public. Tritium is present in air moisture due to natural production and previous global nuclear weapons testing and is a monitored release from INL operations, mostly from ATR and Idaho Nuclear Technology and Engineering Center (INTEC). In 2017, the INL air network was optimized by moving sampling locations to areas of either maximum projected offsite concentrations or offsite locations to ensure accurate measurement of background concentrations based on dispersion modeling of tritium in air. (Reference 2.9-6).

The highest tritium in air moisture results and the corresponding sample locations are presented in Table 2.9-4 for the last five years. The air moisture tritium counting results for the last five years fall within normal trends of the INL environmental monitoring program, below the maximum result reported in previous ASERs from 2008-2021 of 3.4E-12 microcuries per milliliter of air ($\mu Ci/mL_{air}$), and below the DOE-established derived concentration standards for tritium in air. The source of tritium measured in atmospheric moisture samples collected in and around the INL site is likely from cosmic radiation. Tritium releases from normal operational releases, such as from the ATR, are localized and might be detected immediately adjacent to the facility but, due to atmospheric dispersion, are not expected to be detected at current air monitoring stations (Reference 2.9-2 through Reference 2.9-6).

In addition to monitoring for tritium in air moisture, precipitation samples are collected and analyzed for tritium. These samples are collected weekly when available and monthly at the Idaho Falls EPA RadNet monitoring location. The highest tritium precipitation sample results and the corresponding sample locations are presented in Table 2.9-4 for the last five years. The tritium precipitation sample results for the last five years fall within normal trends of the INL environmental monitoring program, below the maximum result reported in previous ASERs from 2008-2021 of 413 picocuries per liter (pCi/L), and below the DOE-established derived concentration standard for tritium in water (Reference 2.9-2 through Reference 2.9-6).

Annual tritium concentrations measured in air moisture and precipitation collected from the INL site, boundary, and distant locations fall within INL expected trends for the five years reviewed and as far back as 2008. Reference 2.9-2 through Reference 2.9-6 discuss statistical comparison of both sets of data (using the nonparametric Wilcoxon Matched Pairs Test) showing no statistically significant differences between the median annual tritium concentrations measured in air moisture and precipitation samples. Reference 2.9-20, Reference 2.9-21, and Reference 2.9-22 describe the statistical method used for 2021, 2020, and 2019, respectively. This analysis concludes that tritium measured in air moisture and precipitation samples is likely from natural origin and not from INL site operations (Reference 2.9-2 through Reference 2.9-6).

Total monitored airborne effluents from INL operations and corresponding dose to the public between 2017 and 2021 are shown in Table 2.9-5. The total curies released for 2021 are lower than in previous years due to the Radiological

Response Training Range-Southern Test Range not operating in 2021. Another difference in 2021 was ventilation work performed at the Safety and Tritium Applied Research facility resulting in an assumed ground release versus the stack release used for previous year calculations. Although the total curies is lower in 2021, the estimated exposure is higher due to a slightly higher percent distribution of radionuclides with higher dose contribution (cesium-137, uranium-238, uranium-234, zinc-65 and chlorine-36) (Reference 2.9-2). The estimated maximum potential dose to a member of the public for the last five years is less than the 40 CFR 61 Supbart H regulatory standard of 10 mrem/yr (Reference 2.9-2 through Reference 2.9-6).

Reference 2.9-14 and the Naval Reactors Facility 2019 environmental report (Reference 2.9-23) estimate air emission total effective dose equivalents of 0.00026 mrem and 0.00032 mrem for the respective years. These results are also below the 40 CFR 61 Supbart H regulatory standard of 10 mrem/yr.

Annual reports of environmental monitoring published by DEQ are conducted as oversight of the INL site operations to encourage public confidence in the state of Idaho and the DOE monitoring programs. The annual reports from 2017 through 2020 (Reference 2.9-15 through Reference 2.9-18) summarize the results of the DEQ air monitoring analyses with comparison to DOE air monitoring results and conclusions. These results indicate agreement between DEQ and DOE air monitoring results, which is based on either direct statistical comparison or comparison to regulatory limits showing the measured values from either program pose no health concerns to members of the public.

Because of the location of the Naval Reactors Facility, the closest INL facilities (ATR and RHLLW), and the prevailing wind direction, normal Naval Reactors Facility and INL site operations are not anticipated to negatively impact CFPP operations or environmental sampling.

2.9.3.2 Groundwater Monitoring and Results

The CFPP is located in the Snake River Basin and accesses the eastern Snake River Plain Aquifer, which serves as the primary source of drinking water and crop irrigation for the region. Groundwater monitoring for the CFPP site began in February 2022 and is described in Section 2.9.2. Because the CFPP site is located within the INL site, existing groundwater, surface water, and drinking water sampling programs are already in place to understand the background radiation present and INL operational impacts on the surrounding environment and members of the public. The purpose of these programs, both for CFPP and for INL, is to monitor contamination that could potentially reach the Snake River Plain Aquifer and take action in a timely manner. The INL is also using this program to monitor and trend known contaminated areas from past INL site operations and ensure that onsite and downgradient drinking water is safe for consumption. Figure 2.9-5 shows the USGS groundwater monitoring wells on and off the INL site.

Historic waste disposal practices have produced localized areas of radionuclide contamination beneath the INL site. Reviewing the results in Reference 2.9-2 through Reference 2.9-6 shows most of the monitoring wells in the plumes have decreasing concentrations of tritium, strontium-90, and iodine-129 over the last 25 years, believed to be due to radioactive decay, discontinued disposal practices, dispersion, and dilution within the aquifer. The closest INL facility to CFPP with a known contaminated groundwater plume is the ATR Complex, also known as Waste Area Group 2. The maximum radiological groundwater results are shown in Table 2.9-6. All results between 2017 and 2021 are: (1) below the maximum contaminant limit (MCL) for drinking water as specified by 40 CFR 141, (2) below the Idaho ground water quality standard (IDAPA 58.01.11, Reference 2.9-24), and (3) below the Idaho public drinking water standard (IDAPA 58.01.08, Reference 2.9-25).

Table 2.9-6 also shows the maximum results for monitoring wells put in service for operation of the RHLLW Disposal Facility with reporting beginning in 2020. Samples are analyzed for gross alpha, gross beta, tritium, carbon-14, iodine-129, and technicium-99 (Reference 2.9-2 and Reference 2.9-3). The results presented in Table 2.9-6 for RHLLW Facility are consistent with the aquifer baseline conditions taken before the facility was in use (Reference 2.9-26).

The Naval Reactors Facility has a series of groundwater wells on the site, down-gradient from the site, and regionally up- and down-gradient from the site that are monitored for radioactivity. Findings reported in Naval Reactors Facility Environmental Reports for years 2019 and 2020, Reference 2.9-14 and Reference 2.9-23, respectively, found that strontium-90 and programmatic gamma emitters were at or below the minimum detection concentration for analysis and tritium levels were below drinking water standards (40 CFR 141, Reference 2.9-24, and Reference 2.9-25).

Reference 2.9-15 through Reference 2.9-18 summarize the findings of the DEQ analyses as compared to DOE and USGS results and conclusions. These results indicate agreement among DEQ, DOE, and USGS results and overall trends. Areas of contamination that exceed drinking water limits are localized to INL facilities and are not used as drinking water. Indications of tritium at the southern INL boundary are above background but below drinking water limits with results trending down over time. No impacts to the Snake River Plain Aquifer from INL operations are identified at distant locations. The DEQ annual reports conclude that groundwater measured values pose no health concerns to members of the public.

The USGS summarizes well water results in the known INL contaminated areas with plume maps showing radiological contamination changes over time (Reference 2.9-27). Those documented changes, combined with recent facility specific groundwater monitoring results summarized in Reference 2.9-2 by the INL for 2021, the plume proximities to the CFPP site, and the direction of groundwater flow, demonstrate potential impacts on CFPP site groundwater monitoring are unlikely.

2.9.3.3 Surface and Drinking Water Monitoring and Results

Because of the arid to semi-arid conditions of the southeastern Idaho region (Reference 2.9-1), the majority of on-site surface water sampling at INL is from the man-made liquid effluent processing ponds and surface water runoff. The liquid effluent wastewater is discharged to land surface ponds and infiltration basins local to the facility producing the effluent; the facilities included in this program are the ATR, INTEC, and Materials and Fuels Complex (MFC). Use of effluent ponds at these facilities requires state-issued permits in accordance with Idaho standards for recycled water (IDAPA 58.01.17, Reference 2.9-28), wastewater (IDAPA 58.01.16, Reference 2.9-29), Reference 2.9-24, and Reference 2.9-12 requiring surface and groundwater sampling to ensure protection of the environment and members of the public. No permit limits were exceeded and all detected concentrations of radionuclides were below the corresponding derived concentration standards for ingested water from 2017 through 2021 (Reference 2.9-2 through Reference 2.9-6).

Surface water runoff due to rapid snowmelt or heavy precipitation in areas of radioactive waste disposal or contamination could serve as an exposure pathway to the public. Areas of concern discussed in Reference 2.9-2 through Reference 2.9-6 include the Subsurface Disposal Area at the Radioactive Waste Management Complex (RWMC) and the Waste Management Facility (WMF)-636 at the Advanced Mixed Waste Treatment project. The area is designed with retention basins and a drainage canal to divert flowing water around the Subsurface Disposal Area and outside the RWMC. At WMF-636 water flows over the asphalt and gets inside the facility through the door seals. Water accumulates in catch tanks and can be pumped to holding tanks for sampling if enough water accumulates before discharge to the Subsurface Disposal Area drainage canal. Reference 2.9-12 and Reference 2.9-13 require control and sampling of the stormwater runoff to ensure impacts to humans and biota can be evaluated. The "Environmental Radiological Effluent Monitoring and Environmental Surveillance" handbook (Reference 2.9-30) provides guidance on sampling methods, data assessments, and statistical analyses including for situations involving water runoff. Detected concentrations presented in Reference 2.9-2 through Reference 2.9-6 show results are less than the corresponding derived concentration standard limits for ingested water between 2017 and 2021.

Regional water sampling is performed at locations shown in Figure 2.9-6. Surface water sampling is performed at the Big Lost River, an intermittently flowing natural water source that flows through part of the INL site. Surface water results are shown in Table 2.9-7 with all results below drinking water MCLs and program-specific screening criteria requiring further action (Reference 2.9-2 through Reference 2.9-6). Sampling from on the INL site was not available in 2020 and 2021 due to a lack of surface water flow in the Big Lost River (Reference 2.9-2 and Reference 2.9-3).

The INL monitored 10 onsite drinking water systems in 2021 and the Navy monitored one onsite drinking water system. The DEQ oversees the sampling programs to ensure compliance with Reference 2.9-25 and 40 CFR 141-143. The analyses required by the State of Idaho are performed using EPA-approved analytical methods and state-certified laboratories. Table 2.9-8 shows the maximum drinking water sampling results from 2017 through 2021. All results are below drinking water MCLs and program-specific screening criteria requiring further action (Reference 2.9-2 through Reference 2.9-6).

The Naval Reactors Facility water sampling results from 2019 and 2020 have no detected radioactivity above background in liquid effluents (Reference 2.9-14 and Reference 2.9-23). Drinking water samples met drinking water standards from Reference 2.9-25 and 40 CFR 141-143.

The DEQ annual oversight reports from 2017 through 2020 (Reference 2.9-15 through Reference 2.9-18) summarize the findings of the DEQ analyses as compared to DOE and USGS results and conclusions with agreement between the organizations. The DEQ annual reports conclude that surface and drinking water measured values pose no health concerns to members of the public.

The surface and drinking water results discussed in this section identify no elevated radionuclide concentrations with no expected impacts to the CFPP background radiation levels as a result of INL or Naval Reactors Facility normal operations.

2.9.3.4 Agricultural, Vegetation, and Soil Monitoring and Results

Secondary exposure pathways to the public include incorporation of man-made radionuclides from INL operations into the food chain. According to land use surveys, approximately 60 percent of the INL site is available for livestock grazing (LWA ER Section 2.1.1.3 and LWA ER Figure 2.1.3), and approximately 45 percent of the land surrounding the INL site is used for agriculture (Reference 2.9-2). Agricultural product sampling began around the INL site in the 1960s with milk and wheat, and it has evolved to the current INL environmental monitoring program that focuses on milk, leafy green vegetables, alfalfa, potatoes, and grains. Representative samples are collected, as recommended in Reference 2.9-30, within 10 miles of the INL site boundary from locations of expected maximum radionuclide concentrations and background locations not expected to be impacted by radionuclides released from the INL site. Sampling locations are based on air dispersion modeling, prevailing winds, availability of the medium to be sampled, public interest, and historical significance (Reference 2.9-2). Sampling locations are presented in Figure 2.9-7.

The radionuclides evaluated in the INL agriculture, vegetation, and soil monitoring program are tritium, strontium-90, iodine-131, and cesium-137. Tritiated water acts like water in the environment and can enter the food chain through ingestion of tritiated drinking water by humans or animals or absorption by plants. Strontium-90 is soluble in the environment and enters the food chain by plant uptake. Iodine-131 can enter the body by ingestion of contaminated milk. Cesium-137 enters the food chain through absorption into plants when in its soluble form after being deposited in the soil or on the vegetation leaves (Reference 2.9-2 through Reference 2.9-6). Table 2.9-9 presents the maximum concentrations of each of these nuclides between 2017 and 2021 for agricultural and vegetation media.

Cow and goat milk samples (when available) are collected weekly from dairies in Idaho Falls and Terreton and monthly at other locations around the INL site. The number and exact location of the dairies vary with farmer and sample availability. Neither iodine-131 nor cesium-137 were detected in milk samples collected between 2017 and 2021. Strontium-90 was detected in milk samples between 2017 and 2021 but at levels determined by the EPA to be due to previous global nuclear weapons testing fallout according to References 2.9-2 through 2.9-6. Milk sampling results in Table 2.9-9 are bounded by results reported by EPA databases and reports (Reference 2.9-31). Milk results are compared to derived concentration standards for radionuclides of concern in drinking water; results are below the drinking water derived concentration standard for strontium-90 (Reference 2.9-19), 40 CFR 141 Subpart G drinking water limits, and Reference 2.9-25 drinking water limits. Tritium was also identified in milk samples between 2017 and 2021 at concentrations consistent with previous years and consistent with results found in atmospheric moisture and precipitation sampling (Reference 2.9-2 through Reference 2.9-6). Results were below the tritium derived concentration standard (Reference 2.9-19), 40 CFR 141 Subpart G drinking water limits, and Reference 2.9-25 drinking water limits.

Uptake of radionuclides by plants occurs through root uptake from the soil and absorption of deposited radionuclides through the plant's foliage. Green, leafy vegetables, like lettuce, can have higher concentration ratios of radionuclides to soil than other kinds of plants. Lettuce samples are collected annually from areas on and adjacent to the INL site. The number and locations of sample collections vary depending on availability. Portable lettuce planters are used to ensure availability of samples in key areas. The results of lettuce sampling from 2017 through 2021 are shown in Table 2.9-9. The only statistically detected radionuclide is strontium-90 in 2017 and 2018. These results fall within trends from 2013 to 2021 and at levels expected from previous global nuclear weapons testing fallout and not from INL operations (Reference 2.9-2 through Reference 2.9-6).

Grains (wheat and barley) and potatoes are sampled in the INL radiological environmental monitoring program as regional staple crops of interest to the public. Samples are collected from areas where grain or potatoes are farmed within the air sampling network and can vary year to year based on crop rotations. Table 2.9-9 presents grain and potato radiological results. Strontium-90 was detected in 2017 at levels expected to be from fallout of previous global nuclear weapons testing and not from INL operations. No man-made radionuclides were identified from 2017 through 2021 (Reference 2.9-2 through Reference 2.9-6).

Alfalfa is sampled and analyzed for the INL environmental monitoring program as a main food source for milk cows in the area. Sample locations represent high potential areas for deposition based on INL operations and weather patterns within the air monitoring network. The results are presented in Table 2.9-9. Strontium-90 was detected in 2017 and 2018 at levels consistent with historical trends and previous global nuclear weapons testing and not as a result of INL operations. No man-made radionuclides were detected (Reference 2.9-2 through Reference 2.9-6).

Soil sampling began on the INL site in 1949 to determine pre-reactor radionuclide background levels according to Reference 2.9-11. The current monitoring program is based on a systematic approach that started with detailed studies in the 1970s and continues today with samples collected within the INL site every five years and sampling at offsite locations every two years. The most recent INL site soil sample results are from 2017 and the most recent offsite results are available from 2018 and 2020. In 2017 samples were collected from RWMC, the Experimental Field Station (EFS), and Radiological and Environmental Sciences Laboratory; historical results for comparison are only available for RWMC with INL collecting data for future trending of results from EFS and Radiological and Environmental Sciences Laboratory locations. The 2017 RWMC results are consistent with previous results in that location (Reference 2.9-6); measured activities were less than the background values previously identified in historical data analysis of the INL soil monitoring program (Reference 2.9-32). The soil sample results from 2017 are shown in Table 2.9-10.

Offsite soil sampling took place in 2018 and 2020 (Reference 2.9-3 and Reference 2.9-5). Samples are collected at the surface (0-5 cm deep) and analyzed for gamma-emitting radionuclides, strontium-90, americium-241, and plutonium isotopes. Subsurface samples (5-10 cm deep) are collected and analyzed to verify the highest concentrations of radioactivity are found in the surface soil, which is confirmed with the available results. Trending of these radionuclides in soil samples from 1978 show cesium-137 and strontium-90 trending down with time through radioactive decay according to their corresponding half-lives (30.17 years and 28.8 years, respectively) from previous global nuclear weapons testing fallout. Strontium-90 concentrations are reducing faster than by radioactive decay alone, likely due to increased mobility in the environment. Plutonium-238 was only detected once in 2018 with no detections in 2020. Plutonium-239 and plutonium-240 results are within expected values; the maximum plutonium-239/240 results reported are 1.54 nanocuries per square meter (nCi/m^2) and 1.36 nCi/m^2 in 2018 and 2020, respectively. The trend over time for americium-241 is expected to increase because of the decay of plutonium-241 (half-life 14.4 years). The soil sampling results for 2018 and 2020 report a maximum americium-241 concentration of 2.25 nCi/m^2 and 1.28 nCi/m^2, respectively, with no statistically evident significant trend. None of the individual soil results or trends indicate the offsite soil surface radionuclide concentrations are impacted negatively by INL operations (Reference 2.9-3 and Reference 2.9-5).

The Naval Reactors Facility performs soil and vegetation sampling and analysis for gamma-emitting radionuclides with 2019 and 2020 results showing no measurable increase in radiation levels (Reference 2.9-14 and Reference 2.9-23).

Annual oversite reports from Reference 2.9-15 through Reference 2.9-18 summarize the findings of the DEQ analyses compared to the DOE results and conclusions with overall agreement. The DEQ found that milk and soil sample results were typical of background values and pose no health concerns to members of the public.

None of the results summarized from the Naval Reactors Facility or INL radiological environmental sampling of agriculture, vegetation, and soils indicate an anticipated impact on CFPP operations or environmental sampling.

2.9.3.5 Animals and Tissue Monitoring and Results

Human consumption of animals that may have been exposed to the radioactive effluents of INL operations presents a potential secondary exposure pathway to the public. Animals sampled include big game (usually samples are collected from roadkill), waterfowl collected from wastewater ponds at the ATR and offsite control locations, and bat samples composited from five INL areas (Reference 2.9-2 through Reference 2.9-6). The highest results reported from 2017 through 2021 are presented in Table 2.9-11.

Muscle, liver, and thyroid samples are collected from big game animals with the muscle and liver samples analyzed for cesium-137 and the thyroid samples analyzed for iodine-131. Cesium-137 behaves similarly to potassium in the body and is readily incorporated into muscle and organ tissues. Thyroids selectively concentrate iodine and are used as a bio-indicator of atmospheric releases. Iodine-131 was not detected in the thyroid samples collected between 2017 and 2021. Cesium-137 and other man-made, gamma-emitting radionuclides were not found in the samples analyzed between 2017 and 2021. No estimated annual exposure to the maximally exposed individual was found for consumption of big game during this time period (Reference 2.9-2 through Reference 2.9-6).

Waterfowl are collected from wastewater ponds located at the ATR and analyzed for gamma-emitting radionuclides, strontium-90, americium-241, plutonium-238, and plutonium-239/240 because these nuclides are measured in liquid effluents from INL facilities. The highest concentrations found between 2017 and 2021 are reported in Table 2.9-11. Ducks removed from the ATR Complex have more identified radionuclides and higher concentrations than other locations. The ducks were taken from a sewage lagoon adjacent to the ATR evaporation ponds, but the source is assumed to be the ATR evaporation ponds (Reference 2.9-2). Ducks collected from control areas had varying detections and concentrations of man-made radionuclides, which are attributed to fallout from previous global nuclear weapons testing (Reference 2.9-2, Reference 2.9-3, Reference 2.9-4). From 2017 to 2021, the overall concentration of man-made radionuclides quantified in the ducks sampled decreased. The estimated annual exposure to the maximally exposed individual eating waterfowl over the last five years shows a maximum of 0.078 mrem in 2020 (Reference 2.9-3) and a minimum of 0.002 mrem in 2021 (Reference 2.9-2).

Bat carcasses from around the INL site have been collected and analyzed for man-made radionuclides since 2015. The bat tissue is composited into groups from similar areas and analyzed for gamma-emitting radionuclides, strontium-90, americium-241, plutonium-238, and plutonium-239/240 because these nuclides are measured in liquid effluents from INL facilities (Reference 2.9-2 through Reference 2.9-6). The highest concentrations found between 2017 and 2021 are reported in Table 2.9-11. Many of the man-made radionuclides quantified in the bats could be attributed to fall out from previous global nuclear weapons testing, but the presence of fission products cobalt-60 and zinc-65 indicates the bats may have accessed INL liquid effluent ponds (Reference 2.9-2 through Reference 2.9-6). Bats are not an expected human exposure pathway; LWA ER Section 2.3 discusses the impacts on ecological resources due to CFPP operation.

The location of the closest INL facilities and migrant nature of waterfowl could impact trends in environmental sampling results for the CFPP.

2.9.3.6 Direct Radiation Monitoring and Results

Direct radiation monitoring measures cumulative exposures in air due to ambient ionizing radiation, the primary exposure pathway. Historically, TLDs were used with placement in specific locations. In 2010, the INL contractor began collocating optically stimulated luminescent dosimeters that can be read multiple times without losing the accumulated data versus the single-read TLDs (Reference 2.9-2). Figure 2.9-8 shows direct radiation monitoring locations. Dosimeters are generally placed at facility perimeters, near radioactive material storage areas, along roadways, and at other areas of interest to ensure exposures are below regulatory standards.

Results are compared to background measurements and doses in excess of background are compared to historical and other data in the area to determine if additional actions and analyses are needed. These requirements are detailed in the INL Environmental Direct Radiation Monitoring Program (Reference 2.9-33). Direct radiation monitoring results for 2017 through 2021 are shown in Table 2.9-12 and compared to the calculated natural external radiation background for the Snake River Plain. The results demonstrate that INL operations are unlikely to increase background radiation levels at distant locations (Reference 2.9-2).

Neutron dosimeters are also deployed to measure exposure impacts to the public with neutron background radiation considered to be zero millirem. Neutron dosimeters are placed at the INL Research Center and Idaho Falls. The detection limit for the neutron dosimeters used by the INL program is 10 mrem of neutron dose equivalent. The neutron dosimeter results for 2017 through 2021 were all below the 10 mrem detection limit (Reference 2.9-2 through Reference 2.9-6).

The Navy performs direct radiation monitoring using TLDs placed around the perimeter of and up to 10 miles from the Naval Reactors Facility security fence. The results from 2019 and 2020 demonstrate that Naval Reactors Facility operations did not contribute to an increase in offsite radiation levels (Reference 2.9-14 and Reference 2.9-23).

In its oversight role, DEQ monitors direct radiation in real-time using high-pressure ion chambers or EcoGamma dual Geiger-Mueller detectors and passive electret ionization chambers to measure cumulative radiation exposure over quarterly monitoring periods. A review of the 2017 through 2020 annual reports (Reference 2.9-15 through Reference 2.9-18) shows that results from DEQ, INL, and Environmental Surveillance, Education, and Research (ESER) Programs were aligned except for 2020 when the DEQ results were lower than both INL and ESER. For all the years reviewed, the DEQ determined direct radiation exposures on the INL site are comparable to background locations, no measurable impacts are above background from INL operations, and no public health risk is related to ambient direct radiation from INL.

The CFPP site is not expected to have increased background direct radiation levels from INL or Naval Reactors Facility operations based on these results and the monitoring locations relative to the CFPP site.

2.9.3.7 Quality Assurance

Quality assurance is planned and systematic activities, defined by a Quality Control Program, that give confidence to the data provided and decisions made from that data. Each of the ASERs summarized in this section (Reference 2.9-2 through Reference 2.9-6) state the primary policies, requirements, and responsibilities for a quality program are:

- 10 CFR 830 Subpart A.
- 40 CFR 61 Subpart H.
- DOE Order 414.1D (Reference 2.9-34).
- American Society of Mechanical Engineers "Quality Assurance Requirement for Nuclear Facility Applications."
- "Intergovernmental Data Quality Task Force Uniform Federal Policy for Implementing Quality Systems" (Reference 2.9-35).
- "EPA Requirements for Quality Assurance Project Plans" (Reference 2.9-36).
- "EPA Guidance on Systematic Planning Using Data Quality Objectives Process" (Reference 2.9-37).

The INL and its contractors achieve quality results by following procedures and processes meeting the requirements above. The guiding documents for the INL environmental sampling program define data quality objectives, which are found in Reference 2.9-38 for the air monitoring program, Reference 2.9-39 for the soil monitoring program, and Reference 2.9-33 for the direct radiation monitoring program. The data quality objectives are incorporated into Reference 2.9-11 and into vendor-specific procedures and processes that detail sample planning, sample collection and handling, sample analysis, data review and evaluation, and reporting. The INL annual reports include procedure requirements used to ensure QA of the INL environmental monitoring data, with each concluding that the data provided are of reliable and acceptable quality (Reference 2.9-2 through Reference 2.9-6).

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Table 2.9-1: Natural Background Radiation in 2021 for the Snake River Plain

Radiation Source	Exposure Type	Total Average Annual Dose (mrem)
Terrestrial[1]	External	73
Cosmic[2]	External	57
Potassium-40[3]	Internal (ingestion)	15
Thorium-232 and uranium-238[3]	Internal (ingestion)	13
Others (carbon-14 and rubidium-87)[3]	Internal (ingestion)	1
Radon-222 (radon) and decay products[3]	Internal (ingestion)	212
Radon-220 (thoron) and decay products[3]	Internal (ingestion)	16
Total		387

Reference 2.9-2

[1] Estimate based on Snake River Plain soil sample concentrations

[2] Estimate based on Snake River Plain altitude

[3] Estimate based on United States average concentrations

Table 2.9-2: INL Site and Regional Ambient Air Monitoring Network

Medium	Analysis	Frequency	Number of Locations						Minimum Detectable Concentration
			Onsite			Offsite			
			INL	ESER	Total	INL	ESER	Total	
Air (low volume)	Gross alpha	Weekly	16	3	19	6	13	19	1E-15 µCi/mL
	Gross beta	Weekly	16	3	19	6	13	19	2E-15 µCi/mL
	Specific gamma[1]	Quarterly	16	3	19	6	13	19	2E-16 µCi/mL
	Plutonium-238	Quarterly	16	1-2	17-18	6	4	10	3.5E-18 µCi/mL
	Plutonium-239/240	Quarterly	16	1-2	17-18	6	4	10	3.5E-18 µCi/mL
	Americium-241	Quarterly	16	1-2	17-18	6	4	10	4.6E-18 µCi/mL
	Strontium-90	Quarterly	16	1-2	17-18	6	4	10	3.4E-17 µCi/mL
	Iodine-131	Weekly	16	3	19	6	13	19	1.5E-15 µCi/mL
	Total Particulates	Weekly	NA	3	3	NA	13	13	10 mg/m^3
Air (high volume)	Gross beta scan	Biweekly	NA	NA	NA	NA	1	1	1E-15 µCi/mL
	Gamma scan	Continuous	NA	NA	NA	NA	1	1	Not applicable
	Specific gamma	Annually	NA	NA	NA	NA	1	1	1E-14 µCi/mL
	Isotopic uranium and plutonium	Every 4 Years	NA	NA	NA	NA	1	1	2E-18 µCi/mL
Air (atmospheric moisture)	Tritium	3-6/Quarter	2	1	3	2	3	5	2E-13 µCi/mL (air)
Air (precipitation)	Tritium	Monthly	NA	0	0	NA	1	1	88 pCi/L
		Weekly	NA	1	1	NA	2	2	

Reference 2.9-2
NA is Not Applicable
[1] The minimum detectable concentration shown is for cesium-137.

Table 2.9-3: INL Site and Regional Maximum Ambient Air Monitoring Results

Year	Gross Alpha (µCi/mL)	Gross Beta (µCi/mL)	Americium-241 (µCi/mL)	Plutonium-238 (µCi/mL)	Plutonium-239/240 (µCi/mL)	Strontium-90 (µCi/mL)	Cesium-137 (µCi/mL)	Iodine-131 (µCi/mL)
2021[1]	(9.6±3.2)E-15 EFS	(8.3±8.5)E-14 CFA	Not detected	Not detected	(5.5±1.6)E-17 Arco	(2.1±0.12)E-16 Mud Lake	Not detected	Not detected
2020[2]	(8.4±0.8)E-15 Jackson	(8.4±0.21)E-14 Craters of the Moon	Not detected	(4.1±1.3)E-18 Howe	Not detected	(3.8±1.3)E-17 Arco	Not detected	Not detected
2019[3]	(6.9±3.0)E-15 CFA	(6.5±0.7)E-14 Gate 4	(3.2±0.99)E-18 Monteview	(3.1±0.90)E-18 Blue Dome	(3.7±1.0)E-18 Monteview	Not detected	Not detected	Not detected
2018[4]	(7.6±2)E-15 INTEC	(5.67±0.10)E-14 Van Buren	(4.5±0.42)E-17 Van Buren	(1.3±0.33)E-17 Van Buren	(1.3±0.13)E-16 ATR	(5.6±0.52)E-17 Arco	Not detected	Not detected
2017[5]	(10.3±2)E-15 Sugar City	(6.7±0.11)E-14 EFS	(1.9±0.54)E-18 Sugar City	(2.5±0.65)E-18 Jackson	(1.8±0.50)E-18 Blackfoot	Not detected	Not detected	Not detected
DCS[6]	3.4E-14	2.5E-11	4.1E-14	3.7E-14	3.4E-14	2.5E-11	9.8E-11	4.1E-10

Errors are one standard deviation (1σ). Results greater than 3σ uncertainty are considered statistically detected.
CFA is Central Facilities Area DCS is derived concentration standards

[1] Reference 2.9-2
[2] Reference 2.9-3
[3] Reference 2.9-4
[4] Reference 2.9-5
[5] Reference 2.9-6
[6] Reference 2.9-19

Table 2.9-4: INL Site and Regional Maximum Tritium Air Monitoring Results

Year	Tritium Atmospheric Moisture ($\mu Ci/mL_{air}$)	Tritium Precipitation (pCi/L)
2021[1]	1.36E-12 EFS	391 ± 31.2 Howe
2020[2]	1.91E-12 EFS	228 ± 28.1 EFS
2019[3]	1.47E-12 EFS	146 ± 24.1 EFS
2018[4]	2.10E-12 Idaho Falls	299 ± 25.2 Idaho Falls
2017[5]	1.58E-12 Atomic City	232 ± 25.8 EFS
Derived Concentration Standards[6]	2.1E-07	1.9E+06

Errors are one standard deviation (1σ). Results greater than 3σ uncertainty are considered statistically detected.

[1] Reference 2.9-2

[2] Reference 2.9-3

[3] Reference 2.9-4

[4] Reference 2.9-5

[5] Reference 2.9-6

[6] Reference 2.9-19

Table 2.9-5: INL Site Monitored Airborne Effluents

Year	Airborne Effluent (Ci)	Annual Dose (mrem)
2021[1]	9.54E+02	6.67E-02
2020[2]	1.45E+03	6.17E-02
2019[3]	1.45E+03	5.59E-02
2018[4]	1.37E+03	1.02E-02
2017[5]	1.33E+03	8.02E-03

[1] Reference 2.9-2
[2] Reference 2.9-3
[3] Reference 2.9-4
[4] Reference 2.9-5
[5] Reference 2.9-6

Table 2.9-6: INL Maximum Groundwater Monitoring Results

Year	ATR Complex			RHLLW Facility[6]		
	Tritium (pCi/L)	Strontium-90 (pCi/L)	Cobalt-60 (pCi/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Tritium (pCi/L)
2021[1]	3,460 ATR (TRA-07)	Not detected	Not detected	1.06 ± 0.337 USGS-141	2.47 ± 0.260 USGS-140	916 ± 149 USGS-136
2020[2]	3,380 ATR (TRA-07)	Not detected	Not detected	1.88 ± 0.523 USGS-140	1.97 ± 0.324 USGS-136	964 ± 138 USGS-140
2019[3]	3,150 ATR (TRA-07)	Not detected	Not detected	Not applicable	Not applicable	Not applicable
2018[4]	4,260 ATR (TRA-07)	Not detected	Not detected	Not applicable	Not applicable	Not applicable
2017[5]	5,020 ATR (TRA-07)	Not detected	Not detected	Not applicable	Not applicable	Not applicable
MCL[7]	20,000	8	100	15	4 mrem/yr	20,000

Errors are one standard deviation (1σ). Results greater than 3σ uncertainty are considered statistically detected.

[1] Reference 2.9-2

[2] Reference 2.9-3

[3] Reference 2.9-4

[4] Reference 2.9-5

[5] Reference 2.9-6

[6] Carbon-14, iodine-129, and technicium-99 were not detected.

[7] 40 CFR 141 Subpart G

Table 2.9-7: Big Lost River Maximum Surface Water Monitoring Results

Year	Big Lost River Sampling Off INL Site			Big Lost River Sampling On INL Site		
	Gross Alpha (pCi/L)	**Gross Beta (pCi/L)**	**Tritium (pCi/L)**	**Gross Alpha (pCi/L)**	**Gross Beta (pCi/L)**	**Tritium (pCi/L)**
2021[1]	8.8 ± 0.83 Alpheus Springs-Twin Falls	14 ± 1.0 Alpheus Springs-Twin Falls	31 ± 23 Clear Springs-Buhl	Not Sampled	Not Sampled	Not Sampled
2020[2]	2.4 ± 0.68 JW Bill Jones Jr Trout Farm-Hagerman	5.3 ± 0.46 Alpheus Springs-Twin Falls	72 ± 24 Clear Springs-Buhl	Not Sampled	Not Sampled	Not Sampled
2019[3]	1.24 ± 0.38 JW Bill Jones Jr Trout Farm-Hagerman	7.9 ± 0.50 Alpheus Springs-Twin Falls	98 ± 24 JW Bill Jones Jr Trout Farm-Hagerman	5.9 ± 0.66 Rest Area	15 ± 0.61 Naval Reactors Facility	148 ± 24 EFS
2018[4]	0.92 ± 0.30 JW Bill Jones Jr Trout Farm-Hagerman	7.7 ± 0.69 Alpheus Springs-Twin Falls	82 ± 25 Alpheus Springs-Twin Falls	3.6 ± 0.52 EFS	9.1 ± 0.53 EFS	136 ± 31 Rest Area
2017[5]	3.7 ± 0.68 Clear Springs-Buhl	6.7 ± 0.58 Alpheus Springs-Twin Falls	204 ± 25 JW Bill Jones Jr Trout Farm-Hagerman	2.8 ± 0.58 INTEC	6.4 ± 0.54 INTEC	104 ± 26 EFS
MCL[6]	15	50 pCi/L screening 4 mrem/yr	20,000	15	50 pCi/L screening 4 mrem/yr	20,000

Errors are one standard deviation (1σ). Results greater than 3σ uncertainty are considered statistically detected.

[1] Reference 2.9-2

[2] Reference 2.9-3

[3] Reference 2.9-4

[4] Reference 2.9-5

[5] Reference 2.9-6

[6] 40 CFR 141 Subpart G

Table 2.9-8: INL Maximum Drinking Water Monitoring Results

Year	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Tritium (pCi/L)	Iodine-129 (pCi/L)
2021[1]	4.68 MFC	10.5 MFC	2,640 CFA	Not detected CFA
2020[2]	7.72 Gun range	5.29 TAN CTF	2,460 CFA	Not detected CFA
2019[3]	2.91 CFA	5.99 CFA	2,670 CFA	Not detected CFA
2018[4]	4.84 CITRC	10.4 TAN CTF	2,900 CFA	Not detected CFA
2017[5]	5.71 TAN CTF	6.16 MFC	2,970 CFA	Not detected CFA
Offsite[1]	3.3 ± 0.54 Rest Area Hwy 20/ 26	8.8 ± 1.0 Atomic City	116 ± 32 Rest Area Hwy 20/ 26	Not applicable
MCL[6]	15	50 pCi/L screening 4 mrem/yr	20,000	1

Errors are one standard deviation (1σ). Results greater than 3σ uncertainty are considered statistically detected.
CFA is Central Facilities Area
TAN CTF is Test Area North/Contained Test Facility
CITRC is Critical Infrastructure Test Range Complex
[1] Reference 2.9-2
[2] Reference 2.9-3
[3] Reference 2.9-4
[4] Reference 2.9-5
[5] Reference 2.9-6
[6] 40 CFR 141 Subpart G

Table 2.9-9: INL Maximum Agricultural Monitoring Results

Year	Medium	Tritium	Strontium-90	Iodine-131	Cesium-137
2021[1]	Milk (pCi/L)	63 ± 32	1.53 ± 0.10	Not detected	Not detected
	Lettuce (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
	Grain (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
	Potatoes (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
	Alfalfa (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
2020[2]	Milk (pCi/L)	214 ± 25	0.45 ± 0.05	Not detected	Not detected
	Lettuce (pCi/kg)	Not evaluated	28.8 ± 18.8	78.5 ± 158	Not detected
	Grain (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
	Potatoes (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
	Alfalfa (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
2019[3]	Milk (pCi/L)	69 ± 25	0.27 ± 0.09	Not detected	Not detected
	Lettuce (pCi/kg)	Not evaluated	44.6 ± 19.7	159 ± 118	Not detected
	Grain (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
	Potatoes (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
	Alfalfa (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
2018[4]	Milk (pCi/L)	171 ± 30	0.21 ± 0.05	Not detected	Not detected
	Lettuce (pCi/kg)	Not evaluated	154 ± 24	109 ± 84.7	Not detected
	Grain (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
	Potatoes (pCi/kg)	Not evaluated	Not detected	Not detected	Not detected
	Alfalfa (pCi/kg)	Not evaluated	135 ± 24.8	Not detected	Not detected
2017[4,5]	Milk (pCi/L)	189.0 ± 24.9 (control)	0.42 ± 0.06	Not detected	Not detected
	Lettuce (pCi/kg)	Not evaluated	112	Not detected	Not detected
	Grain (pCi/kg)	Not evaluated	2.6	Not detected	Not detected
	Potatoes (pCi/kg)	Not evaluated	2.7	Not detected	Not detected
	Alfalfa (pCi/kg)	Not evaluated	13.5	Not detected	Not detected
Derived Concentration Standard[6] (pCi/L)		1.90E+06	1,100	1,300	3,000
40 CFR 141 Subpart G[7] (pCi/L)		20,000	8	Not applicable	Not applicable

Errors are one standard deviation (1σ). Results greater than 3σ uncertainty are considered statistically detected.

[1] Reference 2.9-2

[2] Reference 2.9-3

[3] Reference 2.9-4

[4] Reference 2.9-5

[5] Reference 2.9-6

[6] Reference 2.9-19, drinking water standard for comparison to milk results

[7] Drinking water standard for comparison to milk results

Table 2.9-10: INL Onsite Soil Monitoring Results in 2017

Location	Depth	Americium-241 (pCi/g)	Plutonium-239/240 (pCi/g)	Cesium-137 (pCi/g)
RWMC	0-2 in	0.6	0.2	0.6
	2-4 in	Not evaluated	Not evaluated	0.4
EFS	0-2 in	Not detected	Not detected	0.7
	2-4 in	Not evaluated	Not evaluated	0.1
Rest Area Hwy 20/ 26	0-2 in	Not detected	0.02	0.5
	2-4 in	Not evaluated	Not evaluated	0.1

[1] Reference 2.9-6

Table 2.9-11: INL Maximum Animal Monitoring Results

Year	Big Game		Waterfowl		Bats	
	Samples	**Radionuclide (µCi/mL)**	**Samples**	**Radionuclide (pCi/kg)**	**Samples (composite)**	**Radionuclide (pCi/kg)**
2021[1]	10	None detected	2	cobalt-60: 71±7 strontium-90: 177±6	5	cobalt-60: 16,000±271 zinc-65: 6,420±339 strontium-90: 29,300±190 cesium-137: 2,310±112 plutonium-238: 30±5 plutonium-239: 12±4
	0 Controls	Not applicable	3 Controls	strontium-90: 73±4	0 Controls	Not applicable
2020[2]	2	None detected	3	chromium-51: 382±58 cobalt-60: 5,040±41 zinc-65: 6,550±104 strontium-90: 2,810±18 cesium-137: 5,640±8	4	cobalt-60: 14,100±143 zinc-65: 6,900±410 strontium-90: 17,000±119 cesium-137: 7,720±192 plutonium-239: 13.4±4.38
	0 Controls	Not applicable	2 Controls	strontium-90: 11±3	0 Controls	Not applicable
2019[3]	0	Not applicable	4	cobalt-60: 300±11 zinc-65: 299±27 strontium-90: 358±10 cesium-137: 171±17 plutonium-238: 14±3	4	cobalt-60: 9,710±297 zinc-65: 4,230±517 strontium-90: 14,400±84 cesium-137: 5,530±173 plutonium-238: 15.7±3.4 plutonium-239: 9.01±2.98
	0 Controls	Not applicable	2 Controls	strontium-90: 26±4 americium-241: 6±2	0 Controls	Not applicable
2018[4]	2	None detected	4	cobalt-60: 982±14 zinc-65: 3,030±159 strontium-90: 326±10 cesium-137: 579±38	4	cobalt-60: 96,700±940 zinc-65: 31,000±1,100 strontium-90: 26,900±200 cesium-137: 19,300±440
	0 Controls	Not applicable	2 Controls	None detected	0 Controls	Not applicable
2017[4,5]	5	None detected	3	cobalt-60: 3,340±144 zinc-65: 190±20 strontium-90: 442±9 cesium-137: 3,090±152 plutonium-238: 17±4 plutonium-239/240: 12±4	4	cobalt-60: 110,000±500 zinc-65: 9,880±680 strontium-90: 39,500±170 cesium-137: 70,800±320 europium-152: 1,290±210 plutonium-238: 18±3 plutonium-239: 69±6
	0 Controls	Not applicable	4 Controls	strontium-90: 14±3 plutonium-238: 13±2 plutonium 239/240: 8±3	0 Controls	Not applicable

Errors are one standard deviation (1σ). Results greater than 3σ uncertainty are considered statistically detected.
[1] Reference 2.9-2
[2] Reference 2.9-3
[3] Reference 2.9-4
[4] Reference 2.9-5
[5] Reference 2.9-6, 2017 bat results were reported in Reference 2.9-5

Table 2.9-12: INL Mean Boundary and Regional Direct Radiological Monitoring Results

Year	Entity	Boundary Mean (mrem)	Regional Mean (mrem)	Calculated Background (mrem)
2021[1]	INL ESER	121 122	120 122	130
2020[2]	INL ESER	126 118	128 119	124
2019[3]	INL ESER	120 124	116 126	125
2018[4]	INL ESER	131 119	129 119	126
2017[5]	INL ESER	120 107	117 113	126

[1] Reference 2.9-2
[2] Reference 2.9-3
[3] Reference 2.9-4
[4] Reference 2.9-5
[5] Reference 2.9-6

Figure 2.9-1: CFPP Preoperational Meteorological and Groundwater Monitoring Locations

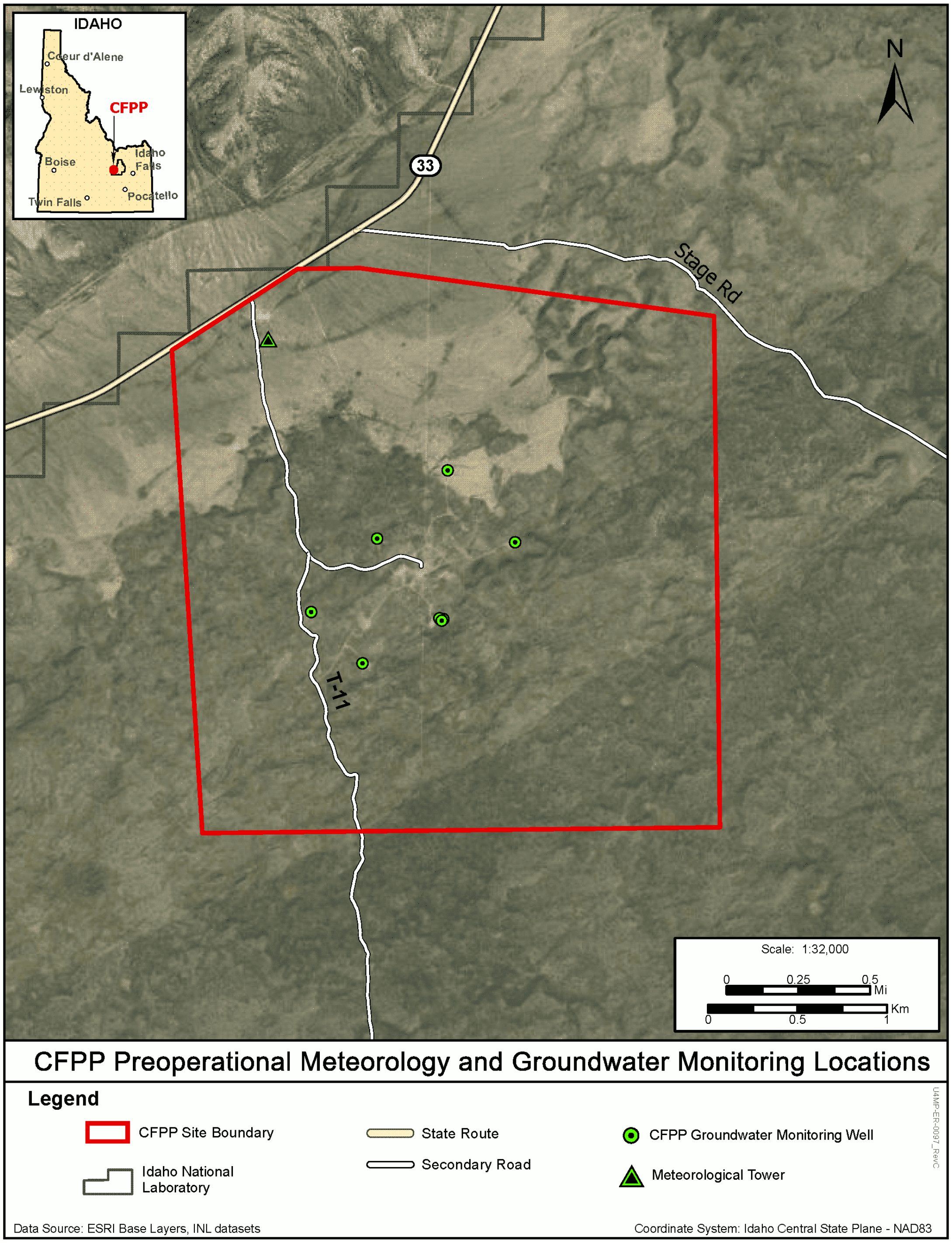


Figure 2.9-2: Southeast Idaho Regional Radiological Monitoring Locations

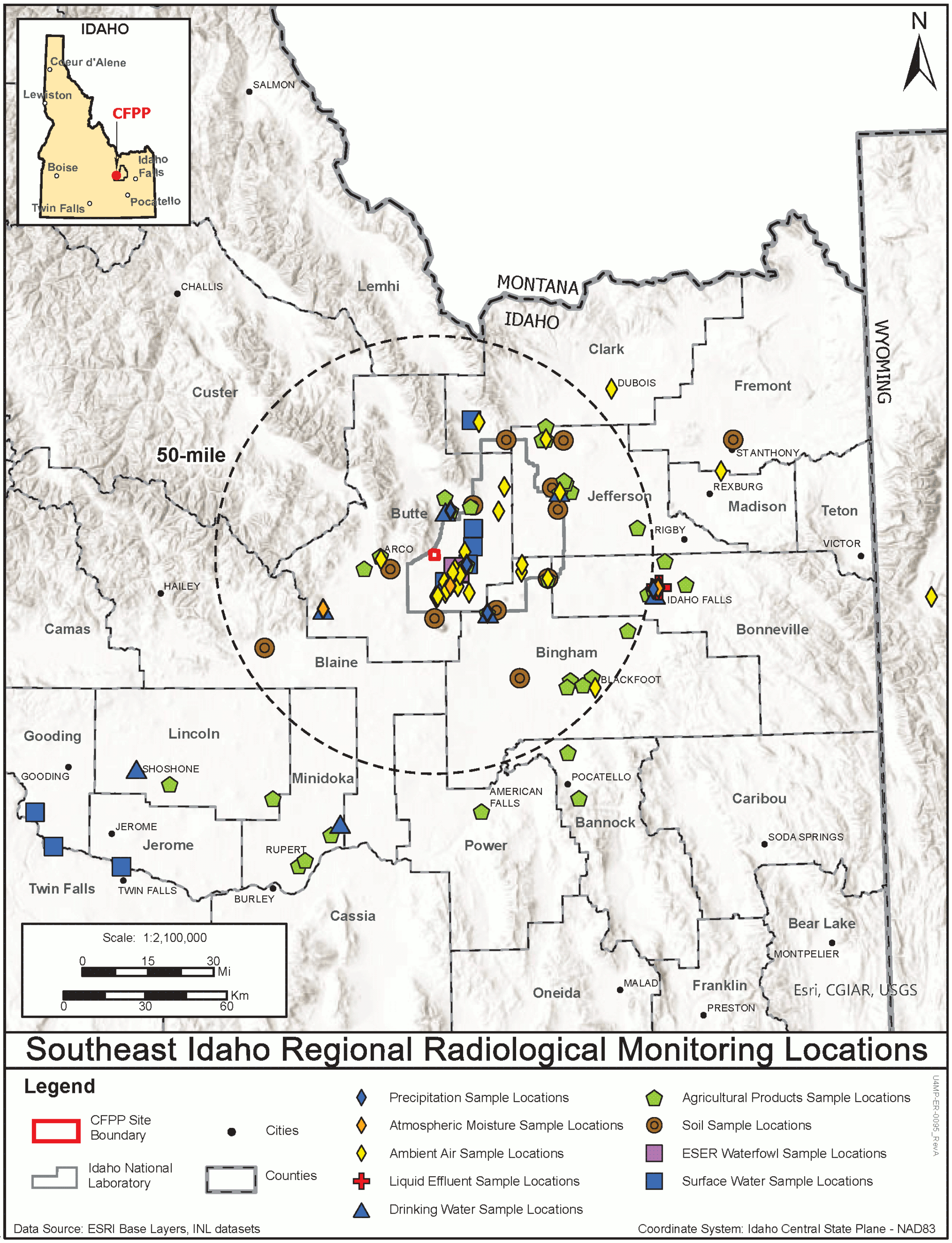


Figure 2.9-3: Southeast Idaho Regional Groundwater Monitoring Locations

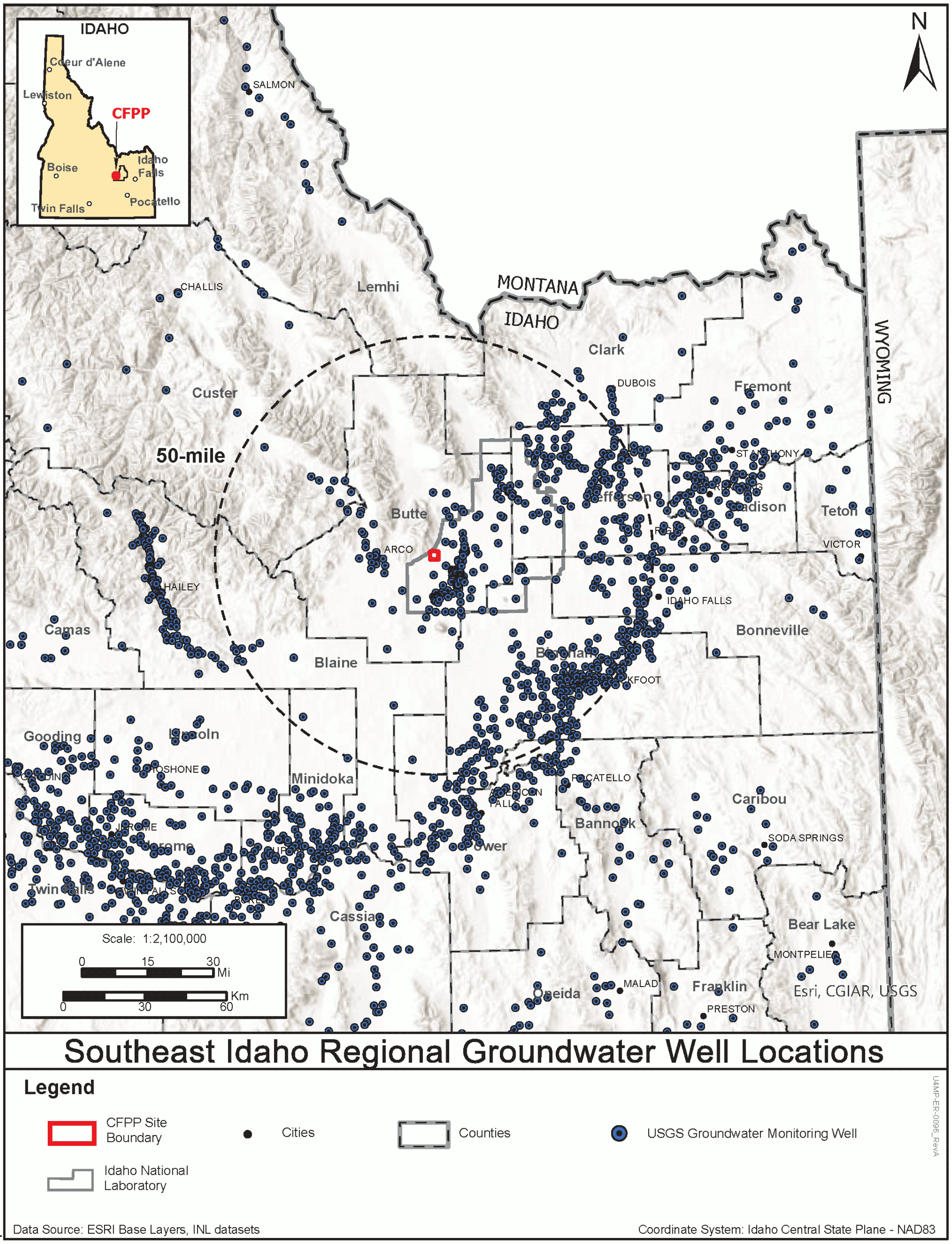


Figure 2.9-4: CFPP Regional Air Radiological Monitoring Locations

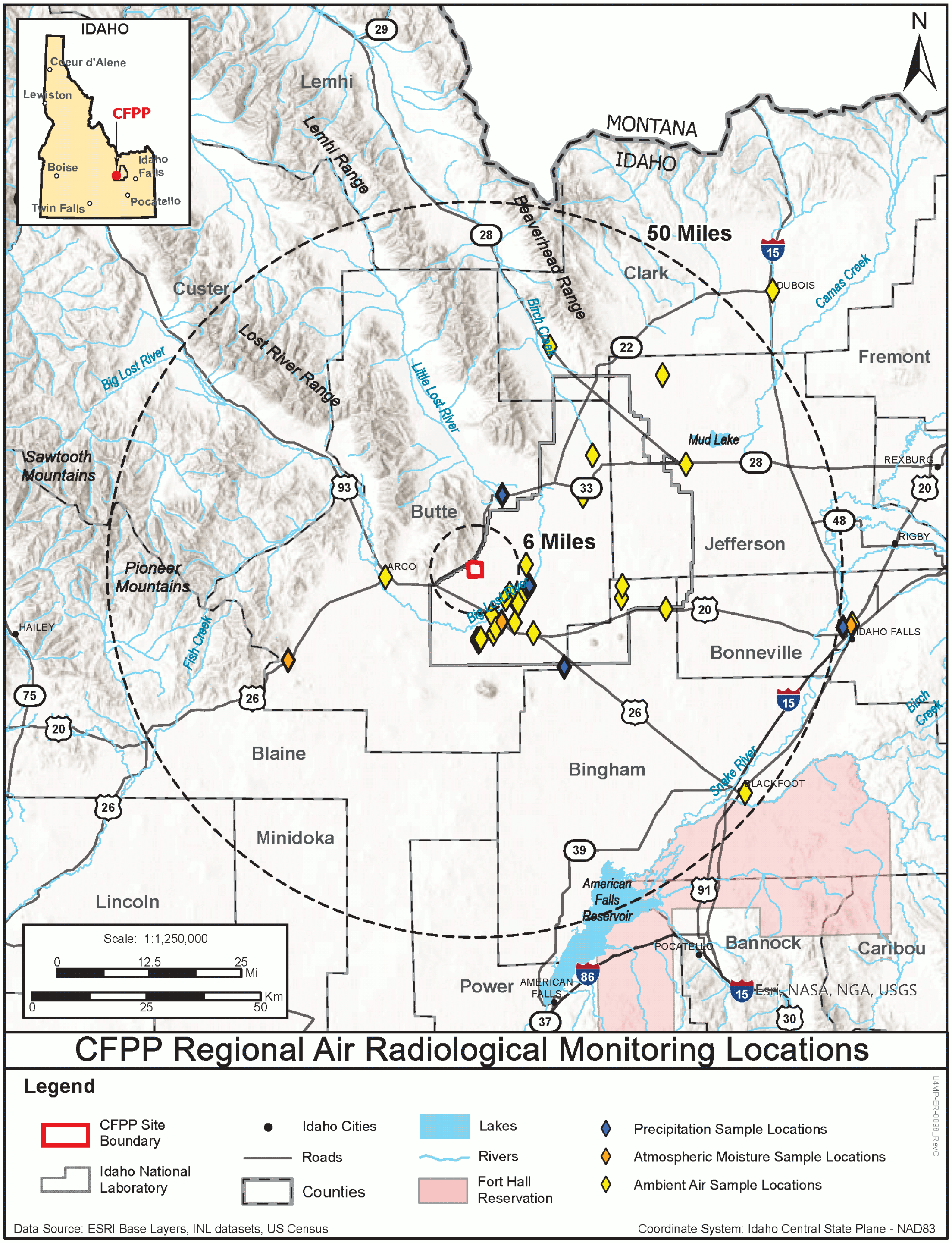


Figure 2.9-5: CFPP Regional Groundwater Radiological Monitoring Locations

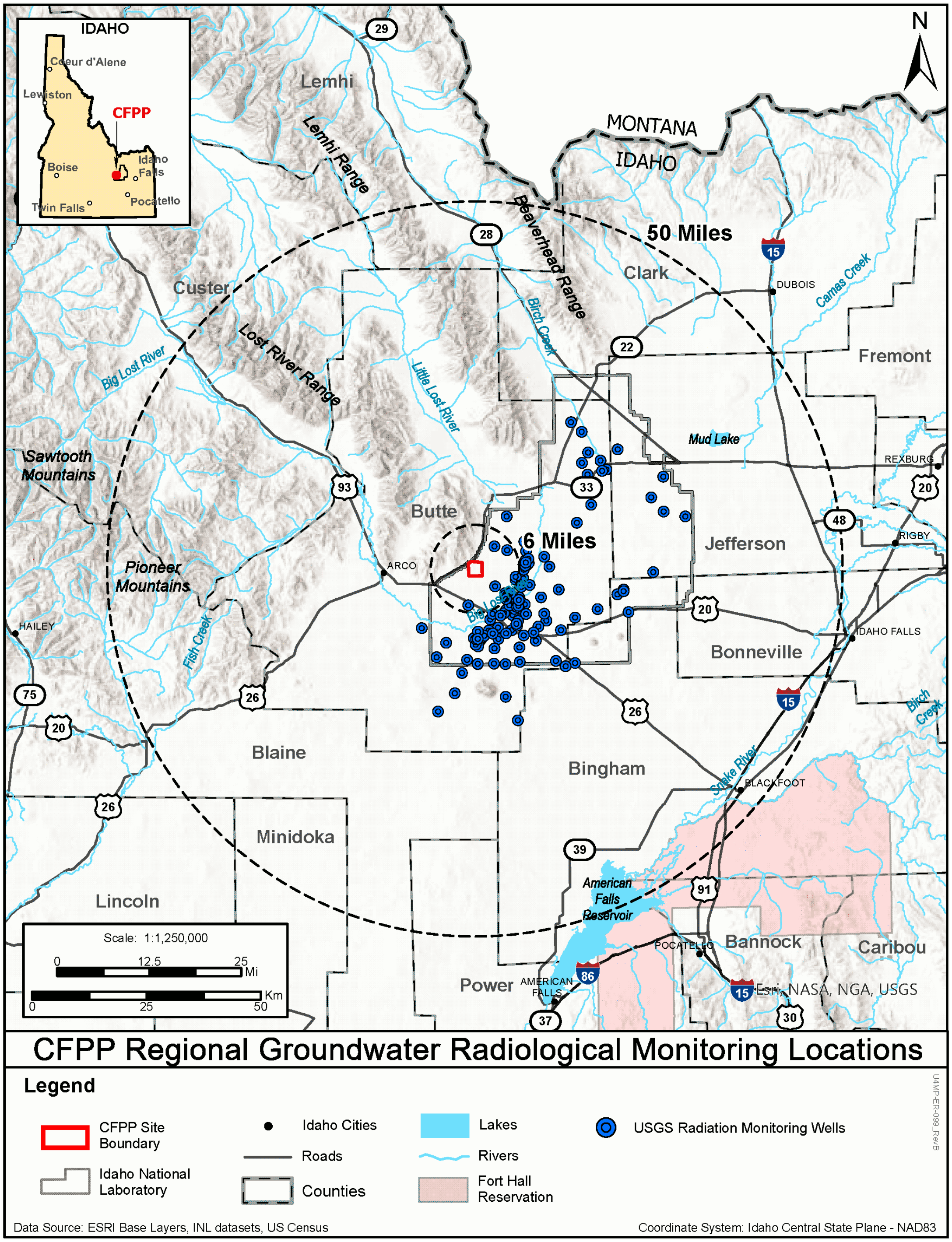


Figure 2.9-6: CFPP Regional Water Radiological Monitoring Locations

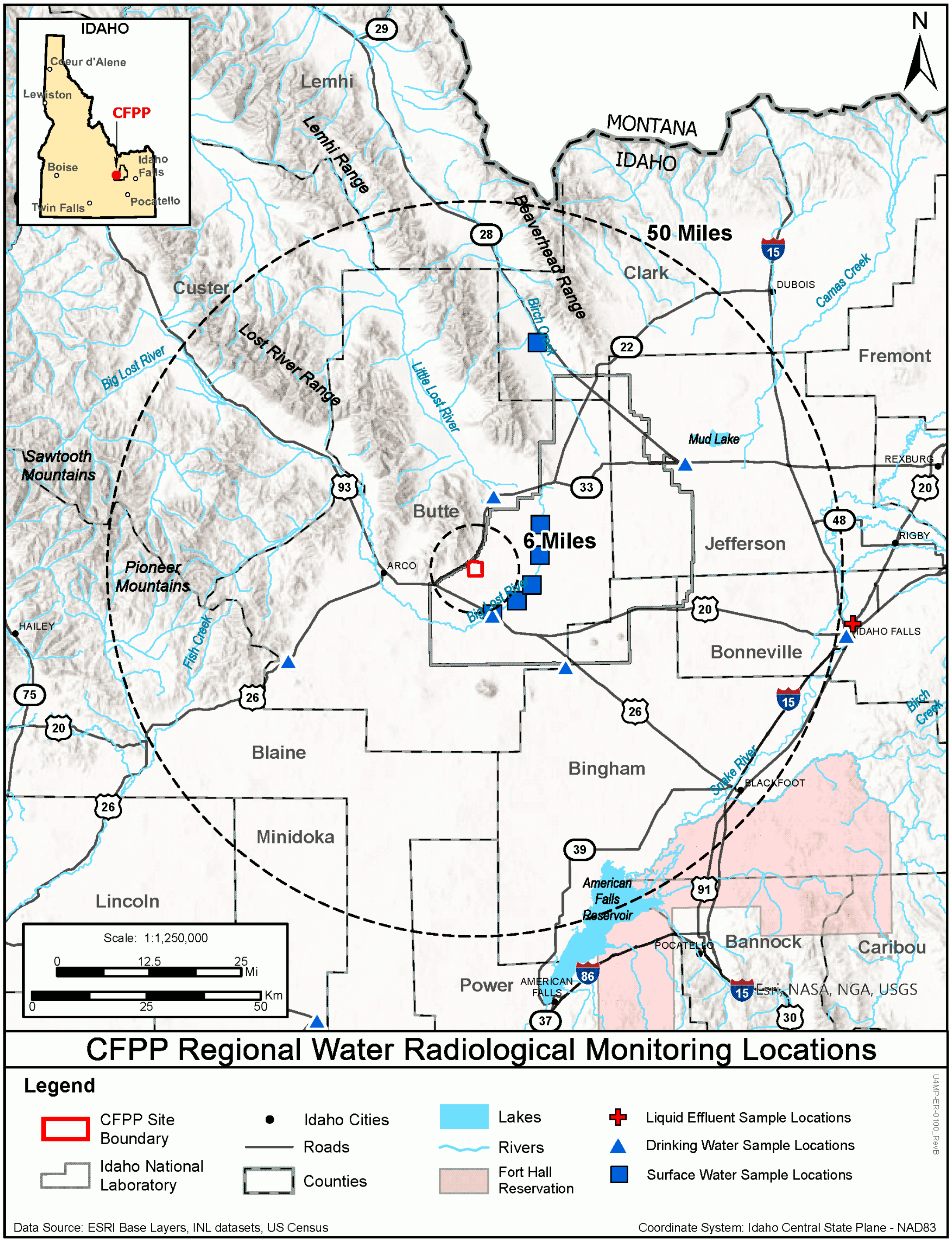


Figure 2.9-7: CFPP Regional Soil, Agriculture, Waterfowl Radiological Monitoring Locations

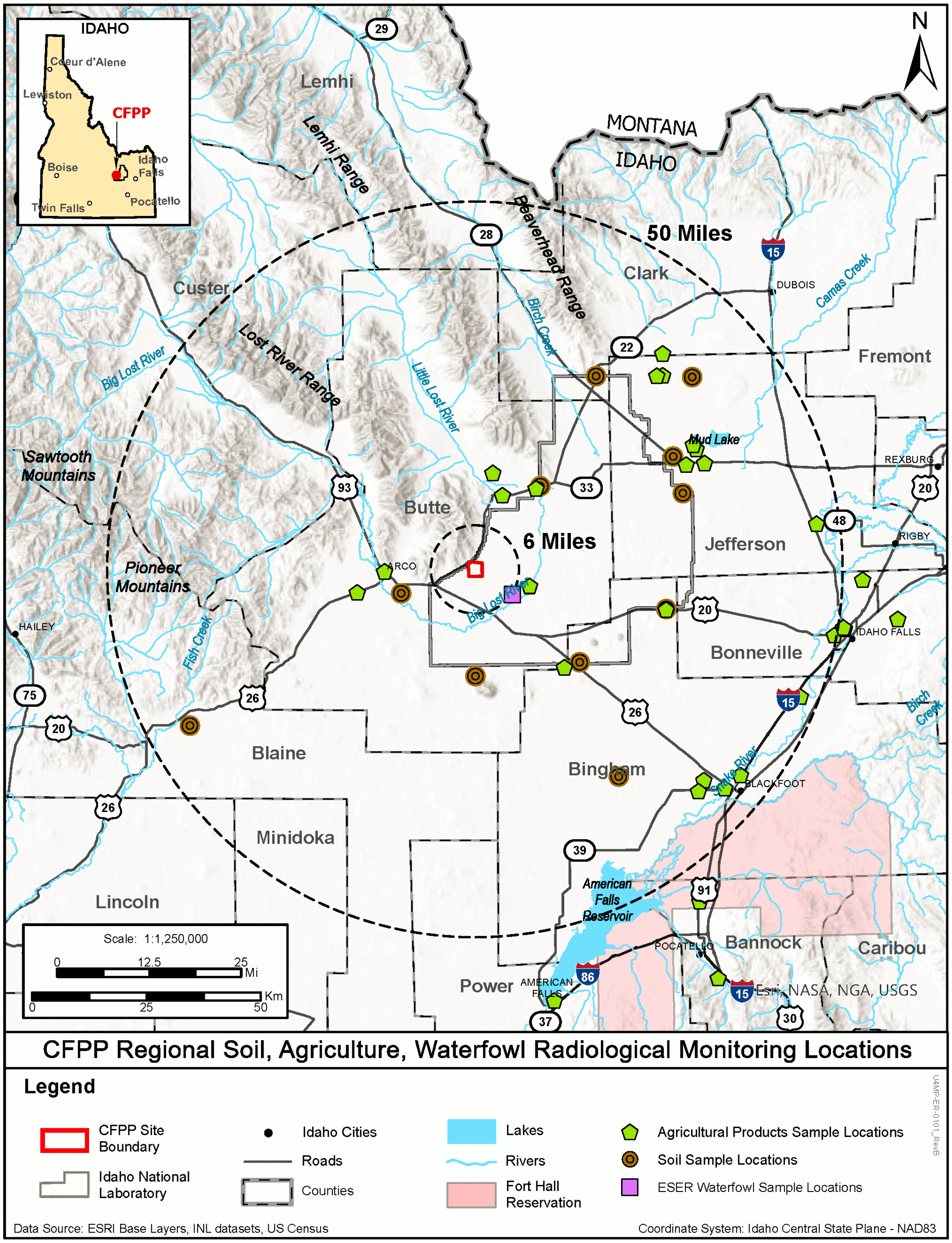
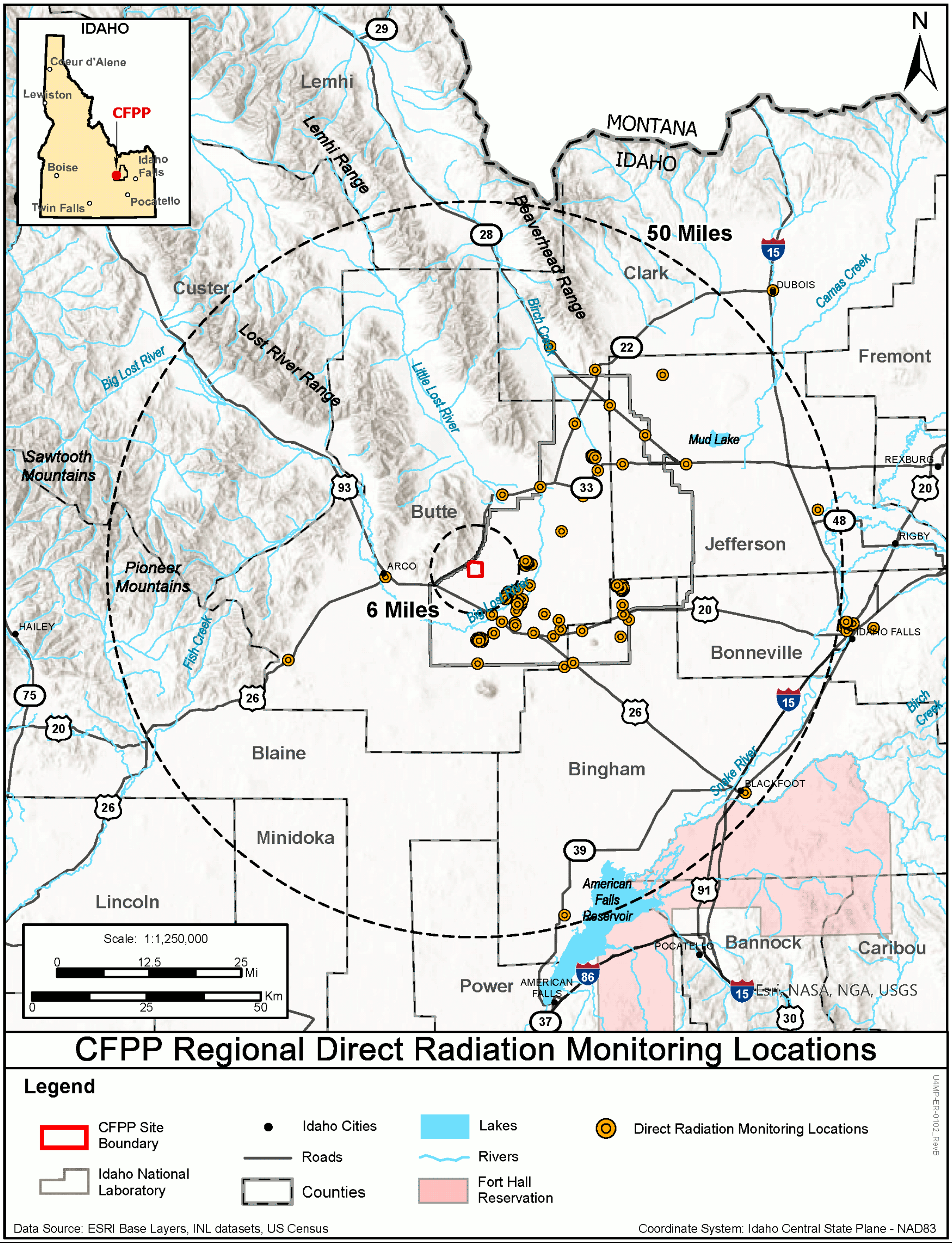


Figure 2.9-8: CFPP Regional Direct Radiation Monitoring Locations



Carbon Free Power Project

Application for Limited Work Authorization

Enclosure 3 - Chapter Three

Site Layout and Project Description

Revision 0
July 2023

Chapter 3 Site Layout and Project Description

3.0 Site Layout and Project Description

This section is not applicable to a Limited Work Authorization application.

3.1 External Appearance and Plant Layout

The CFPP site is located within Butte County, southeastern Idaho, on a portion of the U.S. Department of Energy INL site (LWA ER Figure 2.0-1). The CFPP site encompasses approximately 2325 acres (approximately 3.6 square miles). The area is largely undeveloped high desert (sagebrush steppe habitat) within the Snake River Plain as described in the INL Comprehensive Land Use and Environmental Stewardship Report (Reference 3.1-1).

The Phase I Environmental Site Assessment conducted in May 2020 (Reference 3.1-2) provides information and photographic evidence of the CFPP site before site investigation efforts. Figure 3.1-1 is a ground level photograph of the CFPP site with a view to the northeast showing the central areas of the CFPP site from the southwest quadrant. Figure 3.1-2 is a ground-level photograph of the CFPP site with a view to the south showing the southwest quadrant of the CFPP site. As evidenced by these photographs, the CFPP site is a remote, largely undeveloped area. The surface elevation at the CFPP site ranges from approximately 5180 feet in the northwest to approximately 5020 feet in the east and consists of areas of alluvium and intermittent basalt outcrops (Figure 3.1-5). The landscape is dominated by native Basin and Wyoming big sagebrush vegetation, with its associated shrub, grass, and wildflower species, and the proposed site is located within an environmentally significant Greater Sage Grouse Conservation Area (Reference 3.1-1, pp. 43-44). Past land uses have included livestock grazing. Wildfires, naturally common in sagebrush steppe, have periodically burned portions of the area. The most recent wildfire that impacted the proposed site occurred in 1994.

Current access to the CFPP site is via an unpaved secondary road (designated T-11) with restricted access. Figure 3.1-3 provides a ground level southernly view from the intersection of Idaho State Highway 33 (the nearest paved public road) and T-11. The CFPP meteorological monitoring station and administrative support trailer are visible in the foreground while the CFPP site is proposed to be located approximately a mile to the south in the background of the photo.

Figure 3.1-4 provides an illustration of the CFPP site in relation to the existing vicinity topography. Figure 3.1-5 illustrates the CFPP site topography along with the approximate location of the proposed CFPP plant footprint during the operations phase, the existing CFPP meteorological tower, and existing transmission lines.

Additional areas of the 2325 acre site are utilized during the construction phase. Figure 3.1-6 presents the temporary construction facilities and layout during the construction phase of the project.

The proposed CFPP plant operational layout includes the Nuclear Island, Turbine Island (TI) and balance of site (BOS) buildings. Key Nuclear Island buildings include the Reactor Building (RXB), the Radioactive Waste Building (RWB), and the Control Building (CRB). Additional key buildings located within TI and BOS (TI/BOS) include the air cooled condenser system (ACCS), the Annex Building (ANB), the Turbine Generator Building (TGB), and the site cooling water system (SCWS). Designs are intended to satisfy federal, state and local codes, regulations, ordinances, standard industry practices and the requirements of the authorities having jurisdiction over the project. Further details on these buildings/structures are provided below.

Figure 3.1-7 provides an illustration of the proposed CFPP plant layout with key buildings and station components identified.

To provide a consistent architectural expression for the buildings of the CFPP and to meet the requirements of the building energy codes, both cast-in-place concrete buildings (including steel-composite construction) and metal-framed buildings are clad with a Composite Insulation Metal Panel system over metal furring channels and girts. The Composite Insulation Metal Panel wall cladding system and roofing system are designed to meet the thermal insulation and fire resistance requirements of the applicable codes.

Figure 3.1-8 presents an illustration of the CFPP plant superimposed onto a low aerial photograph of the site. The view is from the intersection of State Highway 33 and T-11 looking south. Figure 3.1-9 is an architectural rendition of the CFPP plant including key buildings and station components. Figure 3.1-10 shows the location of existing and proposed transmission line corridors in relation to the proposed CFPP site.

The following is an introduction to various key buildings and station components.

3.1.1 Reactor Building

The RXB is a multi-story, nuclear island structure. While much of the RXB is below grade, it also extends several stories above grade level. The RXB houses the six NuScale Power Modules (NPMs), as well as the structures, systems and components required for safe shutdown and plant operation. The Ultimate Heat Sink, comprising the combined volume of the reactor pool, refueling pool, and spent fuel pool, is also located in the RXB. The building envelope is a rectangular configuration as shown on Figure 3.1-7.

3.1.2 Radioactive Waste Building

The RWB is a multi-story, nuclear island structure with floors located above and below grade. The RWB provides space for heating, ventilation, and air conditioning (HVAC) space for HVAC equipment and radioactive waste treatment and storage equipment. The RWB houses equipment and systems for processing radioactive gaseous, liquid, and solid waste, and for preparing waste for off-site shipment, including equipment to prepare low-level radioactive waste for compaction and temporary storage of radioactive waste. The RWB also contains electrical equipment, hot machine shop, health physics offices, and the entrance and exit to the radiological control area. The HVAC equipment for high-efficiency particulate air filtration of the air from the RXB and RWB is located in the RWB.

3.1.3 Control Building

The CRB is a multi-story, above-grade, nuclear island structure. The CRB is positioned adjacent to the ANB near the Protected Area entrance of the plant. The

CRB provides space for the main control room and control room envelope (CRE). The main control room houses equipment, controls, and indications for operation of the NPMs and safe shutdown of the plant. The CRE has a number of related support spaces including offices, conference rooms, janitor closet, storage rooms, toilet rooms, and break rooms. The technical support center (TSC) is also located in the CRB and it provides space to support emergency operations and personnel. The TSC support spaces includes offices, conference rooms, and a breakroom. The TSC space is a multipurpose design that can be used for additional functions where applicable. The CRB also houses various equipment storage for instrumentation and controls cabinets, electrical batteries and chargers, air bottle storage for CRE habitability, and various mechanical and HVAC equipment.

3.1.4 Annex Building

The ANB is an above-grade, TI/BOS structure that houses various personnel support business services including locker rooms, showers, toilet facilities, breakrooms, fitness room, conference rooms, and first aid rooms. Additionally, the ANB contains tools storage, clean machine shop, instrument shops, mechanical rooms, digital equipment lab, and electrical rooms.

3.1.5 Air Cooled Condenser System

The primary purpose of the ACCS is to receive and condense exhaust steam from the steam turbine at as low a pressure as possible and to recover the steam condensate so that it can be reused in the steam generator.

System functions include receive and condense exhaust steam from the turbine exhaust, reduce the dissolved oxygen level in the feedwater, maintain ACCS vacuum condition by removing air and noncondensibles from the main condenser and providing adequate capacity for the condensate and feedwater system during normal operation. Six ACCS are included in the CFPP; each dedicated to one of the six NPMs. The ACCS is classified as nonsafety-related.

3.1.6 Turbine Generator Building

The TGB is an above-grade, TI/BOS structure. The TGB houses the turbine generator(s) and associated auxiliaries, condensate systems, and feedwater systems. A laydown area and overhead crane provides for installation and maintenance activities.

3.1.7 Site Cooling Water System

The primary function of the SCWS is to transfer heat from plant auxiliary systems to the SCWS cooling towers, which provides the normal heat sink. The SCWS is a two-loop system consisting of a closed-loop that removes heat from plant loads and an open cooling tower loop that rejects heat through cooling towers to the environment. These two loops interface through a set of plate and frame heat exchangers. The SCWS is nonsafety-related and is not a risk-significant system.

The SCWS cooling tower consists of a rectangular bank of four cells. Each cell includes air-cooled heat exchanger surfaces, a variable frequency drive motor-driven mechanical draft fan and isolation valves. The SCWS cooling towers, cooling tower pumps and basin are located outside the protected area fence and inside the security owner-controlled area fence as illustrated in Figure 3.1-7.

3.1.8 Transmission Structures

Electrical output from the proposed CFPP requires installation of approximately 11 miles of double circuit 230 kilovolt (kV) transmission line from the proposed CFPP southeast to the existing Antelope substation that is located on the INL site in the INL Central Facilities Area. The new CFPP-Antelope 230 kV line traverses INL land on the eastern side of an existing Pacificorp 69 kV transmission line (Figure 3.1-10). Access and maintenance is provided via an existing secondary dirt road. Installation includes 43 double circuit tubular steel monopole tangent structures with direct embed foundations and I-string suspension insulators. Ten double circuit tubular steel monopole deadend structures are also installed, utilizing drilled pier foundations and deadend strain insulator assemblies with I-string suspension jumper insulators. The CFPP-Antelope line includes use of double 1272 thousand circular millimeters (kcmil) Bittern aluminum-conductor steel-reinforced cable for each circuit, as well as 3/8 inch extra high strength steel shield wire and 48 count optical ground wire for shielding and communications.

Construction of the proposed CFPP requires installation of power to support construction. Construction power requires installation of approximately 11 mile 34.5 kV tie line from the future Idaho Power Company Pronghorn Substation proposed to be located immediately northwest of the existing Antelope Substation on the INL site in the INL Central Facilities Area to a single distribution point that ties into the proposed CFPP Substation. This CFPP construction 34.5 kV line includes installation of 50 foot wood poles for the entire route. Structures are direct embed and utilize native backfill. The CFPP construction 34.5 kV line includes use of single 795 kcmil aluminum-conductor steel-reinforced cable, as well as 3/8 inch extra high strength steel shield wire and 48 count optical ground wire.

3.1.9 References

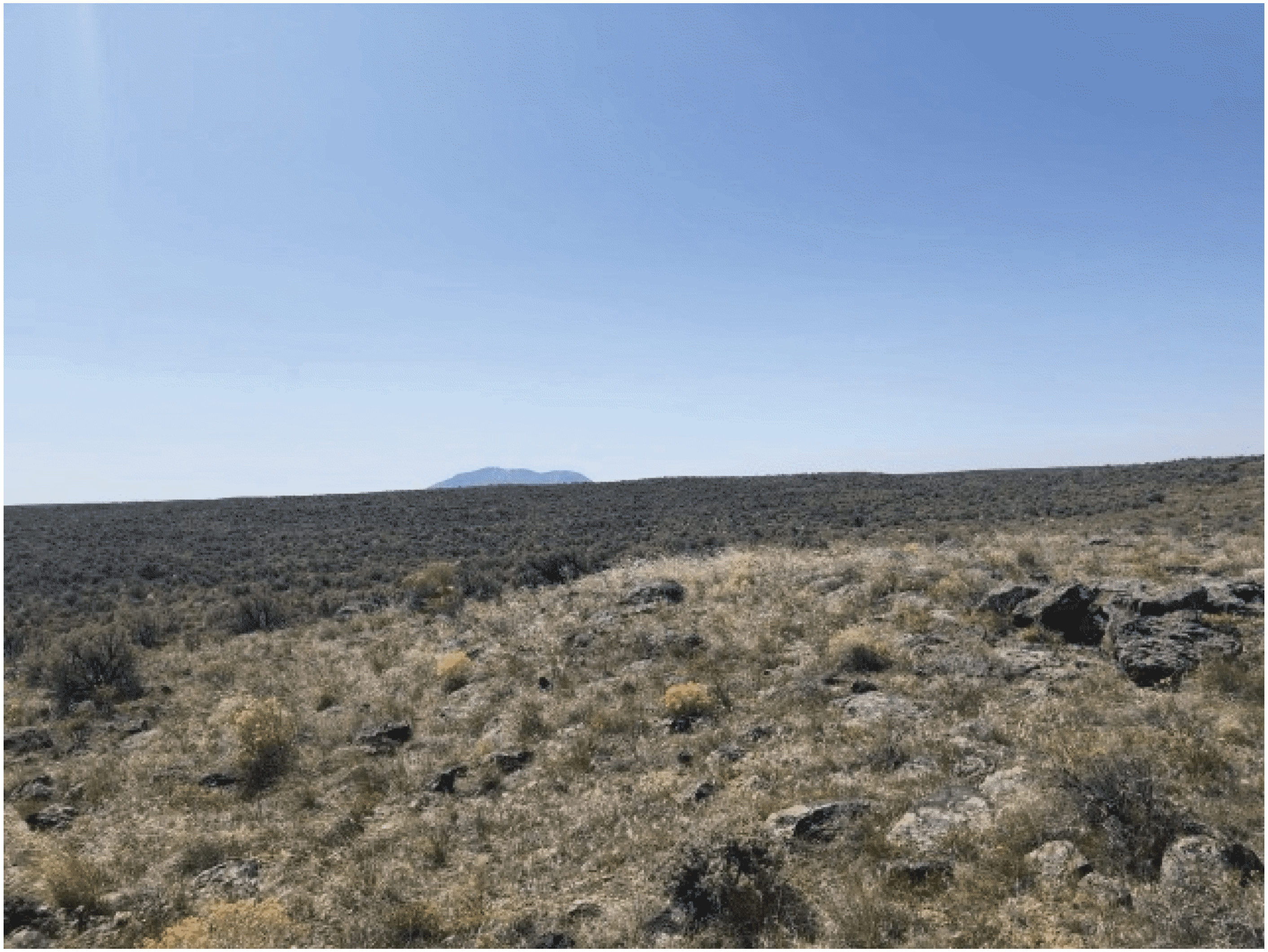
3.1-1 Idaho National Laboratory, “INL Comprehensive Land Use and Environmental Stewardship Report Update,” INL/EXT-20-57515, March 2020.

3.1-2 Cardno, Inc., “Phase I Environmental Site Assessment, UAMPS - INL Property, SE of Hwy 33 & Stage Rd, Arco, Idaho,” 820AR00769.0001, May 27, 2020.

Figure 3.1-1: Ground Level Photograph of the CFPP Site with a View to the Northeast Showing the Central Areas of the CFPP Site from the Southwestern Quadrant

Reference 3.1-2

Figure 3.1-2: Ground Level Photograph of the CFPP Site with a View to the South Showing the Southwest Quadrant of the CFPP Site



Reference 3.1-2

Figure 3.1-3: Ground Level Southernly View of the Existing CFPP Meteorological Monitoring Station Near the Intersection of U.S. Highway 33 and INL T-11

Image courtesy of Keith Lockie.

Figure 3.1-4: Illustration of the CFPP Site in Relation to the Existing Vicinity Topography

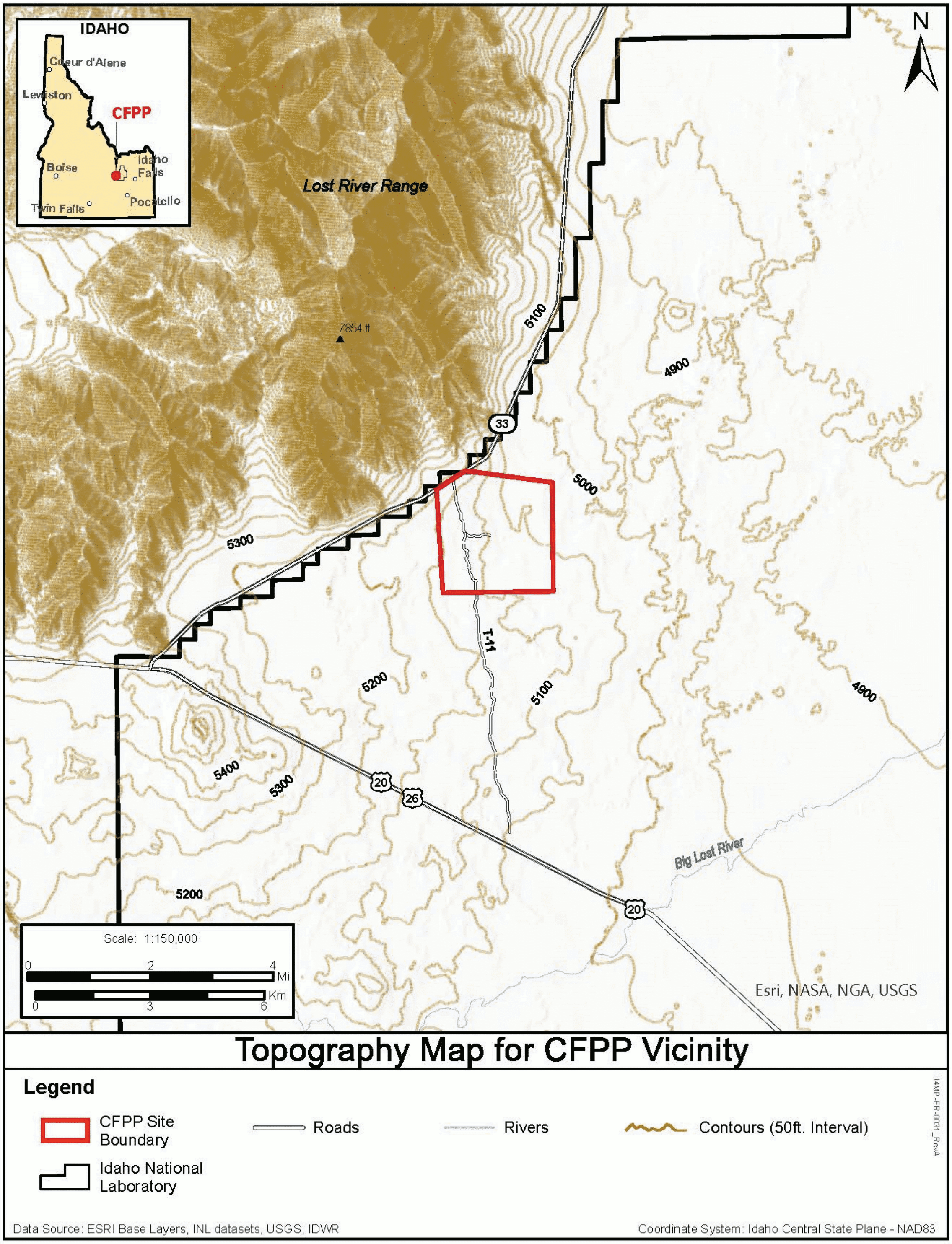


Figure 3.1-5: Illustration of the Site Topography and the Approximate Location of the Proposed CFPP Plant Within the CFPP Site

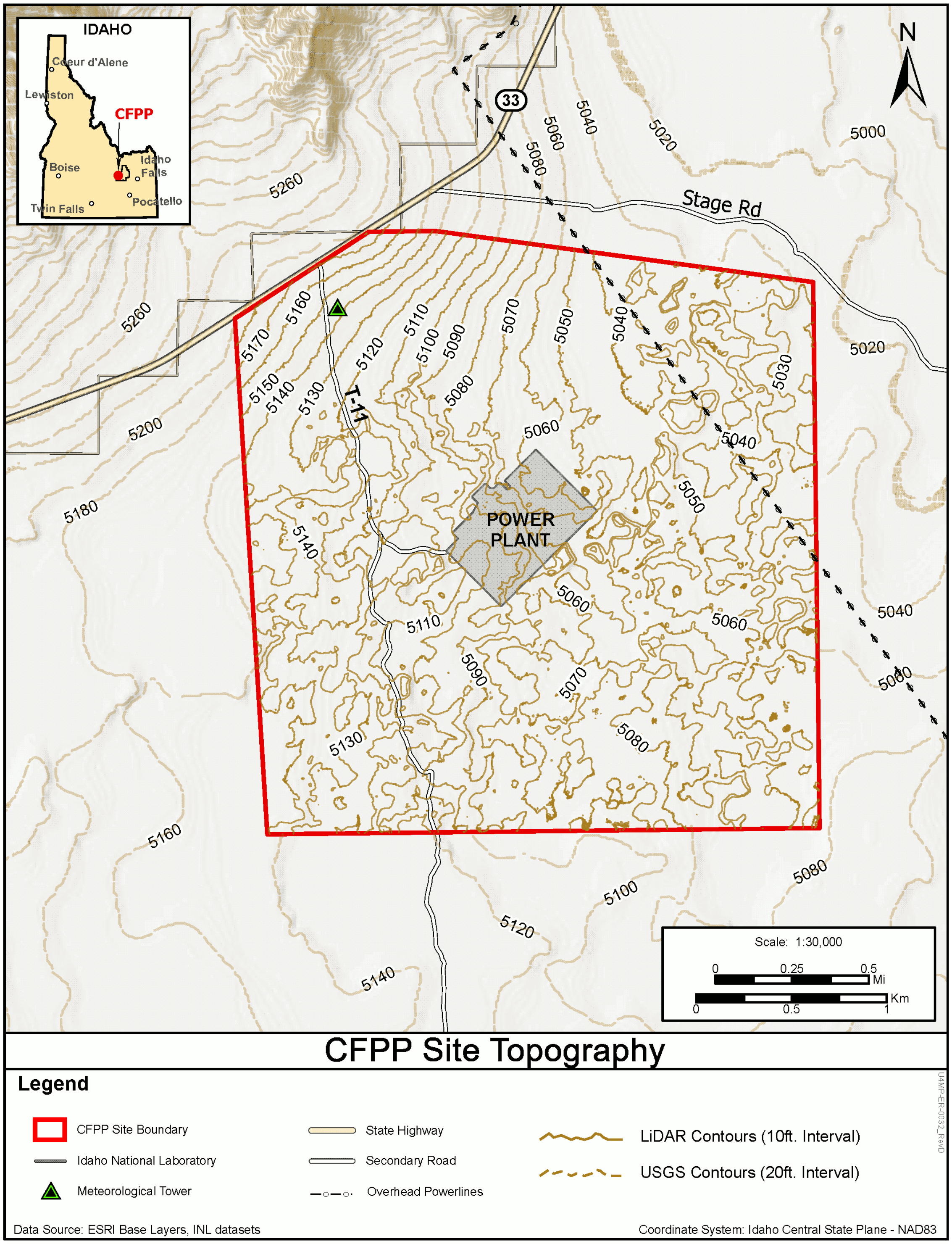


Figure 3.1-6: Illustration of the Temporary CFPP Construction Facilities and Layout

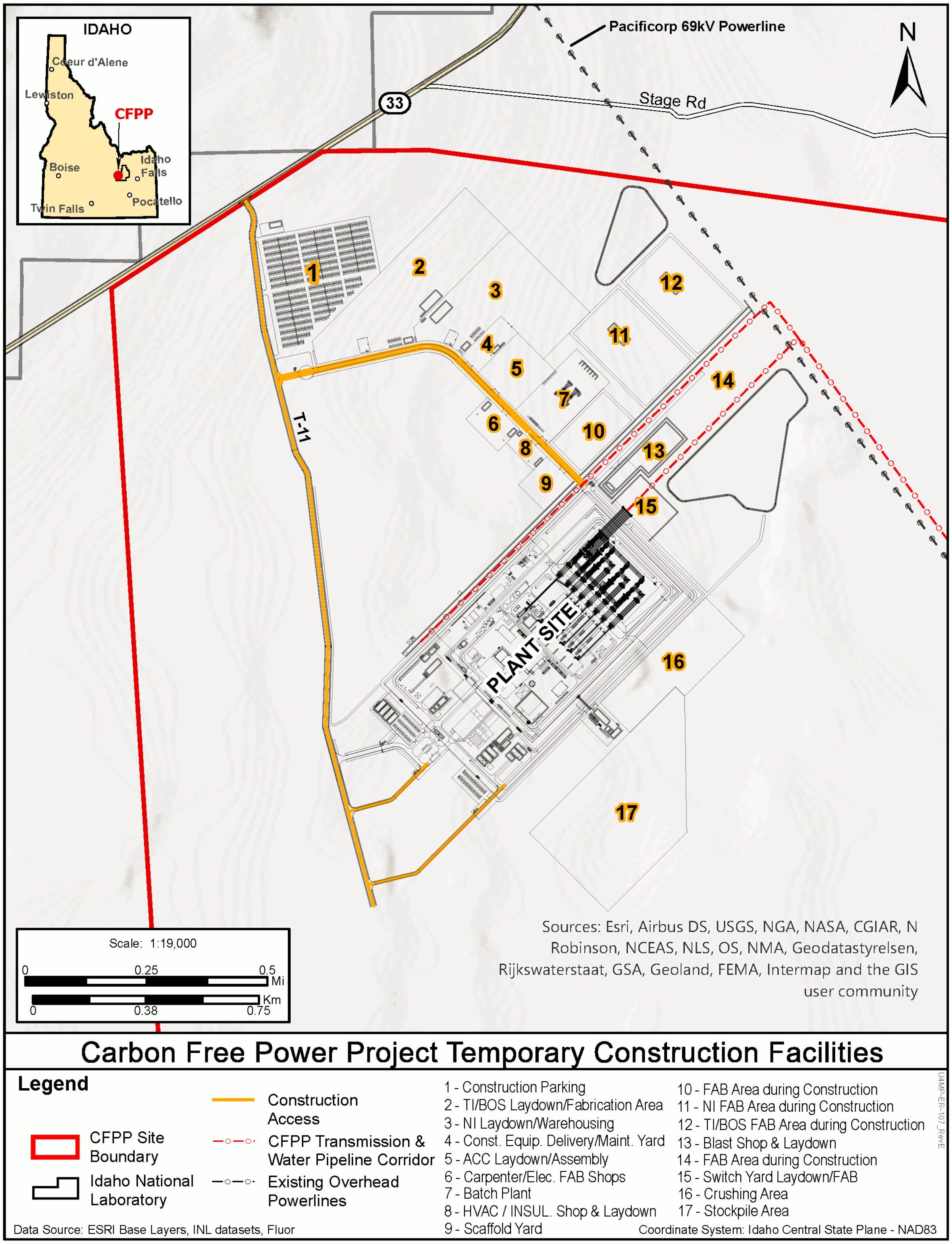


Figure 3.1-7: Conceptual Illustration of the CFPP Plant Layout with Key Buildings and Station Components Identified

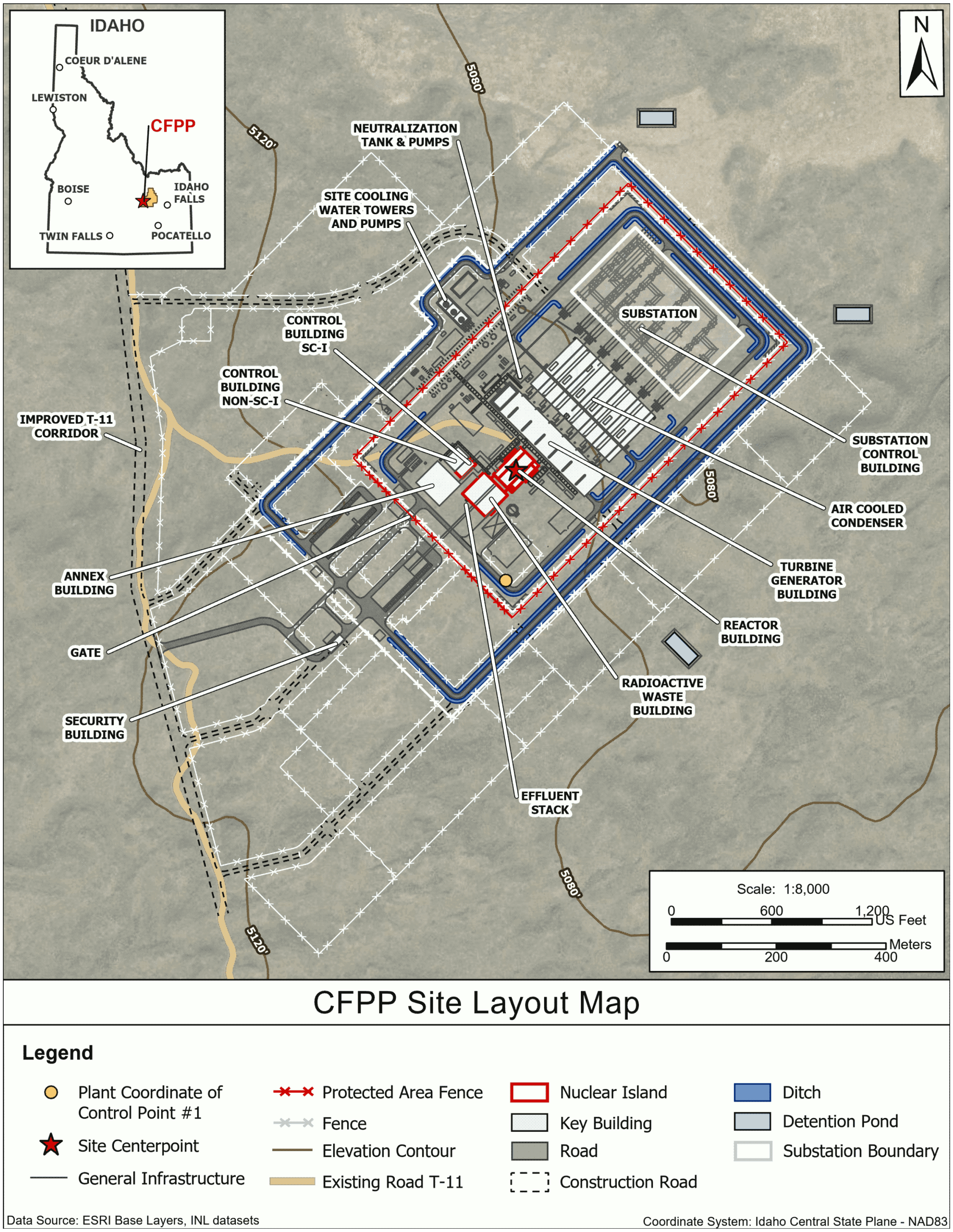


Figure 3.1-8: Illustration of the CFPP Plant Superimposed onto a Low Aerial Photograph of the Proposed CFPP Site

Figure 3.1-9: Architectural Rendition of the CFPP Plant

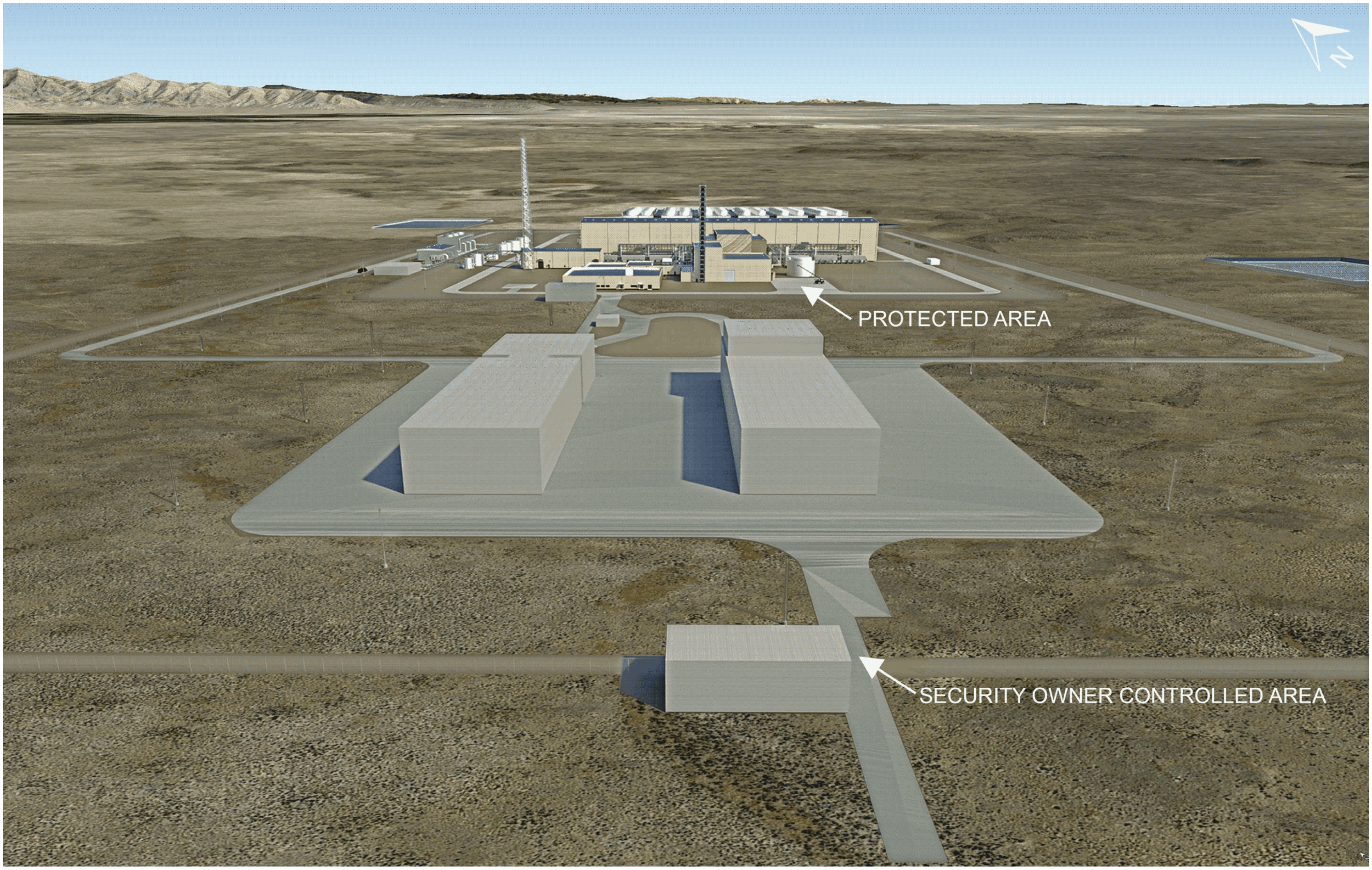
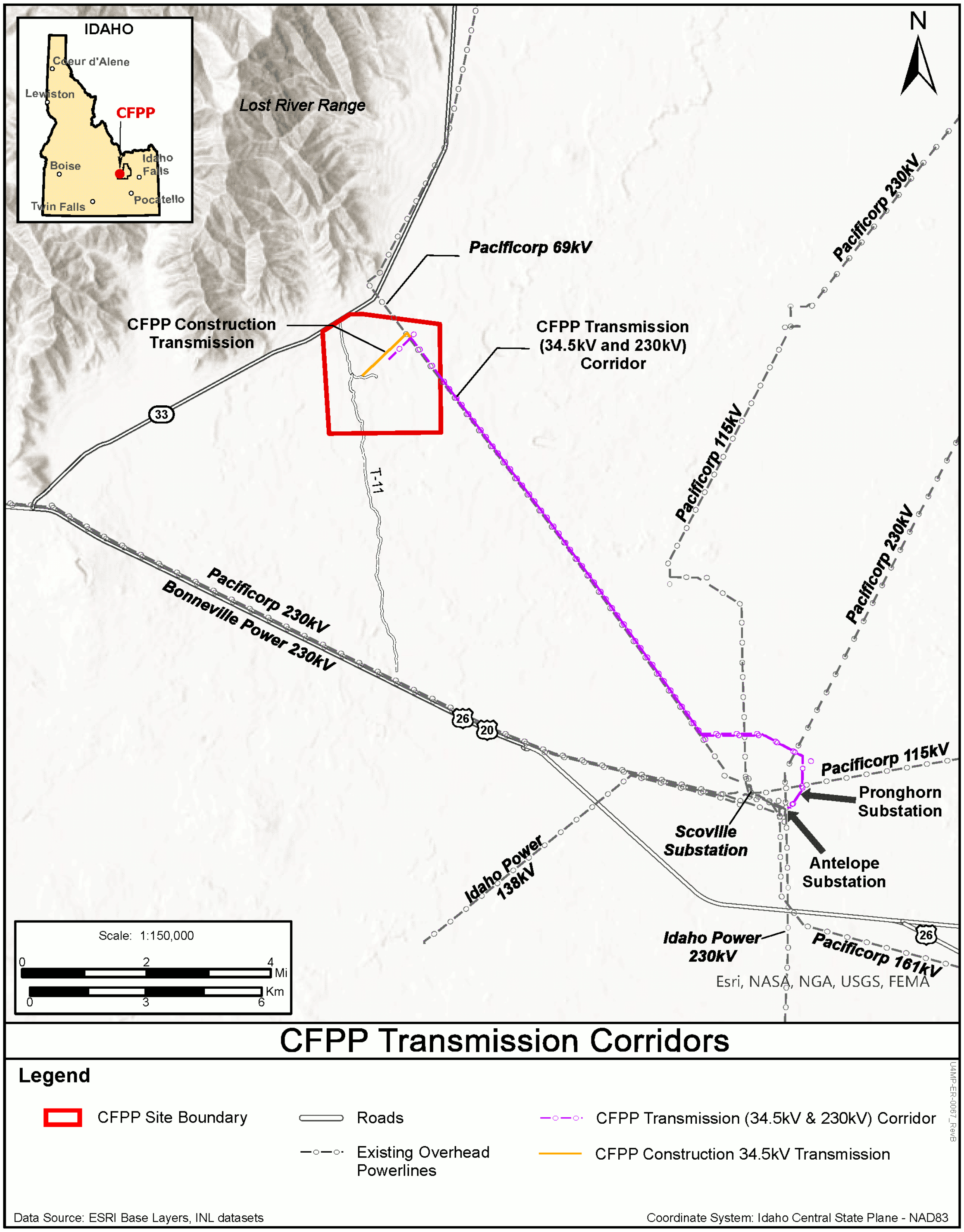


Figure 3.1-10: Proposed Transmission Corridor Routes in Relation to the Proposed CFPP Site



3.2 Proposed Plant Structures, Systems and Components

This section is not applicable to a Limited Work Authorization application.

3.3 Building Activities

This section provides a detailed description of activities, methods, and durations required to build the CFPP. Preconstruction activities including preparing the site for construction, excavation, and other activities described in 10 CFR 50.10(a)(2) that are not related to nuclear safety and are generally more site-wide in scope. Conversely, construction activities are building-specific and include activities associated with safety-related structures, systems, and components, certain fire- and security-related structures, systems, and components, and other activities as described in 10 CFR 50.10(a)(1).

This section describes the building activities for the CFPP site and is divided into the following sections:

- Building Activities – Section 3.3.1
- Workforce and Building Activities – Section 3.3.2
- Construction Site – Section 3.3.3
- Equipment for Building Activities – Section 3.3.4
- In-Water and Nearshore Activities – Section 3.3.5
- Water for Building Activities – Section 3.3.6
- Fill Materials – Section 3.3.7

3.3.1 Building Activities

The timeline for the CFPP preconstruction, exemption request, and LWA is provided in LWA ER Table 1.3-1. The activities associated with the LWA and exemption requests are collectively referred to as pre-combined license (pre-COL) construction activities. The sequencing and estimated duration of building activities are illustrated in Figure 3.3-1.

Before building activities commence, CFPP LLC conducted site investigation activities to support the development of the combined license (COL) application for the CFPP.

Building activities may be impacted by seasonal constraints as listed below:

- wind conditions
- fire hazards
- drought and heat
- snow, ice, and frozen ground
- heavy rain or hail over a short duration resulting in flash flooding
- electrical storms
- breeding birds (LWA ER Section 4.3)

Management advanced planning includes mitigation measures arising from known or suspected inclement and seasonal constraints. Mitigation includes adjusted work schedules and overtime work.

3.3.1.1 Preconstruction

Preconstruction and site preparation activities commence upon receipt of the necessary permissions, permits, licenses, and other regulatory approvals. Activities not constituting construction as defined in 10 CFR 50.10(a)(1) are permissible before receipt of the combined license. Site temporary construction facilities are established when preconstruction work fronts are made available by on-going site preparation activities.

3.3.1.1.1 Mobilization and Site Establishment

After completion of safety and environmental training for workers, site work begins with civil contractors' mobilization to the site. Traffic controls and warnings are established on public highways (State Highway 33) and turn lanes into the site at T-11. To prepare for CFPP land disturbance activities, surveys are performed, boundaries and stormwater controls are established, and dust mitigation measures are implemented. Temporary and permanent roads are established or upgraded from existing roads as required to provide heavy haul routes and stable access to and from work fronts. Similarly, roadways are managed with appropriate signage and naming conventions for purposes of emergency response and road closure planning protocols.

3.3.1.1.2 Site Preparation and Land Disturbance

Site preparation and land disturbance activities include clearing and grubbing, grading, stockpiling, ripping, excavating, backfilling, and spoils management. Site preparation and land disturbance occur during preconstruction and pre-COL construction activities, each progressing and expanding as work fronts open. The activities are sequential but also occur concurrently in multiple work fronts. As vegetation is cleared, road and parking lot development and mass grading commence. Cleared vegetation and spoil materials are placed in designated stockpile areas. Mass grading includes the excavation of alluvial soils and basaltic rock material with the use of heavy construction excavation equipment. Alluvial soils are placed in the stockpile area and are used for non-structural fill. Rock may be fractured with the placement of controlled explosives into boreholes and ripped with a dozer. Excavated rock is processed at the rock crushing area for structural backfill, roadway aggregate materials, and non-structural fill.

3.3.1.1.3 Temporary Facilities

Temporary facilities, such as office, medical, and training trailers; sanitary and craft facilities (e.g., break and lunch areas, ablution facilities); and warehouses are established.

Office and training trailers or portable buildings for use by field staff personnel, subcontractors, and support staff are delivered and installed following completion of site grading and leveling activities.

The craft temporary facilities are fabricated tents with furniture constructed on concrete slabs and foundations. The tents include heating, ventilation, and air conditioning (HVAC) systems, dining areas, and audio-visual facilities for safety messaging, crew meetings, and project communications. Gender-specific ablution trailers are associated with each craft tent. Domestic waste is sent to storage tanks for periodic pumping and disposal by an authorized waste handler at an approved local municipal wastewater treatment facility.

The emergency medical clinic and Health, Safety, and Environmental trailers are strategically located with allocated space for appropriate ramps and an on-site ambulance staging area. The medical clinic houses first responders required for safety incidents that may occur. Personnel with injuries are typically transported to the clinic for initial case management, and depending on the severity of the injury, may be referred to an off-site medical facility. The medical clinic is equipped with appropriate supplies and trained medical staff.

Temporary warehouses for the Nuclear Island (NI), Turbine Island (TI), and the Balance of Site (BOS) are established to store weather-sensitive materials. The warehouses are approximately 25,000 square feet each with both non-climate and climate-controlled areas as required. The warehouses are within access-controlled, fenced laydown areas.

3.3.1.1.4 Temporary Utilities and Services

Temporary utilities and services including power, communications, and water are established. On-site generators are used until construction power is installed. Temporary power ties into Idaho Power’s future Pronghorn substation as described in LWA ER Section 3.1.8. The temporary power becomes the CFPP operations back-up power. A telecommunications fiber bundle is brought on-site by service providers for integrated internet access and a communication tower. The telecommunications services are anticipated to ultimately become the permanent plant telecommunications.

Potable water for drinking is obtained from a subcontractor. Non-potable water for preconstruction and pre-COL construction activities is initially supplied from the INL and trucked to the CFPP site. Early in the preconstruction and pre-COL construction activities, a temporary well located on the CFPP site is used to provide a temporary non-potable water supply for construction support. The establishment of this water supply is consistent with the necessary permissions, permits, licenses, and other regulatory approvals.

3.3.1.1.5 Security Provisions

Prior to commencing security-related or safety-related construction activities, CFPP LLC implements construction site security measures that are consistent with the guidance of Nuclear Energy Institute (NEI) 09-01, Revision 0. These security measures are described in Enclosure 2 to the CFPP LWA application.

3.3.1.1.6 Laydown and Fabrication Yards

Project laydown and fabrication yards are segregated on-site for the NI and shared areas for the TI and the BOS as illustrated in LWA ER Figure 3.1-6. The laydown yards have controlled entry with a staging area for inspection of deliveries. Fabrications shops are established in the fabrication yards during preconstruction. Fabrication activities begin during preconstruction and continue through pre-COL construction and COL construction activities.

Scaffold laydown areas are required as work activities begin moving above ground during the COL construction activities. A 4.5-acre area for scaffold storage and fabrication is constructed during preconstruction. Additional scaffold storage areas are placed closer to facilities, and used for daily staging and execution of scaffold builds for COL construction activities.

An equipment receiving and maintenance yard for incoming construction equipment inspection and assembly is established. A maintenance workshop and associated equipment management trailer are installed with proper spill containment, chemical storage, and waste management areas as discussed in LWA ER Section 4.10.

3.3.1.1.7 Rock Crushing and Concrete Batch Plant Facilities

The on-site rock crushing and mobile concrete batch plant facilities are established early in the preconstruction building activities. Excavated rock material is delivered to the rock crushing facility for processing. Crushed rock is used on suitable site surfaces including parking lots, laydown yards, and other locations that require non-structural fill and structural fill per design specification.

Concrete production for the site includes mobilizing two 300 cubic yards (cu yd) per-hour mobile batch plants. Both are located in the 12-acre batch plant facility located northeast of the CFPP plant footprint and provides easy access for delivery of bulk materials. On-site excavated rock is not used for the production of concrete (LWA ER Figure 3.1-6). Likewise, the batch plant has immediate access to the major work fronts, effectively reducing congestion during critical concrete placements.

The batch plant facility requires temporary power and water for operation, and adequate space to accommodate concrete base materials to support the largest concrete placement (e.g., Reactor Building [RXB] base mat). Concrete waste washouts and truck parking are located at the batch plant site. Temporary concrete waste washouts are strategically located near large concrete placements.

3.3.1.1.8 Excavation of Foundations and Trenches

Excavation of foundations and trenches at the NI, TI, and the BOS occur during preconstruction and pre-COL construction activities. Foundations are surveyed and excavated to the appropriate dimensions using various types of equipment (Section 3.3.4). Spoils and rock are placed in the stockpile area and the rock crushing facility, respectively.

Trenches are surveyed to establish excavation parameters. Sand or bedding material and then small gravel per design detail are applied. Piping and other utilities are installed, followed by filling the trench with bedding and backfill materials.

3.3.1.2 Pre-Combined License Construction Scope

The CFPP pre-COL construction activities are described in LWA Enclosure 2 and LWA ER Section 1.3. The exemption scope includes installation of structural tiebacks (i.e., rock bolts) and fiber mesh or shotcrete during excavation of the RXB and Radioactive Waste Building (RWB). The tieback system stabilizes the excavation during construction. The cut surface is stabilized for loading the construction cranes at the top and edge of the cut location. In addition, the excavation surface is reinforced with shotcrete to prevent falling rock, thus, protecting the workers and equipment in the excavation.

The tiebacks and fiber mesh or shotcrete are installed at appropriate intervals and spacing to the depth of the excavation. Once complete, construction cranes are placed at the edge of cut and workers are safe to work within the excavation.

The LWA activities meet the definition of construction per 10 CFR 50.10(a)(1). The RXB and RWB soft or fractured rock remediation includes appropriate over-excavation and placement of one or more of the following:

- granular backfill
- interstitial grouting of rock fractures
- low strength concrete (i.e., flowable fill)

The RXB mud mat is installed once the excavation base levels are achieved. Installation involves placement of a permanent vapor barrier and reinforcing wire mesh upon which the mud mat (lean concrete) is poured.

After installation of the RXB mud mat, the base mat rebar and other permanently embedded items are installed above the mud mat. In addition to the rebar, other RXB base mat components include embeds, grounding, SpeedCore steel-plate composite (SC) base wall module assemblies, supports, drain piping, sumps, anchor bolts, conduits, and elevator pits. These components are installed primarily for structural support or utility purposes. The base mat concrete placement is performed after COL issuance (i.e., is a COL construction activity) and is beyond the scope of the LWA.

3.3.1.3 Combined License Construction

As described in LWA ER Section 1.3, COL construction refers to site activities that meet the 10 CFR 50.10(a)(1) definition of construction but are not projected to be started before COL issuance. While most of the preconstruction activities (i.e., those not defined by 10 CFR 50.10(a)(1) as construction) related to site preparation and major excavations are implemented during the first 18 months of the project, others continue during COL construction, such as use of temporary facilities and near-surface excavation of trenches and ditches for piping and cabling. Some prefabricated modules for the CFPP are manufactured off-site, with fabricated pieces shipped to the site on federal and state roadways for installation, resulting in less on-site construction. Installation consists mainly of prefabricated civil, structural, electrical, mechanical, and piping modules with field-installed interconnections. Because of road transportation constraints, the CFPP uses off-site fabrication of modular sub-assemblies and on-site fabrication of larger modules.

The CFPP uses the open top construction technique for the RXB, RWB, and the Control Building (CRB). According to the International Atomic Energy Agency, the open top installation method used in large construction projects (e.g., fossil fuel power plants, large civil construction projects, and shipbuilding) is now used in the construction of new nuclear power plants to lower major pieces of equipment (e.g., reactor vessels and steam generators) using heavy-lift cranes (Reference 3.3-1) This technique begins with the placement of concrete on the lower elevation and continues with staging of material and equipment on the floor slab. This pattern continues until each floor is completed to the top of the structure. As civil construction completes slab placement on a given floor, the piping, mechanical, and electrical craft begin work with materials and equipment already rough set. This enhances worker safety, reduces work area congestion, and saves time.

Construction of the key buildings in the NI, TI, and the BOS are described below.

3.3.1.3.1 Reactor Building

The COL construction scope specific to the RXB begins with placing approximately 12,000 cu yd of concrete for the base mat. Within the RXB around the ultimate heat sink (UHS), a concrete mat and NuScale Power Module support plates are placed to form the floor of the UHS. Once the base mat obtains final cure, the off-site fabricated SC walls are installed and welded together to allow the placement of concrete. The SC walls replace the standard construction practice of using formwork and rebar concrete placement to significantly shorten the construction schedule (Reference 3.3-1). The steel plates are modularized and prefabricated off-site. The SC walls are used in the RXB for the UHS, exterior walls, and interior walls. Once the SC wall installation proceeds past a floor slab elevation and the concrete in the SC walls cure, the installation of the floor slab begins. This involves the installation of structural steel, metal decking, Nelson studs, rebar, and concrete placement.

The leak chase system is integrated into the UHS and includes in-floor trenches and wall-leak chases. In-floor trenches are integrated into the UHS concrete during the installation of the RXB base mat. The UHS containment liner of stainless-steel floor panels is installed over the base of the UHS, including covering the trenches. The wall-leak chases are composed of installed tubing within the SC walls.

Individual cranes located at the four corners of the RXB support installation of the SC walls and associated component loading of equipment and commodities within the RXB. Smaller cranes and forklifts are used to support the installation of the components in the UHS. Loading of electrical and mechanical equipment or components occurs as the civil work progresses. Installation begins when the floor above is cured. The installation of electrical and mechanical bulk commodities such as cables, terminations, and fire seals start as the building becomes weather tight. Once the SC walls are complete, the roof is laid in two placements to allow installation of the permanent gantry crane.

3.3.1.3.2 Radioactive Waste Building

The RWB is divided into a north and south section. The north section has four floors (i.e., basement, operating, mezzanine, and HVAC) and a higher roof. The south section has the basement, operating floors, and a lower roof. A dry dock gate, 24 foot (ft) by 24-ft, is located on the south section of the RWB to allow the entrance of large vehicles.

Rebar, forming, integrated utilities, grounding, drainpipe, anchor bolts, and embeds are installed before basement base mat concrete placement. Base mat formwork is set by a crane. The north wall sections are a combination of structural steel framing and reinforced concrete. The south section walls are structural steel framing. Exterior and interior walls are installed followed by placing large equipment, piping, electrical, HVAC, and other utilities into the building for final fabrication. Power, controls, and conduit are run in raceways. Temporary power is brought into the RWB at grade. Permanent power is installed during COL construction.

The operating, mezzanine, and HVAC floors follow the same sequence as the basement, except the mezzanine ceiling ties into the south roof section and the HVAC ceiling functions at the north roof section. A 50-ton overhead crane is installed on the south side operating floor.

Interior architectural construction is initiated upon completion of each intermediate floor slab. Work on the south side operating floor elevation and north side HVAC floor elevation is initiated following roof installation for each respective section.

3.3.1.3.3 Control Building

The CRB is separated into two distinct buildings connected by corridors and penetrations. The south building, which houses the control room, is designated as Seismic Category I construction and the north building is designated as Seismic Category II construction. The lower level of the CRB houses electrical gear, oxygen canisters, and other equipment. An underground duct bank connects the CRB directly to the RXB.

The south building is two stories with exterior and interior walls constructed of reinforced concrete of varying thickness. The intermediate slab is designed to accommodate a raised floor structure that allows power and communications to be run under the floor to support the control room in this area.

The north building is two stories with exterior walls of reinforced concrete and interior walls of reinforced concrete of varying thickness and steel members to support intermediate floor slabs and roof sections.

Installation of rebar, in-slab utilities, grounding, drainpipe, anchor bolts, and embeds occurs before base mat concrete placement. Because of the seismic separation break between the two buildings, 15-inch foam forming is installed between the north margin of the south base mat and the south margin of the north base mat. The same approach is used for the adjacent wall construction by elevation. Reinforced concrete walls are installed; large dimension equipment, piping, and electrical gear are top loaded followed by the intermediate floor installation. The upper wall sections are installed, equipment and large commodities are loaded, followed by placement of the roof sections. Piping or mechanical work includes services for air supply, potable water, firewater systems, and drainage systems. Electrical and instrumentation involves the installation of distribution conduit and cabling through the buildings for various systems. After the setting of elevated slabs, wall-mounted embeds and duct support are installed with final assembly of HVAC equipment installation. Emergency breathing air for the building is installed including the bottled oxygen racks. Architectural finishes begin upon completion of the intermediate floor slab and roof installation.

3.3.1.3.4 Turbine Generator Building

The Turbine Generator Building (TGB) construction requires installation of foundations by establishing level grade with engineered fill, followed by drilled piles with pile caps. Construction continues with base slab, sumps, and tabletop platforms for final placement of the turbine generators. The work progresses from the center of TGB outward in both north and south directions.

The sequence involves starting tabletops for turbines three and four. Tabletops for turbines two and five are erected next, followed by tabletops for turbines one and six.

The TGB overhead permanent crane is not adequate to lift major pieces of the turbine generators, but is used as a construction aid for setting commodities within the TGB. A second temporary overhead crane is used to support construction activities. Both the permanent and temporary overhead cranes are supported using the building structural steel elements. Turbine generators are transported into the TGB and lifted by temporary gantry cranes for final placement. The turbine setting is executed from the middle turbines out allowing work on multiple fronts simultaneously.

The TGB pipe racks that extend from the exterior site utility rack system are pre-assembled for final installation as modular units including pre-loaded piping and electrical commodities. Boiler feedwater pumps, feedwater heaters, auxiliary boilers, and condensate polishers are also pre-assembled. Other piping is received spooled and field erected; other electrical raceways are stick built. Installation of cable is performed after the final installation of pipe racks and associated load connections. Instrumentation installation and associated cabling is completed during the final phases of TGB construction.

The battery room for the TGB is in a self-contained building. The structure is pre-assembled with final interior build-out, including HVAC, before battery installation. The HVAC units are assembled within the TGB with associated piping stick built.

Key architectural elements include exterior steel panels to provide weather protection during installation of major equipment and commodities. The TGB has minimal interior architectural finishes.

3.3.1.3.5 Air Cooled Condenser Systems

The six air-cooled condenser systems (ACCS) are fabricated in a designated area on-site and lifted into final position. The foundation system for each ACCS includes backfill of the area with structural fill, installation of drilled shaft piles to bedrock base, and pile caps. The substructure (pedestals) affixes to the pile caps and includes support elements to affix to the ACCS structure. The ACCS construction involves stainless-steel ducting that requires both prefabrication and final installation in position.

3.3.1.3.6 Central Utilities Building

The Central Utilities Building excavation to subgrade elevation occurs during preconstruction. Start of construction for the Central Utilities Building includes final leveling and backfill of subgrade; mud mat placement; installing forming, rebar, and underground utilities; and installing spread footers to support the building structure with a cast-in-place concrete pad. The building is structural steel with metal-clad exterior sandwich walls and roof panels, and interior wall partitions. The building has two overhead door access points to move equipment and materials into or out of the building. Major mechanical equipment, piping, electrical, and instrumentation and testing occur next. Completion activities include architectural treatments.

3.3.1.3.7 Annex Building

The Annex Building is single-story with spread footers and slab on grade. Construction execution includes an exterior pre-cast wall panel system and a cast-in-place concrete roof with membrane sealant. Most internal room partitions are gypsum board wall with secured areas made of reinforced concrete walls.

3.3.1.3.8 Site Cooling Water System

The site cooling water system contains a four-cell cooling tower with associated pumps. Construction of the facility includes a concrete basin with an attached cooling baffle structure. The approximate dimensions of the cooling tower are 84 ft x 200 ft x 33 ft with pumps adjacent to the cooling tower.

3.3.1.3.9 Transmission Structure

The CFPP-Antelope 230 kilovolt (kV) line traverses INL property along the existing Rocky Mountain Power 69 kV easement and uses an established dirt access. Installation includes 43 double circuit, tubular steel monopole tangent structures with direct embed foundations and I-string suspension insulators. Ten double circuit, tubular steel monopole dead-end structures are installed, using drilled-pier foundations and dead-end strain insulator assemblies with I-string suspension jumper insulators.

3.3.2 Workforce and Building Activities

A construction workforce consists of two components: direct field labor and field staff. Direct field labor, including civil, mechanical/piping, electrical, and support personnel, is the largest component of the construction workforce. Direct field labor is used during preconstruction, pre-COL construction, and COL construction. The field staff includes field management, supervision, and engineers; quality assurance and quality control; health, safety, and environmental; and administrative staff. Workforce details are discussed in LWA ER Section 4.4.2.

The CFPP is located on INL property and the INL has other existing and planned facilities. A project at the Naval Reactor Facility scheduled for completion in 2025 has experienced a potential delay up to two years. The delay in schedule may impact direct field labor availability for the CFPP in 2026.

A number of projects within the region and in neighboring states are associated with mining, data centers, and renewable resources. TerraPower intends to submit a construction permit application to the Nuclear Regulatory Commission for a 345-MW sodium-cooled fast reactor facility in Kemmerer, Wyoming, approximately 250 miles southeast of the CFPP site. Construction during the CFPP construction could impact workforce availability. Other projects within the region of the CFPP are discussed in LWA ER Section 7.1.

3.3.3 Construction Site

The LWA ER Figure 3.1-6 illustrates the temporary CFPP construction facilities (i.e., office trailers, medical and training trailers, craft tents, and ablution buildings) and use areas including parking, laydown, and fabrication areas; rock crushing area; and the concrete batch plant relative to the CFPP site. Key buildings and their uses are described in LWA ER Section 3.1.

Areas potentially impacted during preconstruction and pre-COL construction occur within areas that have been surveyed for both cultural and ecological resources as illustrated in LWA ER Figure 2.6-5. Construction management confines work inside this boundary and minimizes land disturbances where possible.

3.3.4 Equipment for Building Activities

The CFPP is cleared and grubbed, leveled, and graded within the construction site boundary as shown in Figure 3.3-2. Excavation and back fill affect approximately 575 acres as follows.

- Mass site grading, excavation and backfill (including foundations) is approximately 359 acres.
- Excavation of ditches, channels, and ponds is approximately 164 acres.
- Excavation of underground utility trenches is approximately 2 acres.
- Stockpile area is approximately 50 acres.

These activities produce the following approximate volumes of excavated spoils and rock:

- non-structural soils – 1,500,000 cu yd
- RXB and RWB foundation (including ramps and sumps) rock – 315,000 cu yd
- other foundation rock – 36,000 cu yd
- underground utility trenches rock and spoils – 56,500 cu yd

Spoils from land disturbance activities are stored on-site in the stockpile area. Non-structural soils are used as backfill where appropriate or placed in the stockpile area. Rock is crushed and used on-site as structural backfill material for foundations and underground utilities or used as aggregate structural fill for road construction.

Crushed rock not suitable for structural backfill is used as a surface cover in parking lots and laydown yards.

The construction equipment, although not inclusive, on-site during the preconstruction and pre-COL construction activities include the following:

- track drill for blasting operations and installation of rock nails during the exemption scope of work
- rock drill
- backhoes
- rock crushers
- wheel loaders and end dumps
- track loaders
- dozers, some with rippers
- graders
- excavators
- surface mining excavators
- vibratory compactors
- forklifts
- cranes
- generators
- light towers
- compressors, pumps, and power hand tools
- water, fuel, and maintenance trucks, light vehicles, and crew buses

Deep excavations and utility trenches are not impacted by groundwater; however, these areas may require dewatering after a precipitation event or during snow melt. Excavations range from approximately 36-ft to 85-ft deep with length and width ranging from approximately 40-ft to 800-ft. Underground piping includes gravity sewer, process sewer, fire water pressure, and process pressure pipes. Trenches for the underground piping ranges from approximately 3-ft to 20-ft deep from finish grade elevation.

3.3.5 In-Water and Nearshore Activities

In-water and nearshore activities are not part of the CFPP building undertaking because of the extensive distance of the CFPP site from surface water bodies. The LWA ER Section 2.1.1.5.3 and Figure 2.1-11 provide more details regarding waterways in the CFPP region.

3.3.6 Water for Building Activities

A temporary well located on the CFPP site is the source of water for most of the CFPP building activities. Section 3.3.1.1.4 provides more detail on water supply. The estimated rates and quantities of water usage for the CFPP building activities are Table 3.3-1.

The total water needs for the CFPP building activities is estimated to be 137,000,000 gallons, which includes approximately 3,800,000 gallons of potable water for employee consumption based on two gallons per employee per day. Potable and non-potable water usage by workers is based on the average number of workers during preconstruction, exemption, LWA, and construction. Concrete production and dust control uses approximately 56,000,000 and 23,000,000 gallons of water, respectively, for the duration of building activities.

The daily average water usage over the period that building activities are ongoing is approximately 56,000 gallons per day (gpd). The estimated highest usage of water, 130,000 gpd, is during preconstruction and pre-COL construction when building activities are taking place concurrently.

Non-potable water for employee use is calculated as 14 gpd per employee and is disposed of as sanitary waste. Porta-lets and temporary latrines are present in the work sites. The waste is collected and pumped out by a local vendor and disposed of at a licensed sanitary treatment facility.

Concrete washout facilities are located at the batch plant and other temporary locations around the site. Washout liquid waste is evaporated in collection areas or pumped and removed from the site for disposal at an approved facility.

3.3.7 Fill Materials

General fill material for the CFPP comes from on-site excavations. An estimated 5000 cu yd of alluvial soils from the projected 1,505,000 cu yd to be excavated are used as general fill with the remainder disposed in a stockpile.

The CFPP excavated basaltic rock, estimated at approximately 1,860,000 cu yd, is processed at the rock crushing facility producing approximately 1,329,000 cu yd of structural backfill materials. An additional approximately 660,000 cu yd of structural fill material needed for construction is sourced from local rock quarries located on INL property. Representative samples from the quarries are tested for compaction characteristics and potential use as backfill material.

3.3.8 References

3.3-1 International Atomic Energy Agency, “Nuclear Technology Review 2009, Annex IV: Advanced Construction Methods for New Nuclear Power Plants,” Vienna, Austria, 2009.

Table 3.3-1: The CFPP Building Activity Water Usage[1]

	Preconstruction	Pre-COL Construction		COL Construction	Total
		Exemption	LWA		
Concrete Products	2,125,000	1,862,500	4,555,000	17,700,000	26,242,500
Concrete Aggregate Irrigation	5,184,000	N/A	4,320,000	20,736,000	30,240,000
Dust Control	20,000,000	-[2]	625,000	2,500,000	23,125,000
Employee Non-Potable Water	667,800	94,500	658,350	25,166,400	26,587,050
Total Non-Potable Water	27,976,800	2,098,750	10,262,300	66,102,400	106,440,250
Employee Potable Water	95,400	13,500	94,050	3,595,200	3,798,150
Water Needs	28,072,200	2,132,500	10,371,200	69,697,600	110,273,500
Miscellaneous[3] (25%)	7,018,050	533,125	2,592,800	17,424,400	27,568,375
Total Water Needs	**35,090,250**	**2,463,125**	**12,815,500**	**87,122,000**	**137,490,875**
Number of Days During Activity	450	450	275	925	1375
Rate (gpd)	77,978	5474	46,602	94,186	99,993

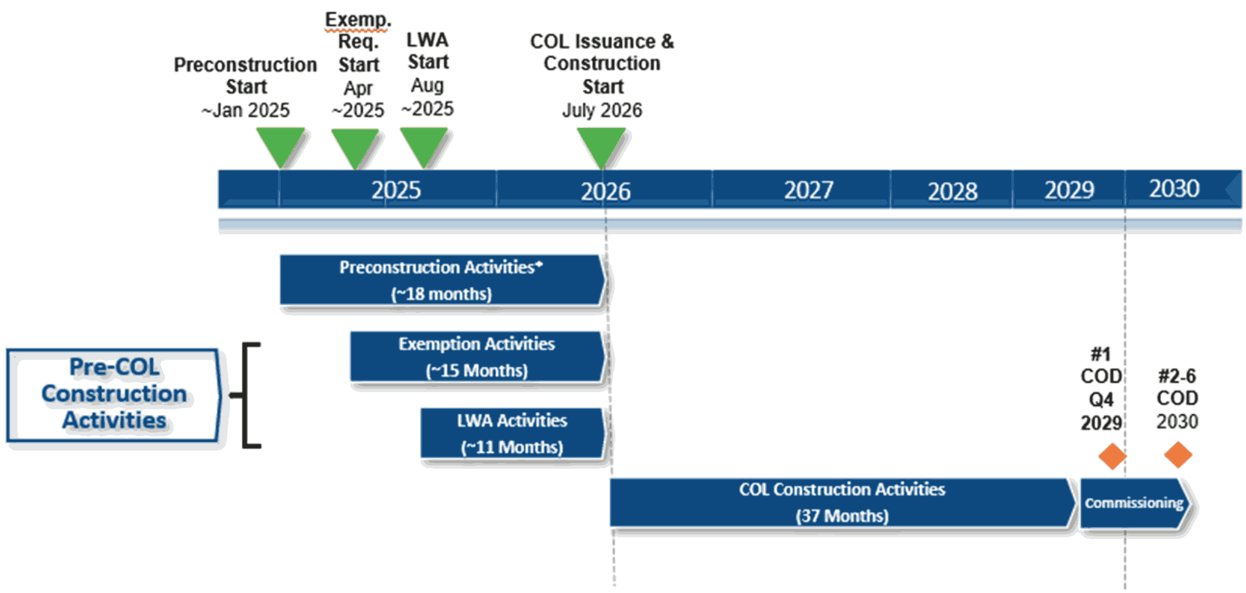
[1] Measurements in gallons unless otherwise specified

[2] Accounted for in LWA

[3] 25% added for miscellaneous needs including leakage and spillage

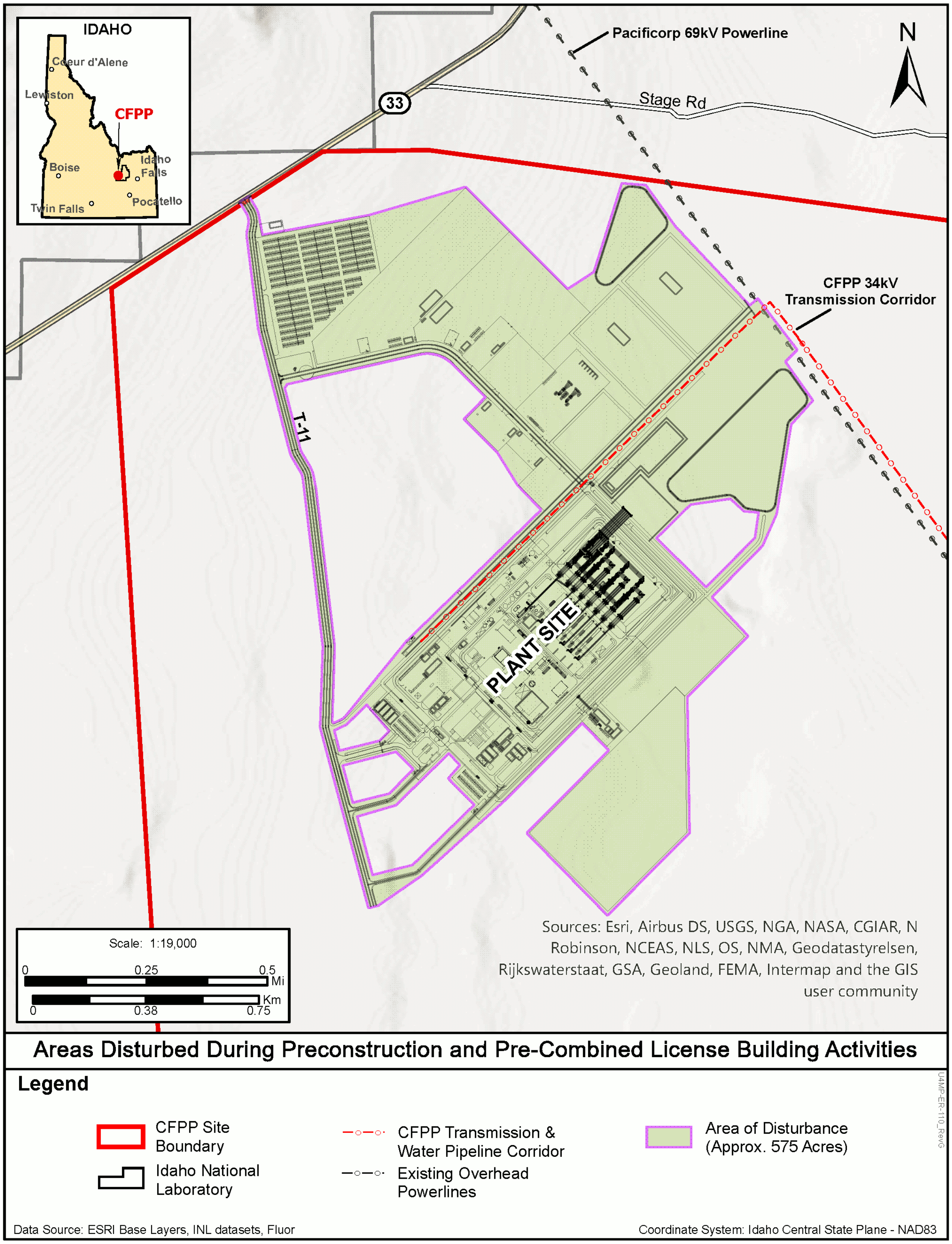
COL - Combined License
gpd - gallons per day
LWA - Limited work authorization
N/A - not applicable

Figure 3.3-1: The CFPP Building Activities Roadmap



* While most of the preconstruction activities (i.e., those not defined by 10 CFR 50.10(a)(1) as construction) are implemented during the first 18 months of the project, some preconstruction activities continue during COL construction.
Exemp. Req. – Exemption Request
COL – Combined License
COD – Commercial Operation Date

Figure 3.3-2: Areas Disturbed During Preconstruction and Pre-Combined License Building Activities



3.4 Operational Activities

This section is not applicable to a Limited Work Authorization application.

Carbon Free Power Project

Application for
Limited Work Authorization

Enclosure 3 - Chapter Four

Environmental Impacts from Construction of the Proposed Project

Revision 0
July 2023

Chapter 4 Environmental Impacts from Construction of the Proposed Project

4.0 Environmental Impacts from Construction of the Proposed Project

This chapter presents the potential environmental impacts of preconstruction and pre-combined license (pre-COL) construction (i.e., exemption to 10 CFR 50.10(c) and LWA building activities) of the CFPP on the U.S. Department of Energy Idaho National Laboratory site. Impacts related to combined license (COL) construction are included where known and are evaluated as needed in the COL application.

As defined in 10 CFR 50.10(a), construction includes activities to install structures, systems, and components related to safety, security, fire protection, or onsite emergency facilities. Preconstruction includes site exploration, preparation for construction (e.g., clearing, grading, establishment of temporary roads and construction power), excavation, and erection of temporary construction support buildings.

As discussed in LWA Environmental Report Section 1.3, preconstruction and pre-COL construction mainly occur over a period of approximately 18 months; however, preconstruction activities can continue into COL construction. The COL construction takes approximately 37 months after NRC license approval.

This chapter is organized into the following sections:

- Land-Use - Section 4.1
- Water Resources (Surface Water and Groundwater) - Section 4.2
- Ecological Resources - Section 4.3
- Socioeconomics - Section 4.4
- Environmental Justice – Section 4.5
- Historic and Cultural Resources – Section 4.6
- Air Resources – Section 4.7
- Nonradiological Health – Section 4.8
- Radiological Health – Section 4.9
- Nonradioactive Waste Management – Section 4.10
- Measures and Controls to Limit Adverse Impacts During Construction Activities – Section 4.11

These sections present the potential environmental impacts of preconstruction, pre-COL construction, and COL construction. This chapter focuses on preconstruction and pre-COL impacts in support of the LWA with available information on COL construction included where known. Additional impacts related to COL construction are evaluated in the COL application.

Potential impacts are analyzed and assigned a significance level to each resource consistent with the criteria established in 10 CFR 51, Appendix B, Table B-1, Footnote 3. Unless the impact is identified as beneficial, the impact is adverse. In the case of SMALL, the impact may be negligible. The definitions of significance are:

- SMALL: Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered SMALL.
- MODERATE: Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
- LARGE: Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

This chapter also presents ways to avoid, minimize, or mitigate adverse impacts of CFPP preconstruction and pre-COL construction to the extent practical.

The four defined building activities described in LWA ER Section 1.3 and Section 3.3 address the following work scopes:

- Preconstruction - preconstruction consists of site establishment and earth moving activities to prepare the property for pre-COL construction, COL construction, and excavation of foundations for buildings. Preconstruction occurs outside NRC licensing under a separate National Environmental Policy Act process. Preconstruction is expected to have the most significant impact on land use by transitioning from mainly undisturbed, government-controlled use to industrial-construction use.
- Exemption to 10 CFR 50.10(c) - the CFPP uses an exemption allowed under 10 CFR 50.12 to install a permanent worker-safety-focused wall shoring system for the Reactor Building (RXB) and Radioactive Waste Building (RWB) excavations. This includes installing structural tiebacks or rock bolts, and fiber mesh or shotcrete during excavation activities. The preconstruction activities and exemption activities last approximately 18 and 15 months, respectively, and occur concurrently for approximately 15 months.
- LWA – the LWA under 10 CFR 50.10(d) and 10 CFR 2.101(a)(9) is used to allow early work on the RXB and RWB subsurface, including techniques to stabilize soft or fractured rock and installing the RXB mud mat, vapor barrier, and permanent base mat components, such as rebar and conduit. Because the LWA activities are conducted after initial surface grading during preconstruction, LWA land use impacts are minimal. The LWA activities start approximately during the seventh month of preconstruction and run concurrently with preconstruction and exemption activities. The exemption and LWA activities are referred to as pre-COL construction.
- COL construction – the COL construction is conducted under an NRC-approved National Environmental Policy Act action and license in accordance with 10 CFR 50.10(c). The activities start when the approved COL application has been received and run approximately 37 months, culminating in the construction completion of the nuclear plant with one Nuclear Power Module. The activities include installation,

assembly, erection, fabrication, and testing of safety-related and associated support structures, systems, and components of the nuclear island, turbine island, and the balance of the site. Five additional modules are progressed to operation in the year following COL construction completion.

Before the start of preconstruction, the CFPP surveys the site and places signage to inform workers and approved visitors about site boundaries, protected resources, and approved travel routes.

4.1 Land-Use

The CFPP site currently is undeveloped land as described in LWA Environmental Report (LWA ER) Section 2.1.1.3, Figure 2.1-4, and Table 2.1-3. The CFPP site is located on the DOE INL site, and according to the INL comprehensive land use report update (Reference 4.1-1), is expected to remain under DOE control through 2095. The Bureau of Land Management (BLM) has administrative control of some aspects of the INL site and administers grazing allotments in the region. The CFPP site is located within BLM grazing allotments (LWA ER Figure 2.1-13). The CFPP comprises an approximate 2325-acre area on the western edge of the INL site. The DOE granted CFPP a phased use permit for the site (Reference 4.1-2) and CFPP conducted site investigations under phase 1 of the permit:

- mobilization of temporary field staff support facilities.
- surface geophysical surveys.
- borehole drilling, well installation, completion, and monitoring.
- installation and monitoring of a meteorologic tower.
- ecological and cultural resources surveys.

The INL site management and operations contractor conducted biological and cultural resource reviews before CFPP field investigation activities. Approximately 32 acres of the CFPP site were disturbed for the investigation activities. Disturbances included vegetation and surface removal, gravel pad installation, meteorological tower installation, borehole drilling, well installation, and wellhead installation.

Preconstruction and pre-combined license (COL) construction-related land use impacts on site, vicinity, and regional land use are provided in this section for the following topic areas:

- On-site impacts - Section 4.1.1
- Off-site impacts - Section 4.1.2

4.1.1 On-site Impacts

The CFPP land disturbance occurs mainly during preconstruction activities to remove vegetation, upgrade or install roads, grade and level the surface, excavate building foundations, and prepare staging, fabrication, and other construction work areas. Disturbance from pre-COL construction (i.e., the exemption and LWA) occur at depth in the Reactor Building (RXB) and Radioactive Waste Building (RWB) following vegetation clearing and surface grading. Minimal additional land use impacts from pre-COL construction and COL construction beyond preconstruction occur.
Table 4.1-1 presents on-site preconstruction, pre-COL construction, and COL construction impacted areas. LWA ER Figure 3.3-2 shows the approximately 575-acre disturbed areas associated with the preconstruction, pre-COL construction, and on-site COL construction. Figure 4.1-1 highlights the individual buildings and fabrication, rock crushing, batch plant, staging, administrative, and other areas to be used during preconstruction, pre-COL construction, and COL construction activities.

The 575-acre disturbed area represents the planned preconstruction, pre-COL construction, and COL construction extent of disturbance. Unknown field conditions could potentially increase the final disturbed area to be approximately 600 to 800 acres.

The CFPP maximizes use of excavated materials in the CFPP preconstruction, pre-COL construction, and COL construction activities, including excavated rock that is crushed for structural and non-structural backfill, laydown and fabrication yard surfaces, and roads. During preconstruction initiation, cleared vegetation (i.e., herbaceous plants and shrubs) is grubbed and stockpiled in an area used for non-structural overburden materials (i.e., sedimentary and sand stockpile). Cleared vegetation material is estimated at approximately 0.74 million cubic yards. No vegetation is burned at the CFPP; vegetation is placed in the stockpile area or in berms at the site. Table 4.1-2 presents the volumes of excavated materials and resulting on-site uses.

Spoils material (i.e., non-structural fill material) is excavated and stockpiled within the CFPP site beginning early in the preconstruction. Berms are strategically built from compacted spoils material on the CFPP site to act as snow and weather barriers during construction and operations. Spoils material is estimated at approximately 0.77 million cubic yards. Minimal spoils are expected during COL construction, which focuses on the build out of the nuclear island, turbine island, and balance of site (BOS) facilities.

Table 4.1-3 provides the areas of land disturbance for permanent and temporary uses. Figure 4.1-1 identifies the following temporary areas and facilities to be used during preconstruction, pre-COL construction, and COL construction as described in LWA ER Section 3.3:

- plant site area that includes temporary office and administration, medical, training, sanitary facilities, and waste management areas
- warehouses for equipment and materials
- construction equipment delivery, maintenance, and waste management area
- rock crushing facilities and associated stockpile areas
- laydown and fabrication areas with associated workshops
- concrete batch plant facilities, washout stations, and stockpile areas
- utilities (i.e., power, water, communication)
- parking areas
- security facilities
- temporary roads

Figure 4.1-2 and LWA ER Figure 3.1-7 identify permanent facilities that remain after preconstruction, pre-COL construction, and COL construction, as follows:

- plant site that includes (details shown on LWA ER Figure 3.1-7)

  - RXB
  - RWB
  - Control Building
  - Turbine Generator Building (TGB)
  - Air cooled condenser system (ACCS)
  - Central Utility Building (CUB)
  - Annex Building
  - Site cooling water system (SCWS) (i.e., cooling towers, basin)
  - neutralization tank and pumps
  - exhaust stack
  - Substation Control Building (i.e., transmission structure)
  - the BOS facilities (e.g., security building)
- permanent roads
- stormwater and evaporation ponds
- utilities

Preconstruction changes the CFPP site land use, as identified in LWA ER Figure 2.1-3, from undeveloped, government-controlled and government mission-focused land use to an industrial use area. The impacts to land use from preconstruction bound the impacts from pre-COL construction and COL construction. The pre-COL construction impacts are focused on the RXB and RWB foundation excavations following preconstruction surface preparation activities of grading, leveling, and excavation, including deep excavation initiation. To support preconstruction, pre-COL construction, and COL construction, a 34.5 kV transmission line is installed from the CFPP plant area to a new Pronghorn Substation at the INL Central Facilities Area, parallel to an existing PacifiCorp 69 kV line on the INL site (LWA ER Figure 2.1-22). The largest land use impact for on-site COL construction is the transition from an industrial construction site to an operating facility producing commercial power on the INL site. The COL construction also includes off-site activities to install the transmission and water supply pipeline corridor. The Bureau of Land Management has ownership responsibility for the subsurface at the INL site. The CFPP preconstruction, pre-COL construction, and COL construction do not alter subsurface ownership or responsibility.

Table 4.1-4 compares CFPP land use identified in LWA ER Table 2.1-3 with land use during preconstruction, pre-COL construction, and COL construction. The land use affected by preconstruction, pre-COL construction, and COL construction occurs under DOE control and the requirements identified in the DOE use permit (Reference 4.1-2) because the CFPP construction area is completely within the INL site. The CFPP is authorized through Reference 4.1-2 to perform siting activities for small commercial modular nuclear reactors. Further uses of the land for construction and operations under Phase II of Reference 4.1-2 are expected to be authorized through DOE and NRC National Environmental Policy Act decision processes and NRC licensing actions. In Reference 4.1-2, the DOE grants use of the CFPP site with the requirement that the use does not materially interfere with ongoing DOE missions. The DOE currently has no specific mission on the CFPP site, which is undisturbed desert that was impacted by a wildfire in 1994 (Reference 4.1-1). The CFPP meteorological tower, an administrative trailer in a gravel area, and groundwater level and quality monitoring wells from investigation activities are located on the CFPP site.

The BLM currently administers grazing allotments on the INL site, including allotments associated with the CFPP site, vicinity, and region. Figure 4.1-3 illustrates the grazing allotments relative to the CFPP construction area. Before preconstruction, pre-COL construction, COL construction, and operations activities, the CFPP consults with DOE and the BLM to realign livestock grazing allotments to restrict cattle grazing on and near the CFPP site. During informal discussions, BLM indicated they frequently alter grazing allotments and permits. Grazing is controlled with grazing permit restrictions and as needed fencing during preconstruction, pre-COL construction, and COL construction to limit impacts from and to livestock in the CFPP area. The grazing area identified in Table 4.1-4 represents a reasonable estimate of remaining potential grazing land on the CFPP site. This estimate excludes areas of ground disturbance from preconstruction; undisturbed areas that are close to the plant; areas that require crossing Road T-11 for access; and undisturbed small areas located between facilities, as shown on Figure 4.1-4. The actual area available for grazing during construction may be negotiated at the CFPP boundary to provide additional protection.

In 2014, DOE and the U.S. Fish and Wildlife Service (USFWS) entered into a Candidate Conservation Agreement (CCA) (Reference 4.1-3) to benefit the greater sage-grouse (*Centrocercus urophasianus*) on the INL site. The CFPP site is located within a designated area on the INL site for greater sage-grouse conservation under the CCA (Figure 4.1-3). Figure 4.1-4 presents the CFPP land use alterations for preconstruction, pre-COL construction, and on-site COL construction. Similar to the grazing areas, the CCA area is estimated by excluding similar areas due to disturbance of the existing sagebrush-steppe habitat used by the sage-grouse. Negotiations between CFPP, DOE, and USFWS determine the final area of impact.

The CFPP site is located within Butte County, Idaho, which implements a comprehensive plan (Reference 4.1-4) and county and city ordinances to direct land use, growth, and industrial and economic development consistent with residents' values. The majority of the county is federally owned with the remainder being state owned or privately held. The county has three incorporated communities, Arco, Butte City, and Moore (approximately 12, 10, and 17 miles [mi] from the CFPP site, respectively), that make up almost half of the county's population of 2574 people, based on the U.S. Census Bureau 2020 decennial data (Reference 4.1-5).

According to Reference 4.1-4, Butte County encourages reasonable, sustainable population and economic growth while maintaining small town and rural quality of life. Agriculture, which mainly occurs in the valleys of the Big Lost and Little Lost Rivers and Birch Creek (LWA ER Figure 2.1-16), is important to Butte County citizens as is access to federal lands for public use. Per Reference 4.1-4, less than 3 percent of INL workers are Butte County residents. No impacts to the Butte County land use beyond the INL changes identified are expected from CFPP construction activities. The CFPP construction is consistent with Butte County development plans because the project does not impact agricultural lands, diminish access to Federal lands for public use, or impact development plans in the communities.

Other counties in the CFPP region are located at distances ranging from approximately 14 to 54 mi from the site measured from the CFPP site center point to the closest county boundary. Construction activities on the CFPP site have small potential impacts to land uses and comprehensive plans in these other counties (LWA ER Section 2.1.1 and Table 2.1-2). Overall, impacts to regional land use, economic development plans, and zoning from CFPP preconstruction, pre-COL construction, and COL construction are SMALL.

Table 4.1-5 summarizes resource area effects for agriculture, forestry, mineral extraction, floodplains, wetlands, and hazardous waste cleanup. Preconstruction and pre-COL construction impacts to agriculture and forestry are SMALL. Agricultural areas are located at least 5 mi from the CFPP site. Nearby forests are not used to source timber products as timber harvest areas are outside the CFPP region. Some localized disruption relative to transportation delays on State Highway 33 during equipment and material movement may impact movement of agricultural equipment along that route. Delays are controlled through compliance with transportation regulations and plans, implementing best management practices, such as movement scheduling during lower use days and times, and traffic controls to optimize flow. Disruption and impacts to ongoing natural resource management activities are SMALL.

The INL site is listed on the National Priorities list and is undergoing Comprehensive Environmental Response, Compensation, and Recovery Act cleanup. Waste removal and packaging operations at the Radioactive Waste Management Complex, located approximately 9.6 mi from the CFPP site (LWA ER Figure 2.1-5) is the closest DOE cleanup site. Portions of the Radioactive Waste Management Complex are remediated by an evapotranspiration cap, expected to be constructed following waste retrieval near the end of the 2020s. Potential impacts to the cleanup from CFPP preconstruction, pre-COL construction, and COL construction include competition for workers and equipment resources. Health issues to CFPP workers from the DOE cleanup are not anticipated. Waste retrieval is conducted in containment structures under strict health, safety, and radiological control requirements. The wind generally blows in the opposite direction from the CFPP site. Health issues to the cleanup site from CFPP are not expected due to the distance between the sites and controls implemented by both projects.

Currently, access to the CFPP site is limited through DOE access controls for the INL site, including badging requirements, security, signage, and fencing. Public access is not allowed without proper approval and trespassing is monitored. During preconstruction, pre-COL construction, and on-site COL construction CFPP security measures limit access to the CFPP site, while areas outside the CFPP site, but on the

INL site, such as the transmission and water supply pipeline corridor, remain under DOE control or under the administration of the BLM-issued rights-of-way.

No surface water resources are currently found on the CFPP site, thus no water-resource access disruption is expected. The DOE controls groundwater use on the INL site. During preconstruction and pre-COL construction, non-potable water is trucked from INL site facilities, from one or more of the existing wells on the CFPP site, or from new wells. A well or wells and water supply pipeline are planned as described in LWA Section 2.1.2 and shown on LWA ER Figure 2.1-22 to provide project water. Disruption to land or water resource access from preconstruction, pre-COL construction, and COL construction is SMALL considering the lack of surface water resources and current access restrictions, which continue during these construction periods.

Access by DOE for INL mission activities and by BLM grazing permit holders comprise the main land use disruptions to existing land users. This disruption is expected to be SMALL. Currently, DOE does not have a nuclear mission or related facilities on the CFPP site. Some environmental monitoring is conducted on the site, including long-term vegetation transect monitoring and greater sage-grouse habitat monitoring under Reference 4.1-3. Private land access is restricted on the INL site. Provisions in the CFPP security plan are implemented to limit public access during preconstruction, pre-COL construction, and COL construction.

The public can access State Highway 33, located on the northwest border of the CFPP site, and U.S. Routes 20 and 26, which cross the INL site south of the CFPP site. The CFPP site is accessed from State Highway 33 at the intersection with INL site road T-11. This access is controlled during preconstruction, pre-COL construction, and COL construction by security provisions. No public land access is disrupted during construction; however, some delays may occur along State Highway 33 as materials and equipment are moved onto the CFPP site. Delay mitigations include best management practices for moving large pieces of equipment. The size of equipment shipped to CFPP is expected to be limited as smaller equipment elements are shipped for further fabrication and assembly on the CFPP site. Large moves are coordinated with impacted counties, law enforcement, and departments of transportation in accordance with state and federal requirements. The CFPP reviewed installing an access road from combined U.S. Route 20/26 to the western entrance area of the plant site as an option to the road T-11 access. The road T-11 access is preferable as a shorter option with less disturbance.

During site preparation as part of preconstruction, surface vegetation is removed and stockpiled on the CFPP site. No timber land is present on the CFPP site, so the impact significance level is SMALL.

Mineral extraction represents a SMALL impact significance level because no mineral resources are located at the CFPP site or transmission and water supply pipeline corridor. Preconstruction, pre-COL construction, and COL construction activities would not preclude use of on-site mineral resources by other entities. Mineral extraction for CFPP preconstruction, pre-COL construction, and COL construction is not anticipated in the CFPP region.

A large amount of on-site alluvial soil and rock are removed during site preparation and building foundation excavations. These materials are used on-site as structural fill in foundations, non-structural backfill, road and laydown yard surface material, and spoil berms for weather and snow protection. These activities are managed per the stormwater pollution prevention plan requirements established for site activities.

The CFPP site has no designated coastal zones, prime farmland, or other legislatively designated lands. The following legislatively designated lands occur within the CFPP region (LWA ER Figure 2.1-3 and Figure 2.1-4):

- Craters of the Moon National Monument and Preserve
- Craters of the Moon Wilderness Area
- Camas National Wildlife Refuge
- multiple wilderness study areas
- multiple areas of critical environmental concern
- three national forests
- two national historic sites

Agency coordination or permitting is not warranted for the preconstruction, pre-COL construction, and COL construction because of the lack of these resources on the CFPP site and distances from the building activities to the resources. The preconstruction and pre-COL construction impact significance level is SMALL. The combined license application addresses impacts to legislatively designated lands and required agency coordination or permitting.

No floodplains or wetlands are located on or near the CFPP site, so the impact significance level is SMALL. LWA ER Section 2.1.1.12 and Figure 2.1-17 provide additional information on floodplains and wetland areas relative to the CFPP site.

Table 4.1-6 summarizes the impact significance levels, impacts, and mitigation measures associated with preconstruction, pre-COL construction, and COL construction by scopes of work and related activities. Preconstruction, pre-COL construction, and COL construction result in loss of use of only a small fraction of the INL site. The INL site is 890 square mi in area, with fewer than 50,000 acres currently being used for DOE mission activities, leaving considerable available area for other projects or future missions. Most of the currently planned new build facilities on the INL site are located near existing facilities.

4.1.2 Off-site Impacts

Off-site areas of the CFPP include a transmission corridor between the CFPP site to the existing Antelope Substation and a new Idaho Power Pronghorn Substation at the INL Central Facilities Area. This corridor includes a 34.5 kV construction transmission line, installed to support preconstruction, pre-COL construction, and COL construction activities. During COL construction, a 230 KV transmission line to support operations and power delivery to the grid is installed in the same corridor as the construction transmission line. The CFPP transmission corridor is located on the INL site and parallels an existing PacifiCorp 69 kV transmission line and corridor right-of-way. The CFPP transmission and water supply pipeline corridor is expanded a maximum of 250 feet (ft) to the east of the current corridor to allow construction of the CFPP 230 kV transmission line. A water supply pipeline and groundwater wells provide water to CFPP operations; the water supply pipeline corridor lies within the transmission corridor (LWA ER Section 2.1.2 and Figure 2.1-22). Pending aquifer testing, well locations are expected to be within a distance of up to 5 mi from the southeast corner of the CFPP site within the transmission and water supply pipeline corridor right-of-way. Up to 400 acres are potentially converted from undisturbed to right-of-way for power transmission and water supply pipeline through construction of the transmission and water supply pipeline corridor.

The transmission lines, water supply pipeline, wells, and associated corridor are permanent features of the CFPP during operations. Table 4.1-7 summarizes the land disturbance for temporary and permanent off-site areas.

The CFPP transmission and water supply pipeline corridor is located within Butte County and completely within the INL site. As stated in Section 4.1.1, DOE controls land use on the INL site with BLM administering certain land uses on the site. The BLM has granted PacifiCorp a right-of-way for the existing 69 kV transmission corridor shown in LWA ER Figure 2.1-22. The CFPP transmission corridor parallels the PacifiCorp transmission corridor. Additionally, the CFPP water supply pipeline to the CFPP plant transports water from groundwater wells located within the CFPP transmission corridor from a maximum distance of 5 mi from the CFPP site boundary. No impacts to local (i.e., Butte County or INL site) or regional (i.e., Bannock, Bingham, Blaine, Bonneville, Clark, Custer, Jefferson, Lemhi, Lincoln, Minidoka, and Power Counties) zoning and land-use plans are expected, as presented in the county-specific comprehensive plans described in LWA ER Section 2.1.1.

The transmission and water supply pipeline corridor does not disrupt land or water resource access. The water supply pipeline does not cross water resources or limit land access beyond the INL access restrictions, as shown in LWA ER Figure 2.1-22. The supply pipeline and associated wells are accessible by the road in the existing PacifiCorp 69 kV line right-of-way.

The CFPP transmission lines cross the Big Lost River parallel to the 69 kV PacifiCorp line at approximately the same location as shown in LWA ER Figure 2.1-22. Figure 4.1-5 shows views of the river crossing. This river has infrequent flow consistent with high precipitation and snow melt events. LWA ER Section 2.1.1.5 and 2.1.1.12 provide additional details on river flow. The transmission lines are oriented to allow poles on either side of the river so only the transmission wires are over the river area. During intermittent periods of flow, the river's western edge is accessible from the CFPP side along the 69 kV corridor road. The opposite side is accessible by using the nearby Lincoln Boulevard Bridge to cross the river and then using the 69 kV corridor road on the eastern side. Disruption to land or water resource access from off-site CFPP preconstruction and construction is SMALL because of existing INL site access restrictions and location of the CFPP corridor near to and parallel with an existing transmission corridor.

The CFPP 34.5 kV construction transmission line ties into a new Idaho Power facility, the Pronghorn Substation, located near the INL Central Facilities Area and the existing Antelope Substation. The CFPP 230 kV transmission line tie into the existing Antelope Substation. Because the CFPP transmission and water supply pipeline corridor is located on the INL site, closely parallels an existing transmission corridor, and ties into an existing substation or new substation in the disturbed area, impacts to existing land uses from the transmission line and water supply pipeline construction are SMALL. Impacts from the Idaho Power Pronghorn Substation construction are evaluated in a separate National Environmental Policy Act action but are expected to be SMALL as the substation will be located in a previously disturbed area.

Table 4.1-8 summarizes the effects on these off-site resources, and LWA ER Section 2.1 discusses the baseline conditions of these areas.

4.1.3 References

4.1-1 Idaho National Laboratory. “Comprehensive Land Use and Environmental Stewardship Report Update,” March 30, 2020, INL/EXT-20-57515, U.S. Department of Energy, Idaho Falls, Idaho, accessed September 2, 2021 from https://www.osti.gov/biblio/1608252.

4.1-2 U.S. Department of Energy. Use Permit No. DE-NE700065, February 17, 2016.

4.1-3 Department of Energy, Idaho Operations Office (DOE), and U.S. Fish and Wildlife Service (USFWS). 2014. "Candidate conservation agreement for greater sage-grouse (Centrocercus urophasianus) on the Idaho National Laboratory Site," DOE/ID-11514, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho., accessed February 22, 2023 from https://idahoeser.inl.gov/publications.html.

4.1-4 Butte County Planning and Zoning. Butte County Comprehensive Plan, Butte County, July 31, 2006.

4.1-5 U.S. Census Bureau. Decennial Census, "2020 Decennial Census Redistricting Data (PL 94-171), Table P1, Race," accessed August 5, 2022 from https://data.census.gov/cedsci/.

Table 4.1-1: On-Site Land Disturbance Areas for Preconstruction, Pre-Combined License Construction, and Combined License Construction

Activity	Preconstruction (acres)[1,2]	Pre-Combined License Construction (acres)[1,2]	Combined License Construction (acres)[1,3]	Description
Grading, Excavation (including ripping), and backfill	359	4.8[4]	0	Total surface area of mass grading, excavation, and backfill, including foundations
Vegetation Clearing	575	0	0	Estimated 0.74 million cu yd cleared vegetation emplaced in stockpile area
Trenching and Ponds	164	0	87[5]	Excavation of trenches, ditches, and stormwater ponds; initially disturbed during preconstruction
Stockpile Area	50	0[6]	0[6]	Approximately 0.77 million cu yd of non-structural soil and rock material dispositioned to the stockpile area
On-site Utilities	42[7]	0	40[8]	Installation of on-site utilities up to the CFPP boundary

Notes:

1 Areas are approximate and subject to change during detailed design.

2 Preconstruction comprises site preparation, grading, clearing, and excavation that disturb approximate 575 acres within the CFPP site. Pre-COL construction comprises installation of rock bolts and fibermesh during the deep excavation of the RXB and RWB foundations (exemption scope) and soft and fractured rock stabilization and mud mat installation at the RXB (Limited Work Authorization scope). Pre-COL construction is conducted in the footprint of the RXB and RWB initially excavated during preconstruction. The 575-acre disturbed area represents the planned preconstruction, pre-COL construction, and COL construction extent of disturbance. Unknown field conditions could impact the disturbed area, resulting in approximately 600 to 800 acres potentially being disturbed.

3 The COL construction comprises continued build out of nuclear and turbine islands and BOS. Grading, excavation, and other surface preparation are performed during preconstruction.

4 Approximate surface excavation area of the RXB and RWB; included in preconstruction area for grading, excavation.

5 Estimated pond area; subject to change during detailed design. Pond areas are initially graded and used during preconstruction and pre-COL construction for laydown and fabrication areas.

6 Included under preconstruction.

7 34.5 kV construction transmission line and plant trenches; line continues off-site to a new Pronghorn Substation at INL Central Facilities Areas. Assumes maximum area based on 250-foot wide corridor 1.3 miles long (LWA ER Figure 2.1-22).

8 Portion of permanent transmission line and water supply pipeline from CFPP plant to CFPP boundary (line continues off-site to the Antelope Substation at INL Central Facilities Area). Assumes maximum area based on 250-ft wide corridor 1.3 mi long (LWA ER Figure 2.1-22).

Table 4.1-2: Preconstruction, Pre-Combined License Construction, and Combined License Construction Excavated Volumes

Material	Use	Volume (cu yd)	Location
Excavated Alluvial Soils	Stockpile and nonstructural backfill	1.505 million - • 5000 for general fill • 1.5 million dispositioned to stockpile	On-site; used in appropriate applications for backfill, yard surfaces, and roads
Total Excavated Rock and Processed Rock	Structural fill	2.24 million (before processing) 1.6 million (processed rock available for backfill)	On-site for foundations, roads, laydown and fabrication yard surfaces
Crushed Rock	Structural backfill for foundations	96,000	On-site for building foundations
Crushed Rock	Structural backfill for underground utilities	44,000	On-site for base material in utility trenches
Aggregate Structural Fill	Road construction	87,000	On-site for site roads

Note: Volumes are approximate and subject to change during detailed design. The majority of excavated materials are removed during preconstruction. Minimal amounts of excavated material are removed during pre-COL activities.

Table 4.1-3: Proposed Footprint of Land Disturbance for Permanent and Temporary Uses

Land Use	Area of Land Disturbance (acres)	Description
Temporary Uses		
Roads	20	Includes temporary roads within plant area and main haul road from Road T-11 to plant
Batch Plant	12	Includes 2 batch plants, concrete waste washouts, and truck parking. Item 7 on Figure 4.1-1
Rock Crushing Facilities	20	Includes rock crushing equipment and rock material staging. Item 16 on Figure 4.1-1
Utilities (water, power, communication)	42	Utilities to support construction activities including the on-site portion of the 34.5 kV construction transmission line; this line may be permanent if maintained as backup power during operations.
Laydown and Fabrication Areas	80	Comprises multiple laydown and fabrication areas with equipment delivery, maintenance and other shops, and warehousing. Items 2-6, 8, and 10-15 on Figure 4.1-1.
Parking	33	Includes large worker parking area near State Highway 33 and Road T-11 intersection (Item 1 on Figure 4.1-1) and multiple worker parking areas at work fronts both within and external to the plant site, such as the civil lab, security gates and entrances, and material management areas
Stockpile Area	50	Large area for removed vegetation, alluvial soils, and nonstructural rock materials. Item 17 on Figure 4.1-1.
Storm Water Ponds	50	Potentially used temporarily during preconstruction and pre-COL construction, as needed, for laydown and fabrication activities
Permanent Uses		
Security Owner Controlled Area (at SOCA fence)	127	Main area of plant site
Internal Plant Area (at internal plant fence)	72	Internal area of the CFPP plant that includes the nuclear island, turbine island, and transmission structure areas
Nuclear Island	18	Area within the internal plant area that includes the RXB, RWB, and Control Building; also includes support facilities such as the Annex Building, CUB, and fire station
Turbine Island	16	Area within the internal plant area that includes the TGB, ACCS, and supporting systems
Transmission Structure (power block)	20	Area within the internal plant area that includes the transformer systems and transmission structure for the CFPP
SCWS	<1	Area within the internal plant area that includes the site cooling water equipment enclosure, cooling towers, and basin
Roads	30	Includes Road T-11, the entry road to the plant, and the road from the plant to the southern storm water pond

Table 4.1-3: Proposed Footprint of Land Disturbance for Permanent and Temporary Uses (Continued)

Land Use	Area of Land Disturbance (acres)	Description
Parking	2.4	Includes parking internal to the plant, at the plant entrance, and in the security area
Ponds	87	Includes stormwater retention ponds and evaporation ponds to support operations. Figure 4.1-2.
Transmission Line, Water Supply Wells and Pipeline, and Corridor	365	Includes the transmission line from the plant to the CFPP boundary and the continuation of the line to the Antelope Substation at the INL Central Facilities Area with wells and water supply pipeline within the same corridor. LWA ER Figure 2.1-22.

Note: Volumes are approximate and subject to change during detailed design.

Table 4.1-4: Existing CFPP Site Land Use Comparison to Preconstruction, Pre-Combined License Construction, and Combined License Construction Land Use

Principal Land Use	Land Use							
	Baseline		Preconstruction		Pre-COL Construction		COL Construction	
	Site (Acres)[1,2]	Site (%)[1]	Site (Acres)[1]	Site (%)[1]	Site (Acres)[1]	Site (%)[1]	Site (Acres)[1]	Site (%)[1]
Total Area	2325	100						
Land Use by Ownership/Control								
Federal Lands	2325	100	2325	100	2325	100	2325	100
INL Site Lands	2325	100	2325	100	2325	100	2325	100
Land Use by Activity								
Undeveloped Land	2325	100	1750[3]	75	1750	75	1750	75
Industrial Land	0	0	575[4]	25	575	25	575	25
Livestock Grazing	2325	100	0[5]	0	0	0	0	0
Utility Rights-of-Way and Roads	728	31	798[6]	32	748	32	798[7]	34
Candidate Conservation Area for Sage-Grouse	2325	100	1571[8]	68	1571	68	1571	68

Notes:

1 Numbers are approximate. Areas have been rounded to the nearest whole acre. Represents on-site disturbance; off-site disturbance areas are included in Table 4.1-7.

2 From LWA ER Table 2.1-3.

3 Figure 4.1-1. Assumes 575 acres are disturbed and used for preconstruction activities; pre-COL construction activities are contained within the preconstruction disturbed area.

4 Assumes 575 acres are disturbed as shown in Figure 4.1-1 for preconstruction, pre-COL construction, and COL construction. The 575-acre disturbed area represents the planned preconstruction, pre-COL construction, and COL construction extent of disturbance. Unknown field conditions could impact the disturbed area, resulting in approximately 600 to 800 acres potentially being disturbed.

5 Assumes CFPP, DOE, and BLM negotiate the entire 2325-acre CFPP site out of grazing allotments during preconstruction, pre-COL construction, and COL construction to provide a safety buffer for cattle and prevent nuisance or destructive cattle encroachment on the CFPP construction. Overall, approximately 603 acres are disturbed or are located close to the plant such that grazing would be unavailable, leaving approximately 1700 acres available for future negotiations.

6 Includes 20 acres of temporary roads and 42 acres of on-site construction transmission line and temporary utilities around the plant area.

7 Includes 30 acres of permanent roads and 40 on-site acres of permanent transmission corridor.

8 Assumes CFPP, DOE, and USFWS negotiate 754 acres of disturbed area and undisturbed areas near the plant out of the CCA during construction as shown in Figure 4.1-4. The greater sage-grouse may still potentially use the undisturbed areas outside the 754 acres for nesting; however, with human activity from construction in the area, they may choose other nesting grounds away from the CFPP site. These impacts are discussed in LWA ER Section 4.3.

Table 4.1-5: Possible On-site Effects on Floodplains, Wetlands, Agriculture, Forestry, Mineral Extraction, and Hazardous Waste Cleanup

Parameter	Possible Effect	Description	Mitigation Approach
Floodplains	• No expected effects • Impact significance level - SMALL	• No surface water located on CFPP site • CFPP outside floodplain of Big Lost River (LWA ER Section 2.1.1.2 and Figure 2.1-17) • Little Lost River flow does not normally reach INL site - located approximately 10 mi from CFPP (see LWA ER Section 2.1.1.5 and Figure 2.1-12)	• No mitigation anticipated
Wetlands	• No expected impact to existing wetland areas • Impact significance level - SMALL	• No wetland areas on CFPP site; closest potential wetland is Big Lost River sinks approximately 11 mi from CFPP site (LWA ER Section 2.1.1.12 and Figure 2.1-3) • Ponds to be constructed during COL construction to support operations	• Implement Stormwater Pollution Prevention Plan to control water runoff from preconstruction, pre-COL construction, and COL construction activities
Agriculture	• Restriction on use of grazing allotments on CFPP site • Impact significance level - SMALL	• BLM administers grazing allotments on and around CFPP site (LWA ER Section 2.1.1.3 and Figure 4.1-3) • No current grazing on CFPP site; allotments would be amended to restrict grazing within the CFPP site • No prime farmland on the CFPP site; nearest designated prime farmland is more than 2 mi from the CFPP site (LWA ER Section 2.1.1.12 and Figure 2.1-3)	• Coordination with BLM before preconstruction, pre-COL construction, and COL construction to align grazing allotments • Fencing around CFPP preconstruction, pre-COL construction, and COL construction areas to mitigate encroachment from grazing herds in area
Forestry	• No expected impacts • Impact significance level - SMALL	• No current commercial timber harvesting in CFPP region (LWA ER Figure 2.1-15) • No forest products located on CFPP site • Lumber sourced from off-site locations • No CFPP preconstruction, pre-COL construction, or COL construction activities located in nearby forests; may enter forests for environmental monitoring plan activities	• Prohibit work-related entry of off-site or foothill areas with motorized equipment to minimize impact to potentially sensitive plants • Follow monitoring plans for incursions into nearby forests

Table 4.1-5: Possible On-site Effects on Floodplains, Wetlands, Agriculture, Forestry, Mineral Extraction, and Hazardous Waste Cleanup (Continued)

Parameter	Possible Effect	Description	Mitigation Approach
Mineral Extraction	• No expected impacts from mineral extraction • Impact significance level - SMALL	• No identified mineral resources at CFPP site; would not preclude other entities use of such materials • No expected mineral extraction to support CFPP preconstruction, pre-COL construction, or COL construction from CFPP region	• No mitigation considered necessary
	• Additional structural backfill material obtained from off-site vendor locations • Impact significance level - SMALL	• Approximately 600,000 cu yd to be obtained through trucking to CFPP site • No additional changes to land use from additional materials	
Hazardous Waste Cleanup Activities	• No expected impacts to INL site hazardous waste cleanup activities • Impact significance level - SMALL	• Environmental cleanup ongoing at the INL site under current Comprehensive Environmental Response, Compensation, and Liability Act actions; waste removal is conducted at Radioactive Waste Management Complex, approximately 9.6 mi from CFPP site (LWA ER Figure 2.1-5) • Ongoing INL site cleanup is focused on surface activities and groundwater remediation	• Comply with DOE use permit for potential interface requirements with ongoing INL site cleanup activities • Implement health, safety, and environment controls at CFPP to protect INL site cleanup project at Radioactive Waste Management Complex

Table 4.1-6: Land Use Summary of Preconstruction, Pre-Combined License Construction, and Combined License Construction Impacts, Significance, and Measures and Controls

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Preconstruction				
Mobilize and Establish Site	Mobilize site excavation and grading contractor (including equipment)	SMALL	• Initial disturbance of undisturbed land area	• Follow equipment staging plans • Minimize disturbed area for staging • Stage equipment in designated areas, use designated roadways on CFPP site, and avoid sensitive areas (e.g., sagebrush habitat)
Prepare Site (clearing, grubbing, grading, excavation)	Remove and stockpile vegetation, alluvial soils, and basaltic rock; establish roads and parking; grade and level surface	SMALL	• Land use conversion from undisturbed land to industrial land with large area disturbance • Loss of grazing capacity for grazing allotment on CFPP site • Loss of designated CCA lands on CFPP site	• Unavoidable land use disturbance to allow CFPP • Maximize use of on-site materials for site preparation, backfill; no off-site disposition of site spoils • Consult and coordinate with BLM on restructuring grazing allotments consistent with CFPP grazing quality, areas of disturbance, and safety precautions for livestock • Comply with DOE use permit (Reference 4.1-2) on requirements regarding CCA with USFWS

Table 4.1-6: Land Use Summary of Preconstruction, Pre-Combined License Construction, and Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Temporary Facilities and Utilities	Establish temporary facilities - office, medical, training trailers; sanitary and craft facilities; warehouses	SMALL	• Land use change occurs in initial site preparation • Limited additional disruption with this activity • Further represents land use shift to industrial by presence of above-ground structures	• Unavoidable land use disturbance to allow CFPP to proceed • Follow preconstruction, pre-COL construction, and COL construction plans for staging, spoils disposition, traffic flow, and designated avoidance areas
	Install temporary power, water, and communications	SMALL	• Land use change occurs in initial site preparation • Limited additional disruption with this activity • Up to 325 acres disturbed to install 34.5 kV construction transmission line in corridor from CFPP to a new Pronghorn Substation at CFA near the existing Antelope Substation; line parallels existing PacifiCorp 69 kV power line	• Unavoidable land use disturbance to allow CFPP to proceed • Follow preconstruction, pre-COL construction, and COL construction plans for staging, spoils disposition, traffic flow, and designated avoidance areas • Limit off-road vehicle use when constructing line • Use existing road and limit disturbance to pole areas when possible
	Install security provisions			
Establish Laydown Yards and Fabrication Areas	Establish laydown and fabrication yards, including fencing, controlled entries, equipment receiving and maintenance yard	SMALL	• Land use change occurs in initial site preparation • Limited additional disruption with this activity	• Unavoidable land use disturbance to allow CFPP to proceed • Follow preconstruction, pre-COL construction, and COL construction plans for staging, spoils disposition, traffic flow, and designated avoidance areas

Table 4.1-6: Land Use Summary of Preconstruction, Pre-Combined License Construction, and Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Rock Crushing and Concrete Batch Plant Facilities	Establish rock crushing, staging areas, and equipment	SMALL	• Land use change occurs in initial site preparation • Limited additional disruption with this activity	• Unavoidable land use disturbance to allow CFPP to proceed • Follow preconstruction, pre-COL construction, and COL construction plans for staging, spoils disposition, traffic flow, and designated avoidance areas
	Establish batch plant, staging, and truck parking areas and washouts			
Excavate Foundations and Trenches	Excavate RXB and RWB foundations	SMALL	• Activities occur underground beneath land disturbed during site preparation	• Unavoidable land use disturbance to allow CFPP to proceed • Follow preconstruction, pre-COL construction, and COL construction plans for staging, spoils disposition, traffic flow, and designated avoidance areas
	Excavate BOS foundations-TGB, ACCS, CUB, Control Building, Annex Building, SCWS, and Transmission Structure			
	Excavate trenches; install bedding, piping, and utilities; backfill			
Pre-Combined License Construction				
Exemption	Install rock bolts in RXB and RWB excavations	SMALL	• Activities occur underground beneath land disturbed during site preparation	• Follow preconstruction, pre-COL construction, and COL construction plans for staging, spoils disposition, traffic flow, and designated avoidance areas
	Apply fibermesh/ shotcrete for RXB and RWB excavations			
Limited Work Authorization	Conduct soft or fractured rock remediation	SMALL	• Activities occur underground beneath land disturbed during site preparation	• Follow preconstruction, pre-COL construction, and COL construction plans for staging, spoils disposition, traffic flow, and designated avoidance areas
	Install RXB mud mat, rebar, and permanently embedded items			

Table 4.1-6: Land Use Summary of Preconstruction, Pre-Combined License Construction, and Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Combined License Construction				
Establish Site Buildings	Construction of nuclear island, turbine island, BOS	SMALL	• Land disturbance and land-use change from undisturbed to industrial occurs during preconstruction • Visual land use changes continue as buildings are erected	• Follow equipment staging plan • Stage equipment in designated areas • Use designated roadways on CFPP site • Avoid sensitive areas (e.g., sagebrush habitat)
Establish Permanent Utilities	Install power, water, and communications	SMALL	• Excavation and disturbance in LWA ER Figure 2.1-22 include on-site power from the CFPP plant to the off-site corridor leading to the Antelope Substation at Central Facilities Area • Off-site power and water from the CFPP site to the Antelope Substation follows the existing PacifiCorp 69 kV corridor (LWA ER Figure 2.1-22) and road • Communication line location evaluated in COL application	• Maintain designated work areas in LWA ER Figure 2.1-22 • Limit transmission and pipeline corridor vehicle disruption to areas outside existing road and well and pole locations (LWA ER Figure 2.1-22) • Coordinate with INL and PacifiCorp to limit impacts to DOE and PacifiCorp missions

Table 4.1-6: Land Use Summary of Preconstruction, Pre-Combined License Construction, and Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Water Management	Install evaporation ponds	SMALL	• Evaporation pond areas are cleared during preconstruction for laydown and fabrication use (Figure 4.1-2) • Evaporation ponds are installed during COL construction in areas disturbed during preconstruction; land use changes from laydown and fabrication industrial to industrial ponds • Necessary revisions to stormwater ponds as needed	• Excavate within the site-plan-defined boundaries that have been previously disturbed • Continue implementing construction stormwater plan

Table 4.1-6: Land Use Summary of Preconstruction, Pre-Combined License Construction, and Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Final Site Configuration	Redress construction areas and landscape site	SMALL	• Contour final land surface and modify weather- protection berms if needed using spoil material where possible; results in visual land surface change	• Implement recontouring plan • Maintain activities within preconstruction disturbed areas • Implement landscaping and revegetation plan, including use of native plants or seeds • Consult and coordinate with BLM and DOE on restructuring grazing allotments consistent with CFPP grazing quality, areas of disturbance, and safety precautions for livestock • Consult with DOE and USFWS regarding DOE's CCA with USFWS; comply with DOE Use Permit (Reference 4.1-2) requirements for the CCA • Consult with DOE on approaches for landscaping consistent with INL site requirements and align with the area climatic conditions

Table 4.1-6: Land Use Summary of Preconstruction, Pre-Combined License Construction, and Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Final Site Configuration	Demobilization	SMALL	• Visual land use change as equipment is removed from site, leaving an industrial nuclear plant site	• Stage equipment awaiting removal in previously disturbed areas to avoid disturbing additional land • Use CFPP site staging areas and roads for loading and hauling equipment and materials • Iteratively conduct redress/ landscaping with equipment and material removal for demobilization efficiency

Notes:

[1] SMALL - Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered SMALL.
MODERATE - Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
LARGE - Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

[2] CFPP follows license and permit requirements and associated project-specific plans for preconstruction and pre-COL construction activities.

ACCS - air cooled condenser system
BOS - balance of site
CUB - Central Utilities Building
RWB - Radioactive Waste Building
RXB - Reactor Building
SCWS - site cooling water system
TGB - Turbine Generator Building

Table 4.1-7: Off-site Land Disturbance Areas

Structure	Preconstruction Activities (acres)	Pre-Combined License Construction (acres)	Combined License Activities (acres)
Permanent Structures			
Transmission Corridor	Up to 300[1]	0	Up to 300[2]
Water Supply Pipeline	0	0	158
Water Wells	0	0	Up to 29
Water Supply Surface Equipment	0	0	0[3]

Notes:

[1] Assumes a new 34.5 kV construction transmission line from the CFPP boundary to a new Pronghorn Substation near CFA. The line parallels the existing PacifiCorp 69 kV line to Antelope Substation within a 250-ft area on the northwest side. The portion of the line from the CFPP plant area to the CFPP boundary is included in Table 4.1-1.

[2] Included in preconstruction acreage for the construction transmission line. Acreage represents the maximum disturbed area for both 34.5 kV construction and 230 kV operational transmission lines, which are located within the same corridor. The water supply pipeline is similarly within the same corridor.

[3] Included with water wells area.

Table 4.1-8: Possible Off-site Effects on Floodplains, Wetlands, Agriculture, Forestry, Mineral Extraction, and Hazardous Waste Cleanup

Parameter	Possible Effect	Description	Mitigation Approach
Floodplains	• No expected effects • Impact significance level - SMALL	• CFPP transmission line and corridor cross Big Lost River, including floodplain (LWA ER Section 2.1.2 and Figure 2.1-22) • Water supply pipeline does not cross the river or floodplain	• Continue current process used by PacifiCorp for 69 kV line that crosses river and floodplain - only wires cross; access via road to west bank and use of Lincoln Boulevard bridge to reach east bank during periods of river flow
Wetlands	• No expected impact to existing wetland areas • Impact significance level - SMALL	• No wetlands along CFPP transmission or water supply pipeline corridor • Closest potential wetland is Big Lost River sinks is approximately 11 mi from CFPP site (LWA ER Section 2.1.1.12 and Figure 2.1-3) • Big Lost River seldom flows on the INL site, mainly during times of high precipitation or snow melt	• Restrict worker access to floodplain area of corridor or river entry during wet and flow periods; require transmission corridor access via bridge crossing during wet and flow periods
Agriculture	• No expected impact to agriculture • Impact significance level - SMALL	• BLM administers grazing allotments that extend partway down the CFPP transmission and water supply pipeline corridor; existing PacifiCorp 69 kV corridor is in same grazing allotments • No current grazing on CFPP site; allotments would be amended to restrict grazing within the CFPP site • No agriculture or prime farmland along the CFPP transmission and water supply pipeline corridor	• No mitigation considered necessary
Forestry	• No expected impacts • Impact significance level - SMALL	• No current timber harvesting or forest products along transmission and water supply pipeline corridor (LWA ER Figure 2.1-15)	• No mitigation considered necessary

Table 4.1-8: Possible Off-site Effects on Floodplains, Wetlands, Agriculture, Forestry, Mineral Extraction, and Hazardous Waste Cleanup (Continued)

Parameter	Possible Effect	Description	Mitigation Approach
Mineral Extraction	• No minerals extracted within CFPP region for preconstruction, pre-COL, or COL construction that would preclude use by other entities • Impact significance level - SMALL	• No identified minerals on the CFPP site	• No mitigation considered necessary
Hazardous Waste Cleanup Activities	• No expected impacts to INL site hazardous waste cleanup activities • Impact significance level - SMALL	• Environmental cleanup ongoing at INL under current Comprehensive Environmental Response, Compensation, and Liability Act actions; ongoing cleanup is focused on surface activities and groundwater remediation • No current cleanup impacts from existing 69 kV PacifiCorp line	• Comply with DOE use permit for potential interface requirements with ongoing INL site cleanup activities

Figure 4.1-1: Land Disturbance Associated with Temporary Areas and Facilities

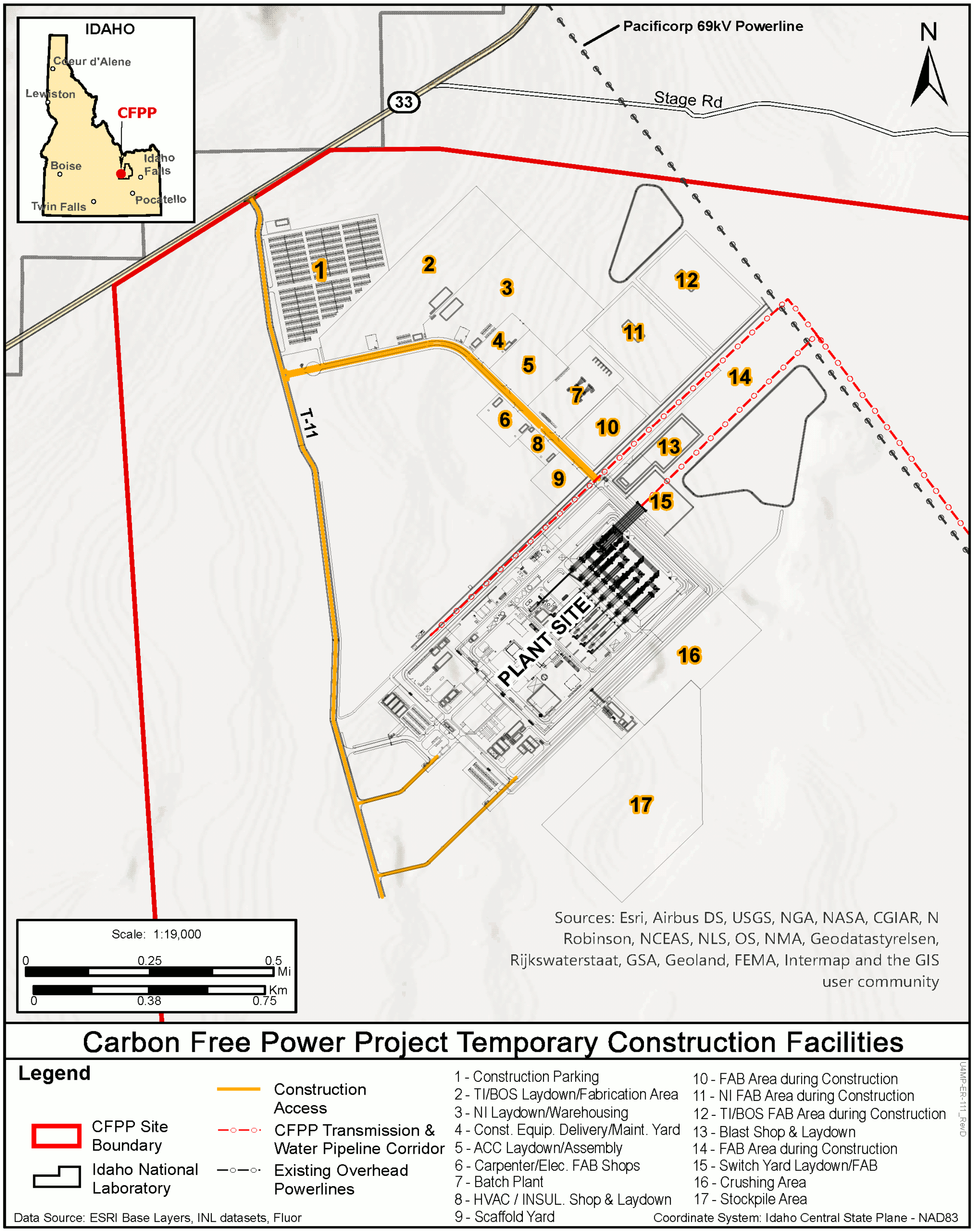


Figure 4.1-2: Land Disturbance Associated with Permanent Areas and Facilities

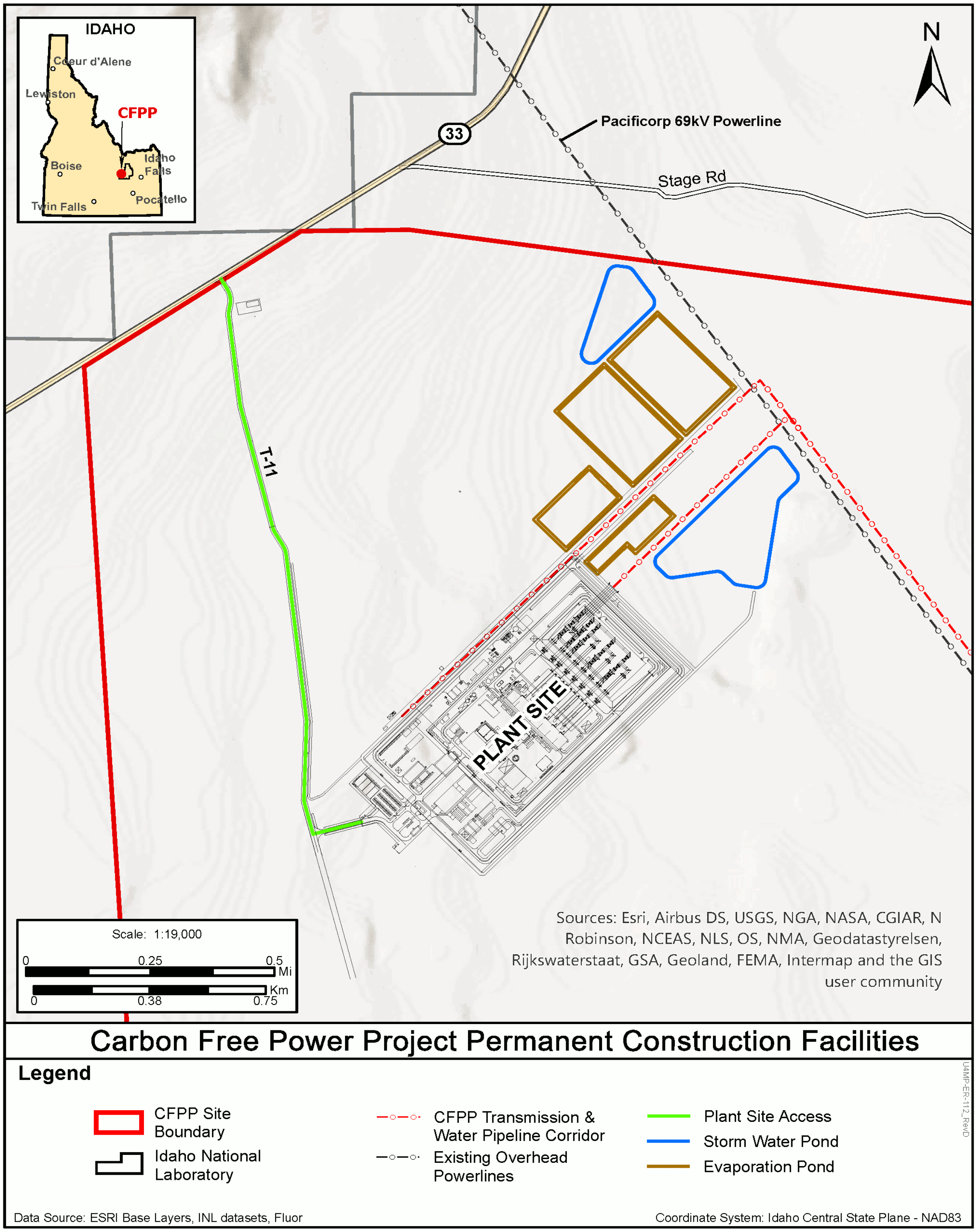


Figure 4.1-3: Existing Land Uses of Carbon Free Power Project Site Showing Grazing Allotments and Candidate Conservation Agreement Areas

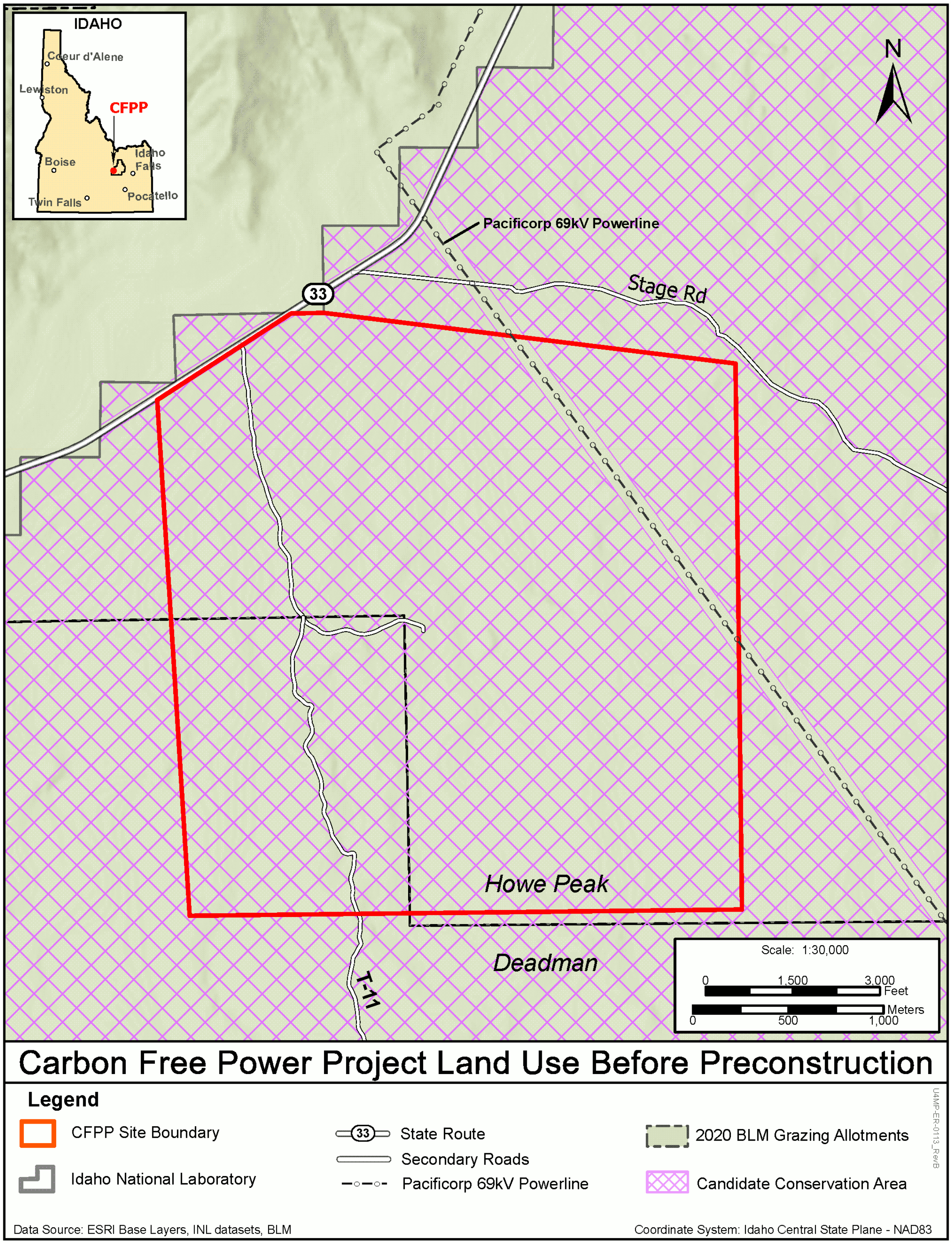
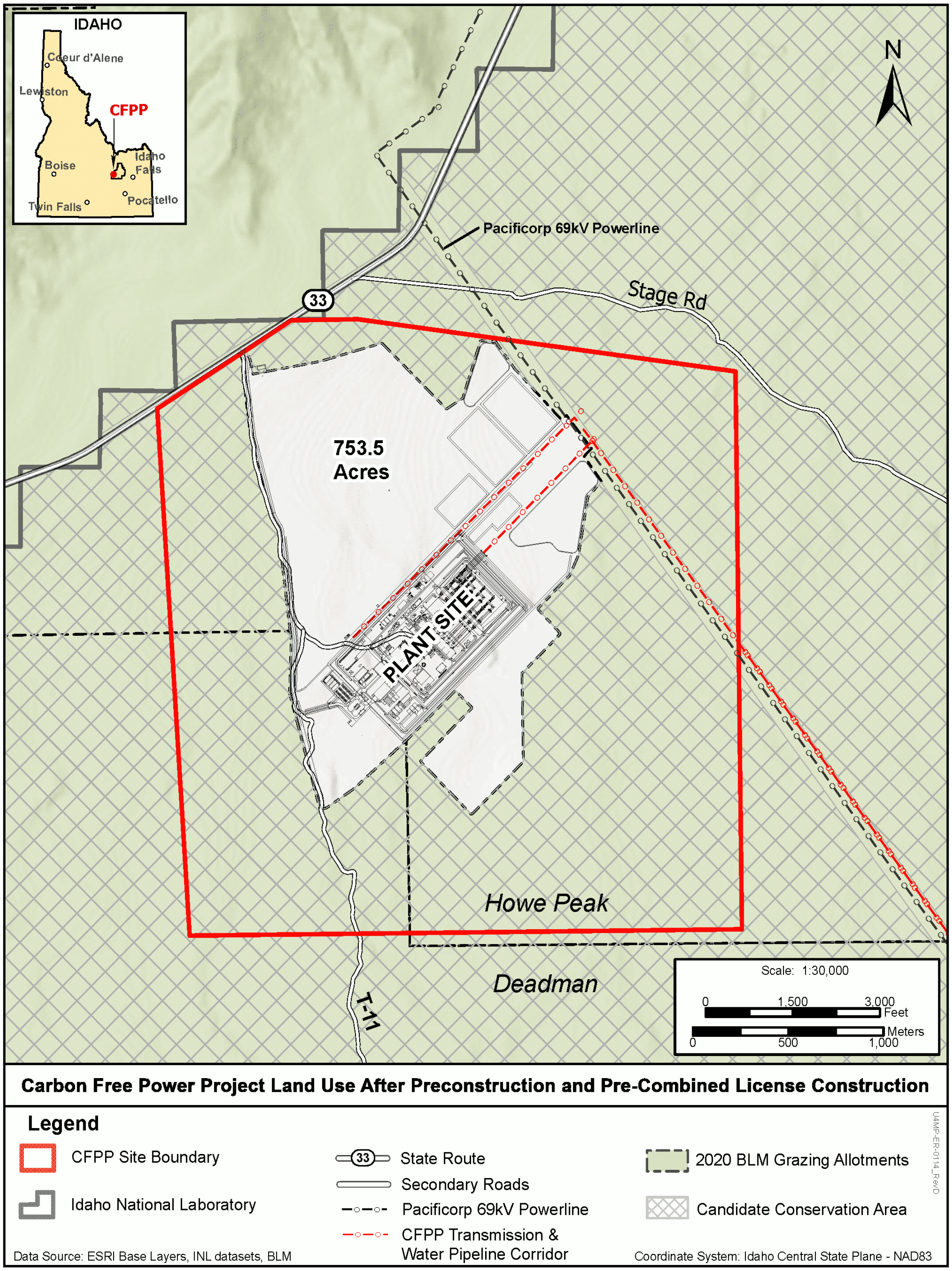


Figure 4.1-4: Land Uses of CFPP Site Following Preconstruction, Pre-Combined License Construction, and Combined License Construction[1]



[1]Note: Actual grazing allotment and CCA areas to be negotiated with DOE, BLM, and USFWS.

Figure 4.1-5: Views of CFPP Transmission Corridor Crossing of Big Lost River

Images courtesy of Keith Lockie

4.2 Water Resources (Surface Water and Groundwater)

This section describes the potential hydrologic alterations and water use impacts that may result from construction activities of the CFPP. LWA Environmental Report (ER) Table 1.4-1 provides a list of construction-related authorizations that are to be obtained before initiating construction activities.

The details of potential impacts to water resources are described in the following sections:

- Hydrologic Alterations - Section 4.2.1
- Water-Use Impacts - Section 4.2.2
- Water Quality Impacts - Section 4.2.3
- Water Monitoring - Section 4.2.4
- Summary of Water Impacts During Construction - Section 4.2.5

A detailed description of construction activities, methods, and durations is provided in LWA ER Section 1.3 and Section 3.3. Preconstruction and construction activities are divided into four different groups:

1. Preconstruction,
2. Exemption activities,
3. LWA activities, and
4. Combined license (COL) construction.

Items 2 and 3 above are collectively referred to as pre-COL construction activities, as shown in LWA ER Figure 3.3-1.

4.2.1 Hydrologic Alterations

This section describes surface water and groundwater hydrologic characteristics that could potentially impact or be affected by the construction of the US460 NuScale Power Plant at CFPP. The potential hydrologic alterations, the impact-mitigating measures, and the regulatory permits and approvals, that are relevant to the construction activities are also described in this section.

4.2.1.1 Preconstruction

During preconstruction the following activities are scheduled to occur, as described in LWA ER Section 3.3.1.1:

- Obtain necessary permissions, permits, licenses, and other regulatory approvals
- Commence land disturbance (surveying, clearing and grubbing, grading, ripping, excavation, soils and rock stockpiling, road and parking lot development, etc.)

- Install temporary office, medical, and training trailers; sanitary and craft facilities; and warehouses
- Install temporary utilities and services, including power, communications, and water
- Establish laydown yards, fabrication yards, scaffold storage and fabrication areas
- Establish a maintenance workshop and associated equipment management trailer(s), with proper chemical storage, waste management facilities, and appropriate spill prevention/containment measures, as discussed in LWA ER Section 4.10
- Establish rock crushing facilities (excavated basalt is delivered to the facility for crushing and is used for parking lots, laydown yards, and other locations, as appropriate)
- Establish two-300 cubic yards (cu yd) per hour concrete batch plants
- Establish concrete waste washouts near the batch plant and other strategic locations
- Survey and excavate foundations and trenches (spoils and rock are placed in the spoil stockpile area and rock crushing facility, respectively)
- Excavate stormwater drainage channels and ponds to intercept and contain stormwater runoff (pond locations are shown on LWA ER Figure 3.3-2)

4.2.1.1.1 Regulations and Permits

LWA ER Table 1.4-1 Authorizations Required and Status of Compliance for the Proposed Action provides a list of relevant authorizations and permits associated with the CFPP.

In compliance with the provisions of the State of Idaho Environmental Protection and Health Act Title 39, Chapter 1, "Rules Regulating the Idaho Pollutant Discharge Elimination System Program" (IDAPA 58.01.25) and the Federal Water Pollution Control Act (Clean Water Act) Title 33 United States Code, Section 1251 et seq., the CFPP construction operator obtains an Idaho Pollutant Discharge Elimination System (IPDES) Discharge Permit No. IDR100000 (Construction General Permit [CGP] for Discharge Activities) from the Idaho Department of Environmental Quality (DEQ). The operator:

- develops and implements a Storm Water Pollution Prevention Plan (SWPPP),
- submits a notice of intent 30 days before start of construction, and
- installs clean water diversions, sediment traps/basins, silt fences and other sediment barriers, and stabilize drainage channels or swales before excavation, fill, or grading work begins (Reference 4.2-1 and Reference 4.2-2).

Once construction begins, best management practices (BMPs) are employed to minimize erosion and sediment transport (Reference 4.2-3, Reference 4.2-4, and Reference 4.2-5). Sediment traps and stormwater retention ponds are sized to retain, at a minimum, the 2-year, 24-hour storm or 3600 cubic feet (ft^3) per acre of contributing drainage area (Reference 4.2-5). The volume of impounded water evaporates or infiltrates within 72 hours.

The stormwater retention ponds (LWA ER Figure 3.3-2) are excavated below the ground surface and are not considered to be dams; therefore, no dam permits are required. Hydraulic structures greater than or equal to ten ft height and reservoirs that impound a volume of water greater than or equal to fifty acre-feet are regulated by the Idaho Department of Water Resources (IDWR) Dam Safety Program.

During preconstruction, a maintenance shop is constructed in order to service and repair construction equipment. Above-ground storage tanks (ASTs) are installed at this location to contain oil, transmission fluid, fuel, and other liquids, as discussed in LWA ER Section 4.10. EPA regulates petroleum ASTs in Idaho under the federal Spill Prevention, Control, and Countermeasure (SPCC) rule where the aggregate aboveground oil storage capacity is greater than 1,320 gallons in containers greater than 55 gallons. Although Idaho does not regulate ASTs, IDAPA 58.01.02 sections 851 and 852 require that DEQ be notified within 24 hours of a petroleum or hazardous substance release.

The preconstruction period lasts approximately 18 months (LWA ER Figure 3.3-1). During that time, approximately 119,250 gallons of potable water and 34,971,000 gallons of non-potable water are used (LWA ER Table 3.3-1). Potable water and much of the non-potable water is trucked into the site; potable water from a private contractor and non-potable water from INL. The non-potable water is used for road watering (dust suppression), concrete preparation, and other miscellaneous purposes (e.g., concrete waste washout).

An existing on-site well (PW-01) may be used to obtain some of the non-potable water during preconstruction (this well is already licensed by the IDWR). In order to do so, water rights are first obtained to pump water from the Eastern Snake River Plain (ESRP) aquifer. Water trucked in from INL is also derived from the ESRP aquifer.

4.2.1.1.2 Surface Water

The land surface is modified during clearing, grubbing, grading, contouring, road construction, excavation, and stockpiling activities. The affected areas are subject to increased erosion and sediment transport during storm and snowmelt events. Drainage ditches, swales, culverts, and sediment traps are constructed where necessary to divert surface runoff toward the two stormwater ponds on the northeast side of the site (LWA ER Figure 3.3-2). Before pre-construction activities begin, a Construction SWPPP (General

Construction Permit for Discharge Activities [IDR100000]) is prepared. BMPs are implemented to minimize erosion and sediment transport throughout the site and the utility corridor. Sediment that is transported during storms and snowmelt events is trapped in sediment traps or the two retention ponds.

The land disturbances may increase the total amount of localized runoff during storm events, but this runoff water is contained in the retention basins, and infiltrates into the subsurface. No storm runoff or suspended sediment migrates off-site or reaches a surface stream of the U.S. Precipitation evaporates back into the atmosphere or infiltrates into the aquifer, as was occurring before site disturbances.

4.2.1.1.3 Groundwater

Based on the shallow soil conditions and characteristics, the overall recharge rates to the underlying aquifer is not changed significantly as a result of the surface modifications.

Early in the preconstruction phase, some groundwater may be obtained for dust control from an existing on-site well (PW-01). If groundwater is pumped from this existing well, the pumping rate is to not exceed approximately 400 gallons per minute (gpm). Based on known groundwater conditions, this pumping rate does not cause significant decrease in the water levels or the amount of water stored in the aquifer.

4.2.1.2 Pre-Combined License Construction

The Pre-COL construction activities are described in LWA ER Section 1.3 and Section 3.3. These activities occur in the excavations of the Reactor Building (RXB) and the Radioactive Waste Building (RWB) and include:

- remediation of soft or fractured rock in the subgrade underlying the RXB and RWB excavations
- installation of RXB mud mat including reinforcing wire mesh and vapor barrier
- installation of RXB permanent base mat components up to but not including concrete placement

The preconstruction activities continue concurrently with the pre-COL construction activities.

The pre-COL construction period is approximately 15 months (LWA ER Figure 3.3-1). During that time, approximately 134,438 gallons of potable water and 15,451,313 gallons of non-potable water are used (LWA ER Table 3.3-1). The potable water and most of the non-potable water are trucked to the site; potable water from a private contractor and non-potable water from INL. As stated for preconstruction activities, an existing on-site well (PW-01) may also provide some of the non-potable water for pre-COL activities.

4.2.1.2.1 Regulations and Permits

Regulations and permits described in Section 4.2.1.1.1 are applicable during pre-COL construction. No new water-related regulations or permits are needed for pre-COL construction activities.

4.2.1.2.2 Surface Water

No additional surface water alterations occur as a result of pre-COL construction.

4.2.1.2.3 Groundwater

Precipitation entering the building excavations either infiltrate downward potentially recharging a water-bearing zone or are pumped into one or both of the stormwater retention basins. When in the retention basins, the water evaporates or infiltrates into the aquifer. Thus, the rate of groundwater recharge in the area remains approximately the same. As a result, there is no measureable alterations of groundwater elevations or storage in the aquifer due to the pre-COL excavations.

Groundwater pumping from the on-site well continues to provide a portion of the non-potable water during pre-COL activities. The pumping rate of this well does not exceed approximately 400 gpm. This rate causes no significant decrease in the water levels or the amount of water stored in the aquifer.

4.2.1.3 Combined License Construction

COL construction activities are described in LWA ER Section 1.3 and Section 3.3. These activities include:

- Construction of permanent buildings and facilities,
- Construction of lined evaporation ponds (LWA ER Figure 3.3-2),
- Drilling, installation, and use of two or more permanent groundwater production wells along the utility corridor (LWA ER Figure 2.1-22),
- Installation of water pipeline within the utility corridor (LWA ER Figure 2.1-22), and
- Installation of the new 230 kilovolt power transmission line within the utility corridor.

The COL construction period lasts approximately 37 months (LWA ER Figure 3.3-1). During that time, approximately 4,494,000 gallons of potable water and 82,628,000 gallons of non-potable water are used (LWA ER Table 3.3-1). Potable water and some of the non-potable water are trucked into the site; potable water from a private contractor and non-potable water from INL. Once the permanent wells and water pipeline construction are completed, these wells serve as the source of water for the remaining construction and operation activities.

4.2.1.3.1 Regulations and Permits

Regulations and permits previously described in Section 4.2.1.1.1 are applicable during COL construction.

New drilling and well installation permits are obtained from the IDWR before permanent production well drilling begins along the utility corridor (LWA ER Section 3.3 and Figure 2.1-22).

4.2.1.3.2 Surface Water

The construction of four lined evaporation ponds prevents infiltration of precipitation that occurs in those specific areas, thereby slightly increasing overall evaporation rates and reducing infiltration in the immediate area.

4.2.1.3.3 Groundwater

When permanent production wells and the water pipeline are installed and become operational during COL construction, the wells supply the non-potable water for the remainder of construction activities. Once the on-site water treatment plant becomes operational, the permanent groundwater wells are also a source of potable water consumed at the site. Pumping of groundwater from the permanent wells causes a slight alteration of groundwater conditions (slightly lowering groundwater elevations in the immediate vicinity of the utility corridor).

4.2.2 Water-Use Impacts

4.2.2.1 Surface Water

Impacts to surface water use or availability as a result of preconstruction, pre-COL construction, or COL construction activities are SMALL. The construction activities have no effect on flow rates or water availability in the Big Lost River or the Snake River watersheds.

4.2.2.2 Groundwater

Although groundwater is pumped from the ESRP aquifer, only a small amount of drawdown (<10 ft) results within a 500-ft radius of the production wells. Impacts to groundwater use or availability as a result of the preconstruction, pre-COL construction, or COL construction activities are SMALL.

4.2.3 Water Quality Impacts

Where tanks, drums, vehicles, or other containers that contain fuels, oils, transmission fluid, lubricants, cleaning agents, antifreeze, or other petroleum products are located on-site, BMPs are employed to avoid spills and leaks according to either the SPCC Plan or the Construction SWPPP. Proper storage, containment, and use are also employed when hazardous materials are present.

4.2.3.1 Surface Water

No discharges to surface water streams, lakes, or reservoirs occur during construction. Hence, impacts to surface water quality are SMALL.

4.2.3.2 Groundwater

Surface water runoff from disturbed areas and water applied to roads to minimize dust occurs during preconstruction and construction activities. A portion of this water infiltrates the ground and enters the ESRP aquifer. However, impacts to groundwater are SMALL.

4.2.4 Water Monitoring

Surface water and groundwater monitoring are performed during each phase of construction at the CFPP site. The U.S. Geological Survey (USGS) and IDWR maintain hundreds of surface water and groundwater monitoring locations throughout the ESRP region and the nearby tributary valleys. Data from these monitoring wells and surface water monitoring stations are used to supplement data collected at the CFPP site.

4.2.4.1 On-Site Surface Water Monitoring

If water should accumulate in either of the two stormwater retention ponds during construction, then water levels and water quality are monitored according to permit requirements established before construction activities. If either retention basin becomes full and results in a surface discharge, the flow rate and quality of the discharge is monitored.

4.2.4.2 Groundwater Monitoring

Ten wells were installed at the CFPP site in 2021 and 2022 (LWA ER Figure 2.2-13). Starting in March 2022, groundwater elevations are monitored every four hours using downhole pressure transducers. In addition, groundwater samples are collected quarterly and analyzed for metals, radiological parameters, nutrients, and other analytes. This monitoring program continues throughout the construction period.

4.2.5 Summary of Water Impacts During Construction

Water usage estimates for COL construction are presented in LWA ER Table 3.3-1. Most non-potable water used for construction is pumped from on-site wells. Potable water is delivered by an outside subcontractor. The potential impacts to surface water and groundwater resources, water quality, and water users during construction are summarized in Table 4.2-1. Impacts are insignificant to SMALL.

4.2.6 References

4.2-1 Idaho Department of Environmental Quality, 2020, Idaho Pollutant Discharge Elimination System, User's Guide to Permitting and Compliance, Volume 5-Storm Water, accessed May 31, 2023 at https://www2.deq.idaho.gov/admin/LEIA/api/document/download/14821.

4.2-2 Idaho Department of Environmental Quality, 2022, Idaho Pollutant Discharge Elimination System, Discharge Permit No. IDR100000, Construction General Permit for Discharge Activities, accessed May 31, 2023 at https://www2.deq.idaho.gov/admin/LEIA/api/document/download/16509.

4.2-3 Idaho Department of Environmental Quality, 2020, Idaho Catalog of Storm Water Best Management Practices, accessed May 31, 2023 at https://www2.deq.idaho.gov/admin/LEIA/api/document/download/14968.

4.2-4 Idaho Transportation Department, 2014, Best Management Practices (BMP) Manual, accessed May 31, 2023 at https://itd.idaho.gov/env/?target=resources.

4.2-5 Idaho Small Business Development Center, 2014, Idaho Construction Site Erosion and Sediment Control Field Guide, accessed May 31, 2023 at https://www.cityofboise.org/media/3642/esc_fieldguide_2014.pdf

Table 4.2-1: Water Resources Summary of Construction Impacts, Significance, and Measures and Controls

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Preconstruction				
Mobilize and Establish Site	Mobilize site excavation and grading contractor (including equipment)	SMALL	• Minimal; small staging area is already present as well as an access road • Existing roads are upgraded for heavy equipment, stormwater controls implemented, and dust mitigation measures taken • Potential for spills associated with equipment deliveries	• Follow Best management Practices (BMPs) for staging equipment • Follow Idaho Pollutant Discharge Elimination System (IPDES) permit and BMP's to control erosion and sedimentation • Implement spill control plan; stage spill control materials on-site; manage waste per waste plan
Prepare Site (clearing, grubbing, grading, excavation)	Remove and stockpile vegetation, alluvial soils, and basaltic rock; establish roads and parking; grade and level surface	SMALL	• Increasing impervious area • Cleared vegetation and spoil materials are placed in designated stockpile areas • Mass grading includes the excavation of alluvial soils and basaltic rock material with the use of heavy construction excavation equipment	• Follow IPDES permits, and BMPs to control erosion and sedimentation
Establish Temporary Facilities and Utilities	Establish temporary facilities- office, medical, training trailers; sanitary and craft facilities; warehouses	SMALL	• Altering surface water runoff	• Follow IPDES permits and BMPs to control erosion and sedimentation • Sanitary wastes are properly contained and disposed of off-site
	Install temporary power, water, and communications	SMALL	• Initial water from Central Facilities Area then install groundwater well into same aquifer as CFA supply	• Obtain water rights and IDWR permits to install wells • Follow IPDES permits and BMPs
	Install security provisions	SMALL	• None	• Not needed

Table 4.2-1: Water Resources Summary of Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Laydown Yards and Fabrication Areas	Establish laydown and fabrication yards, including fencing, controlled entries, equipment receiving and maintenance yard	SMALL	• Altering surface water runoff • Potential for spills associated with equipment deliveries	• Follow IPDES permits and BMPs to control E&S • An equipment receiving and maintenance yard for incoming construction equipment inspection and assembly is established • A maintenance workshop and associated equipment management trailer are installed with proper spill containment, chemical storage, and waste management areas
Establish Rock Crushing and Concrete Batch Plant Facilities	Establish rock crushing, staging areas, and equipment	SMALL	• Increased runoff • Increased dust	• Follow IPDES permits and BMPs to control erosion and sedimentation • Implement dust control measures
	Establish batch plant, staging, truck parking areas, and washouts	SMALL	• Increased runoff • Increased dust • Water use for concrete plants	• Follow IPDES BMPs to control erosion and sedimentation • Implement dust control measures per DEQ permits and BMPs

Table 4.2-1: Water Resources Summary of Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Excavate Foundations and Trenches	Excavate RXB and RWB foundations	SMALL	• Increased dust • Increased water use	• Follow IPDES BMPs to control erosion and sedimentation • Implement dust control measures per DEQ permits and BMPs
	Excavate BOS foundations TGB, ACCS, CUB, Annex Building, SCWS, and Transmission Structure	SMALL	• Increased runoff • Increased dust	• Follow IPDES BMPs to control erosion and sediment • Implement dust control measures per DEQ permits and BMPs
	Excavate trenches; install bedding, piping, and utilities; backfill	SMALL	• Increased runoff • Increased dust	• Follow IPDES BMPs to control erosion and sediment • Implement dust control measures per DEQ Permits and BMPs
Pre-Combined License Construction				
Exemption	Install rock bolts in RXB and RWB excavations	SMALL	• None	• Adhere to preconstruction mitigations and DEQ permits and BMPs
	Apply fibermesh/ shotcrete for RXB and RWB excavations	SMALL	• Increased water use for mixing shotcrete	• Follow IPDES BMPs to control erosion and sediment
Limited Work Authorization	Conduct soft or fractured rock remediation	SMALL	• Increased water use for mixing grout	• Adhere to preconstruction mitigations and DEQ permits and BMPs
	Install RXB mud mat, rebar, and permanently embedded items	SMALL	• Reduced infiltration • Increased water use for mixing concrete	• Not needed as footprint is small.
Combined License Construction				
Establish Site Buildings	Construction of nuclear island, turbine island, BOS	SMALL	• Increased water use for mixing concrete and dust control	• Adhere to construction mitigations and DEQ permits and BMPs

Table 4.2-1: Water Resources Summary of Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Permanent Utilities	Install power, water, and communications	SMALL	• Increased water use	• Minimize land disturbance along corridor. • Follow IPDES BMPs to control erosion and sedimentation
Establish Water Management	Install evaporation ponds	SMALL	• Evaporation pond areas are cleared during preconstruction for laydown and fabrication use • Evaporation ponds are installed during COL construction in areas disturbed during preconstruction; land use changes from laydown and fabrication industrial to industrial ponds • Necessary revisions to stormwater ponds as needed	• Minimize land disturbance • Follow IPDES BMPs to control erosion and sedimentation

Table 4.2-1: Water Resources Summary of Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Final Site Configuration	Redress construction areas and landscape site	SMALL	• Contour final land surface and modify weather-protection berms if needed	• Adhere to construction mitigations and DEQ permits and BMPs

[1] SMALL: Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered SMALL.
MODERATE: Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
LARGE: Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

[2] CFPP follows license and permit requirements and associated project-specific plans for preconstruction and pre-COL construction activities.

ACCS - air cooled condenser system
BOS - balance of site
CUB - Central Utilities Building
RWB - Radioactive Waste Building
RXB - Reactor Building
SCWS - site cooling water system
TGB - Turbine Generator Building

4.3 Ecological Resources

This section describes potential impacts to terrestrial, wetland, and aquatic, ecological resources by preconstruction, pre-combined license (pre-COL) construction, and combined license (COL) construction activities on the Carbon Free Power Project (CFPP) site. LWA Environmental Report (LWA ER) Section 2.3.1 provides general descriptions of terrestrial resources.

LWA ER Section 3.3 describes proposed construction activities that could potentially affect terrestrial ecosystems and provides the approximate durations of such activities. Activities of particular interest to the evaluation of impacts on terrestrial ecosystems include land clearing and noise.

This section presents ecological impacts in the following areas:

- Terrestrial and Wetlands Impacts - Section 4.3.1
  - Terrestrial Habitats - Section 4.3.1.1
  - Wetlands - Section 4.3.1.2
  - Wildlife - Section 4.3.1.3
  - Important Species and Habitats - Section 4.3.1.4
- Aquatic Impacts - Section 4.3.2. Aquatic impacts are not expected because no surface water is present on the CFPP site.

4.3.1 Terrestrial and Wetlands Impacts

Terrestrial habitat in the CFPP region is largely sagebrush-steppe shrublands. Aquatic and wetland habitats do not occur on the CFFP site or vicinity and are rare in this desert area. Site assessments performed for CFPP include rare, threatened, endangered, or sensitive species and rare habitat types. The CFPP preconstruction, pre-COL construction, and COL construction could potentially impact ecological resources through temporary habitat disturbance, habitat alteration, or habitat loss from land clearing activities. Additionally, potential impacts such as disturbance or displacement of wildlife due to an increase in noise and human activity, could occur. Fragmentation of remaining habitats and increased human-wildlife interactions, such as encounters and collisions between wildlife and motor vehicles, are possible. Construction related hazards (e.g., accidental hydrocarbon spill or fire, including wildfire) pose a risk of deleterious effects on vegetation and wildlife, such as decline in species diversity, mortality, growth rate and vigor, and genetic mutations.

Preconstruction activities, such as land clearing, grading, excavation, and filling, have the greatest potential to result in substantial effects on ecosystems. The LWA ER Section 4.1, Table 4.1-4, and Figure 4.1-1 present the area impacted by preconstruction, pre-COL construction, and CFPP site-specific COL construction comprising approximately 575 acres of the more than 2000-acre CFPP site.

Radiological exposure has potential effects on ecological resources with some species being more sensitive than others. For CFPP, radiological impacts on human health are used as a measure to determine the need to address the potential impacts on ecological resources. Radiological exposure from the CFPP preconstruction, pre-COL construction, and COL construction does not differ significantly from ambient levels. Radiological impacts on human health are determined to be SMALL in LWA ER Section 4.9; therefore, radiological impacts on ecological resources are considered to be SMALL and are not analyzed in detail.

The Comprehensive Land Use and Environmental Stewardship Report Update (Reference 4.3-1) describes wildfire management activities on the INL site. The hot, dry summers characteristic of eastern Idaho predispose sagebrush-steppe communities to a history of recurring fire. Estimates of fire return intervals for sagebrush-steppe systems range from around 20 to more than 100 years. The natural interval between fires in these systems has been hypothesized to be sufficiently long to allow big sagebrush, which does not resprout, to regain dominance through recolonization of burned sites from seed. Otherwise, these areas would become dominated by root-sprouting shrubs, such as horsebrush or rabbitbrush.

According to the INL Environmental Surveillance, Education, and Research (ESER) program website (Reference 4.3-2), the potential for wildland fires on the INL site is routinely high due to the rapid growth of prairie grasses, particularly non-native invasive species, and brush during cool, wet springs followed by extended dry weather in the late spring and early summer months. The resulting dried vegetation provides excellent fuel for potential wildfires every season. Sagebrush, crested wheatgrass, and cheatgrass are the main ground fuels that occur on the INL and CFPP sites. During a typical fire season, the fire danger rating in May and June is "moderate" and upgraded to "high," "very high," or "extreme" during July, August, and September, depending on seasonal rainfall, humidity, wind, and ambient temperature trends. During the July-to-September time period, the INL site characteristically experiences little rainfall (normal annual precipitation is approximately 9 inches), low humidity, high daytime temperatures, and prevailing strong winds from the southwest. The INL site has experienced numerous large fires and averages approximately five fires involving more than 15,000 acres per year.

Control measures for wildfires have been implemented, including installation of firebreaks, at the INL site since 1950, which may have decreased the area that otherwise would have burned. Recent wildfires and past fire scars are shown on Figure 4.3-1 that includes habitat information from recent INL habitat mapping (Reference 4.3-3). In 1994, approximately 23,000 acres burned on the western edge of the INL site near State Highway 33 and U.S. Route 20/26. This fire burned the CFPP site, essentially removing the sagebrush dominated areas and resulting in the grass, forbs, and sparse small shrubs that dominate the majority of the CFPP site today. As shown in Figure 4.3-2, an area of big sagebrush-green rabbitbrush (threetip sagebrush) shrubland is located in the southeastern corner of the CFPP site, outside the preconstruction, pre-COL construction, and on-site COL construction disturbance area.

The project design provides management plans and control measures to reduce the potential for project fires (e.g., spill control, fire, chemical, and waste management plans; refueling procedures) and planned emergency response to project fires and wildfires.

4.3.1.1 Terrestrial Habitats

Site preparation using heavy equipment (e.g., graders, loaders, and excavators) includes vegetation grubbing, land clearing, and surface preparation for building foundations; laydown and fabrication yards; and parking, spoils, rock crushing, and batch plant areas. Cleared vegetation is stockpiled and covered with soils and rock that are stockpiled for on-site use as non-structural or structural fill, berm material, or spoils. The CFPP implements project-specific plans, consistent with license and permit requirements, to guide building activities. These plans incorporate requirements for environmental protections, training, and best management practices (e.g., designated driving and parking areas, controls on work-related access to Big Lost River foothills, and weed management program) to limit impacts to flora and fauna on and around the CFPP site.

The CFPP construction execution plan defines an efficient area of disturbance that reduces the use of surface blasting and minimizes the overall ecological area impacted by preconstruction, pre-COL construction, and on-site COL construction activities. Designated parking, staging, laydown, fabrication, rock crushing, and batch plant areas are connected by designated roads used in accordance with the CFPP traffic plan. Construction workers and other approved personnel are trained and required to avoid travel outside designated areas.

Before preconstruction work begins, CFPP conducts surveys and site marking to delineate areas of disturbance consistent with the site plan, and implements the construction stormwater plan, including physical protections where needed. Non-structural fill is used to create berms, and ditches are constructed to control storm water. The dust control plan includes water spray to limit dust from excavation and traffic with capability for additional measures, such as fixants, as needed based on weather conditions.

Figure 4.3-2 shows the temporary disturbance of the terrestrial habitat from preconstruction activities on the CFPP site. Approximately 575 acres are disturbed for roads, parking areas, laydown and fabrication yards, and building foundation areas. Up to an additional 179 acres (LWA ER Figure 4.1-4), for a total of 754 acres, are impacted by preconstruction, pre-COL construction, and on-site COL construction activities on the CFPP site that result in a few small, disconnected patches of natural habitat. While the habitat is not disturbed, its location relative to the plant site and support areas make it unlikely to be used by wildlife. The site is essentially an island in an area of surrounding natural sagebrush-steppe habitat.

To account for potential future needs, CFPP conducted ecological surveys beyond the planned preconstruction and construction area to allow flexibility for field changes if needed. Figure 4.3-4 provides the ecological area of study for field efforts in 2022 and 2023. The transmission and supply water pipeline areas are included in the 2023 field study. Results of the 2023 field study are incorporated into the COL application. Accounting for potential fragmentation and real-time expansion needs during preconstruction and construction, approximately 600 to 800 acres could be impacted at the CFPP site with fewer than 10 acres of sagebrush habitat. This area is small relative to the approximately 569,000 total acres of the INL site, about 274,000 of which are sagebrush habitat.

Figure 4.3-3 provides the anticipated area of permanent disturbance from preconstruction, pre-COL construction, and on-site COL construction resulting in the final operating area of disturbance. This area is considered permanent for purposes of this ER because these changes last through the license period of the CFPP. The disturbed area in Figure 4.3-3 results mainly from preconstruction site preparation activities that remove the surface area. While not permanently eliminated, this area is managed during operations to limit weed growth and encourage re-establishment of shrub-steppe habitat. Following completion of operations, including potential operating extensions, the CFPP undergoes decommissioning and appropriate restoration. The CFPP, DOE, NRC, and other federal and state agencies as appropriate, such as the Bureau of Land Management or U.S. Fish and Wildlife Service (USFWS) negotiate the restoration process. The COL application provides further details on COL construction and operations.

Table 4.3-1 identifies the terrestrial habitats and percentages on the CFPP site. Habitat impacts within the preconstruction, pre-COL construction, and on-site COL construction area are considered temporary but long-term. Sagebrush-steppe habitat requires significant time to reach climax sagebrush restoration and are not likely to occur before the end of licensed CFPP operations.

Table 4.3-2 provides terrestrial habitats and percentages for the off-site installation of a 34.5 kV construction transmission line to support preconstruction, pre-COL construction, and COL construction. The construction line runs from the CFPP plant site to a new Idaho Power Pronghorn Substation to be built at the INL Central Facilities Area near the existing Antelope Substation. The construction transmission corridor parallels the existing PacifiCorp 69 kV transmission corridor as shown in LWA ER Figure 2.1-22. During COL construction, a 230 kV transmission line is constructed in the same corridor as the construction line to support CFPP operations. The 230 kV line runs from the CFPP plant to the Antelope Substation at the CFA. Additionally, a water supply pipeline and wells are planned along the transmission corridor at a distance no more than 5 mi from the CFPP site. The final pipeline length and well locations are determined through well drilling and testing to meet plant water needs and negotiations on water rights in the proposed location.

The corridor encounters a greater amount of sagebrush habitat than the CFPP on-site preconstruction, pre-COL, and COL construction area. The disturbed area represents a maximum expected amount. Efforts to limit the final width and associated disturbance area are part of the CFPP approach to corridor construction. Running parallel to the existing transmission line corridor and leveraging the existing transmission line road limit additional impacts from fragmentation, new roads, and greater disturbance of climax sagebrush.

Construction of the CFPP results in temporary and semi-permanent impacts on terrestrial ecological communities, most significantly the direct loss of sagebrush-steppe habitat. The CFPP preconstruction approach begins with site mobilization followed by site preparation. The site preparation includes vegetation removal and surface grading that eliminates the existing habitat from the planned preconstruction area. This initial activity creates the largest impact to terrestrial habitats. The pre-COL construction and on-site COL construction activities occur within the preconstruction footprint. Table 4.3-1 provides acreage and percentages for the habitat on the CFPP site prior to preconstruction, for the disturbed area, and for the undisturbed area remaining after the preconstruction, pre-COL construction, and COL construction activities.

The sagebrush habitat is the most important habitat type on the CFPP site, providing food and cover for greater sage-grouse and other sagebrush obligate wildlife. The fire that burned the CFPP site in 1994 reduced the sagebrush habitat to approximately 19 percent coverage, located mainly in the southeast portion of the CFPP site away from the planned construction area. Nearly all of this habitat is preserved in the planned construction approach, as shown in Table 4.3-1 and Figure 4.3-2 and Figure 4.3-3. The 575-acre preconstruction, pre-COL, and on-site COL construction area has approximately 4.7 acres of sagebrush habitat. Impacts to sagebrush habitat is SMALL. The off-site COL construction of the transmission lines, water supply pipeline, and associated right-of-way corridor disturb up to a conservative 325 acres, 55 percent of which is sagebrush habitat. Use of the existing PacifiCorp 69 kV road and limiting vehicles on native areas by confining activities to pole and well areas should reduce the overall habitat impact of these elements. The CFPP implements plans and best practices, such as the traffic plan and clear site markings to control traffic, that limit unplanned and unnecessary impacts to natural habitats.

4.3.1.2 Wetlands

No surface water or wetland areas occur on the CFPP site. The closest potential wetlands, the Big Lost River Sinks, are approximately 11 mi from the CFPP site. The INL has a jurisdictional determination for the INL Spreading Areas A-D, located approximately 9 mi south of the CFPP. This determination is effective through August 2027 and concludes no Waters of the United States, including wetlands, are located in the spreading areas.

The CFPP preconstruction, pre-COL construction, and COL construction have no impacts on wetlands because of the lack of surface waters or wetland areas on the site and the distances to potential wetland areas greater than 6 mi, the closest distance to the Big Lost River. This river rarely experiences flow and disappears to the aquifer on the INL site.

The CFPP implements a stormwater pollution prevention plan and controls during preconstruction that effectively addresses stormwater runoff using collection ditches and stormwater ponds (Figure 4.3-2 and LWA ER Figure 4.1-1). Stormwater run-off may result from the following preconstruction and construction activities:

- site excavation and backfill of on-site soils
- discharges from temporary and permanent drainage ditches
- discharges into permanent storm drainage systems
- discharges from retention ponds and ditches
- pumping of nuisance water that may occur in excavations

The CFPP site requirements for stormwater management are implemented as required during preconstruction activities. Consultation with the agency that has primacy for construction stormwater pollution prevention plan provisions (i.e., currently Idaho Department of Environmental Quality) occur before final development of stormwater management plans to satisfy state and federal requirements. Stormwater mitigation approaches may include silt fence barriers on boundaries of earthwork disturbance, riprap for outlet and permanent ditch structures, and ongoing inspections and maintenance of controls.

Due to the dry southeastern Idaho climate, stormwater ponds are expected to be intermittently and infrequently wet and are designed to evaporate water. Water discharge is not expected from the stormwater ponds, but if required, discharges would occur on the CFPP site outside the construction area. No water is discharged from the ponds to a channel or waterbody.

4.3.1.3 Wildlife

Terrestrial wildlife species identified on the CFPP site, vicinity, and region are described in LWA ER Section 2.3.1.4. Wildlife observed on and around the CFPP site are characteristic of sagebrush-steppe habitats and recovering sagebrush-steppe habitats impacted by wildfires. Wildlife includes mammals (e.g., ungulates; predators, such as coyotes; and small mammals, such as rabbits), birds, reptiles, and terrestrial invertebrates.

During the CFPP preconstruction activities, some disturbance, displacement, and mortality of individual animals is expected from heavy equipment used for clearing, grading, and excavation. Mobile animals, such as birds, larger mammals, some reptiles, and flying terrestrial invertebrates (e.g., butterflies, flies, bees, and grasshoppers), can avoid these disturbances by moving to safer areas. However, small, less-mobile animals, such as small mammals, small reptiles, and crawling terrestrial invertebrates, are likely to be at greater risk of mortality. No protected species of these wildlife types are known to occur at the site. Although wildlife displaced by clearing activities can find refuge in undisturbed habitats in the vicinity, temporary reductions in population could occur as a result of increased predation and competition in these habitats.

Effects from clearing, grading, excavation, and construction of the CFPP transmission lines and pipeline during COL construction are confined to an area adjacent to an existing transmission line right-of-way. The main disturbances for the transmission line are associated with installation of poles and vehicle traffic to install transmission wires. An existing dirt road adjacent to the PacifiCorp 69 kV line was previously constructed, with associated habitat disturbance, and undergoes periodic maintenance activities. The CFPP transmission line imposes limited additional disruption to habitat and wildlife.

The CFPP implements plans directed at limiting wildlife impacts. The workforce is required to be licensed to drive personal and company vehicles and undergoes training on safe driving practices, including avoiding animal strikes. The CFPP cooperates with DOE and INL on environmental management practices and complies with requirements for dealing with wildlife implemented through the DOE use permit. The CFPP environmental management plan informs management and the workforce in dealing appropriately with wildlife encountered on the project. The wildlife plan identifies requirements concerning animal takes and reporting in USFWS regulations.

Preconstruction and pre-COL construction wildlife impacts are limited in duration, as most of the clearing, grading, and excavation are completed within 18 months or less. Wildlife is accustomed to nuclear facilities and missions on the INL site. The COL construction activities continue for an additional 37 months, representing a longer period that impacts additional pronghorn and bird migrations and causes potential impacts from noise, dust, and emissions. The COL construction does not further impact habitats as habitat disturbance occurs during preconstruction. Overall, impacts to wildlife from preconstruction, pre-COL construction, and COL construction are SMALL.

4.3.1.3.1 Amphibians

The closest amphibians to the CFPP site are associated with the Big Lost River during rare high-precipitation periods when the river flows onto the INL site. The Big Lost River is more than 6 mi from the CFPP center point at its closest point. Amphibians are not expected to be impacted during the CFPP construction due to the general lack of habitat, specifically standing water for breeding, and the distance between the CFPP site and amphibian habitats.

Stormwater ponds used during preconstruction, pre-COL construction, and COL construction are sporadically wet consistent with weather patterns. These ponds are not anticipated to provide sufficient habitat to support amphibians.

The clearing of approximately 575 acres on the CFPP site and 325 off-site acres during preconstruction and construction activities is not expected to cause mortality or physical harm to amphibians.

4.3.1.3.2 Birds

Birds are frequent users of the CFPP site, and a number of bird species visit, breed, nest, and migrate in the CFPP vicinity and region. Sagebrush-obligate species identified in the Idaho State Wildlife Action Plan 2022 (Reference 4.3-4) include

- Brewer's sparrow
- common nighthawk
- greater sage-grouse
- loggerhead shrike
- sage thrasher

Preconstruction activities are anticipated to begin during the winter in January 2025, limiting impacts to breeding and nesting birds from site mobilization and preparation activities.

The greater sage-grouse is a species of concern for the CFPP. In 2010 the USFWS made a Warranted but Precluded determination, concluding that greater sage-grouse (*Centrocercus urophasianus*) warranted protection based on Endangered Species Act (ESA) listing factors A (habitat fragmentation) and D (lack of adequate regulatory mechanisms). As described in the Policy for Greater Sage-Grouse Management in Idaho, Idaho 2021 Plan (Reference 4.3-5), this action designated greater sage-grouse as a candidate species for listing under the ESA. The USFWS concluded in October 2015 that an ESA listing for sage-grouse was not warranted, which removed greater sage-grouse from the ESA Candidate list. The DOE and USFWS entered into a Greater Sage-grouse Candidate Conservation Agreement (CCA) (Reference 4.3-6) in 2014 that provides voluntary protection actions and monitoring on the INL site.

The greater sage-grouse faces threats in Idaho, including wildfire, invasive species, and habitat fragmentation from large-scale infrastructure development. The CFPP implements fire management as a component of the health, safety, and environment and emergency plans. Fire management involves compliance with federal, state, and local laws and incorporates best practices, such as spill controls, vegetation clearing and management, and fire breaks around staging, laydown, fabrication, and operating areas. The CFPP plant area and construction support areas are located away from the higher quality sagebrush habitat in the southeastern portion of the CFPP site.

The CFPP collaborates with DOE, USFWS, and the Bureau of Land Management to determine monitoring and mitigation requirements or best management practices associated with Reference 4.3-5 and Reference 4.3-6 and complies with requirements identified in the DOE Use Permit. Examples of potential mitigation include maintaining distances from leks as prescribed in Reference 4.3-5, prudent use of fencing to avoid bird collisions with fences, restore or replace habitat, and control invasive plants and noxious weeds. Other sage obligate birds benefit from the collaboration and mitigation actions, if any, resulting from these efforts.

The CFPP integrates requirements from the Migratory Bird Treaty Act into the environmental management plan and informs the workforce on identifying and reporting bird nests to management. Preconstruction starts in winter with clearing, grading, leveling, and early excavation beginning before bird breeding season. The early start is expected to dissuade nesting near the CFPP site. Equipment is checked daily to identify the presence of nests before operations. The INL environmental group has reported infrequent occurrences of birds nesting in equipment.

Potential mitigation to protect birds include use of scarecrows, fluttering flags on fences and wires, or reflectors to discourage predatory birds from landing and using tall equipment or structures for hunting. While the stormwater ponds are expected to be intermittently wet and not pose an issue for visiting waterfowl, netting could reduce bird use during wet periods if waterfowl become an issue.

4.3.1.3.3 Mammals

Pronghorn and bats represent mammal species that may be adversely impacted by CFPP preconstruction and construction activities. Other mammals may experience impacts relative to noise, dust, emission, open excavations, and vehicle interactions.

The Upper Snake River Plain pronghorn migration route, as shown in Figure 28 of Ungulate Migrations of the Western United States, Volume 2 (Reference 4.3-7), runs from the summer range near Carey and Bellevue and north of Leadore to the winter range near Howe. The high use route area runs through the CFPP site, vicinity, and region along State Highway 33 and the toe of the Lost River Range. Preconstruction, pre-COL construction, and COL construction have the potential to disrupt pronghorn migration and impact animals with dust, noise, vehicle collisions, fences, and general human presence. While pronghorn are mobile and can adjust to changes in their regular migration route, these changes may cause increases in predation, hunting access, or vehicle to animal interactions, resulting in injury or death. Removal of sagebrush habitat impacts both available food sources and cover for pronghorn young. The CFPP collaborates with DOE and USFWS during preconstruction, pre-COL construction, and COL construction to support ongoing pronghorn monitoring activities and migration impact assessment.

Potential impacts to bats include noise, dust, perch attraction from tall equipment, vibrations, emissions, and draw to water sources (e.g., stormwater ponds, truck washouts) that could increase human-to-bat interactions. The main bat hibernacula are located more than 10 mi from the CFPP site and are not directly impacted by preconstruction or construction activities. One bat species found on the INL and CFPP sites, the little brown myotis (*Myotis lucifugus*), is experiencing critically declining population over their range due to white-nose syndrome, a fungal disease, and mortality from wind energy facilities. While not currently listed as threatened or endangered under the ESA, the USFWS is currently reviewing the status of little brown myotis. The CFPP limits night work requiring lights, when possible, that could increase insects and draw bats to the preconstruction and construction area. Tall structures, such as cranes, may impact bat flight paths, but would not likely result in significant bat collisions.

Mitigation strategies to control dust, emissions, and noise for humans provide similar impact mitigation for wildlife. Mitigations include limiting vehicle idle time, encouraging ride sharing, restricting vehicle access to approved and marked roadways, and implementing an environmental management plan. Open excavations can present dangerous situations for wildlife. Fencing and escape methods are integrated into construction plans and activities to limit detrimental impacts. Escape methods may include ramps, nets, or other fixtures to allow animals to climb out of excavations.

4.3.1.3.4 Reptiles

Reptiles that inhabit underground spaces may be susceptible to injury or death from vegetation clearing, grading, leveling, and excavation activities. Tall equipment and structures may provide perching locations for predators not currently available on the CFPP site due to lack of large bushes and trees. Additionally, increased site roads and traffic present hazards to reptiles. Dust, noise, emissions, vibrations, and lights can disrupt reptile breeding, nesting, resting, hunting, and foraging. Eggs and young reptiles may be susceptible to ground clearing and excavation.

Stockpiled vegetation, soil, and rock may create resting and hiding areas for reptiles, resulting in increased potential for injury or death when these materials are added to or subsequently moved and used in preconstruction and construction activities. Increases in reptile to human encounters are likely to increase around the stockpiles.

Strategies to control dust, emissions, and noise for humans provide similar impact mitigation for reptiles. Restricting vehicle access to approved and marked roadways limits disturbance of reptile habitat areas. Informing workers to avoid interfacing with reptiles on-site, such as trying to catch lizards or approaching snakes, and following protocols in the environmental management plan, limit potential injury to both animals and humans.

4.3.1.3.5 Terrestrial Invertebrates

Terrestrial invertebrates are not expected to be significantly impacted by CFPP preconstruction and construction activities. Flying or wide-ranging invertebrates, such as grasshoppers, would have limited impact. Crawling and burrowing invertebrates may be impacted during preconstruction activities to remove and prepare the site surface.

4.3.1.3.6 Wildlife Impacts

The CFPP site is located in a sparsely populated area used by a variety of wildlife, such as pronghorn, deer, elk, coyote, small mammals, birds, and reptiles. Changes to migration routes may force wildlife closer to State Highway 33 or to INL site roads. State Highway 33 borders a portion of the CFPP site. The foothills of the Lost River Range are across State Highway 33 from the CFPP site. While elk and mule deer routes tend to be farther west, the pronghorn migration route passes through the CFPP site, posing the biggest risk for increased vehicle strikes.

The CFPP has no preconstruction or construction reason to access the Lost River Range beyond potential monitoring activities. Workers and equipment drivers are required to be licensed and to follow the designated roads on the CFPP and INL sites. Workers are precluded from accessing the foothills during work hours and for work purposes. The health, safety, and environment plan includes instruction on safe driving, including driving in areas frequented by wildlife near and on the roads.

Activities may push antelope deeper into INL site to the east increasing potential vehicle/animal interactions on INL site or towards the foothills, increasing exposure to traffic impacted by increased vehicles of CFPP workers or to predators from the mountains. Based on data from the Idaho Fish and Game (Reference 4.3-8), 290 animals were reported as killed on CFPP main access roads in the region (i.e., U.S. Route 20, U.S. Route 26, and State Highways 22, 28, and 33) from 2017 to March 2023.

Table 4.3-3 presents the number of animals killed by year on these roads based on Reference 4.3-8. Table 4.3-4 summarizes the Idaho Traffic Crashes 2021 (Reference 4.3-9) average daily traffic on the three main access roads to the CFPP site: U.S. Route 20, U.S. Route 26, and State Highways 22, 28, and 33. The approximate average number of workers during preconstruction, exemption, and LWA, is 106, 18, and 171, respectively, averaging approximately 300 workers (rounded up from 295 total of preconstruction, exemption, and LWA to be conservative) commuting daily for round trips of 113 mi (LWA ER Section 4.8.3). Approximately 35 daily delivery trips are also expected, for a total of 670 daily trips to and from CFPP. Reference 4.3-8 data from 2019 represent the most complete and reasonably conservative data set on animal kills and forms the basis of the analysis of impacts. Ratioing average daily 2019 traffic from Table 4.3-4 augmented with 670 daily trips from CFPP workers and the number of 2019 animals killed in 2019 results in between approximately three additional animal kills per year due to increased CFPP traffic or up to five for the preconstruction and pre-COL construction 18-month period. This assumes that the average 300 preconstruction and pre-COL construction workers would individually drive to work. This conservative estimate does not account for worker carpooling, which would reduce the number of vehicles on the road and the risk of animal strikes. The impact from increased worker and delivery transportation is SMALL.

Animals use sound to navigate, find food, attract mates, and avoid predators. Noise pollution makes it difficult for them to accomplish these tasks, which affects their ability to survive. Noise at the CFPP site is a result of preconstruction, pre-COL construction, and COL construction activities, generally involving vibratory or hydrocarbon powered equipment. Construction-related noise rapidly attenuates over relatively short distances. Noise from the loudest equipment activity, dozer rock fracturing, is 81 dBA at a distance of about 800 ft (LWA ER Table 4.8-9). This corresponds to an 80 to 85 dBA threshold at which birds and small mammals are startled or frightened, as noted in Final Environmental Impact Statement for Combined Licenses for Virgil C. Summer Nuclear Station Units 2 and 3 (NUREG-1939, Volume 1). Noise from preconstruction and pre-COL construction activities are not likely to disturb wildlife outside approximately 800 ft or the CFPP boundary.

The CFPP preconstruction, pre-COL construction, and COL construction impact approximately 575 acres or between 600 and 800 acres when accounting for a conservative buffer for potential field modifications during activities. While this disturbance causes direct impacts in this area, the CFPP site is located in an expansive area of sagebrush-steppe habitat. The disturbance area is small relative to available habitat, both on and off the INL site.

Migratory birds and large ungulates may migrate across the CFPP site, vicinity, or region. LWA ER Section 2.3.1.1.4 provides information on migratory species relative to the CFPP site. The impact from CFPP on most wildlife migration is SMALL based on the limited disturbance area and the extent of available habitat that exists in the CFPP vicinity and region that can support migrations.

Migration pathway alterations affect pronghorns the most because they migrate annually along State Highway 33, including the area on and around the CFPP site. Pronghorn are adapted to the INL site; during the plot surveys on the CFPP site conducted in 2022 (LWA ER Section 2.3.1.4.7 and Figure 28 of Reference 4.3-7), pronghorn sign was identified on 74 of 111 plots. Pronghorn are frequent users of the INL site, including during ongoing DOE mission activities and construction of large nuclear facilities. While CFPP influences migration routes, the INL site and Lost River Range foothills and mountain areas provide substantial area for pronghorn to adjust. Based on Reference 4.3-7, the documented migration route is more than 5 mi wide near the CFPP site.

Preconstruction activities are performed using heavy equipment, including cranes. During the deeper Reactor Building and Radioactive Waste Building excavation and continuing through pre-COL construction and COL construction, cranes are used to support equipment and material movement and placement, concrete and grout pours, and building construction. Cranes are placed at each corner of the Reactor Building and Radioactive Waste Building during late-stage excavation, mud mat installation, and placement of rebar and permanently embedded items. While crane heights are expected to be limited to 80 ft tall, potential exists for collisions with birds and bats. When practicable, CFPP lowers crane booms during off hours. When not possible, CFPP monitors bird and bat collisions and implements mitigation strategies to reduce wildlife injury, such as shiny repellant flagging or reflective stickers on the crane booms or other tall equipment or structures. Bats tend to be less susceptible to collisions because of their navigation capabilities.

4.3.1.4 Important Species and Habitats

No threatened or endangered plant species have been identified on the CFPP site. LWA ER Table 2.3-11 identifies and evaluates Idaho threatened and endangered plant species, their habitats and threats, and their relevance to CFPP construction and operational activities.

No rare and sensitive target plant species were documented within the one- and six-mi sampling zones (LWA ER Section 2.3.1.5.1 and Figure 2.3-8) during the 2022 field survey; however, rare and sensitive target plant species occurrences were documented within the three-mi sampling zone (LWA ER Table 2.3-14 and Figure 2.3-8). During CFPP field surveys, rare and sensitive plants Pygmy suncup (*Camissonia pterosperma*), Lost River draba (*Draba hitchcockii*), and Imperfect buckwheat (*Eriogonum mancum*) were identified in the foothills of the Lost River Range to the west of the CFPP site. These three species were found in limestone outcroppings, a habitat type not occurring the CFPP site; these species were not found on the CFPP site.

LWA ER Table 2.3-15 provides information on threatened or endangered wildlife species for the State of Idaho, global and state rankings, and relevance to the CFPP site. None of the threatened or endangered species are considered species of concern for CFPP as described in the table.

One species that is not listed as endangered or threatened that inhabits the CFPP site, vicinity, and region, the greater sage-grouse, is considered a species of concern for CFPP. The greater sage-grouse is facing declining numbers and loss of habitat in many areas of the west. The species is generally considered an obligate of the sagebrush-steppe system, requiring sagebrush for nesting, winter feeding, and shelter from weather and predators throughout the year. Greater sage-grouse are abundant at the INL site and are monitored annually and managed through provisions of the CCA between DOE and USFWS as discussed in LWA ER Section 2.3.1.4.3. The CFPP consults with DOE and USFWS before the start of preconstruction to determine requirements to be implemented through the DOE use permit or consistent with federal and state regulations relative to greater sage-grouse.

Figure 4.3-5 provides the greater sage-grouse management areas as defined by the BLM and USFS, the CCA area, and the INL site baseline greater sage-grouse lek locations monitored under the CCA.

The BLM and USFS define a three-tiered habitat management approach that focuses protections on the areas of highest importance to the species.

- Priority Habitat Management Areas (PHMA) are managed to avoid and minimize further disturbance. Surface energy and mineral development is limited in these areas. Development is capped with limits on the amount and density of disturbance allowed.
- Important Habitat Management Areas (IHMA) have moderate-to-high conservation value for greater sage-grouse populations. While IHMA is managed less-conservatively than PHMA, more protection allocations may be instituted through an adaptive management strategy.
- General Habitat Management Areas (GHMA) provide greater flexibility for land use activities. Mitigation and required design features ensure that impacts from development are avoided, minimized, and mitigated in GHMA.

As shown in Figure 4.3-5, the CFPP site is located within an IHMA area and the INL CCA area. While the 1994 wildfire burned much of the CFPP site, as shown in LWA ER Figure 4.3-1, the surrounding area provides important sage-grouse habitat. The sage-grouse leks are monitored and reported annually by INL (Reference 4.3-10).

Impacts to the greater sage-grouse are SMALL because:

- leks are 2 or more mi from the CFPP site.
- only a small amount of sagebrush habitat is removed during preconstruction.
- the species is managed through the CCA between DOE and USFWS that CFPP collaborates on with these agencies.

The greater sage-grouse and the little brown myotis are two species currently on the ESA radar for potential future listing action. The CFPP impacts on both these species are SMALL because

- the disturbance area is small relative to available habitat in the region.
- no bat hibernacula are disturbed, damaged, or destroyed during preconstruction, pre-COL construction, or COL construction.
- CFPP collaborates with DOE and USFWS to define and comply with species management requirements.
- CFPP implements best management practices to reduce risks during preconstruction, pre-COL construction, and COL construction activities, such as limiting unnecessary fencing and using reflective warning materials on tall equipment.

Table 4.3-5 summarizes ecological impacts to the resource areas identified in Regulatory Guide 4.2, Revision 3. Table 4.3-6 describes ecological impacts relative to major preconstruction, pre-COL construction, and COL construction activities. Overall, the impacts to ecological resources from the preconstruction and pre-COL construction of the CFPP are SMALL. While CFPP site-specific habitat impacts may be MODERATE considering approximately 575 acres, with up to 800 acres accounting for potential field changes during on-site construction, are disturbed on the site and another approximately 325 off-site acres are disturbed for the transmission and water supply pipeline corridor, fewer than 1000 acres of sagebrush-steppe habitat are disturbed in area of approximately 569,000 acres of similar habitat and approximately 274,000 of sagebrush habitat on the INL site. Impacts to wildlife are localized and temporary, and CFPP identifies mitigation measures and controls to further limit impacts. No threatened or endangered species occur on the CFPP site. Only approximately 4.7 acres of sagebrush habitat are disturbed on the CFPP site; up to approximately 179 acres may be disturbed for the transmission and water supply corridor if the full 250-ft corridor width is disturbed. Using the existing transmission corridor road and focusing disturbance on pole and well locations, should result in a smaller disturbed area.

4.3.2 Aquatic Impacts

No aquatic impacts are expected from the CFPP preconstruction, pre-COL construction, or COL construction because the site has no surface waters or aquatic resources.

4.3.3 References

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4.3-2 Idaho National Laboratory, Environmental Surveillance, Education and Research Program, "INL ESER Program," Idaho National Laboratory, Idaho Falls, Idaho, accessed May 2023 from https://idahoeser.inl.gov/.

4.3-3 Shive, J. P., et al., "Vegetation Community Classification and Mapping of the Idaho National Laboratory Site 2019," VSF-ID-ESER-LAND-064, Veolia Nuclear Solutions - Federal Services, Idaho Falls, Idaho, June 2019, accessed March 23, 2021 from https://idahoeser.inl.gov/publications.html.

4.3-4 Idaho Department of Fish and Game, "Idaho State Wildlife Action Plan 2022 - Draft," Idaho Department of Fish and Game, Boise, Idaho, August 2022.

4.3-5 State of Idaho, "Idaho 2021 Plan, Policy for Greater Sage-Grouse Management in Idaho," October 22, 2021 Version, accessed on May 31, 2023 from https://www.bing.com/

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4.3-6 Department of Energy, Idaho Operations Office (DOE), and U.S. Fish and Wildlife Service (USFWS). 2014. "Candidate conservation agreement for greater sage-grouse (Centrocercus urophasianus) on the Idaho National Laboratory Site," DOE/ID-11514, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho., accessed February 22, 2023 from https://idahoeser.inl.gov/publications.html.

4.3-7 Kauffman, Matthew, et al., "Ungulate Migration of the Western United States, Volume 1," Scientific Investigations Report 2020-5101, United States Geological Survey, Reston, Virginia, 2020.

4.3-8 Idaho Department of Fish and Game, "Roadkill Observations," accessed April 27, 2023 from https://data-idfggis.opendata.arcgis.com/datasets/IDFGgis::roadkill-observations/about.

4.3-9 Idaho Transportation Department, Office of Highway Safety, "Idaho Traffic Crashes 2021," Boise, Idaho, 2021; accessed May 24, 2023 from https://itd.idaho.gov/safety/.

4.3-10 National Laboratory, “Implementing the Candidate Conservation Agreement for Greater Sage-Grouse on the Idaho National Laboratory Site, 2022 Full Report” INL/RPT-23-70807, Revision 0, Idaho National Laboratory, Idaho Falls, Idaho, 2023, accessed February 22, 2023 from https://idahoeser.inl.gov/publications.html.

Table 4.3-1: Habitat Types and Areas for the CFPP Site with Disturbed and Undisturbed Areas

Habitat	CFPP Site		Disturbed Area		Undisturbed Area	
	Acres	Percentage	Acres	Percentage	Acres	Percentage
(1)[1] Green rabbitbrush / Sandberg bluegrass - bluebunch wheatgrass shrub grassland	1248	56%	268	12%	980	44%
(2) Cheatgrass ruderal grassland	18	1%	5.3	0%	13	1%
(3/5) Green rabbitbrush / thickspike wheatgrass shrub grassland and needle and thread grassland	526	24%	297	13%	229	10%
(6) Big sagebrush - green rabbitbrush (threetip sagebrush) shrubland	416	19%	4.7	0%	411	19%
(99-4) Borrow sources/ disturbed	2.0	0%	0.0	0.0%	2	0%
TOTAL	**2211**	**100%**	**575**	**26%**	**1636**	**74%**

[1] Shown in Figure 4.3-2 and described in LWA ER Section 2.3.1.2.1 and Table 2.3-6.

Table 4.3-2: Habitat Types and Areas for the CFPP Transmission and Water Supply Pipeline Corridor

Habitat Type	Acres	Percentage
(1)[1,2,3] Green rabbitbrush / Sandberg bluegrass - bluebunch wheatgrass shrub grassland	22	7%
(2) Cheatgrass ruderal grassland	33	10%
(3/5) Green rabbitbrush / thickspike wheatgrass shrub grassland and needle and thread grassland	77	24%
(6) Big sagebrush - green rabbitbrush (threetip sagebrush) shrubland	179	55%
(7) Crested wheatgrass ruderal grassland	1.5	0%
(9) Western wheatgrass grassland	3.8	1%
(99-3) Big Lost River channel	0.4	0%
(99-4) Borrow sources/disturbed	7.8	2%
(99-6) Paved roads	0.4	0%
TOTAL	**325**	**100%**

[1] Shown in Figure 4.3-2 and described in LWA ER Section 2.3.1.2.1 and Table 2.3-6.

[2] LWA ER Figure 2.1-23a and Figure 2.1-23b show habitat maps of the transmission corridor.

[3] Applies to both the construction transmission line and the operational transmission line, which share the same corridor with the water supply pipeline.

Table 4.3-3: Number of Animals Killed on Regional Public Roads Used to Access the CFPP Site

Road	Year							
	2023[1]	**2022**	**2021**	**2020**	**2019**	**2018**	**2017**	**Total**
State Highway 22	4	5	2	2	5	5	6	***45***
State Highway 28	1	6	8	10	7	4	9	***29***
State Highway 33	4	13	15	13	22	8	17	***92***
U.S. Route 20	29	8	6	13	28	9	3	***96***
U.S. Route 26	3	1	2	6	8	3	5	***28***
Total	***41***	***33***	***33***	***44***	***70***	***29***	***40***	***290***

Reference 4.3-8

[1] Data through May 2023

Table 4.3-4: Average Daily Traffic for CFPP Public Access Roads

Road	Year				
	2021	2020	2019	2018	2017
State Highway 22	556	590	508	478	478
State Highway 28	928	831	792	609	609
State Highway 33	3346	3000	3110	2908	2908
U.S. Route 20	8104	7177	7532	7471	7471
U.S. Route 26	4455	4027	3290	3334	3334
Total[1]	***17389***	***15625***	***15232***	***14800***	***14800***

Reference 4.3-9

Data not available in Reference 4.3-9 for 2022 or 2023

[1] Total is simple total for the identified roads; data may overestimate if drivers followed more than a single road and because data were not separately presented for the portions of U.S. Route 20 and U.S. Route 26 that are combined for a distance through the INL site.

Table 4.3-5: Preconstruction and Pre-Combined License Construction Effects on Ecological Resources and CFPP Mitigation Approaches

Ecological Resource	Possible Effect	Description	Mitigation Approach[1]
Terrestrial Habitats	• Removal of 575 acres of grass and brush habitat with small sagebrush area (approximately 4.7 acres; Figure 4.3-2 and Table 4.3-1 • Terrestrial habitat impacts are associated with the CFPP site and transmission and supply water pipeline; impacts are SMALL because fewer than 1000 acres of sagebrush-steppe are disturbed on the INL site that has approximately 520,000 acres of similar habitat (accounting for facility areas)	• CFPP site terrestrial habitat has been impacted by 1994 fire; sagebrush habitat can take tens to more than 100 years to recover (Reference 4.3-1) • INL site is approximately 889 square miles and mostly protected from hunting, off-road vehicles, and other habitat damaging activities • Entire CFPP site is currently within the CCA area; during investigations, CFPP and DOE negotiated a sagebrush mitigation strategy based on the habitat status following the 1994 fire; CCA has a Eno net loss' general provision • CFPP regional area of CCA is approximately 37,700 acres; CFPP activities would represent a 3% reduction if the entire CFPP site were covered in high quality CCA habitat; INL site has approximately 274,000 acres of greater sage-grouse habitat • Soil disturbance for site and transmission corridor construction can fragment habitat, impact wildlife, increase soil erosion, and increase invasive species; CFPP corridor follows the existing 69 kV corridor and road	• Negotiate with DOE and USFWS for appropriate mitigations for removal of sagebrush habitat under the CCA • Irreversible removal (or long-term recovery) of vegetative habitat to complete project; limit impacts to smallest reasonable area by using future pond areas for laydown and fabrication • Integrate with INL on greater sage-grouse habitat monitoring and preservation actions • Limit transmission corridor to minimum width from existing 69 kV corridor • Restrict unnecessary off-road traffic and implement weed control consistent with DOE use permit requirements • Focus construction activities for the transmission and water supply pipeline corridor on the pole and well locations and use the existing road to limit the habitat disturbed to less than the maximum 250-ft corridor width where possible

Table 4.3-5: Preconstruction and Pre-Combined License Construction Effects on Ecological Resources and CFPP Mitigation Approaches (Continued)

Ecological Resource	Possible Effect	Description	Mitigation Approach[1]
Wetlands	• No expected wetland impacts from preconstruction, pre-COL construction, or COL construction • Wetlands impacts are SMALL	• No wetlands currently exist on CFPP site; closest potential wetlands are Big Lost River at about 6 mi and Big Lost River Sinks at 11 mi; both are intermittently wet • Stormwater ponds constructed during preconstruction draw wildlife • Amount of time stormwater ponds are wetted depends on precipitation levels and timing; with CFPP dry climate, most stormwater discharged to ponds is expected to evaporate or infiltrate quickly or be frozen throughout the winter • Transmission corridor crosses Big Lost River at the same location as the existing PacifiCorp 69 kV line; poles are placed on opposite river banks, and only the wires cross the river; no poles are placed within the river bed	• Implement stormwater pollution protection plan • Evaluate viability, based on meteorology and expected precipitation levels, of fencing or other options to limit wildlife intrusion to stormwater ponds • Consult with U.S. Army Corp of Engineers on issues or requirements relative to the transmission line crossing of the Big Lost River; obtain and comply with permit, if required

Table 4.3-5: Preconstruction and Pre-Combined License Construction Effects on Ecological Resources and CFPP Mitigation Approaches (Continued)

Ecological Resource	Possible Effect	Description	Mitigation Approach[1]
Wildlife	• Disruption to pronghorn migration route with increased potential for animal-vehicle strikes • Loss of habitat used for cover, breeding, birthing, and overwintering • Building activities during nesting season and birthing seasons disrupt wildlife • Risk of safety issues to workers and equipment from large numbers of nesting birds through equipment fowling by nest materials and feathers, caustic excrement • Inadvertent taking of sensitive species during preconstruction and pre-COL construction • Temporary facilities provide perching or resting areas for birds and bats, and shade for wildlife; also provide perching for predatory birds not currently found on the CFPP site • Stormwater ponds may draw wildlife into preconstruction, pre-COL construction, and COL construction areas, increasing potential for human-animal interaction • Impacts to wildlife are SMALL; these impacts are temporary and limited by the area of disturbance	• No threatened or endangered species on CFPP site; though some sensitive species may use or travel through site • Pronghorn migration route is partially within CFPP site; pronghorn would be diverted into the Lost River Range foothills, requiring crossing State Highway 33, or deeper into the INL site, pushing them closer to INL facilities and roads • CFPP has no large trees and only sporadic large bushes that provide above-ground resting and nesting sites • USFWS implements process for limited, justified species takes; DOE currently sets zero take limit for the INL site • Two species, greater sage-grouse and little brown myotis are being evaluated for potential listing under the ESA • Ravens prey on greater sage-grouse and other sage obligate eggs and chicks; these birds are monitored by the INL	• Comply with license requirements and environmental laws and regulations, such as nesting bird requirements in the Migratory Bird Treaty Act and threatened and endangered species protection in the Endangered Species Act • Begin preconstruction in the winter and take preemptive steps early in spring, such as mowing as needed in construction areas, to limit nesting close to the work fronts; employ bird deterrents, such as nets or reflective tape • Include animal avoidance and strike potential in safety plan and training • Implement environmental management plan that includes provisions for complying with regulatory requirements for nesting birds • Report inadvertent sensitive species taking in accordance with NRC license and DOE use permit and USFWS requirements • Evaluate viability of fencing or other options to limit wildlife intrusion to stormwater ponds while optimizing fencing to protect greater sage-grouse and other animals that could collide with fences • Implement measures, such as lowering crane booms and attaching reflective tape to reduce potential bird and bat collisions and dissuade predators

Table 4.3-5: Preconstruction and Pre-Combined License Construction Effects on Ecological Resources and CFPP Mitigation Approaches (Continued)

Ecological Resource	Possible Effect	Description	Mitigation Approach[1]
Important Species and Habitats	• Loss of important habitat, such as habitat used by sagebrush obligate species • Disruption of sensitive plant and animal species during excavations and building activities • Noise, emissions, and visual impacts that alter plant and wildlife behaviors • Impacts to important species and habitats are SMALL because no threatened or endangered species are located on the CFPP site and mitigation measures are available for the greater sage-grouse	• Sensitive plant species located outside CFPP boundary and preconstruction, pre-COL construction, and COL construction disturbed areas • Greater sage-grouse habitat on CFPP site previously destroyed in 1994 fire; recovering habitat stage on CFPP consists mainly of shrubs and grasses • Greater sage-grouse and little brown myotis are species being considered for status change under ESA	• Implement environmental management plan • Prohibit work-related entry to off-site or foothill areas with motorized equipment to prevent disruption of sensitive plants and wildlife • Comply with NRC and DOE use permit requirements for CCA, nesting birds • Integrate with INL ecological monitoring activities • Monitor ESA status for greater sage-grouse and little brown myotis; collaborate with DOE and USFWS to respond effectively to change in status • Consult with DOE and USFWS on requirements from the CCA that may be applicable to CFPP

Includes information on COL construction where known.

[1] CFPP follows license and permit requirements and associated project-specific plans for preconstruction, pre-COL construction, and COL construction activities.

Table 4.3-6: Ecological Resources Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Preconstruction				
Mobilize and Establish Site	Mobilize site excavation and grading contractor (including equipment)	SMALL	• Disturbance of limited area to stage equipment • CFPP is located in previous burn area consisting mainly of brush and grass land and some sagebrush areas • No threatened or endangered species identified on CFPP site • Potential for wildlife strikes while moving equipment and supplies to site • Potential for diesel or fuel spills	• Survey and mark boundaries of work areas. • Minimize disturbed area for staging • Stage equipment in designated areas, use designated roadways on CFPP site, and avoid sensitive areas (e.g., sagebrush habitat) • Implement spill control plan; stage spill control materials on-site; manage waste per waste plan
Prepare Site (clearing, grubbing, grading, excavation)	Remove and stockpile vegetation, alluvial soils, and basaltic rock; establish roads and parking; grade and level surface	SMALL	• Approximately 575 acres disturbed by vegetation clearing, grading, and excavation; most significant change to terrestrial habitat • Noise, human presence, and dust impacts to wildlife, breeding, nesting, or migration patterns; considered small based on the size of the disturbed area relative to similar habitats in the CFPP and INL sites • No threatened or endangered species on CFPP site; some sensitive species may use or visit site, including migratory birds • Closest greater sage-grouse lek is approximately 2 mi from CFPP site • Terrestrial habitat altered by building activities for the license period, approved license extensions, and long-term habitat recovery period; can be mitigated through CCA approaches, such as replacement plantings at alternate locations	• Follow construction plan for site layout, using designated roadways, parking areas, and work areas to minimize disturbance outside plan areas. • Negotiate with DOE and USFWS to determine equitable mitigation action for destruction of CCA habitat; implement DOE use permit requirements for CCA compliance, including possible replacement plantings in another area for sagebrush removed during building activities • Implement dust control and stormwater control plans and measures • Limit use of broadcast systems • Regularly inspect and maintain equipment, including noise controls to limit wildlife impacts • Limit nighttime work; use minimum lighting for nighttime work to curtail wildlife disturbance • Comply with migratory bird nesting requirements

Table 4.3-6: Ecological Resources Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Temporary Facilities and Utilities	Establish temporary facilities- office, medical, training trailers; sanitary and craft facilities; warehouses	SMALL	• Significant terrestrial habitat change occurs in initial site preparation; limited additional disruption with this activity because built on preconstruction disturbed land • Reduced noise, dust, and wildlife disturbance on-site with these activities because of smaller footprints • 34.5 kV line installed from CFPP plant to CFA area paralleling existing PacifiCorp 69 kV transmission corridor; up to 300 acres of sagebrush-steppe may be impacted for transmission poles, line, and corridor	• Continue mitigation and controls implemented during site preparation • Optimize facility placement on designated locations and surfaces to reduce invasive species encroachment • Limit transmission construction to existing road and pole areas to reduce habitat and wildlife impacts • Place transmission line poles on opposing banks of Big Lost River with only the wire crossing the river; consult with U.S. Army Corps of Engineers on requirements for river closing
	Install temporary power, water, and communications			
	Install security provisions			
Establish Laydown Yards and Fabrication Areas	Establish laydown and fabrication yards, including fencing, controlled entries, equipment receiving and maintenance yard	SMALL	• Significant terrestrial habitat change occurs in initial site preparation; limited additional disruption with this activity • Vegetation removed in site preparation; gravel added to laydown and fabrication areas reduces potential for nesting and ground use by wildlife, limits dust, and reduces invasive species encroachment	• Continue mitigation and controls implemented during site preparation • Comply with construction plan for laydown and fabrication areas and surfaces

Table 4.3-6: Ecological Resources Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Rock Crushing and Concrete Batch Plant Facilities	Establish rock crushing, staging areas, and equipment	SMALL	• Significant terrestrial habitat change occurs in initial site preparation; limited additional disruption with this activity • Higher levels of noise and dust from crushing equipment; 67 decibels at site boundary, 49 decibels at Highway 33 and T-11 intersection • Birds nesting in equipment	• Continue mitigation and controls implemented during site preparation • Locate crushing work front near plant location for efficient logistics and to focus disruptive activities near the main preconstruction and pre-COL construction work • Implement dust control plan and measures • Daily check for bird nests; comply with migratory bird nesting requirements • Comply with rock crushing requirements in permit to construction
	Establish batch plant, staging, truck parking areas, and washouts	SMALL	• Significant terrestrial habitat change occurs in initial site preparation; limited additional disruption with this activity • Higher levels of noise and dust from concrete mixing • Hydrated lime from cement can cause harm to workers, plants, and wildlife • Bird nesting in equipment • Diesel/fuel spills can damage plants and wildlife • Water from concrete truck washout alters soil chemistry and impacts terrestrial plants	• Continue mitigation and controls implemented during site preparation • Strictly enforce washout dumping activities and locations; control washout waters; reuse or dispose of waste concrete properly • Comply with batch plant permit requirements • Implement dust control plan and measures Implement dust control plan and measures • Check daily for bird nests during nesting season; comply with migratory bird nesting requirements • Implement spill control plan; regularly inspect and maintain equipment

Table 4.3-6: Ecological Resources Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Excavate Foundations and Trenches	Excavate RXB and RWB foundations	SMALL	• Significant terrestrial habitat change occurs in initial site preparation; limited additional disruption with this activity • Noise and emissions impacts are lower because activities progress at depth • Wildlife entering or falling into open excavations	• Continue mitigation and controls implemented during site preparation • Contain excavations within construction fence • Monitor excavations daily for presence of animals • Provide means of escape for wildlife from deep excavations
	Excavate BOS foundations- TGB, ACCS, CUB, Annex Building, SCWS, and transmission structure			
	Excavate trenches; install bedding, piping, and utilities; backfill		• Significant terrestrial habitat change occurs in initial site preparation; limited additional disruption with this activity • Small areas of impact with majority inside construction fence area	
Pre-Combined License Construction				
Exemption	Install rock bolts in RXB and RWB excavations	SMALL	• Activities overlap preconstruction; significant terrestrial habitat change occurs in initial site preparation; limited additional disruption with this activity • Portions of the work front are deep, so noise is reduced at the surface where wildlife would be exposed	• Continue mitigation and controls implemented during site preparation • Contain excavations within construction fence • Monitor excavations daily for presence of animals • Provide means of escape for wildlife from deep excavations
	Apply fibermesh/ shotcrete for RXB and RWB excavations			
LWA	Conduct soft or fractured rock remediation	SMALL	• Activities overlap preconstruction; significant terrestrial habitat change occurs in initial site preparation; limited additional disruption with this activity • Work front is deep, so noise is reduced at the surface where wildlife would be exposed	• Continue mitigation and controls implemented during site preparation • Contain excavations within construction fence • Monitor excavations daily for presence of animals • Provide means of escape for wildlife from deep excavations
	Install RXB mud mat, rebar, and permanently embedded items			

Table 4.3-6: Ecological Resources Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Combined License Construction				
Establish Site Buildings	Construction of nuclear island, turbine island, BOS	SMALL	• Significant terrestrial habitat change occurs in initial site preparation; limited additional disruption with this activity • Noise and emissions impacts • Wildlife entering or falling into open excavations • Wildlife colliding with equipment, such as cranes, or structures • Potential for birds and bats to use structures or equipment for perching or nesting	• Implement similar mitigation and controls used during site preparation • Keep work areas mowed to reduce potential for bird nesting • Check daily for bird nests during nesting season; comply with migratory bird nesting requirements • Implement environmental management plan with provisions for addressing wildlife encounters • Limit use of broadcast systems • Regularly inspect and maintain equipment, including noise controls to limit wildlife impacts • Limit nighttime work; use minimum lighting for nighttime work to curtail wildlife disturbance • Provide means of egress from open excavations and construction fronts
Establish Permanent Utilities	Install power, water, and communications	SMALL	• Installation of operational transmission line and water supply well(s) and pipeline parallel to existing corridor disturbs up to approximately 325 acres of habitat, with up to about 179 acres of sagebrush habitat (300 acres are coincident with the 34.5 kV construction transmission line and 25 acres associated with well sites; the total of 325 encompasses both transmission lines, wells, and water supply pipeline within the same corridor) • No rare and sensitive plants identified in the proposed transmission and water supply pipeline corridor during field survey	• Implement similar mitigation and controls used during site preparation • Limit transmission line and pipeline construction to existing corridor road and to well and pole locations to reduce habitat and wildlife disturbance • Limit off road vehicle use

Table 4.3-6: Ecological Resources Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Water Management	Install evaporation ponds	SMALL	• Area for evaporation ponds cleared during preconstruction for use as laydown or fabrication yards; excavation during COL construction conducted in disturbed area • Stormwater pond use continues • Excavation to pond depth may disturb wildlife that remains after surface disturbance and placement of yards surface material	• Implement similar mitigation and controls used during site preparation • Excavate within the site-plan-defined boundaries that have been previously disturbed; limits impacts to smallest reasonable area by using future pond areas for laydown and fabrication • Continue implementing construction stormwater plan • Implement dust control plan and measure

Table 4.3-6: Ecological Resources Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Final Site Configuration	Redress construction areas and landscape site	SMALL	• Recontouring and revision of berms (if needed) may disrupt wildlife established during COL construction, mainly small reptiles or mammals	• Implement similar mitigation and controls used during site preparation • Implement dust control plan and measure • Implement landscaping and revegetation plan, including use of native plants or seeds • Consult and coordinate with BLM and DOE on restructuring grazing allotments consistent with CFPP grazing quality, areas of disturbance, and safety precautions for livestock • Consult with DOE and USFWS regarding DOE's CCA with USFWS; comply with DOE Use Permit (Reference 4.1-2) requirements for the CCA • Consult with DOE on approaches for landscaping consistent with INL site requirements and align with the area climatic conditions
	Demobilization	SMALL	• Noise and emissions during equipment removal may disrupt wildlife	• Remove equipment during daylight hours as much as possible • Limit equipment idle time • Check equipment for nests if demobilizing during nesting season • Stage equipment in designated areas • Implement spill control plan

Table 4.3-6: Ecological Resources Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

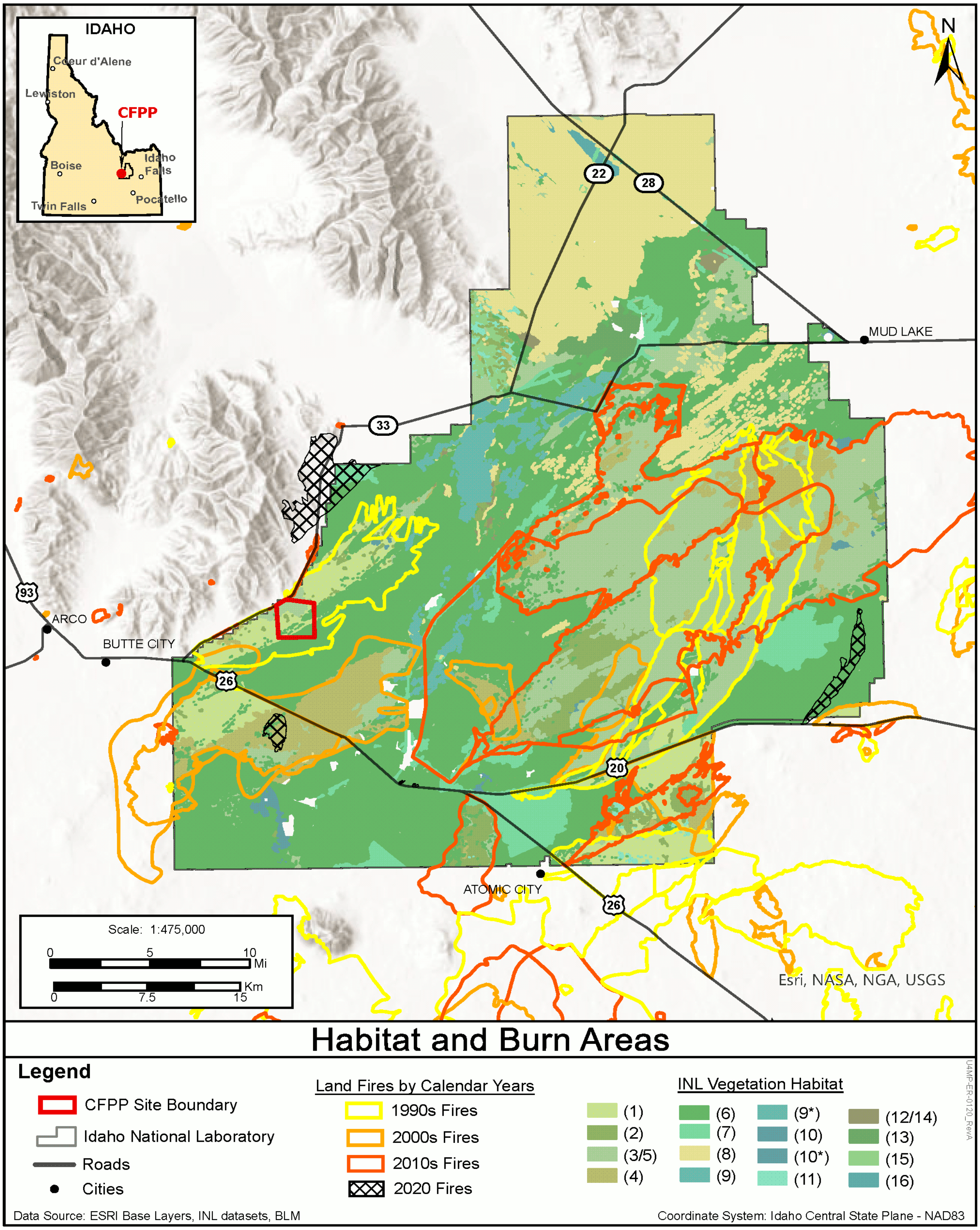
Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]

[1] SMALL- Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered SMALL.
MODERATE- Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
LARGE- Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

[2] CFPP follows license and permit requirements and associated project-specific plans for preconstruction, pre-COL construction, and COL construction activities.

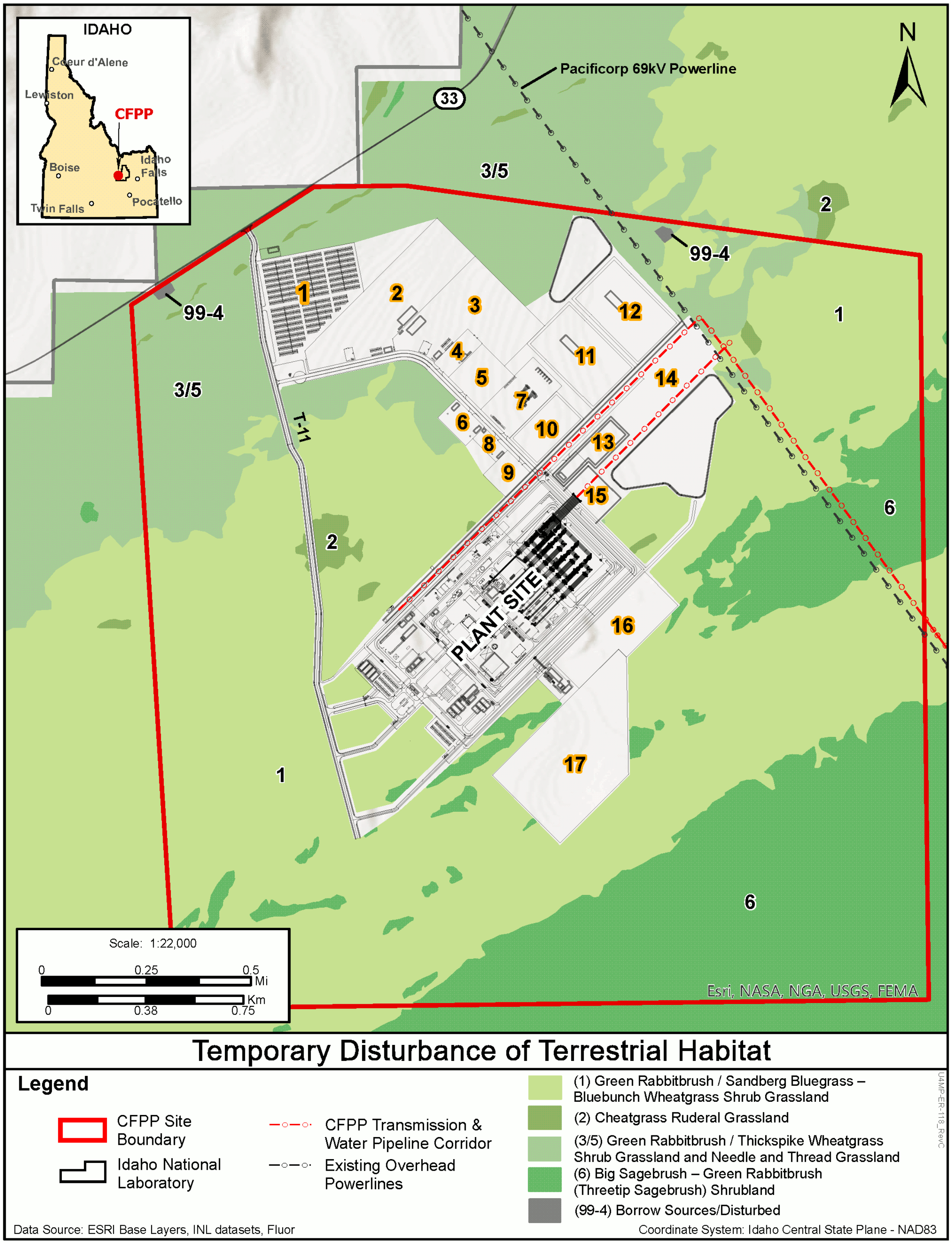
ACCS - air cooled condenser system
BOS - balance of site
CUB - Central Utilities Building
RWB - Radioactive Waste Building
RXB - Reactor Building
SCWS - site cooling water system
TGB - Turbine Generator Building

Figure 4.3-1: INL Burn Areas and Vegetation Map



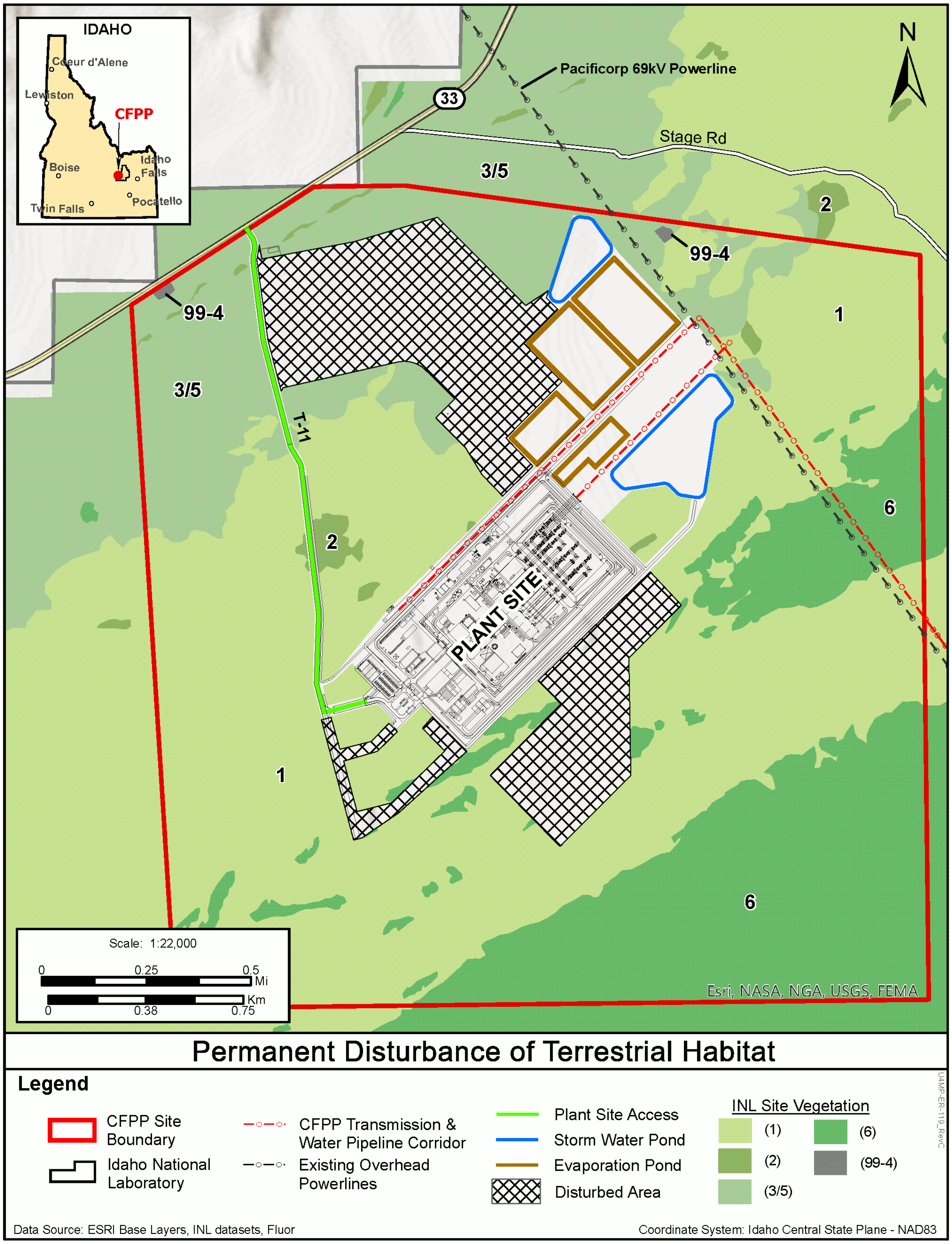
Reference 4.3-3, LWA ER Section 2.3.1.2.1, and LWA ER Table 2.3-6 provide habitat descriptions.

Figure 4.3-2: CFPP Temporary Disturbance of Terrestrial Habitat



Reference 4.3-3, LWA ER Section 2.3.1.2.1, and LWA ER Table 2.3-6 provide habitat descriptions. LWA ER Figure 4.1-1 shows facility identification.

Figure 4.3-3: CFPP Permanent Disturbance of Terrestrial Habitat



Reference 4.3-3, LWA ER Section 2.3.1.2.1, and Table 2.3-6 provide habitat descriptions.

Figure 4.3-4: Total Area of CFPP Ecological Field Study

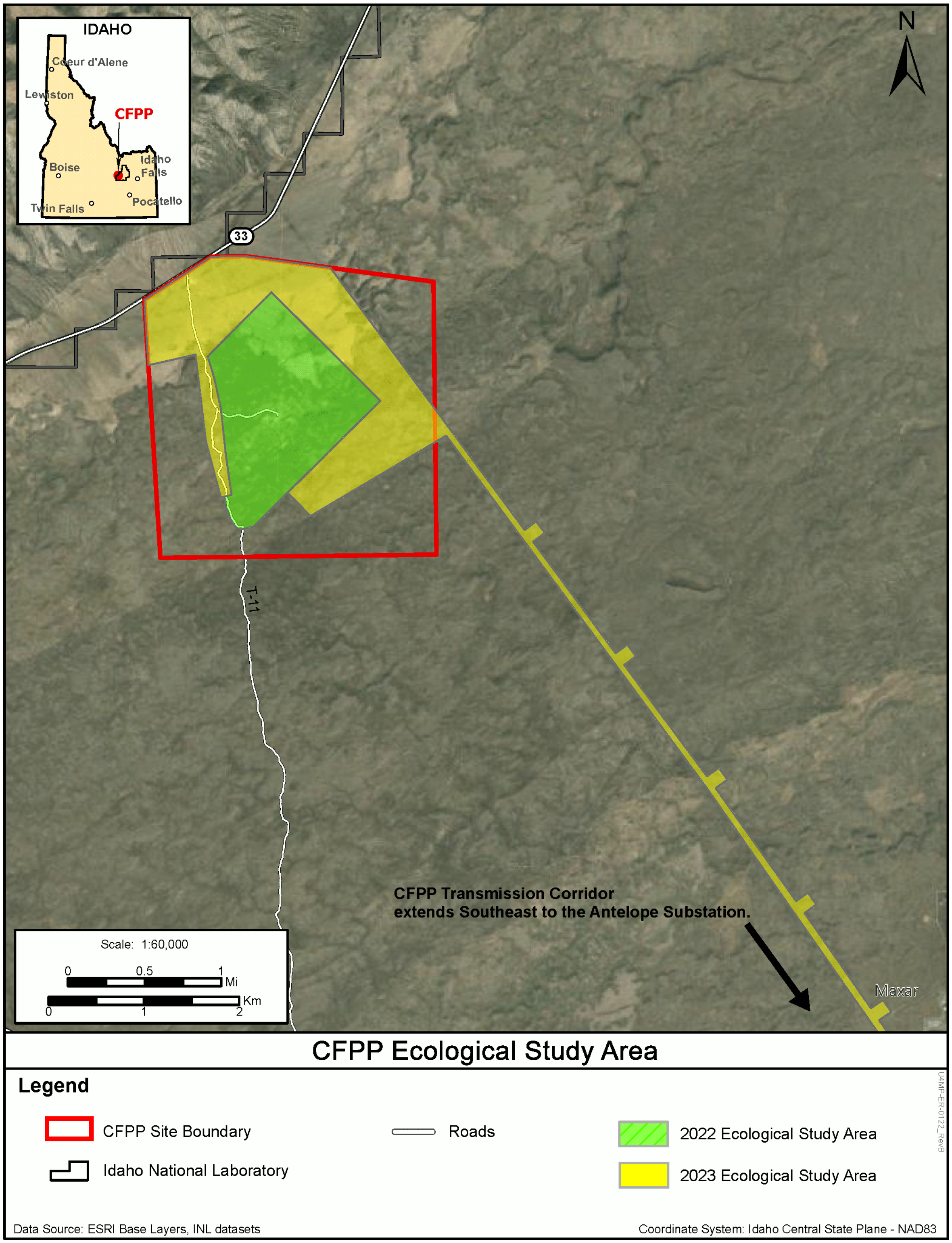
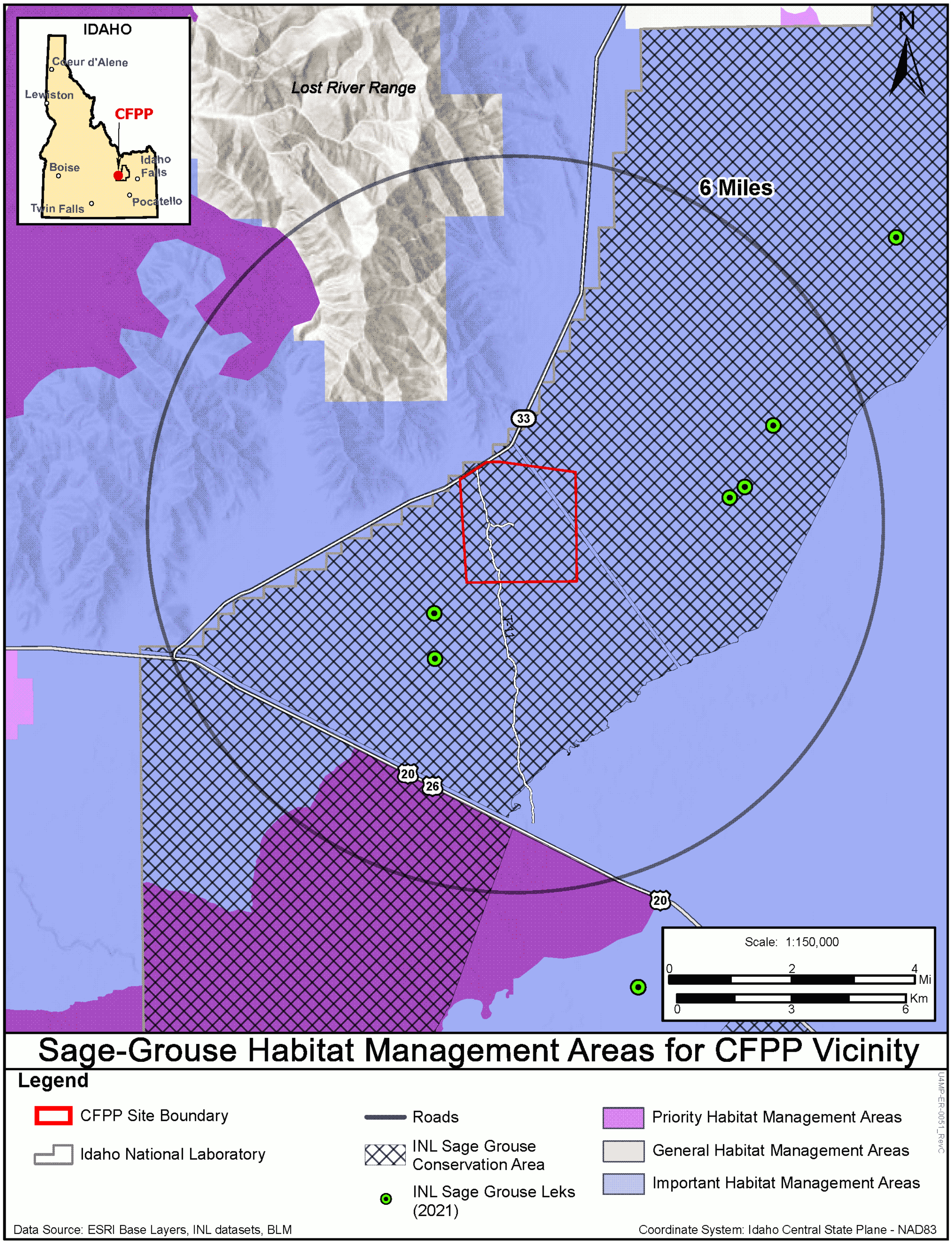


Figure 4.3-5: Greater Sage-Grouse Habitat Management Areas and Lek Locations



4.4 Socioeconomics

This section describes the potential socioeconomic impacts associated with the CFPP at a location in southeastern Idaho on the DOE INL site. Some COL construction aspects are presented in this section when known; these are clearly identified as COL construction. Socioeconomic impacts from CFPP preconstruction and pre-COL construction are described in the following sections:

- Physical Impacts - Section 4.4.1
- Demographic Impacts - Section 4.4.2
- Economic Impacts to the Community - Section 4.4.3
- Community Infrastructure Impacts - Section 4.4.4

4.4.1 Physical Impacts

Preconstruction and construction activities can cause temporary and localized physical impacts such as noise, vibration, shock from blasting, odors, vehicle exhaust, dust, and viewshed changes. This section addresses potential preconstruction and pre-COL construction impacts associated with the CFPP that may affect people, buildings, transportation infrastructure, and aesthetic quality of local viewsheds. Table 4.4-1 provides the socioeconomic impacts and measures and controls associated with preconstruction and pre-COL construction activities. Table 4.4-2 provides similar information focused on socioeconomic resource areas.

For purposes of the preconstruction and pre-COL construction, the following define the geographic scope for physical impacts. Distances from the CFPP site to the identified receptors are measured from the CFPP center point (LWA Environmental Report [ER] Table 2.8-8 and Figure 4.8-2).

- The preconstruction and pre-COL construction disturbance area is defined in LWA ER Section 4.1.1 and Figure 4.1-1.
- The closest public location is the intersection of State Highway 33 and INL site secondary road T-11; this road is the main entry to the CFPP site. This intersection is approximately 1.1 mi from the CFPP site center point. The Big Lost River rest area is approximately 6.5 mi away on U.S. Route 20.
- The closest residences are in Howe, approximately 9.3 mi, and Butte City, approximately 9.5 mi.
- The closest recreation and community centers are the Howe Community Center and Howe Park, approximately 10.5 mi. The Salmon-Challis National Forest is approximately 2 mi from the CFPP site in the foothills area of the Lost River Range. Forested areas are farther from the site. The Craters of the Moon National Monument and Preserve is approximately 23 mi from the CFPP site.
- The closest schools are Arco Elementary and Butte County middle and high schools, approximately 12.5 mi.
- The closest church is Arco Baptist Community Church, approximately 12.6 mi.

- The closest cultural resources formally listed on the National Register of Historic Places are the Experimental Breeder Reactor-1, approximately 9.1 mi, and the Arco Baptist Community Church, approximately 12.6 mi.

Physical impacts attenuate with distance; therefore, onsite workers involved in preconstruction and pre-COL construction experience the most direct exposure to physical impacts with off-site impacts reduced relative to the distance between the receptor and the CFPP site. Nonradiological health impacts to workers are identified in LWA ER Section 4.8.

4.4.1.1 Noise Impacts

Preconstruction and pre-COL construction, as described in LWA ER Section 1.3 and Section 3.3, result in noise from heavy construction and impact equipment, generators, and vehicles that could impact nearby residents and users of recreational facilities. LWA ER Section 2.8.2 describes noise relative to current conditions at the CFPP and INL sites.

Table 4.8-9 in LWA ER Section 4.8 identifies sources of noise from equipment and activities conducted during preconstruction and pre-COL construction with associated peak noise-level measurements and sound levels at noise-sensitive-receptor locations. Additional details on noise impacts are provided in LWA ER Section 4.8.

Based on the U.S. Department of Transportation Living with Noise, (Reference 4.4-1), levels of highway traffic noise typically range from 70 to 80 A-weighted decibels (dBA) at a distance of 50 ft from the highway. Traffic on State Highway 33, adjacent to the CFPP northern-most boundary and approximately 5800 ft from the center of the CFPP site typically has a noise level in this range. The loudest estimated peak noise level during preconstruction and pre-COL construction is created by rock fracturing with a dozer. At the State Highway 33 and road T-11 intersection, the closest noise sensitive human receptor location, noise from the rock fracturing activity is approximately 64 dBA. This noise level from the loudest activity during preconstruction and pre-COL construction is less than that created by passing traffic.

According to the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG-1437, Revision 1, plant noise sources are not generally perceived by many people off-site because the level of noise from the surrounding communities and highways are typically high, approximately 60 to 65 dBA. In rural or low-population areas, where background noise levels range from 35 to 45 dBA, plant noises are more noticeable. The peak noise levels from preconstruction and pre-COL construction equipment or activity at the State Highway 33 and road T-11 intersection, the closest noise-sensitive human receptor, range from 26 dBA to 64 dBA (LWA ER Table 4.8-9). The peak noise level at the next closest noise sensitive human receptor, Big Lost River Rest Area, is between 10 dBA and 48 dBA. The peak noise at the closest residence (9.3 mi at Howe) ranges from

7 dBA to 45 dBA. Overall, noise impacts to nearby residents and recreational users are SMALL.

4.4.1.2 Impacts of Changes in Air Quality

Preconstruction, pre-COL construction, and COL construction activities at the CFPP site and in the off-site areas (i.e., transmission and water supply pipeline corridor) generate temporary, localized, and intermittent air emissions of both gaseous and particulate pollutants. Potential air emission activities include:

- Land clearing and material removal
- Soil excavation and grading
- Truck deliveries of supplies and materials to the CFPP site and off-site areas
- Soil transport and stockpiling
- Workforce commuting
- Preconstruction, pre-COL construction, and COL construction machinery operation and maintenance
- Material processing and handling, including rock crushing and concrete batch plants
- Material replacement (including subsurface preparation and concrete pouring and paving)
- Pile driving and structure erection (occurs during COL construction)

Preconstruction, pre-COL construction, and COL construction activities associated with the operation of motor vehicles and engines produce intermittent, localized, and temporary air emissions. Equipment is used for construction of the project but not used continuously during preconstruction, pre-COL construction, and COL construction. Construction activity emissions generally occur at or near ground level, with the greatest impacts to workers near the construction activities.

LWA ER Section 4.8.1.1 discusses impacts of greenhouse gas emissions, fugitive dust, and other particulate matter relative to worker and public health and mitigating measures. The analysis in LWA ER Section 4.8.1.1 concludes air quality impacts to workers are SMALL. Air quality impacts to the receptors are SMALL because the effects on air quality from these temporary localized emissions to the distant public are expected to be minor and are minimized through use of mitigation and control measures (e.g., dust collection systems and compliance with construction air permits).

4.4.1.3 Impacts to Onsite and Offsite Structures

Structures at the CFPP site currently include an administration trailer and the meteorological tower. Nearby structures include facilities on the INL site, as shown in LWA ER Figure 2.1-5. The Advanced Test Reactor Complex is approximately 5.6 mi from the CFPP center point, the Remote-Handled

Low-Level-Waste facility is 5.8 mi, and the Naval Reactors Facility is 7 mi. These nuclear facilities are built to DOE and NRC requirements. The Experimental Breeder Reactor-1 is more than 9 mi from the CFPP site.

According to The Impact of Construction Vibration on Adjacent Structures (Reference 4.4-2), most construction-related vibration occurs during the early phases of construction. For the CFPP, this includes mainly preconstruction and the drilling for rock bolts during pre-COL construction. Three primary activities cause most of the vibration-related damage claims in construction:

- Site clearing and removal
- Site grading and soil compaction
- Installation of deep foundations, which may include blasting

The CFPP preconstruction includes removal of existing vegetation and site leveling through grading, excavation, and backfilling. Vibration-inducing equipment includes excavators, dozers, loaders, large trucks, and compactors. Laydown and fabrication yard, roads, and other features involve site leveling with excavators, graders, and vibratory compactors. Optional drilling and blasting may be used to advance the Reactor Building and Radioactive Waste Building excavations.

The state of Idaho does not have existing standards for vibrations. Other literature and states were reviewed to provide information on vibration impacts, safe distances, and mitigations. For example, the U.S. Bureau of Mining, U.S. Department of Transportation, Florida Department of Transportation, and New Hampshire Department of Transportation report methodologies and analyses for structural impacts relative to vibrations for a range of vibration sources.

The U.S. Department of Transportation Federal Transit Administration provides methodology to evaluate vibration impacts in the Transit Noise and Vibration Impacts Assessment Manual (Reference 4.4-3).

Florida Section 108, Monitoring Existing Structures (Reference 4.4-4), specifies monitoring and inspection for nearby structures if they are within:

- A distance of five shaft or auger cast pile diameters, or the estimated depth of drilled shaft or auger cast pile excavation, whichever is greater, measured from the center of these foundation elements
- A distance of three times the depth of other excavations
- 200 ft of sheet pile installation and extraction operations
- 100 ft of steel soldier pile installation and extraction

Evaluation of Vibration Limits and Mitigation Techniques for Urban Construction (Reference 4.4-5) provides analysis of available literature, standards, and a questionnaire survey administered to the Florida Department of Transportation; other state transportation departments; consulting, design, and construction companies; and vibration consultants. Reference 4.4-5 evaluates impact distances from a variety of vibration studies and analysis methods relative to existing standards. Impact distances range from 200 ft to 1300 ft. Additionally, 75 percent of transportation department questionnaire respondents indicated monitoring plans should include measurement of vibrations within 1500 ft of the site and up to a half-mile radius.

Based on the distances between the CFPP site and nearby structures relative to available reference information of impact distances as decribed above, the impact of vibrations on nearby structures, including structures that house vibration-sensitive equipment, is SMALL.

Cultural field surveys identified recommended eligible historic properties within the CFPP site. Depending on the nature and type of the properties, vibratory sources could potentially cause impact to these sites and vibratory sources are a consideration in determining mitigation approaches by the NRC, DOE, Shoshone-Bannock Tribes, State Historic Preservation Office, and interested public members.

4.4.1.4 Transportation Impacts

United States Routes 20 and 26 and State Highway 33 are the main access roads to the CFPP site, including worker travel to the job site. Interstates 15 and 86 are main arteries used for equipment, materials, and supplies transportation from sources outside the CFPP region, including the west coast and additional areas of the United States and other nations. No regional railroads are used to move equipment, materials, or supplies to the CFPP site. Potential rail shipment from the east or west coasts may support movements to larger rail centers, such as Salt Lake City, with trucking of items to the CFPP site.

Discussions with the Idaho Transportation Department (ITD) resulted in the following ITD-identified road modification to support the CFPP preconstruction, pre-COL construction, and COL construction:

- Construction of a left-hand turn lane from U.S. Route 26 onto State Highway 33
- Construction of left- and right-hand turn lanes from State Highway 33 onto road T-11 on the INL site leading to the CFPP site
- A traffic impact study is not required by ITD if these turning lanes are constructed to support preconstruction and construction activities at the CFPP site.

Turning lanes permit trucks to turn from both directions of State Highway 33 onto INL site road T-11 that leads to the CFPP construction area. State Highway 33 turn lanes and road T-11 upgrades are made to support the preconstruction period, consistent with ITD requirements, to allow heavy loads to the plant site. A new heavy haul road is used to transport equipment, materials, and supplies from road T-11 to the construction areas, as shown on LWA ER Figure 4.1-1. Roads internal to the construction site provide access to laydown and fabrication areas, plant site excavation areas, and stormwater pond areas.

Transportation activities are conducted in compliance with Federal, state, and local requirements, license requirements, and the project-specific traffic control plan. Transportation routes are evaluated for load limits; the CFPP designs loads consistent with these limits to avoid road deterioration and impacts. Increases in road deterioration are not anticipated for preconstruction and pre-COL construction because of limited workforce and adherence to road weight and speed limits. The ITD indicated during discussion that they do not plan on requiring mitigation for heavy haul activities. Impacts from road alterations and deterioration are SMALL.

4.4.1.5 Viewshed Impacts

The most significant visual change at the CFPP site during preconstruction, pre-COL construction, and COL construction is conversion of the undisturbed desert to a construction site. Portions of the site are visible from State Highway 33. Additional visual changes occur when trailers and tents, heavy equipment, including cranes, concrete batch plants, a rock crusher, and worker transportation vehicles occupy the site for preconstruction and pre-COL construction, and then when above-grade building structures are erected during COL construction. While the CFPP site is currently undisturbed land, the site is located on the INL site, where several DOE facilities are part of the visual aesthetic.

No State of Idaho dark skies regulations or ordinances are identified, and no national standard is implemented.

Mobile cranes are used to support preconstruction excavation and erection activities (e.g., tent set up). During the deeper excavations of the Reactor Building and Radioactive Waste Building, four or more 80-ft tall cranes support soil and rock removal and the mud mat, rebar, and embedded item installation for the LWA. These cranes are likely to be visible from State Highway 33 and possibly areas of the INL site. If lights are required on the cranes, they would be visible from State Highway 33 during dark hours. Due to distance and topography, visibility of the cranes from the INL site facilities and surrounding areas is expected to be SMALL. Visibility impacts from CFPP are discussed further in LWA ER Section 4.6.2.

Table 4.4-3 provides details on the workforce, work hours, and shifts. The preconstruction activities are conducted during a 10-hour day shift, 5 days per week with occasional as-needed weekend work. During spring, summer, and fall seasons, lighting impacts are not expected. Winter work may require lighting during portions of the day shift.

The exemption scope is conducted 5 days per week on a 10-hour night shift. The LWA scope is conducted 5 days per week on a 10-hour day shift. Both exemption and LWA may have occasional weekend overtime shifts as necessary to the scope and schedule. The LWA scope associated with the mud mat and subsurface remediation scopes includes a potential night shift averaging approximately half of the LWA workers. The LWA work is conducted at depth in the RXB and RWB excavations, so light reaching the surface is attenuated.

Because of the proximity of the Craters of the Moon National Monument and Preserve to the CFPP site, lights from the project could negatively impact viewing of night skies. CFPP implements measures and controls during preconstruction and pre-COL activities to limit impacts. Lighting during night shifts and dark periods of winter day shifts is configured to limit light pollution to surrounding communities and the Craters of the Moon. Light plants are aimed downward and focused toward the work areas. Deliveries are scheduled during daylight hours, when possible, to further limit light impacts. Workers are instructed to limit unnecessary lights and to turn off vehicles and equipment lights when not needed. CFPP schedules the work to minimize the amount of nighttime or dark period work activities when possible and coordinates with DOE and National Park Service on lighting approaches.

4.4.2 Demographic Impacts

The CFPP construction workforce consists of three main components:

- Direct field labor: workers consisting of craft labor, including civil, mechanical/ piping, electrical, and laborers
- Field staff: management and support workers engaged in construction activities and program implementation, such as field management; field supervision; field engineers; quality assurance and quality control; health, safety, and environment; and administrative and clerical staff
- Subcontractors: specialty workers providing specific skill sets, such as clearing and grubbing, excavations, batch plant operations, and establishment of temporary facilities. Subcontract workers represent a mix of craft, subcontractor management and supervisors, and subcontractor program staff

Based on preliminary staffing estimates:

- approximately 36 percent of preconstruction and pre-COL construction workers are direct field labor
- subcontractors make up approximately 18 percent
- field staff make up approximately 38 percent
- the remaining 8 percent are indirect field labor, workers that perform level-of-effort tasks, such as janitorial support and supplying portable toilets and drinking water to facilities

This workforce distribution is estimated based on current design and continues to evolve through the ongoing design process. These staffing numbers are preliminary and are updated in the COL application as available.

Table 4.4-4 presents the percentages of these labor components for the preconstruction, exemption scope, and LWA scope (to provide labor and analysis data for each of these scopes), and for combined preconstruction and pre-COL construction activities (i.e., consisting of exemption and LWA scopes). Figure 4.4-1 presents a preliminary month-to-month staffing estimate curve for the CFPP preconstruction, exemption, and LWA scopes with estimated total staffing for the combined preconstruction and pre-COL construction activities.

The expanded economic region has a labor force population of approximately 166,926 (LWA ER Table 2.4-28) with approximately 13,942 construction workers (Table 4.4-5) based on 2021 Bureau of Economic Analysis data (Reference 4.4-6). With an average unemployment rate for the counties of the expanded economic region of 3.1 percent (LWA ER Table 2.4-8), approximately 421 construction workers would be available in the region to support the CFPP. The preconstruction, exemption, and LWA activities have specific skill sets that CFPP intends to fill using specialty subcontractors. While some general construction labor and other required workers may be available in the CFPP demographic and economic regions, competition and necessary skill sets drive the need for higher percentages of non-local workers. Table 4.4-4 presents the numbers of construction workers by category, number of in-migrating workers, and population increases related to the project. The percentages of workers relocating with their families are also provided in Table 4.4-4. These data are preliminary and subject to change as the CFPP design progresses. The family size is estimated at 2.7 for in-migrating workers based on U.S. Census Bureau data (Reference 4.4-7), as shown in Table 4.4-6. Family numbers are rounded to the next highest whole number to account for the 2.7 partial-person average. School age children are not specifically evaluated for the preconstruction and pre-COL construction because the change in population is small and resulting changes in student-to-teacher ratios are small (Section 4.4.4.4). Subcontractors are expected to bring their own resources and the CFPP construction contractor brings management, supervision, and program support specialists from its offices around the country.

Based on the analysis of demographic changes to the region from preconstruction, exemption scope, and LWA scope, the impacts are SMALL:

- 166 in-migrating workers and family members for preconstruction
- 28 in-migrating workers and family members for the exemption scope
- 261 in-migrating workers and family members for the LWA scope
- 357 in-migrating workers and family members for the preconstruction and pre-COL construction

The maximum preconstruction and pre-COL construction workforce of 408 workers occurs in month 18 of the preconstruction and pre-COL period, which is the month before the anticipated start of COL construction. The individual maximum workforces for preconstruction, exemption scope, and LWA scope occur in different months. Therefore, in Table 4.4-4, the sum of the individual maximum workforces for preconstruction, exemption, and LWA is greater than the maximum for all three in month 18. The analysis of the workforce uses the individual maximums when evaluating discreet scopes but uses the number of workers for each in the maximum total for workers of 408 in month 18 when assessing the preconstruction and pre-COL construction impacts.

No CFPP operations workers are expected to be on-site during the preconstruction, pre-COL construction, or COL construction. Outage events at the INL site may temporarily increase competition for workers; however, the outage cycle at INL has been ongoing for many years and is expected to have a SMALL impact on CFPP preconstruction, pre-COL construction, and COL construction scopes. The INL facilities are not expected to undergo outages during the CFPP construction time frame, based on input from INL. The CFPP potential outage impacts are discussed in the COL application.

4.4.3 Economic Impacts to the Community

Economic impacts to the community result directly from jobs and taxes coming into the state, region, and communities. Indirect impacts occur from new workers obtaining housing, purchasing items in the area, and preconstruction and construction activities spurring business.

4.4.3.1 Economy

The CFPP is conducting input-output economic modeling using IMPLAN to estimate the increased output (sales), gross regional product, employment, employee compensation, and tax revenues resulting from the preconstruction, construction, and operations of the project. The analysis measures the estimated impacts arising from the preconstruction, pre-COL construction, COL construction, and operation of the CFPP that occurs within the regional economy. Expenditures occurring outside the region are excluded from the analysis. Dates and durations are approximate and subject to change based on the design process. The preconstruction period is estimated to be 18 months; the pre-COL construction period starts with the exemption scope in month 4 of the preconstruction period and runs 15 months. The LWA scope starts in month 8 of the preconstruction and runs 11 months. The preconstruction and pre-COL construction run concurrently and complete in 18 months at which time COL construction begins and continues for 37 months. Preconstruction is slated to start in January 2025 and operations are expected to begin in December 2029. The building activities roadmap is shown in LWA ER Figure 3.3-1. The model results are presented in the COL application.

The economic model is built using an existing INL model platform, refined with CFPP-specific parameters and assumptions. The INL conducts an annual assessment of economic impacts for the region surrounding the INL site. This model incorporates factors and parameters relative to the state of Idaho and the counties impacted by DOE and INL site contractors' presence, spending, and community involvement. Using this relevant model to evaluate CFPP economic impacts leverages the historical data collection and refinement specific to southeastern Idaho while incorporating CFPP details on workforce, local versus non-local resources, timeframes, and construction and operation activities.

Specific information for CFPP in the model for construction activities includes:

- Demographic region consistent with the 14 counties identified in LWA ER Section 2.4.1
- Economic region consistent with the six counties identified in LWA ER Section 2.4.2
- Tax analysis consistent with federal, state, and local requirements based on estimated number of in-migrating workers, property tax burden including applicable exemptions, and valuation of local versus non-local equipment, materials, and supplies
- In-migrating workers and families assumptions based on experience from other construction projects and knowledge of the southeast Idaho economy
- Source of equipment, materials, and supplies relative to the CFPP region

Economic impacts relative to preconstruction include approximately 270 new-to-the-area jobs at wages commensurate with other INL site construction jobs in accordance with the INL Site Stabilization Agreement (SSA) (Reference 4.4-8). The labor posture for CFPP is union for both the subcontracted and direct hire workforce.

4.4.3.2 Taxes

Several types of tax revenues are generated by construction activities:

- sales (state and local), payroll, and business income taxes from vendors of construction-related commodities
- use tax on equipment and materials that do not have sales tax withheld against their purchase
- personal income tax on worker wages
- state and local sales tax on worker expenditures
- business income tax on worker expenditures
- CFPP payroll taxes
- CFPP property taxes
- CFPP federal and state business income tax
- property taxes for worker-purchased housing
- property taxes on improvements made to real property on the site, including buildings, structures, and fixtures
- property taxes on business personal property located at the site

Increased revenues to multiple levels of government are viewed as a benefit to the state and the local jurisdictions in the CFPP region.

4.4.3.2.1 Income Taxes

Idaho imposes tax on taxable income, which is defined in accordance with the Internal Revenue Code's definition (Idaho Code § 63-3011B). The amount of tax liability is calculated using a definition of adjusted gross income that is updated each year to conform with the definition of adjusted gross income in the Internal Revenue Code, with occasional conscious decisions not to conform. The current top individual and single corporate income tax rate is 5.8 percent.

The CFPP workers estimated in Table 4.4-4 pay income tax on their wages. Based on the INL SSA, the average INL site SSA worker had an approximate base rate in 2021 of $36 per hour with average adders for vacation and health and welfare benefits of approximately $17 per hour. Because of the remoteness of the site, the labor agreement stipulates a per day per diem stipend (currently $75) for signatory employees.

The CFPP may be required to pay business income tax in accordance with federal and state laws. Utah Associated Municipal Power Systems is likely exempt from federal and Idaho income taxes based on being a political subdivision of the State of Utah. However, with the creation of CFPP LLC, a Utah limited liability company, federal and state income tax and potential impacts are being evaluated by CFPP and are addressed in the COL application.

4.4.3.2.2 Sales and Use Taxes

Idaho sales tax law defines contractors as the consumers (i.e., end users) of the goods they use. As a result, contractors must pay sales tax on purchases, including equipment, tools, and supplies used to build, improve, repair, or alter real property. Excise taxes are imposed on the purchase, sale, and use of tangible personal property in Idaho at a 6 percent rate (Idaho Code § 63-3619, sales tax, and Idaho Code § 63-3621, use tax). Tangible personal property used to improve real property is subject to sales and use taxes before incorporation into the real property.

Use tax is paid on equipment and materials bought or received where no sales or use tax is included. The use tax is due as soon as the contractor has the right to use or store the property (or has the right to direct someone else to use or store the property).

Sales taxes is paid by workers and their families on their personal purchases. This tax stream is dependent on the individual spending habits of the workers and their families. The in-migrating workers and families bound the tax level as other workers are assumed to work and shop in the area without an increase in tax revenue. Some tax may increase if workers get better jobs or wages with the CFPP.

4.4.3.2.3 Property Taxes

In Idaho, property taxes are imposed by local units of government on real property and on personal property used in a trade or business located within their jurisdiction(s). The state of Idaho itself does not impose taxes on property. Because the CFPP is located within the INL site, which is federally-owned public land, the land is not subject to property taxes. Property taxes are assessed on improvements made to real property on the CFPP site, including buildings, structures, and fixtures, and on business personal property located at the site. This property is assessed at fair market value and subjected to the accumulated tax levies imposed annually by the local units of government where the property is located. Because the CFPP is located entirely within Butte County, the project is subject to the county property tax districts. Based on the Idaho State Tax Commission 2021 Annual Report (Reference 4.4-9), the average 2021 property tax rate for Butte County is 1.675 percent for urban (i.e., taxes paid within incorporated cities that levy property tax) and 1.033 percent for rural areas. The average rates are expressed as percentages of the property's taxable value and include the total taxes levied by taxing districts in the county. Butte County taxing districts are discussed in LWA ER Section 2.4.2.4 and identified in LWA ER Table 2.4-33. Because property tax is levied at the county level, Butte County stands to benefit from the CFPP.

Under an exemption in Idaho Code § 63-4502, the net taxable value of property of a taxpayer is limited to $400 million if

- the property is located within a single county.
- the taxpayer makes a qualifying new capital investment of at least $1 billion in new plant and building facilities at a project site.
- the capital investment occurs during a qualifying period of seven years, regardless of whether it initially was acquired before, during, or after the qualifying period.

This exemption means that property taxes are assessed on a maximum of $400 million, but once that cap is met, property taxes on property values above that amount located within a single county are exempt from taxation. Preliminary analysis indicates the CFPP may qualify for this exemption. Additional exemptions are being evaluated. Property tax values and impacts are assessed in greater detail in the COL application.

Impacts from property taxes are expected to be positive and substantial for Butte County. According to State and Local Tax Burdens, Calendar Year 2022 (Reference 4.4-10), the state and local tax burden for Idaho is 10.7 percent or approximately $5,406 per capita. For an in-migrating population of 347 people, this could equate to approximately $1.8 million of increased revenue to Idaho and the CFPP region. The full effects of income, sales and use, and property tax is provided in the COL application.

4.4.4 Community Infrastructure Impacts

Community infrastructure impacts related to CFPP preconstruction and pre-COL construction are expected to be small because the workforce for these activities is small, as shown in Table 4.4-4. Traffic, recreation, housing, and public services are impacted consistent with the workforce numbers. The COL construction workforce is larger, with a maximum number of workers between 2800 and 2900; impacts from this workforce and the operations workforce are discussed in the COL application.

4.4.4.1 Traffic

Residents in the vicinity of the CFPP and INL sites have been exposed to intermittent temporary increases in traffic from previous construction, cleanup projects, and outages (e.g., Advanced Test Reactor core overhaul outage completed in March 2022) in addition to normal INL operations and local traffic. The magnitude of increased traffic and shift schedules during construction may impact residents. Table 4.4-3 details the approximate starting dates, duration, and the workforce schedule. Preconstruction and pre-COL construction activities overlap and continue for a duration of approximately 18 months (LWA ER Figure 3.3-1). Preconstruction activities occur during the first three months with one shift per day. Shifts are 10 hours per day for five days per week. Residents may notice a slight increase (e.g., average of 106 preconstruction workers) in traffic before and after the end of shift along the main roads: State Highway 33, U.S. Route 20, or U.S. Route 26. The exemption scope commences after the first three months of preconstruction with one night shift averaging 18 workers per shift. Approximately 50 workers from preconstruction work a night shift to support the excavation of the RXB and RWB. An increase of approximately 18 additional vehicles along the main roads to the CFPP is not expected to further impact residents when accumulated with the preconstruction traffic. During the final 11 months of preconstruction and exemption work the LWA begins with an average increase of 171 workers. Approximately one-half of the LWA workers are on the night shift for subsurface soil remediation activities and mud mat installation during the LWA. According to the Idaho Transportation Department (Reference 4.4-11), in 2019, the total annual average daily traffic for State Highway 33, U.S. Route 20, and U.S. Route 26 within the CFPP region was 14,215 vehicles (LWA ER Table 4.8-10). If worker vehicles are on the main commuter roads (e.g., an additional 670 worker vehicles round trip), the 2019 annual average daily traffic would increase by approximately 4.7 percent.

The area of greatest impact from increased CFPP traffic is on State Highway 33 at the intersection of T-11 as this is the only entrance to the CFPP. Improvements to the roadways before the start of preconstruction are described in Section 4.4.1.4. Howe is the closest community along State Highway 33 at approximately 10.4 mi away (LWA ER Table 2.4-2). Butte City and Arco, 9.7 and 12.3 mi from the CFPP respectively, are located on U.S. Routes 20/26 north of State Highway 33 junction, which is approximately 5.9 mi from road T-11. The residents of Butte City and Arco are not affected by the main transportation routes used by workers at the CFPP unless they are also using these main roads south of State Highway 33 for commuting in the mornings and evenings.

Worker and vehicle numbers are approximate and conservative as some workers may ride share resulting in fewer additional vehicles on the roads. Estimated traffic-related accidents, injuries, and fatalities for preconstruction and pre-COL construction are detailed in LWA ER Section 4.8.3.

Based on the distance between CFPP and the closest communities, the estimated traffic-related accidents, injuries, and fatalities, and less than one half percent increase in the annual average daily traffic, the impact to local residents from the increased traffic during preconstruction and pre-COL construction activities is SMALL.

The CFPP site on the DOE Idaho National Laboratory property is segregated from the existing INL operating nuclear facilities. No known outages are expected at INL facilities during the 55-month building period of the CFPP. If INL shuts down a facility for maintenance, the regular workforce performs the work so there is no appreciable change to workforce size, schedule, or traffic impacts. Based on current information, no additional congestion and traffic accident-related consequences from additional work (e.g., outages or operations) performed at the CFPP site are expected during preconstruction, pre-COL construction, and COL construction of the CFPP. Congestion and accident-related consequences of additional traffic from operations and outage workers for projects co-located with an operating nuclear station are SMALL.

Accident-related consequences of additional traffic from the CPP preconstruction and pre-COL construction workers and equipment, materials, and supplies are discussed in LWA ER Section 4.8.3. The estimated average number of workers during preconstruction, exemption, and the LWA, is 106, 18, and 171, respectively, summed a total average of approximately 295 workers commuting daily, rounded up to 300 workers for a total of 600 round trips per day. Approximately 35 deliveries per day of equipment, materials, and supplies during the preconstruction and pre-COL construction totaling of 70 round trips per day. An incremental increase of 4.4, 2.2, and 0.05 accidents, injuries, and fatalities, respectively, is calculated to occur (LWA ER Table 4.8-10). The accident-related consequences from additional CFPP traffic during preconstruction and pre-COL construction is SMALL.

State Highway 33, U.S. Route 20, and U.S. Route 26 operate at a level of service (LOS) D or better (e.g., LOS C) as explained in LWA ER Section 2.8.3. The average annual daily traffic on State Highway 33, U.S. Route 20, and U.S. Route 26 in 2021 totaled 14,215 (LWA ER Table 4.8-10). Upgrades to State Highway 33 and U.S. Route 26, discussed in Section 4.4.1.4, are expected to enable traffic to move more freely at the intersection of State Highway 33 and T-11 and the intersection of U.S. Route 20/26 and State Highway 33. During shift change, the additional 300 workers from the CFPP may possibly change the LOS from D to E along State Highway 33 as a temporary intermittent impact. Per LWA ER Section 2.8.3, the LOS is an average or typical service rather than a constant state. CFPP upgrades roadways and implements traffic control plans to help minimize congestion; thus, the impact from congestion is SMALL.

Overall, the CFPP preconstruction and pre-COL construction impact from traffic to local residents and communities is SMALL.

4.4.4.2 Recreation

LWA ER Section 2.4.1.7 describes the recreational facilities and opportunities in the expanded demographic and economic CFPP regions. Recreational public venues, listed in LWA ER Table 2.4-13, include facilities and lands such as:

- sports arenas and raceways
- forest lands with camping, hunting, fishing, sightseeing, wildlife viewing, and hiking
- wilderness study areas
- a wilderness area
- Craters of the Moon National Monument and Preserve
- wildlife management units
- Camas National Wildlife Refuge
- lakes, reservoirs, and rivers
- museums
- golf courses
- a zoo
- parks
- fairgrounds
- libraries
- swimming pools
- art centers and theaters
- gun and archery ranges
- recreation centers.

The closest recreation facilities are located in Howe and Arco, more than 10 mi from the CFPP site, while other venues range from approximately 18 mi to 80 mi from the site. Many of the venues are located near or within the main population centers of Idaho Falls, Blackfoot, Pocatello, and Rexburg. The forest starts within approximately 2 mi of the site; however, this area is mainly in the foothills.

Forested areas are farther up the Big Lost and Little Lost River valleys and the Birch Creek valley.

Butte City, Arco, and Howe each lie on an access road to the CFPP site. Residents and visitors to these areas may be impacted while driving by the changing visual aesthetic of the CFPP site. Recreational visitors to the Big Lost River foothills area would have an altered view of the area during preconstruction, pre-COL construction, and COL construction. Areas such as the Craters of the Moon and wilderness study areas are at sufficient distance from the CFPP site to have little to no visual impact; though, night work may impact the night sky viewing at the national monument.

Because many workers are expected to be housed in the four main populated cities, the in-migrating workers and families for preconstruction (166 people), exemption scope (31 people), and LWA scope (261 people) (Table 4.4-4) are not anticipated to stress availability or access to public venues. Overall, the preconstruction and pre-COL construction would increase the population in the expanded economic region by approximately 357 workers and their families. The total for the preconstruction and pre-COL construction is not a direct sum of the individual elements as the maximum workers for each element do not occur at the same point in time.

Workers using area recreational vehicle (RV) parks is consistent with available individual park spaces amenities, so impacts are negligible. The RV park housing is discussed in Section 4.4.4.3. Workers attending venues in Arco or Howe could impact smaller venues in these areas; however, small numbers of workers are expected to be housed in these areas compared to the larger numbers in the main cities.

Dust is not likely an aesthetic issue for most of the venues due to distance. State Highway 33 is an area that may be impacted by dust on certain occasions because of three distinct micro-climatic zones. Normal wind direction is southwest to northeast across the INL site. Strong winds account for approximately 9.7 percent of wind patterns. Light to moderate winds have a higher occurrence but are unlikely to significantly push dust for almost a mile to reach the road. LWA ER Section 2.7.1 discusses wind directions, speeds, and frequencies in greater detail.

Overall, impacts to recreational users from preconstruction and pre-COL construction are expected to be SMALL. The smaller workforces combined with mainly federal land ownership in the area and a significant number of natural and public recreational venues provide opportunity for a range of activities that can accommodate the added usage. Aesthetic impacts are limited to a small impact area around State Highway 33. Users traveling this road are accustomed to seeing INL site facilities.

No timber or mineral resources are extracted from the CFPP region to support the CFPP preconstruction and pre-COL construction activities, so impacts are SMALL for these resources. Materials extracted from CFPP preconstruction, such as soil and rock, are used as structural or non-structural fill and on road, laydown yard, and fabrication area surfaces. These materials would be unavailable for other INL site users. However, the loss-of-use impact is SMALL due to the size of the INL site and availability of similar materials.

4.4.4.3 Housing

The expected number of in-migrating workforce members is presented in Table 4.4-4 with the analysis of number of workers bringing family members and the family size. Table 4.4-7 describes the family residential geographical distribution among the six counties of the expanded economic region. The remaining counties in the expanded demographic region have small populations; small, distant communities; represent effluent retirement communities; or longer, arduous routes to reach the CFPP site. Therefore, the analysis of housing focuses on the expanded economic region. The spread of in-migrating workers and families is based on the current population as a percentage of the county-specific population to the total expanded economic region population, as shown in Table 4.4-7.

Preconstruction and pre-COL construction workers are anticipated to use a combination of RV parks with personal vehicles, lower-cost apartments, and long-term stay motels because of the shorter durations of these activities. Workers that bring families are likely to use personal recreational vehicles or rent available houses or apartments. Under Reference 4.4-8, craft workers are entitled to per diem. The per diem provides approximately $75 per day under the current SSA that expands housing options and incentives for workers to engage in work away from their normal residence.

For preconstruction, the peak number of workers occurs before indirect field labor is required on the project. A maximum of five indirect field labor workers are anticipated in early staffing estimates, but these workers are needed later in the preconstruction period, after the peak preconstruction employment. Field staff supporting preconstruction are expected to be longer-term employees of the CFPP construction contractor; these workers are pulled from corporate offices around the United States with a larger in-migrating percentage. Subcontractors performing preconstruction are also expected to draw workers from their home or other locations in the United States.

The exemption scope occurs across approximately 15 months and is performed by a specialty subcontractor bringing skilled workers with the contract. Additionally, some field staff and indirect field labor support the effort.

For the LWA scope, direct field labor and field staff make up the largest portion of the workforce. While about half of the direct field labor workers are expected to in-migrate and are not anticipated to bring their families. These are workers used to travelling for work and not likely to uproot their families for each new job. Similarly, field staff, indirect field labor, and subcontract workers are expected to generally travel for work without their families, as presented in Table 4.4-4.

Based on experience of the CFPP construction contractor, construction workers often leverage available RV parks by using personal RVs. To better understand the seasonal availability, options for expansion, and constraints on length of stay, CFPP contacted regional parks for input.

The 26 parks that responded to CFPP calls had a total of 918 RV spaces, but only 7 parks were open year-round with a total of 221 spaces providing services through the winter and 181 available as long-term spaces. One park in Mackay with year-long, long-term spaces is considering expanding the number of spaces but did not have specific details. Another RV park is closing and may not be reopened. One summer-only park is planning to expand while one summer-only park is considering conversion to year-round availability. Several parks indicated renting to construction workers; two of these parks noted behavior issues with their construction-worker renters. The CFPP construction contractor has experienced past entrepreneurial startups of RV parks on large construction projects that may be an opportunity for CFPP workers.

LWA ER Table 2.4-22 provides information on housing occupancy in the expanded economic region. Table 4.4-8 summarizes housing availability for the region and the associated counties. The table shows that housing is likely adequate to accommodate the 357-person increase in the population based on the total vacant housing units and the number of housing units available for rent. Considering that a portion of the in-migrating workers and families are expected to live in RV parks, the overall impact on housing is SMALL. No additional construction appears to be required to house the preconstruction and pre-COL construction workforce. The main communities of Idaho Falls, Pocatello, Blackfoot, and Rexburg provide hotels with long-term stay options. Additionally, smaller communities may provide a limited number of additional hotel or motel rooms that can be accessed for longer terms.

4.4.4.4 Public Services

Preconstruction and pre-COL construction have minimal impact on services in the expanded economic region. Changes to service requirements are provided in the following data tables.

- Table 4.4-9 for public water systems shows the change in population served is below the capacity for the region and for each county.
- Table 4.4-10 for sanitary wastewater shows approximately a 0.1 percent increase in the resident-to-flow ratio between current flow conditions and those resulting from the increased population of in-migrating workers and families; the population change remains well below the design capacity for the region and counties.
- Table 4.4-11 compares the current resident to law enforcement officer ratio with the resulting ratio based on the population with in-migrating workers and their families resulting in approximately 0.1 percent change; Table 4.4-12 provides a similar comparison for firefighters with a maximum of 0.16 percent

ratio increase in Bonneville County. The other counties range from 0.04 percent to 0.12 percent ratio change with 0.13 percent change for the region.

- Table 4.4-13 looks at hospitals and doctors. Both result in minor changes of approximately 0.1 percent ratio changes for the counties and region.
- Table 4.4-14 addresses the changes in student-to-teacher ratios. Similarly, these ratios change by approximately 0.1 percent, ultimately reflecting a small change in population at the county and regional levels.

The impacts to services from the in-migrating workers and their families are SMALL for the preconstruction and pre-COL construction. Services are not evaluated individually for preconstruction, exemption scope, and LWA scope because the analysis of the combined scope provides a conservative estimate that is larger than any of these separately. The impacts are SMALL at the combined level, indicating impacts for the individual elements would be SMALL also.

4.4.5 References

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Table 4.4-1: Socioeconomics Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Preconstruction				
Mobilize and Establish Site	Mobilize site excavation and grading contractor (including equipment)	SMALL	• 64 decibels at Highway 33/T-11 intersection (1.1 mi) (LWA ER Section 4.8.2) • Dust and exhaust emissions from transporting, unloading, and staging equipment • Visual change from undisturbed desert area to industrial construction site as seen from State Highway 33 • Increased traffic at Highway 33/T-11 intersection and at Big Lost River rest area • Access roads rated for expected equipment hauling loads	• Implement traffic control and dust control plans and measures (e.g., traffic warning signs; publish notices to public for increased traffic periods, water application for dust) • Follow equipment staging plan • Limit equipment idle time to reduce emission • Optimize equipment movement to limit number of vehicles required • Optimize loads to comply with road weight limits

Table 4.4-1: Socioeconomics Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Prepare Site (clearing, grubbing, grading, is excavation)	Remove and stockpile vegetation, alluvial soils, and basaltic rock; establish roads and parking; grade and level surface	SMALL	• 143 worker maximum employment; 106 average employees over 18 months; minimal impacts on regional housing, services, and recreational venues relative to workforce level • Closest residents, schools, medical facilities, and other receptors are more than 9 mi from CFPP; limited noise, dust, and exhaust impacts because of distance, topography, and vegetation attenuation • Visually appears as industrial site from Highway 33 and nearby BLM and USFWS lands; not within view of recreational uses of forests that are located farther up the river valleys • No visible impacts to residents, schools, medical facilities because of distance • No expected vibratory impacts to INL site or off-site structures due to distance from CFPP site • Potential competition with INL site construction activities for workers, equipment, and materials consistent with workforce levels, especially with INL site construction projects • Job opportunities in region and increased tax revenue support community and economic development	• Use dozer to fracture surface rock if needed; avoid noise and vibration from surface blasting • Implement dust control plan and measures (e.g., water application, chemical soil treatments if needed) • Implement traffic control and measures; restrict on-site vehicle speeds to reduce dust generation • Limit equipment idling time to reduce emissions • Conduct regular inspections and preventive maintenance on equipment • Use site materials, such as rock and soil, for work surfaces to reduce dust generation • Encourage ride sharing • Leverage local housing and real estate companies to support identification of worker housing • Proactively work with RV parks to identify available spaces and provide information to workers • Alert INL field management of potential for noise and vibration

Table 4.4-1: Socioeconomics Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Temporary Facilities and Utilities	Establish temporary facilities- office, medical, training trailers; sanitary and craft facilities; warehouses	SMALL	• Lower noise, dust, and emissions from small footprints and initial removal of vegetation and soil with site preparation activities; temporary and intermittent impacts • Minor progression of visual change to industrial site with buildings (e.g., tents, trailers, building construction) • Limited vibrations from these activities	• Continue mitigations and controls implemented during site preparation • Dispose or recycle waste in approved off-site location • Identify niche work scopes for local businesses, such as security, temporary sanitary facilities and maintenance, and fencing.
	Install temporary power, water, and communications			
	Install security provisions			
Establish Laydown Yards and Fabrication Areas	Establish laydown and fabrication yards, including fencing, controlled entries, equipment receiving and maintenance yard	SMALL	• Noise associated with gravel placement and compaction using dump trucks (43 dBA at Highway 33/T-11 intersection), compactors (38 dBA), and loaders (33 to 39 dBA) • Dust from emplacing crushed aggregate and exhaust from heavy equipment used to move materials and lay and compact surfaces; temporary and intermittent activities with limited impacts	• Continue mitigations and controls implemented during site preparation • Place gravel, aggregate, pavement, or concrete as appropriate on work surfaces to reduce dust • Identify niche work scopes for local businesses, such as fencing
Establish Rock Crushing and Concrete Batch Plant Facilities	Establish rock crushing, staging areas, and equipment	SMALL	• 49 dBA at Highway 33/T-11 intersection from vibratory rock crusher • Dust, exhaust, and visual impacts limited to crushing area near plant site, temporary activities	• Continue mitigations and controls implemented during site preparation
	Establish batch plant, staging, truck parking areas, and washouts		• 42 dBA at Highway 33/T-11 intersection from concrete batch plant • Dust, exhaust, and visual impacts limited to batch area	• Continue mitigations and controls implemented during site preparation • Comply with batch plant permit requirements

Table 4.4-1: Socioeconomics Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Excavate Foundations and Trenches	Excavate RXB and RWB foundations	SMALL	• Impacts comparable to site preparation • Potential for controlled explosions on RXB and RWB to advance excavation; vibrations not expected to impact on-site or off-site structures due to distance	• Continue mitigations and controls implemented during site preparation • Provide proactive notifications of explosions to workers and INL field management
	Excavate BOS foundations- TGB, ACCS, CUB, Annex Building, SCWS, and Transmission Structure			
	Excavate trenches; install bedding, piping, and utilities; backfill			
Pre-Combined License Construction				
Exemption	Install rock bolts in RXB and RWB excavations	SMALL	• 23 worker maximum employment; 18 average employees over 15 months; small work force limits demographic impacts • Limited visual impacts due to deep excavation • Scope conducted on night shift with potential for visual impacts from lights; workface for most of activity would be at depth with minimal impact to receptors at the Highway 33/T-11 intersection, especially at night • Blasting, if conducted, would use drilling method to emplace blasting material that provides attenuation of blast noise; LWA ER Section 4.8.2 and Table 4.8-9 provide additional information on noise associated with different types of equipment and construction activities	• Continue mitigation and controls implemented during site preparation • Activities overlap preconstruction; limited additional disruption with this activity • Limit surface lighting as practicable; use downward facing lighting when needed
	Apply fibermesh/ shotcrete for RXB and RWB excavations			

Table 4.4-1: Socioeconomics Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Limited Work Authorization	Conduct soft or fractured rock remediation	SMALL	• 319 worker maximum employment; 171 worker average employment over 11 months • Potential competition for housing and recreational vehicle sites results in small impact from size of work force and short duration of activity • Some scope may be conducted on night shift with potential for visual impacts from lights; workface at depth with minimal impact to receptors at the Highway 33/T-11 intersection, especially at night • Noise attenuated by depth of work activities • Blasting, if conducted, would be done at depth with associated noise attenuation	• Continue mitigation and controls implemented during site preparation • Activities overlap preconstruction; limited additional disruption with this activity • Work front is deep, so noise and dust are reduced at the CFPP surface and at exposure points for residents, schools, and recreational users • Limit surface lighting as practicable; use downward facing lighting when needed
	Install RXB mud mat, rebar, and permanently embedded items			

[1] SMALL- Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered SMALL.
MODERATE- Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
LARGE- Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

[2] CFPP follows license and permit requirements and associated project-specific plans for preconstruction and pre-COL construction activities.

ACCS - air cooled condenser system
BOS - balance of site
CUB - Central Utilities Building
dBA - A-weighted decibel
RWB - Radioactive Waste Building
RXB - Reactor Building
SCWS - site cooling water system
TGB - Turbine Generator Building

Table 4.4-2: Socioeconomic Resource Impacts Assessment for Preconstruction and Pre-Combined License Construction

Parameter	Possible Effect	Description	Mitigation Approach
Physical Impacts			
Noise	• Noise impacts are SMALL to nearby residents and recreational users because of distance from the CFPP site	• 64 dBA at Highway 33/T-11 intersection (1.1 mi) • Less than 50 dBA at other evaluated locations (LWA ER Table 4.8-9)	• Implement noise control plan and measures, such as mufflers • Limit equipment use near Highway 33/T-11 intersection and site boundary with Highway 33 • Regularly conduct preventative maintenance on equipment • Limit equipment idling time
Air Quality	• Air quality impacts are SMALL for nearby residents and recreational users because of distances from the CFPP site and implementation of project plans and controls	• Prevailing wind direction is southwest to northeast at CFPP sites. Closest residents are southwest or northwest of the site at distances of more than 9 mi. • Asthma is a health concern for Butte County, especially with prevalence of wildfires • LWA ER Section 4.7 and Section 4.8 provides additional information on air quality impacts	• Limit equipment use near Highway 33/T-11 intersection and site boundary with Highway 33 • Limit equipment idle time to reduce emissions and noise • Restrict on-site vehicle speed • Use low sulfur diesel fuel in equipment where possible • Implement dust control plan and measures, such as water suppression and chemical soil treatments • Implement fire protection plan; coordinate with INL on fire prevention and control protocols • Conduct regular inspections and preventative maintenance on equipment • Encourage worker car pooling • Use compacted granular material for project roads
On-site and Off-site Structures	• Structure impacts from preconstruction and pre-COL construction vibrations are SMALL because of the distances to nearby facilities, public, and residential buildings	• Nearby structures are more than 5 mi from CFPP site • Sources indicate propagation distances of vibrations that cause structural damage are generally less than 1300 ft	• Notify INL site facilities before starting preconstruction activities or explosive activities • Limit vibration-inducing activities to daylight hours when possible

Table 4.4-2: Socioeconomic Resource Impacts Assessment for Preconstruction and Pre-Combined License Construction (Continued)

Parameter	Possible Effect	Description	Mitigation Approach
Transportation	• Transportation impacts are SMALL because loads comply with road weight limits and turn lanes are to be installed for safety	• Major access roads are rated for heavy loads • Intersection between Highway 33 and T-11 realigned to permit safe turning of large and long loads; evaluating turn lanes and road widening at intersection • New heavy haul road from near Highway 33/ T-11 intersection to plant site and construction areas (LWA ER Figure 4.1-1) • T-11 upgrades to allow vehicle access to plant site • New construction roads (e.g., gravel) to allow access to construction areas and stormwater ponds	• Adhere to traffic plan • Coordinate large or potentially disruptive transport activities with local transportation and law enforcement authorities • Post traffic warning signs • Optimize equipment movement to limit number of vehicles required • Optimize loads to comply with road weight limits
Viewshed	• Viewshed impacts are SMALL because distances and topography limit view of preconstruction and pre-COL construction equipment, such as cranes • People using public roads are accustomed to seeing INL site facilities • Controls in place to mitigate night work impacts	• Cranes are used in preconstruction and construction activities; may be visible from Highway 33/T-11 intersection and foothill areas of Lost River Range; not expected to be visible beyond these areas • Lights used for night/dark shift work could alter visual resources and impact dark sky resources	• Minimize surface lighting as practicable during night shift • Use downward facing lighting when needed • Control dust through water suppression and use of compacted granular material on roads • Restrict on-site vehicle speeds • Curtail excavation work during high wind periods • Limit night work as much as possible
Demographic Impacts			
Workforce	• SMALL for preconstruction and pre-COL	• Preconstruction workers - 143 maximum; 106 average • Exemption scope workers - 23 maximum; 18 average • LWA scope workers - 319 maximum; 171 average	• Recruit local workers where practicable considering required skill levels for specific jobs

Table 4.4-2: Socioeconomic Resource Impacts Assessment for Preconstruction and Pre-Combined License Construction (Continued)

Parameter	Possible Effect	Description	Mitigation Approach
Residential Distribution	• Impacts to residential distribution are SMALL because of small workforces for preconstruction and pre-COL construction	• High demand for construction workers in region could limit resource availability • Equipment and material requirements may exceed regional availability, resulting in larger import of supplies from outside the region • Majority of workers expected to come from outside CFPP region • Workers from within the region are expected to come mainly from the population centers in the expanded economic region (i.e., Idaho Falls, Pocatello, Blackfoot, and Rexburg) • Eastern Idaho is experiencing significant growth • Construction workers are anticipated to leverage use of personal recreational vehicles and housing sharing to optimize per diem benefits based on experience with similar construction projects	• Encourage ride sharing • Leverage local housing and real estate companies to support identification of worker housing
In-migrating Family Characteristics	• Impacts from in-migrating families are SMALL for preconstruction and pre-COL construction	• Of preliminary maximum preconstruction and pre-COL workforce of 408, estimated 270 are in-migrating workers bringing an estimated 87 family members (Table 4.4-4) • Minimal impacts from preconstruction and pre-COL construction workforce and associated families on housing, schools, recreation, medical, and services (Table 4.4-4 through Table 4.4-14)	• Assume craft workforce receives per diem per labor agreement

Table 4.4-2: Socioeconomic Resource Impacts Assessment for Preconstruction and Pre-Combined License Construction (Continued)

Parameter	Possible Effect	Description	Mitigation Approach
Co-located Projects	• Impacts to co-located projects are SMALL	• Ongoing operations at the INL site are focused on DOE missions and are currently staffed; CFPP impacts on or from these operations are not expected • No operating power stations co-located with CFPP • Building activities on the INL site during the CFPP construction time frames could compete for workers, materials, and equipment; a number of small modular reactor projects are being proposed for construction on the INL site (ER Chapter 7 for additional information) • Opportunity to obtain nuclear construction workers from INL site construction projects or to provide workers to those projects, depending on schedule and needs	• Monitor ongoing construction activities on the INL site and coordinate with DOE and its contractors to maintain current understanding on INL site project schedules, including outages • Leverage INL site outages to obtain short-term workers as needed • Share job openings and excess resources with INL leadership to avoid layoffs and maximize use of available skilled workers
Economic Impacts			
Economy	• Economic impacts for preconstruction and pre-COL construction are SMALL	• 270 jobs created in regional economy • Subcontract opportunities for regional businesses	• Hire local resources consistent with required skill levels • Subcontract locally for supplies, equipment, and services consistent with business availability and capability • Additional details provided in the COL application
Income taxes	• Income tax impacts are expected to be SMALL during preconstruction and pre-COL construction based on 270 new jobs for in-migrating workers	• Income taxes paid to state coffers and distributed to counties • Idaho imposes 5.8% top income tax rate on individuals and single corporations	• Income tax impacts are expected to be beneficial for the state and local economy consistent with number of new jobs and expected worker wages • Comply with federal, state, and local tax laws, using available exemptions where appropriate • Additional details provided in the COL application
Sales and use taxes	• Sales and use tax impacts are expected to be positive and SMALL to MODERATE for preconstruction and pre-COL construction	• 6% excise tax on purchase, sale, and use of tangible personal property	• Sales and use taxes are expected to be beneficial for the state and local economy • Hire and subcontract locally when viable • Comply with federal, state, and local tax laws, using available exemptions where appropriate • Additional details provided in the COL application

Table 4.4-2: Socioeconomic Resource Impacts Assessment for Preconstruction and Pre-Combined License Construction (Continued)

Parameter	Possible Effect	Description	Mitigation Approach
Property Taxes	• Property tax impacts are expected to be SMALL to MODERATE for Butte County	• Idaho property tax imposed by local government units on real property and on personal property used in trade or business • CFPP is located on INL site, a federally-owned public land, so land is not subject to property taxes • Property taxes are charged on improvements to the land, such as buildings, structures, and fixtures and on business personal property located at the site • May be eligible for Idaho Code 63-4502 exemption, limiting net taxable value of property to $400 million or other exemptions	• Property tax impacts are expected to be beneficial to Butte County as the recipient of property tax through Idaho's tax process • Comply with federal, state, and local tax laws, using available exemptions where appropriate • Additional details provided in the COL application
Community Infrastructure Impacts			
Traffic	• Traffic impacts are SMALL for preconstruction and pre-COL construction	• Smaller workforces minimally impact access roads and communities; workers are anticipated to be housed in the population centers of Idaho Falls, Pocatello, Blackfoot, and Rexburg with some workers leveraging personal RVs in vicinity and regional parks • Preconstruction and pre-COL construction worker transportation impacts marginally increase traffic on access roads	• Encourage ride sharing • Implement traffic control and measures • Implement a health, safety, and environment plan that incorporates safe driving requirements
Recreation	• Recreation impacts are SMALL	• CFPP vicinity and region mainly Federal lands with forests, a national monument, and numerous recreational venues • CFPP site access is restricted by INL access controls; no recreational activities occur on the site • Workforce levels provide minor additional demand on forest access and public venues • Tax revenue may be used to enhance recreational venues	• Prohibit work-related entry of off-site or foothill areas with motorized equipment to prevent disruption of recreational users • Limit equipment use near Highway 33/T-11 intersection unless warranted to limit disruption to recreational users in the Lost River Range foothills

Table 4.4-2: Socioeconomic Resource Impacts Assessment for Preconstruction and Pre-Combined License Construction (Continued)

Parameter	Possible Effect	Description	Mitigation Approach
Housing	• Housing impacts are SMALL for preconstruction and pre-COL construction	• Housing availability in area consistent with smaller workforce for preconstruction and pre-COL construction • RV parks may experience winter closure and high summer demand, impacting workers that use personal RVs for housing	• Leverage local housing and real estate companies to support identification of worker housing
Public Services	• Added tax revenue may support enhanced services, service jobs, and service availability • Public service impacts for preconstruction and pre-COL construction are SMALL	• Impacts are consistent with small work force for preconstruction and pre-COL construction • Services are available in expanded economic region population centers where workers are anticipated to live	• No mitigation identified

Table 4.4-3: Workforce Size and Fluctuation, Work Schedule, and Shifts

Parameter	Preconstruction	Pre-Combined License Construction		Assumptions
		Exemption Scope	LWA Scope	
Starting Date	• January 2025	• April 2025	• August 2025	• Exemption issued April 2025 • LWA issued August 2025 • Start dates are approximate
Duration (months)	• 18	• 15	• 11	• Durations are estimated
Workforce Schedule	• 5 days per week • 10 hours per day • 2 shift per day for RXB and RWB excavation • 1 day shift for remaining preconstruction activities	• 5 days per week • 10 hours per day • 1 night shift	• 5 days per week • 10 hours per day • 1 day shift • Potential for night shift for mud mat and remediation activities with approximately half of the average 171 workers on night shift.	• Select overtime and make-up days on weekends as needed for each scope period
Monthly Workforce Fluctuation	• Figure 4.4-1 • Maximum - 143 workers • Average - 106 workers	• Figure 4.4-1 • Maximum - 23 workers • Average - 18 workers	• Figure 4.4-1 • Maximum - 319 workers • Average - 171 workers	• Workforce includes direct and indirect field labor, field staff, and subcontractors
Peak Workforce Reductions	• Figure 4.4-1 • 143 to 86 between August and November 2025	• Figure 4.4-1 • 23 to 18 from December 2025 to January 2026	• Figure 4.4-1 • None	• Preconstruction and pre-COL maximum workforce occurs in month 18 before start of COL construction
On-site Operations Personnel During Building	• Not expected	• Not expected	• Not expected	• No operations personnel on-site until systems are built to the stage to begin flushing and pre-operational testing

Table 4.4-4: Construction Workforce, In-Migrating Workers and Families, and Population Increase for Preconstruction, Exemption Scope, and Limited Work Authorization Scope

Construction Workforce	Maximum Number of Workers[1]	Percent of Workers	Percent of In-Migrating Workers	Number of In-Migrating Workers	Number of Family Members[2]	Total In-Migrating Population
Total Peak Preconstruction Workforce	***143***			***109***	***57***	***166***
Direct Field Labor	0	0%	0%	0	0	0
Field Staff	43	30%	80%	34	18	52
Indirect Field Labor	0	0%	0%	0	0	0
Subcontractors	100	70%	75%	75	39	114
Total Peak Exemption Workforce	***23***			***18***	***13***	***31***
Direct Field Labor	0	0%	0%	0	0	0
Field Staff	2	9%	100%	2	4	6
Indirect Field Labor	1	4%	50%	1	1	2
Subcontractors	20	87%	75%	15	8	23
Total Peak LWA Workforce	***319***			***202***	***59***	***261***
Direct Field Labor	145	45%	50%	73	0	73
Field Staff	108	34%	80%	86	45	131
Indirect Field Labor	26	8%	50%	13	3	16
Subcontractors	40	13%	75%	30	11	41
Total Preconstruction and Pre-COL Construction Workforce[3]	***408***			***270***	***87***	***357***
Direct Field Labor	145	36%	50%	73	0	73
Field Staff	156	38%	80%	125	64	189
Indirect Field Labor	32	8%	50%	16	3	19
Subcontractors	75	18%	75%	56	20	76

[1] Figure 4.4-1.

[2] Family members are calculated based on an average family size of 2.7 individuals from LWA ER Table 4.4-3. Values are rounded up to account for partial-person average.

[3] The maximum total preconstruction, exemption, and LWA workforce occurs in month 18 of the preconstruction period when preconstruction, exemption, and LWA activities are concurrent. The maximum number of workers for preconstruction, exemption, and LWA occur at different times. therefore, the maximum of 408 workers cannot be determined by adding the maximum for each. As shown on Figure 4.4-1, the maximum for preconstruction occurs in month 8, for exemption in month 12, and for LWA in month 18, which corresponds to the maximum for the three scopes of 408 workers.

Table 4.4-5: Construction Worker Availability in Expanded Economic Region

Region or County	Construction Workers[1]	Unemployment Rate[2]	Available Construction Workers
Bannock	3239	3.6%	117
Bingham	1895	3.2%	61
Bonneville	5753	2.9%	167
Butte	62	3.8%	2
Jefferson	1645	2.7%	44
Madison	1348	2.2%	30
Expanded Economic Region	13942	3.1%	421

[1] Reference 4.4-6.

[2] LWA ER Table 2.4-28.

Table 4.4-6: In-Migrating Worker Family Size Estimation

Region or County	Household Type[1]								Weighted Average Family Size
	Total	1 person	2 person	3 person	4 person	5 person	6 person	7+ person	
Bannock	31,669	9203	10,897	4690	3049	1957	1178	695	2.5
Bingham	15,612	3601	5043	2111	1849	1646	713	649	2.8
Bonneville	40,946	1,275	13,334	6081	4426	3638	1815	1377	2.7
Butte	966	331	380	160	32	31	12	20	2.1
Jefferson	8825	1364	3219	1128	1135	903	565	511	3.1
Madison	11,858	1393	4931	1670	1226	1040	1120	478	3.1
Expanded Demographic Region	109,876	26,167	37,804	15,840	11,717	9215	5403	3730	2.7

[1] Reference 4.4-7

Table 4.4-7: In-Migrating Worker Geographic Distribution

Region or County	Employed Population[1]	Percentage Relative to Expanded Economic Region	In-Migrating Preconstruction Workers	In-Migrating Exemption Workers	In-Migrating LWA Workers	In-Migrating Preconstruction and Pre-COL Construction Workers	Number of In-Migrating Workers and Families[2]
Expanded Economic Region	161,916	100%	109[2]	18[2]	202[2]	270[2,3]	357[2,3]
Bannock	41,215	25%	28	4	51	69	91
Bingham	23,503	15%	16	2	29	39	52
Bonneville	58,722	36%	40	6	73	98	129
Butte	1392	1%	1	0	2	2	3
Jefferson	14,274	9%	10	1	18	24	31
Madison	22,810	14%	15	2	28	38	50

[1] LWA ER Table 2.4-28.

[2] Table 4.4-4.

[3] The maximum total preconstruction, exemption, and LWA workforce occurs in month 18 of the preconstruction period when preconstruction, exemption, and LWA activities are concurrent. The maximum number of workers for preconstruction, exemption, and LWA occur at different times. therefore, the maximum of 408 workers cannot be determined by adding the maximum for each. As shown on Figure 4.4-1, the maximum for preconstruction occurs in month 8, for exemption in month 12, and for LWA in month 18, which corresponds to the maximum for the three scopes of 408 workers. The distribution is calculated based on the Total Preconstruction and Pre-COL Construction Workforce numbers from Table 4.4-4.

Table 4.4-8: Housing Availability in the Expanded Economic Region[1]

Housing Type	County						Expanded Economic Region
	Bannock	Bingham	Bonneville	Butte	Jefferson	Madison	
Total Housing Units	34,550	16,895	43,734	1,292	9,586	14,680	120,737
Total Vacant Housing Units	2881	1283	2788	326	761	2822	10861
Vacancy Rate	8.34%	7.59%	6.37%	25.23%	7.94%	19.22%	9.00%
Housing Units Available for Rent	785	210	626	57	9	1978	3665
Housing Units Rented (Not Occupied)	142	86	126	10	5	254	623
Housing Units for Sale Only	277	206	282	33	28	138	964
Housing Units Sold (Not Occupied)	64	68	154	21	52	96	455
Housing Units for Seasonal, Recreational, or Occasional Use	635	203	848	23	42	30	1781
Housing Units for Migrant Workers	0	97	0	0	161	26	284
Other Vacant Housing Units	978	413	752	182	464	300	3089

[1] LWA ER Table 2.4-22.

Table 4.4-9: Impact of In-Migrating Workers and Families on Economic Region Public Water Systems

Region or County	Population Served by Systems[1]	Additional Population Due to CFPP[2]	New Population with In-Migrating Workers and Families	Current Capacity of Water Systems[1]
Expanded Economic Region	279,210	357	279,567	452,650
Bannock	77,006	91	77,097	109,700
Bingham	27,987	52	28,039	52,500
Bonneville	115,145	129	115,274	177,700
Butte[3]	5763	3	5766	23,500
Jefferson	10,231	31	10,262	23,000
Madison	43,078	50	43,128	66,250

[1] LWA ER Table 2.4-40.

[2] Table 4.4-4.

[3] Includes water systems at the INL site.

Table 4.4-10: Impact of In-Migrating Workers and Families on Economic Region Sanitary Wastewater Systems

Region or County	Population[1]	Additional Population Due to CFPP[2]	New Population with In-Migrating Workers and Families	Existing Total Flow (millions of gallons per day)[3]	Current Resident to Flow Ratio	Resident to Flow Ratio with In-Migrating Workers and Families	Present Design Total Flow (millions of gallons per day)[3]	Residents Present System Designed to Handle[3]
Expanded Economic Region	345,352	357	345,709	25.418	13,587	13,601	43.0	584,780
Bannock	87,018	91	87,109	7.44	11,696	11,708	11.57	135,322
Bingham	47,992	52	48,044	3.85	12,465	12,479	8.93	111,317
Bonneville	123,964	129	124,093	10.66	11,629	11,641	17.0	197,691
Butte	2574	3	2577	0.211	12,199	12,214	0.29	3538
Jefferson	30,891	31	30,922	0.817	37,810	37,849	1.65	62,387
Madison	52,913	50	52,963	2.44	21,686	21,706	3.6	78,068

[1] LWA ER Table 2.4-4.

[2] Table 4.4-4.

[3] LWA ER Table 2.4-42.

Table 4.4-11: Impact of In-Migrating Workers and Families on Economic Region Law Enforcement

Region or County	Population[1]	Additional Population Due to CFPP[2]	New Population with In-Migrating Workers and Families	Total Number of Officers (Sworn and Civilian)[3]	Current Residents per Officer	Residents per Officer with Additional Population	Percent Change in Ratios
Expanded Economic Region	345,352	357	345,709	967	357.1	357.5	0.10%
Bannock	87,018	91	87,109	289	301.1	301.4	0.10%
Bingham	47,992	52	48,044	158	303.7	304.1	0.11%
Bonneville	123,964	129	124,093	327	379.1	379.5	0.10%
Butte	2574	3	2577	14	183.9	184.1	0.12%
Jefferson	30,891	31	30,922	68	454.3	454.7	0.10%
Madison	52,913	50	52,963	111	476.7	477.1	0.09%

[1] LWA ER Table 2.4-4.

[2] Table 4.4-4

[3] LWA ER Table 2.4-43.

Table 4.4-12: Impact of In-Migrating Workers and Families on Economic Region Firefighters

Region or County	Population Protected[1]	Additional Population Due to CFPP[2]	New Population with In-Migrating Workers and Families	Total Number of Firefighters (Career and Volunteer)[1]	Current Residents per Firefighter	Residents per Firefighter with Additional Population	Percent Change in Ratios
Expanded Economic Region	273,304	357	273,661	967	282.6	283.0	0.13%
Bannock	76,856	91	76,947	131	586.7	587.4	0.12%
Bingham	42,257	52	42,309	139	304.0	304.4	0.12%
Bonneville	77,760	129	77,889	168	462.9	463.6	0.17%
Butte	8500	3	8503	110	77.3	77.3	0.04%
Jefferson	27,931	31	27,962	112	249.4	249.7	0.11%
Madison	40,000	50	40,050	70	571.4	572.1	0.13%

[1] LWA ER Table 2.4-34.

[2] Table 4.4-4.

Table 4.4-13: Impact of In-Migrating Workers and Families on Economic Region Doctors and Hospitals

Region or County	Population[1]	Current Resident to Doctor Ratio[2]	Additional Population Due to CFPP[3]	New Population with In-Migrating Workers and Families	New Resident to Doctor Ratio	Percent Change in Doctor Ratios	Current Resident-Staffed Bed Ratio	New Resident-Staffed Bed Ratio	Percent Change in Bed Ratios
Expanded Economic Region	345,352	586	357	345709	587	0.10%	428.5	428.9	0.10%
Bannock	87,018	456	91	87,109	456	0.10%	497.2	497.8	0.10%
Bingham	47,992	318	52	48,044	318	0.11%	210.5	210.7	0.11%
Bonneville	123,964	855	129	124,093	856	0.10%	410.5	410.9	0.10%
Butte	2574	74	3	2577	74	0.12%	59.9	59.9	0.12%
Jefferson	30,891	0	31	30,922	0	N/A	0	0	N/A
Madison	52,913	790	50	52,963	790	0.09%	912.3	913.2	0.09%

[1] LWA ER Table 2.4-4.

[2] LWA ER Table 2.4-45 lists current number of doctors and staffed beds included in ratio calculations.

[3] Table 4.4-4.

N/A - Not applicable

Table 4.4-14: Impact of In-Migrating Workers and Families on Economic Region Schools

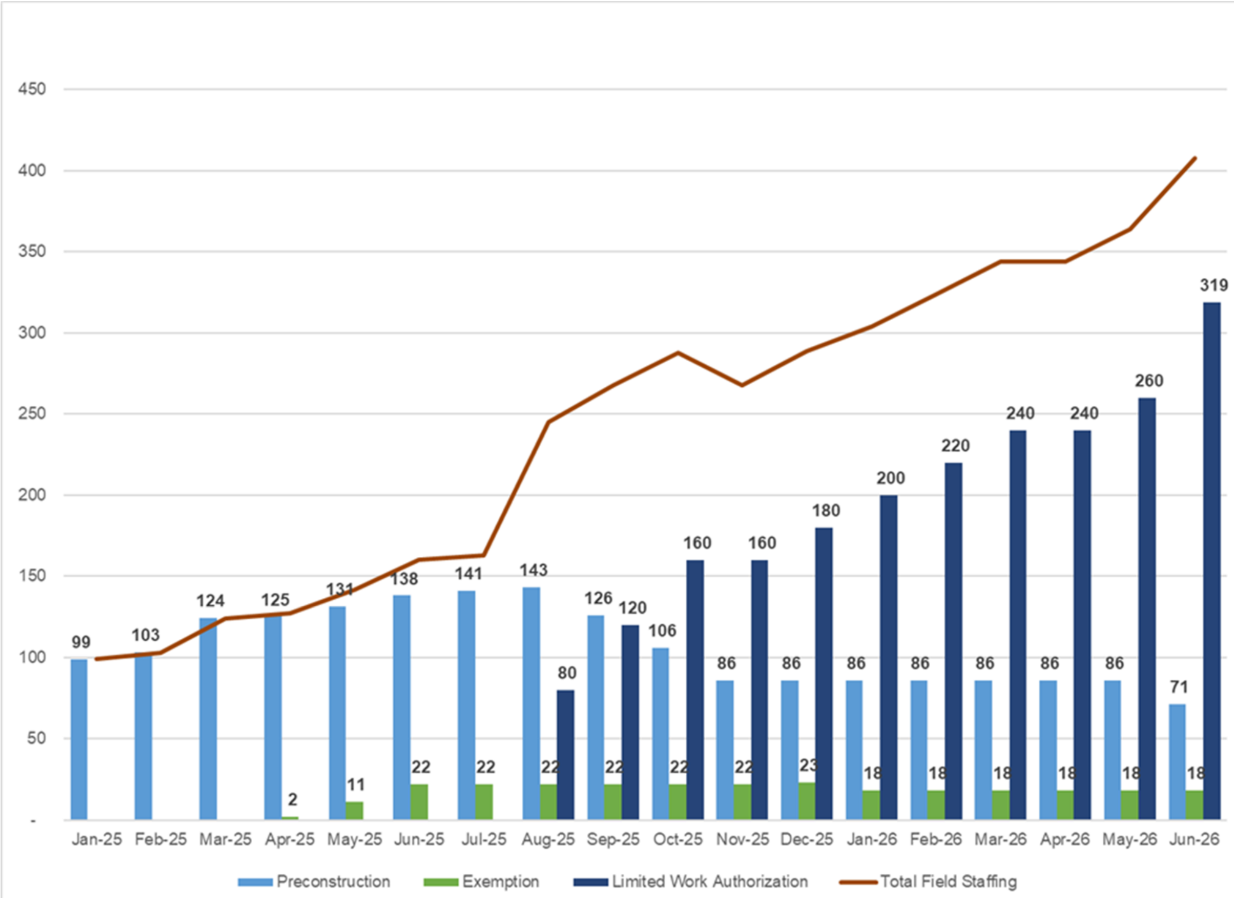
Region or County	Population[1]	Current Student to Teacher Ratio[2]	Additional Population Due to CFPP[3]	New Population with In-Migrating Workers and Families	New Student to Teacher Ratio	Percent Change in Ratios
Expanded Economic Region	345,352	19.6	357	345,709	19.62	0.10%
Bannock	87,018	19.6	91	87,109	19.62	0.10%
Bingham	47,992	18.7	52	48,044	18.72	0.11%
Bonneville	123,964	19.7	129	124,093	19.72	0.10%
Butte	2574	14.4	3	2577	14.42	0.12%
Jefferson	30,891	20.4	31	30,922	20.42	0.10%
Madison	52,913	20.8	50	52,963	20.82	0.09%

[1] LWA ER Table 2.4-4.

[2] LWA ER Table 2.4-37.

[3] Table 4.4-4.

Figure 4.4-1: Staffing for Preliminary Preconstruction, Exemption Scope, and Limited Work Authorization Scope



Data are preliminary and subject to change as the CFPP design progresses.

4.5 Environmental Justice

Environmental justice (EJ) refers to a federal policy under which each federal agency identifies and addresses, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority or low-income populations. The NRC has a policy on the treatment of EJ matters in licensing actions (69 FR 52040). Minority and low-income populations are identified in LWA ER Section 2.5 and shown on LWA ER Figure 2.5-1 through Figure 2.5-5.

The EJ impacts from the CFPP preconstruction and pre-combined license (pre-COL) construction (i.e., exemption scope and LWA scope as defined in LWA ER Section 1.3) are evaluated in the following sections; combined license (COL) construction impacts are discussed where known.

- Environmental Impacts - Section 4.5.1
- Human-Health Effects - Section 4.5.2
- Subsistence, Special Conditions, and Unique Characteristics - Section 4.5.3

4.5.1 Environmental Impacts

The CFPP site is located on the INL site in southeastern Idaho. The regional population is mainly white with minority and low-income populations found most frequently in the populated communities in the expanded demographic and economic CFPP regions, as described in LWA ER Section 2.4.1. These communities are Idaho Falls, Pocatello, Blackfoot, and Rexburg and represent the housing locations of the expected CFPP workforce. As shown in LWA ER Figure 2.5-1, the closest aggregate minority Census Block Groups (CBGs) are

- CBG 197 in Clark County, at approximately 23 mi from the CFPP site.
- CBG 97 in Blaine County, at approximately 24 mi.
- CBG 192 in Bonneville County, at approximately 27 mi.

The closest aggregate minority and low-income CBG is 268 in Minidoka County, approximately 35 mi from the CFPP site.

The closest low-income population is CBG 197 in Butte County, approximately 4.3 mi from the CFPP site at the closest boundary. The low-income population of the CBG 196 is 987 individuals. The closest communities in the CBG include Butte City, approximately 9.7 mi, Howe, approximately 10 mi, and Arco, approximately 12 mi from the CFPP site. These communities have populations of 71, 392, and 758, respectively based on U.S. census data (Reference 4.5-1).

The analysis of impacts in LWA ER Section 4.4 concludes that socioeconomic impacts are SMALL for the CFPP preconstruction and pre-COL construction activities. Residents and recreational users are located a substantial distance from the CFPP site, reducing the likelihood and severity of impacts in these areas. As illustrated in LWA ER Section 2.5 and LWA ER Figure 2.5-1 through Figure 2.5-5, minority and low-income populations are located at similarly substantial distances from the CFPP site. Therefore, impacts to minority and low-income populations are generally SMALL. Table 4.5-1 summarizes potential EJ factors identified in LWA ER Section 2.5 and the likelihood and impact levels relative to preconstruction, exemption, and LWA scopes.

For the purposes of this EJ assessment, the environmental effects related to the preconstruction, pre-COL construction, and COL construction include the following factors; relevant LWA ER sections with additional information are identified:

- land development (LWA ER Section 4.1.1)
- air quality and related asthma (LWA ER Section 4.4.1, Section 4.7, and Section 4.8.1)
- employment opportunities (LWA ER Section 4.4.2)
- housing availability (LWA ER Section 4.4.4)
- transportation availability (LWA ER Section 4.4.4 and 4.4.8)
- residential proximity to major highways (LWA ER Section 4.4.4)

Table 4.5-1 summarizes the likelihood of impacts for these factors and describes the associated impact level for preconstruction and pre-COL construction. Each of the factors have low likelihood of impact with SMALL impact levels. Housing and transportation availability are likely the most impactful to the overall CFPP construction effort. However, the impact likelihoods and impact levels for preconstruction, exemption, and LWA scopes are consistent with in-migrating workers and their families. LWA ER Table 4.4-8 highlights the small impact on housing for these scopes. Competition for low-income housing should not be an issue as workers under the stabilization agreement receive wages that keep them above low-income housing levels.

The minority and low-income population CBGs identified in LWA ER Section 2.5 are located 4.3 mi or more from the CFPP site. Impacts from dust and emissions on the site are not expected to impact air quality or worsen asthma concerns for these populations because of

- distance
- wind direction
- intermittent equipment operation
- mitigation approaches and controls implemented by CFPP during preconstruction, pre-COL construction, and COL construction.

Asthma in the region is identified in LWA ER Section 2.5.2.3 and Section 4.4 as a concern, related to the dry climate and associated blowing dust and wildfires. The CFPP implements mitigation approaches to limit dust, such as applying water to construction areas. Additionally, CFPP employs fire safety practices to reduce fire risk associated with fuels and equipment used during preconstruction and construction activities and coordinates with INL on limiting impacts from wildfires.

Employment opportunities are open to appropriately qualified and skilled individuals relative to the job requirements in accordance with federal and state labor laws. The evaluation of available jobs for preconstruction, exemption, and LWA scopes is presented in LWA ER Section 4.4.2 and Table 4.4-4. Minority or low-income populations that obtain CFPP preconstruction, pre-COL construction, or COL construction jobs could be challenged with availability of transportation. While the INL site operates buses for INL workers, CFPP is assuming workers commute to the site using personal vehicles. The INL Site Stabilization Agreement (Reference 4.5-2) provides for a per diem stipend for each day worked for workers qualified under the agreement, helping to offset job-related transportation and housing costs. Additionally, CFPP encourages ride sharing, a common practice among construction workers to manage personal costs and decrease emissions. The major communities of Idaho Falls, Pocatello, Blackfoot, and Rexburg are expected to be the main resident areas for workers, as discussed in LWA ER Section 4.4.4. These communities are located on or near one of the access roads leading to the CFPP site. The CFPP preconstruction and pre-COL construction increase the daily average of 14,215 vehicles on these roads by 670 vehicles (LWA ER Table 4.8-10) when accounting for both worker transportation and expected delivery transportation. This increase has minimal impact on air quality in these communities and along the access roads to the CFPP site. The COL construction impacts related to increased traffic are presented in the combined license application.

Road modifications include turning lanes on combined U.S. Routes 20 and 26 at the State Highway 33 intersection and a turning lane from State Highway 33 onto INL site road T-11, the access road to the CFPP site. These modification areas are located at a distance from residents and EJ populations and represent temporary actions with minimal and localized impacts to drivers.

Overall, environmental effects related to CFPP preconstruction and pre-COL construction do not result in disproportionately high or adverse impacts on potentially affected EJ populations in the CFPP region.

4.5.2 Human-Health Effects

Table 4.5-1 summarizes the likelihood of impacts and describes the associated impact levels for the following human-health effects relative to CFPP preconstruction and pre-COL construction. Human-health effects identified in LWA ER Section 2.5.2 and Section 4.4 include:

- motor-vehicle-related accidents, injuries, and fatalities
- drinking water
- vectors
- poverty
- homelessness

- elderly care
- mental health
- diabetes and heart disease
- drug use

Poverty, homelessness, elderly care, mental health, diabetes and heart disease, and drug use are effects that impact EJ populations. However, these effects are not a result of the CFPP preconstruction, pre-COL construction, or COL construction activities and are not further discussed in this section. Increased tax revenue from the CFPP could provide a possible indirect positive impact on these factors depending on state- and county-specific spending decisions.

Motor-vehicle-related accidents, injuries, and fatalities are evaluated in LWA ER Section 4.8.3. Average daily traffic increases less than 5 percent from preconstruction and pre-COL construction with corresponding incremental increases in accidents, injuries, and fatalities.

The likelihood of drinking water effects is low because CFPP does not discharge to waters of the United States or to groundwater. The stormwater ponds identified for preconstruction, pre-COL construction, and COL construction provide potential breeding grounds for mosquitos. The stormwater ponds are expected to be intermittently wet because of the dry southeastern Idaho climate. Mitigation measures to control vectors are available if needed, and requirements consistent with INL-site vector control programs may be implemented through the DOE use permit (Reference 4.5-3).

Overall, human-health effects related to CFPP preconstruction and pre-COL construction do not result in disproportionately high or adverse impacts on potentially affected EJ populations in the CFPP region.

4.5.3 Subsistence, Special Conditions, and Unique Characteristics

Organizations contacted during LWA ER Section 2.5 research indicated that hunting, fishing, and personal gardening are practiced for convenience and recreation, not for subsistence. The Shoshone-Bannock Tribes have treaty rights to hunt, fish, and gather on unoccupied lands of the United States. The INL site is federal land and excluded from the treaty rights, but lands surrounding the INL site are used by the tribes for these purposes. The CFPP preconstruction and pre-COL construction activities do not impact these rights.

According to the 2021 INL annual site environmental report (Reference 4.5-4), the lands now designated as the INL site are included in the ancestral homelands of the Shoshone and Bannock people. Archaeological sites on the INL site and far beyond are viewed by the Shoshone-Bannock Tribes as evidence of their cultural heritage and a direct link to their ancestors. This landscape is populated by plants, animals, and water that are not only important for subsistence and medicine but are sacred.

The DOE, Idaho Operations Office, has a long-term relationship with the Shoshone-Bannock Tribes documented in an Agreement in Principle (Reference 4.5-5) that formalizes Tribal involvement in planning and implementation of environmental restoration, long-term stewardship, cultural resources protections, waste management operations, and nuclear energy programs at INL.

The tribes participated in the CFPP cultural surveys conducted to identify historic sites at the CFPP site and transmission and water supply pipeline corridor. The sites identified are undergoing National Register of Historic Places-eligibility evaluation. Formal consultations and determinations are made, and mitigation strategies are implemented before preconstruction begins. LWA ER Section 2.6 and Section 4.6 describe the historic properties located on and near the CFPP site.

Overall, subsistence, special conditions, and unique characteristics of the populations of the CFPP site and region do not result in disproportionately high or adverse impacts on potentially affected populations relative to CFPP preconstruction and pre-COL construction.

4.5.4 References

4.5-1 U.S. Census Bureau, American Community Survey. "American Community Survey 5-Year Estimates 2016-2020, Table B01001,"Sex by Age," accessed on June 17, 2023 from https://data.census.gov/table.

4.5-2 Department of Energy, Idaho National Laboratory, "INL Site Stabilization Agreement, SSA," Idaho Falls, Idaho, Rev. 43, May 30, 2023, accessed on June 9, 2023 from https://sitelaborcoordinator.com/.

4.5-3 U.S. Department of Energy. Use Permit No. DE-NE700065, February 17, 2016.

4.5-4 U.S. Department of Energy, Idaho Operations Office; Environmental Surveillance, Education, and Research Program, "Idaho National Laboratory Site Environmental Report Calendar Year 2020," DOE/ID 12082(20), ISSN 1089-5469, VFS-ID-ESER-ASER-094, Idaho Falls, Idaho, September 2021; accessed December 13, 2022 from https:// idahoeser.inl.gov/ publications.html.

4.5-5 Small, Nation, Fort Hall Business Council; Robert Boston, Idaho Operations Office; and Connie M. Flohr, Idaho Cleanup Project, "Agreement-in-Principle Between the Shoshone-Bannock Tribes and the United States Department of Energy," ID11423 Mod 6, September 26, 2022.

4.5-6 Idaho National Laboratory, "Comprehensive Land Use and Environmental Stewardship Report Update," March 2020, INL/EXY-20-57515, U.S. Department of Energy, Idaho Falls, Idaho, accessed on September 2, 2021 from https://www.osti.gov/biblio/1608252.

Table 4.5-1: Likelihood of Impacts and Impact Level for Potential Environmental Justice Factors

Potential Environmental Justice Factors	Likelihood of Impacts and Impact Level		
	Preconstruction	Exemption	Limited Work Authorization
Environmental Impacts			
Employment opportunities	Likelihood is low • maximum worker level of 143, average of 106 Impact level is SMALL • assumes 34 local jobs with 109 in-migrating workers • higher in-migrating because of specialty subcontractor and higher percentage of field staff from CFPP construction contractor	Likelihood is low • maximum worker level of 23, average of 18 Impact level is SMALL • assumes 6 local jobs with 18 in-migrating workers • specialty subcontractor bringing skilled and trained workers	Likelihood is low • maximum worker level of 319, average level of 198 Impact level is SMALL • assumes 117 local jobs with 202 in-migrating workers • higher percentage of direct field labor and field staff workers assumed in-migrating • specialty subcontractor bringing skilled and trained workers
Housing availability	Likelihood is low • 34 local workers assumed already housed Impact level is SMALL • Housing availability at RV parks, apartments, houses, and long-term motels exceed CFPP worker demand of 166 in-migrating workers and families • Service (e.g., public water systems, police) impacts are SMALL (LWA ER Table 4.4-9 through Table 4.4-14)	Likelihood is low • 6 local workers assumed already housed Impact level is SMALL • Housing availability at RV parks, apartments, houses, and long-term motels exceed CFPP worker demand of 31 in-migrating workers and families • Service impacts are SMALL (LWA ER Table 4.4-9 through Table 4.4-14)	Likelihood is low • 117 local workers assumed already housed Impact level is SMALL • Housing availability at RV parks, apartments, houses, and long-term motels exceed CFPP worker demand of 261 in-migrating workers and families • Service impacts are SMALL (LWA ER Table 4.4-9 through Table 4.4-14)
Air quality and asthma	Likelihood is low • Distance from CFPP dust and emissions to closest low-income population is more than 4 mi • Distance to closest minority population CBG is approximately 23 mi • Distance to closest low-income population CBG is approximately 4.3 mi • Distance to closest combined minority and low-income population CBG is approximately 35 mi • Low-income and minority population are in opposite direction from prevailing wind direction Impact level is SMALL • Air quality impacts from dust and emissions are small as assessed in LWA ER Section 4.7 and Section 4.8 • Fire protection implemented at CFPP to control project fires that can contribute to asthma impacts		

Table 4.5-1: Likelihood of Impacts and Impact Level for Potential Environmental Justice Factors (Continued)

<table>
<tr><th rowspan="2">Potential Environmental Justice Factors</th><th colspan="3">Likelihood of Impacts and Impact Level</th></tr>
<tr><th>Preconstruction</th><th>Exemption</th><th>Limited Work Authorization</th></tr>
<tr><td>Land development</td><td colspan="3">Likelihood is low
• Limited size of CFPP construction relative to INL site and CFPP region
Impact level is SMALL
• No impacts to counties’ comprehensive plans</td></tr>
<tr><td>Transportation availability</td><td colspan="3">Likelihood is moderate
• No available public transportation to the INL or CFPP sites
Impact level is SMALL
• CFPP workers under the SSA receive per diem to offset transportation impacts
• Workers are encouraged to carpool; historically on other construction projects, workers frequently carpool</td></tr>
<tr><td>Residential proximity to major highways</td><td colspan="3">Likelihood is low
• Low-income residences are generally grouped around the major roads in Idaho, including U.S. Routes 20 and 26 and State Highway 33 that provide access to the CFPP site
• The main communities of Idaho Falls, Pocatello, Blackfoot, and Rexburg are local to federal or state highways with access to the site
• Other nearby communities, such as Arco, Butte City, and Howe are located on U.S. Routes 20 and 26 or State Highway 33
Impact level is SMALL
• Workers under the INL Site Stabilization Agreement qualify for per diem to offset travel costs to the CFPP site
• Traffic and air quality impacts from the small workforces are small as defined in LWA ER Section 4.4 and Section 4.8</td></tr>
<tr><td colspan="4">Human Health Effects</td></tr>
<tr><td>Motor-vehicle related accidents, injuries, and fatalities</td><td colspan="3">Likelihood is low
• Annual average daily traffic increases by 650 compared to current 14,215
Impact level is SMALL
• Traffic-related accidents, injuries, and fatalities are low as assessed in LWA ER Section 4.4 and Section 4.8</td></tr>
<tr><td>Drinking water</td><td colspan="3">Likelihood is low
• No releases to Waters of the U.S. or groundwater
Impact level is SMALL
• No discharges to surface or ground water</td></tr>
<tr><td>Vectors</td><td colspan="3">Likelihood is low
• Stormwater ponds may provide breeding grounds for insects; however, ponds are anticipated to be infrequently wet
Impact level is SMALL
• Ponds are expected to be infrequently wet
• CFPP implements vector control as needed or as driven by DOE through the use permit</td></tr>
<tr><td>Poverty</td><td colspan="3">Likelihood is low
• Factor not caused by preconstruction, pre-COL construction, or COL construction activities
Impact level is SMALL
• Possible indirect positive impact from potential job opportunities and increases in tax revenue</td></tr>
</table>

Table 4.5-1: Likelihood of Impacts and Impact Level for Potential Environmental Justice Factors (Continued)

Potential Environmental Justice Factors	Likelihood of Impacts and Impact Level		
	Preconstruction	**Exemption**	**Limited Work Authorization**
Homelessness	Likelihood is low • Factor not caused by preconstruction, pre-COL construction, or COL construction activities Impact level is SMALL • Minimal impact on housing availability due to low number of in-migrating worker and families • Possible indirect positive impact from potential job opportunities and increases in tax revenue		
Elderly care	Likelihood is low • Factor not caused by preconstruction, pre-COL construction, or COL construction activities Impact level is SMALL • Possible indirect positive impact from potential increases in tax revenue		
Mental health	Likelihood is low • Factor not caused by preconstruction, pre-COL construction, or COL construction activities Impact level is SMALL • Possible indirect positive impact from potential increases in tax revenue		
Diabetes and heart disease	Likelihood is low • Factor not caused by preconstruction, pre-COL construction, or COL construction activities Impact level is SMALL • Possible indirect positive impact from potential increases in tax revenue		
Drug use	Likelihood is low • Factor not caused by preconstruction, pre-COL construction, or COL construction activities Impact level is SMALL • CFPP implements a fitness-for-duty program to address drug use among CFPP workers		
Subsistence, Special Conditions, and Unique Characteristics			
Subsistence behavior	Likelihood is low • No surface water available on the CFPP site for fishing • Hunting is not allowed on the CFPP site and only allowed on a small area of the INL located north of the CFPP site • Subsistence was not identified as a common behavior by the organizations contacted as described in LWA ER Section 2.5.2 • Minority and low-income gardens and personal farms are located at distance from CFPP Impact level is SMALL • No discharges to surface waters used for fishing • DOE Idaho Operations Office has a long-term relationship with the Shoshone-Bannock Tribes documented in Reference 4.5-5 that formalizes tribal involvement in DOE-ID planning and implementation of environmental restoration, long-term stewardship, cultural resources protections, waste management operations, and nuclear energy programs.		

Table 4.5-1: Likelihood of Impacts and Impact Level for Potential Environmental Justice Factors (Continued)

Potential Environmental Justice Factors	Likelihood of Impacts and Impact Level		
	Preconstruction	Exemption	Limited Work Authorization
Unique cultural practices	Likelihood is low • No specific unique cultural practices identified in LWA ER Section 2.5.2 • Tribes have treaty rights to hunt, fish, and gather plants in areas surrounding INL site (Comprehensive Land Use and Environmental Stewardship Report Update [Reference 4.5-6]) • Tribes have been granted access to an area around, and including, the Middle Butte Cave, which is approximately 18 mi from CFPP (Reference 4.5-5) Impact level is SMALL • DOE Idaho Operations Office has a long-term relationship with the Shoshone-Bannock Tribes documented in Reference 4.5-5 that formalizes tribal involvement in DOE-ID planning and implementation of environmental restoration, long-term stewardship, cultural resources protections, waste management operations, and nuclear energy programs.		
Unique communities	Likelihood is low • No unique communities identified in minority and low-income community assessment in LWA ER Section 2.5.2 • Shoshone-Bannock Tribes are located within region on Fort Hall Reservation (LWA ER Figure 2.1-3) Impact level is SMALL • Tribes have treaty rights to hunt, fish, and gather plants in areas surrounding INL site • Tribes have been granted access to an area around, and including, the Middle Butte Cave • Tribes collaborate with DOE through Reference 4.5-5 that formalizes tribal involvement in planning and implementation of environmental restoration, long-term stewardship, cultural resources protections, waste management operations, and nuclear energy programs at the INL site		
Historic properties	Likelihood is low • Field studies have been conducted; historic sites have been identified and are undergoing NRHP eligibility evaluation • Closest NRHP-listed properties are EBR-1 (approximately 9 mi from CFPP) and Arco Baptist Church (approximately 13 mi from CFPP) (LWA ER Table 4.8-9) Impact level is SMALL • Formal consultation and determination made before preconstruction begins • Mitigation strategies implemented before preconstruction activities begin		

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4.6 Historic and Cultural Resources

Information related to Cultural Resources (location and specifics of the artifacts) is protected by the National Historic Preservation Act and the Battelle Energy Alliance/Fluor/CFPP LLC Nondisclosure Agreement, and is exempt from the Freedom of Information Act, Exemption 3.

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4.7 Air Resources

This section describes the potential air quality (air resources) impacts that may result from site preparations for construction of the CFPP. Activities, identified as preconstruction and pre-combined license (pre-COL) construction, are expected to result in the temporary generation of criteria air pollutants (CAPs), hazardous air pollutants (HAPs), and greenhouse gases (GHGs).

The details of potential impacts to air quality (air resources) are described in the following sections:

- Regulatory Considerations - Section 4.7.1
- Air Pollutant Sources, Types and Mitigating Measures - Section 4.7.2
- Air Pollutant Emission Estimates - Section 4.7.3

4.7.1 Regulatory Considerations

As previously described in LWA Environmental Report (ER) Section 2.7, the U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) under provisions of the federal Clean Air Act (CAA). In Idaho, the EPA delegated enforcement of the CCA and NAAQS monitoring to the Idaho Department of Environmental Quality (DEQ) under a state implementation plan (SIP). Idaho's SIP, incorporating Idaho Administrative Procedures Act (IDAPA) 58.01.01, "Rules for the Control of Air Pollution in Idaho," establishes NAAQS for six CAPs, consistent with national standards. Per IDAPA 58.01.01, these pollutants include carbon monoxide (CO), lead (Pb), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter (PM). The EPA and DEQ collectively characterize and designate air quality control regions (AQCRs) as in attainment, in nonattainment, or in maintenance with respect to NAAQS pollutant concentrations. In Idaho, AQCR designations of attainment, nonattainment, or maintenance are made for each CAP based on ambient air monitoring data collected by the DEQ.

Under Title I of the CAA, the EPA and thus the DEQ are tasked with establishing and enforcing New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants. These two standards are specifically intended to provide a mechanism for the reduction of emissions from new stationary sources and for controlling emissions of HAPs, respectively. Section 112(b) of the CAA provides an initial list of HAPs (chemical compounds or classes known or suspected to seriously impact health) but is periodically reviewed and revised.

Amendments to the CAA have directed the EPA (and thereby the DEQ) to enforce maximum achievable control technologies for major stationary pollutant sources. Major sources are specifically defined as a source emitting (or potentially emitting) 10 tons per year or more of a HAP, 25 tons per year or more of a combinations of HAPS, or 100 tons per year or more of an air pollutant subject to regulation, with lower thresholds for some CAPS in nonattainment areas.

4.7.1.1 New Source Review

New Source Review (NSR) permitting was established under the CAA to limit the degradation of air quality by new construction or modification of existing facilities. The NSR permits specifically establish new source operational requirements and new source emission limits, including for construction. Prevention of Significant Deterioration permits and nonattainment NSR permits are required for new major sources or for major modifications of existing sources located in AQCR attainment areas and AQCR nonattainment or maintenance areas, respectively. The Prevention of Significant Deterioration program requires new construction or modifications to use best available control technologies and completion of air quality and environmental impact analyses.

4.7.1.2 General Conformity Requirements

Section 176(c) of the CAA prohibits federal actions or activities from causing or contributing to new violations of NAAQS, to worsening of existing violations of NAAQS, or to delays in attaining NAAQS. The term conformity, as used here, implies conformance to Idaho's SIP. The conformity rule applies only to federal actions that would directly emit criteria pollutants or their precursors in NAAQS nonattainment or maintenance areas. For actions in attainment areas, conformity rules generally do not apply.

Unlike permitting programs that only consider emissions from stationary sources, the General Conformity Rule (GCR) requires federal agencies to consider emissions from direct and indirect activities associated with a proposed project, including new (or modified) stationary emission sources, mobile emission sources, and fugitive emission sources. Direct emissions are specifically defined as emissions resulting directly from construction or operation of a proposed project. Indirect emissions are associated with the proposed project but occur at a later time or at a further distance from the proposed project. Emissions from construction personnel commutes is an example of an indirect emission.

When applied, the GCR requires federal agencies to perform a conformity review analysis to estimate annual air emission increases that would occur from the proposed project and complete a comparison to minimum emission thresholds. These thresholds are applicable to project-related emissions emitted within nonattainment or maintenance areas. In a conformity review analysis, project emission levels shown to be below these thresholds are considered to conform with state plans for maintaining and improving air quality. Project level emissions exceeding one or more of the thresholds would require additional air quality analyses and trigger the need to evaluate and apply emission reduction strategies for the proposed action.

The CFPP site is in an area classified by the EPA and the DEQ as being in attainment, so the GCR is not specifically applicable. However, for proposed projects located in NAAQS attainment areas, the process of evaluating air emissions under the GCR can be applied to support National Environmental

Policy Act reviews (i.e., comparison of emission thresholds defined by the GCR and emissions inventory data for a proposed project provides a method for quantitatively assessing the significance of impacts to local air resources in support of a National Environmental Policy Act determination).

4.7.2 Air Pollutant Sources, Types and Mitigating Measures

Preconstruction and pre-COL construction scope described in LWA ER Section 1.3 and Section 3.3 may result in the generation of multiple air pollutants. Preconstruction (site preparation) activities most likely to impact air quality include:

- excavating, ripping, blasting, and grading for site leveling and construction of haul roads
- ripping and/or blasting and corresponding excavation for Reactor Building (RXB), Radioactive Waste Building (RWB), and Turbine Generator Building (TGB) foundations and structures
- ripping, blasting, and excavation for utility trenches, sumps, ponds, and drainages
- establishing and operating rock crushing facilities
- stockpiling and grading excavated overburden, rock, and imported aggregate
- establishing and operating concrete batch plants
- constructing temporary structures such as badging, training, administration, and warehouse.

The pre-COL construction activities most likely to impact air quality are expected to include the following:

- remediation of soft and/or fractured rock in the RXB and RWB excavations
- permanent shoring of the RXB and RWB excavation walls
- installation of a mud mat, reinforcing wire mesh, and vapor barrier in the RXB excavation
- installation of basemat components such as rebar and embeds, but excluding concrete.

Per LWA ER Section 1.3 and Section 3.3, remediation of the RXB and RWB excavation floors is expected to include removal of soft sediment layers or soft sediment lenses, removal of highly-fractured rock, and subsequent placement of granular and/or flowable fill to final excavation grade. Excavation remediation may also include interstitial grouting of more expansive fractured rock masses, rock gaps, or voids, if encountered. The RXB and RWB excavation wall shoring for general worker safety is expected to include rock bolt installation and placement of a shotcrete liner on excavation wall faces.

Dust generation (and corresponding PM production) is expected to result from preconstruction and pre-COL construction activities such as clearing and grubbing, excavation and grading, materials stockpiling, and rock crushing and batch plant operations, and may be more significant in drier weather periods or periods of high winds. Generation of non-dust-related CAPS, HAPS, and GHGs are similarly expected to result from on-site (but off-road) bulldozer, scraper, grader, backhoe, loader, dump truck, crane, and heavy and light truck engine operations, from stationary equipment engine operations; and from personnel commuting (i.e., commuter vehicle engine operations). Generation of HAPs is also expected to occur as a result of the on-site storage, handling, and usage of coatings and paints.

Table 4.7-1 provides a summary of potential preconstruction and pre-COL construction impacts on air quality, a corresponding assessment of the significance of the identified impacts, and a listing of measures and controls to be implemented to minimize pollutant emissions and impacts. Further details related to air pollutant emissions from preconstruction and pre-COL construction activities are provided in Section 4.7.3, excluding GHG emissions. Discussion of GHG emissions is included in LWA ER Section 4.8.

4.7.3 Air Pollutant Emission Estimates

Preconstruction work is expected to be largely completed in the first 18-months of the project. The RXB and RWB excavation wall shoring and foundation treatment and subsequent RXB and RWB basemat preparation work are expected to be completed over an overlapping 15-month period, sequenced to begin approximately three months into the preconstruction activities, as presented in LWA ER Section 3.3. In particular, foundation treatment and basemat preparation (work identified as LWA-specific) is expected to be completed over the last 11-months of the pre-COL construction duration. The RXB and RWB excavations, but not foundation treatments and basemat preparations, are expected to be completed over an approximate 4-month period.

Based on the aforementioned schedule, air pollutant estimates for CFPP preconstruction and pre-COL construction work are provided in the sections below. These estimates conservatively reflect temporal scaling of preconstruction air pollutant emissions calculated for construction of a proposed third reactor unit at the Calvert Cliffs Nuclear Power Plant (CCNPP Unit 3) (Reference 4.7-4; Reference 4.7-5; Reference 4.7-6). Pre-construction and construction air pollutant emissions calculations developed for the licensing of CCNPP Unit 3 form the basis for Appendix A of Attachment 1 of the NRC's Interim Staff Guidance (ISG) on environmental issues associated with new COL applications and Early Site Permit (ESP) applications for new reactors (COL/ESP-ISG-026). In the absence of detailed inventories of construction equipment operations, the NRC's use of CCNPP Unit 3 as a reference plant for GHG emissions estimates is adopted hereinafter for further estimations of CAPs and HAPs emissions from CFPP preconstruction and pre-COL construction. Supplemental information and methodologies presented in U.S. Air Force guides for estimating emissions of air pollutants from transitory sources (e.g., construction sources) (Reference 4.7-4) and mobile sources (Reference 4.7-4) and, by inference, the incorporation of the EPA's "Compilation of Air Pollutant Emission Factors" (Reference 4.7-6).

4.7.3.1 Particulate Matter Emissions Estimates for Construction

According to COL/ESP-ISG-026, daily fugitive dust emissions from site grading, excavation, and trenching can be estimated as a function of the total projected construction disturbance area for a given project, in acres, a work duration in months, and an emissions factor of 0.22 tons per acre-month. This estimate is considered specific to particulates less than or equal to 10 micrometers (microns) in diameter (PM_{10}). Based on a total acreage of preconstruction disturbance equal to 575 acres, per LWA ER Section 4.1, and a maximum work duration of 18 months, this function conservatively projects PM_{10} emissions from CFPP site preparation work to 43 tons, as shown in Table 4.7-2, assuming no mitigation or controls on emissions.

By comparison, as shown in Table 4.7-3, a site preparation PM_{10} emissions total of approximately 140 tons was estimated for construction of CCNPP Unit 3. Most of these emissions (127 tons) were projected to occur in the first three years of the construction program for the project. This estimate corresponds to a PM_{10} emissions rate of approximately 42 tons per year, a value consistent with estimates for the CFPP.

Based on this similarity, in the absence of more detailed construction operations information, the maximum annual PM_{10} emissions value from the CCNPP Unit 3 projections (approximately 91 tons) is adopted here as a conservative maximum estimate for CFPP preconstruction and pre-COL construction. This total is less than the GCR minimum threshold of 100 tons per year for PM_{10}, per Table 4.7-5 (Reference 4.7-7). Likewise, the maximum annual $PM_{2.5}$ emissions value from the CCNPP Unit 3 projections, approximately 29 tons, as shown in Table 4.7-5, is adopted here as a maximum estimate for $PM_{2.5}$ emissions from CFPP site preconstruction and pre-COL construction. This value is also below GCR threshold. Accordingly, CFPP preconstruction and pre-COL construction impacts on regional PM_{10} and $PM_{2.5}$ levels are expected to be SMALL.

4.7.3.2 Construction Emission Estimate for Other CAPs and HAPs

Non-dust CAP emissions (i.e., emissions of CAPs other than PM_{10} and $PM_{2.5}$ concentrations) reported for CCNPP Unit 3 COL application are presented in Table 4.7-6. Using the logic just presented for particulates emissions, the average annual emissions estimates for NO_2, CO, SO_2, and VOCs projected for construction of CCNPP Unit 3 are adopted here as a likely estimate for other CAPs emissions from CFPP construction. Because these maximum values are below the GCR thresholds presented in Table 4.7-5, CFPP preconstruction and pre-COL construction impacts on CAPs levels are expected to be SMALL.

The HAPs emissions were not projected for construction of CCNPP Unit 3 but are assumed to be effectively negligible (and short term) for CFPP preconstruction and pre-COL construction, given minimum use of outgassing chemicals during early phase construction. CFPP preconstruction and pre-COL construction impacts on HAPs levels are expected to be SMALL.

4.7.3.3 Emission Estimates for Workforce Commutes

Construction personnel commuting during preconstruction and pre-COL construction are also expected to impact air quality. Project commuting during preconstruction and pre-COL construction has been estimated to total 4,491,750 miles and 5,063,974 miles, respectively, as detailed in LWA ER Section 4.8. Based on emissions factor estimates for on-road vehicles operating in Idaho, as presented in Table 4.7-7, annual emissions of CO, VOCs, and NO_2 are estimated to be approximately 43.4 tons, 4.0 tons, and 5.9 tons, respectively, as shown in Table 4.7-8. Emissions of SO_2 and particulates are expected to be negligible, as also shown in Table 4.7-8, as are HAPs emissions. Accordingly, impacts from workforce commutes during CFPP preconstruction and pre-COL construction are expected to be SMALL.

4.7.4 References

4.7-1 UniStar Nuclear Development, LLC, “Technical Report in Support of Application of UniStar Nuclear Energy, LLC and UniStar Nuclear Operting Services, LLC for Certificate of Public Convenience and Necessity Before the Maryland Public Service Commission for Authorization to Construct Unit 3 at Calvert Cliffs Nuclear Power Plant and Associated Transmission Lines,” November 2007, U.S. Nuclear Regulatory Commission Package No. ML090680053.

4.7-2 ENSR Corporation/AECOM, “Report of the Construction Activities and Air Impacts from the Proposed Unit 3 at Calvert Cliffs Nuclear Power Plant,” Prepared for UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC, Document No.: 04189-025-0016, August 2008, U.S. Nuclear Regulatory Commission Accession No. ML092730192.

4.7-3 Maryland Department of Natural Resources, "Environmental Review of Proposed Unit 3 at Calvert Cliffs Nuclear Power Plant," Maryland Power Plant Research Program, Publication No. 12-1202011-490, January 2011

4.7-4 Solutio Environmental, Inc., "Air Emissions Guide for Air Force Mobile Sources: Methods for Estimating Emissions of Air Pollutants for Mobile Sources at U.S. Air Force Installations," Prepared for the U.S. Air Force Civil Engineering Center, Compliance Technical Support Branch, June 2022.

4.7-5 Solutio Environmental, Inc., "Air Emissions Guide for Air Force Transitory Sources: Methods for Estimating Emissions of Air Pollutants for Transitory

Sources at U.S. Air Force Installations," Prepared for the U.S. Air Force Civil Engineering Center, Compliance Technical Support Branch, June 2022.

4.7-6 U.S. Environmental Protection Agency, "AP-42: Compilation of Air Emissions Factors," <https://www.epa.gov/air-emissions-factors-and-quantification/ap-42?compilation-air-emissions-factors>, Last accessed May 25, 2023.

4.7-7 U.S. Environmental Protection Agency, “De Minimis Tables,” <https://www.epa.gov/general-conformity/de-minimis-tables>, Last accessed May 28, 2023.

Table 4.7-1: Summary of Preconstruction and Pre-COL Construction Air Quality Impacts, Significance, and Measures and Controls

Work Scope[1]	Activity[2]	Impact Significance Level[3]	Impact[4]	Measures and Controls[5]
			Preconstruction	
Mobilize and Establish Site	Mobilize site excavation and grading contractor (including equipment)	SMALL	• Emission of fugitive dust, CAPs, HAPs, and GHGs during personnel commutes • Dust generation from construction vehicle operation on on-site unpaved surfaces • CAP, HAP, and GHG emissions from fossil fuel combustion associated with construction vehicle and equipment engine operations on-site • Fugitive dust generation during completion of improvements to existing roads • Dust generation from road improvement material loading/ unloading	• Dust (particulates) suppression by means of water application or use of other dust palliatives • Maintenance of adequate freeboard for loads in haul trucks, wetting of material loads, and/ or use of enclosures/covers to secure loads • Use of track-out control devices such as wheel washers to limit transport of debris off site • Restrict vehicle speeds to minimize dust generation on unpaved surfaces • Encourage personnel carpooling; • Proper maintenance of vehicle and equipment engines and exhaust systems • Use of low sulfur diesel, diesel particulate filters, catalytic converters, and/or emissions reducing catalysts when practicable • Limit engine idle times and cold starts

Table 4.7-1: Summary of Preconstruction and Pre-COL Construction Air Quality Impacts, Significance, and Measures and Controls (Continued)

Work Scope[1]	Activity[2]	Impact Significance Level[3]	Impact[4]	Measures and Controls[5]
Prepare Site (clearing, grubbing, grading, excavation)	Remove and stockpile vegetation, alluvial soils, and basaltic rock; establish roads and parking; grade and level surface	SMALL	• Continuation of impacts associated with mobilization and site establishment work scope • Dust generation from clearing, grubbing, grading, and excavation (i.e., dust from cut and fill) • Dust generation from material loading and unloading • Dust generation from truck dumping of removed material or imported materials (cut and fill material haulage) • Dust generation from material stockpiles • Dust, HAPs, and GHG emissions from workforce commutes	• Maintenance of mitigation measures and controls implemented during mobilization and site establishment work scope • Establishment of wind fencing • Sequential clearing/grading to keep existing cover intact until just before construction when feasible • Minimization of earth-moving activities during high wind conditions • Wetting of aggregates at the batch plants • Compaction of disturbed soils where practiable • Stabilization of earthwork using stone or gravel • Confinement of loading and unloading activities to the downwind side of stockpiles when practiable • Utilization of enclosures or coverings for earth material stockpiles, as practicable • Proper scheduling of delivery of imported earth materials, as/if needed, to in order minimize storage times

Table 4.7-1: Summary of Preconstruction and Pre-COL Construction Air Quality Impacts, Significance, and Measures and Controls (Continued)

Work Scope[1]	Activity[2]	Impact Significance Level[3]	Impact[4]	Measures and Controls[5]
Establish Temporary Facilities and Utilities	Establish temporary facilities- office, medical, training trailers; sanitary and craft facilities; warehouses	SMALL	• Continuation of impacts associated with mobilization and site establishment work scope • Dust generation from concrete batching for the construction of slabs and foundations for temporary facilities • Dust generation from cutting and grinding during facilities construction	• Maintenance of mitigation measures and controls implemented during mobilization and site establishment work scope • Use of prefabricated materials, as possible, to minimize cutting, grinding, or drilling operations • Use of water sprays in conjunction with cutting operations when practicable • Use of dust bags, screening, or vacuuming to minimize grinding dust where practicable • Utilization of pre-mixed concrete, plasters, and masonry • Use of water in sufficient quantities to minimize dust generation during concrete cutting • Use of primers, paints, lacquers, and other architectural coatings with low VOC content • Use of low VOC solvents and cleaners
Establish Temporary Facilities and Utilities	Install temporary power, water, and communications	SMALL	• Continuation of impacts associated with mobilization and site establishment and site preparation work scopes • CAPs, HAPs, and GHG emissions from on-site generators, before installation of construction power	• Maintenance of mitigation measures and controls implemented during mobilization and site establishment and site preparation work scopes • Proper maintenance of generator engines and exhaust systems • Use of low sulfur diesel, diesel particulate filters, catalytic converters, or emissions reducing catalysts on generators when practicable
Establish Temporary Facilities and Utilities	Install security provisions	SMALL	• Emission of fugitive dust, CAPs, HAPs, and GHGs during personnel commutes • Dust generation from vehicle operation on on-site unpaved surfaces	• Proper maintenance of security vehicle engines and exhaust systems • Limit security vehicle engine idle times and cold starts

Table 4.7-1: Summary of Preconstruction and Pre-COL Construction Air Quality Impacts, Significance, and Measures and Controls (Continued)

Work Scope[1]	Activity[2]	Impact Significance Level[3]	Impact[4]	Measures and Controls[5]
Establish Laydown Yards and Fabrication Areas	Establish laydown and fabrication yards, including fencing, controlled entries, equipment receiving, and maintenance yard	SMALL	• Continuation of impacts associated with mobilization and site establishment and site preparation work scopes • CAPs or HAPs emissions from stored coating materials or other chemicals	• Maintenance of mitigation measures and controls implemented during mobilization and site establishment and site preparation work scopes • Maintenance of tight seals on coating or chemical storage containers • Minimization of opening or decanting of stored coating and chemical containers to minimize VOC losses
Establish Rock Crushing and Concrete Batch Plant Facilities	Establish rock crushing, staging areas, and equipment	SMALL	• Continuation of impacts associated with mobilization and site establishment and site preparation work scopes • Dust emissions from unloading of rock, rock crushing, and screening	• Maintenance of mitigation measures and controls implemented during mobilization and site establishment and site preparation work scopes • Minimize material drop heights • Irrigation of aggregates to reduce dusting during crushing • Use of a fabric baghouse or cartridge filter dust extraction and collection systems (or a similar control device)
Establish Rock Crushing and Concrete Batch Plant Facilities	Establish batch plant, staging, truck parking areas, and washouts	SMALL	• Continuation of impacts associated with mobilization and site establishment and site preparation work scopes • Dust emissions from unloading and stockpiling of sand, aggregate, and cementitious materials • Dust emissions from sand, aggregate, and cementitious materials transfer to elevated storage bins or silos, and receiving or weighing hopper • Dust emissions from centralized mixer loading	• Maintenance of mitigation measures and controls implemented during mobilization and site establishment and site preparation work scopes • Irrigation of aggregates to reduce dusting during mixing • Full enclosure of mixing equipment and use of a dust extraction and collection system in the mixer

Table 4.7-1: Summary of Preconstruction and Pre-COL Construction Air Quality Impacts, Significance, and Measures and Controls (Continued)

Work Scope[1]	Activity[2]	Impact Significance Level[3]	Impact[4]	Measures and Controls[5]
Excavate Foundations and Trenches	Excavate RXB and RWB foundations	SMALL	• Continuation of impacts associated with mobilization and site establishment and site preparation work scopes • Generation of fugitive dust from excavation and trenching • Generation of HAPs from blasting	• Maintenance of mitigation measures and controls implemented during mobilization and site establishment and site preparation work scopes
Excavate Foundations and Trenches	Excavate BOS foundations- TGB, ACCS, CUB, ANB, SCWS, and transmission structures	SMALL	• Continuation of impacts associated with mobilization and site establishment and site preparation work scopes • Continuation of impacts associated with RXB and RWB excavation activity	• Maintenance of mitigation measures and controls implemented during mobilization and site establishment and site preparation work scopes • Maintenance of mitigation measures and controls implemented during RXB and RWB excavation activity
Pre-COL Construction				
Exemption	Install rock bolts in RXB and RWB excavations	SMALL	• Generation of fugitive dust from rock boring for rock bolt installation • Generation of non-dust CAPs and HAPs from anchor epoxy	• Use of wet drilling methods for anchor hole drilling • Use of low VOC epoxies
Exemption	Apply fiber-mesh/ shotcrete for RXB and RWB excavations	SMALL	• Generation of fugitive dust from shotcrete production • CAP, HAP, and GHG emissions from concrete pumping or spraying equipment operations	• Use of wet-mix shotcrete, relative to dry or semi-wet shotcrete, to reduce dust generation • Proper maintenance of shotcrete pump equipment engines and exhaust systems and use of low sulfur diesel or other emissions reducing controls when practicable

Table 4.7-1: Summary of Preconstruction and Pre-COL Construction Air Quality Impacts, Significance, and Measures and Controls (Continued)

Work Scope[1]	Activity[2]	Impact Significance Level[3]	Impact[4]	Measures and Controls[5]
Limited Work Authorization	Conduct soft or fractured rock remediation	SMALL	• Continuation of impacts associated with mobilization and site establishment and site preparation work scopes • Generation of fugitive dust from structural fill or flowable fill placement, flowable fill or grouting production, boring of grout injection holes, or grout pumping equipment operations	• Maintenance of mitigation measures and controls implemented during mobilization and site establishment and site preparation work scopes • Maintenance of mitigation measures and controls implemented for concrete batch plant mixing operations, and flowable fill or grout production • Possible use of wet drilling methods for grout hole drilling • Proper maintenance of flowable fill or grout pump equipment engines and exhaust systems and use of low sulfur diesel or other emissions reducing controls when practicable

Table 4.7-1: Summary of Preconstruction and Pre-COL Construction Air Quality Impacts, Significance, and Measures and Controls (Continued)

Work Scope[1]	Activity[2]	Impact Significance Level[3]	Impact[4]	Measures and Controls[5]
Limited Work Authorization	Install RXB mud mat, reinforcing wire mesh, rebar, and permanently embedded items	SMALL	• Continuation of impacts associated with mobilization and site establishment and site preparation work scopes • Generation of fugitive dust from concrete production or mud mat concrete placement	• Maintenance of mitigation measures and controls implemented during mobilization and site establishment and site preparation work scopes • Maintenance of mitigation measures and controls implemented for concrete batch plant mixing operations and concrete production

[1] LWA ER Section 1.3 and Section 3.3.

[2] LWA ER Section 1.3 and Section 3.3.

[3] SMALL: Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered small. MODERATE: Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource. LARGE: Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

[4] Impact on air quality. Site mobilization and establishment and site preparation impacts largely overlap or are likewise associated with the various other preconstruction and pre-COL construction activities.

[5] Preconstruction and pre-COL construction work is expected to comply with air quality provisions of the project license and "Permit to Construct" and associated project plans.

ACCS - air cooled condenser system
BOS - balance of site
CUB - Central Utilities Building
RWB - Radioactive Waste Building
RXB - Reactor Building
SCWS - site cooling water system
TGB - Turbine Generator Building

Table 4.7-2: PM_{10} Emissions Estimates for CFPP Preconstruction and Pre-Combined License Construction

Activity	Disturbance Acreage			Disturbance Rate	PM_{10} Emissions
	Preconstruction	Pre-COL	Total	(acres/month)	(tons)
Grading and Excavation	359	5	364	121	27
Trenching and Ponds	164	0	164	55	12
Stockpile Area	50	0	50	17	4
Underground Utilities	2	0	2	1	0
Total	**575**	**5**	**580**	**193**	**43**

Table 4.7-3: PM_{10} Emissions Estimates for Construction of Calvert Cliffs Nuclear Power Plant Unit 3

Activity	2012	2013	2014	2015	2016	2017	Total	Minimum	Maximum	Average
Paved Roads	0.07	0.27	0.53	0.80	0.27	0.02	1.96	0.02	0.80	0.33
Unpaved Roads	17.48	25.10	17.56	23.58	7.75	0.56	92.03	0.56	25.10	15.34
Material Transport	3.49	3.16	0.44	0.00	0.00	0.00	7.09	0.00	3.49	1.18
Site Preparation	50.40	52.79	24.28	9.38	2.58	0.37	139.80	0.37	52.79	23.30
Concrete Batch Plant	0.12	0.38	0.50	0.49	0.12	0.00	1.61	0.00	0.50	0.27
Wind Erosion	6.90	7.09	6.90	3.90	2.10	2.10	28.99	2.10	7.09	4.83
Combustion Equipment	1.49	2.08	1.95	1.50	0.98	0.38	8.38	0.38	2.08	1.40
Total	79.95	90.87	52.16	39.65	13.80	3.43	279.86	3.43	90.87	46.64

Table 4.7-4: General Conformity Rule Threshold Values for Nonattainment Areas

Nonattainment Air Pollutant	Threshold (tons/year)
Carbon Dioxide (CO_2)	100
Nitrogen Dioxide (NO_2)	100
Particulate Matter (PM) ≤ 10 Microns in Diameter (PM_{10})	100
Particulate Matter (PM) ≤ 2.5 Microns in Diameter ($PM_{2.5}$)	100
Ozone (O_3)	100
Sulfur Dioxide (SO_2)	100

Table 4.7-5: $PM_{2.5}$ Emissions Estimates for Construction of Calvert Cliffs Nuclear Power Plant Unit 3

Activity	2012	2013	2014	2015	2016	2017	Total	Minimum	Maximum	Average
Paved Roads	0.01	0.03	0.07	0.10	0.03	0.00	0.24	0.00	0.10	0.04
Unpaved Roads	2.68	3.85	2.69	3.62	1.19	0.09	14.12	0.09	3.85	2.35
Material Transport	0.16	0.18	0.07	0.00	0.00	0.00	0.41	0.00	0.18	0.07
Site Preparation	15.40	16.13	7.42	2.87	0.79	0.11	42.72	0.11	16.13	7.12
Concrete Batch Plant	0.03	0.08	0.11	0.11	0.03	0.00	0.36	0.00	0.11	0.06
Wind Erosion	6.73	6.73	6.73	4.06	2.24	2.24	28.73	2.24	6.73	4.79
Combustion Equipment	1.44	2.02	1.90	1.45	0.95	0.37	8.13	0.37	2.02	1.36
Total	26.45	29.02	18.99	12.21	5.23	2.81	94.71	2.81	29.02	15.79

Table 4.7-6: Criteria Air Pollutants Emissions Estimates in Tons for Construction of Calvert Cliffs Nuclear Power Plant Unit 3

Year	VOCs	CO	NO_2	SO_2
2012	4.36	23.31	60.92	2.45
2013	6.37	36.33	82.48	3.32
2014	7.18	44.67	72.61	2.91
2015	5.55	39.72	57.04	2.27
2016	4.40	34.56	39.03	1.54
2017	1.78	15.77	13.92	0.54
Total	29.64	194.36	326.00	13.03
Minimum	1.78	15.77	13.92	0.54
Maximum	7.18	44.67	82.48	3.32
Average	4.94	32.39	54.33	2.17

Table 4.7-7: Criteria Air Pollutant Emission Factors for On-Road Vehicles

Fuel	Vehicle Type	Emissions Factors (g/mile)					
		CO	VOCs	NO_2	SO_2	PM_{10}	$PM_{2.5}$
Gasoline	Light-Duty Vehicles (Passenger Cars)	3.526	0.238	0.173	0.002	0.005	0.004
Gasoline	Light-Duty Trucks (0 to 8500 lb)	4.003	0.244	0.292	0.003	0.006	0.006
Gasoline	Heavy-Duty Vehicles (8501 + lb)	15.055	0.835	1.137	0.006	0.027	0.024
Diesel	Light-Duty Vehicles (Passenger Cars)	3.183	0.096	0.113	0.001	0.002	0.002
Diesel	Light-Duty Trucks (0-8500 lb)	2.873	0.151	0.298	0.001	0.004	0.003
Diesel	Heavy-Duty Vehicles (8501 + lb)	1.654	0.153	3.092	0.005	0.067	0.062
NA	Motorcycles	12.978	2.270	0.769	0.003	0.022	0.020
-	Average	6.182	0.570	0.839	0.003	0.019	0.017

Table 4.7-8: Criteria Air Pollutant Emission Estimates in Tons for CFPP Construction Personnel Commutes

Activity	Total Commute Distances (miles)	CO	VOCs	NO_2	SO_2	PM_{10}	$PM_{2.5}$
Preconstruction	4,491,750	30.608	2.820	4.155	0.015	0.094	0.086
Pre-COL Construction	5,063,974	34.507	3.179	4.684	0.017	0.106	0.096
Total	9,555,724	65.114	6.000	8.839	0.032	0.200	0.182
Per Month Average	530,874	3.617	0.333	0.491	0.002	0.011	0.010
Annual Average	6,370,483	43.410	4.000	5.893	0.021	0.133	0.121

4.8 Nonradiological Health

The details of nonradiological human health impacts related to preconstruction, pre-combined license (pre-COL) construction (consisting of exemption and LWA building activities), and combined license (COL) construction of the CFPP are provided in this section for the following topic areas:

- Public and Occupational Health Impacts - Section 4.8.1
- Noise Impacts - Section 4.8.2
- Transportation of Construction Materials and Personnel to and from the Proposed Site - Section 4.8.3

4.8.1 Public and Occupational Health

Potential impacts to public and occupational health are evaluated in this section. Potential impacts may result from preconstruction and pre-COL construction, which includes the exemption and LWA scopes, and COL construction as described in the LWA ER Section 1.3.1 and Section 3.3.

Populations within the 6-mile vicinity of the CFPP that may be vulnerable to nonradiological health impacts from preconstruction, pre-COL construction, and COL construction activities are described in LWA ER Section 2.8.1.2. During these activities, access to the CFPP site is controlled and limited to authorized workers and visitors. Public health risks from preconstruction, pre-COL construction, and COL construction activities at the CFPP are minimal because of the distance from the site to the nearest residences, schools, community centers, INL facilities, and additional public locations as detailed in LWA ER Table 2.8-9, Table 2.8-10, and Figure 2.8-3. The closest CFPP public exposure distance is approximately one mile at the intersection of State Highway 33 and T-11. The Big Lost River Rest Area is the closest location where the public would be expected to be outside of their vehicles, at approximately 6.5 miles from the site. The Advanced Test Reactor Complex and the Remote-Handled Low-Level Waste facilities on INL property, with workers that are present daily, are approximately 5.6 and 5.8 miles respectively, from the site. Visitors to the CFPP site during preconstruction and construction are required to complete basic safety training, provided with appropriate safety equipment, personal protective equipment (PPE), escorted on-site, and required to follow site health and safety precautions.

Table 4.8-1 summarizes nonradiological health impacts, significance, and measures and controls to public and occupational health from preconstruction and pre-COL construction activities. The impacts from the scopes of work and measures and controls for those impacts are discussed in the following sections.

4.8.1.1 Air Quality

Preconstruction, pre-COL construction, and COL construction activities result in localized increases in air emissions. Earth-moving, excavation, clearing, steel erection, batch plant operation, and construction-related traffic generate fugitive dust and fine particulate matter (PM) that may potentially impact on-site workers and the off-site public. Criteria air pollutants, including PM and hazardous air pollutants, as discussed in LWA ER Section 2.7.2 and Section 2.8.1.5, can be released into the atmosphere during preconstruction, pre-COL construction, and COL construction. Vehicles and engine-driven equipment (e.g., generators and compressors) generate combustion product emissions such as carbon monoxide, nitrogen oxides and, to a lesser extent, sulfur dioxide. Painting, coating, and similar operations also generate emissions from the use of volatile organic compounds. People living near or working at or near construction sites may be subject to the physical impacts of construction activities. Activities associated with the use of construction equipment may result in varying amounts of air emissions and dust. The magnitude and area of extent of these potential impacts is typically related to the specific construction activities that occur at the site, the nature and effectiveness of implemented environmental controls, and the proximity of the site to populated areas. Contractors, vendors, and subcontractors are required to adhere to appropriate federal and state occupational health and safety regulations (LWA ER Section 2.8.1.1). These regulations set limits to protect the public and workers from adverse conditions, including air emissions.

Preconstruction, pre-COL construction, and COL construction activities associated with the operation of motor vehicles and engines produce intermittent localized temporary air emissions. These emissions are temporary in that equipment is only used for the construction portion of the project and the equipment is not used continuously during preconstruction, pre-COL construction, and COL construction. Because construction activity emissions are generally emitted near or at ground level, the impacts are greatest to workers nearest to the construction activities.

The greenhouse gas (GHG) emissions for the 462 MW CFPP construction equipment is determined using Appendix A, Table A-1, from the Combined License and Early Site Permit, COL/ESP-IS-026 (Reference 4.8-1). Table 4.8-2 presents the GHG emissions in metric tons of carbon dioxide (MT CO_2) equivalency (MT CO_2 [eq]) from construction equipment. Approximately 11,700 MT CO_2 (eq) is emitted for the duration of CFPP building activities. Pre-COL construction activities, the exemption and LWA scopes, are combined with preconstruction because the generic GHG footprint estimate is the basis for the calculation and the activities overlap during 15- and 11-month timeframes (LWA ER Figure 3.3-1). The GHG emissions from construction equipment during preconstruction and pre-COL construction is approximately 3831 MT CO_2 (eq) (Table 4.8-2).

Mitigation measures and controls are in place to limit and decrease the amount of air emissions from construction equipment.

- Low sulfur diesel fuel is used for equipment where possible.

- Heavy equipment is in good condition and is compliant with applicable federal regulations for on- and off-road diesel engines.
- Equipment is maintained and operated in accordance with the manufacturer's specifications.
- Regular inspections and preventative maintenance are conducted on equipment.
- Equipment is turned off, when practicable, to reduce idling time.

The GHG emissions for the CFPP workforce commute are determined using Appendix A, Table A-2 (Reference 4.8-1). Table 4.8-3 details the CFPP workforce commute GHG footprint estimates. Commuting trips (e.g., round-trips per day) are calculated based on the average number of workers during each construction period. The round-trip commute distance to the CFPP is calculated as 113 miles per day from the average distance of the CFPP site to the four principal cities (i.e., Blackfoot, Idaho Falls, Rexburg, and Pocatello) as described in LWA ER Table 2.4-2. Commuting days are based on five days per week for 50 weeks. The total estimated GHG footprint from workforce commute during preconstruction, pre-COL construction, and COL construction activities is approximately 76,000 MT CO_2 (eq). During the period in which LWA activities are being conducted, approximately 1900 MT CO_2 (eq) is emitted from the workforce commute.

Motor vehicle emissions from the construction workforce commute are temporary, non-localized, and are limited to the hours of shift changes. The workforce is encouraged to ride share. Deliveries to the CFPP site generate additional intermittent temporary non-localized air emissions. Vehicles delivering equipment, supplies, and materials to the CFPP site are turned off when possible, during the loading and unloading process, and reduction in idling times is encouraged.

The total GHG footprint for the preconstruction and construction activities (e.g., workforce commute and construction equipment) in accordance with Reference 4.8-1 for the CFPP is approximately 87,000 MT CO_2 (eq) (Table 4.8-4). The GHG emissions for preconstruction and pre-COL construction from workforce commute and construction equipment is approximately 8000 MT CO_2 (eq). GHG emissions from preconstruction, pre-COL construction, and COL construction activities are a small fraction of those from the entire nuclear power plant lifecycle, and a reduction in construction and preconstruction emissions may not have a significant impact on the resulting lifecycle emissions (Reference 4.8-1). According to the NRC, the estimated total lifecycle GHG footprint for a reference 1000 MW(e) nuclear power plant with an 80 percent capacity factor is approximately 10,500,000 metric tons (Reference 4.8-1). Preconstruction, pre-COL construction, and COL construction activities generate less than 1 percent of the estimated total lifecycle GHG footprint (Table 4.8-4).

Fugitive dust and other PM, such as PM_{10} and $PM_{2.5}$ (i.e., PM with a mean aerodynamic diameter of less than or equal to 10 μm and 2.5 μm, respectively), can be released into the atmosphere during preconstruction, pre-COL construction, and COL construction (e.g., clearing, grubbing, grading, and excavation). Like equipment engine exhaust, preconstruction, pre-COL construction, and COL construction-related emissions from fugitive dust tend to be limited and localized to the immediate project area because they are generated from or near ground level (Reference 4.8-2). Mitigation measures and controls are in place for construction fugitive dust on-site during preconstruction, pre-COL construction, and COL construction.

- Compaction of construction roads with granular material.
- Use of dust suppression, such as application of water, to site roads, excavation faces, and in active work areas including crushing activities. Chemical treatments, such as calcium chloride, may be applied to bind dust in the soil substrate.
- Restricted and reduced on-site vehicle and equipment speeds to minimize air-borne PM.
- Covering of fill and concrete materials during transport from off-site when feasible.
- Deferring certain work activities creating dust on exceptionally windy days when practicable.
- Monitoring of disturbed areas for undue dusting. Areas of dusting are stabilized as practicable.
- Use of dust collection devices for on-site mobile concrete batch plants and the rock crushing facility.

Dust storms, smoke from wildfires, and potential public exposure to contamination from other facilities on the INL are not in the control of the CFPP.

A small potential exists for an air release of hazardous materials, such as paint and coatings; outdoor painting or coating is generally not performed on windy days. The quantity and number of nonradiological hazardous materials brought on site during preconstruction, pre-COL construction, and COL construction is as low as reasonably achievable. Hazardous materials are used, stored, and disposed of in accordance with applicable federal, state, and local regulations, and safety data sheets are maintained on-site. Workers receive appropriate hazard communication training and safety procedures are in place, such as the use of PPE and response and cleanup of hazardous material leaks, spills, or releases.

Preconstruction, pre-COL construction, and COL construction activities at the CFPP site generate temporary air emissions. In accordance with the federal Clean Air Act and Idaho Administrative Procedure Act 58.01.01.213 (LWA ER Section 2.8.1.1), a construction permit that includes the rock crusher and a concrete batch plant permit are obtained and conditions are followed. The effects on air quality from these temporary localized emissions to the distant public are expected to be minor and are minimized through use of mitigations and controls measures (e.g., dust collection systems). Accordingly, air quality impacts and the potential for health risks from CFPP construction are expected to be SMALL for the public and surrounding communities.

4.8.1.2 Occupational Health Risks

Nonradiological occupational health impacts to workers from preconstruction, pre-COL construction, and COL construction include those addressed in Section 4.8.1.1, with additional occupational impacts and mitigation measures and controls detailed in Table 4.8-1.

Controlling exposures to occupational hazards is the fundamental method of protecting workers. A hierarchy of controls has been used as a means of determining how to implement feasible and effective control solutions as shown in Figure 4.8-1 (Centers for Disease Control and Prevention [Reference 4.8-3]). Before and during preconstruction and construction activities, hazards are managed by a process of elimination, substitution, engineering, administrative controls, and lastly, by protecting the worker with PPE (i.e., respirators, chemical gloves, goggles, and face shields). Administrative controls and personnel training enhance compliance with industry standards, and observations of these protocols minimize exposure of the workers to noise, pollutants, hazardous materials, and other workplace hazards. Compliance with site permits, adherence to worker safety and health procedures, and application of best management practices protects workers during preconstruction, pre-COL construction, and COL construction activities.

Exposure of workers to hazardous materials, such as crystalline silica, chromium, and hexavalent chromium, are occupational hazards during preconstruction, pre-COL construction, and COL construction. Standard contract provisions restrict the use of controlled materials (e.g., asbestos and lead paint). The Environmental Protection Agency precludes the use of asbestos under 40 CFR 763 (Reference 4.8-4). The ban of lead-containing paint and consumer products bearing lead-containing paint is mandated under 16 CFR 1303 (Reference 4.8-5).

Workers may be exposed to hazardous dust containing crystalline silica during CFPP preconstruction, pre-COL construction, and COL construction. Respirable crystalline silica (referred to as silica) is derived from small particles of sand, concrete, and stone that become airborne during work activities (e.g., rock drilling, crushing machines, grinding, abrasive blasting, and stonecutting). Inhalation of silica causes silicosis, an irreversible but preventable lung disease, and other serious diseases, including lung cancer (Reference 4.8-6). The Occupational Safety and Health Administration (OSHA) standard, 29 CFR 1926.1153, states employers have the responsibility for implementing engineering and administrative controls, providing PPE, and conducting safety and health training for employees (Reference 4.8-9). The OSHA permissible exposure limit (i.e., the maximum daily concentration that most workers can be exposed to for a working lifetime) without adverse health effects from crystalline silica is 50 $\mu g/m^3$ (micrograms of silica per cubic meter of air) as an 8-hour time weighted average (Reference 4.8-10). The National Institute for Occupational Safety and Health

(NIOSH) found that drill dust could be decreased by using wet or dry dust reduction engineering controls and enclosed cabs implementing a dust control program (Reference 4.8-6). The CFPP implements a dust control program to minimize silica and follows the site-specific Health, Safety, and Environmental (HSE) plan that incorporates OSHA and NIOSH requirements to protect workers.

Chromium and hexavalent chromium compounds (referred to as chromium) (OSHA standard 29 CFR 1926.1126 [Reference 4.8-9]) are a large group of chemicals with varying properties and uses that generate workplace airborne exposures harmful to eyes, skin, and the respiratory system. Chromium is considered an occupational carcinogen by NIOSH (Reference 4.8-10). Workers at greatest risk of exposure to chromium during preconstruction, pre-COL construction, and COL construction include those working with or near wet cement and welders working with carbon and stainless-steel welding. The CFPP uses the hierarchy of controls to minimize exposure and follows the site-specific HSE Plan that incorporates OSHA and NIOSH requirements to protect workers.

Workers have the potential to be exposed to soil or air contamination from a release or accident involving hazardous materials. Following the hierarch of controls, hazardous materials are eliminated or substituted, if possible, for those less detrimental. Workers are trained in handling hazardous materials in addition to receiving appropriate PPE for the task being performed to minimize a direct exposure (e.g., inhalation or dermal contact). Impacts to occupational health from hazardous materials, such as silica and chromium are SMALL during preconstruction, pre-COL construction, and COL construction as the hazards are minimized using mitigation and control measures.

Provisions in the appropriate site-specific plans and procedures address events (e.g., dust storms and wildfires) not within the control of the CFPP to protect workers from hazards including excess PM in the air. Impacts to nonradiological occupational health from events outside of the CFPP control are SMALL during preconstruction, pre-COL construction, and COL construction. Preconstruction, pre-COL construction, and COL construction activities at the CFPP are performed in accordance with applicable federal, state, and local regulations intended to minimize occupational health risks.

4.8.1.3 Occupational Injuries and Illnesses

Estimated occupational injuries and illnesses for the CFPP preconstruction, pre-COL construction, and COL construction activities are calculated based on the total case incident rate (TCIR) and days away, restricted, or transferred (DART) data for similar work performed by Fluor Corporation (engineering, procurement, and construction contractor for the CFPP) from 2021 (Reference 4.8-11). Injury and illness calculated estimates for preconstruction, pre-COL construction, and COL construction are in Table 4.8-5. Specific to the LWA work scope, the estimated number of potential total injury and illness cases and DART cases for the CFPP is less than one; 0.52 and 0.25, respectively, compared to the industry benchmark of 1.10 and 0.78, respectively. During COL construction an estimated 21 injuries and illnesses and 10 DART cases occur based on the CFPP construction contractor TCIR and DART rates. Based on this data, the CFPP COL construction and total construction (preconstruction, pre-COL construction, and COL construction) are estimated to have potentially less than half of the total incident and DART cases compared to the industry benchmark.

Work on the CFPP site is self-performed and augmented with subcontractors. Lagging indicators from work performed during the CFPP site investigation is shown in Table 4.8-6. More than 48,000 work hours were completed with no incidents.

The United States Bureau of Labor Statistics provides reports that account for occupational injuries and illnesses as incidence rates, which represent the number of injuries and illnesses per 100 full-time workers (i.e., full-time equivalent employees). In 2020, the national incidence rate for Construction (i.e., the North American Industry Classification System [NAICS] for Construction [NAICS 23]) was 2.5 total recordable cases per 100 full time workers whereas Power and Communication Line and Related Structures Construction, NAICS 23713, for the CFPP during preconstruction and construction activities was 1.9 total recordable cases per 100 full time workers (Reference 4.8-12). Details regarding the NAICS is provided in LWA ER Section 2.8.1.10. The rate for NAICS 23713 is less than NAICS 23 but remains higher than the TCIR industry benchmark (0.70) and Fluor (0.33) rates (Reference 4.8-11).

During the preconstruction and construction of the CFPP, workers from the INL site may be employed to perform work at the CFPP (LWA ER Section 4.4). Data obtained from the Computerized Accident/Incident Reporting System, the government database used to collect and analyze DOE and DOE contractor reports of injuries, illnesses, and other accidents that occurred from 2019 to 2022 during DOE operations (Reference 4.8-13) are summarized in Table 4.8-7. In 2021, the TCIR and DART rates for DOE contractors at INL are significantly higher than the 2021 Fluor and the Industry Benchmark TCIR and DART rates (Reference 4.8-11) as shown in Table 4.8-8. The variation in TCIR and DART rates may be attributed to the types of work being performed, the safety culture, or possibly the management of injury-related cases.

The CFPP is committed to minimizing worker occupational injuries and illnesses during the preconstruction, pre-COL construction, and COL construction.

4.8.1.4 Safety Standards, Practices, and Mitigation Measures

Construction activities are performed in accordance with applicable federal, state, and local ordinances, laws, regulations (LWA ER Section 2.8.1.1), licenses, and permits intended to minimize adverse environmental effects on air, water, and land and on workers and the public. Safety standards, practices, and mitigation measures and controls are used by the CFPP to lessen public and occupational health risks. Mitigation and control measures to minimize public and occupational exposure risks from preconstruction, pre-COL construction, and COL construction activities are described in Table 4.8-1 and Section 4.8.1.1 and Section 4.8.1.2. Mitigation and control measures to minimize noise impacts are described in Section 4.8.2.

Occupational injury and fatality risks are managed and reduced by compliance with OSHA safety standards, practices, and procedures to minimize worker exposures to injuries and illnesses. During construction activities, the CFPP site follows 29 CFR 1926, the OSHA Safety and Health Regulations for Construction (Reference 4.8-14). CFPP workplace hazards are reduced using the hierarchy of controls including work control practices, training, and proper PPE.

The site-specific HSE plan is established before the start of preconstruction and establishes the goals, procedures, and overall safety culture to be implemented on the CFPP project. The NRC and the Institute of Nuclear Power Operations (INPO) are the two primary drivers for a nuclear safety culture. Traits of a Healthy Nuclear Safety Culture, INPO 12-012, describes the essential traits and attributes of a healthy nuclear safety culture, with the goal of creating a framework for open discussion and continuing evolution of safety culture throughout the commercial nuclear energy industry (Reference 4.8-15). The INPO traits are incorporated into daily activities before the start of preconstruction and continued through COL construction.

4.8.2 Noise

Preconstruction, pre-COL construction and COL construction activities cause temporary increases and fluctuations in ambient noise levels around the site depending on the number and type of equipment in use at any given time. The applicable federal, state, and local regulations governing noise from construction activities are discussed in LWA ER Section 2.8.1.1 and Section 2.8.2. A discussion on background noise and the noise-sensitive human-receptor locations and their respective distances to the CFPP are detailed in LWA ER Section 2.8.2, Table 2.8-8, and Table 2.8-9.

Preconstruction, pre-COL construction, and COL construction noise is generated by the operation of heavy construction machinery and vehicles, including internal combustion engines (e.g., front end loaders, graders, heavy trucks, cranes, and generators), impact equipment (e.g., pneumatic equipment, jackhammers, and rock drills), and stationary equipment (e.g., saws, pumps, generators, and air compressors). The average maximum noise levels at 50 feet from heavy equipment ranges from approximately 73 to 101 A-weighted decibels (dBA) for non-impact equipment and approximately 79 to 110 dBA from impact equipment according to the Nuclear Regulatory Commission's Biological Assessment Preparation, Construction Noise Impact Assessment (Reference 4.8-16). Stationary equipment noise levels range from approximately 68 to 88 dBA at a 50-foot distance. The equipment type, age of equipment, specific model, equipment condition, and the operation performed influence equipment noise. Design improvements and technological advances have created newer machines that are quieter than older models because of better engine mufflers, refinements in fan design, and improved hydraulic systems (Reference 4.8-17). The main types of equipment used during preconstruction and pre-COL construction activities are listed in LWA ER Section 3.3.4.

The identified noise sources from equipment and activity generated during preconstruction and pre-COL construction estimated peak noise level measurements and the estimated noise levels at the noise-sensitive human-receptor locations are detailed in Table 4.8-9. Estimated peak noise levels is used to illustrate a worst-case scenario. Attenuated noise levels calculated in Table 4.8-9 are maximum noise levels at the noise-sensitive human-receptors. Distances to the noise-sensitive human-receptors are measured from the center of the CFPP site. The noise from traffic on State Highway 33, adjacent to the CFPP north-most boundary and approximately 5800 feet from the center of the CFPP, typically ranges from 70 to 80 dBA at 50 feet from the highway (Living with Noise, [Reference 4.8-18]). The loudest estimated peak noise level during preconstruction and pre-COL construction is created by fracturing rock with a dozer. Fracturing rock with a dozer, also called ripping, involves a dozer fitted with a hydraulic hook that is lowered into the substrate and dragged through it breaking up the rock to allow for excavation. Noise from this activity varies depending on the substrate being fractured. Noise from blasting or controlled explosions varies due to surface or subsurface explosions, type of substrate, size of charge, detontation system, directivity, and use of best management practices (Reference 4.8-16). Blasting at the CFPP occurs subsurface and is performed in a manner to lessen noise impacts. Because of the variations in noise created from blasting subsurface, Table 4.8-9 uses surface blasting, which is more likely to be louder than subsurface blasting noise. At State Highway 33 and T-11, the closest noise-sensitive human-receptor location, noise from the rock fracturing with a dozer is approximately 64 dBA; thus, the noise from the loudest activity during preconstruction and pre-COL construction is less than that created by passing traffic. Because the noise from passing traffic is higher than 65 dBA no further surveys were performed for specific noise mitigation measures. Noise impacts from preconstruction and pre-COL construction to the public is SMALL.

Figure 4.8-2 presents the peak noise level at each noise-sensitive human-receptor location for preconstruction and pre-COL construction equipment and activities. Estimated peak noise levels from rock fracturing with a dozer at the National Register of Historic Places, Experimental Breeder Reactor-1 and Arco Baptist Church, are less than 46 dBA and 43 dBA, respectively. Similarly, at Howe and Butte City residences, schools, and Howe Park and Community Center, the peak noise generated from the CFPP is less than 46 dBA. The Advanced Test Reactor Complex and Remote-Handled Low Level Waste facility are the closest noise-sensitive human-receptors at INL and are subjected to estimated noise levels less than 50 dBA from preconstruction and pre-COL construction activities. Most employees at these INL facilities work indoors. The impact from preconstruction and pre-COL construction noise at the closest noise-sensitive human-receptors is SMALL.

Background noise in rural areas range from 35 to 40 dBA according to NUREG-1437. The approximate range of peak noise levels from preconstruction and pre-COL construction equipment or activity at State Highway 33 and T-11 ranges from approximately 5 dBA to 64 dBA. The impact from preconstruction and pre-COL construction noise at the closest public noise-sensitive human-receptor is SMALL.

Traffic associated with the construction workforce commuting to and from the site generates noise. The increase in noise relative to ambient background conditions is most noticeable during the shift changes in the morning and late afternoon. Given the short duration of such potential traffic noise increase, potential noise impacts to the community are intermittent and limited primarily to shift changes. The noise impact from preconstruction and pre-COL construction-related traffic to nearby residences, schools, churches, and parks is SMALL.

Unusual noise from construction activities, such as controlled explosions, periodically occur resulting in temporary intermittent excessive noise levels. Blasting occurs during preconstruction and pre-COL construction activities on an irregular basis with charge size kept to a minimum. Blasts produce instantaneous noise of approximately 94 dBA according to the Construction Noise Handbook (Reference 4.8-19). Loudspeakers, public address systems, and loud signaling devices produce intermittent excessive noise levels (e.g., 90 to 100 decibels) according to the Federal Aviation Administration (Reference 4.8-20). Use of public address systems and loudspeakers are kept to a minimum. Handheld radios are used for on-site communications. Because of the intermittency of blasting and loudspeakers the impact from noise to the public and workers is SMALL.

The Occupational Safety and Health Administration requires employers to implement a hearing conservation program when noise exposure is at or above 85 dBA averaged over 8 working hours, or an 8-hour time-weighted average (Reference 4.8-21). The HSE plan implements this requirement and provides mitigation measures for protecting workers from noise exposure following the hierarchy of controls in Figure 4.8-1. Noise impacts from preconstruction and pre-COL construction is SMALL for workers because of the implementation of appropriate plans, procedures, and mitigation measures and controls.

Additional common practices to mitigate noise include, but are not limited to, the following.

- Using noise reduction devices on heavy equipment (e.g., mufflers).
- Limiting driving speeds, use of engine brakes, and slamming of tailgates.
- Construction of earthen berms.
- Placing foliage or ground cover between the noise sources and receptors.

4.8.3 Transportation of Construction Materials and Personnel to and from the Proposed Site

The CFPP site has one access route, located at the intersection of State Highway 33 and T-11. Modifications to the site access are planned to maintain traffic flow to, from, and beyond the site area at an acceptable and safe level of service. The improvements include a left and right turn lane on State Highway 33 onto an improved

T-11 approach and a left turn lane on State Highway 33 at the junction of US Route 20/26.

Estimated workforce traffic-related accidents, injuries, and fatalities for preconstruction and pre-COL construction are shown in Table 4.8-10. Table 4.8-10 includes data from 2019, which is the most current data set available for both annual average daily traffic (Reference 4.8-22 and Reference 4.8-23) and accident, injury, and fatality data specific to the roadways of concern for the CFPP (Reference 4.8-24 and Reference 4.8-25). Calculations are conservative and based on the following assumptions.

- The approximate average number of workers during preconstruction, exemption, and the LWA, is 106, 18, and 171, respectively, averaging approximately 300 workers commuting daily for a total of 600 round trips.
- Some workers may carpool, resulting in less than an additional 600 vehicles commuting on the roads between the CFPP and the principal cities.
- Approximately 35 deliveries per day of equipment, materials, and supplies during the preconstruction and pre-COL construction occur for a total of 70 round trips.
- Accidents, injuries, and fatalities are based on traffic patterns associated with the roadways discussed in LWA ER Section 2.4.2.8 and Section 2.8.3 (e.g., U.S. Route 20, U.S. Route 26, and State Highway 33) coming from the four principal cities (e.g., Blackfoot, Idaho Falls, Pocatello, and Rexburg) that may house the workforce as listed in LWA ER Table 2.4-2.
- Accidents, injuries, and fatalities are limited to those that occur within the CFPP 50-mile region on U.S. Route 20, U.S. Route 26, and State Highway 33 coming from the four principal cities.

During preconstruction and pre-COL construction, a total of approximately 670 extra vehicles per day are on roadways. Data in Table 4.8-10 show an incremental increase of 4.43 accidents, 2.22 injuries, and 0.05 fatalities. Training is provided to workers on safe operation of vehicles and equipment. The impacts from increased traffic during preconstruction and pre-COL construction is SMALL.

In summary, the impacts to nonradiological health of the public and workers from air quality, noise, transportation, and occupational health risks from the CFPP preconstruction and pre-COL construction are SMALL.

4.8.4 References

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Table 4.8-1: Nonradiological Health Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
		Preconstruction		
Mobilize and Establish Site	Mobilize site excavation and grading contractor (including equipment)	SMALL	• Increase traffic on State Highway 33 and US Routes 20 and 26 • Noise level increase from equipment and activities • GHG increase from equipment and workforce	• Follow site plans for traffic management • Minimize use of equipment near CFPP north-most boundary • Follow site plans for hearing protection[3] • Comply with Permit to Construct requirements • Suppress dust with water application • Restrict on-site vehicle speeds • Conduct regular inspections and preventative maintenance on equipment • Limit equipment idle time to reduce emissions • Follow site plans for occupational health and dust control[3]
Prepare Site (clearing, grubbing, grading, excavation)	Remove and stockpile vegetation, alluvial soils, and basaltic rock; establish roads and parking; grade and level surface	SMALL	• Noise level increase from equipment and activities • Construction fugitive dust generated • GHG increase from equipment and workforce • Potential for hazardous materials release to air • Potential exposure to crystalline silica[3] • Potential for hazardous materials release to land or direct exposure[3]	• Minimize use of equipment near CFPP north-most boundary • Follow site plans for hearing protection[3] • Comply with Permit to Construct requirements • Suppress dust with water application • Restrict on-site vehicle speeds • Conduct regular inspections and preventative maintenance on equipment • Limit equipment idle time to reduce emissions • Encourage worker car pooling[3] • Train employees in hazard communications[3] • Follow site plans for occupational health and dust control[3]

Table 4.8-1: Nonradiological Health Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Temporary Facilities and Utilities	Establish temporary facilities- office, medical, training trailers; sanitary and craft facilities; warehouses	SMALL	• Noise level increase from equipment and activities • Construction fugitive dust generated • GHG increase from equipment and workforce • Potential for hazardous materials release to air • Potential for hazardous materials release to land or direct exposure[3]	• Continue measures and controls implemented during site preparation
	Install temporary power, water, and communications			
	Install security provisions			
Establish Laydown Yards and Fabrication Areas	Establish laydown and fabrication yards, including fencing, controlled entries, equipment receiving and maintenance yard			
Establish Rock Crushing and Concrete Batch Plant Facilities	Establish rock crushing, staging areas, and equipment	SMALL	• Noise level increase from equipment and activities • Construction fugitive dust generated • GHG increase from equipment and workforce • Potential exposure to crystalline silica[3]	• Continue measures and controls implemented during site preparation • Rock crushing is included in the Construction permit
	Establish batch plant, staging, truck parking areas, and washouts	SMALL	• Air emissions from batch plant • Potential exposure to crystalline silica and chromium compounds[3]	• Continue measures and controls implemented during site preparation • Comply with batch plant permit requirements • Use of duct collection devices

Table 4.8-1: Nonradiological Health Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Excavate Foundations and Trenches	Excavate RXB and RWB foundations Excavate BOS foundations- TGB, ACCS, CUB, Annex Building, SCWS, and Transmission Structure Excavate trenches; install bedding, piping, and utilities; backfill	SMALL	• Noise level increase from equipment and activities • Construction fugitive dust generated • GHG increase from equipment and workforce • Potential for hazardous materials release to air • Potential exposure to crystalline silica and chromium compounds[3] • Potential for hazardous materials release to land or direct exposure[3]	• Continue measures and controls implemented during site preparation
Pre-Combined License Construction				
Exemption	Install rock bolts in RXB and RWB excavations Apply fibermesh/ shotcrete for RXB and RWB excavations	SMALL	• Noise level increase from equipment and activities[3] • Construction fugitive dust generated • GHG increase from equipment and workforce • Potential for hazardous materials release to air • Potential exposure to crystalline silica and chromium compounds[3] • Potential for hazardous materials release to land or direct exposure[3]	• Continue measures and controls implemented during site preparation • Activities overlap preconstruction; limited additional disruption with this activity

Table 4.8-1: Nonradiological Health Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Limited Work Authorization	Conduct soft or fractured rock remediation	SMALL	• Noise level increase from equipment and activities[3] • Construction fugitive dust generated • GHG increase from equipment and workforce • Potential for hazardous materials release to air • Potential exposure to crystalline silica and chromium compounds[3] • Potential for hazardous materials release to land or direct exposure[3] • GHG increase from equipment and workforce	• Continue measures and controls implemented during site preparation • Activities overlap preconstruction; limited additional disruption with this activity
	Install RXB mud mat, rebar, and permanently embedded items			

[1] SMALL- Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered SMALL.
MODERATE- Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
LARGE- Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

[2] CFPP follows license and permit requirements and associated project-specific plans for preconstruction and pre-COL construction activities.

[3] Pertains to workers and occupational health only

ACCS - air cooled condenser system
BOS - balance of site
CUB - Central Utilities Building
RWB - Radioactive Waste Building
RXB - Reactor Building
SCWS - site cooling water system
TGB - Turbine Generator Building

Table 4.8-2: Construction Equipment Greenhouse Gas Emissions Estimate

Construction Equipment for Building Activities	1 MW Preconstruction and Construction Total[1,2] (1 month period)[3]	CFPP 462 MW Preconstruction Activities (~3 months)[3]	CFPP 462 MW Preconstruction and Pre-COL Activities[4] (~15 months)[3]	CFPP 462 MW COL Construction (37 months)[3]	CFPP 462 MW Total Construction (55 months)[3]
Earthwork and Dewatering	0.143	198	990	2442	3630
Batch Plant Operations	0.040	56	281	692	1029
Concrete	0.064	89	446	1099	1634
Lifting and Rigging	0.067	92	462	1140	1694
Shop Fabrication	0.012	17	83	204	303
Warehouse Operations	0.017	23	116	285	424
Equipment Maintenance	0.119	165	825	2035	3025
Total GHG Emitted (MT CO_2 [eq])	**0.462**	**640**	**3201**	**7896**	**11,737**

[1] Reference 4.8-1

[2] Generic Greenhouse Gas Footprint Estimates from Reference 4.8-1

[3] MT CO_2 (eq) - metric tons carbon dioxide equivalent

[4] Pre-COL Activities includes the exemption and LWA scopes

MW - mega watt

Table 4.8-3: Workforce Commute Greenhouse Gas Emissions Estimate

	Preconstruction	Pre-COL Construction		COL Construction
		Exemption	LWA	
Commuting Trips[1] (roundtrips per day)	106	18	171	1944
Commute Distance[2] (miles per roundtrip)	113	113	113	113
Commuting Days[3] (days per year)	250	250	250	250
Duration (years)	1.5	1.25	0.92	3.08
Total Distance Traveled (miles)	4,491,750	635,625	4,428,349	169,330,866
Average Vehicle Fuel Efficiency (miles per gallon)	21.6	21.6	21.6	21.6
Total Fuel Burned (gallon)	207,951	29,427	205,016	7,839,392
CO_2 Emitted Per Gallon (MT CO_2)	0.00892	0.00892	0.00892	0.00892
Total CO_2 Emitted (MT CO_2)	1855	262	1829	69,927
CO_2 Equivalent Factor (MT CO_2/MT CO_2 (eq))	0.977	0.977	0.977	0.977
Total GHG Emitted[3] (MT CO_2 [eq])	**1899**	**269**	**1872**	**71,574**

Reference 4.8-1

[1] Average based on current staffing levels

[2] Commute based on average distance from principal cities in LWA Environmental Report Table 2.4-2

[3] Based on 5 days per week for 50 weeks

MT CO2 - metric tons carbon dioxide

(eq) - equivalency

Table 4.8-4: Construction Greenhouse Gas Emissions Estimate

	Construction Equipment Emissions (MT CO_2 [eq])[1]	Workforce Commute Emissions (MT CO_2 [eq])[1]	Total Construction Emissions (MT CO_2 [eq])[1]	Percent of Estimated Total Lifecycle GHG Footprint[2] (10,500,000)
Preconstruction	3841	1899	7880	0.08
Exemption[3]		269		
LWA[3]		1872		
COL Construction	7896	71,574	79,469	0.76
Total Construction Emissions	**11,737**	**75,613**	**87,350**	**0.83**

Reference Sources:
Table 4.8-2 and Table 4.8-3
Reference 4.8-1

[1] Metric tons carbon dioxide equivalent

[2] Estimated total lifecycle GHG footprint for a reference 1000 MW(e) nuclear power plant with an 80 percent capacity factor to be about 10,500,000 metric tons

[3] Pre-COL activities includes the exemption and LWA scopes

MT CO2 (eq) - metric tons carbon dioxide equivalent

Table 4.8-5: Estimated Injuries and Illnesses During Construction Activities

Construction Activity	Number of Cases Based on Industry Benchmark[1] TCIR (0.70)	Number of Cases Based on Fluor Actual[2] TCIR (0.33)	Number of Cases Based on Industry Benchmark[1] DART (0.50)	Number of Cases Based on Fluor Actual[2] DART (0.16)
Preconstruction	1.11	0.52	0.80	0.25
Exemption Scope	0.16	0.07	0.11	0.04
LWA Scope	1.10	0.52	0.78	0.25
Pre-COL Construction	1.25	0.59	0.90	0.29
Total Preconstruction and Pre-COL Construction	**2.37**	**1.12**	**1.69**	**0.54**
COL Construction	43.10	20.32	30.78	9.85
Total Preconstruction, Pre-COL Construction, and COL Construction	**45.46**	**21.43**	**32.47**	**10.39**

Reference 4.8-11
Data from 2021
[1] Bureau of Labor Statistics construction companies with more than 1,000 employees
[2] Excluding Covid-19 cases
DART - days away, restricted, or transferred
Pre-COL construction includes the exemption and LWA scopes
TCIR - Total case incident rate (self-perform and subcontractor)
Employee hours are based on the average number of workers during the construction activity
Incident rates of nonfatal occupational injuries and illnesses by industry and case types for 2020 represent the number of injuries and illnesses per 100 full-time workers and were calculated as: (N/EH) x 200,000, where N = number of injuries and illnesses, EH = total hours worked by employees during the calendar year, 200,000 = base for 100 equivalent full-time workers (working 40 hours per week, 50 weeks per year). R = (N/EH) X 200,000

Table 4.8-6: CFPP Site Investigation Lagging Indicators

Lagging Indicators	Cumulative Actuals
Total Cases	0
Total Case Incident Rate	0.00
DART-R Rate	0.00
DART-L Rate	0.00
Total Exposure Hours	**48,716**

DART-R - Restricted workday case rate
DART-L - Lost time incidence rate

Table 4.8-7: INL Injury and Illness Rates

	2019	2020	2021	2022
Total Case Incident Rate	1	1.5	1.3	1.39
Days Away, Restricted, or Transfer Case Rate	0.38	0.95	0.69	0.9

Reference 4.8-11

Table 4.8-8: Summary of 2021 Total Case Incident Rate and Days Away, Restricted, or Transferred Rate

	Total Case Incident Rate	Days Away, Restricted, or Transferred
Fluor Corporation[1]	0.33	0.16
Industry Benchmark[1]	0.70	0.50
Idaho National Laboratories[2]	1.3	0.69

[1] Reference 4.8-11
[2] Reference 4.8-13

Table 4.8-9 Noise Levels at Sensitive Human Receptor Locations During Preconstruction and Pre-Combine License Construction

Equipment/Activity	Noise Level (dBA)	Peak Noise at Noise Sensitive Human Receptor Locations (dBA)																
		Construction Site Boundary (0.15 mi)	Hwy 33 & T-11 (1.1 mi)	Big Lost River Rest Area (6.5 mi)	EBR-1 (9.1 mi)	Howe Residence (9.3 mi)	Butte City Residence (9.52 mi)	Howe Community Center (10.5 mi)	Howe Park (10.5 mi)	Schools[5] (12.5 mi)	Arco Baptist Church (12.6 mi)	ATR (5.6 mi)	RHLLW (5.8 mi)	NRF (7 mi)	INTEC (7.6 mi)	CFA (9.1 mi)	RWMC (9.6 mi)	CITRC (11.2 mi)
Dozer rock fracturing[1]	105	81	64	48	45	45	45	44	44	43	43	50	49	48	47	45	45	44
Rock blasting, surface (controlled explosion)[1]	94	70	55	37	34	34	34	33	33	32	32	39	38	37	36	34	34	33
Vibratory rock crusher[2]	96	68	52	35	32	32	32	31	31	29	29	36	36	34	33	32	31	30
Rock crushing[3]	81	67	51	34	31	31	30	30	30	28	28	35	35	33	32	31	30	29
Busses[1]	88	64	49	31	28	28	28	27	27	26	26	33	32	31	30	28	28	27
Fuel and maintenance trucks[1]	88	64	49	31	28	28	28	27	27	26	26	33	32	31	30	28	28	27
Motor grader[1]	85	61	46	28	25	25	25	24	24	23	23	30	29	28	27	25	25	24
Concrete trucks[1]	85	61	46	28	25	25	25	24	24	23	23	30	29	28	27	25	25	24
Dozer[1]	85	61	46	28	25	25	25	24	24	23	23	30	29	28	27	25	25	24
Rock drill (pneumatic)	85	61	46	28	25	25	25	24	24	23	23	30	29	28	27	25	25	24
Dump trucks[1]	84	60	45	27	24	24	24	23	23	22	22	29	28	27	26	24	24	23
Water trucks[1]	84	60	45	27	24	24	24	23	23	22	22	29	28	27	26	24	24	23
Forklift[2]	88	60	44	27	24	24	24	23	23	21	21	28	28	26	25	24	23	22
Concrete batch plant[1]	83	59	44	26	23	23	23	22	22	21	21	28	27	26	25	23	23	22
Concrete pump truck[1]	82	58	43	25	22	22	22	21	21	20	20	27	26	25	24	22	22	21
Generator[1]	82	58	43	25	22	22	22	21	21	20	20	27	26	25	24	22	22	21
Light plant generator[1]	81	57	42	24	21	21	21	20	20	19	19	26	25	24	23	21	21	20
Air compressors (diesel/gas)[1]	80	56	41	23	20	20	20	19	19	18	18	25	24	23	22	20	20	19
Excavating equipment, track Hoe, front loader[1]	80	56	41	23	20	20	20	19	19	18	18	25	24	23	22	20	20	19
Track drill[1]	80	56	41	23	20	20	20	19	19	18	18	25	24	23	22	20	20	19
Backhoe[1]	80	56	41	23	20	20	20	19	19	18	18	25	24	23	22	20	20	19
Vibratory compactor[2]	84	56	40	23	20	20	20	19	19	17	17	24	24	22	21	20	19	18
Mobile wheeled cranes (15-30 tons)[2]	83	55	39	22	19	19	19	18	18	16	16	23	23	21	20	19	18	17
Mobile crane hydraulic rough terrain (30-130 ton)[2]	83	55	39	22	19	19	19	18	18	16	16	23	23	21	20	19	18	17
Pumps[1]	77	53	38	20	17	17	17	16	16	15	15	22	21	20	19	17	17	16
Light vehicles (gas pickup trucks, all-terrain vehicles)[1]	75	51	36	18	15	15	15	14	14	13	13	20	19	18	17	15	15	14
Surface excavator[2]	79	51	35	18	15	15	15	14	14	12	12	19	19	17	16	15	14	13
Wheeled loader[2]	79	51	35	18	15	15	15	14	14	12	12	19	19	17	16	15	14	13

Table 4.8-9 Noise Levels at Sensitive Human Receptor Locations During Preconstruction and Pre-Combine License Construction (Continued)

Equipment/Activity	Noise Level (dBA)	Peak Noise at Noise Sensitive Human Receptor Locations (dBA)																
		Construction Site Boundary (0.15 mi)	Hwy 33 & T-11 (1.1 mi)	Big Lost River Rest Area (6.5 mi)	EBR-1 (9.1 mi)	Howe Residence (9.3 mi)	Butte City Residence (9.52 mi)	Howe Community Center (10.5 mi)	Howe Park (10.5 mi)	Schools[5] (12.5 mi)	Arco Baptist Church (12.6 mi)	ATR (5.6 mi)	RHLLW (5.8 mi)	NRF (7 mi)	INTEC (7.6 mi)	CFA (9.1 mi)	RWMC (9.6 mi)	CITRC (11.2 mi)
Drills, saws, hand tools (92 to 108 dBA, average 101 dBA)[4]	101	43	28	10	7	7	7	6	6	5	5	12	11	10	9	7	7	6

Reference Sources:
[1] Reference 4.8-19
[2] Reference 4.8-26
[3] Reference 4.8-28
[4] Reference 4.8-27
[5] Arco Elementary & Butte Middle/ High Schools
Equipment is assumed diesel unless otherwise noted
Attenuation by distance only
Distances measured from center of the CFPP site to noise sensitive receptors
dBA - A-weighted decibels
mi - miles
ATR - Advanced Test Reactor
CFA - Central Facilities Area
CITRC - Critical Infrastructure Test Range Complex
EBR-1 - Experimental Breeder Reactor-1
INTEC - Idaho Nuclear Technology & Engineering Center
NRF - Naval Reactors Facility
RHLLW - Remote-Handled Low Level Waste
RWMC - Radioactive Waste Management Complex

Table 4.8-10 Estimated Incremental Increase of Accidents, Injuries, and Fatalities Attributed to the CFPP (2019)

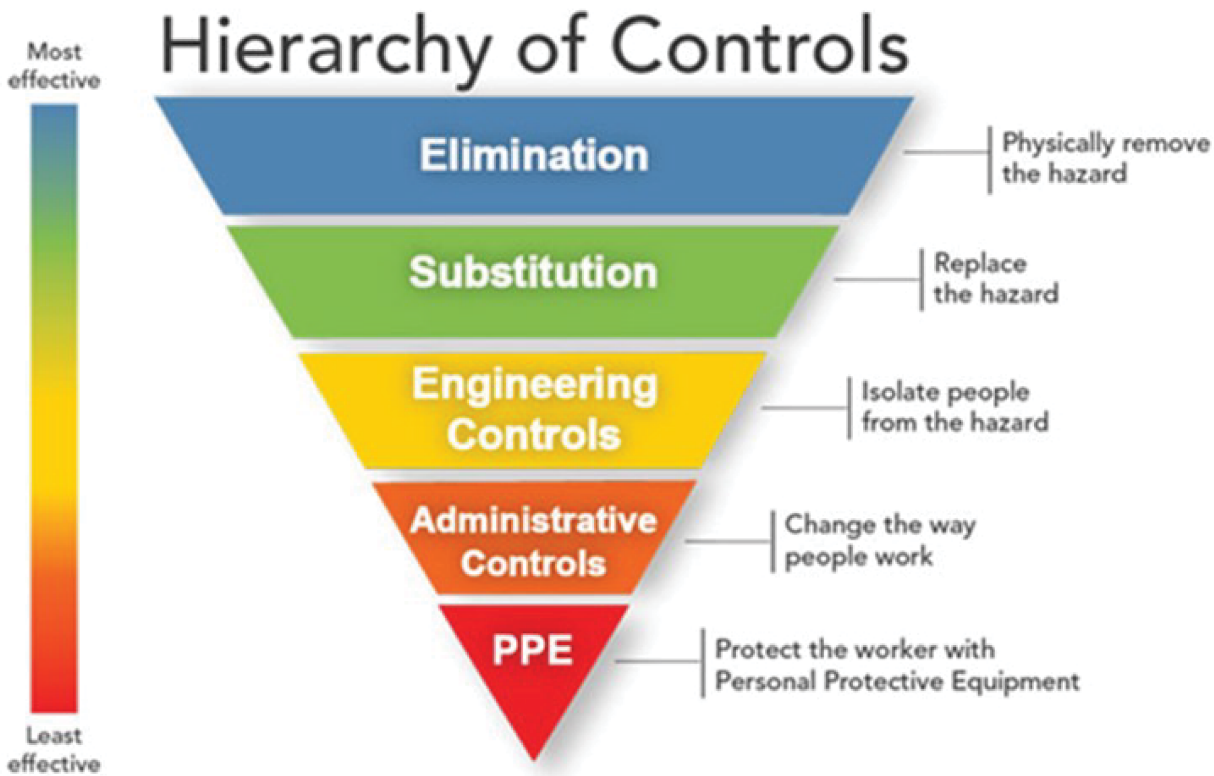
Roadway	Daily Traffic within the Region[1]	Daily Traffic Increase from CFPP	Accidents in the CFPP Region[2]	Injuries in the CFPP Region[2]	Fatalities in the CFPP Region[2]
U.S. Route 26	7720	670	30	29	0
U.S. Route 20	4682		40	15	0
State Highway 33	1813		24	3	1
Totals	14,215	670	94	47	1
Incremental Increase Attributed to CFPP	**-**	**-**	**4.43**	**2.22**	**0.05**

Reference sources:

[1] Reference 4.8-22 and Reference 4.8-23

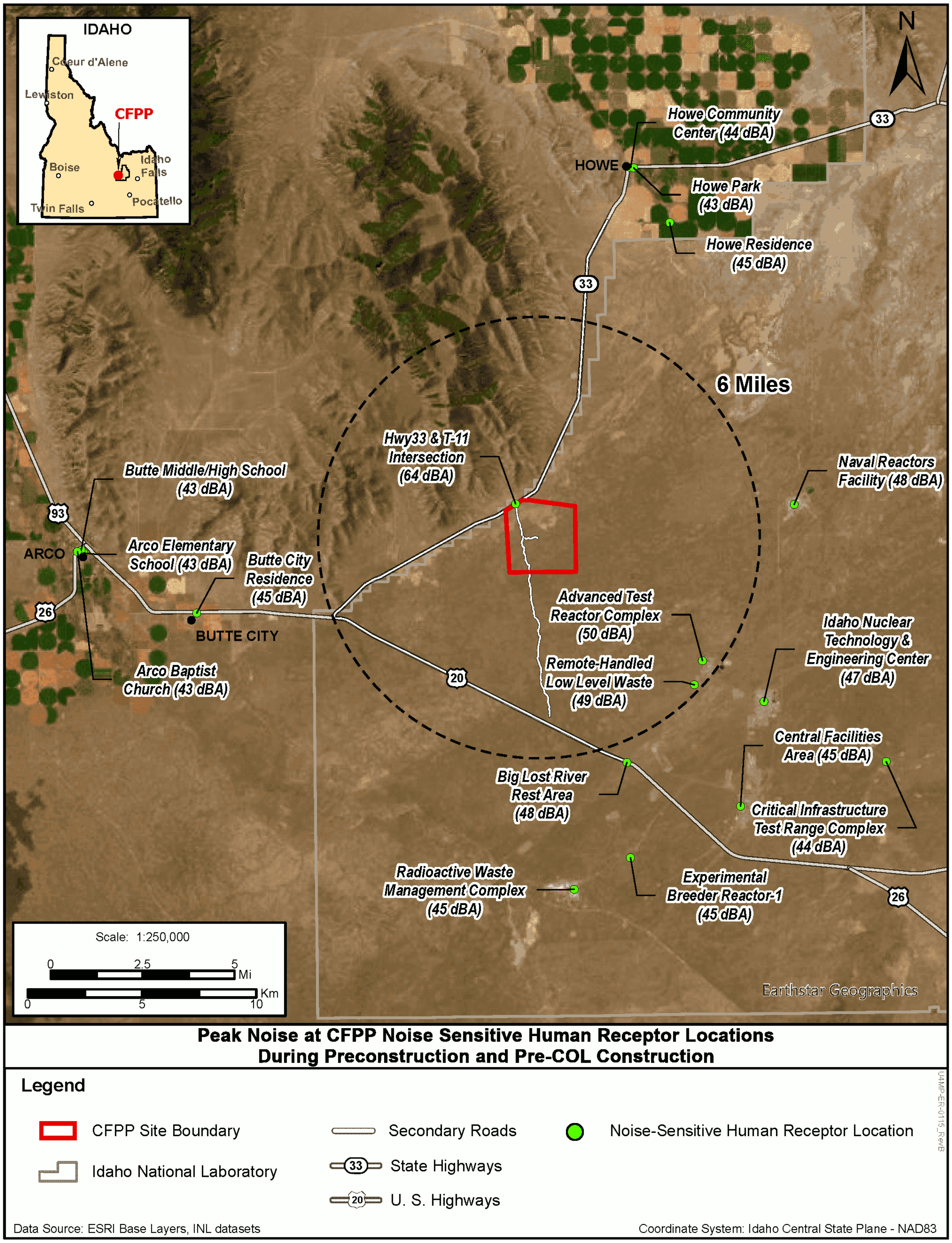
[2] Reference 4.8-25 and Reference 4.8-25

Figure 4.8-1: Hierarchy of Controls



Reference 4.8-3

Figure 4.8-2: Peak Noise at the CFPP Noise-Sensitive Human-Receptor Locations During Preconstruction and Pre-Combined License Construction



4.9 Radiological Health

This section provides information on the expected radiological impacts to the construction workforce during the preconstruction, pre-combined license (pre-COL) construction, and combined license (COL) construction of the CFPP as described in LWA ER Section 1.3.

The CFPP is located on an undeveloped parcel of the DOE INL site. There are no existing radiological sources of exposure on the CFPP site. However, because of the proximity of CFPP to INL facilities, INL gaseous and liquid releases are evaluated for impact on the individual construction worker dose and the collective dose of the CFPP construction workforce. Figure 4.9-1 highlights the areas of construction relative to the CFPP site boundary and the INL facilities discussed in this section. These facilities are included because they are physically closest to the CFPP site providing a potential direct radiation source or are listed in the annual site environmental reports for 2021 to 2017 (Reference 4.9-1, Reference 4.9-2, Reference 4.9-3, Reference 4.9-4, and Reference 4.9-5) and represent the most-likely INL gaseous or liquid sources of radiation to the CFPP site. A more detailed physical construction layout of the CFPP site within the construction boundaries is provided in LWA ER Figure 3.1-6.

Because of the time line of planned activities detailed in LWA ER Table 1.3-1, the discussion in this section includes the potential radiological impacts during preconstruction and pre-COL construction separately from COL construction as represented in Table 4.9-1. The radiological impacts to the construction worker and workforce are discussed based on the type of radiation to which the construction worker is exposed:

- Direct Radiation Exposures – Section 4.9.1
- Radiation Exposures from Gaseous Effluents – Section 4.9.2
- Radiation Exposures from Liquid Effluents – Section 4.9.3
- Total Dose to Construction Workers – Section 4.9.4

4.9.1 Direct Radiation Exposures

The US460 NuScale Power Plant design consists of six reactor modules (i.e., NuScale Power Modules [NPMs]) housed in a single reactor building. Consistent with NUREG-2226, Environmental Impact Statement for an Early Site Permit at the Clinch River Nuclear Site: Final Report, construction is considered complete when the first NPM is operational. As such, radiation exposure to remaining workers installing the subsequent NPMs is evaluated as occupational radiation exposure.

The CFPP site is located on an undeveloped area of the INL site with no current or previous direct radiological sources. However, within 10 miles (mi) of the CFPP site, INL facilities have current and previous direct radiological sources. The closest potential direct radiological sources are shown in Figure 4.9-1. The Advanced Test Reactor (ATR) is approximately 5.6 mi from the CFPP center, the Remote-Handled Low Level Waste Disposal Facility is approximately 5.8 mi away, and the Naval Reactors Facility is approximately 7 mi away. Direct radiation monitoring performed under the INL site environmental monitoring program, described in LWA ER Section 2.9.3.6 and LWA ER Table 2.9-12, which summarizes results from Reference 4.9-1 through Reference 4.9-5, found no increased radiation exposure at the INL site boundaries. The Naval Reactors Facility, discussed in LWA ER Section 2.9.3.6, reported no increased radiation exposure beyond its security fence and up to 10 mi from the fence in 2020 and 2019 environmental monitoring reports (Reference 4.9-6 and Reference 4.9-7, respectively). The CFPP site and INL site share a boundary on the northwest side of the CFPP site as shown in Figure 4.9-1. The center of the CFPP site is approximately 1 mi from that boundary. Because of the distance between the CFPP site construction areas highlighted in Figure 4.9-1 and the sources of direct radiation exposure, there is no estimated exposure to the construction workers above background from direct radiation sources.

Table 4.9-1 estimates the number of construction workers for the construction activities and the duration of those construction activities. The estimated time of exposure for a construction worker assumes 10 hours per shift for 5 days per week for 50 weeks per year.

During preconstruction, pre-COL construction, or COL construction, radioactive materials in the form of sealed sources are brought on site to support activities (e.g., compaction testing and radiography). These radioactive materials are used and maintained by trained and qualified vendors under their own radioactive material licenses in accordance with standard operating procedures. Once radioactive material licenses and authorizations are issued in accordance with 10 CFR 30, 10 CFR 40, and 10 CFR 70, CFPP maintains sources and worker exposures as low as reasonably achievable in accordance with 10 CFR 20 and relevant CFPP processes and procedures.

In summary, no existing sources of direct radiation are on the CFPP site, and radiological sources brought on site during construction are a negligible source of direct radiation exposure to construction workers. Although there are nuclear facilities on the INL site that are sources of direct radiation, these facilities are too far away to result in exposure greater than background radiation levels to construction workers. Thus, there is negligible exposure to the construction workforce above background from direct radiation sources.

4.9.2 Radiation Exposures from Gaseous Effluents

No gaseous radiological effluent sources are within the CFPP site during construction. Thus, postulated gaseous effluent radiation exposures to construction workers would be from INL operations.

The INL site environmental monitoring program results for gaseous effluents are summarized in LWA ER Section 2.9.3.1 with total radioactivity released and corresponding exposure presented in LWA ER Table 2.9-5 for the years 2017 through 2021. Reference 4.9-1 through Reference 4.9-5 provide the INL sources of gaseous radiological effluents and include those from the Naval Reactors Facility. Continuous gaseous effluents are released via stacks at the Materials and Fuels Complex (MFC) approximately 20.2 mi away, the Advanced Mixed Waste Treatment Project located at the Radioactive Waste Management Complex (RWMC) approximately 9.6 mi away, and the Idaho Nuclear Technology and Engineering Center (INTEC) approximately 7.6 mi away from the CFPP center (Reference 4.9-2). Other INL facilities are highlighted based on their corresponding gaseous release dose contribution to the total gaseous dose of the maximally exposed individual (MEI) as determined by INL modeling. In 2020, the ATR gaseous effluents (approximately 5.6 mi from the CFPP center) accounted for 80.3 percent of the total airborne exposure, the MFC accounted for 16.2 percent, and the RWMC accounted for 3.16 percent (Reference 4.9-2).

In 2020, the estimated dose to the MEI due to airborne effluents from the INL site was 0.062 millirem (mrem) for the year. The MEI is located approximately 1.8 mi from the INL site east entrance as determined by the Clean Air Act Assessment Package-1988 personal computer model Version 4. The model uses average annual wind information and assumes the individual's exposure is 24 hours per day (Reference 4.9-2). Assuming 0.062 mrem per year to the MEI to estimate the annual airborne effective dose equivalent for a CFPP construction worker is conservative because: (1) the CFPP site is located approximately 5.6 mi from the closest gaseous effluent, (2) the CFPP site is not located downwind of the prevailing wind direction from the main gaseous effluent sources discussed in this section, and (3) construction workers are expected to be on the CFPP site for 10 hours per day.

4.9.3 Radiation Exposures from Liquid Effluents

No liquid radiological effluent sources are from within the CFPP site during construction. Postulated liquid effluent radiation exposures to construction workers would be due to INL operations.

The Naval Reactors Facility is located within the INL site approximately 7 mi from CFPP and has its own environmental sampling and reporting program. Reference 4.9-6 and Reference 4.9-7 conclude that no liquid effluent releases, sewer discharges, drinking water, or groundwater contained radioactivity above expected background levels. Liquid effluent sources are not expected from the Naval Reactors Facility normal operations that would impact potential exposures to construction workers at the CFPP site.

The potential sources of liquid radiological sources to construction workers include INL operations liquid effluents, existing INL groundwater plumes, and surface water runoff from the INL site. The INL site environmental monitoring program results for these potential sources are summarized in LWA ER Section 2.9.3.2 and Section 2.9.3.3 from information in Reference 4.9-1 through Reference 4.9-5.

According to Reference 4.9-1 through Reference 4.9-5, radiological liquid effluents from INL operations are discharged into infiltration or evaporation ponds at ATR, MFC, and INTEC. Surface and groundwater monitoring from these ponds show results were below health-based standards for ingested water from 2017 through 2021. There are existing, monitored groundwater plumes at ATR and INTEC. These groundwater plumes would only have an impact on construction workers if the contaminated groundwater is extracted for use as plant or drinking water, which is not anticipated. Radiological monitoring results from LWA ER Table 2.9-6 are: (1) below the maximum contaminant limit for drinking water specified by 40 CFR 141, (2) below the Idaho ground water standard (Reference 4.9-8), and (3) below the Idaho public drinking water standard (Reference 4.9-9). Surface water runoff is monitored at the RWMC with results below the DOE-established derived concentration standard limits for ingested water from 2017 through 2021 (Reference 4.9-1 through Reference 4.9-5) and too far away to negatively impact the CFPP site.

As stated in Reference 4.9-2 for 2020, there was no estimated dose to the INL site MEI from liquid radiological sources. However, the Central Facilities Area drinking water distribution system is down-gradient from a historic radioactive groundwater plume. Reference 4.9-2 calculates the dose associated with INL workers consuming their drinking water from this distribution system in 2020 is 0.118 mrem for the year. Construction workers for the CFPP are not expected to have the same drinking water source, but the provided dose estimate is used as a conservative and bounding exposure for construction workers due to liquid radiological effluents.

4.9.4 Total Dose to Construction Workers

As described throughout this section, the distances between the CFPP construction areas and the existing INL nuclear facilities, coupled with the NUREG-2226 consideration that construction is complete when the first NPM is operational, limit the potential exposure of the individual CFPP construction worker and the CFPP construction workforce as a whole. Table 4.9-1 presents the estimated construction worker and construction workforce radiation exposures during the construction activities described.

No matter the construction worker location on the CFPP site, the estimated annual exposure to the construction worker is assumed to be a maximum of 1 mrem/year. This is a conservative estimate based on the direct, gaseous, and liquid sources of radiation to which the construction workers could be exposed due to fluctuating, annual INL operations. This estimate is also based on calculations that assume 24 hours per day of exposure when the workforce is expected to be on site only 10 hours per day. The 1 mrem/year estimate is below the limit of 100 mrem/year specified in 10 CFR 20.1301 and 10 CFR 20.1302. As such, the radiological impact significance during pre-construction, pre-COL construction, and COL construction is considered SMALL as defined in LWA ER Section 4.0, and the construction workers are considered members of the public until a radiation protection program is established in accordance with 10 CFR 20 and in preparation for the CFPP to receive radioactive material licenses and authorizations allowing for operation. Table 4.9-2 summarizes the radiological impacts during construction and the measures and controls in place to maintain the significance as SMALL.

The collective workforce annual dose is calculated by multiplying the total dose to the individual construction worker by the peak number of construction workers in a given year. The estimated annual exposure to the construction workforce, no matter their location on the CFPP site, is assumed to be a maximum of 0.65 person-rem per year (person-rem/year) for preconstruction and pre-COL construction. This is based on the conservatively assumed annual exposure of 1 mrem/year and conservatively assumed peak number of 650 construction workers. This peak workforce is expected to last less than one year but is conservatively assumed to last a full year for the purpose of this dose evaluation.

The estimated annual exposure to the construction workforce, regardless of their location on the CFPP site is assumed to be a maximum of 2.9 person-rem/year for COL construction. This is based on the assumed annual exposure of 1 mrem/year and conservatively assumed peak number of 2,900 construction workers. This peak workforce is expected to last less than one year but is conservatively assumed to last a full year for the purpose of this dose evaluation.

Without existing radiological sources on the CFPP site and the consideration in NUREG-2226 that construction ends when the first NPM is operational, the guidance of NRC Regulatory Guide 8.19 for occupational radiation dose assessment is not applicable for the estimated annual construction worker dose or the estimated annual collective construction workforce dose.

4.9.5 References

4.9-1 U.S. Department of Energy, Idaho National Laboratory; “2021 Site Environmental Report Idaho National Laboratory,” DOE/ID-12082(21), INL/RPT-22-68974, Rev 0, Idaho Falls, Idaho, September 2022; accessed December 13, 2022 from https://idahoeser.inl.gov/publications.html.

4.9-2 U.S. Department of Energy, Idaho Operations Office; Environmental Surveillance, Education, and Research Program, “Idaho National Laboratory Site Environmental Report Calendar Year 2020,” DOE/ID-12082(20), ISSN 1089-5469, VFS-ID-ESER-ASER-094, Idaho Falls,Idaho, September 2021; accessed November 8, 2022 from https://idahoeser.inl.gov/publications.html.

4.9-3 U.S. Department of Energy, Idaho Operations Office; Environmental Surveillance, Education, and Research Program, “Idaho National Laboratory Site Environmental Report Calendar Year 2019," DOE/ID-12082(19), ISSN 1089-5469, VFS-ID-ESER-ASER-081, Idaho Falls, Idaho, September 2020; accessed November 8, 2022 from https://idahoeser.inl.gov/publications.html.

4.9-4 U.S. Department of Energy, Idaho Operations Office; Environmental Surveillance, Education, and Research Program, “Idaho National Laboratory Site Environmental Report Calendar Year 2018,” DOE/ID-12082(18), ISSN 1089-5469, VFS-ID-ESER-ASER-033, Idaho Falls,Idaho, September 2019; accessed November 8, 2022 from https://idahoeser.inl.gov/publications.html.

4.9-5 U.S. Department of Energy, Idaho Operations Office; Environmental Surveillance, Education, and Research Program, “Idaho National Laboratory Site Environmental Report Calendar Year 2017,” DOE/ID-12082(17), ISSN

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4.9-6 U.S. Department of Energy, Naval Reactors Facility; “Naval Reactors Facility Environmental Monitoring Report Calendar Year 2020,” NRF-OSQ-ESH-01150, Naval Reactors Facility, Idaho Falls, Idaho; accessed June 28, 2022 from https://doi.org/10.2172/1868080.

4.9-7 U.S. Department of Energy, Naval Reactors Facility; “Naval Reactors Facility Environmental Monitoring Report Calendar Year 2019,” NRF OSQ-ESH-01026, Naval Reactors Facility, Idaho Falls, Idaho; accessed June 28, 2022 from https://doi.org/10.2172/1868091.

4.9-8 Idaho Department of Environmental Quality, Drinking Water Protection and Finance Division, "Ground Water Quality Rule," IDAPA 58.01.11; accessed January 4, 2023 from https://adminrules.idaho.gov/rules/current/58/.

4.9-9 Idaho Department of Environmental Quality, Drinking Water Protection and Finance Division, "Idaho Rules for Public Drinking Water Systems," IDAPA 58.01.08; accessed January 4, 2023 from https://adminrules.idaho.gov/rules/current/58/.

Table 4.9-1: Total Exposure to Construction Workers and Construction Workforce

Activity	Total Duration (months)	Conservatively Assumed Peak Workforce	Worker Exposure (mrem/year)	Workforce Exposure (person-rem/year)
Preconstruction	18	650	1	0.65
Pre-COL Construction				
COL Construction	42	2900	1	2.9

Table 4.9-2: Radiological Health Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Mitigation Measures

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls
Preconstruction				
Mobilize and Establish Site	Mobilize site excavation and grading contractor (including equipment)	SMALL	• Maximum expected exposures of 1 mrem/ year per person • Radiological sources in support of work activities	• Coordinate with DOE to verify minimal impact to construction workers • Use of trained vendors under material license using standard operating procedures
Prepare Site (clearing, grubbing, grading, excavation)	Remove and stockpile vegetation, alluvial soils, and basaltic rock; establish roads and parking; grade and level surface			
Establish Temporary Facilities and Utilities	Establish temporary facilities - office, medical, training trailers; sanitary and craft facilities; warehouses			
	Install temporary power, water, and communications			
	Install security provisions			
Establish Laydown Yards and Fabrication Areas	Establish laydown and fabrication yards, including fencing, controlled entries, equipment receiving and maintenance yard			
Establish Rock Crushing and Concrete Batch Plant Facilities	Establish rock crushing, staging areas, and equipment			
	Establish batch plant, staging, truck parking areas, and washouts			
Excavate Foundations and Trenches	Excavate RXB and RWB foundations			
	Excavate BOS foundations - TGB, ACCS, CUB, Annex Building, SCWS, and Transmission Structure			
	Excavate trenches; install bedding, piping, and utilities; backfill			

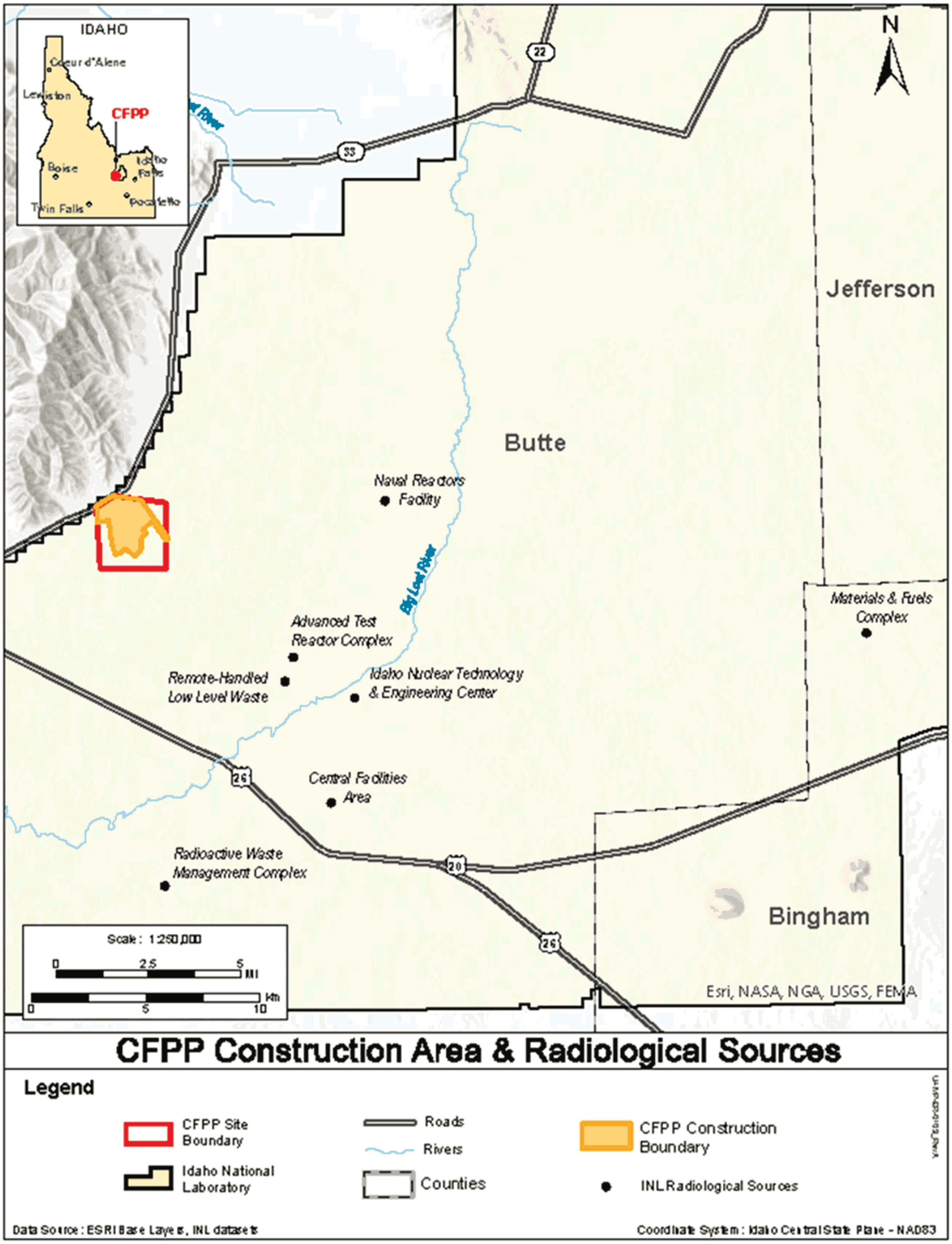
Table 4.9-2: Radiological Health Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Mitigation Measures (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls
Pre-Combined License Construction				
Exemption	Install rock bolts in RXB and RWB excavations	SMALL	• Maximum expected exposures of 1 mrem/ year per person • Radiological sources in support of work activities	• Coordinate with DOE to verify minimal impact to construction workers • Use of trained vendors under material license using standard operating procedures
	Apply fibermesh/shotcrete for RXB and RWB excavations			
Limited Work Authorization	Conduct soft or fractured rock remediation			
	Install RXB mud mat, rebar, and permanently embedded items			
Combined License Construction				
Establish Site Buildings	Construction of nuclear island, turbine island, BOS	SMALL	• Maximum expected exposures of 1 mrem/ year per person • Radiological sources in support of work activities	• Coordinate with DOE to verify minimal impact to construction workers • Use of trained vendors under material license using standard operating procedures
Establish Permanent Utilities	Install power, water, and communications			
Establish Water Management	Install evaporation ponds			
Establish Final Site Configuration	Redress construction areas and landscape site			
	Demobilization			

[1] SMALL - Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered SMALL.
MODERATE - Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
LARGE - Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

ACCS - air cooled condenser system
BOS - balance of site
CUB - Central Utilities Building
RWB - Radioactive Waste Building
RXB - Reactor Building
SCWS - site cooling water system
TGB - Turbine Generator Building

Figure 4.9-1: Carbon Free Power Project Construction Area and Radiological Sources



4.10 Nonradioactive Waste Management

Nonradiological wastes generated during preconstruction, pre-combined license (pre-COL) construction, and combined license (COL) construction of the CFPP are comprised of cleared vegetation and soils, rock, building material debris, municipal waste, stormwater runoff, sanitary waste, used oils and lubricants, and possibly hazardous materials. Dust and air emissions are also generated. A potential for accidental releases, to the land, water, and air of hazardous and non-hazardous materials exists. The generation, proper handling and proper disposal of nonradiological waste during construction activities are discussed in this section.

Preconstruction, pre-col construction, and COL construction activities, as described in the LWA Environmental Report (ER) Section 1.3 and Section 3.3, generate nonradiological wastes. Nonradiological wastes are managed in accordance with applicable federal, state, and local laws, regulations, and permit requirements described in LWA ER Section 2.8 and Section 1.4.

The details of nonradioactive waste management and impacts to the land, water, and air related to preconstruction and pre-COL construction from the CFPP are described in the following sections:

- Generation, Handling, and Disposal of Nonradiological Waste – Section 4.10.1
- Impacts to Land – Section 4.10.2
- Impacts to Water – Section 4.10.3
- Impacts to Air – Section 4.10.4

4.10.1 Generation, Handling, and Disposal of Nonradiological Waste

A summary of estimated nonradiological waste quantities generated, storage methods, disposal, and waste management measures and controls for the CFPP preconstruction and pre-COL construction is highlighted in Table 4.10-1 and detailed below.

Cleared vegetation and excavated spoils and rock are estimates based on the approximate 575 acres of land disturbed during the preconstruction building activities as shown in LWA ER Figure 3.3-2. Approximately 740,000 cubic yards (yd^3) of vegetation is removed during preconstruction and placed in the on-site stockpile area and covered with spoils. Roughly 1.5 million yd^3 of alluvial soils are excavated during preconstruction. Minimal soils are generated during the exemption from the rock bolt installation and possibly from civil remediation during the LWA. Soils that meet engineer specifications are reused as structural or non-structural fill. An estimated 2.24 million yd^3 of rock is excavated during preconstruction activities. Excavated rock is transported to the on-site rock crushing facility to produce structural and non-structural fill. Excavated rock is not suitable for concrete production. Soils and rock that are unusable for construction are stored in the stockpile area. An additional approximate 400 acres is disturbed during preconstruction and construction for the

34.5kV temporary transmission corridor as discussed in LWA ER Section 3.1.8. No vegetation and minimal rock waste are generated during pre-COL activities.

Municipal waste generation is based on 1.3 cubic feet (ft^3) per employee per day. The average number of workers during preconstruction, exemption work activities, and the LWA work scope is 106, 18, and 171, respectively. Municipal waste is collected in dumpsters and transported off-site by a local licensed contractor to a permitted landfill. Items, such as plastics and metal, are recycled to the extent practicable. During preconstruction, the exemption, and the LWA approximately 2300 yd^3, 300 yd^3, and 2300 yd^3, respectively, of municipal waste is generated. The CFPP and the municipal waste contractor follow the regulations set forth in the Idaho Solid Waste Management Rules Idaho Administrative Procedures Act (IDAPA) 58.01.06 as explained in LWA ER Section 2.8.1.1.2.

Sanitary waste generation is based on 16 gallons per person per day using the average number of workers as described for municipal waste. A factor of 1.4 is applied for sanitary waste solids to calculate the total volume of sanitary waste. Porta-lets and ablution units are used during preconstruction and pre-COL construction. Porta-lets are cleaned, pumped, and disposed of by a local licensed contractor to a permitted municipal wastewater treatment facility. Ablution units use a collection tank or bladder that is pumped and disposed of by a local contractor to a permitted municipal treatment facility. During preconstruction, exemption work activities, and LWA work scope, approximately 1,070,000 gallons, 150,000 gallons, and 1,050,000 gallons respectively, of sanitary waste is generated. The CFPP follows the Idaho Solid Waste Management Rules IDAPA 58.01.16 as explained in LWA ER Section 2.8.1.1.2.

Construction waste (e.g., packaging, dunnage, and scrap materials) calculations are estimated at 10 yd^3 per day. The waste received during preconstruction, pre-COL construction, and COL construction are segregated and collected in compatible containers (e.g., roll-off containers). Waste is disposed of at a permitted Construction and Demolition (C&D) landfill. Recyclable materials are sent for recycling to the extent practicable. During preconstruction, the exemption, and the LWA approximately 4500 yd^3, 3750 yd^3, and 2750 yd^3, respectively, of construction waste is generated. The CFPP and the contractor responsible for disposal of construction waste follow the regulations set forth in the Idaho Solid Waste Management Rules Idaho IDAPA 58.01.06 as explained in LWA ER Section 2.8.1.1.2.

Concrete is produced during preconstruction, pre-COL construction, and COL construction activities at the on-site batch plants. Concrete solids generated from leftover concrete or concrete washouts is transported to the rock crushing facility to be reused as non-structural fill material or placed in the stockpile area. Concrete wash-out water is collected in earthen berms (lined as necessary) at the batch plant and at different locations within the plant site during concrete placement. Wash-out water is allowed to evaporate and solids are removed as described above. When a liner is used, it is disposed of as construction waste. Water that does not evaporate is pumped and disposed of at a permitted wastewater treatment facility by a local contractor.

During the conduct of construction activities under the LWA, the Reactor Building and the Radiological Waste Building soft and fractured rock remediation includes the placement of interstitial grouting of rock fractures. Due to the low viscosity of grout mix, extra unused grout is applied to the working surface of the excavation since it permeates into surface imperfections, thus no waste grout is generated.

Idaho has adopted the federal hazardous waste regulations (40 CFR 124, 260-266, 268, 270, 273, and 279) into state rules, IDAPA 58.01.05, as described in LWA ER Section 2.8.1.1.2. The CFPP incorporates the regulations into the site-specific environmental management plan for handling, storing and accumulation, and disposal of hazardous waste (e.g., solvents, paints, coatings, adhesives, and aerosol cans that according to the Resource Conservation and Recovery Act [RCRA] are not considered RCRA empty). A licensed local contractor transports hazardous wastes for disposal, treatment, or recycling.

Other wastes (e.g., used oil, lubricants, hydraulic fluids, oil filters, and RCRA empty aerosol cans) are considered non-hazardous waste. Used oil, lubricants, and hydraulic fluids are segregated and stored in compatible containers (e.g., 55-gallon drums). Oil or fuel contaminated soil from spills is stored in compatible containers such as 55-gallon drums or roll-offs depending on the amount of waste generated. The wastes are transported by a local licensed contractor for recycling. Used oil filters are processed (e.g., hot-drained) to extract the oil from the filter. Drained filters and RCRA empty aerosol cans are recycled as scrap metal to the extent practicable. Used filters and the segregated used oil are transported for disposal or recycling by a licensed local contractor. The CFPP and the contractor responsible for disposal of other wastes follow the regulations set forth in the Idaho Solid Waste Management Rules Idaho, IDAPA 58.01.06, and Idaho Rules and Standards for Hazardous Waste, IDAPA 58.01.05, as explained in LWA ER Section 2.8.1.1.2.

Non-radiological solid and liquid wastes generated by the CFPP are managed in accordance with applicable laws, regulations, license, and permit requirements.

4.10.2 Impacts to Land

Approximately 575 acres are disturbed during the CFPP preconstruction and pre-COL construction as shown in LWA ER Figure 3.3-2. During this period, the CFPP site changes from a mainly undeveloped, government-controlled and government mission-focused land use to an industrial use area. An additional approximate 400 acres is disturbed during preconstruction and COL construction for the installation of the 34.5 kilovolt (kV), 230 kV, and water pipeline corridor as shown in LWA ER Figure 2.1-22. Further details on land use are provided in LWA ER Section 4.1.1. Nonradiological waste generated during the CFPP site investigation was appropriately managed and disposed of at a permitted off-site facility.

On-site waste generated at the CFPP is detailed in Section 4.10.1 and Table 4.10-1 and Table 4.10-2 including storage, disposal, minimization, and recycling options. Cleared vegetation, soil, and rock are stored for reuse at the on-site stockpile area. Volumes and reuse of excavated alluvial soils and rock is described in LWA ER Table 4.1-2. Berms are strategically built from a portion of excavated soils material on the CFPP site to act as snow and weather barriers during construction. Excavated rock and waste concrete is transported to the rock crushing facility and reused on-site as feasible, except for use in the production of concrete, or stored at the CFPP stockpile area.

Impacts to land at the CFPP site from other nonradiological wastes occurs during handling and storing activities. Other construction waste materials (e.g., sanitary, municipal, construction, and non-hazardous wastes) are removed from the site for treatment, disposal, or recycling by licensed contractors to permitted facilities. Metals, cardboard, glass, and plastic are recycled to the extent practicable. Figure 4.10-1 shows permitted landfills within and just outside the CFPP 50-mile region. Details of the types of landfills and the distance from the CFPP site are described in Table 4.10-3. Municipal solid waste and C&D landfills are approximately 10 to 60 miles away from the CFPP; thus, the impact to the landfills during preconstruction, pre-COL construction, and COL construction is SMALL.

Small amounts of hazardous waste (e.g., non-RCRA empty aerosol cans, paints, coatings, solvents, and adhesives) are generated during preconstruction and pre-COL construction activities. Personnel are trained to comply with industry standards (e.g., proper handling of waste materials, spill prevention, and clean-up). Hazardous materials brought on-site are as low as reasonably achievable to minimize waste or potential releases. Nonradiological liquid waste (e.g., sanitary waste and petroleum, oils, and lubricants [POL]) can potentially be spilled and contaminate soils. Concrete washout water contains toxic metals and is caustic and corrosive with an approximate pH of 12 according to the Environmental Protection Agency (Reference 4.10-1). Concrete washout water can alter the soil chemistry and increase the toxicity of other substances in the soils. Washout liquid waste is evaporated in collection areas or pumped and removed from the site for disposal at a permitted wastewater treatment facility to minimize soil contamination. Washout concrete solid wastes are transferred to the rock crushing facility for reuse or storage in the stockpile area. The Spill Prevention Control and Countermeasures Plan includes details on waste management and control measures (e.g., secondary containments and spill cleanup procedures) established to minimize impacts from nonradiological waste to the land. The impact to the CFPP land from nonradiological waste generated, handled, stored, and disposed of during preconstruction and pre-COL construction is SMALL.

4.10.3 Impacts to Water

During the CFPP preconstruction, pre-COL construction, and COL construction sanitary waste, stormwater runoff, and liquid waste (e.g., non-hazardous and hazardous) is generated from building and vehicle or equipment maintenance activities. Table 4.10-1 and Section 4.10.1 introduce the waste streams including the quantities generated, storage, disposal, and waste management measures and controls. No waters bodies or waters of the United States are impacted by the CFPP activities during preconstruction, pre-COL construction, and COL construction. The Big Lost River is the closest water body to the CFPP site, located approximately 6.3 miles away at its closest point (LWA ER Figure 2.1-11). The LWA ER Section 2.1.1.5.3 provides details regarding waterways in the CFPP region. Groundwater is approximately 600 feet below ground surface (LWA ER Section 2.2.1.2.3). The impact from preconstruction, pre-COL construction, and COL construction to surface waters, waters of the United States, and the groundwater is SMALL.

Sanitary waste, discussed in Section 4.10.1, for preconstruction, pre-COL construction, and COL construction is transported and treated off-site at a permitted municipal wastewater treatment facility. Municipal wastewater treatment facilities in the CFPP region with existing total flow and design flow capacity from the most recent available data (2012) are listed in LWA ER Table 2.4-42. Future expansions or modifications planned for municipal wastewater treatment facilities is discussed in LWA ER Section 2.4.2.7. During preconstruction and pre-COL construction an estimated 5000 gallons of sanitary wastewater is generated per day by the CFPP, totaling approximately 2,270,000 gallons of sanitary wastewater. Based on the data presented in LWA ER Table 2.4-42, the closest treatment facilities in Butte County (e.g., Arco Sewer Treatment Facility and Moore Water & Sewer Association) and Mud Lake Sewer Treatment Plant in Jefferson County have capacity to treat sanitary wastewater generated at the CFPP. The impacts from CFPP during preconstruction and pre-COL construction sanitary wastewater to municipal wastewater treatment facilities is SMALL.

The amount of stormwater run-off is determined by the amount of precipitation at the CFPP site as described in LWA ER Section 2.7.1.2.3. Stormwater ponds are designed for CFPP site conditions. The stormwater ponds and stormwater control measures are constructed in early preconstruction. During the preconstruction, pre-COL construction, and COL construction stormwater is directed to CFPP on-site ponds to minimize pollutants and sediment leaving the CFPP site. The CFPP stormwater ponds do not drain off-site. The Idaho Department of Environmental Quality (DEQ) is the permitting authority for construction stormwater permits (IDAPA 58.01.25.130) under the Clean Water Act National Pollutant Discharge Elimination System, as described in LWA ER Section 2.8.1.1.1 and Section 1.4. A Stormwater Pollution Prevention Plan is maintained for the CFPP site during construction. A site-specific Spill Prevention Control and Countermeasures Plan is in place before the commencement of preconstruction that provides best management practices such as the adequate cleanup of POL and other spills. The equipment maintenance shop maintains work surfaces free from contamination to prevent stormwater from spreading contaminants to the land or stormwater ponds. The CFPP stormwater is controlled, thus the impacts to water resources is SMALL.

Liquid waste is produced during the CFPP preconstruction, pre-COL construction, and COL construction. Concrete wash-out water is not treated on-site but is allowed to evaporate if possible or pumped for transport and disposal at a permitted wastewater treatment facility. Used POL and hydraulic fluids from vehicle and equipment maintenance are kept segregated and recycled. Liquid wastes generated at the CFPP have a SMALL impact to water resources.

No impacts to water resources results from the CFPP generated wastes during preconstruction and pre-COL construction; therefore, the impact to water resources is SMALL.

4.10.4 Impacts to Air

Preconstruction, pre-COL construction, and COL construction activities that generate impacts to air quality (e.g., fugitive dust and emissions) are discussed in LWA ER Section 4.8.1.1. Greenhouse gas emissions for construction activities are detailed in LWA ER Table 4.8-2, Table 4.8-3, and Table 4.8-4. No burning occurs during CFPP building activities. In accordance with the federal Clean Air Act and IDAPA 58.01.01.213 (LWA ER Section 2.8.1.1), construction permit that includes the rock crusher and a concrete batch plant permit are obtained, and conditions are followed. The effects on air quality from these temporary localized emissions are expected to be minor and are minimized through use of mitigation measures and controls measures (e.g., dust collection systems) as explained in Table 4.10-2, LWA ER Table 4.8-1, and Section 4.8.1.1. Releases from hazardous materials to the air is discussed in LWA ER Section 4.8.1.1. Impacts to air quality from CFPP preconstruction and pre-COL construction activities are SMALL.

During the CFPP preconstruction and pre-COL construction the impacts to land, water, and air are SMALL.

4.10.5 References

4.10-1 U.S. Environmental Protection Agency, “Stormwater Best Management Practice, Concrete Washout,” accessed on June 5, 2023 from https://www3.epa.gov/npdes/pubs/concretewashout.pdf.

4.10-2 Wastebits Locator, “Butte County Arco Sanitary Landfill,” accessed on June 6, 2023 from https://locator.wastebits.com/location/butte-county-arco-sanitary-landfill.

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4.10-4 Jefferson County Idaho, “Solid Waste,” accessed on June 6, 2023 from http://www.co.jefferson.id.us/266/Solid-Waste.

4.10-5 Blue Mountain Refuse Inc., “Custer Country Transfer Sites Information,” accessed on June 6, 2023 from https://bluemountainrefuseinc.com/sites.

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4.10-9 Bingham County State of Idaho, “Rattlesnake Landfill,” accessed on June 6, 2023 from https://www.binghamid.gov/RattlesnakeLandfill.

Table 4.10-1: Preconstruction and Pre-Combined License Construction Nonradiological Waste

Parameter	Quantity Generated			Storage	Disposal Method	Waste Management Measures and Controls[3]
	Preconstruction	Pre-COL Construction				
		Exemption	LWA			
Cleared Vegetation[1]	• 740,000	• Not applicable	• Not applicable	• Stockpile	• Stockpile	• Reduce land disturbance where not necessary
Alluvial Soils[1]	• 1,505,000	• Minimal	• Minimal	• Stockpile	• Reuse as non-structural fill (5000 cu yd) • Stockpile (1,500,000 cu yd)	• Reuse as structural or non-structural fill material on-site
Rock[1]	• 2,240,000	• Not applicable	• Not applicable	• Rock crushing area	• Crushed and used as fill or stockpile	• Reuse as structural or non-structural fill material on-site
Construction Waste[1] (packaging, dunnage)	• 4500	• 3750	• 2750	• Roll-offs	• Permitted landfill	• Recycle to the extent practicable
Concrete Wash-out Solids	• Unknown			• Rock crushing area	• Reuse as fill material • Stockpile	• Reuse
Concrete and Grout Wash-out Liquids	• Unknown			• Lined wash-out areas • Collection tank	• Evaporation • Treated and disposed of at permitted wastewater treatment facility	• Evaporation
Metals	• Dependent on excess materials, RCRA empty containers,			• Compatible container (e.g., roll-off)	• Recycle	• Recycle • ALARA
Municipal Waste[1]	• 2300	• 300	• 2300	• Dumpsters	• Permitted landfill	• Recycle metals, glass, cardboard, and plastic to the extent practicable
Sanitary Waste[2]	• 1,070,000	• 151,000	• 1,050,000	• Porta-lets and bladders	• Permitted sanitary treatment facility	• NA

Table 4.10-1: Preconstruction and Pre-Combined License Construction Nonradiological Waste (Continued)

Parameter	Quantity Generated			Storage	Disposal Method	Waste Management Measures and Controls[3]
	Preconstruction	Pre-COL Construction				
		Exemption	LWA			
Stormwater Run-off	• Contingent upon precipitation (LWA ER Section 2.7.1.2.3)			• Stormwater ponds	• Stormwater ponds	• Manage sediment to ponds
Used Oil, Lubricants, and Hydraulic Fluids	• Dependent on equipment operations and maintenance			• Compatible container (e.g., 55-gallon drum)	• Recycle	• Recycle
Used Oil Filters	• Dependent on equipment operations and maintenance			• Compatible container (e.g., 55-gallon drum)	• Permitted landfill	• Punctured, warmed, and drained into waste 55-gallon drum • Recycle oil • Recycle drained filter as scrap metal
POL Contaminated Rags and Absorbents	• Unknown			• Compatible container (e.g., 55-gallon drum)	• Permitted landfill	• Recycle if possible
POL Contaminated Soils	• Dependent on amounts of POL spilled and affected soils			• Compatible container (e.g., 55-gallon drum or roll-off)	• Permitted landfill	• Follow spill prevention measures and controls and plan • Treatment if feasible
Hazardous Waste (solvents, paints, coatings, adhesives, and non-RCRA empty aerosol cans)	• Small amounts			• Per manufacturer's recommendation	• Permitted landfill	• ALARA • Recycling or treatment if feasible
RCRA Empty Paints, Coatings, and Adhesives Containers	• Small amounts			• Compatible container (e.g., roll off)	• Permitted landfill	• ALARA • Recycle as scrap metal if feasible

Table 4.10-1: Preconstruction and Pre-Combined License Construction Nonradiological Waste (Continued)

Parameter	Quantity Generated			Storage	Disposal Method	Waste Management Measures and Controls[3]
	Preconstruction	Pre-COL Construction				
		Exemption	LWA			
RCRA Empty Aerosol Cans	• Small amounts			• Compatible container (e.g., 55-gallon drum)	• Permitted landfill	• ALARA • Recycle as scrap metal

Volumes are approximate, rounded, and subject to change during detailed design.

[1] Cubic yards

[2] Gallons

[3] CFPP follows license and permit requirements and associated project-specific plans for preconstruction and pre-COL construction activities.

ALARA - As low as reasonably achievable
COL - Combined license

Table 4.10-2: Nonradiological Waste Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Preconstruction				
Mobilize and Establish Site	Mobilize site excavation and grading contractor (including equipment)	SMALL[A,L,W]	• Municipal waste generated[L] • Sanitary waste generated[W] • POL waste generated[L] • Potential for land or air contamination from hazardous materials[A,L]	• Dispose of municipal waste at certified landfill • Recycle metals, glass, cardboard, and plastic to the extent practicable • Treat sanitary waste at a licensed sanitary treatment facility • Segregate and recycle POL waste • Train employees in hazard communications
Prepare Site (clearing, grubbing, grading, excavation)	Remove and stockpile vegetation, alluvial soils, and basaltic rock; establish roads and parking; grade and level surface	SMALL[A,L,W]	• Stockpiles of cleared vegetation, spoils, and rock[L] • Municipal waste generated[L] • Sanitary waste generated[W] • GHG increase from equipment and workforce[A] • Construction fugitive dust generated[A] • POL waste generated[L] • Potential for land or air contamination from hazardous and non-hazardous materials[A,L] • Stormwater runoff[W]	• Maintain stockpiles • Reuse soil and rock for fill materials • Dispose of municipal waste at certified landfill • Recycle metals, glass, cardboard, and plastic to the extent practicable • Treat sanitary waste at a licensed sanitary treatment facility • Conduct regular inspections and preventative maintenance on equipment • Limit equipment idle time to reduce emissions • Suppress dust with water application • Restrict on-site vehicle speeds • Segregate and recycle POL waste • Train employees in hazard communications • Comply with stormwater plan

Table 4.10-2: Nonradiological Waste Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Establish Temporary Facilities and Utilities	Establish temporary facilities-office, medical, training trailers; sanitary and craft facilities; warehouses	SMALL[A,L,W]	• Municipal waste generated[L] • Sanitary waste generated[W] • GHG increase from equipment and workforce[A] • POL waste generated[L] • Potential for land or air contamination from hazardous and non-hazardous materials[A,L] • Stormwater runoff[W]	• Continue measures and controls implemented during site preparation
	Install temporary power, water, and communications			
	Install security provisions			
Establish Laydown Yards and Fabrication Areas	Establish laydown and fabrication yards, including fencing, controlled entries, equipment receiving and maintenance yard			
Establish Rock Crushing and Concrete Batch Plant Facilities	Establish rock crushing, staging areas, and equipment	SMALL[A,L,W]	• Construction fugitive dust generated[A] • GHG increase from equipment[A] • Stormwater[W]	• Continue measures and controls implemented during site preparation
	Establish batch plant, staging, truck parking areas, and washouts	SMALL[A,L,W]	• GHG increase from equipment[A] • Concrete solids generated[L] • Concrete washout water generated[W] • Stormwater runoff[W]	• Continue measures and controls implemented during site preparation • Comply with concrete batch plant permit • Maintain dust collection system • Evaporate or treat concrete washout water at a licensed water treatment facility • Transport concrete solids produced to rock crushing area to be recycled

Table 4.10-2: Nonradiological Waste Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Excavate Foundations and Trenches	Excavate RXB and RWB foundations	SMALL[A,L,W]	• Municipal waste generated[L] • Sanitary waste generated[W] • GHG increase from equipment and workforce[A] • Construction fugitive dust generated[A] • POL waste generatedL • Potential for land or air contamination from hazardous and non-hazardous materials[A,L] • Stormwater runoff[W]	• Continue measures and controls implemented during site preparation
	Excavate BOS foundations: TGB, ACCS, CUB, Annex Building, SCWS, and Transmission Structure			
	Excavate trenches; install bedding, piping, and utilities; backfill			
Pre-Combined License Construction				
Exemption	Install rock bolts in RXB and RWB excavations	SMALL[A,L,W]	• Municipal waste generated[L] • Sanitary waste generated[W] • GHG increase from equipment[A] • Construction fugitive dust generated[A] • POL waste generated[L] • Potential for land or air contamination from hazardous and non-hazardous materials[A,L]	• Continue measures and controls implemented during site preparation • Activities overlap preconstruction; limited additional disruption with this activity
	Apply fibermesh/ shotcrete for RXB and RWB excavations			

Table 4.10-2: Nonradiological Waste Summary of Preconstruction and Pre-Combined License Construction Impacts, Significance, and Measures and Controls (Continued)

Scope of Work	Activity	Impact Significance Level[1]	Impact	Measures and Controls[2]
Limited Work Authorization	Conduct soft or fractured rock remediation Install RXB mud mat, rebar, and permanently embedded items	SMALL[A,L,W]	• Municipal waste generated[L] • Sanitary waste generated[W] • GHG increase from equipment and workforce[A] • Construction fugitive dust generated[A] • POL waste generated[L] • Potential for land or air contamination from hazardous and non-hazardous materials[A,L] • Stormwater runoff[W]	• Continue measures and controls implemented during site preparation • Activities overlap preconstruction; limited additional disruption with this activity

[1] SMALL: Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered SMALL.
MODERATE: Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
LARGE: Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

[2] CFPP follows license and permit requirements and associated project-specific plans for preconstruction and pre-COL construction activities.

[A] Air impact

[L] Land impact

[W] Water impact

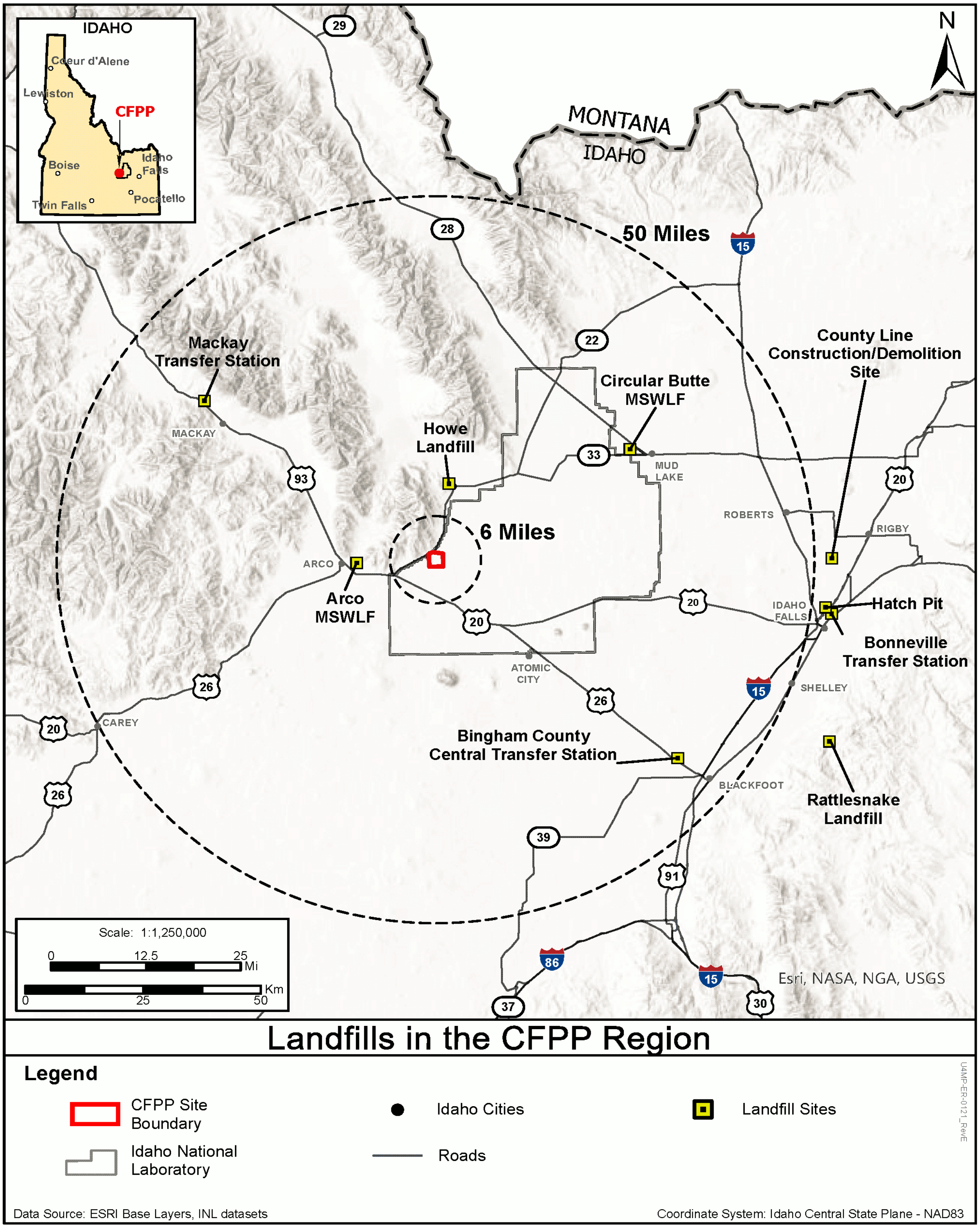
ACCS - air cooled condenser system
BOS - balance of site
CUB - Central Utilities Building
GHG - greenhouse gas
RWB - Radioactive Waste Building
RXB - Reactor Building
SCWS - site cooling water system
TGB - Turbine Generator Building

Table 4.10-3: Landfills in the CFPP Region

Landfill	Distance from CFPP[1] (miles)	Landfill Type
Arco MSWLF[2]	10	C&D and MSWLF
Howe Landfill[3]	11	C&D and MSWLF
Circular Butte Landfill MSWLF[4]	30	MSWLF
Mackay Transfer Station[5]	38	MSWLF
Bingham County Central Transfer Station[6]	42	MSWLF
Hatch Pit[7]	52	C&D
County Line Construction/Demolition Site[4]	52	C&D
Bonneville Transfer Station[8]	53	MSWLF
Rattlesnake Landfill[9]	58	C&D and MSWLF

[1] Distances measured from landfill to the center of the CFPP
[2] Reference 4.10-2
[3] Reference 4.10-3
[4] Reference 4.10-4
[5] Reference 4.10-5
[6] Reference 4.10-6
[7] Reference 4.10-7
[8] Reference 4.10-8
[9] Reference 4.10-9
MSWLF - municipal solid waste landfill

Figure 4.10-1: Landfills in the CFPP Region



4.11 Measures and Controls to Limit Adverse Impacts during Construction Activities

This section summarizes the primary adverse environmental impacts anticipated to result from preconstruction and pre-combined license (pre-COL) construction of the CFPP. Included within this section is a summary of information described within the preceding Chapter 4 sections of this Environmental Report (ER). This information includes potential adverse environmental impacts that may occur within each of the environmental resource categories along with CFPP measures and controls.

CFPP measures and controls are designed to limit adverse impacts during preconstruction and pre-COL construction. Table 4.11-1 summarizes CFPP measures and controls to limit adverse impacts during preconstruction and pre-COL construction for each environmental impact category.

In addition to these resource-specific measures, CFPP LCC adheres to the following principles throughout preconstruction and pre-COL construction. To limit adverse environmental impacts during preconstruction and pre-COL construction CFPP LLC intends to

- comply with applicable Federal, State, and local laws, ordinances, and regulations intended to prevent or minimize adverse environmental impacts
- comply with applicable requirements of permits or licenses required for preconstruction and pre-COL construction of the CFPP
- comply with applicable DOE Use Permit requirements and agreements for preconstruction and pre-COL construction of the CFPP
- comply with applicable processes and procedures for environmental compliance of activities during preconstruction and pre-COL construction
- employ Best Management Practices for preconstruction and pre-COL construction activities
- employ waste minimization and material reuse plans
- incorporate applicable environmental compliance requirements into contracts for preconstruction and pre-COL construction
- monitor environmental compliance performance of preconstruction and pre-COL construction activities and implement corrective actions as necessary.

LWA ER Table 1.4-1 provides a list of required authorizations and the status of CFPP compliance.

Table 4.11-1: Summary of Measures and Controls to Limit Adverse Impacts During Preconstruction and Pre-Combined License Construction

Impact Category	Planned Measures and Controls During Preconstruction and Pre-Combined License Construction
Land Use Impacts	
Site and Vicinity	• Adhere to project-specific plans (i.e., stormwater management) to control water runoff and erosion • Limit land disturbance to the smallest area necessary • Return temporarily disturbed lands to former uses upon completion of construction • Maximize the use of on-site materials • Adhere to project-specific plans (e.g., equipment and material staging, spoils disposition, traffic flow, and designated avoidance areas) • Coordinate grazing allotments with appropriate agencies before preconstruction and pre-COL construction to mitigate livestock encroachment • Comply with Candidate Conservation Agreement
Off-site Areas (i.e., Utility Corridors)	• Limit land disturbance to the smallest area necessary • Maximize the use of extracted materials with the disposition of excess materials to the CFPP site • Restrict worker access to floodplain area of corridor or river entry during wet and flow periods
Water Resources Impacts	
Water Quantity	• Manage site water use per project-specific plans (e.g., dust control water, batch plant water, washouts)
Water Quality	• Adhere to project-specific plans (e.g., stormwater management, spill prevention) to control water runoff, erosion, and spills
Ecological Resources Impacts	
Terrestrial Ecosystems	• Minimize area to be disturbed (e.g., removal of vegetative habitat) • Adhere to project-specific plans (e.g., stage equipment in designated areas, use designated roadways, and avoid sensitive areas)
Aquatic Ecosystems	• Adhere to project-specific plans (e.g., stormwater management, spill prevention) • Manage site water use per project-specific plans (e.g., dust control water, batch plant water, washouts)
Socioeconomic Impacts	• Adhere to project-specific plans (e.g., traffic control, dust control measures, emission reduction techniques, Health, Safety & Environmental [HSE], worker training, noise protection, controlled substance management protocol) • Adhere to equipment preventative maintenance protocol • Increased tax revenues as a result of this construction project may support community infrastructure
Environmental Justice Impacts	• Adhere to project-specific plans (e.g., traffic control, dust control measures, equipment staging, use designated roadways, and avoid sensitive areas, HSE, worker training, noise protection, controlled substance management protocol) • Adhere to equipment preventative maintenance protocol
Historic and Cultural Resources Impacts	• Avoid disturbance to recommended eligible National Historic Preservation Act sites • Adhere to project-specific plans (e.g., stage equipment in designated areas, use designated roadways, and avoid sensitive areas) • Adhere to inadvertent discovery protocol

Table 4.11-1: Summary of Measures and Controls to Limit Adverse Impacts During Preconstruction and Pre-Combined License Construction (Continued)

Impact Category	Planned Measures and Controls During Preconstruction and Pre-Combined License Construction
Air Resources Impacts	• Adhere to project-specific plans (e.g., traffic control, dust control measures, emission reduction techniques, noise protection, on-site vehicle use, HSE, worker training, noise protection) • Adhere to equipment preventative maintenance protocol
Nonradiological Health Impacts	• Adhere to project-specific plans (e.g., HSE, worker training, noise protection, dust control, on-site vehicle use, controlled substance management protocol, defined on-site traffic pattern and limit speeds, equipment use and idling limits, blasting schedule) • Adhere to equipment preventative maintenance protocol • Limit personal vehicle use on-site and encourage ride share
Radiological Health & Exposure Impacts	• Coordinate with applicable agencies (e.g., DOE, Idaho Department of Environmental Quality) to monitor and minimize impact to CFPP workers from INL sources • Adhere to emergency response agreements established with local agencies and organizations • Employ qualified and trained vendors under vendor material license
Nonradiological Waste Management Impacts	• Adhere to project-specific plans (e.g., waste management, waste segregation, disposal at certified facilities, recycle, HSE, worker training, noise protection, dust control, on-site vehicle use, stormwater management)

CARBON FREE
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Carbon Free Power Project

Application for
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Enclosure 3 - Chapter Five

Environmental Impacts from Operation of the Proposed Plant

Revision 0
July 2023

Chapter 5 Environmental Impacts from Operation of the Proposed Plant

This chapter is not applicable to a Limited Work Authorization application.

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Enclosure 3 - Chapter Six

Fuel Cycle, Transportation and Decommissioning Impacts

Revision 0
July 2023

Chapter 6 Fuel Cycle, Transportation, and Decommissioning Impacts

This chapter is not applicable to a Limited Work Authorization application.

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Enclosure 3 - Chapter Seven

Cumulative Impacts

Revision 0
July 2023

Chapter 7 Cumulative Impacts

7.0 Cumulative Impacts

This Chapter presents the resource impact area of each environmental resource type for the CFPP; identifies federal, state, local, or other activities within the defined resource impact areas that could contribute to cumulative impacts on the environmental resource types; assesses those cumulative impacts for significance, and suggests mitigation efforts, where applicable, to address cumulative impacts.

The Council of Environmental Quality defines cumulative impact in 40 CFR 1508.7 as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

This Chapter is divided into two sections:

- Past, Present, and Reasonably Foreseeable Future Activities – Section 7.1
- Impact Assessment – Section 7.2

Impacts are analyzed and assigned a significance level of potential impact to each resource (i.e., SMALL, MODERATE, or LARGE) consistent with the criteria that the NRC established in 10 CFR Part 51, Appendix B, Table B-1, Footnote 3. Unless the impact is identified as beneficial, the impact is considered adverse. In the case of "SMALL," the impact may be negligible. The definitions of significance are as follows:

- SMALL: Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered SMALL.
- MODERATE: Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
- LARGE: Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

7.1 Past, Present, and Reasonably Foreseeable Future Activities

In order to identify the past, present, and reasonably foreseeable future activities for cumulative impacts, consideration is given to the applicable environmental resource types and resource impact areas. Table 7.1-1 summarizes the resource impact areas, as described in LWA Environmental Report (ER) Chapter 2, for all resource types. Postulated accidents and fuel cycle, transportation, and decommissioning are defined as the 50-mile (mi) radius from the CFPP site.

Table 7.1-2 lists the past, present, and reasonably foreseeable future activities compiled from public and private sources including but not limited to the following:

- U.S. Environmental Protection Agency's "NEPAssist" Tool (Reference 7.1-1)
- U.S. Environmental Protection Agency's Environmental Impact Statement (EIS) Database (Reference 7.1-2)
- INL 2020 Annual Site Environmental Report (Reference 7.1-3)
- INL site activity EIS reports (Reference 7.1-4, Reference 7.1-6, and Reference 7.1-9) as recent examples of published projects located on the INL site and project-specific details
- INL site activity environmental reports (Reference 7.1-7, Reference 7.1-9, and Reference 7.1-11)
- INL 2021 Lab Overview (Reference 7.1-8), which summarizes current and future activities
- Naval Reactors Facility 2020 Annual Environmental Report (Reference 7.1-12)
- activity EIS reports within the resource type area (Reference 7.1-13 and Reference 7.1-19)
- PacifiCorp 2023 Integrated Resource Plan (Reference 7.1-14)
- Mine Safety and Health Administration (Reference 7.1-15)
- Idaho Transportation Department and project specific websites (Reference 7.1-17 and Reference 7.1-18)

The list of activities in Table 7.1-2 have the potential to impact the resource types listed in Table 7.1-1 within the resource impact area defined for the CFPP and are included in the cumulative impact assessment for LWA ER Section 7.2. Additional activities identified have been screened out because their potential environmental resource impacts are outside of the resource impact areas defined for the CFPP.

7.1.1 References

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7.1-2 U.S. Environmental Protection Agency. Environmental Impact Statement (EIS) Database, accessed May 1, 2023 from https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/search.

7.1-3 U.S. Department of Energy, Idaho Operations Office; Environmental Surveillance, Education, and Research Program, "Idaho National Laboratory Site Environmental Report Calendar Year 2020," DOE/ID- 12082(20), ISSN 1089-5469, VFS-ID-ESER-ASER-094, Idaho Falls, Idaho, September 2021; accessed November 8, 2022 from https://idahoeser.inl.gov/publications.html.

7.1-4 U.S. Department of Energy; "Final Versatile Test Reactor Environmental Impact Statement (VTR EIS)," DOE/EIS-0542, Idaho, South Carolina, Tennessee, May 2022; accessed May 1, 2023 from https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=366202.

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7.1-10 U.S. Department of Energy; "Microreactor Agile Non-Nuclear Experimental Test Bed (MAGNET) Integrated Thermal Testing Capability to Enable

Microreactors," 21-50386, Idaho Falls, Idaho, 2021; accessed May 2, 2023 from https://inl.gov/factsheet/ microreactor-agile-non-nuclear-experimental-test-bed-magnet/.

7.1-11 U.S. Department of Energy, Idaho Operations Office; "Draft Environmental Assessment for the Molten Chloride Reactor Experiment (MCRE) Project," DOE/EA-2209, INL/RPT-22-68976, Idaho Falls, Idaho, March 2023; accessed May 2, 2023 from https://www.energy.gov/nepa/ doeea-2209-molten-chloride-reactor-experiment-mcre-project-idaho-falls-id.

7.1-12 U.S. Department of Energy, "Naval Reactors Facility Environmental Monitoring Report Calendar Year 2020," NRF-OSQ-ESH-01150, Naval Reactors Facility, Idaho Falls, Idaho; accessed June 28, 2022 from https:// doi.org/10.2172/1868080.

7.1-13 U.S. Department of the Interior, Bureau of Land Management; "Lava Ridge wind Project Draft Environmental Impact Statement," DOI-BLM-ID-T030-2021-0015-EIS, Shoshone, Idaho, January 2023; accessed May 3, 2023 from https://cdxapps.epa.gov/cdx-enepa-II/public/ action/eis/details?eisId=389681.

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7.1-19 U.S. Department of the Interior, Bureau of Land Management; "Cedar Fields Proposed Plan Amendment/Final Environmental Impact Statement for the Monument Resource Management Plan," DOI-BLM-ID-T020-2013-0029-EIS, Burley, Idaho, September 2022; accessed May 3, 2023 from https:// cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=378811.

Table 7.1-1: Resource Type and Impact Area

Resource	Resource Impact Area	Relevant Environmental Report Sections
Land Use	CFPP vicinity (6-mi radius from CFPP site) with focus on 575-acre disturbed area of CFPP's 2325-acre site and approximately 400 transmission-related acres.	LWA ER Section 2.1 (Figure 2.1-4, Figure 2.1-13, Figure 2.1-22)
Water Use and Quality	CFPP vicinity (6-mi radius from CFPP site) with focus on INL site production wells	LWA ER Section 2.2 (Figure 2.2-5, Figure 2.2-19, Figure 2.2-21)
Terrestrial Ecology	CFPP vicinity (6-mi radius from CFPP site) with focus on 575-acre disturbed area of CFPP's 2325-acre site and approximately 400 transmission-related acres	LWA ER Section 2.3 (Figure 2.3-1, Figure 2.3-5, Figure 2.3-6, Figure 2.3-8)
Aquatic Ecology	Not applicable; no aquatic ecology on CFPP site and 6-mi vicinity	LWA ER Section 2.3.2
Socioeconomics and Environmental Justice	• Expanded demographic region defined as 12 counties within 50-mi radius CFPP region and two additional counties to the east (Bannock, Bingham, Blaine, Bonneville, Butte, Clark, Custer, Fremont, Jefferson, Lemhi, Lincoln, Madison, Minidoka, Power) • Economic region defined by 6 counties (Butte, Bingham, Bannock, Bonneville, Madison, Jefferson)	LWA ER Section 2.4 and Section 2.5 (Figure 2.4-1, Figure 2.4-7, Figure 2.4-13)
Historic and Cultural Resources	CFPP vicinity (6-mi radius from CFPP site) for NRHP listed sites, approximately 400 transmission-related acres, and indirect APE considered out to approximately 11 mi	LWA ER Section 2.6 (Figure 2.6-6)
Air Quality	Butte County	LWA ER Section 2.7
Nonradiological Health	• Noise- CFPP vicinity (6-mi radius from CFPP site) • Safety- 575-acre disturbed area of total 2325-acre CFPP site • Public Safety- 4 main regional population centers (Idaho Falls, Pocatello, Blackfoot, Rexburg) • EMF- approximately 400 transmission-related acres • Transportation- 6 counties in economic region with focus on the 4 main regional population centers (Idaho Falls, Pocatello, Blackfoot, Rexburg) • Etiological agents- Butte County • Equipment and Material transportation- economic region defined by 6 counties (Butte, Bingham, Bannock, Bonneville, Madison, Jefferson)	LWA ER Section 2.8 (Figure 2.8-2, Figure 2.8-6, Figure 2.8-13)
Radiological Health	CFPP region (50-mi radius from CFPP site)	LWA ER Section 2.9 (Figure 2.9-4, Figure 2.9-5, Figure 2.9-8)
Postulated Accidents	CFPP region (50-mi radius from CFPP site)	To be addressed in Combined License Application
Fuel Cycle, Transportation, and Decommissioning	CFPP region (50-mi radius from CFPP site)	To be addressed in Combined License Application

Table 7.1-2: Past, Present, and Reasonably Foreseeable Future Activities

Activity Name	Location	Summary of Activity	Status	Potentially Affected Resource(s)
Nuclear Activities				
Advanced Test Reactor (ATR) Complex[1]	INL ATR (5.6 mi from CFPP)	The Advanced Test Reactor (ATR) is the largest research reactor in the U.S. for irradiation testing of reactor fuels and materials including medical and industrial isotopes. Includes the ATR Critical Facility, Test Train Assembly Facility, Radiation Measurements Laboratory, Radiochemistry Laboratory, and Safety and Tritium Applied Research Facility. Groundwater plume monitoring is ongoing.	Operational	Land Use; Water Use and Quality; Terrestrial Ecology; Aquatic Ecology; Socioeconomics; Environmental Justice; Historic and Cultural Resources; Air Quality; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning
Remote Handled Low Level Waste (RHLLW) Disposal Facility[1]	INL RHLLW (5.8 mi from CFPP)	Facility providing below-grade, permanent radioactive waste disposal capability for up to 20 years and expansion capability up to 50 years. Comprised of an administration building, maintenance building, 175,000 square foot vault yard with groundwater monitoring wells, surface water drainage system, and 446 below-grade concrete waste disposal vaults.	Operational	Land Use; Water Use and Quality; Terrestrial Ecology; Aquatic Ecology; Socioeconomics; Environmental Justice; Historic and Cultural Resources; Air Quality; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning

Table 7.1-2: Past, Present, and Reasonably Foreseeable Future Activities (Continued)

Activity Name	Location	Summary of Activity	Status	Potentially Affected Resource(s)
Materials and Fuels Complex (MFC)	INL MFC (20.2 mi from CFPP)	Consists of the Transient Reactor Test Facility (TREAT) for testing design-basis accidents and other pulse-type irradiations, Experimental Breeder Reactor No. II Dome retained for future repurposing, Hot Fuel Examination Facility with the largest inert atmosphere hot cell for nuclear materials research, Irradiated Materials Characterization Laboratory for investigations of microstructural and thermal characterization of irradiated nuclear fuels and materials, Zero Power Physics Reactor Facility providing storage, inspection, and repackaging of transuranic elements and enriched uranium as well as material handling capabilities for material detection experiments and training, and the Sample Preparation Laboratory with instrumentation for analysis of irradiated structural materials.	Operational	Socioeconomics; Environmental Justice; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning
Specific Manufacturing Capability (SMC)	INL SMC/TAN (22.7 mi from CFPP)	Supports research and development, training, and testing of handguns, rifles, heavy weapons, and explosions. The Test Area North (TAN) previously supported Aircraft Nuclear Propulsion program with environmental monitoring and groundwater cleanup ongoing.	Operational	Socioeconomics; Environmental Justice; Air Quality; Nonradiological Health; Radiological Health; Fuel Cycle, Transportation, and Decommissioning
Central Facilities Area (CFA)	INL CFA (9.1 mi from CFPP)	Mostly comprised of adminstrative offices and support functions including medical and fire resources. There are laboratories present for analytical chemistry and radiation measurements and instrument upkeep. Also includes handling and open storage area and sanitary landfill. Groundwater plume monitoring is ongoing.	Operational	Socioeconomics; Environmental Justice; Air Quality; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning

Table 7.1-2: Past, Present, and Reasonably Foreseeable Future Activities (Continued)

Activity Name	Location	Summary of Activity	Status	Potentially Affected Resource(s)
Idaho Nuclear Technology and Engineering Center (INTEC)	INL INTEC (7.6 mi from CFPP)	Home to stored spent fuel treatment product for use in advanced reactor fuels and a demonstration facility for work supporting ZIRCEX process. Current operations include startup and operation of the Integrated Waste Treatment Unit to treat approximately 900,000 gallons of sodium-bearing liquid waste, closure of remaining liquid waste storage tank, spent nuclear fuel storage, environmental remediation, disposition of excess facilities, management of Idaho CERCLA Disposal Facility (ICDF).	Operational	Socioeconomics; Environmental Justice; Air Quality; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning
Production of High Assay Low-Enriched Uranium (HALEU) Material[2]	INL MFC (20.2 mi from CFPP)	Interim supply of HALEU from irradiated sodium bonded uranium-based material stored from EBR-II. Requires expansion of the fuel fabrication capability, including new equipment.	Proposed	Socioeconomics; Environmental Justice; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning
Versatile Test Reactor (VTR)[2]	INL CITRC (11.2 mi from CFPP)	Facility capable of performing large-scale, fast-spectrum neutron irradiation tests and experiments supporting research, development, and demonstration of innovative nuclear energy technologies focusing on fuels, materials, and sensors.	Proposed	Socioeconomics; Environmental Justice; Historic and Cultural Resources; Air Quality; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning

Table 7.1-2: Past, Present, and Reasonably Foreseeable Future Activities (Continued)

Activity Name	Location	Summary of Activity	Status	Potentially Affected Resource(s)
Radioactive Waste Management Complex (RWMC) / Advanced Mixed Waste Treatment Project (AMWTP)[1]	INL RWMC (9.6 mi from CFPP)	Consists of Subsurface Disposal Area, approximately 96-acre radioactive waste landfill containing radioactive waste, organic solvents, acids, metals, and nitrates from historical INL and other DOE facility operations. Location of Advanced Mixed Waste Treatment Project - A 17-year exhumation project retrieved, treated, and shipped 65,000 cubic meters of transuranic waste with completion in March 2022. Next phase of project involves removal of all buildings and installation of surface barrier.	In Progress	Socioeconomics; Environmental Justice; Air Quality; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning
Radioactive Waste Management Complex Evapotransporation Surface Barrier[3]	INL RWMC (9.6 mi from CFPP)	Subsurface Disposal Area under a CERCLA Record of Decision with construction of final surface barrier once complete.	In Progress	Socioeconomics; Environmental Justice; Air Quality; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning
Project Pele Prototype Microreactor[4]	INL MFC (20.2 mi from CFPP)	Mobile microreactor advanced gas-cooled reactor using high-assay low-enriched uranium tristructural isotropic fuel for testing and capable of producing 1 to 5 MWe.	Proposed	Socioeconomics; Environmental Justice; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning
Aurora Fast Reactor Power Plant[5]	INL MFC (20.2 mi from CFPP)	Experimental fast reactor transporting heat from reactor core to supercritical carbon dioxide power conversion system to generate 1.5 MWe and usable heat from metallic high-assay low-enriched uranium.	Proposed	Socioeconomics; Environmental Justice; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning

Table 7.1-2: Past, Present, and Reasonably Foreseeable Future Activities (Continued)

Activity Name	Location	Summary of Activity	Status	Potentially Affected Resource(s)
Microreactor Applications Research, Validation and Evaluation (MARVEL) Project[6,7]	INL MFC (20.2 mi from CFPP)	Construct and operate a 100 KW thermal microreactor application test platform offerring experimental capabilities on operational features of microreactors and improving integrations for final applications at TREAT facility.	Proposed	Socioeconomics; Environmental Justice; Nonradiological Health;
Microreactor Agile Non-Nuclear Experimental Test Bed (MAGNET)[8]	INL MFC (20.2 mi from CFPP)	Portable nuclear microreactor modeling and simulation at INL Systems Integration Laboratory.	In Progress	Socioeconomics; Environmental Justice; Nonradiological Health
Molten Chloride Reactor Experiment (MCRE) Terrapower[6,9]	INL MFC (20.2 mi from CFPP)	Demonstration program for experimental molten chloride fast reactor, a generation IV nuclear technology. A liquid salt-fueled, salt-cooled fast reactor enabling operation at low pressures and high temperatures with flexible fuel sources.	Proposed	Socioeconomics; Environmental Justice; Nonradiological Health; Radiological Health; Postulated Accidents;
Naval Reactors Facility[10]	INL (7 mi from CFPP)	Current operations include design, development, testing, and operation of nuclear reactor propulsion plant for naval surface and submarine vessels as well as prepares spent naval fuel for dry storage.	Operational	Socioeconomics; Environmental Justice; Air Quality; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning
Naval Reactors Facility[10]	INL (7 mi from CFPP)	Construction of Naval Spent Fuel Handling Facility consisting of a 213,000 ft^2 structure to support management operations of spent nuclear fuel before transfer to a permanent repository.	Under Construction	Socioeconomics; Environmental Justice; Air Quality; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning

Table 7.1-2: Past, Present, and Reasonably Foreseeable Future Activities (Continued)

Activity Name	Location	Summary of Activity	Status	Potentially Affected Resource(s)
Naval Reactors Facility[10]	INL (7 mi from CFPP)	Three former naval reactor prototypes all shut down by 1995.	Decommissioned	Socioeconomics; Environmental Justice; Air Quality; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning
Decommissioned INL Reactors	INL (various locations)	Multiple test reactors and prototype reactors that have been decommissioned.	Decommissioned	Land Use; Water Use and Quality; Terrestrial Ecology; Aquatic Ecology; Socioeconomics; Environmental Justice; Historic and Cultural Resources; Air Quality; Nonradiological Health; Radiological Health; Postulated Accidents; Fuel Cycle, Transportation, and Decommissioning

Table 7.1-2: Past, Present, and Reasonably Foreseeable Future Activities (Continued)

Activity Name	Location	Summary of Activity	Status	Potentially Affected Resource(s)
Other Energy Activities				
Research and Education Center	Idaho Falls, ID (52.6 mi from CFPP)	INL Battery Test Center with laboratory space for testing several hundred batteries at the same time and energy storage testing at the cell, module, and pack level, including climate chambers for testing in extreme environments; Power and Energy Real-Time Laboratory with power system test grid for integration of real power system hardware with digital simulations of electric grid; INL ESL Microgrid Test Bed that enables real-time simulations and hardware-in-the-loop validation of simulation results; Dynamic Energy Transport and Integration Laboratory that allows integration of grid simulator with electrically heated nuclear plant simulator testing integration of nuclear, renewable, and fossil energy sources to produce electrical and nonelectrical energy products; Microscopy and Characterization Suite laboratory supporting multiple initiatives including characterization of mildly radioactive samples	Operational	Socioeconomics; Environmental Justice; Nonradiological Health
Lava Ridge Wind Project[11]	Jerome, Lincoln, and Minidoka counties (35-45 mi from CFPP)	Up to 400 wind turbines and associated infrastructure and a 500 kV generation intertie transmission line	Proposed	Socioeconomics; Environmental Justice
Solar and Storage[12]	Idaho Falls, ID (52.6 mi from CFPP)	200 MW, 26.1% CF + BESS- 100% pwr for 4 hours	Proposed	Socioeconomics; Environmental Justice
Wind and Storage[12]	Pocatello, ID (54 mi from CFPP)	200 MW, CF- 37.1% + BESS- 10% pwr for 4 hours	Proposed	Socioeconomics; Environmental Justice

Table 7.1-2: Past, Present, and Reasonably Foreseeable Future Activities (Continued)

Activity Name	Location	Summary of Activity	Status	Potentially Affected Resource(s)
Critical Infrastructure Test Range Complex	INL CITRC (11.2 mi from CFPP)	Provides specialized open landscape, technical employees, and specialized facilities, such as test beds and training complexes. • Government agencies, utility companies, and military customers collaborate to find solutions for national security issues in physical security, contraband detection, and infrastructure testing including utility-scale electric power grid test bed and an above-ground, full-scale water distribution system.	Operational	Socioeconomics; Environmental Justice; Historic and Cultural Resources; Air Quality; Nonradiological Health
Pronghorn Substation	INL CFA (9.1 mi from CFPP)	Idaho Power INL substation expansion with one 34.5 kV distribution circuit constructed from the substation expansion to the CFPP site.	Approved	Socioeconomics; Environmental Justice; Air Quality; Nonradiological Health
Mining Activities				
Current Producing Mines[13]	Within 50 mi of CFPP LWA ER Figure 2.1-12	Operational mines within 50 mi of CFPP site. LWA ER Table 2.1-5	Operational	Socioeconomics; Environmental Justice; Nonradiological Health
Past Producing Mines[13]	Within 50 mi of CFPP LWA ER Figure 2.1-12	Past mines within 50 mi of CFPP site. LWA ER Figure 2.1-15	Closed	Socioeconomics; Environmental Justice; Nonradiological Health
Champagne Mine[14]	Arco, ID (11.9 mi from CFPP)	Previously reclaimed silver mine with mining rights purchased in 2018 for additional silver and gold mining	Future	Socioeconomics; Environmental Justice; Nonradiological Health
Transportation Activities				
Interstate 15/U.S. Route 86 System Interchange Complex[15]	Pocatello, ID (58 mi from CFPP)	Road construction and interchange reconfiguration, bridge repairs and construction, and construction of bicycle/ pedestrian pathways.	Proposed	Socioeconomics; Environmental Justice; Nonradiological Health
U.S. Route 20 Rexburg Interchanges[15]	Rexberg, ID (61.1 mi from CFPP)	Improve U.S. Route 20/University Boulevard interchange and U.S. Route 20/State Highway 33 interchange in Rexburg to address safety, travel times, and mobility.	Proposed	Socioeconomics; Environmental Justice; Nonradiological Health

Table 7.1-2: Past, Present, and Reasonably Foreseeable Future Activities (Continued)

Activity Name	Location	Summary of Activity	Status	Potentially Affected Resource(s)
Interstate 15/U.S. Route 20 Connector[16]	Idaho Falls, ID (49.5 mi from CFPP)	Construction to address safety, congestion, mobility, and travel time near Idaho Falls. Includes addition of pedestrian and bicycle travel.	Proposed	Socioeconomics; Environmental Justice; Nonradiological Health
Parks and Aquaculture Activities				
Cedar Fields[17]	American Falls, ID (61.8 mi from CFPP)	Plan for management of recreation use and off-highway vehicle use on approximately 7106 acres administered by the Bureau of land Management, Burley Gield Office, and the Bureau of Reclamation	Proposed	Socioeconomics; Environmental Justice
Other Activities				
Research and Education Center	Idaho Falls, ID (52.6 mi from CFPP)	Operational support activities including non-nuclear research and development, training, and testing. Scope includes- Cybercore Integration Center for the investigation and implementation of cyber security research; Wireless User Facility providing industrial, commercial, and academic users with access to wireless resources; INL Data and Control Center for collaborative review of data, models, and assets for research, demonstration, and validation; Electric Vehicle Infrastructure Laboratory for development and evaluation of solutions for electric vehicle charging infrastructure integration with the electric grid; High Performance Computing for support of advanced modeling and simulation; Collaborative Computing Center to support modeling and simulation research, development, and applications.	Operational	Socioeconomics; Environmental Justice; Nonradiological Health

Table 7.1-2: Past, Present, and Reasonably Foreseeable Future Activities (Continued)

Activity Name	Location	Summary of Activity	Status	Potentially Affected Resource(s)
Materials and Fuels Complex	INL MFC (20.2 mi from CFPP)	Operational support activities including non-nuclear research and development, training, and testing.	Operational	Socioeconomics; Environmental Justice; Nonradiological Health

[1] Reference 7.1-3
[2] Reference 7.1-4
[3] Reference 7.1-5
[4] Reference 7.1-6
[5] Reference 7.1-7
[6] Reference 7.1-8
[7] Reference 7.1-9
[8] Reference 7.1-10
[9] Reference 7.1-11
[10] Reference 7.1-12
[11] Reference 7.1-13
[12] Reference 7.1-14
[13] Reference 7.1-15
[14] Reference 7.1-16
[15] Reference 7.1-17
[16] Reference 7.1-18
[17] Reference 7.1-19

7.2 Impact Assessment

The methodology and assumptions used to approach the cumulative impact assessment for the CFPP include:

- identifying the environmental resource types and the resource impact areas defined in LWA Environmental Report (ER) Table 7.1-1.
- evaluating the baseline environmental conditions, including the past and present activities, as described in LWA ER Chapter 2.
- evaluating the impacts of reasonably foreseeable future activities (not including CFPP) as identified in LWA ER Table 7.1-2.
- evaluating the incremental impact of CFPP (i.e., preconstruction, construction and operation).
- evaluating the cumulative impacts of the identified past, present, and reasonably foreseeable future activities, including CFPP, for the resource types and resource impact areas defined.

The discussion on the cumulative impact assessment aligns with LWA ER Table 7.1-1 and is presented in this section by resource type:

- Land Use – Section 7.2.1
- Water Use and Quality – Section 7.2.2
- Terrestrial Ecology – Section 7.2.3
- Aquatic Ecology – Section 7.2.4
- Socioeconomics and Environmental Justice – Section 7.2.5
- Historical and Cultural Resources – Section 7.2.6
- Air Quality – Section 7.2.7
- Nonradiological Health – Section 7.2.8
- Radiological Health – Section 7.2.9
- Postulated Accidents – Section 7.2.10
- Fuel Cycle, Transportation, and Decommissioning – Section 7.2.11
- Global Climate Change – Section 7.2.12
- Cumulative Impact Summary – Section 7.2.13

7.2.1 Land Use

This section addresses the land use impacts from the CFPP along with past, present, and reasonably foreseeable future activities for the resource impact area. The land use resource impact area is defined in LWA ER Table 7.1-1 as the CFPP vicinity (i.e., 6-mile (mi) radius from CFPP site) with a focus on the approximate 575-acre disturbed portion of the CFPP site, and an approximate 400 acres of additional transmission and water pipeline corridor-related land.

As described in LWA ER Section 2.1, the CFPP vicinity is completely within Butte County with no towns, cities, or members of the public residing within this vicinity. The majority of the land within the CFPP vicinity is undeveloped land located on the INL site, which is controlled by the DOE (Reference 7.2-1 and Reference 7.2-2). Use of the CFPP site is granted via a DOE Use Permit to the Utah Associated Municipal Power Systems (Reference 7.2-3). Two INL nuclear facilities (the Advanced Test Reactor and Remote-Handled Low-Level Waste facilities) are present within the CFPP vicinity, approximately 5.6 mi and 5.8 mi from the CFPP, respectively. The CFPP site and much of the CFPP vicinity lies within the Howe Peak and Deadman grazing allotments administered by the U.S. Bureau of Land Management, Livestock Grazing on Public Lands (Reference 7.2-4). The area of the CFPP vicinity that extends outside of the INL site is uninhabited and includes the foothills of the Lost River mountain range, and is used for recreational activities and livestock grazing with past mining activities.

The INL site is included within a large territory once inhabited by and still important to the Shoshone-Bannock Tribes, but does not lie within land boundaries established by the Fort Bridger Treaty of 1868 (Reference 7.2-5). Section 7.2.6 discusses the agreements in place allowing access to the site.

The INL site lands were withdrawn from the public domain by way of Public Land Orders No. 318, 545, 637, and 1770 (Reference 7.2-6 through Reference 7.2-8, respectively) beginning in 1949 giving DOE authority to administer INL lands for the reasonably foreseeable future (Final Versatile Test Reactor Environmental Impact Statement, Reference 7.2-9). The INL site access is administratively controlled and limited to official business with no residential dwellings located on INL property. Public access is only allowed in rights-of-way associated with public highways, the Big Lost River rest area, and the Experimental Breeder Reactor-I National Historic Landmark visitor center (Reference 7.2-9).

The INL site consists of approximately 569,600 acres, of which approximately 11,400 acres are developed for INL facilities. Utility and public rights-of-way on the INL site, including roadways, combine for a total of about 34,000 acres. Other land uses on the INL site include the 73,260-acre Sagebrush-Steppe Ecosystem Reserve (approximately 10 mi from the CFPP site), up to 340,000 acres leased for cattle and sheep grazing (not all currently used), and a small section for controlled elk and antelope hunting. (Reference 7.2-9).

Another consideration of land use is waste management for both radiological and nonradiological wastes. The past, present, and reasonably foreseeable future activities on the INL site are expected to continue to produce similar types and quantities of radiological and nonradiological wastes, thus having a SMALL impact on the land use resource type.

Land use stresses from past, present, and reasonably foreseeable future activities on the INL site, and specifically within the CFPP vicinity, are considered SMALL. Many of the activities included in LWA ER Table 7.1-2 occur or are expected to occur in industrial or otherwise developed areas of the INL site and would result in minor or no new land disturbance.

The incremental impact of the CFPP on the land use resource type is considered SMALL. Although the CFPP site is located in a currently undeveloped portion of the INL site, new land disturbance is limited to approximately 575 acres of the CFPP site with an additional approximately 400 acres of transmission and water pipeline corridor-related land running alongside an existing transmission line and extending to the Antelope substation on the INL. This disturbed area represents a relatively small portion of the available resource and is not anticipated to adversely impact land use within the resource impact area.

Visual characteristics of the area within the viewshed are expected to be minimally impacted because of the remoteness of the site (approximately 1 mi from the nearest public access point). Preconstruction and construction activities may create short-term visual impacts but are not out of character for an industrial site as currently exists in other areas of the INL site. CFPP operations are expected to have visual impacts due to the release of plant exhaust steam. Visual impacts are discussed in greater detail in LWA ER Section 2.4 and LWA ER Section 2.6.

Radiological, nonradiological, and hazardous waste disposal for the CFPP is not within the defined resource impact area. The impacts associated with waste created during preconstruction, construction, and operations are minimized through waste management programs and disposal at approved facilities meeting acceptance requirements and in accordance with permits and regulations.

The cumulative land use impact from all identified activities and the CFPP is considered SMALL. Potential mitigation efforts include consultation with the DOE and U.S. Bureau of Land Management to realign livestock grazing allotments, if needed, on and near the CFPP site, and negotiations between CFPP, DOE, and U.S. Fish and Wildlife Service to determine final mitigation to reduce impact to the greater sage-grouse in alignment with a site-specific Candidate Conservation Agreement (Reference 7.2-10). There are no further land use impacts expected in Butte County as the proposed CFPP is consistent with Butte County development plans (Reference 7.2-11).

7.2.2 Water Use and Quality

This section addresses the water use and quality impacts from the CFPP along with past, present, and reasonably foreseeable future activities for the resource impact area. The water use resource impact area is defined in LWA ER Table 7.1-1 as the CFPP vicinity (i.e., 6-mi radius from CFPP site), with a focus on water impacts from the CFPP and the INL site production wells. No surface water or wetland areas occur on the CFPP site or within the vicinity; therefore, no surface water impacts are expected.

As described in LWA ER Section 2.2, the CFPP site is underlaid by the Eastern Snake River Plain (ESRP) aquifer. The ESRP aquifer is designated by U.S.

Environmental Protection Agency (EPA) as a sole source aquifer, supplying drinking water for approximately 200,000 people (Reference 7.2-12 and Reference 7.2-13), and is an important resource for the state of Idaho because it supplies water for industry including approximately 900,000 acres of farmland irrigation (LWA ER Figure 2.2-7).

Across the INL site the water table drops from approximately 4600 feet (ft) to 4400 ft, or a decrease in hydraulic head of approximately 200 ft. Regional groundwater flow direction (northeast to west-southwest) is shown on LWA ER Figure 2.2-13.

Ten monitoring wells were installed around the perimeter of the CFPP power block area between September 2021 and February 2022 (LWA ER Figure 2.2-14). Two U.S. Geological Survey regional groundwater monitoring wells, 142 and 142A (LWA ER Figure 2.2-8), are located approximately 1.7 mi east-northeast of the CFPP site. The CFPP well site elevations and flow directions are consistent with the regional water-table maps generated by the U.S. Geological Survey (Reference 7.2-14 and Reference 7.2-15).

The closest production wells to CFPP and the only current user within the 6-mi vicinity are located on the INL site, approximately 5.6 mi away at the Advanced Test Reactor (ATR) as shown on LWA ER Figure 2.2-20. The ATR accounts for approximately 53 percent of the total INL site water usage (Reference 7.2-16). The 2020 total annual groundwater volume use for the ATR was approximately 445.5 million gallons as reported in “2020 Idaho National Laboratory Water Use Report and Comprehensive Well Inventory (Revision 29)”, Reference 7.2-17.

Water quality for the CFPP site and within the CFPP vicinity is discussed in LWA ER Section 2.2. There are known groundwater plumes on the INL site from past practices and infiltration from evaporation ponds and drain fields. These groundwater plumes, shown in LWA ER Figure 2.2-23, are outside of the CFPP vicinity and are not anticipated to impact the CFPP. Sampling for the CFPP site indicates that groundwater quality is representative of groundwater in the ESRP aquifer with no indication of groundwater contamination from past INL activities.

Water use and quality stresses from past, present, and reasonably foreseeable future activities on the INL site, and specifically within the CFPP vicinity, are considered SMALL. Although there are groundwater plumes beneath the INL site from past operations, they are monitored regularly and have not migrated off the site. Future INL activities are assumed to operate within approved water quality limits. The INL site used less than 7.5 percent of their Federal Reserved Water Right in 2020 (Reference 7.2-18 and Reference 7.2-19), but the general consensus is that water levels throughout the ESRP aquifer have been declining slowly over time, at least up until 2013, because of over pumping and recent drought conditions (Reference 7.2-20). Water needs for future INL site activities listed in LWA ER Table 7.1-2 are not expected to challenge the INL site water rights.

The incremental impact of CFPP on the water use and quality resource type is considered SMALL. The NuScale US460 Power Plant at the CFPP site is designed to operate with reduced water needs. The CFPP utilizes evaporation ponds to store and evaporate effluent from the liquid radwaste system. CFPP is obtaining its own water rights and it is currently anticipated the CFPP site requires approximately 1200 gallons per minute (gpm) of water to be sourced from the ESRP aquifer. CFPP pump test results described in LWA ER Section 2.2 indicates that CFPP groundwater production is expected to result in a negligible drawdown within the highly productive ESRP aquifer.

The cumulative water use and quality impact from all identified activities and the CFPP is considered SMALL. Potential mitigation efforts related to declining ESRP aquifer levels are in progress with the Idaho Legislature passing Idaho Senate Concurrent Resolution No. 136 in April 2006, requesting that the Idaho Water Resource Board prepare and submit a comprehensive aquifer management plan for the ESRP aquifer (Reference 7.2-21).

7.2.3 Terrestrial Ecology

This section addresses the terrestrial ecology impacts from the CFPP along with past, present, and reasonably foreseeable future activities for the resource impact area. The terrestrial ecology resource impact area is defined in LWA ER Table 7.1-1 as the CFPP vicinity (i.e., 6-mi radius from CFPP site), which includes a focus on the approximate 575-acre disturbed portion of the CFPP site and approximate 400 acres of additional transmission and water pipeline corridor-related land.

As described in LWA ER Section 2.3, the CFPP commissioned a series of ecological field surveys at and around the CFPP site to provide recent and site-specific information and to supplement the INL long-term vegetation transects monitoring, one of the oldest, largest, and most comprehensive vegetation data sets for sagebrush-steppe ecosystems in North America (Reference 7.2-22). The CFPP also commissioned site-specific surveys to evaluate wildlife species and associated habitats on the CFPP site. The results of these monitoring efforts are representative of impacts on the terrestrial ecology from past and current activities in the resource impact area.

According to Reference 7.2-22, declines in big sagebrush cover are due to direct losses from wildland fire and possibly from reduced germination and establishment because of below average spring precipitation over the past decade. Changes in the seasonality of precipitation are also likely affecting the abundance of introduced annuals. Increased pressure from non-native species, including annuals (e.g., cheatgrass) and perennials (e.g., crested wheatgrass), may persist over the next few decades. Some of the recent changes in vegetation distribution and structure may also suggest the beginning of a shift to less resilient native plant communities on the INL site.

The INL site encompasses a large area of sagebrush-steppe habitat protected through decades of federal site management. Wildlife studies provide understanding of the species that inhabit, use, and visit the INL site. Because much of the CFPP vicinity and the transmission and water pipeline corridor lie within the INL site, species from the INL site may also be present or visit the CFPP site. The habitats within the U.S. Bureau of Land Management-controlled areas outside the CFPP and INL site-boundaries are similar to INL site habitats and similar mobile wildlife species, such as birds and large mammals, can be expected to inhabit or traverse the boundaries.

Terrestrial ecology impacts from past, present, and reasonably foreseeable future activities on the INL site, and specifically within the 6-mi CFPP vicinity, are considered SMALL. Vegetation removal activities at the INL site increases the amount of habitat loss and leads to potential local habitat degradation. Direct impacts could include permanent and temporary impacts on wildlife due to an increase in noise and human activity near construction and operation activities and the loss of habitat due to land-clearing activities that could result in habitat fragmentation. Construction and operation activities could also result in potential increases in collisions between wildlife and motor vehicles. Indirect impacts would also include an increased potential for the spread of invasive species due to soil disturbance. Many of the activities included in LWA ER Table 7.1-2 occur or are expected to occur at different locations and times and in already developed areas of the INL site, minimizing cumulative impacts of ground disturbance and land clearing. The INL site also incorporates mitigations, such as sagebrush replacement, invasive species management, and a revegetation assessment program, to reduce the terrestrial ecology impacts.

The potential incremental impact from construction and operation of the CFPP are considered SMALL. There is approximately less than 10 acres of sagebrush-steppe habitat located within the preconstruction area that is lost with impacts to the greater sage-grouse. Such impacts are anticipated to be small because leks are two or more miles from the CFPP site. Other wildlife impacts are expected to be small; temporarily affecting pronghorn and bird migrations due to preconstruction activities involving noise, dust, and emissions. No threatened or endangered plant species have been identified on the CFPP site. No rare and sensitive target plant species were documented within the 1- and 6-mi sampling zones. (LWA ER Section 2.3)

The cumulative terrestrial ecology impact from all identified activities and the CFPP is considered SMALL. Coordination between CFPP, DOE, and the U.S. Fish and Wildlife Service determines mitigation measures for sagebrush-steppe habitat protection and greater sage-grouse conservation in alignment with LWA ER Reference 4.1-3. The CFPP also incorporates requirements for environmental protections, training, and use of best practices to limit impacts to flora and fauna on and around the CFPP site.

7.2.4 Aquatic Ecology

This section addresses the aquatic ecology impacts from the CFPP along with past, present, and reasonably foreseeable future activities for the resource impact area. The aquatic ecology resource impact area is defined in LWA ER Table 7.1-1, but is not applicable because no aquatic ecosystems are located on the CFPP site or the CFPP vicinity (i.e., 6-mi radius from CFPP site).

As described in LWA ER Section 2.3, the Big Lost River is the nearest body of water (6 mi at its closest point) to the CFPP site. On the INL site, the river is ephemeral and generally dry with infrequent, temporary flow during exceptional rain or snowmelt (Reference 7.2-23). The water is almost completely used for agriculture before reaching the INL site or flows underground into the stream bed. Discharge measured by the U.S. Geological Survey at the Arco water gauge, approximately 12 mi west of the CFPP site, recorded zero flow in five of the past ten years (2013 to 2022) (Reference 7.2-24). The dry climate limit fish and other aquatic wildlife to only those occasions when precipitation, dam control, and changes in agricultural withdrawal allow some flow onto the INL site.

Aquatic ecology impacts from past, present, and reasonably foreseeable future activities on the INL site are considered SMALL. A number of man-made INL liquid waste disposal ponds and ditches currently provide aquatic habitat, but do not support aquatic ecosystems.

The incremental aquatic ecological impact due to the CFPP is considered SMALL. Construction and operational activities at the CFPP site, including transmission and water pipeline corridors and transportation, have limited potential to impact aquatic species in the CFPP site, vicinity, or region due to no or limited flow, limited populations, and distance from the CFPP site. The CFPP is designed to include storm water drainage ponds and evaporation ponds, but they are not expected to sustain aquatic ecosystems.

The cumulative aquatic ecological impacts of identified activities, including the CFPP, is considered SMALL.

7.2.5 Socioeconomics and Environmental Justice

This section addresses the socioeconomic and environmental justice impacts from the CFPP along with past, present, and reasonably foreseeable future activities for the resource impact area. The socioeconomic and environmental justice resource impact area is defined in LWA ER Table 7.1-1 as the expanded demographic region of 14 surrounding counties (Bannock, Bingham, Blaine, Bonneville, Butte, Clark, Custer, Fremont, Jefferson, Lemhi, Lincoln, Madison, Minidoka, and Power Counties).

As described in LWA ER Section 2.4, Butte County is the only county completely within the 50-mi radius of the CFPP site with the INL site making up approximately 24 percent, by land, of the county. Because there are no resident populations on the INL site, most workers travel daily from local communities or support INL site activities through the INL campus in Idaho Falls, Idaho. The demographic region was expanded to include the major population areas, which are generally located outside the eastern and southeastern extent of the 50-mi radius region. These population areas include the principal cities of Idaho Falls; Pocatello; Blackfoot; and Rexburg, and are expected to be sources of potential construction and operation workers; worker housing, services, and recreation; and main transportation corridors that access the CFPP site location (Interstate 15, U.S. Routes 20 and 26, and State

Highway 33). Population in the expanded demographic region is projected to increase approximately 7.8 percent by the start of operations and approximately 62 percent by 3 years following the end of the 40-year CFPP operating license (irrelevant of construction and operation of the CFPP) (Reference 7.2-25). This includes an overall increasing trend in the labor force expected for the reasonably foreseeable future and need for additional housing.

Socioeconomic and environmental justice impacts from past, present, and reasonably foreseeable future activities in the expanded demographic area are considered MODERATE. The nature of many of the proposed activities are transient work opportunities with overlapping construction time lines. The transient population to support these work activities are expected to trend upward. Housing needs are also expected to increase with a need for workers to either compete for limited housing in Butte County or to look farther from the site for housing. Minimal impacts are expected for low-income and minority populations based on provided details of the reasonably foreseeable future activities closest to residential areas. Several activities in the expanded demographic area include transportation improvement activities that are expected to have an overall beneficial socioeconomic impact, as well as increased tax revenues to multiple levels of government from many of the proposed activities in LWA ER Table 7.1-2.

The potential incremental impact from construction and operation of the CFPP are considered SMALL. The same transient work force and need for housing impacts are possible both during construction and for limited durations during operation for planned refueling and maintenance outages, but the anticipated increase is expected to be within the projected population growth of the region. Disproportionate impacts to minority and low-income populations in the expanded demographic area are not expected because of the distance from CFPP and the lack of residences along the main access roads to the CFPP. Beneficial socioeconomic impact is anticipated because of increased tax revenues.

The cumulative socioeconomic and environmental justice impacts of identified activities, including the CFPP, is considered SMALL to MODERATE.

7.2.6 Historical and Cultural Resources

This section addresses the historical and cultural impacts from the CFPP along with past, present, and reasonably foreseeable future activities for the resource impact area. The historical and cultural resource impact area is defined in LWA ER Table 7.1-1 as the CFPP vicinity (i.e., 6-mi radius from CFPP site), which includes the direct area of potential effects and approximately 400 acres of additional transmission and water pipeline corridors that extend approximately 11 mi from the CFPP center towards the INL Central Facilities Area. The indirect areas of potential effect are outside the CFPP direct area of potential effects and mostly outside the CFPP vicinity.

As described in LWA ER Section 2.6, the CFPP commissioned site-specific Class III cultural resource inventories to establish an understanding of the area’s historical and cultural resource characteristics, which include archaeological materials and sites; standing structures, buildings and objects; and cultural and natural places, landscapes, natural resources, and sacred areas or objects. The INL site is included within a large territory once inhabited by and still important to the Shoshone-Bannock Tribes, but does not lie within land boundaries established by the Fort Bridger Treaty of 1868 (Reference 7.2-5). In order to minimize impacts to the historical and cultural resources of the area, the DOE and the Shoshone-Bannock Tribes have an Agreement-In-Principle (Reference 7.2-26) encouraging regular interactions and a Memorandum of Agreement (Reference 7.2-27) for access to areas on the INL site of significant Tribal interest. These activities and other cultural resource activities are overseen by the Cultural Resources Working Group that includes INL, DOE, and the Shoshone-Bannock Tribes.

Historical and cultural impacts from past, present, and reasonably foreseeable future activities in the defined resource area are considered SMALL. Although details of impacted cultural and historical resources for individual activities are unknown, it is assumed that activities proceed with the State Historic Preservation Office (SHPO), Heritage Tribal Office, DOE, and NRC’s formal determination and mitigations completed. In addition, the proposed activities within the resource area are all on the INL site and there is an established Cultural Resources Working Group to oversee the Agreement-In-Principle and Memorandum of Agreement aimed to minimize impacts to historical and cultural resources.

Craters of the Moon, approximately 15 mi from the CFPP site, is designated as an International Dark Sky Site (Reference 2.6-20). Light pollution from the INL site and nearby cities affects visibility of both the dark skies and the nocturnal visual landscape at Craters of the Moon (Reference 7.2-9). Impacts to Dark Skies from CFPP lighting is minimized during detailed engineering.

The potential incremental impact from construction and operation of the CFPP is considered MODERATE. Within the CFPP area of potential effects, there are recommended eligible National Register of Historic Places cultural and historical sites. These cultural and historical sites have a potential of adverse effects if no avoidance or mitigation actions are taken. The formal National Environmental Policy Act and National Historic Preservation Act Section 106 determination occurs before commencement of preconstruction. Assessment of impacts and required mitigation associated with the CFPP are dependent on consultation between the NRC, DOE, SHPO, the Shoshone-Bannock Tribes, and other members of the public that show interest. Until such determination is made, CFPP considers the impacts to cultural resources as MODERATE.

The cumulative historical and cultural impacts of identified activities, including the CFPP, is considered SMALL to MODERATE.

7.2.7 Air Quality

This section addresses the air quality impacts from the CFPP along with past, present, and reasonably foreseeable future activities for the resource impact area.

The air quality resource impact area is defined in LWA ER Table 7.1-1 as Butte County.

As described in LWA ER Section 2.7, Butte County fully contains the CFPP site and is classified by the EPA as being in National Ambient Air Quality Standards (NAAQS) attainment. In addition, there are no nonattainment designations for the counties encompassing or abutting the wider INL site (Reference 7.2-28). Authority for implementing the National Ambient Air Quality Standards for the state of Idaho is delegated to the Idaho Department of Environmental Quality (DEQ) using the Idaho Administrative Procedures Act 58.01.01, “Rules for the control of Air Pollution in Idaho” (Reference 7.2-29). INL has several major facilities considered to be potential sources of criteria air pollutants, but modeling of the predicted criteria air pollutant background concentrations for the CFPP site from current sources using the Northwest International Air Quality Environmental Science and Technology Consortium’s “background concentration lookup” tool (NW-AIRQUEST) are within National Ambient Air Quality Standards and DEQ limits (Reference 7.2-30).

Air quality impacts from past, present, and reasonably foreseeable future activities in the defined resource area are considered SMALL. Future activities require air permits from DEQ for both construction and operation with actual air emissions expected to be below permit limits.

The potential incremental impact from construction and operation of the CFPP is considered SMALL. Permits are required from DEQ for both construction and operation with air emissions expected to remain below permit levels.

The cumulative air quality impact of identified activities, including the CFPP, is considered SMALL.

7.2.8 Nonradiological Health

This section addresses the nonradiological health impacts from the CFPP along with past, present, and reasonably foreseeable future activities for the resource impact area. The nonradiological health resource impact area is defined in LWA ER Table 7.1-1 and varies with the type of health effect. Discussion of water and air quality impacts are included in Section 7.2.2 and Section 7.2.7, respectively; those cumulative impacts are expected to be SMALL to both workers and members of the public. This section focuses on both occupational and public exposures to typical industrial setting hazards: noise; electromagnetic fields; etiological agents; general safety; and transportation safety of personnel, equipment, and materials.

From LWA ER Table 7.1-1, the noise impact area is the CFPP vicinity (i.e., 6-mi radius from CFPP site). As described in LWA ER Section 2.8, noise generated at the INL site is not detectable off-site to the public because existing primary facilities are at least 3 mi from site boundaries (Reference 7.2-9). Transportation is the principal noise source at the INL site consisting of transportation of people and materials via buses, trucks, private vehicles, material handling equipment, and freight trains. Other noise sources at the INL site include industrial facilities, equipment, and machines.

The CFPP site is approximately 1 mi from State Highway 33. Because of the CFPP location on the INL site and its characteristics (e.g., rural setting, vegetative ground cover, negligible bare exposed basalt, and relative distance from noise sources) ambient noise levels are currently low at the CFPP site.

CFPP construction and operation activities cause temporary increases and fluctuations in ambient noise levels, which are not expected to impact members of the public because of distance and existing, ambient noise levels. CFPP occupational exposure to noise is controlled with engineering and administrative controls to minimize impacts.

From LWA ER Table 7.1-1, the electromagnetic field impact area is the approximate 400 acres of transmission and water pipeline corridor. As described in LWA ER Section 2.8, an existing PacifiCorp 69 kilovolt (kV) transmission line crosses through the northeast corner of the CFPP site from State Highway 33 and southeast across the INL site to the Antelope substation. The CFPP is proposing to construct a new 230 kV line to exit the CFPP site on the northeast side and run southeast adjacent to the existing PacifiCorp 69 kV transmission line towards the Antelope Substation (LWA ER Figure 2.8-13).

The entire CFPP 230 kV transmission line lies within the INL boundary, which is access controlled and expected to limit electromagnetic field exposure to the public. The CFPP and other INL employees are expected to be exposed to near zero electrical fields and minimal magnetic fields outside the right-of-way of the 230 kV transmission line. Electrical shock potential is of small significance for transmission lines that are operated in adherence with the National Electrical Safety Code (NESC) as stated in NUREG-1437, Revision 1. The CFPP meets the National Electrical Safety Code requirements to ensure safety of the public and employees. According to NUREG-1437, because of inconclusive scientific evidence, the chronic health effects of electromagnetic field are considered uncertain and no generic impact level is assigned.

From LWA ER Table 7.1-1, the etiological impact area is the CFPP site and Butte County. As described in LWA ER Section 2.8, etiological agents should not create impacts to surface waters as there are no fresh, salt, or brackish water bodies at or near the CFPP site to be used as a water resource or a discharge location.

The proposed CFPP cooling tower and associated water systems, water pipelines, HVAC systems, nonradiological evaporation ponds, and sewage lagoons can foster the growth and distribution of etiological agents with potentially negative health impacts, many of which can be mitigated. The CFPP complies with environmental, health, and safety requirements, promulgated by the Nuclear Regulatory Commission, Occupational Safety and Health Administration, EPA, and DEQ regulations, to minimize potential impacts from etiological agents for public and occupational health.

From LWA ER Table 7.1-1, the general safety impact area is the approximate 575-acre disturbed area of the CFPP site. As described in LWA ER Section 2.8, nonradiological occupational exposures at the INL site are controlled through industrial hygiene and occupational safety programs, which track numerous performance indicators that are consistent with those of general industry using Occupational Safety and Health Administration's occupational injury and illness reporting criteria according to The Final Environmental Impact Statement for a project at the Naval Reactors Facility (Reference 7.2-31).

The CFPP workplace hazards are minimized using work control practices, training, and proper personal protective equipment. Access to work areas is limited to the authorized, trained, and adequately protected workforce.

From LWA ER Table 7.1-1, the transportation impact area is the six counties in the economic region with focus on the four main regional population centers, which include Idaho Falls, Pocatello, Blackfoot, and Rexburg.

Regional transportation infrastructure of the CFPP site includes Interstate 15, four U.S. Routes (20, 26, 91, and 93), four State Highways (22, 28, 33, and 39), and the INL on-site road systems (Figure 2.4-7). The Idaho Public Transportation Plan for District Six, which includes Bonneville, Butte, Clark, Custer, Jefferson, Lemhi, and Madison counties explains that Idaho has limited public transportation options in rural areas (Reference 7.2-32). An employment shuttle provides transit to employees of INL from Idaho Falls, Pocatello, and Blackfoot during the weekdays. It is unknown at this time if CFPP operations employees have access to a similar shuttle option for transportation to the CFPP site.

The majority of road segments in the vicinity of the INL site operate at level of service (LOS) D or better (e.g., LOS C). Traffic LOS for the CFPP vicinity and region currently operate at LOS D or better. Most of the roads are adequate for the current level of normal transportation activity and can handle an increase in traffic volume (Reference 7.2-9). LWA ER Table 7.1-2 identifies transportation-related improvements proposed for the resource impact area, which are expected to temporarily increase impacts to the public, but overall improve the traffic patterns within and between the CFPP regional populations centers.

The CFPP construction scope includes improvements on State Highway 33, INL site road T-11, and the junction of State Highway 33 with US Route 26 to improve transportation impacts for the CFPP site access route.

Radiological, nonradiological, and hazardous waste disposal for the CFPP is not within the defined resource impact area, but the transportation-related impacts associated with waste created during preconstruction, construction, and operations are minimized through waste management programs and disposal at approved facilities meeting acceptance requirements and in accordance with permits and regulations.

Nonradiological health impacts from past, present, and reasonably foreseeable future activities for the affected resource impact areas are considered SMALL. Access to work areas is limited to the authorized and adequately protected workforce.

Administrative controls and personnel training ensure compliance with industry standards, and observations of these protocols minimize and possibly eliminate exposure of the workers to noise, pollutants, hazardous chemicals, and other workplace hazards. Nonradiological health impacts to members of the public are minimized due to the remoteness of the resource impact areas.

The incremental nonradiological health impact from the CFPP is considered SMALL. Consistent with industry standards, the CFPP implements engineered and administrative controls to minimize potential impacts for public and occupational health in accordance with environmental, health, and safety requirements, promulgated by the Nuclear Regulatory Commission, Occupational Safety and Health Administration, EPA, and DEQ regulations.

The cumulative nonradiological health impact from identified activities, including the CFPP, is considered SMALL.

7.2.9 Radiological Health

This section addresses the radiological health impacts from the CFPP along with past, present, and reasonably foreseeable future activities for the resource impact area. The radiological health resource impact area is defined in LWA ER Table 7.1-1 as a 50-mi radius from the CFPP site, which includes some or all of Bannock, Bingham, Blaine, Bonneville, Butte, Clark, Custer, Jefferson, Lemhi, Lincoln, Minidoka, and Power Counties.

As described in LWA ER Section 2.9, the existing radiological sources in the resource impact area are because of the nuclear missions of the DOE and U.S. Navy on the INL site. Annual environmental reports are published by both departments detailing gaseous and liquid effluents, environmental sampling results of flora and fauna, sample monitoring of surface and ground waters, and modeled and measured radiation exposures to members of the public. These results are representative of the radiological health impacts from past and present nuclear operations on the INL site for the resource impact area.

Radiological health impacts from past, present, and reasonably foreseeable future activities for the CFPP region (i.e., 50-mi radius from CFPP site) are considered SMALL. While the nuclear missions within the INL site are extensive, annual environmental reports summarized in LWA ER Section 2.9 demonstrate that effluent releases and radiological exposures to the occupational workers and members of the public are below regulatory limits and maintained as low as is reasonably achievable.

The incremental radiological health impact from the CFPP is considered SMALL. Consistent with commercial nuclear standards, the CFPP implements engineered and administrative controls to maintain occupational and public radiation exposures below regulatory limits and maintained as low as is reasonably achievable.

The cumulative radiological health impact from identified activities, including the CFPP, is considered SMALL.

7.2.10 Postulated Accidents

This section addresses the postulated accident impacts from the CFPP along with past, present, and reasonably foreseeable future activities for the resource impact area. The postulated accident resource impact area is defined in LWA ER Table 7.1-1 as a 50-mi radius from the CFPP site, which includes some or all of Bannock, Bingham, Blaine, Bonneville, Butte, Clark, Custer, Jefferson, Lemhi, Lincoln, Minidoka, and Power Counties.

Regulations require nuclear facilities to model design-basis accident (DBA) scenarios as part of the safety review to demonstrate that the plant can be sited and operated without undue risk to the health and safety of the public by comparing the dose consequences of the DBAs modeled to acceptance criteria in 10 CFR 100. The environmental impact evaluation of DBAs are conservative in nature with actual environmental impacts expected to be much lower than those modeled. Severe accidents are considered by the regulations to be less likely to happen due to the significant loss of safety-related equipment and functions required to meet the definition of severe accident, but the consequences are considered larger than DBAs. A probabilistic risk assessment approach is used to assess the severe accident scenarios and the modeled consequences against acceptance criteria for operation license approval.

Postulated accident impacts from past, present, and reasonably foreseeable future activities for the CFPP region are considered SMALL. The operational licenses granted for these facilities means the environmental impacts from DBA and severe accidents were reviewed and deemed acceptable. The operational characteristics of many of the INL site nuclear facilities are different in nature with probabilistic risk assessments specific to their design. As such, a cumulative impact from a single initiating event is not expected to cause undue risk to the health and safety of the public.

The incremental postulated accident impact attributed to the CFPP is considered SMALL based on the proposed CFPP design and modeled accident scenario impacts meeting the 10 CFR 100 requirements.

The cumulative postulated accident impact from identified activities, including the CFPP, is considered SMALL.

7.2.11 Fuel Cycle, Transportation, and Decommissioning

This section addresses the fuel cycle, transportation, and decommissioning impacts from the CFPP along with past, present, and reasonably foreseeable future activities for the resource impact area. The fuel cycle, transportation, and decommissioning resource impact area is defined in LWA ER Table 7.1-1 as a 50-mi radius from the CFPP, which includes all or some of Bannock, Bingham, Blaine, Bonneville, Butte, Clark, Custer, Jefferson, Lemhi, Lincoln, Minidoka, and Power Counties.

The existing and future nuclear activities on the INL site, such as DOE initiatives, have resources unavailable to the commercially-operating CFPP. For example, the DOE has access to alternative fuel supplies and on-site radioactive waste disposal. Assuming these are operated within their license and within permit and regulatory limits, the impacts are considered SMALL.

The environmental impacts of the fuel cycle are evaluated for the CFPP as compared to the standard light water reactor of 1000 megawatt electric (MWe) from the 1996 version of NUREG-1437. An adjustment factor is used based on the CFPP nominal capacity factor and electrical generation capacity relative to the reference 1000-MWe light water reactor nominal capacity factor and electrical generation capacity. The adjustment factor for the proposed CFPP is approximately 55 percent. The capacity factor is used to estimate the environmental impacts to land use, water use, fossil fuel impacts, chemical effluents, radiological effluents, radiological wastes, occupational dose for the fuel cycle, and transportation-related dose. The impacts in each area are considered SMALL.

The environmental impacts of fuel and radioactive wastes to and from the CFPP are bounded by the impacts listed in 10 CFR 51.52 Table S-4 and are considered SMALL. Radioactive and mixed hazardous wastes are minimized through waste management programs and disposal at approved facilities meeting acceptance requirements and in accordance with permits and regulations.

Decommissioning of a nuclear facility is performed by safely removing the plant from service and reducing residual radioactivity to a regulatory-acceptable level that allows unrestricted or restricted conditional use of the property and termination of the operating license. The environmental impacts associated with decommissioning are captured by the Decommissioning Generic Environmental Impact Statement of NUREG-0586, Supplement 1, and are considered beneficial. Therefore, the environmental impacts from decommissioning of existing and future nuclear facilities on the INL site are considered SMALL.

The impacts of decommissioning the CFPP are bound by the larger reference reactors described in the NUREG-0586. This includes consideration for volume of land for radiological waste disposal and greenhouse gas (GHG) emissions during the decommissioning process. Therefore, the environmental impacts from decommissioning of the CFPP are considered SMALL.

The cumulative environmental impacts from fuel cycle, transportation, and decommissioning from identified activities, including the CFPP, is considered SMALL.

7.2.12 Global Climate Change

General predictions of long-term environmental impacts from increased atmospheric GHGs include rising sea-levels, changing weather patterns, changing local and regional ecosystems, and reduction in winter snowpack. The latest national climate assessment (Reference 2.7-33) reports that the cumulative impact of global GHG emissions for the northwest region of the United States has resulted in the average temperature increasing two degrees Fahrenheit since 1990 with average temperatures expected to continue rising. Higher surface temperatures may result in increasing frequency and severity of weather-related events, decreasing snowpack, and increasing droughts. In addition, the region is at risk of decreasing water supplies and hydropower; increasing wildfires; damage to aquatic and terrestrial ecosystems; increases in infectious disease and other human health problems; and stresses to agricultural productivity. The United States and global GHG emissions are estimated by the EPA in the Global Carbon Project (Reference 7.2-34) at 6.6 billion metric tons and 36.4 billion metric tons of carbon dioxide equivalent in 2019, respectively. The estimated GHG emissions from construction and operation of CFPP are not expected to have an incremental impact on global climate change. The operation of CFPP, a carbon-free baseload energy source replacing retiring fossil-fuel source(s), results in beneficial impacts.

7.2.13 Cumulative Impact Summary

Table 7.2-1 summarizes the cumulative impacts associated with past, present, and reasonably foreseeable future activities for the resource types and defined resource areas presented in this chapter.

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Table 7.2-1: Cumulative Analysis

Resource Type	Activity Type							
	CFPP	Nuclear	Other Energy	Mining	Transportation	Park/Aquaculture	Other	Cumulative Impact
Land Use	S	S	NA	NA	NA	NA	NA	S
Water Use and Quality	S	S	NA	NA	NA	NA	NA	S
Terrestrial Ecology	S	S	NA	NA	NA	NA	NA	S
Aquatic Ecology	S	S	NA	NA	NA	NA	NA	S
Socioeconomics	S	S	M	S	S	S	S	S-M
Environmental Justice	S	S	S	S	S	S	S	S
Historical and Cultural Resources	M	S	S	NA	NA	NA	NA	S-M
Air Quality	S	S	S	NA	NA	NA	NA	S
Nonradiological Health	S	S	S	S	S	NA	S	S
Radiological Health	S	S	NA	NA	NA	NA	NA	S
Postulated Accidents	S	S	NA	NA	NA	NA	NA	S
Fuel cycle, Transportation, Decommissioning	S	S	NA	NA	NA	NA	NA	S

SMALL (S)- Environmental effects are not detectable or are so minor that they neither destabilize nor noticeably alter important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered SMALL.
MODERATE (M)- Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
LARGE (L)- Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.
Not applicable (NA)- There are no identified activities within the resource area to consider in the cumulative analysis.

CARBON FREE
POWER PROJECT

Carbon Free Power Project

Application for Limited Work Authorization

Enclosure 3 - Chapter Eight

Need for Power

Revision 0
July 2023

Chapter 8 Need for Power

This chapter is not applicable to a Limited Work Authorization application.

Carbon Free Power Project

Application for Limited Work Authorization

Enclosure 3 - Chapter Nine

Environmental Impacts of Alternatives

Revision 0
July 2023

Chapter 9 Environmental Impacts of Alternatives

9.0 Environmental Impacts of Alternatives

This chapter describes the alternatives to the proposed action of issuance of a LWA, under the provisions of 10 CFR 50.10(d) and 10 CFR 2.101(a)(9), to CFPP LLC for pre-combined license construction activities for the CFPP at the proposed location in Butte County, Idaho. Details within this chapter support the evaluation of impacts of the no action alternative as specified by National Environmental Policy Act Section 102(2)(C)(iii).

The content of this chapter is organized into the following sections:

- No-Action Alternative - Section 9.1
- Energy Alternative - Section 9.2
- Site-Selection Process - Section 9.3
- System Alternatives - Section 9.4

9.1 No-Action Alternative

Under the no-action alternative, the NRC would not issue CFPP LLC a LWA for proposed CFPP early construction activities described in LWA ER Section 1.2, Description of the Proposed Action and the Purpose and Need, for the CFPP. The no-action alternative would result in a major project delay and potentially jeopardize the CFPP which is needed for demonstrating American technological advances of nuclear reactor capabilities, generating added capacity for UAMPS customers and reducing reliance on carbon-emitting, fossil-fuel electricity generation.

With the no-action alternative, the proposed CFPP schedule would not be achievable. Construction activities would be delayed until after issuance of the combined licenses. This construction delay would affect the target commercial operation date of the CFPP which would present significant financial and socioeconomic implications for both current and future investors and subscribers.

The no-action alternative would result in increased project costs due to the schedule delays. These combined economic impacts resulting from the no-action alternative would generate negative publicity, which could reduce investor and subscriber confidence, potentially leading to canceled subscriptions and potentially jeopardizing the economic viability of the CFPP.

Termination of the CFPP would prevent UAMPS project benefits, which include

- meeting a demonstrated need for power by building and operating CFPP.
- producing carbon-free electricity adequate to meet the expected baseload electrical generating capacity and growth demand to maintain system reliability and increase fuel diversity.
- providing a carbon-free baseload resource with minimal effects on human health and the environment to offset retiring fossil fuel generating assets.
- locating the proposed site on a portion of the INL, which provides a suitable location for siting this first-of-a-kind plant from both environmental and safety perspectives.
- maintaining an adequate reserve margin to mitigate uncertainties in meeting load requirements that can arise from unit outages, adverse weather conditions, unexpected demand, or unplanned loss in the transmission system.
- establishing an advanced nuclear energy resource in cooperation with the DOE Office of Nuclear Energy.
- demonstrating the resilient safety features of the NuScale Power Plant US460 design.
- supporting national goals to advance the use of nuclear energy and foster collaboration between the private sector and national laboratories.
- supplying lower-cost, reliable, alternative carbon-free power to their customers.
- creating new jobs for construction and operation, manufacture of systems and components, and ongoing procurement of required goods and associated services that would introduce millions of dollars into the regional economy.

Furthermore, terminating the proposed CFPP could potentially increase environmental impacts at other locations if another applicant proposes construction and operation of new generating capacity of any kind to meet the need for power, such as

- increasing land use requirements for building alternatives.
- increasing dependency on fossil-fuel generation options that would have continued impacts to regional air quality and climate change.

In summary, the no-action alternative would delay construction and increase project cost. The severity of these impacts could prevent demonstration of the NuScale Power Plant US460 design resulting in a missed opportunity to innovate American technological advances using a first-of-a-kind carbon-free baseload resource while meeting UAMPS customer power demands.

9.2 Energy Alternative

This section is not applicable to a Limited Work Authorization application.

9.3 Site-Selection Process

This section is not applicable to a Limited Work Authorization application.

9.4 System Alternatives

This section is not applicable to a Limited Work Authorization application.

Carbon Free Power Project

Application for Limited Work Authorization

Enclosure 3 - Chapter Ten

Conclusions

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Chapter 10 Conclusions

10.0 Conclusions

This Chapter summarizes the potential environmental impacts, unavoidable adverse environmental effects, productive uses, irreversible and irretrievable commitment of resources, and alternatives of the proposed action to issue the LWA for the CFPP at the preferred site in Butte County, Idaho.

The content of this Chapter is organized into the following sections:

- Impacts of the Proposed Actions – Section 10.1
- Unavoidable Adverse Environmental Effects – Section 10.2
- Relationship between Local Short-Term Use of the Environment and Long-Term Productivity – Section 10.3
- Irreversible and Irretrievable Commitments of Resources – Section 10.4
- Alternatives to the Proposed Action – Section 10.5
- Benefits and Costs Analysis - Section 10.6

10.1 Impacts of the Proposed Actions

As discussed in the LWA ER Chapter 2, the CFPP site is located on the western edge of the INL site within Butte County. The INL site encompasses approximately 890 square miles (569,600 acres) that includes vast areas of unpopulated and undeveloped desert with a series of dispersed INL operational and research facilities. The INL site is mostly bordered by federal lands consisting largely of desert managed by the Bureau of Land Management (BLM), range and forest land managed by the U.S. Forest Service, and some private agriculture lands. The INL site is under DOE control, and access is limited to official business. The DOE allows occasional limited access to portions of the INL site for livestock grazing, controlled hunting (LWA ER Section 2.1) and seasonal public access to the Experimental Breeder Reactor-1 museum.

The CFPP site encompasses approximately 2325 acres of which about 575 acres are used for preconstruction and pre-combined license (pre-COL) activities. An additional approximately 400 transmission-related acres are used during preconstruction, pre-COL construction, COL construction, and operation. These areas extend from the CFPP site southeast to the Antelope Substation within the INL Central Facilities Area. The DOE Use Permit (Reference 2.0-1), granted by DOE to CFPP LLC, specifies that access to this area is a secondary use that shall not materially interfere with DOE’s ongoing missions. As such, there are no competing uses for the areas associated with CFPP’s short-term use.

10.1.1 Resource Impacts from Proposed Action

Preconstruction and pre-COL construction change approximately 575 acres of the CFPP site land use, as described in LWA ER Section 4.1, from undeveloped, government-controlled and government mission-focused land use to an industrial use area. The BLM currently administers grazing allotments on the INL site, including two allotments associated with this undeveloped CFPP site. The proposed action requires withdrawal of the CFPP site from the grazing program. Similarly, the CFPP site is located within a designated area on the INL site for greater sage-grouse conservation. The proposed action impacts less than 10 acres of important habitat associated with this Candidate Conservation Agreement. No impacts to the Butte County land use beyond these aforementioned changes are expected from CFPP preconstruction and pre-COL construction activities as these are consistent with Butte County development plans. As further discussed in LWA ER Section 4.1 and Section 7.2, the impacts to land use from CFPP preconstruction and pre-COL construction are SMALL.

During preconstruction, pre-COL construction, and COL construction, best management practices (BMPs) are used to minimize impacts to water resources, including erosion and sediment transport. No waters of the U.S. are located on the CFPP site. Although land disturbances may increase the total amount of localized runoff during storm events, runoff water is contained in new stormwater ponds, or infiltrate into the subsurface. No storm runoff or suspended sediment migrates off the site. Surface runoff rates and recharge rates to the underlying aquifer are not anticipated to change significantly as a result of surface modifications. Water use increases due to the preconstruction and pre-COL activities. Approximately 15 Mgal of non-potable water are sourced from the Eastern Snake River Plain aquifer for pre-COL construction. No impacts to groundwater use or availability occur as a result of preconstruction or pre-COL construction activities. Potential impacts from preconstruction and pre-COL construction to water resources (i.e., surface water, groundwater, and water quality) as well as other water users are SMALL.

No surface water or wetland areas occur on the CFPP site. As such, no aquatic ecological impacts are expected to result from the CFPP preconstruction, pre-COL construction, and COL construction.

Terrestrial habitat in the CFPP region is largely sagebrush-steppe shrublands. The hot, dry summers characteristic of eastern Idaho predispose sagebrush-steppe communities to a history of recurring fire. In 1994, a wildland fire burned approximately 23,000 acres on the western edge of the INL site including the area associated with the CFPP site. This fire essentially removed the sagebrush dominated areas and resulted in the grass, forbs, and sparse small shrubs that currently dominate the majority of the CFPP site. Preconstruction activities, such as land clearing, grading, excavation, and filling, have the greatest potential to effect ecosystems. Temporary disturbance of terrestrial habitat from preconstruction activities is discussed in LWA ER Section 4.3. Preconstruction, pre-COL construction, and COL construction disturb approximately 575 acres at the CFPP site including less than 10 acres of sagebrush habitat. This area is small relative to the approximately 569,000 total acres of the INL site, about 274,000 acres of which are sagebrush habitat. No threatened or endangered plant species have been identified on the CFPP site. Impacts to terrestrial habitat and flora from preconstruction, pre-COL construction, and COL construction are SMALL.

Terrestrial wildlife species identified on the CFPP site, vicinity, and region are characteristic of sagebrush-steppe habitats and recovering sagebrush-steppe habitats impacted by wildfires. Wildlife includes mammals (e.g., ungulates; predators, such as coyotes; and small mammals, such as rabbits), birds, reptiles, and terrestrial invertebrates. Wildlife impacts associated with preconstruction and pre-COL construction are limited in duration, as most of the clearing, grading, and excavation are completed within 18 months or less. The greater sage-grouse faces threats in Idaho, including wildfire, invasive species, and habitat fragmentation. The greater sage-grouse is a species of concern for the CFPP, who is collaborating with DOE, U.S. Fish and Wildlife Services, and the BLM to comply with Candidate Conservation Agreement requirements, including mitigation measures or BMPs. Pronghorn and bats also represent mammal species that may be impacted by CFPP preconstruction, pre-COL construction and COL construction activities. Preconstruction, pre-COL construction, and COL construction have the potential to disrupt pronghorn migration and impact animals with dust, noise, vehicle collisions, fences, and general human presence. Potential impacts to bats include noise, dust, perch attraction from tall equipment, vibrations, emissions, and attraction to water sources (e.g., stormwater ponds, truck washouts) that could increase human-to-bat interactions. No threatened or endangered species are found on the CFPP site. Overall, the impacts to wildlife from preconstruction, pre-COL construction, and COL construction are SMALL.

Socioeconomic impacts associated with preconstruction and pre-COL construction are presented in LWA ER Section 4.4. The analysis of impacts includes consideration of physical (i.e., noise, air quality, transportation, viewshed) impacts, demographic impacts, economic impacts, and community infrastructure (i.e., traffic, recreation, housing, public services) impacts within the surrounding 14-county expanded demographic region (LWA ER Figure 2.4-1) and 6-county expanded economic region (LWA ER Figure 2.4-7). Projected workforce levels for preconstruction and pre-COL construction vary monthly (LWA ER Figure 4.4-1) and peak at 408 workers in month 18, which is the month prior to the anticipated start of COL construction. Given the remote location of the CFPP, projected workforce size, and workscope associated with preconstruction and pre-COL construction socioeconomic (physical, demographic, economic, and community infrastructure) impacts are SMALL.

The CFPP is conducting input-output economic modeling using an impact analysis for planning tool (IMPLAN) to estimate the increased output, gross regional product, employment, employee compensation, and tax revenues resulting from the preconstruction, construction, and operations of the project. Increased revenues to multiple levels of government are viewed as a benefit to the state and the local jurisdictions in the CFPP region. Impacts from property taxes are expected to be positive and substantial for Butte County. The model results are included in the COL application.

Environmental justice impacts from preconstruction and pre-COL construction are described in LWA ER Section 4.5. The CFPP site is located on the INL site in southeastern Idaho. The regional population is mainly white with minority and low-income populations found most frequently in the populated communities within the CFPP expanded demographic and economic regions. The closest aggregate minority Census Block Groups are located more than 20 miles from the CFPP site in Clark County.The closest low-income population is located approximately 4.3 miles from the CFPP site in Butte County. Disproportional impacts to populations identified as minority or low-income are SMALL.

Cultural resources at the INL site include

- prehistoric, historic, or protohistoric archaeological materials
- historic structures and buildings
- natural places, landscapes, and select natural resources
- sacred areas of importance for Native American Tribes.

The direct and indirect areas of potential effects for the CFPP are described in LWA ER Section 2.6. Details of historic and cultural resource impacts related to preconstruction and pre-COL construction are presented in LWA ER Section 4.6. Class III cultural resource inventories of areas to be disturbed by preconstruction and pre-COL construction activities were completed by qualified archaeologists. A formal National Historic Preservation Act of 1966, Section 106, determination of potential historic sites occurs in consultation between DOE, NRC, State Historic Preservation Office, Heritage Tribal Office, and members of the public with an interest prior to the implementation of preconstruction activities. Until such determination is made, CFPP considers the preconstruction impacts to cultural resources as MODERATE. Pre-COL construction impacts are considered SMALL because the pre-COL construction activities are performed within the same Area of Potential Effects and after the initiation of preconstruction activities. Therefore, the prior determinations and associated mitigations are already agreed upon and implemented.

Atmospheric conditions at the remote CFPP site are influenced by its northerly latitude, high elevation, proximity to central Idaho mountain ranges, and a position on the lee side of the Coastal and Cascade mountain ranges located in Oregon and Washington states. The prevailing wind direction is from the southwest. Arid to semi-arid conditions persist within the CFPP region and total precipitation for the period of the CFPP record is 8.86 inches (LWA ER Section 2.7 and Table 2.7-34). Air resource impacts resulting from preconstruction and pre-COL construction are presented in LWA ER Section 4.7. Preconstruction and pre-COL construction activities result in localized increases in air emissions. Greenhouse gas emissions for preconstruction and pre-COL construction from workforce commute and construction equipment are approximately 7880 MT CO_2 (eq) (LWA ER Table 4.8-2 and Table 4.8-3). Impacts to air resources during preconstruction, pre-COL construction, and COL construction are SMALL.

Details of nonradiological human health impacts related to preconstruction and pre-COL construction are presented in LWA ER Section 4.8. Nonradiological human health impacts include public and occupational health impacts, noise impacts, and impacts associated with transportation of construction materials and personnel. Public health risks from construction activities at the CFPP are minimal because of the distance from the CFPP site to the nearest residences, schools, community centers, INL facilities, and additional public locations.

Preconstruction and pre-COL construction activities cause temporary increases and fluctuations in ambient noise levels around the site depending on the number and type of equipment in use. The impacts from noise from preconstruction and pre-COL construction at the closest public noise-sensitive human-receptor and from construction-related traffic to nearby residences schools, churches, and parks are SMALL. Anticipated impacts to traffic-related accidents, injuries, and fatalities resulting from the increased traffic volume during CFPP preconstruction and pre-COL construction of the CFPP are SMALL. Compliance with site permits, adherence to worker safety and health procedures, and application of BMPs protects workers during preconstruction and pre-COL construction. Impacts to non-radiological health of the public and workers from air quality, noise, transportation, and occupational health risks from the CFPP preconstruction and pre-COL construction is SMALL.

The CFPP, located on an undeveloped parcel of the INL site, has no known radiological sources of exposure and no gaseous or liquid radiological effluent sources on or from within the CFPP site. Three INL facilities located between 5 and 10 miles from the CFPP site have current and previous direct radiological sources. Given the distance of these facilities from CFPP, exposure to the construction workforce is negligible and consistent with background from direct radiation sources.

Regardless of the construction worker location on the CFPP site, the estimated annual exposure is conservatively estimated at a maximum of 1 mrem/year, below the limit of 100 mrem/year specified in 10 CFR 20.1301 and 10 CFR 20.1302. Radiological health impacts during preconstruction, pre-COL construction, and COL construction are SMALL.

10.2 Unavoidable Adverse Environmental Effects

This section focuses on unavoidable adverse impacts from preconstruction and pre-combined license (pre-COL) construction (i.e., exemption to 10 CFR 50.10(c) and LWA construction activities). Some anticipated adverse environmental impacts that cannot be avoided remain after practical mitigation measures are taken. These include the use of the site and associated off-site facilities. This section considers unavoidable adverse impacts prior to preconstruction, construction, and operation of the CFPP, including transmission and water supply.

10.2.1 Unavoidable Adverse Environmental Impacts of Preconstruction and Pre-COL Construction

Preconstruction and pre-COL construction impacts are described in detail in Chapter 4 and summarized in LWA ER Section 10.1. This section presents the preconstruction and pre-COL construction adverse impacts and lists measures and controls that reduce or eliminate impacts and unavoidable adverse impact after mitigation. Mitigation measures include best management practices (BMPs), measures, methods, procedures, practices, or industry standards used to adhere to environmental regulations to reduce or prevent pollution and environmental impacts. Mitigation measures are implemented through project-specific plans and procedures developed for preconstruction and construction activities that account for environmental regulations and site characteristics.

Table 10.2-1 presents the adverse impacts associated with the CFPP preconstruction activities and includes measures and controls to reduce or eliminate adverse impacts and unavoidable adverse environmental impact remaining after mitigation. Table 10.2-2 presents the same information relative to adverse impacts associated with the CFPP pre-COL construction activities.

Table 10.2-1: Preconstruction-Related Unavoidable Adverse Environmental Impacts

Resource Area	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impact after Mitigation
Land Use	Preconstruction disturbs approximately 575 acres of undeveloped desert land/ habitat. Approximately 3.7 M cu yd of soils and rock materials are impacted due to site grading and excavation. Grazing acreage is reduced by approximately 754 acres.	Preconstruction activities comply with relevant federal, state, and local regulatory requirements, including BMPs, stormwater management, dust control plans. Temporary impacted areas are redressed or improved with landscaping and native plants. Excavated materials, such as crushed rock, are reused for structural backfill, roadway aggregate, and general fill. Grazing allotment acreage to be coordinated with DOE and BLM.	Preconstruction changes to the land use, extracted materials, and reduced acreage available to grazing are unavoidable. The reduced grazing allotments are a small percentage of the overall available grazing acreage. Temporarily disturbed areas are redressed as soon as practical. These unavoidable adverse impacts are therefore SMALL.
Water Resources	Approximately 35 M gal of water is used to support preconstruction activities with the majority being sourced from the Eastern Snake River Aquifer.	Preconstruction activities and groundwater production comply with relevant federal, state, and local permits and regulatory requirements, including BMPs, stormwater management and other applicable management plans.	Preconstruction activities consume water supplied from groundwater sources. No waters of the U.S. are used or impacted from preconstruction activities. These unavoidable adverse impacts are SMALL.
Ecological Resources	Approximately 575 acres are disturbed, involving vegetation clearing, grading, and excavation resulting in impact to terrestrial habitat. Preconstruction activities increases noise, generate dust, and impacts wildlife breeding, nesting, and migration patterns due to human presence.	Preconstruction activities comply with relevant federal, state, and local regulatory requirements, including BMPs and DOE use permit requirements. Prior wildland fires have impacted native vegetation of the site. Long-term habitat improvements are mitigated through replacement plantings and continued management through the operational phase of the project.	Destruction of the current sagebrush habitat occurs from the building activities and change in land use. These unavoidable adverse impacts are SMALL given the prior wildfire impacts and the available surrounding habitat acreage.

Table 10.2-1: Preconstruction-Related Unavoidable Adverse Environmental Impacts (Continued)

Resource Area	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impact after Mitigation
Socioeconomics	Preconstruction worker employment levels are not expected to adversely impact regional housing, services, and recreational venues. Localized traffic volumes within the vicinity of the CFPP site are expected to increase, however, these increases are not anticipated to cause adverse impacts to traffic infrastructure. Access to the CFPP site is from State Highway 33, which increases traffic congestion.	Preconstruction activities comply with relevant federal, state, and local regulatory requirements including coordination with the Idaho Transportation Department regarding necessary improvement at the HW-33 and T-11, and the HW-33 and HW-26 intersections. Administrative controls such as posted speed limits, traffic controls, and staggered shift hours could reduce impacts.	Unavoidable adverse socioeconomic impacts are not expected from the preconstruction activities, thus are considered SMALL.
Environmental Justice	Maximum preconstruction worker employment level is estimated to be 143 with an average of 106 employees over 18 months. Minimal impacts on regional housing, services, and recreational venues are anticipated. The preconstruction labor workers are likely to be attracted from outside the economic region. Lack of public transportation to the CFPP site may limit low-income individual job opportunities.	The project engages with local agencies, trades, and small businesses to support CFPP preconstruction activities; encourages ride sharing; and coordinates with local real estate agencies to facilitate housing options.	Unavoidable adverse environmental justice impacts are not expected from the preconstruction activities, thus are considered SMALL.
Historic & Cultural Resources	Cultural resources are present within the area of potential effects, and the preconstruction activities alter, directly or indirectly, the characteristics of the property.	Preconstruction activities comply with relevant federal, state, and local regulatory requirements including prior implementation of mitigation strategies determined via the formal NHPA, Section 106 review. Adhere to inadvertent discovery process.	Unavoidable impacts to known historic and cultural sites occurs as the result of preconstruction activities. These adverse impacts are SMALL given that designated mitigation strategies are implemented.

Table 10.2-1: Preconstruction-Related Unavoidable Adverse Environmental Impacts (Continued)

Resource Area	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impact after Mitigation
Air Resources	Preconstruction activities result in localized increases in air emissions and noise. Activities associated with the use of construction equipment and construction workforce traveling to and from the project site may result in varying amounts of dust, air emissions, and noise.	Preconstruction activities comply with relevant federal, state, and local regulatory requirements including implementation of BMPs such as dust control measures to reduce particulate emissions. The area is in an attainment area. However, the increase in emissions due to preconstruction activity and increased traffic is not anticipated to cause non-attainment.	Unavoidable adverse air resource impacts are not expected from the preconstruction activities, thus the impacts are considered SMALL.
Human Health (Radiological & Nonradiological Health)	Noise levels from preconstruction activities, equipment and material transport, and workforce commuting to and from the site present potential adverse impacts.	Preconstruction activities comply with relevant federal, state, and local regulatory requirements. On-site noise exposure is controlled through general industry work control practices and site-specific plans. Traffic noise is limited to workforce shift changes and normal business hours. The maximum noise level at the intersection of T-11 and State Highway 33, the closest noise-sensitive human-receptors, is expected to be 66 dBA.	Increased noise levels on-site represent unavoidable adverse impacts. These impacts are SMALL as they are limited to within one mile of the site and occur during normal work hours.
Waste Management	Preconstruction activities result in unavoidable waste impacts involving the generation of 0.74 M cu yds of vegetative debris. This vegetation debris is stockpiled on site. Approximately 0.77 M cu yds of spoils materials (non-structural fill materials) is excavated and emplaced within stockpiles or berms at the site.	Preconstruction activities comply with relevant federal, state, and local regulatory waste management requirements. Project-generated waste is managed and disposed of at certified disposal facilities. BMPs such as waste segregation and recycling reduce waste volumes.	Unavoidable adverse waste impacts resulting from preconstruction activities are expected to be SMALL.

Table 10.2-2: Pre-Combined License Construction-Related Unavoidable Adverse Environmental Impacts

Resource Area	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impact after Mitigation
Land Use	Pre-COL construction activities occur in areas previously disturbed by preconstruction activities.	Pre-COL construction activities comply with relevant federal, state, and local regulatory requirements.	Unavoidable adverse land use impacts are not anticipated from the pre-COL construction activities.
Water Resources	Approximately 15.6 M gal of water used to support pre-COL construction activities is sourced from the Eastern Snake River Aquifer.	Pre-COL construction activities and groundwater production comply with relevant federal, state, and local regulatory requirements, including BMPs, stormwater management and other applicable management plans.	Pre-COL construction activities consume water supplied from groundwater sources. These unavoidable adverse impacts are SMALL. No waters of the U.S. are used or impacted from pre-COL construction activities.
Ecological Resources	Pre-COL construction activities occur in areas previously disturbed by preconstruction activities.	Pre-COL construction activities comply with relevant federal, state, and local regulatory requirements.	Unavoidable adverse ecological impacts are not expected from the pre-COL construction activities.
Socioeconomics	Pre-COL construction worker employment levels are not expected to adversely impact regional housing, services, and recreational venues. Localized traffic volumes within the vicinity of the CFPP site are expected to increase, however, these increases are not anticipated to cause adverse impacts to traffic infrastructure. Access to the CFPP site is from State Highway 33, which increases traffic congestion.	Pre-COL construction activities comply with relevant federal, state, and local regulatory requirements. Road modifications made during preconstruction mitigate impacts.	Unavoidable adverse socioeconomic impacts are not expected from the pre-COL construction activities.

Table 10.2-2: Pre-Combined License Construction-Related Unavoidable Adverse Environmental Impacts (Continued)

Resource Area	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impact after Mitigation
Environmental Justice	The maximum pre-COL construction worker employment level is estimated to be 337 (19 for Exemption Request work and 318 for LWA work). Minimal impacts on regional housing, services, and recreational venues is anticipated. The pre-COL construction labor workers are likely to be attracted from outside the economic region. Lack of public transportation to the CFPP site may limit low-income individual job opportunities.	The project is engaging with local agencies, trades, and small businesses to support CFPP pre-COL construction activities; encourages ride sharing; and coordinates with local real estate agencies to facilitate housing options.	Unavoidable adverse environmental justice impacts are not expected from the pre-COL construction activities.
Historic & Cultural Resources	Pre-COL construction activities occur in areas previously disturbed by preconstruction activities.	Pre-COL construction activities comply with relevant federal, state, and local regulatory requirements. Adhere to inadvertent discovery process.	Unavoidable adverse cultural resource impacts are not expected from the pre-COL construction activities.
Air Resources	Pre-COL construction activities results in localized increases in air emissions and noise. Activities associated with the use of construction equipment and construction workforce traveling to and from the project site may result in varying amounts of dust, air emissions, and noise.	Pre-COL construction activities comply with relevant federal, state, and local regulatory requirements including implementation of BMPs such as dust control measures to reduce particulate emissions. The area is in an attainment area. However, the increase in emissions due to preconstruction activity and increased traffic is not expected to cause non-attainment.	Unavoidable adverse air resource impacts are not expected from the pre-COL construction activities.

Table 10.2-2: Pre-Combined License Construction-Related Unavoidable Adverse Environmental Impacts (Continued)

Resource Area	Adverse Impact	Mitigation Measure	Unavoidable Adverse Environmental Impact after Mitigation
Human Health (Radiological & Nonradiological Health)	Noise levels from pre-COL construction activities, equipment and material transport, and workforce commuting to and from the site present potential adverse impacts.	Pre-COL construction activities comply with relevant federal, state, and local regulatory requirements. On-site noise exposure is controlled through general industry work control practices and site-specific plans. Traffic noise is limited to workforce shift changes and normal business hours. Noise levels are expected to decrease within one mile of the site and no sensitive receptors are located within this radius.	Increased noise levels on-site represent unavoidable adverse impacts. These impacts are SMALL during pre-COL construction as they are limited to within one mile of the site and occur during normal work hours.
Waste Management	Pre-COL construction activities generate a variety of waste streams including solid waste, sanitary waste, and construction waste. The volumes of projected waste are not expected to result in adverse impacts.	Pre-COL construction activities comply with relevant federal, state, and local regulatory waste management requirements. Project-generated waste is managed and disposed of at certified disposal facilities. BMPs such as waste segregation and recycling reduce waste volumes.	Unavoidable adverse waste impacts are not expected from the pre-COL construction activities.

10.3 Relationship between Local Short-Term Use of the Environment and Long-Term Productivity

This section of the LWA Environmental Report (ER) provides analysis and consideration of the short-term environmental and socioeconomic impacts arising from preconstruction and pre-combined license (pre-COL) activities of the CFPP. These activities are considered to be local and short-term uses of the CFPP site for purposes of this section. Additional short-term uses (i.e., COL construction and operation activities) are presented in the COL application ER. The long-term use of the site starts with the conclusion of the proposed facility decommissioning.

10.3.1 Preconstruction and Pre-COL Construction

Potential unavoidable adverse environmental impacts from preconstruction and pre-COL construction and proposed measures to reduce impacts are summarized in LWA ER Section 10.2. Some adverse environmental impacts remain after implementation of mitigation measures; however, these impacts do not constitute long-term productivity effects that preclude options for future use of the CFPP site.

Early CFPP preconstruction site preparation activities disturb approximately 575 acres of undeveloped desert land/habitat. These early activities also impact limited areas of sagebrush-steppe habitat and existing grazing allotments. The acreage disturbed during preconstruction represents a larger support area (i.e., required for construction) than is required for the physical CFPP structures and ancillary facilities. These temporarily disturbed areas are redressed as soon as practical, resulting in a smaller footprint to support operations. The preconstruction and COL construction activities further impact approximately 400 acres for a utility (i.e., transmission and water supply) corridor. This corridor runs adjacent to an existing transmission line and uses the exiting service road for maintenance, thus minimizing the impact.

Preconstruction and pre-COL construction avoid known cultural resources. Impacts to cultural areas of potential effect are impacted with the transition of undeveloped land into a short-term construction and industrial (i.e., energy production) use. Mitigation measures are used to minimize these impacts.

Limited impacts to wildlife occur due to the short-term use of the CFPP site. These impacts are most noticeable during the preconstruction and pre-COL construction activities. Impacts include increased noise levels, increased presence of human interaction, removal of preferred habitat, disturbance to potential nesting areas for birds, and disruption of migration routes for pronghorns.

Preconstruction activities associated with the CFPP site include site clearing, installation of stormwater management measures, installation and improvement of roadways, installation of utilities, and excavation of building foundations. These site improvements align with U.S. policy to advance nuclear energy (Reference 10.3-1), DOE development plans for nuclear energy commercialization (Reference 10.3-2) and INL campus development (Reference 10.3-3).

Preconstruction and pre-COL construction activities temporarily increase the ambient noise levels on the CFPP site and in adjacent areas. However, because of the remoteness of the site, impacts to noise-sensitive human-receptors including residences, schools, churches, and parks are not anticipated. The workforce adheres to the occupational-health and project-specific worker protection requirements to avoid exposure to excessive noise levels.

Preconstruction and pre-COL construction traffic does not appreciably increase the volume of traffic on local roads and is not anticipated to have an adverse impact on traffic patterns, traffic accidents, or the level of service.

Beneficial socioeconomic effects on the local area are anticipated because of the short-term use of the CFPP site. These beneficial impacts include an increase in construction-related jobs and services, local spending by the workforce, and increased tax revenues within the state, county, and region. The temporary influx of an in-migrating construction workforce for preconstruction and pre-COL construction supports existing small businesses. Community infrastructure, such as recreation areas, housing, and other public services are anticipated to experience beneficial impacts from the limited number of in-migration workers supporting the short-term use without exceeding available venues and services.

Populations identified as minority or low-income populations are not anticipated to be disproportionally impacted by the short-term use of the CFPP site for preconstruction and pre-COL construction. As such, no effects on the long-term productivity of the region are expected as a result of environmental justice impacts.

The activities associated with the preconstruction and pre-COL construction are generally consistent with other large construction projects that involve inherent hazards to the workforce including occupational health hazards, excessive noise, and transportation hazards associated with transport of construction materials and personnel. Adherence to project-specific safety plans and applicable safety standards reduce the risks of accidents and exposures to hazardous environments.

10.3.2 COL Construction

Content is not applicable to a Limited Work Authorization application.

10.3.3 Operation

Content is not applicable to a Limited Work Authorization application.

10.3.4 Summary of the Relationship Between Short-term Use and Long-term Productivity

Short-term use of the CFPP site for preconstruction and pre-COL construction results in both adverse and beneficial impacts. The short-term adverse impacts, after mitigation, include temporary changes to land use, terrestrial ecology, cultural resources, ambient noise, and air quality. Short-term benefits include employment opportunities, increased tax revenues, regional economic expansion, and improvements to local infrastructure and community services.

Short-term use of the CFPP site is not anticipated to affect its long-term productive use. No long-term impacts to environmental or socioeconomic resources result from CFPP activities. The LWA Enclosure 4, Site Redress Plan, provides reasonable assurance that the site can be returned to an environmentally stable and aesthetically acceptable condition consistent with applicable federal, state, and local requirements. Further considerations of short-term use and long-term productivity are presented in the COL application ER.

10.3.5 References

10.3-1 Nuclear Energy Innovation Capabilities Act of 2017, Public Law 115-248, 115th Congress, September 28, 2018.

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10.4 Irreversible and Irretrievable Commitments of Resources

This section describes the expected irreversible and irretrievable environmental resource commitments used in the preconstruction and pre-combined license (COL) construction of the CFPP. Irreversible commitments of resources refers to environmental resources that would be irreparably changed by the preconstruction and pre-COL construction activities, where resources could not be restored at some later time to the resource's state that existed prior to the relevant activities. Irretrievable commitment of resources are materials used or consumed in such a way that they could not, by practical means, be recycled or restored for other uses. As described in LWA ER Chapters 4 and 7, impact to each of these resources is SMALL.

10.4.1 Irreversible Commitments of Resources

The irreversible commitments of environmental resources associated with CFPP preconstruction and pre-COL construction are presented in Table 10.4-1. This table describes resource commitments and evaluates the irreversibility and irreparability of the resource. Unavoidable adverse environmental impacts associated with preconstruction and pre-COL construction are presented in LWA ER Table 10.2-2 and Table 10.2-2, respectively.

10.4.2 Irretrievable Commitments of Resources

Irretrievable commitments of resources during the CFPP preconstruction and pre-COL construction include materials used during these activities that cannot be recovered or recycled or that are consumed or reduced to unrecoverable forms. Given the anticipated quantity of irretrievable resources consumed during the preconstruction and pre-COL construction, the impact on their availability is SMALL.

Irretrievable commitments of resources and materials used for or consumed during the preconstruction and pre-COL activities include:

- Consumption of Water
- Consumption of Energy
- Construction Material

The CFPP preconstruction and pre-COL construction activities consume potable and non-potable water for activities, such as dust control, concrete production and washout, employee consumption, sanitation, and fire protection. Potable water is obtained from a subcontractor. Non-potable water for preconstruction and pre-COL construction activities is initially supplied from the INL and transported to the CFPP site. Early in the preconstruction and pre-COL construction activities, a temporary well (or wells) located on the CFPP site or INL site, sourced from the Eastern Snake River Plain aquifer, is used to provide a non-potable water supply. This water supply is established consistent with the necessary permissions, permits, licenses, and other regulatory approvals. Up to approximately 50 Mgal of water are consumed during preconstruction and pre-COL construction (LWA ER Table 3.3-1). The projected volumes of water consumed are SMALL relative to the source aquifer capacity and regional, national, or global consumption.

Nonrenewable energy in the form of fuels (i.e., gas, oil, and diesel) and electricity are consumed during the preconstruction and pre-COL construction activities. The projected amounts of energy consumed are SMALL relative to national or global consumption of these energy sources.

During execution of CFPP preconstruction and pre-COL construction, several waste streams are collected for final disposition at the appropriate off-site permitted facilities. These waste streams include non-hazardous solid waste, construction waste (e.g., wood, concrete, metal), hazardous waste, sanitary waste, and used oils and lubricants. Cleared vegetation and spoils are placed on the CFPP site; some are used for weather-protection berms. The projected volumes of these waste streams are SMALL relative to national or global production of these materials and consumption of disposal lands.

Table 10.4-1: Irreversible Commitments of Resources

Resource Area	Resource Commitments	Irreversibility
Land Use	• Undeveloped land changed to industrial use • Grazing acreage reduced • Excavated soil and rock used in construction • Landscape changes	• No irreversible use of resources • Resource commitments reversible through redress, if necessary
Water Resources	• Water consumed	• No irreversible use of resources • Resource commitments reversible following short-term use
Ecological Resources	• Important habitat acreage removed • Biota temporarily reduced/eliminated; no threatened or endangered species on site • Wildlife disturbance	• No irreversible use of resources • Resource commitments reversible following short-term use
Socioeconomics	• Increased use of community infrastructure • Increased tax revenues	• No irreversible use of resources • Resource commitments reversible following short-term use
Environmental Justice	• No disproportional commitments	• No irreversible use of resources • Resource commitments reversible following short-term use
Historic & Cultural Resources	• Known resources avoided • Changes to the character of the property (i.e., use, setting, and physical features)	• Irreversible impacts (i.e., viewshed, landscape)
Air Resources	• Temporary localized increases in air emissions	• No irreversible use of resources • Resource commitments reversible following short-term use
Nonradiological Health	• Temporary increases to ambient noise, emissions, and traffic	• No irreversible use of resources • Resource commitments reversible following short-term use
Radiological Environment	• Negligible exposure to construction workforce	• No irreversible use of resources • Resource commitments reversible following short-term use
Waste Management	• Offsite waste treatment/disposal (i.e., sanitary, solid, construction) at permitted facilities	• Irreversible impacts (i.e., land committed to waste disposal)

10.5 Alternatives to the Proposed Action

The alternative to the proposed action of issuance of the LWA is to delay certain pre-combined license (pre-COL) construction activities (e.g., soft/fractured rock remediation, installation of Reactor Building mud mat, vapor barrier, reinforcing wire mesh, and permanent base mat components) by approximately 11 months or until obtaining authorization for construction and operation via the combined license.

The LWA ER Section 9.1 describes the no-action alternative and the implications associated with missing the commercial operation date. These potential impacts include delayed construction schedule, increased project costs, reduced investor and subscriber confidence, loss of benefits to workers and service providers, and other unintended consequences up to and including jeopardizing the economic viability of the CFPP.

10.6 Benefits and Costs

This section is not applicable to a Limited Work Authorization application.

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Chapter Eleven

References

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Chapter 11 Reference Guidance

11.0 Reference Guidance

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CARBON FREE
POWER PROJECT

Carbon Free Power Project

Application for Limited Work Authorization

Enclosure 3 - Appendix A

Consultations

Revision 0
July 2023

Appendix A Consultations

A.0 Consultations

Consultations under the National Environmental Policy Act (NEPA) of 1969, as amended, are required to obtain approvals and permits for the construction and operation of the CFPP. Formal NRC consultations are considered with regulatory agencies, tribes, and other stakeholders for select topics during the environmental review process. Table A-1 provides a list of potentially relevant topics applicable to the CFPP for future NRC federal consultations.

To support the formal federal consultation efforts, the following summary information provides relevant CFPP interactions associated with these topics and the applicable agencies and organizations that occurred during the development of the LWA ER.

A.1 National Historic Preservation Act

The National Historic Preservation Act of 1966, as amended, establishes requirements for the preservation of historic and archaeological sites in the U.S. The Act requires federal agencies to evaluate the effects and impacts their actions may have on historic properties (i.e., buildings, archaeological sites, etc.) in partnership with States, local governments, and Tribes.

Class III cultural resource inventories completed in support of the CFPP provide important data regarding the types, amounts, and locations of cultural resources in the project area (Reference A-1). Archaeologists from the INL conducted the inventories of the CFPP proposed site location consistent with the INL Cultural Resources Management Office and Idaho State Historic Preservation Office guidance (Reference A-1).

Coordination discussions with relevant entities, including the DOE, Shoshone-Bannock Tribes, and INL cultural resource experts were held prior to initiating resource surveys to identify the area of potential effects and clarify expectations and methods. Shoshone-Bannock Tribal representatives were invited by INL and participated in CFPP-commissioned Class III cultural resources inventories. Data from these field surveys are used in the preparation of the LWA ER Section 2.6, Historical and Cultural Resources.

The Shoshone-Bannock Tribes and the DOE have an Agreement-In-Principle encouraging regular interactions between the DOE and the Tribes on issues of mutual concern. The Tribes and DOE also have a Memorandum of Agreement providing special access to areas of significant Tribal interest (e.g., ceremonial, cultural, and educational activities) on the INL site. The Agreement-In-Principle, the Memorandum of Agreement, and implementation of cultural resources activities are overseen by the Cultural Resources Working Group, which consists of representatives of the Shoshone-Bannock Tribes, DOE, and INL. The CFPP, through the DOE INL, uses the Cultural Resources Working Group for historic and cultural resource considerations.

A.2 Endangered Species Act

The Endangered Species Act (ESA) of 1973, as amended, establishes protections for fish, wildlife, and plants that are listed as threatened or endangered; provides for adding species to and removing them from the list of threatened and endangered species, and for preparing and implementing plans for their recovery; provides for interagency cooperation to avoid take of listed species; and provides for cooperation with States.

The DOE and the U.S. Fish and Wildlife Service (USFWS) entered into a Memorandum of Understanding regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds" (Reference A-2). The purpose of the Memorandum of Understanding is to strengthen migratory bird conservation through enhanced collaboration between DOE and the USFWS, in coordination with state, tribal, and local governments.

Coordination discussions were held with relevant entities, including the DOE, USFWS, U.S. Forest Service, U.S. Bureau of Land Management (BLM), Idaho Fish and Game, and INL ecological resource experts during the development of the LWA ER. These discussions guided the formulation of CFPP ecological surveys, sensitive plant species, data integration, and evaluation.

Ecological experts from INL conducted ecological (terrestrial) surveys on and in the vicinity of the CFPP site to provide current data on flora, fauna, and ecological habitats. This information is supplemented with additional publicly available information, including DOE information that maintains a robust ecological management program with decades of records for the vicinity and region.

No federally listed species or critical habitats are identified in ecological evaluations in the area to be affected by CFPP construction. Some species of protected migratory birds may nest on or within the vicinity of the site. Migratory birds may pass through or over the CFPP site. No eagles or eagle nests have been observed on the CFPP site; although, bald and golden eagles have been observed on the INL site and within the vicinity of the CFPP site.

The CFPP site is located within an area of the INL site that has a Candidate Conservation Agreement in place for the benefit of greater sage-grouse, a ground-nesting species. This Candidate Conservation Agreement has provisions to protect the greater sage-grouse and its nests. No greater sage-grouse nests have been observed on the CFPP site. The closest known sage-grouse lek is approximately 2 miles from the CFPP site.

The CFPP site is located within an area of the INL site that participates in a livestock grazing program. The U.S. Bureau of Land Management administers livestock grazing leases at the INL site in cooperation with the DOE. Interagency coordination may be necessary to review the livestock grazing program and formally modify leases to withdraw the area of the CFPP site from future livestock grazing.

A.3 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act of 1996, as amended, authorizes the conservation and management of U.S. fishery resources, including ocean-going anadromous species. No change to aquatic resources is anticipated from CFPP construction.

The CFPP has limited aquatic interface and impacts to aquatic systems due to the absence of permanent streams, ponds, or other surface water bodies on or within the vicinity of the CFPP site. No surface waters of the U.S. are withdrawn by the project. No waters of the U.S. receive discharge from the project. Wetlands are not impacted. The CFPP does not alter waterways or surface water supplies.

A.4 Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), of 1980, as amended, is commonly known as Superfund. The Act establishes prohibitions and requirements concerning closed and abandoned hazardous waste sites; provides for liability of persons responsible for releases of hazardous waste at these sites; and establishes a trust fund to provide for cleanup when no responsible party can be identified. The Act also authorizes response actions to reduce the dangers associated with releases or threats of releases of hazardous substances. The INL is included within the National Priority List maintained by the U.S. Environmental Protection Agency. No known contamination has been identified at the CFPP site as described in the LWA ER Chapter 2.

A.5 References

A-1 U.S. Department of Energy, Idaho Operations Office, "Idaho National Laboratory Cultural Resource Management Plan," DOE/ID-10997, Revision 6, February 2016, accessed on April 25, 2022 from https:fol/crm.inl.gov/SiteAssets/Documents/INL_CRMP_Rev06_Mach2016%20(1)%20(5).pdf.

A-2 Memorandum of Understanding between the United States Department of Energy and the United States Fish and Wildlife Service Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds," September 12, 2013.

Table A-1: Consultation Considerations Under National Environmental Policy Act

Regulation	Consultation Entity	Relevance to Carbon Free Power Project
Bald & Golden Eagle Protection Act	• U.S. Fish & Wildlife Service • U.S. Department of Energy	• No eagles have been observed on the CFPP site. • No eagles are known to breed on the CFPP site. • Bald and golden eagles have been observed on the INL site within the vicinity of the CFPP site. • Eagles, particularly golden, may forage near the CFPP site.
Candidate Conservation Agreement for Greater Sage-Grouse	• U.S. Fish & Wildlife Service • U.S. Department of Energy	• Greater sage-grouse are known to occur on the INL site. • Known mating grounds (leks) occur approximately 2 mi from the CFPP site; nests or young may occur on the site in future years.
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	• U.S. Environmental Protection Agency • U.S. Department of Energy	• The INL site is an active CERCLA cleanup site due to past operations. • No known contamination has been identified at the CFPP site.
Endangered Species Act	• U.S. Fish & Wildlife Service • U.S. Department of Energy • Idaho Fish & Game	• Listed species of wildlife and plants occur within the 50 mi region of the site. • No listed wildlife species are known to breed on or regularly inhabit the site. • Listed migratory birds, such as whooping crane, could pass through the site during spring or fall migration.
Federal Water Pollution Control Act (commonly called the Clean Water Act)	• U.S. Army Corps of Engineers (Section 404) • U.S. Department of Energy	• No surface waters of the U.S. are withdrawn for the project. • No waters of the U.S. receive discharge from the project.
National Historic Preservation Act (includes National Register of Historic Places and the Archaeological Resources Protection Act)	• Idaho State Historic Preservation Office • U.S. Department of Energy • Shoshone-Bannock Tribes	• Historic resources, including historic structures, isolated finds, archaeological sites, and a linear feature of cultural significance are known to occur within the 50 mi region of the project. • Potentially eligible cultural resources have been identified within the CFPP area of potential effect (LWA ER Section 2.6). • Areas culturally important to the Shoshone-Bannock Tribes occur on the INL site (the location of some sites is confidential).
Magnuson-Stevens Fishery Conservation and Management Act	• U.S. Department of Commerce • National Oceanic and Atmospheric Administration • National Marine Fisheries Service	• This act protects salmon and other types of ocean-going anadromous fish. Some anadromous fish spawn in Idaho rivers within 100 miles of the project site. • The project does not alter waterways or water supplies used by anadromous fish and this Act is not an issue for CFPP but noted here for inclusiveness.

Table A-1: Consultation Considerations Under National Environmental Policy Act

Regulation	Consultation Entity	Relevance to Carbon Free Power Project
Migratory Bird Treaty Act	• U.S. Fish & Wildlife Service • U.S. Department of Energy	• Many species of migratory birds, protected by the Migratory Bird Treaty Act pass through the area near the site during spring and fall migrations. • Several species of migratory birds may forage on or near the site during migration. • Some migratory species, such as Brewer's sparrow and sage thrasher, may breed on or near the site.
Grazing allotment adjustment	• U.S. Bureau of Land Management • U.S. Department of Energy	• The U.S. Bureau of Land Management administers livestock grazing leases at the INL site. Interagency coordination may be necessary to adjust leases to withdraw the CFPP site from program.

Carbon Free Power Project

Application for Limited Work Authorization

Enclosure 3 - Appendix B

Environmental Protection Plan

Revision 0
July 2023

Appendix B Environmental Protection Plan (Nonradiological)

B.0 Environmental Protection Plan (Nonradiological)

B.1 Objective of the Limited Work Authorization Environmental Protection Plan

The purpose of this LWA Environmental Protection Plan (EPP) is to comply with project approvals (e.g., permits and authorizations) and safeguard environmental resources from nonradiological threats during preconstruction and pre-combined license (pre-COL) construction. The objectives of the EPP are to:

a. confirm that the preconstruction and pre-COL activities are performed in compliance with the LWA Final Environmental Impact Statement and other applicable National Environmental Policy Act determinations.

b. implement NRC requirements and achieve consistency with other federal, state, tribal, and local environmental and cultural resource requirements.

c. communicate with the NRC regarding environmental issues that arise during the facility construction and the outcomes of corrective actions.

B.2 Consistency Requirements for Project Authorizations and Permits

The LWA ER Table 1.4-1, Authorizations Required and Status of Compliance for the Proposed Action, contains a list of expected project authorizations and permits. Terms and conditions of each required permit are incorporated into CFPP construction plans and compliance is monitored by the project. Incidents of non-compliance are corrected and reported to the NRC and the appropriate permit regulatory entity.

The CFPP notifies the NRC of proposed changes to approvals by providing the NRC with a copy of the proposed change at the time of submittal to the authorizing agency. The licensee provides the NRC with a copy of the application for any renewal of permits or certifications at the time the application is submitted to the permitting agency.

Changes to or renewals of approvals are reported to the NRC within 30 days of when either the change or renewal is approved or the date the change becomes effective, whichever date is the latest of the two. If a permit or certification, in part or in its entirety, is appealed and stayed, the NRC is notified within 30 days following the date the stay is granted.

B.3 Environmental Protection Issues

This LWA EPP applies to CFPP preconstruction and pre-COL construction actions that may affect environmental resources evaluated in the LWA Final Environmental Impact Statement and CFPP actions that may affect any newly discovered environmental or cultural resources. CFPP combined license construction and operation activities are evaluated in a Supplemental Environmental Impact Statement.

B.3.1 Aquatic Resources Issues

The CFPP has limited aquatic interface due to the absence of permanent streams, ponds, or other surface water bodies on or within the vicinity of the CFPP site. No wetlands are impacted, filled, or dredged; no surface water is extracted for project use; and no discharges occur into waters of the United States during preconstruction or pre-COL construction. The CFPP informs the NRC if circumstances change regarding aquatic resources.

B.3.2 Terrestrial Resources Issues

The Endangered Species Act of 1973 establishes protections for fish, wildlife, and plants that are listed as threatened or endangered. The project supports the NRC with needed consultation with the U.S. Fish and Wildlife Service, DOE, and other agencies.

Ecological surveys have been completed on and in the vicinity of the CFPP site. In addition, the DOE has a robust ecological management program with decades of records for the vicinity and region.

No federally listed species or critical habitat have been found in the area to be affected by the LWA construction. Although federally listed bird and mammal species are known within the 50-mile region of the CFPP site, generally in the mountain ranges north of the site, none are known to breed on or near the CFPP site. If any federally listed species or critical habitat is subsequently found in the area affected by LWA construction, the CFPP informs the NRC within twenty-four hours of discovery and provide details regarding the encounter and actions taken in a written report.

No federally listed species are expected to be taken by the project. If a federally listed species (as defined in the Endangered Species Act) is taken by project activities, the CFPP informs the NRC within 24 hours of discovery and provides details of the incident and actions performed in a written report.

No federally listed species or critical habitats are identified in ecological evaluations in the area to be affected by CFPP construction. Some species of protected migratory birds may nest on or within the vicinity of the site. Migratory birds may pass through or over the CFPP site. No eagles or eagle nests have been observed on the CFPP site, although, bald and golden eagles have been observed on the INL site and within the vicinity of the CFPP site.

The CFPP site is located within an area on the INL site that has a Candidate Conservation Agreement in place for the benefit of greater sage-grouse, a ground-nesting species. The Candidate Conservation Agreement has provisions regarding protecting the greater sage-grouse and its nests. Although no greater sage-grouse nests have been discovered on the CFPP site, the CFPP supports the NRC with needed consultation with the U.S. Fish and Wildlife Service and the DOE. The CFPP informs the NRC if circumstances change regarding terrestrial resources.

B.3.3 Cultural Resources

Historic and cultural resources may exist at and in the vicinity of the CFPP site that could potentially be affected by preconstruction and pre-COL construction. The CFPP commissioned site-specific Class III cultural resources inventories and consolidated relevant regional information on historical and cultural resources to establish an understanding of the area's historical and cultural resource characteristics.

The CFPP complies with applicable requirements regarding protection of cultural and historic resources. Workers are trained to work within project boundaries and stop work and report inadvertent discoveries of cultural resource finds immediately. Reports of inadvertent discoveries are provided to NRC and DOE. The CFPP supports required consultation between NRC, DOE, Idaho State Historic Preservation Office, and the Shoshone-Bannock Tribes to assess the finds and determine appropriate mitigation prior to work proceeding in these areas.

B.4 Administration of the Environmental Protection Plan

B.4.1 Implementation of the Environmental Protection Plan

Under this LWA EPP, the CFPP may make changes in the design or construction, or perform tests or experiments, affecting the environment without prior NRC approval provided such activities do not involve an unreviewed environmental question and do not involve a change in this LWA EPP. Changes in design or construction, or performance of tests which do not affect the environment are not subject to the requirements of this LWA EPP.

Before engaging in additional construction activities that may involve an unreviewed environmental question, the licensee prepares and records an environmental evaluation of such activity. This evaluation is provided to NRC by the licensee for evaluation and approval prior to conducting the activities. Activities are excluded from this requirement if measurable nonradiological environmental effects are confined to the on-site areas previously disturbed during site preparation and plant construction.

B.4.2 Reporting Requirements

A written incident report is provided to the NRC within 30 days of a confirmed occurrence of an unusual incident involving environmental or culture resources or non-compliance. The report

a. describes and assesses the event, including extent and magnitude of any impact at the time and subsequent to the event.
b. describes the probable cause of the event.
c. indicates the action taken to correct the reported event, including ongoing or future planned mitigations.
d. indicates corrective actions taken to prevent repetition of the event.

e. indicates agencies or entities notified and provides the NRC documentation of incident reports submitted to other tribal, federal, state, or local agencies, and any subsequent responses from those entities.

A final Environmental Record describing environmental matters covered by this LWA EPP for the LWA construction activities is submitted to the NRC within 30 days of the end of LWA construction.

B.4.3 Environmental Protection Plan Audit

The CFPP provides for at least one audit of compliance with this LWA EPP by an appointed independent environmental staff not directly assigned to oversee project construction during the first 90 days of LWA construction activities. The results of the audit and any corrective actions are made available to NRC upon request.

B.4.4 Records Retention

Records related to this LWA EPP are completed and retained in an electronic format convenient for review and inspection by NRC, including project data (before and during construction), permit-related correspondence and reports, and incident reports and follow-up. The records relating to this LWA EPP are retained for five years or, where applicable, in accordance with the requirements of other agencies.

B.4.5 Changes in Environmental Protection Plan

This LWA EPP may be updated or amended by CFPP to improve its implementation, address changes to construction activities, or provide for greater protection of environmental and cultural resources. Proposed changes to the LWA EPP involving an unreviewed environmental question are provided to the NRC and approved prior to execution. Changes in design or construction, or performance of tests or experiments, which do not affect the environment are not subject to the requirements of this LWA EPP.