DOE/EA-2145

ENVIRONMENTAL ASSESSMENT FOR THE LITHIUM PROCESSING FACILITY AT THE Y-12 NATIONAL SECURITY COMPLEX, OAK RIDGE, TENNESSEE

Final
March 2021

Approved for Public Release

EXECUTIVE SUMMARY

The National Nuclear Security Administration (NNSA), a semi-autonomous agency within the United States (U.S.) Department of Energy (DOE), has the primary responsibility to maintain and enhance the safety, security, and effectiveness of the U.S. nuclear weapons stockpile. One of NNSA's critical production sites is the Y-12 National Security Complex (Y-12), which is located on the Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee. Y-12 is the only source of secondaries, cases, lithium components, and other nuclear weapon components for the NNSA nuclear security mission. Lithium, which is the subject of this environmental assessment (EA), is an essential element for the refurbishment and modernization of the nuclear weapons stockpile. NNSA has prepared this EA to analyze the potential environmental impacts associated with constructing and operating the Lithium Processing Facility (LPF) to process and supply the lithium material and components that are needed to support the National Security Enterprise.

Currently, processing work for enriched lithium vital to weapon components is primarily performed in Building 9204-2, which was built in 1943. The facility, at approximately 325,000 square feet, is oversized for today's mission, was not built in accordance with current codes and standards, is costly to operate, has many operating issues, and has exceeded its expected life. Replacing Building 9204-2 with a new LPF that is code compliant would improve employee safety; reduce the site's footprint; improve facility operations to provide energy-efficient assets; and reduce operation and maintenance costs. NNSA is proposing to construct and operate the LPF at the Biology Complex site, which is directly east of the Jack Case Center, and has facilities that are currently being demolished by the DOE Office of Environmental Management (DOE-EM).

The analysis in Chapter 3 of this EA shows that impacts associated with construction and operation of the LPF would be minor. Land disturbance would be limited to approximately 13.9 acres of previously disturbed land at Y-12. Visually, Y-12 would remain a highly developed area with an industrial appearance. Short-term air quality impacts associated with construction would occur but emissions would be below *de minimis* thresholds. There would be no notable noise sources associated with LPF construction and operation. Water requirements for LPF construction and operation would represent less than one percent of water use at Y-12 and would be within the bounds of historical water use at the site. No water quality impacts are expected from operations as stormwater and effluents would be managed under existing permits, as required.

Construction activities would not impact ecological or cultural resources. Because the peak construction workforce (300 persons) would be negligible compared to the projected population in the region of influence (ROI), socioeconomic impacts during construction, although beneficial, are expected to be negligible. The operational workforce for the LPF would be comprised of the same workers who currently conduct lithium operations in Building 9204-2. No disproportionately high and adverse environmental or economic effects on minority or low-income populations are expected. Workers would be subject to minimal occupational risks. LPF postulated accidents would not result in high consequences, meaning no member of the public would be exposed to chemical concentrations that could result in irreversible or other serious health effects. The LPF would generate approximately 25.7 tons of nonhazardous waste annually, which would be disposed of at the ORR landfills. With regard to utility requirements, the existing infrastructure at Y-12 would be adequate to support the LPF.

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ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ACM	asbestos containing materials
AIHA	American Industrial Hygiene Association
AMSL	above mean sea level
AoA	Analysis of Alternatives
APC	Air Pollution Control
BEU	beyond extremely unlikely
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BTU	British thermal unit
CAA	*Clean Air Act of 1990*
CATV	Cable Television Network
CEQ	Council on Environmental Quality
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CCTV	closed-circuit television
CFR	Code of Federal Regulations
CNS	Consolidated Nuclear Security, LLC
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
D&D	decontamination and decommissioning
dB	decibels
dBA	A-weighted decibels
DMM	Direct Material Manufacturing
DNL	Day-night Sound Level
DPNet	Defense Programs Network
DOE	U.S. Department of Energy
DOE-EM	DOE Office of Environmental Management
DSWM	TDEC Division of Solid Waste Management
EA	environmental assessment
EFDP	Excess Facilities Disposition Program
EFPC	East Fork Poplar Creek
EIS	environmental impact statement
EMDF	Environmental Management Disposal Facility
EMWMF	Environmental Management Waste Management Facility
EO	Executive Order
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
ERB	Emergency Response Boundary
ERPG	Emergency Response Planning Guidelines
ETTP	East Tennessee Technology Park
FHWA	Federal Highway Administration
FIR	Federal Industry and Research

FONSI	finding of no significant impact
FR	*Federal Register*
GHG	greenhouse gas
gpm	gallons per minute
HEPA	High Efficiency Particulate Air
HCl	hydrochloric acid
HHW	heating hot water
HPP	historic preservation plan
HVAC	heating, ventilation, and air conditioning
IBC	International Building Code
ISMS	Integrated Safety Management System
kW	kilowatt
LBS	lithium bridging strategy
LED	Light Emitting Diode
L_{eq}	Equivalent Sound Level
Li	lithium
LiCl	Lithium Chloride
LiD	Lithium Deuteride
LiH	Lithium Hydride
LPF	Lithium Processing Facility
MVA	megavolt amperes
MWe	megawatts
NAAQS	National Ambient Air Quality Standards
NCA	National Climate Assessment
NEI	National Emissions Inventory
NEPA	*National Environmental Policy Act of 1969*
NERP	National Environmental Research Park
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	*National Historic Preservation Act*
NIOSH	National Institute for Occupational Safety and Health
NNSA	National Nuclear Security Administration
NOx	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPR	Nuclear Posture Review
NRHP	National Register of Historic Places
O_3	ozone
ORETTC	Oak Ridge Enhanced Technology and Training Center
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PEL	permissible exposure limits
PHA	Preliminary Hazards Analysis
PIDAS	Perimeter Intrusion, Detection, and Assessment System
PM_n	particulate matter less than or equal to n microns in aerodynamic diameter

PPA	Property Protection Area
PPE	personal protective equipment
psig	pounds per square inch gauge
RCRA	*Resource Conservation and Recovery Act*
ROI	region-of-influence
SHPO	State Historic Preservation Officer
SNM	special nuclear material
SO_2	sulfur dioxide
SPCC	spill prevention, control, and countermeasures
SR	State Route
SSC	structures, systems, and components
SSMP	Stockpile Stewardship and Management Plan
SWPPP	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TEEL	Temporary Emergency Exposure Limits
TEMA	Tennessee Emergency Management Agency
THC	Tennessee Historical Commission
TLV	Threshold Limit Values
TSWMA	*Tennessee Solid Waste Management Act*
TVA	Tennessee Valley Authority
UEFPC	Upper East Fork Poplar Creek
UPF	Uranium Processing Facility
U.S.	United States
USAF	U.S. Air Force
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
VRM	Visual Resource Management
Y-12	Y-12 National Security Complex

1 INTRODUCTION

1.1 Introduction and Background

The National Nuclear Security Administration (NNSA), a semi-autonomous agency within the United States (U.S.) Department of Energy (DOE), has the primary responsibility to maintain and enhance the safety, security, and effectiveness of the U.S. nuclear weapons stockpile. The National Security Enterprise, overseen by the NNSA, includes production sites and design laboratories across the country. One of the critical production sites is the Y-12 National Security Complex (Y-12), which is located on the Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee. Y-12 spans 811 acres, with 7.3 million square feet of laboratory, machining, dismantlement, and research and development and office areas (Figure 1-1). Y-12 is unique in that it is the only source of secondaries, cases, lithium components, and other nuclear weapon components for the NNSA nuclear security mission. Lithium, which is the subject of this environmental assessment (EA), is an essential element for the refurbishment and modernization of the nuclear weapons stockpile. Lithium is also vital for radiation detection equipment and tritium production.[1]

In accordance with the Council on Environmental Quality (CEQ) regulations at 40 Code of Federal Regulations (CFR) Parts 1500−1508[2] and DOE *National Environmental Policy Act* (NEPA) implementing regulations at 10 CFR Part 1021, NNSA has prepared this EA to analyze the potential environmental impacts associated with constructing and operating the Lithium Processing Facility (LPF) to process and supply the lithium material and components that are needed to support the National Security Enterprise.

Depending on the results of this EA, NNSA could: (1) determine that the potential environmental impacts of the Proposed Action would be significant to human health and the environment, in which case NNSA would prepare an environmental impact statement (EIS); or (2) determine that a finding of no significant impact (FONSI) is appropriate, in which case NNSA could proceed with the Proposed Action with no additional NEPA documentation.

Environmental Assessment

A primary purpose of an EA is to determine if a Proposed Action would have significant environmental impacts. If there would be none, no further NEPA documentation is required. If there would be significant environmental impacts, an EIS is required.

[1] When used as a target in a nuclear reactor, Li-6 reacts with a neutron to produce tritium.

[2] On July 16, 2020, the CEQ issued a final rule to update its regulations for federal agencies to implement NEPA (85 *Federal Register* 43304). The effective date for the new regulations is September 14, 2020. Because this EA was initiated prior to that effective date, this EA has been prepared in accordance with the CEQ regulations dated 1978, as amended in 1986 and 2005, and DOE's NEPA regulations at 10 CFR Part 1021.

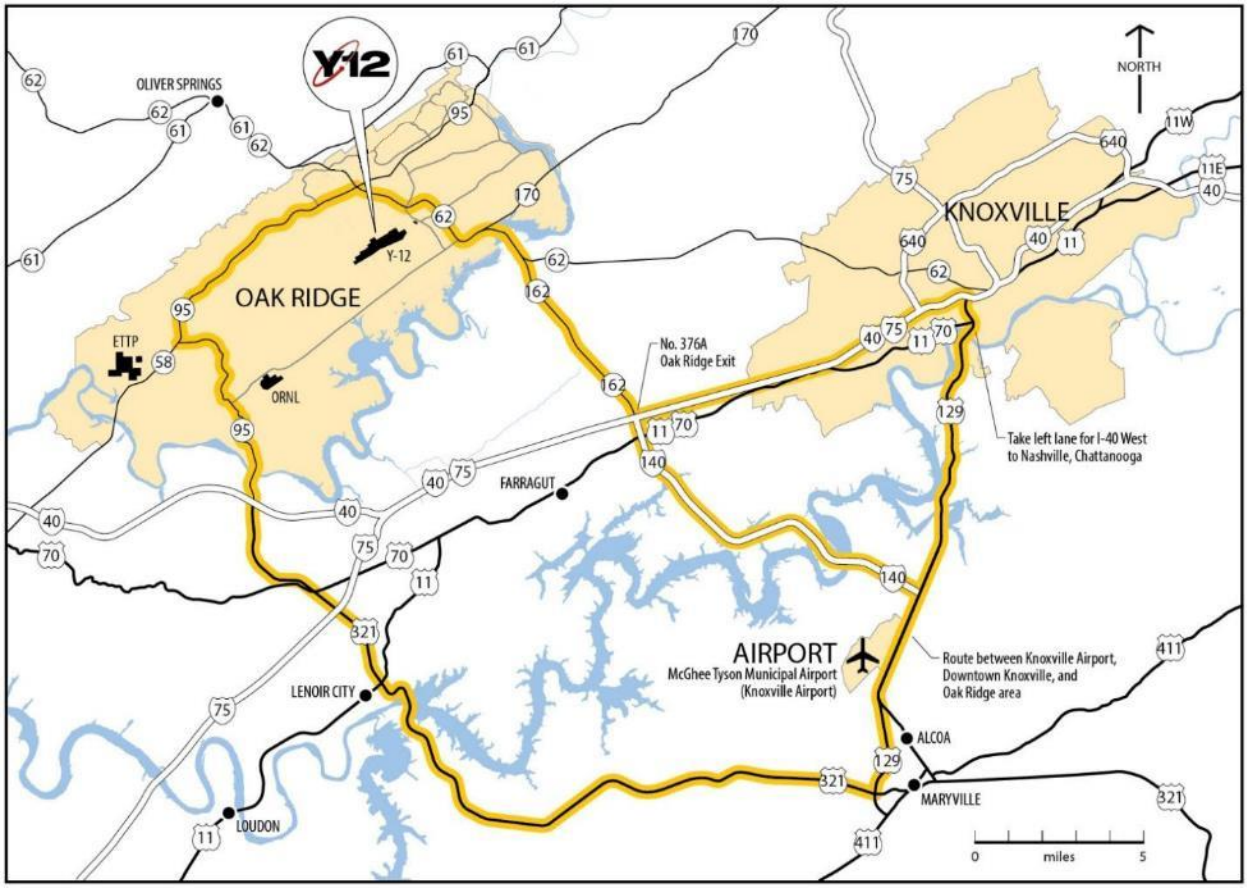


Figure 1-1. Location of Y-12

1.2 Purpose and Need for Agency Action

Currently, processing work for enriched lithium vital to weapon components is primarily performed in Building 9204-2 (*see* Figure 1-2), which was built in 1943.[3] The facility, at approximately 325,000 square feet, is oversized for today's mission, was not built in accordance with current codes and standards, is costly to operate, has many operating issues, and has exceeded its expected life (Parsons 2019). Approximately 98 percent of the assets in Building 9204-2 are more than 40 years old and 91 percent are insufficient to meet mission requirements (CNS 2019). The facility has concrete deterioration, both internal and external, in areas where the roofs, walls, and ceilings have been exposed to decades of corrosive liquids and processing fumes, requiring restricted access and protective equipment (e.g., hard hats) in some processing areas. In fact, a significant incident related to spalling concrete occurred in March 2014 (CNS 2019). Since then, NNSA has taken steps to improve worker safety by installing temporary steel shielding/structural protection in portions of Building 9204-2. Nonetheless, conditions in Building 9204-2 continue

[3] Other facilities at Y-12 also support lithium processing operations, including Building 9204-2E (weapon component disassembly); Building 9202 (cleaning of lithium components); Building 9201-01 (manufacturing support); Buildings 9805 and 9805-1 (production of deuterium gas); Building 9404-09 (production of molds); Building 9995 (Quality Laboratory); and Buildings 9720-46, 9720-47, 9720-59, and 9811-01 (storage facilities).

to degrade and cannot be easily reversed or rectified. The corrosion of underlying steel rebar will continue to lead to cracking and spalling of concrete (CNS 2019).

Figure 1-2. Building 9204-2

Y-12's operational health risk assessments rate two lithium processes located in Building 9204-2 as among the highest equipment risks at Y-12 due to their impact on safety and mission delivery if they were to fail. Recovery/purification operations in Building 9204-2 have been shut down because of equipment degradation, facility degradation, funding constraints, and safety concerns. As a result, the production processes are reliant on material recycled from disassembly and dismantlement activities. Without recovery/purification, over time, in-process scrap and other materials would have to be stored and could not be used, and at some point, Y-12 would not be able to meet national security requirements (CNS 2019).

In order to ensure lithium capabilities for decades to come and to reduce annual operating costs and increase processing efficiencies using safer, more modern, agile, and responsive processes, Building 9204-2 must be replaced; the current facility and equipment have degraded beyond the option of repair (CNS 2019).

If a new LPF is not constructed, NNSA would…

- Face escalating operation and maintenance costs to keep the current facility and processes operational and compliant;
- Experience continued process equipment, facility equipment, and structural system failures; and
- Incur increased risk to mission capability and worker safety.

Source: CNS 2019.

The need for a long-term, assured lithium capability is described in the most recent (2018) Nuclear Posture Review (NPR) (DoD 2018). The 2018 NPR states that, "the U.S. is also unable to produce or process a number of other critical materials, including lithium and enriched uranium. For instance, the United States largely relies on dismantling retired warheads to recover lithium to sustain and produce deployable warheads. This may be inadequate to support the nuclear force replacement program and any supplements to it." The NPR further states that the U.S. "will pursue initiatives to ensure the necessary capability, capacity, and responsiveness of the nuclear weapons infrastructure and the needed skills of the workforce, including the following: Ensure the current plans to reconstitute the U.S. capability to produce lithium compounds are sufficient to meet military requirements" (DoD 2018).

NPR

The NPR is a legislatively mandated, comprehensive review of the U.S. nuclear deterrence policy, strategy, and force posture. Previous NPRs were prepared in 1994, 2002, and 2010.

The Stockpile Stewardship and Management Plan (SSMP) (NNSA 2019a) is the highest-level annual report from NNSA to Congress. The SSMP defines NNSA weapons program, infrastructure, and workforce plans. According to the SSMP, maintaining a lithium processing capability at Y-12 is crucial to meeting NNSA's primary mission to maintain a viable nuclear deterrent and conduct weapon refurbishments and modernization upgrades that extend the life of weapons, while enhancing the safety, security, and reliability of those weapons (NNSA 2019a).

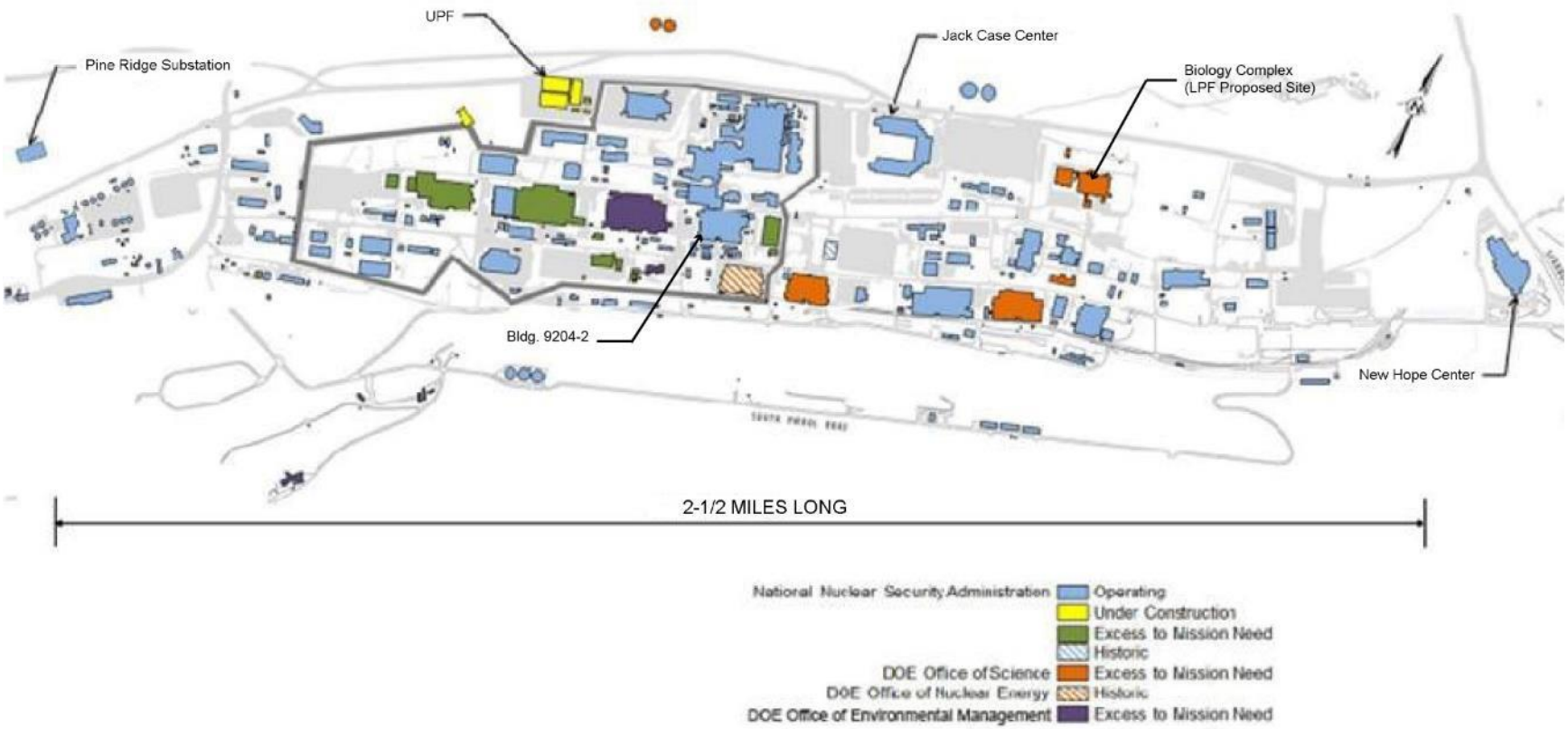
Replacing Building 9204-2 with a new LPF that is code compliant would improve employee safety; reduce the site's footprint; improve facility operations to provide energy-efficient assets; remove substandard and hazardous space; and reduce operation and maintenance costs (CNS 2019).

1.3 Proposed Action Evaluated in this Environmental Assessment

NNSA's Proposed Action is to construct and operate the LPF at the Y-12 site on a proposed location that is currently occupied by the Biology Complex (Figure 1-3). The Biology Complex is currently undergoing decontamination and decommissioning (D&D), which is scheduled to be completed in approximately 2022. That D&D would include the demolition of Biology Complex facilities prior to turnover of the site from DOE-EM to NNSA. Construction of the proposed LPF, which would be approximately 135,000 square feet in size, is expected to begin in 2024, with a completion date of 2028. LPF operations are expected to begin in 2030. A detailed description of the Proposed Action is presented in Section 2.2.

1.4 Scope of this Environmental Assessment and Organization

This EA analyzes the potential environmental impacts of NNSA's proposal to construct and operate the LPF at Y-12. This EA considers the potential direct, indirect, and cumulative impacts. Direct impacts are those that would occur as a direct result of the Proposed Action. Indirect impacts are those that are caused by the Proposed Action but would occur later in time and/or farther away in distance; perhaps outside of the study area. Cumulative impacts result when the incremental impacts on resources from the Proposed Action are added to impacts that have



Source: CNS 2018a.

Figure 1-3. Location of Proposed LPF

occurred or could occur to that resource from other actions, including past, present, or reasonably foreseeable future actions.

The organization of this EA is as follows:

- An introduction and background discussion of the Proposed Action and the purpose and need for the NNSA action (Chapter 1);
- A description of the Proposed Action and the No-Action Alternative (Chapter 2);
- A description of the existing environment relevant to potential impacts of the Proposed Action and the No-Action Alternative (Chapter 3);
- An analysis of the potential direct and indirect environmental impacts that could result from the Proposed Action and the No-Action Alternative (Chapter 3);
- Identification and characterization of cumulative impacts that could result from the construction and operation of the LPF in relation to past, present, and other reasonably foreseeable actions within the surrounding area (Chapter 4); and
- A listing of the references cited in this EA (Chapter 5).

1.5 Public Participation

In November 2020, NNSA published the Draft EA on the NNSA NEPA web page (https://www.energy.gov/nnsa/nnsa-nepa-reading-room) and the DOE NEPA web page (https://www.energy.gov/nepa/public-comment-opportunities) for public review and comment. NNSA also provided the Tennessee Department of Environment and Conservation (TDEC) with a copy of this Draft EA. As shown in Table 1-1, NNSA announced the availability of the Draft EA in local newspapers and provided an email address and postal address where comments could be submitted. NNSA initially provided an approximately 30-day comment period, which was scheduled to end on January 8, 2021. In mid-December 2020, in response to requests from stakeholders, NNSA extended the public comment period through January 22, 2021. NNSA received seven comment documents on the Draft EA. Comments on the Draft EA, as well as NNSA's corresponding responses to those comments, are presented in Appendix A of this EA. All comment documents received are included in the Administrative Record for this EA.

Table 1-1. Newspaper Notices for the Draft EA

Newspaper	Media	Publication Date Announcing Draft EA Availability	Publication Date Announcing Extension of Comment Period
Knox News-Sentinel	Print/Web	12/3/2020	12/19/2020
The Oak Ridger	Print	12/4/2020	12/24/2020
Roane County News	Print	12/9/2020	12/23/2020
Oak Ridge Today	Web	12/1/2020	12/18/2020

In the process of preparing this Final EA, NNSA reviewed and considered all comments received on the Draft EA. Based on the comments and other considerations, NNSA has made revisions to the EA, as appropriate. This Final EA is available to the public on the DOE NEPA web page (https://www.energy.gov/nepa/doe-environmental-assessments) and the NNSA NEPA web page (https://www.energy.gov/nnsa/nnsa-nepa-reading-room).

2 PROPOSED ACTION AND ALTERNATIVES

2.1 Development of the Proposed Action

The decision to pursue a new LPF at Y-12 was reached through a detailed evaluation process that is documented in the *Lithium Production Capability Analysis of Alternatives Report* (AoA Report) (Parsons 2017). The approach for the AoA Report was to identify and validate the requirements, develop evaluation criteria (attributes), identify possible alternatives, perform an initial screening of the alternatives, and then perform a more complete evaluation of the viable alternatives to determine which alternative best satisfies the selection criteria. At the highest level, the AoA Team developed mission alternatives that would satisfy the mission need and meet program requirements. In addition to the mission alternatives, the AoA Team identified technology/process alternatives that could be utilized in any future facility. Six mission alternatives were identified:

(1) Refurbish/repurpose one or more existing Y-12 facilities;
(2) Buy/lease (and potentially refurbish) an existing facility off-site near Y-12;
(3) Secure third-party financing to build one or more new facilities;
(4) Outsource the lithium processing capability;
(5) Consider new modular facilities to transfer missions from existing facilities or facilities that are beyond repair; and
(6) Build a new facility at Y-12 (Parsons 2017).

As a result of the evaluation process for the mission alternatives, the AoA Team determined that two mission alternatives should be considered for further evaluation: (1) Buy and refurbish an existing facility off-site near Y-12; and (2) Build a new facility at Y-12.[4] With regard to technology/process alternatives, the AoA Team concluded that the historic and current technologies should be used to complete the baseline design for the project (Parsons 2017).[5]

In April 2017, the AoA Team conducted a site-specific evaluation of two existing buildings within the K-1065 area at the East Tennessee Technology Park (ETTP) (*see* Figure 1-1) to use for the LPF. However, as a result of that evaluation, the two buildings at ETTP were determined to be unsuitable, and NNSA decided to pursue a new facility (the LPF) at Y-12 (Parsons 2019).

In April 2018, Consolidated Nuclear Security, LLC (CNS), the management and operating contractor at Y-12, conducted a Siting Study to identify potential sites for the LPF at Y-12 (CNS 2018a). Because the Biology Complex site (Figure 2-1) possessed notable advantages (e.g., location/access relative to assembly and disassembly of weapons components, utility support, and other considerations, such as available parking and minimal site preparation once D&D of the Biology Complex facilities is completed), that site was preferred. Section 2.4 explains why other sites were not preferred. Currently, the Biology Complex site is occupied by two major buildings

[4] "Buy and refurbish an existing facility off-site near Y-12" was identified as preferred. "Build a new facility at Y-12" was identified as a backup in the event an existing off-site facility was not suitable/feasible.

[5] All of the technologies considered are described in Parsons 2017. As the LPF evolves, NNSA intends to develop and evaluate newer technologies for potential future use in the LPF; however, those technologies are not part of the baseline design for the project, which forms the basis for the analysis in this EA.

Figure 2-1. Biology Complex Site for the LPF

(9207 and 9210) and several ancillary facilities (see Figure 2-2), all of which and are currently being demolished by DOE-EM under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA).

Figure 2-2. Existing Biology Complex Site Facilities

2.2 Proposed Action: Construct and Operate the LPF at the Proposed Site

As stated in Section 1.3, NNSA's Proposed Action is to construct and operate the LPF at the Biology Complex site shown in Figure 2-1. The Biology Complex site is directly east of the Jack Case Center, located south of Bear Creek Road and north of First Street. The proposed site is within limits of the Y-12 Property Protection Area (PPA), which is secured with a perimeter fence, but outside the Y-12 Protected Area, which is secured by a Perimeter Intrusion, Detection, and Assessment System (PIDAS). The proposed site is relatively flat and in a previously disturbed area with essentially no vegetation.

Construction. The LPF would be designed and constructed to meet the "high-hazard" classification for occupancy described in Section 307 of the International Building Code (IBC).

For a non-nuclear facility like the proposed LPF, the IBC establishes the minimum requirements to safeguard the public safety and safety to life and property from fire and other hazards and provides the classification of buildings based on the purpose or purposes for which they are used. Construction of the LPF would not begin until the facilities at the Biology Complex are demolished and the site is transferred from DOE-EM to NNSA.[6] That demolition, which is proceeding independent of the Proposed Action addressed in this EA, is expected to be completed in approximately 2022. LPF construction is expected to begin in 2024 and be completed in 2028.[7] Although an early finish to construction could occur, for purposes of this EA, a 4-year construction duration is assumed.

The proposed LPF would consist of a reinforced concrete and steel structure, approximately 135,000 square feet in size. The facility would be made up of eight independent wings (*see* Table 2-1).[8] To an outside observer, the eight wings would be adjoining such that the LPF would appear as a single structure. The majority of the LPF would be 10-20 feet high, although portions of the facility with high bays would be approximately 50 feet high (Parsons 2019). Figure 2-3 presents a conceptual layout of the LPF and Figure 2-4 presents an overlay of the LPF on the Biology Complex site.

Table 2-1. LPF Wings and Functions

Wing Designations	Function
Wing A	Administration, Services (mechanical, electrical, restrooms), Support System for Dry Air Requirements
Wing B	Powder Production/Forming Operations
Wing C	Machining/Inspection
Wing D	Hydriding/Deuteriding, Metal Production
Wing E	Maintenance Support Shop, Shipping/Receiving/Loading Dock, Corridors
Wing F	Recovery/Purification and Salvage
Wing H	Lithium Metal Storage
Wing I	Lithium Metal Storage

Source: Parsons 2019.

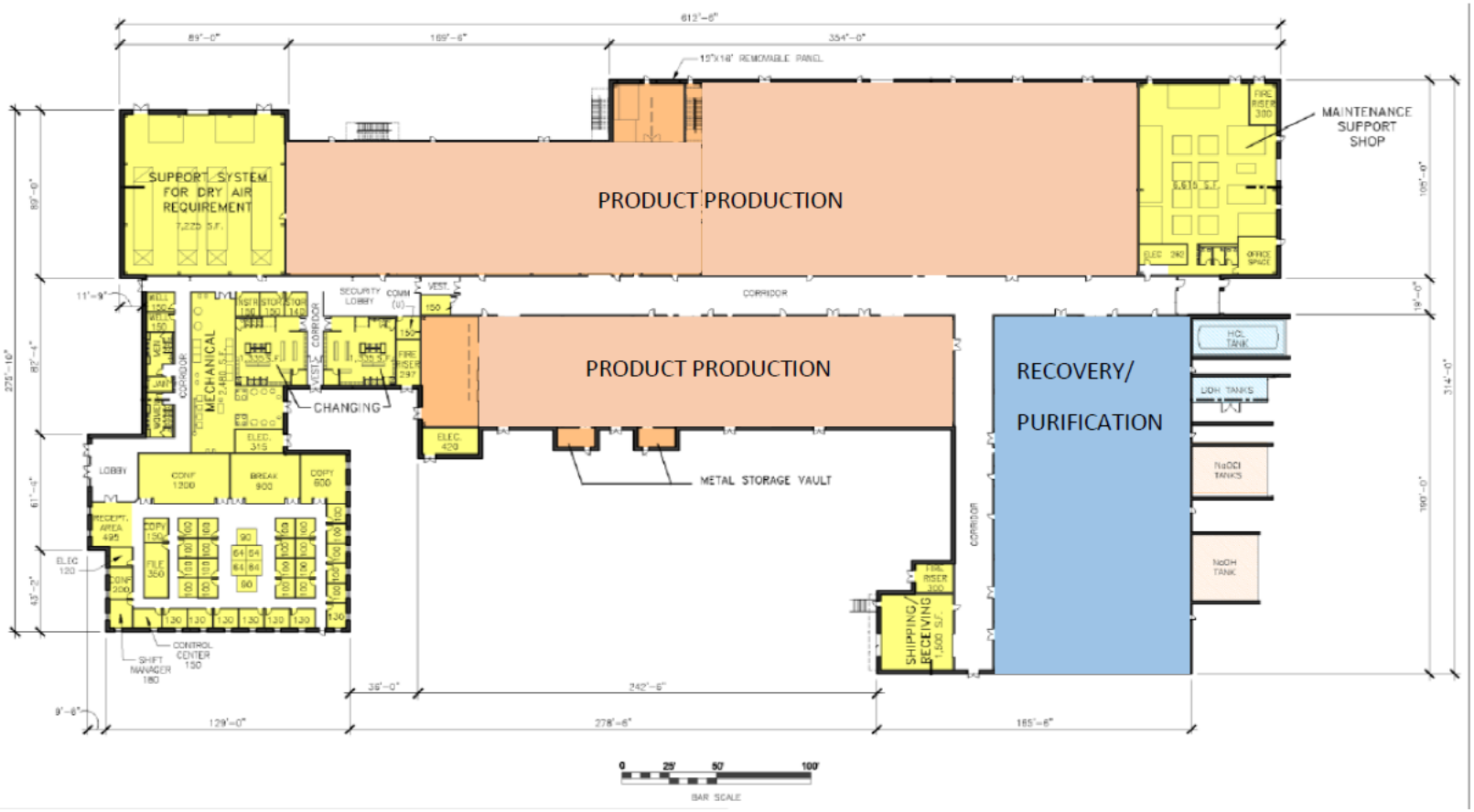
The LPF would contain exterior bulk chemical storage areas, an exterior compressed gas storage area, a loading dock, parking for staff, stormwater drainage swales, a stormwater detention pond/basin, electrical substations and an emergency diesel generator and diesel fuel tank (2,000 gallons), a firewater containment tank (29,000 gallons), and landscape areas. An access controlled chain-linked fence would be used to protect the outside chemical storage areas. The outdoor emergency diesel-engine generating system would power the LPF during a utility power outage (Parsons 2019).

The exterior of the LPF would be constructed with clear sight lines and would be provided with Light Emitting Diode (LED) lighting to allow for the control, monitoring, and defense of the

[6] Administrative transfer of the Biology Complex site from DOE-EM to NNSA would occur once D&D and remediation of the site is accomplished.

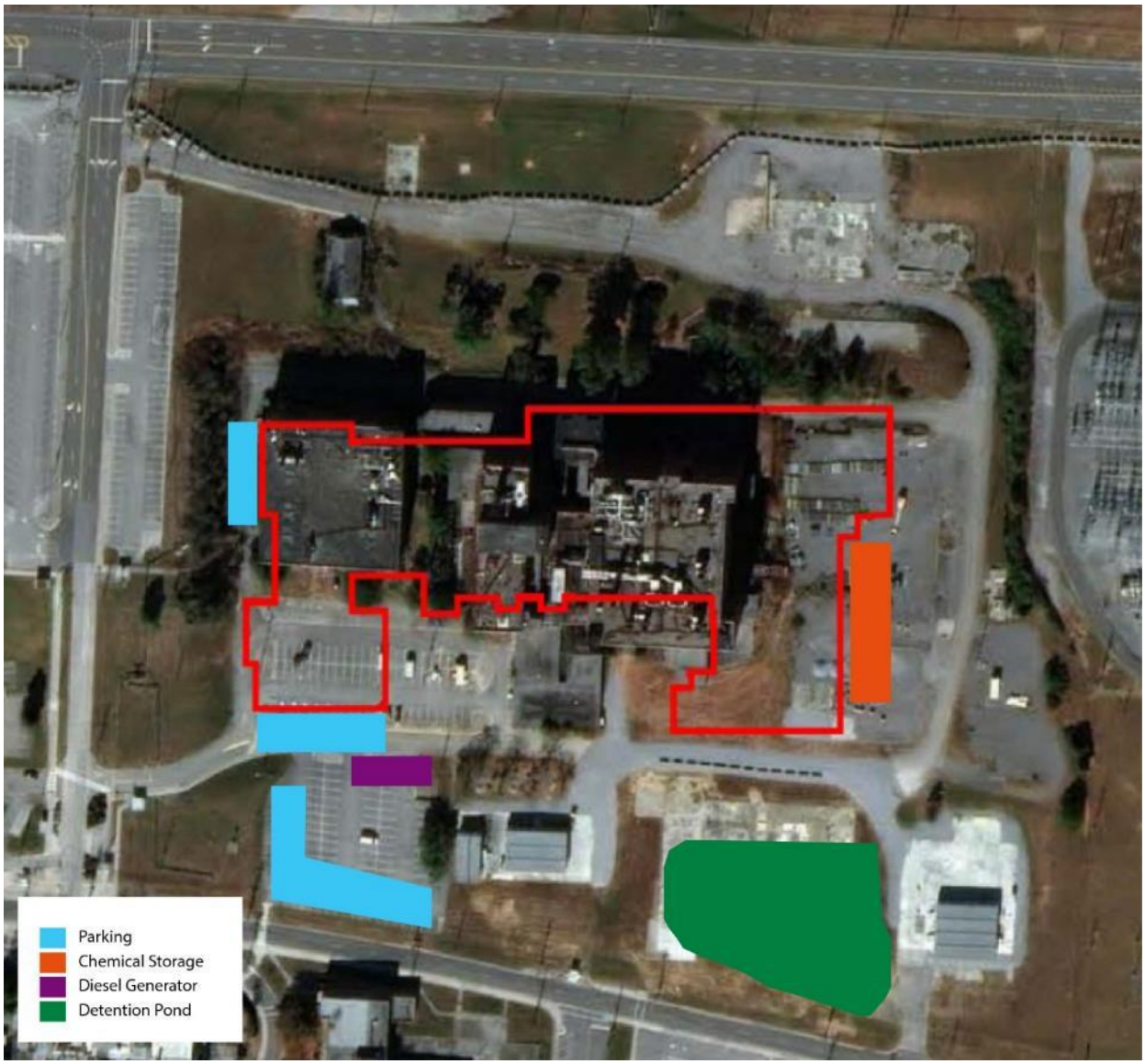
[7] Early site preparation work, such as decommissioning the existing utilities and demolishing site features such as existing foundations, could begin earlier.

[8] Each of the eight wings would have specific construction requirements under the IBC and the Life Safety Code.



Source: CNS 2020a.

Figure 2-3. Conceptual Layout of the LPF



Source: CNS 2020a.

Figure 2-4. Overlay of the LPF on the Biology Complex Site

building by site security forces. Exterior lighting would be coordinated with the closed-circuit television (CCTV) system to allow for clear nighttime camera images. Access to the LPF would be via a security system at each entrance (Parsons 2019).

Existing underground utilities that traverse the site include stormwater drains, roof drains, fire water, electrical conduits and duct banks, communications, sanitary sewer, domestic water, natural gas, compressed air, chilled water, cooling tower water, nitrogen, and argon. During site preparation, the existing utilities would be demolished, rerouted, or reconnected to the new/relocated utilities for the LPF. Existing monitoring wells would be protected for the ongoing groundwater monitoring program (Parsons 2019).

A new 10-inch combined domestic water and fire water main line would be provided around the LPF to form a loop to provide water to the LPF. The majority of the LPF would be fully sprinklered. A new drainage system would also be constructed to convey stormwater flows southerly toward bioswales and then into a new detention pond/basin (approximately 1.1 acres in size) that would be located at the southeast corner of the facility north of First Street. The proposed LPF would be located more than 1,100 feet from the 500-year floodplain limit. The flood elevation is more than 30-feet below the proposed first floor elevation of the LPF (Parsons 2019).

Access to the LPF would generally be from First Street, via a new 26-foot wide entrance road to be constructed at the southeast corner of the facility. A looped access road that would also serve as the facility fire department access road would be provided around the LPF with tie-in locations at First Street and immediately adjacent to Bear Creek Road. An existing parking area southwest of the existing Biology Complex would likely be kept and reconditioned to serve as new parking for the LPF (Parsons 2019).

Because of the corrosive environment, protecting the concrete and reinforcing steel is a major consideration in the design process. Concrete protection mitigation options that are under consideration include: improved concrete mix design, additional concrete cover (thickness above reinforcing steel), epoxy-coated or galvanized reinforcing steel, carbon fiber rebar, corrosion-inhibiting admixtures, surface protective coating, and cathodic protection (Parsons 2019). Construction parameters for the proposed LPF are provided in Table 2-2.

Table 2-2. Construction Parameters for the LPF

Requirements	Consumption/Use
Total land disturbed during construction at proposed site[a] (acres)	13.9
Permanent facility footprint, including roads, at proposed site (acres)	12.9
Stormwater detention pond/basin to be constructed at proposed site (acres)	1.1
Water requirement for construction (average gallons/year)	2,600,000
Total construction employment (worker-years)	800
Peak construction employment (workers)	300
Construction period (years)	4

a. Includes temporary construction laydown area of 1 acre.
b. Based on: (1) water needed to produce 25,000 yards^3 of concrete; potable water usage of 35 gallons/day/person; and dust suppression of 3,000 gallons/day.
Source: CNS 2020a.

Operation. Operations would be expected to begin in approximately 2030. The operational workforce at the LPF is estimated to be 70 persons. The two primary functions of the LPF are: (1) recovery/purification, and (2) processing. Each of these functions are discussed below.

Recovery/purification operations accept disassembled parts, remove surface impurities from Lithium Hydride (LiH) or Lithium Deuteride (LiD) material, and purify the material into a dry solid Lithium Chloride (LiCl) salt, which is a safe, long-term storage configuration and is the input material for processing.

Production takes the LiCl back to LiH and LiD so that it may be formed and machined into LiH and LiD parts.

In addition to the two primary functions discussed above, the LPF would also include salvage operations, which converts the Li-6, to a safe disposal form. In addition, salvage operations remove lithium from process equipment and consumables so subsequent disposal of these items can be handled as a non-classified, nonhazardous waste stream (CNS 2020b).

The proposed LPF would be a non-nuclear[9] facility with an expected operational lifetime of approximately 50 years. Table 2-3 displays the operational requirements associated with the LPF.

Once the LPF is operational, lithium operations at Building 9204-2 would cease and that facility would undergo D&D. The potential impacts of ceasing operations in Building 9204-2 are presented in Section 3.15. The potential impacts associated with the D&D of Building 9204-2 are presented in Section 3.16.

Table 2-3. Operational Requirements for the LPF

Requirements	Consumption/Use
Operational Workers (number of workers)	70
Annual Electricity Use (kilowatt-hours)[a]	3,050,000
Potable Water Use (gallons/year)[b]	1,100,000
Natural gas use (cubic feet/year)[c]	3,250,000
Wastewater (gallons/day)[d]	1,750
Waste Generation	
Hazardous waste (yd^3/yr)	0
Nonhazardous waste (tons/yr)[e]	25.7

a. Based on 22.5 kilowatt-hours/square foot/year. The LPF would total approximately 135,000 square feet.
b. Based on potable water use of 35 gallons/day/person. Process water estimated at 500,000 gallons/year
c. Based on 24 cubic feet/square foot/year. The LPF would total approximately 135,000 square feet.
d. Based on wastewater generation of 25 gallons/person/day.
e. Based on generation of 3 pounds of nonhazardous waste/person/day. Process wastes estimated at 0.5 tons/year.
Source: CNS 2020a.

2.3 No-Action Alternative

Under the No-Action Alternative, NNSA would not construct and operate the LPF, but would continue to operate existing facilities to meet national security requirements for as long as possible. As discussed in Section 1.2, current operations in Building 9204-2 are limited due to the building and process equipment conditions. For example, the current operations do not include wet chemistry, as that process was shut down in 2013.[10] Current operations in Building 9204-2 bypass wet chemistry and instead send the cleaned LiH or LiD directly to powder production in a process referred to as Direct Material Manufacturing (DMM). The DMM process is inefficient and introduces significant quantities of dust during production which cannot be reused without purification (i.e., wet chemistry) (Parsons 2017). In addition, only certain weapon types have currently been approved for use in DMM. NNSA has estimated that lithium requirements could be met through approximately 2031-2033 with lithium bridging strategy (LBS) mitigations

[9] The LPF has less than Hazard Category 3 threshold quantities of radiological materials, and criticality is precluded; therefore, the facility is not classified as a nuclear facility (CNS 2020c).
[10] A small scale wet chemistry process is in development as part of the LBS mitigations until LPF is operational.

(Parsons 2017). Nonetheless, under the No-Action Alternative, Y-12 would not be able to meet long-term national security requirements, and at some point, a new LPF would be needed.[11]

The No-Action Alternative does not mean that NNSA would not take necessary actions to meet national security requirements. In fact, NNSA has been taking actions to ensure that Building 9204-2 can operate as long and as safely as possible. Through completion of recent infrastructure projects, critical heating, ventilation, and air conditioning (HVAC) reliability has been improved and electrical and fire systems have been upgraded. However, continued infrastructure and process improvements are required in order for Building 9204-2 to meet mission demands through deployment of the LPF (CNS 2019).

The No-Action Alternative reflects the current management direction to continue infrastructure and process improvements to enable Y-12 to operate existing facilities to meet national security requirements. Such an approach is consistent with the CEQ requirements that "no-action" may be thought of in terms of continuing with the present course of action until that action is changed (CEQ 1981).

CNS has prepared a *Lithium Infrastructure Implementation Plan* (CNS 2019) to evaluate how to sustain the current lithium processing infrastructure until the LPF is operational. Based on that plan, NNSA is in the process of performing or planning the following LBS actions in Building 9204-2:

- Structural Repairs;
- Electrical System Upgrades/Repairs;
- Additional Fire Protection Repairs/Replacements;
- Kathabar (i.e., structural steel) Installations;
- Additional HVAC Upgrades/Replacements;
- Roof Repairs; and
- Process Equipment Repairs/Refurbishments (CNS 2019).

These actions have been, or would be, evaluated in accordance with DOE's NEPA regulations.

2.4 Alternatives Considered but Eliminated from Detailed Analysis

Mission Alternatives. As discussed in Section 2.1, in the process of developing the Proposed Action analyzed in this EA, NNSA considered six mission alternatives and pursued the two most reasonable alternatives. The AoA Report details the specific reasons why the four other mission alternatives were eliminated (Parsons 2017).

Site Alternatives for the LPF on Y-12. Once NNSA proposed to institute the backup alternative identified in the AoA Report (Parsons 2017), such that a new facility should be pursued on the Y-12 site, CNS performed a Siting Study (CNS 2018a) to determine the best location for the LPF. A total of six sites were considered (*see* Figure 2-5). The Biology Complex site (#2 on Figure 2-5)

[11] The date by which Y-12 would not be able to meet national security requirements depends upon many factors, such as classified supply and demand requirements, the acceptance rate of lithium materials from disassembled weapons, the number of DMM-approved weapon systems, and mitigation actions that could be implemented as a bridging strategy (Parsons 2017).

was determined to be the best site for the LPF and is evaluated in detail in this EA. Sites #1, 3, 4, 5, and 6 on Figure 2-5 scored lower than site #2 and were determined to be unreasonable alternatives (*see* the "notes" for Figure 2-5). The Siting Study details the specific reasons why the Y-12 site alternatives were eliminated (CNS 2018a).

Notes:
Site 1: Mod-West Hillside Brownfield Site (eliminated due to poor access, extensive grading, location within PA).
Site 2: Biology Complex Site (Proposed location for LPF).
Site 3: South of Elza Brownfield Site (eliminated due to uncertain contamination, poor access, parking constraints).
Site 4: Bear Creek Road/New Hope Road Greenfield Site (eliminated due to disadvantages relative to Biology Complex Site: loose fill may require extensive footings, stormwater enters East Fork Poplar Creek, and minimal utility support).
Site 5: 9720-06 Slab Brownfield Site (eliminated due to uncertain contamination).
Site 6: Elza Switchyard Brownfield Site (eliminated due to disadvantages relative to Biology Complex Site: site cleanup more likely to be on critical path, minimal utility support).
Source: CNS 2018a.

Figure 2-5. Y-12 Sites Considered for the LPF

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter includes an analysis of the potential environmental consequences or impacts that could result from the Proposed Action and the No-Action Alternative. The affected or existing environment is the result of past and present activities at Y-12 and provides the baseline from which to compare impacts from the Proposed Action and the No-Action Alternative, as well as the baseline to which reasonably foreseeable future actions and the incremental impact of the Proposed Action are added for the cumulative impacts analysis presented in Chapter 4.

The purpose of this EA is to enable NNSA to determine if the potential environmental impacts of the Proposed Action would be significant to human health and the environment. Certain aspects of the Proposed Action have a greater potential for creating adverse environmental impacts than others. For this reason, CEQ regulations (40 CFR 1502.1 and 1502.2) recommend a "sliding-scale" approach so that those actions with greater potential effect can be discussed in greater detail in NEPA documents than those that have little potential for impact. Preparation of this EA was guided by that sliding-scale approach.

As discussed in Section 1.4, this EA considers the potential direct, indirect, and cumulative impacts. Sections 3.2 through 3.14 present the affected environment and potential environmental consequences for each of the resource areas analyzed in detail. For the Proposed Action, the analysis in Sections 3.2 through 3.14 focus on the impacts associated with constructing and operating the LPF and do not include the impacts that would result from phasing out lithium operations from Building 9204-2. The analysis of phasing out lithium operations from Building 9204-2 is contained entirely within Section 3.15. Once operations are phased out of Building 9204-2, that facility would undergo D&D. Section 3.16 presents those D&D impacts.

This EA evaluates the environmental impacts of the alternatives within a defined region of influence (ROI), as described for each resource below. The ROIs encompass geographic areas within which any notable impact would be expected to occur. The level of detail in the description of each resource varies with the likelihood of a potential impact to the resource. The following resources are described/evaluated in this chapter.

- **Land use:** land use practices and land ownership information. The ROI for land use is the Biology Complex site, Y-12, and adjacent areas.

- **Visual resources:** visual resources in terms of land formations, vegetation, and the occurrence of unique natural views. The ROI for visual resources is the Biology Complex site and areas adjacent to the eastern portion of Y-12.

- **Geology and soils:** the geologic characteristics of the area at and below the ground surface, the frequency and severity of seismic activity, and the kinds and qualities of soils. The ROI for geology and soils is the Biology Complex site, Y-12, and adjacent areas.

- **Water resources:** surface-water and groundwater features, water quality, and water use. The ROI for water resources is Y-12 and adjacent surface water bodies and groundwater.

- **Air quality and noise:** the quality of the air and greenhouse gas emissions; baseline noise environment for Y-12. The ROI for air quality and noise is Y-12 and nearby offsite areas within Anderson County where air quality or noise impacts could potentially occur.

- **Biological resources:** plants and animals that live in the area, including aquatic life in the surrounding surface waters, and the occurrence of threatened or endangered species. The ROI for ecological resources is the Biology Complex site, Y-12, and adjacent areas.

- **Cultural and paleontological resources:** historic and archaeological resources of the area and the importance of those resources. The ROI for cultural resources is the Biology Complex site and adjacent areas.

- **Socioeconomics and environmental justice:** the labor market, population, housing, some public services, and personal income; location of low-income and minority populations in the vicinity of the project location. The socioeconomics ROI is a four-county area in Tennessee comprised of Anderson, Knox, Loudon, and Roane counties where a majority of the Y-12 workforce resides.

- **Waste management:** solid waste generation and management practices. The ROI for waste management is Y-12 and offsite locations where recycling and waste management activities could occur.

- **Human health and safety:** the existing public and occupational safety conditions and baseline conditions to support analysis of impacts to health and potential accident scenarios. The human health and safety analysis focuses on impacts to workers and offsite members of the public.

- **Transportation:** the existing transportation systems in the area to facilitate analysis of impacts locally. The ROI for transportation is Y-12 and adjacent areas where transportation could occur.

- **Infrastructure:** utilities, energy, and site services, including capacities and demands in the immediate area of the proposed LPF. The ROI for infrastructure is Y-12 and adjacent areas.

3.2 Land Use

3.2.1 Affected Environment

This section summarizes existing onsite and surrounding land uses at the ORR, and specifically, Y-12. The ORR lies within Oak Ridge's city limits but operates autonomously. City or county organizations have no planning jurisdiction at the site because the ORR is a federal facility owned by DOE.[12] Figure 3-1 shows the location of Y-12, Oak Ridge National Laboratory (ORNL), and ETTP within the ORR.

[12] Legally, land is owned by the U.S. and in the custody of a particular federal agency, but for the purposes of this EA, the term 'owned' is used to refer to land "in the custody of DOE/NNSA."

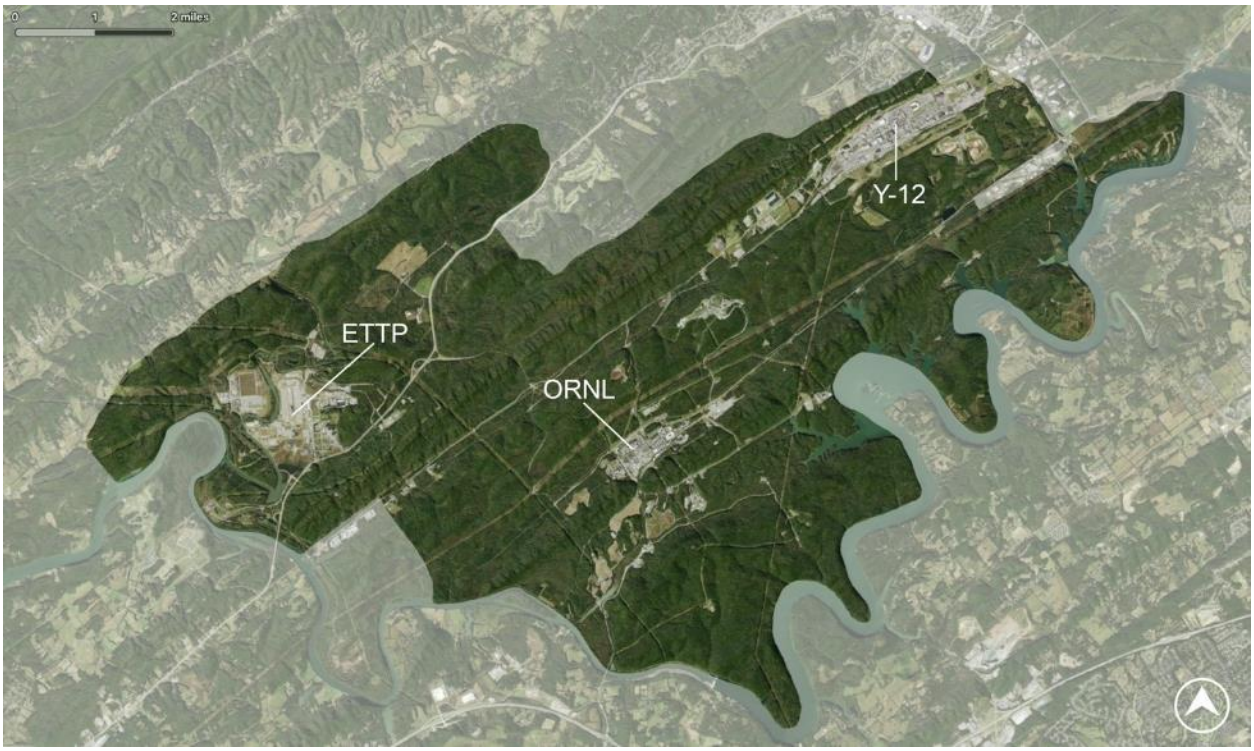


Figure 3-1. Aerial View of the ORR

The ORR consists of approximately 35,000 acres in the Ridge Physiographic Province of east Tennessee. Approximately 25,000 of the ORR's roughly 35,000 acres have remained undeveloped in a relatively natural state. Approximately 20,000 of the 25,000 acres have been designated a DOE National Environmental Research Park, an international biosphere reserve, and part of the Southern Appalachian Man and the Biosphere Cooperative.

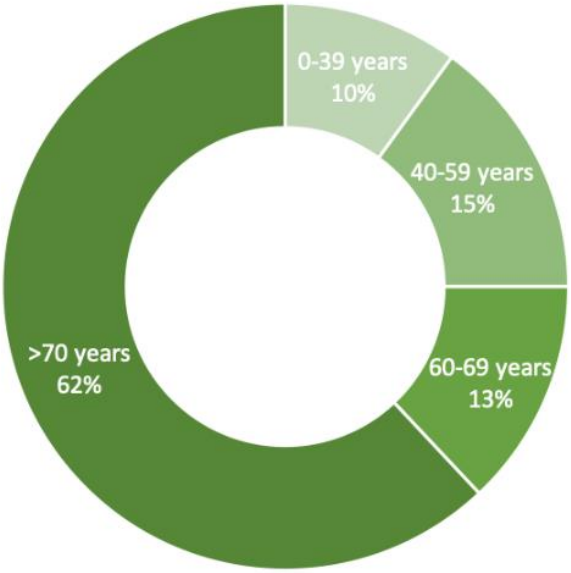
DOE classifies land use on the ORR into five categories: Institutional/Research, Industrial, Mixed Industrial, Institutional/Environmental Laboratory, and Mixed Research/Future Initiatives. Development on the ORR accounts for about 35 percent of the total acreage, leaving approximately 65 percent of the ORR undeveloped. Land bordering the ORR is predominately rural, with agricultural and forest land being predominant. Lands bordering Y-12 are predominantly rural and are used primarily for residences, small farms, forest land, and pasture land. The City of Oak Ridge has a typical urban mix of residential, public, commercial, and industrial land uses; it also includes almost all of the ORR (NNSA 2011).

The entire ORR, which includes Y-12, was designated a CERCLA site by the U.S. Environmental Protection Agency (EPA) in 1989. About 15 percent of the ORR is contaminated by hazardous and radioactive materials, including waste sites or remediation areas (NNSA 2011). This legacy contamination is being cleaned up, in accordance with the existing Federal Facilities Agreement. Y-12 spans 811 acres in the Bear Creek Valley, 2.5 miles in length between its east and west boundaries down the valley and 1.5 miles in width across the valley. Housed within its borders are manufacturing, production, laboratory, support, and research and development areas. While modernization/transformation activities have reduced the footprint of operating facilities, Y-12

remains a highly developed area. Nearly 600 of the 800 acres at Y-12 are enclosed by perimeter fences.

The eastern portion of Y-12 is occupied by Lake Reality and the former New Hope Pond (now closed), maintenance facilities, office space, training facilities, change houses, and former ORNL Biology Division facilities. The far western portion of Y-12 consists primarily of waste management facilities and construction contractor support areas. The central and west-central portions of Y-12 encompass the high-security portion, which supports core NNSA missions.

Real property at Y-12 includes approximately 390 facilities, totaling approximately 7.3 million gross square feet. While NNSA is the site landlord and is responsible for approximately 75 percent of the floor space, other DOE program offices have responsibility for the remaining 25 percent. More than 60 percent of Y-12's mission critical facilities are more than 70 years old. As facilities age past their design life, they are being consolidated and replaced with modern structures and infrastructure. Figure 3-2 shows the ages of mission-critical facilities at Y-12. Approximately 58 buildings, accounting for 20 percent of the total Y-12 facility square footage, are currently shut down pending D&D or transfer to DOE-EM (DOE 2019a).



Source: DOE 2019a.

Figure 3-2. Age of Mission-Critical Facilities at Y-12

3.2.2 Proposed Action Impacts

Construction. The proposed LPF would be constructed on the east side of Y-12 on the site of the old Biology Complex, within limits of the Y-12 PPA. The facility would be secured with a perimeter fence, but outside the Y-12 PIDAS. The site is an industrialized and developed area of Y-12. The total land disturbed during construction of the LPF site would be 13.9 acres.

Operation. The permanent footprint of the facility, including access roads, would be 12.9 acres, or approximately 1.6 percent of the total area of Y-12, and 0.04 percent of the total area of the ORR. The site would include a 1.1-acre detention pond/basin to mitigate stormwater runoff. The proposed LPF would be consistent with NNSA's vision to replace older, oversized, and inefficient facilities with right-sized, modern, and more efficient facilities.

3.2.3 No-Action Alternative

Under the No-Action Alternative, the LPF would not be constructed and the site would be open space once the Biology Complex D&D is completed in approximately 2022.

3.3 Visual Resources

3.3.1 Affected Environment

The scenic quality or character of an area consists of the landscape features and social environment from which they are viewed. The landscape features that define an area of high visual quality may be natural, such as mountain views, or man-made, such as city skyline. To assess the quality of visual resources in the project area, this section describes the overall visual character and distinct visual features on or in the viewshed of the proposed LPF site.

Locations of visual sensitivity are defined in general terms as areas where high concentrations of people may be present or areas that are readily accessible to large numbers of people. They are further defined in terms of several site-specific factors, including:

- Areas of high scenic quality (i.e., designated scenic corridors or locations);
- Recreation areas characterized by high numbers of users with sensitivity to visual quality (i.e., parks, preserves, and private recreation areas); and
- Important historic or archaeological locations.

The land is not readily accessible to the public; therefore, no visually sensitive locations are defined on the Y-12 site. The viewshed, which is the extent of the area that may be viewed from the ORR, consists mainly of rural land. The City of Oak Ridge is the only adjoining urban area. Viewpoints affected by DOE facilities are primarily associated with the public access roadways, the Clinch River/Melton Hill Lake, and the bluffs on the opposite side of the Clinch River. Views of development are constrained by the terrain and vegetation. Some partial views of the City of Oak Ridge Water Treatment Plant facilities, located at Y-12, can be seen from the urban areas of the City of Oak Ridge.

The ORR is largely undeveloped with the exception of Y-12, ORNL, and ETTP, where development is concentrated. Before government acquisition, the agrarian landscape was made up of forest (approximately 50 percent), isolated woodlots, fields, and homesteads. Since acquisition, most of the original open fields were replanted and the forest cover has increased significantly. In 1994, remote-sensing analyses revealed an expansion of forest cover to about 70 percent of the ORR (Mann et al. 1996).

As shown in Figure 3-3, Y-12 is situated in Bear Creek Valley at the eastern boundary of the ORR. It is bounded by Pine Ridge to the north and Chestnut Ridge to the south. The area surrounding Y-12 consists of a mixture of wooded and undeveloped areas. Facilities at Y-12 are brightly lit at night, making them especially visible. Structures at Y-12 are mostly low profile, reaching heights of three stories or less, and largely built in the 1940s of masonry and concrete. The tallest structure is the 197-foot-tall meteorological tower erected in 1985 and located on the west end of the Complex. The west tower is located on a slight rise across from the intersection of Old Bear Creek Road and Bear Creek Road. The west tower is used to measure and collect meteorological data for ETTP databases. The transmission lines towers installed on Pine Ridge in 2019, and the two water towers north of the Biology Complex site, are two of the most visible features on the site.

Figure 3-3. Aerial View of Y-12

For the purpose of rating the scenic quality of Y-12 and surrounding areas, the Bureau of Land Management's (BLM) Visual Resource Management (VRM) Classification System was used. Although this classification system is designed for undeveloped and open land managed by BLM, this is one of the only systems of its kind available for the analysis of visual resource management and planning activities. Currently, there is no BLM classification for Y-12; however, the level of development at Y-12 is consistent with VRM Class IV which is used to describe a highly developed area. Most of the land surrounding the Y-12 site would be consistent with VRM Class II and III (i.e., left to its natural state with little to moderate changes).

3.3.2 Proposed Action Impacts

Construction. The proposed LPF site is located in the Bear Creek Valley between Pine Ridge and Chestnut Ridge. Bear Creek Valley is relatively flat and heavily developed. The land is not readily accessible to the public and there are no visually sensitive locations on Y-12. Many viewsheds surrounding Y-12 are constrained by topography and vegetation. Development and building design of the LPF would be driven by function and purpose and would be consistent with the vision to modernize Y-12. Construction activities would use cranes that would create short-term visual impacts, but would not be out of character for an industrial site such as Y-12. After construction of the LPF is complete, cranes would be removed and the construction laydown area would be restored. The Scarboro Community is the closest developed area to Y-12 (approximately 0.6 mile) and is located to the north of Y-12. However, as a result of Pine Ridge, Y-12 is not visible from the Scarboro Community. To an observer looking west from Union Valley, the LPF could be perceived as an improvement to the viewshed, because the LPF would replace the dilapidated, unmaintained Biology Complex facilities currently on that site. A rendering of the LPF is provided in Figure 3-4.

Figure 3-4. Rendering of the LPF

Operation. Following LPF construction, landscaped areas would be planted in various open areas around the facility to enhance the look of natural surroundings (Parsons 2019). Because the proposed LPF would replace the oversized Building 9204-2, there would be a net reduction in the

density of industrial facilities once D&D of Building 9204-2 is completed. However, Y-12 would remain a highly-developed area with an industrial appearance, and there would be no change to the VRM Class IV.

3.3.3 No-Action Alternative

Under the No-Action Alternative, the LPF would not be constructed and the site would be open space once the Biology Complex D&D is completed in approximately 2022.

3.4 Air Quality

3.4.1 Affected Environment

Air pollution is the presence in the atmosphere of one or more contaminants (e.g., dust, fumes, gas, mist, odor, smoke, and vapor) such as to be injurious to human, plant, or animal life. Air quality as a resource incorporates several components that describe the levels of overall air pollution within a region, sources of air emissions, and regulations governing air emissions. The following sections include a discussion of the existing conditions and the environmental consequences of the Proposed Action and No-Action Alternative.

Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The levels of pollutants are generally expressed on a concentration basis in units of parts per million or micrograms per cubic meter. The baseline standards for pollutant concentrations are the National Ambient Air Quality Standards (NAAQS) and state air quality standards established under the *Clean Air Act of 1990* (CAA). These standards represent the maximum allowable atmospheric concentration that may occur and still protect public health and welfare. The NAAQS specify acceptable concentration levels of six criteria pollutants: particulate matter (measured as both particulate matter less than or equal to 10 microns in diameter [PM_{10}] and particulate matter less than or equal to 2.5 microns in diameter [$PM_{2.5}$]), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead.

All areas of the U.S. are designated as having air quality better than the NAAQS (attainment) or worse than the NAAQS (nonattainment). Areas where there are insufficient air quality data for the EPA to form a basis for attainment status are unclassifiable. Thus, such areas are treated as attainment areas until proven otherwise. "Maintenance areas" are those that were previously classified as nonattainment but where air pollution concentrations have been successfully reduced to levels below the standard. Maintenance areas are subject to special maintenance plans to ensure compliance with the NAAQS.

The Proposed Action would occur in Anderson County, which is used as the ROI for the air quality analysis. According to EPA, Anderson County is in attainment for all criteria pollutants (EPA 2020a). Anderson County emissions were obtained from the latest EPA National Emissions Inventory (NEI), as shown in Table 3-1. The county data include emissions amounts from point sources, area sources, and mobile sources. *Point sources* are stationary sources that can be identified by name and location. *Area sources* are point sources from which emissions are too low to track individually, such as a home or small office building, or a diffuse stationary source, such

as wildfires or agricultural tilling. *Mobile sources* are any kind of vehicle or equipment with gasoline or diesel engine, an airplane, or a ship. Two types of mobile sources are considered: on-road and non-road. On-road sources consist of vehicles such as cars, light trucks, heavy trucks, buses, engines, and motorcycles. Non-road sources are aircraft, locomotives, diesel and gasoline boats and ships, personal watercraft, lawn and garden equipment, agricultural and construction equipment, and recreational vehicles (EPA 2017).

Table 3-1. Baseline Criteria Pollutant Emissions Inventory for Anderson County, TN

Area	Criteria pollutant (tons/year)[a]					
	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOCs
Anderson County	17,632	4,541	3,100	1,211	758	12,362

a. Ozone is not included in the table because ozone is not emitted directly. NOx and VOCs are regulated as ozone precursors. Lead emissions are so low that they are typically not included. For example, baseline lead emissions in Anderson County were listed as 0.0 tons per year.

Source: EPA 2018.

Airborne discharges from DOE Oak Ridge facilities are subject to regulation by the EPA, the TDEC, and DOE Orders. Permits issued by the State of Tennessee are the primary vehicle used to convey the clean air requirements that are applicable to Y-12. New projects are governed by construction permits and modifications to the site-wide Title V Major Source Operating Permit, and eventually the requirements are incorporated into that operating permit. Y-12 is currently governed by Title V Major Source Operating Permit 571832 (DOE 2019a).

Y-12 has a comprehensive air regulation compliance assurance and monitoring program to ensure that airborne emissions satisfy all regulatory requirements and do not adversely affect ambient air quality. Common air pollution control devices employed on the ORR include exhaust gas scrubbers, fabric filters, and High Efficiency Particulate Air (HEPA) filtration systems designed to remove contaminants from exhaust gases before release to the atmosphere. Process modifications and material substitutions are also made to minimize air emissions. In addition, administrative control plays a role in regulation of emissions. Both effluent and ambient air are sampled on the ORR. Effluent air flows into the environment from a source, such as an exhaust stack, and ambient air is the air that exists in the surrounding area (DOE 2019a).

The release of non-radiological contaminants into the atmosphere at Y-12 occurs as a result of plant production, maintenance, waste management operations, and steam generation. Most process operations are served by ventilation systems that remove air contaminants from the workplace. Approximately three-fifths of the permitted air sources release primarily non-radiological contaminants. The remaining two-fifths of the permitted sources process primarily radiological materials. TDEC air permits for the non-radiological sources do not require stack sampling or monitoring. For non-radiological sources where direct monitoring of airborne emissions is not required, or is required infrequently, monitoring of key process parameters is done to ensure compliance with all permitted emission limits (DOE 2019a).

The primary source of criteria pollutants at Y-12 is the steam plant, where natural gas and fuel oil are burned. Actual and allowable emissions from the steam plant are shown in Table 3-2; actual emissions are well below allowable emission limits (DOE 2019a).

Table 3-2. Air Emissions from Y-12 Steam Plant, 2018

Pollutant	Emissions (tons/year)[a]		Percentage of allowable
	Actual	Allowable	
Particulate	3.43	41	8.4
Sulfur dioxide	0.27	39	0.7
Nitrogen oxides[b]	14.27	81	17.6
VOCs[b,c]	2.39	9.4	25.4
Carbon Monoxide[b]	36.57	139	26.3

Note: The emissions are based on fuel usage data for January through December 2018.

[a] 1 ton = 907.2 kg.

[b] When there is no applicable standard or enforceable permit condition for a pollutant, the allowable emissions are based on the maximum actual emissions calculation, as defined in Tennessee Department of Environment and Conservation Rule 1200-3-26-.02(2)(d) 3 (maximum design capacity for 8,760hr/year). Both actual and allowable emissions were calculated based on the latest EPA compilation of air pollutant emission factors (EPA 1995 and1998). Ozone and lead are not included as discussed in footnote "a" to Table 3-1.

[c] The volatile organic compound (VOC) emissions include VOC hazard air pollutant emissions.

Source: DOE 2019a.

Greenhouse gases. Greenhouse gases (GHGs) are gases that trap heat in the atmosphere; the accumulation of these gases in the atmosphere has been attributed to the regulation of Earth's temperature. Regulations to inventory and decrease emissions of GHGs have been promulgated. On October 30, 2009, the EPA published a rule for the mandatory reporting of GHGs from sources that, in general, emit 25,000 metric tons or more of carbon dioxide equivalent (CO_2e) per year in the United States (74 *Federal Register* [FR] 56260). With regard to this EA, on June 26, 2019, the CEQ published draft guidance on how NEPA analysis and documentation should address GHG emissions (84 FR 30097). Based on that guidance, CEQ stated that, "agencies should attempt to quantify a proposed action's projected direct and reasonably foreseeable indirect GHG emissions when the amount of those emissions is substantial enough to warrant quantification, and when it is practicable to quantify them using available data and GHG quantification tools." CEQ also stated that, "where GHG inventory information is available, an agency may also reference local, regional, national, or sector-wide emission estimates to provide context for understanding the relative magnitude of a proposed action's GHG emissions. This approach, together with a qualitative summary discussion of the effects of GHG emissions based on an appropriate literature review, allows an agency to present the environmental impacts of a proposed action in clear terms and with sufficient information to make a reasoned choice among the alternatives. Such a discussion satisfies NEPA's requirement that agencies analyze the cumulative effects of a proposed action because the potential effects of GHG emissions are inherently a global cumulative effect. Therefore, a separate cumulative effects analysis is not required." Baseline GHG emissions, which are represented by CO_2e, for Anderson County and the State of Tennessee, are presented in Table 3-3.

Table 3-3. Baseline Greenhouse Gas Emissions Inventory for Anderson County, TN

Area	Greenhouse Gases (million metric tons/year)
	CO_2e
Anderson County	3.8
Tennessee	99.8

Source: USEIA 2018.

3.4.2 Proposed Action Impacts

There would be short- and long-term minor adverse effects to air quality. Short-term effects would be due to generating airborne dust and other pollutants during construction. Long-term effects would be due to personnel commutes and the heating/cooling of the LPF. Air quality effects would be minor unless the emissions would exceed the general conformity rule *de minimis* (of minimal importance) threshold values, or would contribute to a violation of any federal, state, or local air regulation.

Construction. A construction air permit from TDEC would be required. NNSA would coordinate the permitting activities with TDEC personnel by preparing and submitting a construction air permit application at least 120 days prior to the estimated starting date of construction of the emission source (CNS 2020a). Construction emissions were estimated for fugitive dust, on- and off-road diesel equipment and vehicles, worker trips, and paving off-gasses (Table 3-4). Small changes in facilities site and ultimate design, and moderate changes in quantity and types of equipment used would not substantially change these emission estimates, and would not change the determination under the general conformity rule or level of effects under NEPA. During construction, NNSA would take reasonable precautions to prevent fugitive dust from becoming airborne. Reasonable precautions might include wetting by water spray any areas likely to generate fugitive dust during on site construction activities as needed. Additionally, all construction equipment employed on site would be well-maintained and equipped with the latest emissions control equipment. Consequently, there would be minimal emissions associated with fugitive dust and earthmoving equipment.

Table 3-4. Maximum Annual Air Emissions Compared to *De Minimis* Thresholds

Activity/Source	CO (tpy)	NO_x (tpy)	VOC (tpy)	SO_x (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	*De Minimis Threshold* (tpy)	Exceeds *De Minimis* Thresholds? [Yes/No]
Construction Emissions (Note 1)	5.2	5.2	3.6	<0.1	17.8	0.2	100	No
Operational Emissions	2.1	0.5 (Note 2)	0.2 (Note 2)	<0.1 (Note 2)	<0.1 (Note 2)	<0.1 (Note 2)	100	No

tpy = tons per year

Note 1: Air quality model conservatively assumes all construction takes place in one year. Annual construction emissions over four years would be approximately one-fourth the values presented.

Note 2: The allowable site-wide emissions in the current Y-12 Title V Major Source Operating Permit 571832 are as follows: NOx = 483.26 tpy; VOC = 109.15 tpy; SO_2= 39.03 tpy; and PM = 204.95 tpy. Limits for 9204-2 operations are specified in the permit and NNSA submits an annual compliance certificate that emissions are within the permit requirements. LPF operations would be conducted in accordance with the permit requirements, as modified to account for the LPF.

Source: USAF 2020.

Operation. Operational emissions were estimated for changes in heated/cooled space and emissions associated with commuting workers. No new stationary sources of air emissions would be associated with the facility, with the exception of a backup emergency diesel generator[13]

[13] For backup emergency diesel generators, NNSA would provide TDEC with a copy of the EPA Certification of Conformity to document compliance with air quality requirements. Emergency Standby Power Systems can be run up to 100 hours a year for testing and maintenance. There is no hour limit for true emergency operation.

Although the area is in attainment and the general conformity rules do not apply, the *de minimis* threshold values were carried forward to determine the level of effects under NEPA. As shown in Table 3-4, the estimated emissions from the Proposed Action would be below the *de minimis* thresholds; therefore, the level of effects would be minor. Upon completion of construction, the construction air permit will be incorporated in Y-12 Complex's Title V Operating Air Permit.

Greenhouse Gases and Climate Change. Per the CEQ draft guidance (84 FR 30097), this EA quantifies the reasonably foreseeable GHG emissions associated with the Proposed Action by examining GHGs as a category of air emissions. Table 3-5compares the estimated GHG emissions from the Proposed Action compared to the global, nationwide, and statewide GHG emissions. The estimated increase would be minimal.

Table 3-5. Global, Countrywide, and Statewide GHG Emissions

Scale	CO_2e Emissions (million metric tons/year)	Change from the Proposed Action
Global	43,125	0.00000006%
United States	6,870	0.0000004%
Tennessee	99.8	0.00003%
Anderson County, Tennessee	3.8	0.001%
Proposed Action	0.000028 (note 1)	---

Note 1: Conservatively assumes construction emissions and annual operational emissions occur in same year.
Sources: USAF 2020, EPA 2017, USEIA 2018, EPA 2020b.

Climate-related challenges are expected to involve: (1) resolving increasing competition among land, water, and energy resources; (2) developing and maintaining sustainable agricultural systems; (3) conserving vibrant and diverse ecological systems; and (4) enhancing the resilience of the region's people to the impacts of climate extremes (NCA 2014). Table 3-6 outlines potential climate stressors and their effects from the construction and operation of the LPF. The proposed LPF in and of itself is only indirectly dependent on any of the elements associated with future climate scenarios (e.g., meteorological changes). At this time, no future climate scenario or climate stressor would have appreciable effects on any element of the Proposed Action.

Table 3-6. Effects of Potential Climate Stressors

Potential Climate Stressor	Effects on the Proposed LPF
More frequent and intense heat waves	negligible
Longer fire seasons and more severe wildfires	negligible
Changes in precipitation patterns	negligible
Increased drought	negligible
Harm to water resources, agriculture, wildlife, ecosystems	negligible

Source: NCA 2014.

3.4.3 No-Action Alternative

Under the No-Action Alternative, no new facilities would be constructed and no additional air emissions would occur. Air quality would be unaffected compared to baseline levels discussed in Section 3.4.1.

3.5 Noise

3.5.1 Affected Environment

Sound is a physical phenomenon consisting of vibrations that travel through a medium, such as air, and are sensed by the human ear. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise is often generated by activities essential to a community's *quality of life*, such as construction or vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, described in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Hertz are used to quantify sound frequency. The human ear responds differently to different frequencies. "A-weighing", measured in A-weighted decibels (dBA), approximates a frequency response expressing the perception of sound by humans. Sounds encountered in daily life and their dBA levels are provided in Table 3-7.

Table 3-7. Common Sounds and Their Levels

Outdoor	Sound Level (dBA)	Indoor
Motorcycle	100	Subway train
Tractor	90	Garbage disposal
Noisy restaurant	85	Blender
Downtown (large city)	80	Ringing telephone
Freeway traffic	70	TV audio
Normal conversation	60	Sewing machine
Rainfall	50	Refrigerator
Quiet residential area	40	Library

Source: Harris 1998.

The dBA noise metric describes steady noise levels, although very few noises are, in fact, constant. Therefore, A-weighted Day-night Sound Level has been developed. Day-night Sound Level (DNL) is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10:00 p.m. to 7:00 a.m.). DNL is a useful descriptor for noise because: (1) it averages ongoing yet intermittent noise, and (2) it measures total sound energy over a 24-hour period. In addition, Equivalent Sound Level (L_{eq}) is often used to describe the overall noise environment. L_{eq} is the average sound level in dB.

The *Noise Control Act of 1972* (PL 92-574) directs federal agencies to comply with applicable federal, state, and local noise control regulations. In 1974, the EPA provided information suggesting continuous and long-term noise levels in excess of DNL 65 dBA are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals.

The acoustic environment along Y-12 site boundary, in rural areas, and at nearby residences away from traffic noise, is typical of a rural location with a DNL in the range of 35 to 50 dBA. Areas near Y-12 within Oak Ridge are typical of a suburban area, with a DNL in the range of 53 to 62

dBA. The primary source of noise at Y-12 site boundary and at residences located near roads is traffic. During peak hours, Y-12 worker traffic is a major contributor to traffic noise levels in the area.

Because Y-12 is an industrial site, there are many existing noise sources. Major noise emission sources within Y-12 include various industrial facilities, equipment, and machines (e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, and vehicles). Most of the Y-12 industrial facilities are at a sufficient distance from the site boundary so that noise levels at the boundary from these sources are not distinguishable from background noise levels. Within the Y-12 site boundary, noise levels from Y-12 mission operations range between 50 and 70 dBA, which is typical for industrial facilities (NNSA 2015). The State of Tennessee has not established specific community noise standards applicable to Y-12; however, Anderson County has quantitative noise-limit regulations as shown in Table 3-8 (Anderson 2009).

Table 3-8. Allowable Noise Level by Zoning District in Anderson County

Zoning District	Allowable Noise Level (in dBA)	
	7 AM – 10 PM	10 PM – 7 AM
Suburban Residential (R-1)	60	55
Rural Residential (R-2)	65	60
Agricultural – Forest (A-1)	65	60
General Commercial (C-1)	70	65
Light Industrial (I-1)	70	70
Heavy Industrial (I-2) (see note)	80	80
Floodway (F-1)	80	80

Note: Per the City of Oak Ridge Zoning Ordinance, which was last amended in 2019, Y-12 falls into the Federal Industry and Research (FIR) zoning district, which is zoning classification assigned to areas of the city that are part of the ORR. Although the ordinance does not provide guidelines on use within the FIR district, Y-12 would likely be classified as heavy industrial.
Source: Anderson 2009.

There are no sensitive noise receptors (schools, churches, daycare facilities, etc.) within 0.5 miles of the proposed LPF site. The nearest sensitive noise receptor is the Oak Ridge Schools' Preschool in the Scarboro neighborhood, which is approximately 0.67 miles northwest of the proposed LPF site. The nearest residence to the LPF site is approximately 0.5 miles to the northwest, also in the Scarboro neighborhood. Pine Ridge, which rises more than 150 feet above Y-12 to the north, separates Y-12 from the Scarboro community and provides natural noise attenuation for site activities. There have been no known noise complaints associated with Y-12 operations in the recent past.

3.5.2 Proposed Action Impacts

Construction. Construction of the LPF would require site preparation and construction of facilities and an access road. Maximum noise levels generated by construction equipment types commonly used on this type of project are listed in Table 3-9 at a reference distance of 1,000 feet. At this distance, the highest noise level generated by the equipment types listed would be 64 dBA. Under a highly conservative scenario in which all of the listed equipment types are operating during a single day at a single location, the L_{eq} during workday hours at a distance of 1,000 feet

would be 64 dBA. Because the nearest residence to the LPF site is more than 1,000 feet to the northwest, noise levels would be less than 64 dBA. Pine Ridge would further reduce any construction noise.

Table 3-9. Noise Levels of Common Construction Equipment

Equipment type	Lmax at 1,000 ft
Crane	55
Dozer	56
Dump Truck	50
Excavator	55
Fork Lift	49
Front End Loader	53
Concrete Saw	64
L_{eq} during workday hours at 1,000 ft (Total)	**64**

Source: FHWA 2006.

The area surrounding the proposed LPF is generally used for industrial purposes and is not considered to be noise sensitive. The construction activities associated with the proposed LPF would take place in an industrial area that is relatively insensitive to noise. For example, current activities in the area include construction of the UPF, which is expected to continue through approximately 2025. LPF construction would be similar to UPF construction, albeit on a smaller scale.

Although construction-related noise impacts would be minor, the following best management practices would be performed to reduce the already limited noise effects:

- Construction and demolition would primarily occur during daytime hours;
- Equipment mufflers would be properly maintained and in good working order; and
- On-site personnel, and particularly equipment operators, would don adequate personal hearing protection to limit exposure and ensure compliance with federal health and safety regulations.

Operation. There would be no major sources of noise from the LPF and no long-term increases in the overall noise environment (e.g., L_{eq}) would be expected from operations; therefore, no long-term changes in the noise environment would occur.

3.5.3 No-Action Alternative Impacts

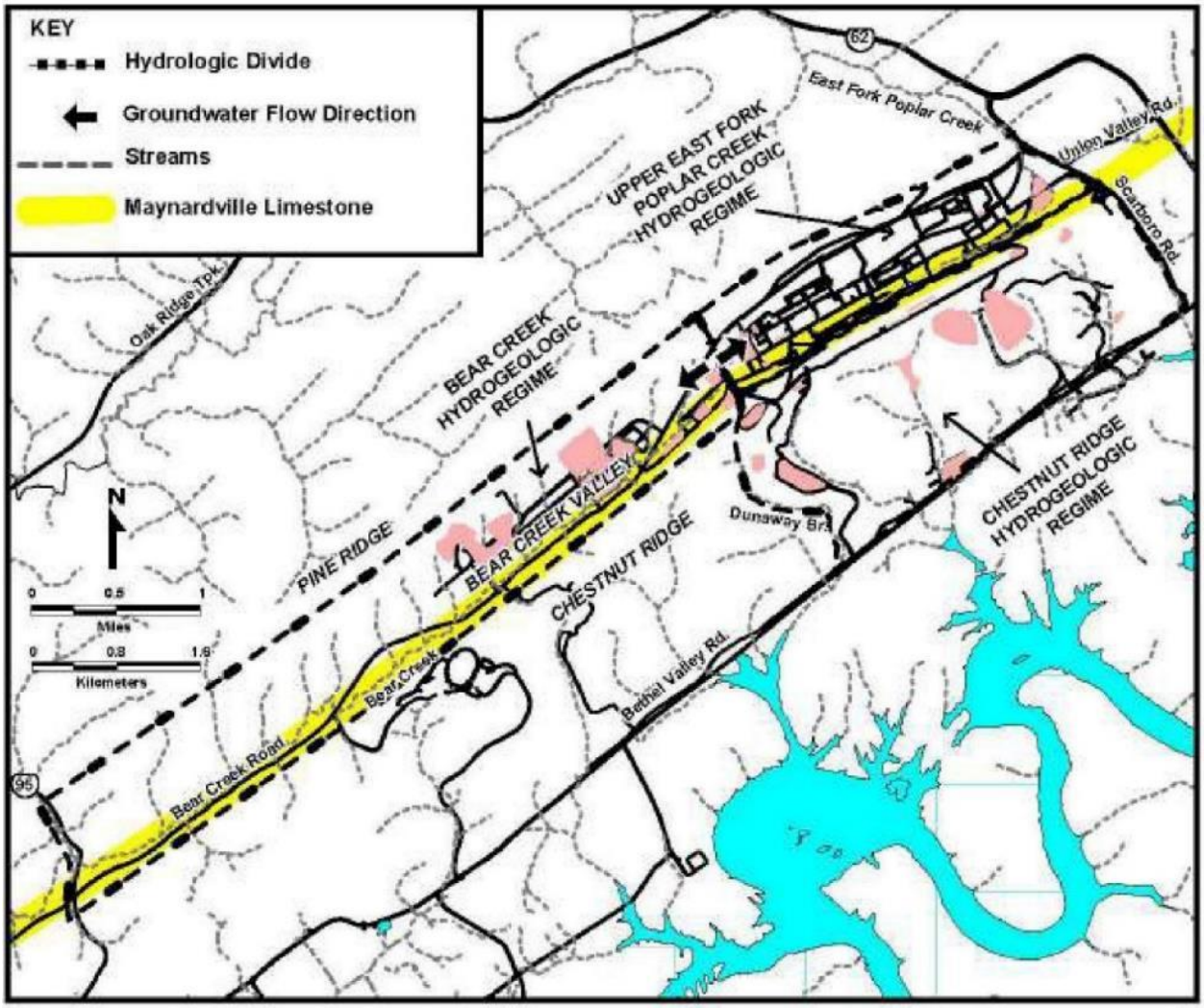
Under the No-Action Alternative, the LPF would not be constructed and there would be no changes to noise impacts from current operations discussed in Section 3.5.1.

3.6 Water Resources

3.6.1 Affected Environment

Groundwater. Y-12 is divided into three hydrogeologic regimes, which are delineated by surface water drainage patterns, topography, and groundwater flow characteristics. The regimes are

further defined by the waste sites they contain. These regimes include the Bear Creek Hydrogeologic Regime, the Upper East Fork Poplar Creek (UEFPC) Hydrogeologic Regime, and the Chestnut Ridge Hydrogeologic Regime (Figure 3-5. Hydrogeologic Regimes at Y-12). Most of the Bear Creek and UEFPC regimes are underlain by geologic formations that are part of the ORR aquitard. The ORR aquitard is comprised of six geologic formations (Nolichucky Shale, Maryville Limestone, Rogersville Shale, Rutledge Limestone, Pumpkin Valley Shale, and Rome Formation) which collectively have low permeability and low transmissivity. The northern portion of Bear Creek and UEFPC regimes is underlain by aquitard formations including the Nolichucky Shale, Maryville Limestone, and Rogersville Shale.



Source: DOE 2018.

Figure 3-5. Hydrogeologic Regimes at Y-12

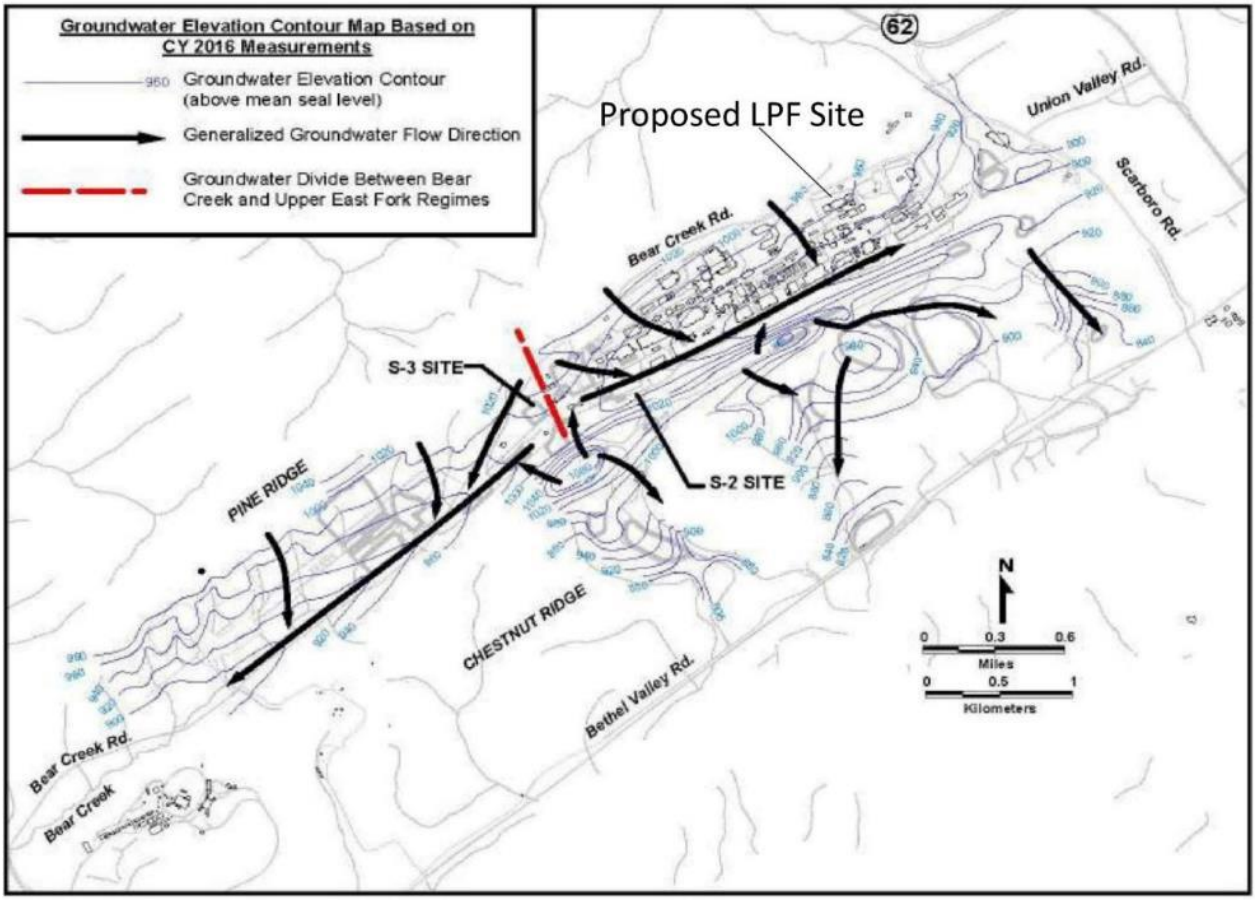
In general, near surface groundwater flow follows topography at Y-12; therefore, it flows off areas of higher elevation into the valley and then flows parallel to the valley, along the geologic strike.[14]

[14] The geologic strike is the direction of the line formed by the intersection of the geologic beds with the ground surface; the geologic strike is northeast to southwest in vicinity of Y-12.

Shallow flow in the Bear Creek and UEFPC regimes is divergent from a topographic and groundwater divide located near the western end of Y-12. In the Chestnut Ridge regime, a groundwater divide nearly coincides with the crest of the ridge. On Chestnut Ridge, shallow groundwater flow tends to be toward either flank of the ridge, with discharge primarily to surface streams and springs in Bethel Valley to the south and Bear Creek Valley to the north. In Bear Creek Valley, groundwater in the intermediate and deep intervals moves through fractures in the aquitard, converging on and then moving through fractures and solution conduits in the Maynardville Limestone. Karst development in the Maynardville Limestone has a significant impact on groundwater flow paths in the water table and intermediate intervals. Groundwater flow rates in Bear Creek Valley vary; they are slow within the deep interval of the fractured non-carbonate rock (less than 10 feet/year) but can be quite rapid within solution conduits in the Maynardville Limestone (10 to 5,000 feet/day) (DOE 2019a).

Contaminants are transported along with flowing groundwater through the pore spaces, fractures, or solution conduits of the hydrogeologic system. Strike-parallel transport of some contaminants can even occur within the aquitard units for significant distances, where they discharge to surface water tributaries or underground utility and storm water distribution systems in Y-12's industrial area. For example, elevated levels of nitrate (a contaminant from legacy waste disposals) within the fractured bedrock of the aquitard are known to extend east and west from the S-2 and S-3 sites for thousands of feet. The proposed LPF site is located within the UEFPC Hydrogeologic Regime within the Maryville Formation. Groundwater in the vicinity of the proposed LPF site flows to the southeast towards East Fork Poplar Creek (Figure 3-6) (DOE 2019a).

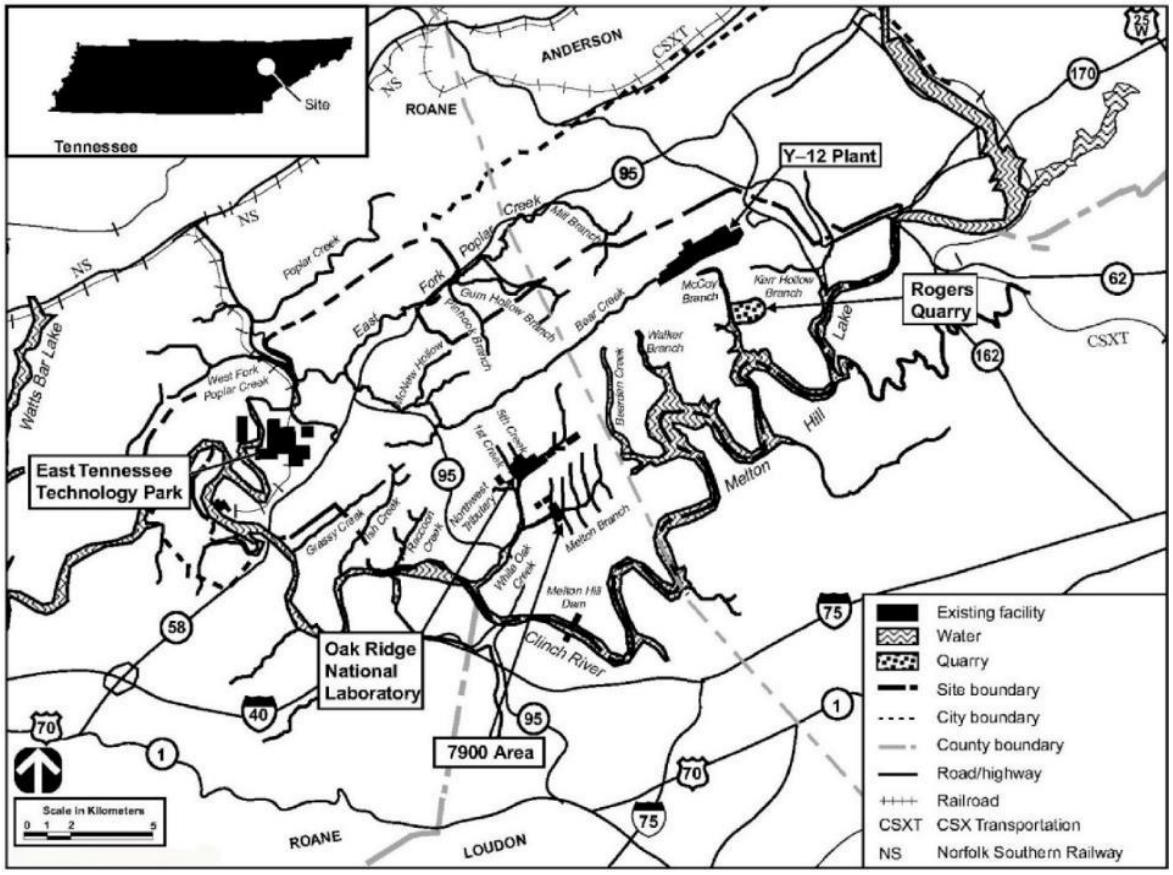
More than 200 sites have been identified at Y-12 that represent known or potential sources of contamination to the environment as a result of past waste management practices (NNSA 2011). Because of that contamination, extensive groundwater monitoring is performed to comply with regulations and DOE orders. Historical monitoring efforts have shown that four types of contaminants have affected groundwater quality at Y-12: nitrate, volatile organic compounds, metals, and radionuclides. Of those, nitrate and volatile organic compounds are the most widespread. Some radionuclides, particularly uranium and Technetium-99 (99Tc) were found principally in the Bear Creek regime and the western and central portions of the East Fork Poplar Creek (EFPC) regime. Among the three hydrogeologic regimes underlying the Y-12 Complex, the UEFPC regime encompasses most of the known and potential sources of surface water and groundwater contamination (DOE 2018). Because of the many legacy source areas, VOCs are the most widespread groundwater contaminants in the UEFPC regime. However, groundwater contamination does not appear prevalent in the vicinity of the proposed LPF site; contaminant plumes are delineated south of the proposed LPF site. There are no identified groundwater contaminant source areas at the proposed LPF site (DOE 2019a). Because of the abundance of surface water and its proximity to the points of use, very little groundwater is used at Y-12. Industrial and drinking water supplies are taken primarily from surface water sources; however, single-family wells are common in adjacent rural areas not served by the public water supply system. Most of the residential wells in the immediate vicinity of Y-12 are south of the Clinch River (NNSA 2011).



Source: DOE 2018.

Figure 3-6. Groundwater Elevation Contours and Flow Directions at Y-12

Surface water. Waters drained from the ORR eventually reach the Tennessee River via the Clinch River, which forms the southern and western boundaries of the ORR (Figure 3-7). The ORR lies within the Valley and Ridge Physiographic Province, which is composed of a series of drainage basins containing many small streams feeding the Clinch River. Surface water at each of the major facilities on the ORR drains into a tributary or series of tributaries, streams, or creeks within different watersheds. Each of these watersheds drains into the Clinch River. The largest of the drainage basins is that of Poplar Creek, which receives drainage from a 136-square mile area, including Y-12. It flows from northeast to southwest, approximately through the center of the ETTP, and discharges directly into the Clinch River (NNSA 2011).



Source: NNSA 2011.

Figure 3-7. Surface Water Features in the Vicinity of Y-12

The EFPC, which discharges into Poplar Creek east of the ETTP, originates within Y-12 just south of Building 9204-1 and flows northeast along the south side of Y-12 (Figure 3-8). Various Y-12 wastewater discharges to the upper reaches of EFPC from the late 1940s to the early 1980s left a legacy of contamination (e.g., mercury, PCBs, uranium) that has been the subject of water quality improvement initiatives over the past two decades. The water quality of surface streams in the vicinity of Y-12 is affected by current and historical legacy operations. Discharges from Y-12 processes flow into EFPC before the water exits Y-12. EFPC eventually flows through the City of Oak Ridge to Poplar Creek and into the Clinch River (DOE 2018).

An application for a new Y-12 National Pollutant Discharge Elimination System (NPDES) permit was prepared and submitted to TDEC in May 2016. The currently-expired NPDES permit continues in effect until the new permit is issued by the state of Tennessee. The current permit (TN002968) requires sampling, analysis, and reporting for approximately 56 outfalls including locations within the EFPC. The number is subject to change as outfalls are eliminated, consolidated, or added. Currently, Y-12 has outfalls and monitoring points in the following water drainage areas: EFPC, Bear Creek, and several unnamed tributaries on the south side of Chestnut Ridge. These creeks and tributaries eventually drain to the Clinch River (DOE 2019a).

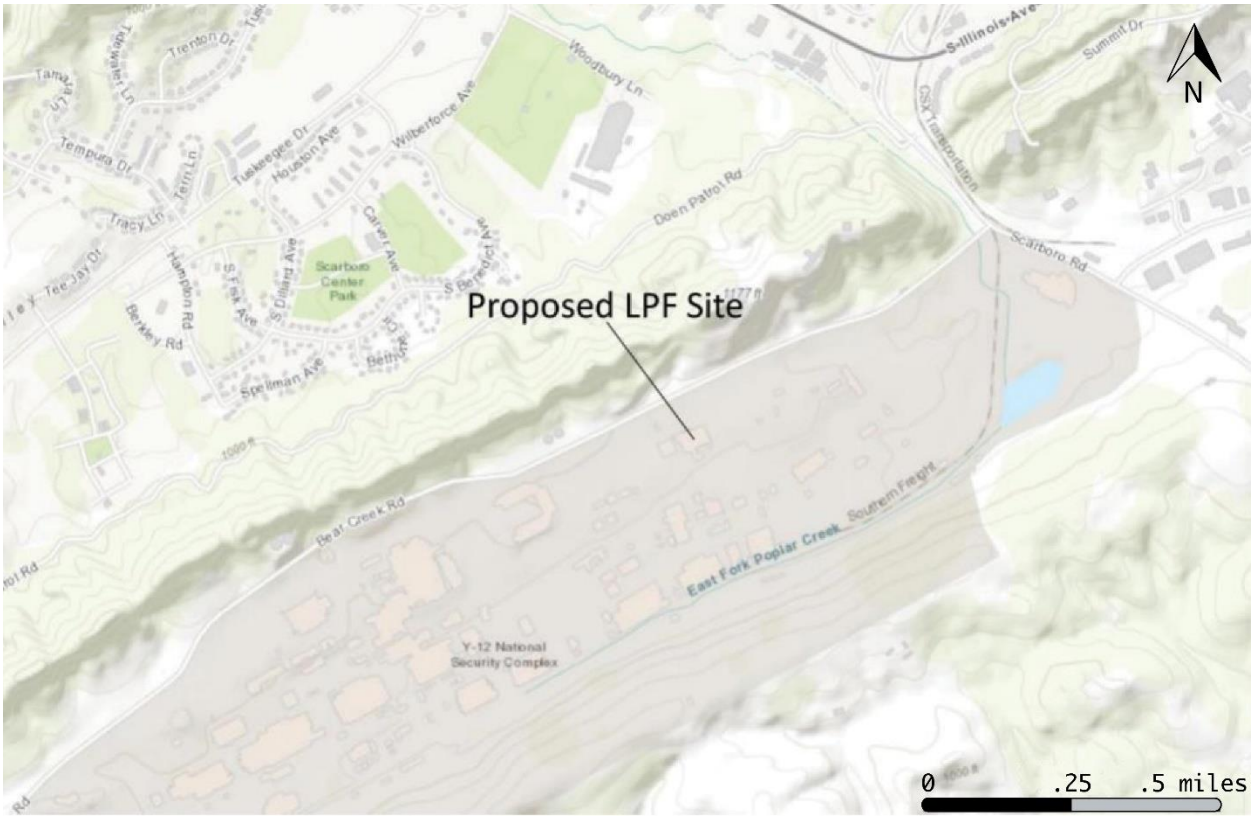


Figure 3-8. East Fork Poplar Creek at Y-12

Discharges to surface water allowed under the permit include storm drainage, cooling water, cooling tower blowdown, steam condensate, and treated process wastewaters, including effluents from wastewater treatment facilities. Groundwater inflow into sumps in building basements and infiltration to the storm drain system are also permitted for discharge to the creek. The monitoring data collected by the sampling and analysis of permitted discharges are compared with NPDES limits for parameters with existing limits. Some parameters, defined as "monitor only," have no specified limits (DOE 2018).

The NPDES permit requires regular monitoring and stormwater characterization. The effluent limitations contained in the permit are based on the protection of water quality in the receiving streams. The permit emphasizes storm water runoff and biological, toxicological, and radiological monitoring. Requirements of the NPDES permit for 2018 were satisfied. The percentage of compliance with permit discharge limits for 2018 was 99.9 percent (DOE 2019a).

Wetlands. Approximately 600 acres of wetlands exist on the ORR, with most classified as forested palustrine, scrub/shrub, and emergent wetlands (NNSA 2011). Wetlands occur across the ORR at lower elevations, primarily in the riparian zones of headwater streams and their receiving streams, as well as in the Clinch River embayments.

Wetlands are protected under Executive Order (EO) 11990 (42 FR 26961, May 24, 1977). A wetlands survey of the Y-12 area found palustrine, scrub/shrub, and emergent wetlands. An

emergent wetland was found at the eastern end of Y-12, at a seep by a small tributary of EFPC, between New Hope Cemetery and Bear Creek Road. Eleven small wetlands have been identified north of Bear Creek Road in remnants of the UEFPC (NNSA 2011). There are no wetlands at the proposed LPF site.

Floodplains. A floodplain is defined as the valley floor adjacent to a streambed or arroyo channel that may be inundated during high water. The Tennessee Valley Authority (TVA) conducted floodplain studies along the Clinch River, Bear Creek, and EFPC. Eastern Portions of Y-12 lie within the 100- and 500-year floodplains of EFPC (NNSA 2011). The proposed LPF would be located more than 1,100 feet from the 500-year floodplain limit. The flood elevation is more than 30-feet below the proposed first floor elevation of the LPF (Parsons 2019).

3.6.2 Proposed Action Impacts

Construction and Operation

***Groundwater*.** No impacts to groundwater are anticipated from construction activities or normal facility operations. Groundwater from the site would not be used as a water source. Potential impacts to groundwater quality are not expected because lithium processing would be contained within the building, and hazardous materials would be properly managed. Any spills would be contained and cleaned up in an appropriate manner under the spill prevention, control, and countermeasures (SPCC) Plan. Small quantities of process water generated during lithium processing would be characterized and properly disposed. As such, facility operations would not be expected to contaminate the groundwater. Additionally, existing monitoring wells at the site would continue to be used for the ongoing groundwater monitoring program (Parsons 2019), and per DOE Order 458.1, and DOE Order 436.1, a groundwater-monitoring network including upgradient and downgradient monitoring wells, would be established to evaluate baseline and operational site conditions.

***Surface Water*.** Prior to the start of construction, it would be necessary to obtain a construction stormwater NPDES permit for discharges of stormwater associated with construction activities. As part of the NPDES permit, the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) would be required to help minimize any pollution that might leave the site by stormwater. The SWPPP would contain a detailed site plan and schematics for the installation of temporary and permanent stormwater and erosion control devices to effectively manage the site during construction and facility operation. Because the area of disturbance would be greater than 5 acres, a stormwater detention pond/basin would be used for sediment control during construction.

Under the NPDES permit, stormwater runoff from developed areas on site must be managed at pre-construction levels, which requires that the first inch of rainfall from any precipitation event preceded with 72 or more hours of no rainfall be retained, and not discharged to surface waters. The existing stormwater drainage system in the area was designed based on a 25-year storm event

in accordance with the DOE Standard 1020 applicable at the time. For critical action facilities[15] such as the LPF, flood level protection design in accordance with Executive Order 11988 must be based on a 0.2 percent annual flood likelihood, which equates to a 500-year storm event. Because the existing stormwater drainage system was only designed for a 25-year storm, a detention pond/basin would be required to detain the excess flows over and beyond the 25-year storm flows so as to not flood downstream facilities caused by their inadequate drainage capacities (Parsons 2019). Figure 2-4 depicts the proposed 1.1 acre detention pond/basin.

There are no surface water bodies within or immediately adjacent to the proposed LPF site. As shown on Figure 3-8, the EFPC is about 0.25 miles to the south of the site. During construction, soil erosion and sedimentation would increase due to increased soil exposure. However, the implementation of erosion prevention and sediment control measures such as silt fence and filter sock, would reduce the potential for offsite transport of sediment. Installing and maintaining erosion controls around the perimeter of the construction footprint would contain disturbed site soils and reduce potential for offsite transport of sediment. The potential for offsite sediment transport would exist until disturbed areas are stabilized and revegetation is established.

Small quantities of process water generated during lithium processing would be characterized to determine treatability in available wastewater treatment facilities during process design. Any discharges of process water to the sanitary sewer would be subject to requirements under the Industrial and Commercial User Wastewater Discharge Permit 1-91. This permit defines requirements for the discharge of wastewaters to the sanitary sewer system as well as prohibitions for certain types of wastewaters. Additionally, it prescribes requirements for monitoring certain parameters at the East End Sanitary Sewer Monitoring Station (DOE 2019a). Discharges of process water from the LPF directly to East Fork Poplar Creek would comply with the general conditions and the specific discharge requirements of the latest NPDES permit issued to Y-12. The introduction of new waste streams or water priority chemicals would require a revision of the NPDES permit, though this is not expected. Due to the small quantities of process water anticipated during LPF operations and Permit 1-91 and NPDES requirements, LPF operations would not be expected to contaminate sanitary wastewater or surface water.

With the construction of a new permanent stormwater management system (i.e. detention pond/basin), implementation of spill prevention and response plans, and compliance with NPDES permit requirements including the SWPPP, adverse impacts to surface water bodies would not be expected during construction and operations.

Wetlands. There are no wetlands within or adjacent to the proposed LPF site. As such, there would be no impacts to wetlands.

Floodplains. There are no floodplains within or adjacent to the proposed LPF site. The proposed LPF would be located more than 1,100 feet from the 500-year floodplain limit. The flood elevation is more than 30-feet below the proposed first floor elevation of the LPF. As such, there would be no impacts from flooding nor floodplain disturbance.

[15] Per 10 CFR 1022, facilities are considered "critical action" if even a slight chance of flooding would result in impacts that would be too great. Critical action facilities may include, but are not limited to, facilities that store highly volatile, toxic, or water reactive materials.

3.6.3 No-Action Alternative Impacts

Under the No-Action Alternative, no new facilities would be constructed and there would be no additional impacts to water resources. Impacts to water resources would continue as discussed in Section 3.6.1. Ongoing and planned cleanup activities would continue at Y-12. Potential impacts to groundwater and surface waters, including wetlands, from existing operations and future operations would be addressed under approved NEPA decisions and other applicable regulatory documents.

3.7 Geology and Soils

3.7.1 Affected Environment

Geology. The ORR lies in the Valley and Ridge Physiographic Province of eastern Tennessee, which is characterized by a series of parallel narrow, elongated ridges and valleys that follow a northeast-to-southwest trend. The Valley and Ridge Physiographic Province has developed on thick, folded beds of sedimentary rock deposited during the Paleozoic era. The long axes of the folded beds control the shapes and orientations of a series of long, narrow parallel ridges and intervening valleys (ORNL 2006). In general, the ridges consist of resistant siltstone, sandstone, and dolomite units, and the valleys, which resulted from stream erosion along fault traces, consist of less-resistant shales and shale-rich carbonates (NNSA 2011). Elevation within the ORR ranges from a low of 750 feet above mean sea level (AMSL) along the Clinch River to a high of 1,260 feet AMSL along Pine Ridge. Within the ORR, the relief between the valley floors and ridge crests is generally about 300 to 350 feet (NNSA 2011). Most of the ORR facilities are located in the valleys.

Several geologic formations are present in the ORR area. The Rome Formation, which is present north of Y-12 and forms Pine Ridge, consists of massive-to-thinly bedded sandstones interbedded with minor amounts of thinly bedded, silty mudstones, shales, and dolomites. The Conasauga Group, which underlies Bear Creek Valley and Y-12, consists primarily of calcareous shales, siltstone, and limestone. The Knox Group, which is present immediately south of Y-12, consists of dolomite and limestone and underlies Chestnut Ridge.

Y-12 is located within Bear Creek Valley, which is underlain by Middle to Late Cambrian strata of the Conasauga Group (Figure 3-9). The Conasauga Group consists primarily of highly fractured and jointed shale, siltstone, calcareous siltstone, and limestone. The upper part of the group is mainly limestone, while the lower part consists mostly of shale (NNSA 2011). This group can be divided into six discrete formations, which are, in ascending order, the Pumpkin Valley Shale, the Rutledge Limestone, the Rogersville Shale, the Maryville Limestone, the Nolichucky Shale, and the Maynardville Limestone. Within Y-12, the proposed LPF site is underlain by the Maryville Limestone formation, which is a partially oolitic, gray limestone with localized gray dolomite.

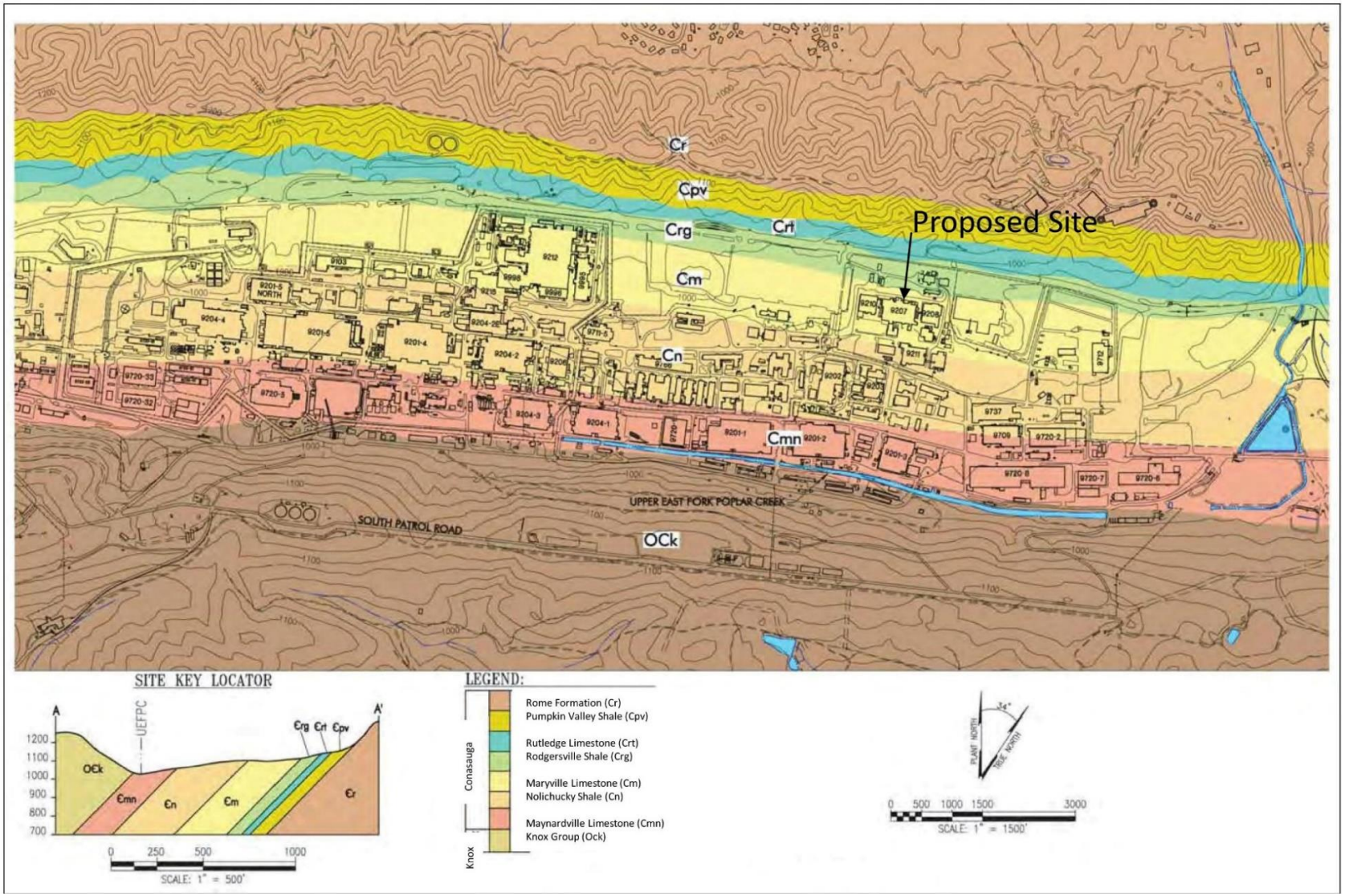
Unconsolidated materials overlying bedrock at Y-12 include alluvium (stream-laid deposits), colluvium (material transported downslope), man-made fill, fine-grained residuum from the weathering of the bedrock, saprolite (a transitional mixture of fine-grained residuum and bedrock remains), and weathered bedrock. The overall thickness of these materials in the Y-12 area is typically less than 40 feet. The geology of the ORR is complex as a result of extensive thrust faults

and folds. The White Oak Mountain Thrust Fault located north of Y-12, and other major faults in the vicinity are displayed in Figure 3-10. Although major thrust faults are numerous at the ORR, these faults are associated with mountain building episodes that ended more than 200 million years ago. These faults are no longer active, but stress stored up at depth in these rocks is periodically released as minor earthquakes. Since 1900, 138 earthquakes have been recorded within 62 miles of the proposed LPF site (at Y-12) with the highest magnitude of 4.7 (USGS 2020).

The U.S. Geological Survey (USGS) Earthquake Hazards Program's 2018 Long-term Model (USGS 2018) for the Conterminous United States shows earthquake ground motions for various probability levels across the United States. The USGS rates ground motions using peak ground acceleration, which is the maximum acceleration experienced during the course of an earthquake and is measured in units of acceleration due to gravity ("g"). The Long-Term Model indicates that the study area is located in an area with a moderate seismic hazard class rating: 0.34g peak horizontal ground acceleration with a 2 percent probability of exceedance in 50 years; and 0.11g peak horizontal ground acceleration with a 10 percent probability of exceedance in 50 years (*see* Figures 3-11 and 3-12). An earthquake generating 0.3g would produce very strong perceived shaking. Damage would be slight in specially designed structures. An earthquake generating 0.10g would be perceived by all, with minimal damage to well-built ordinary structures (USGS 2018, NNSA 2011, NNSA 2020a).

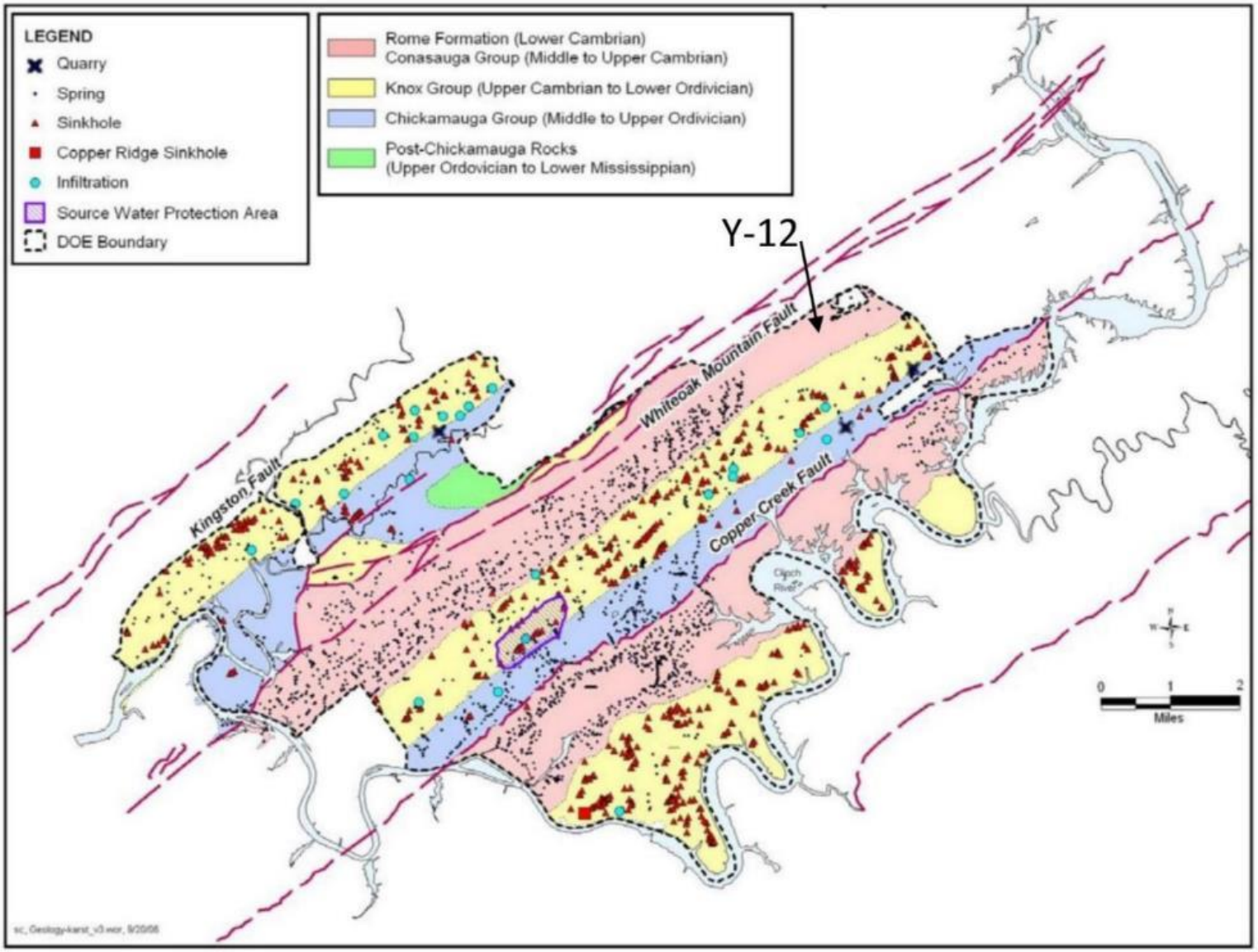
Karst features are dissolutional features occurring in carbonate bedrock. Numerous surface indications of karst development have been identified at the ORR (Figure 3-10). Surface evidence of karst development includes sinking streams (swallets) and overflow swallets, karst and overflow springs, accessible caves, and numerous sinkholes of varying size. Karst appears to be most developed in association with the Knox Group and adjacent Maynardville Limestone carbonate units. The highest density of sinkholes occurs in the Knox Group, and drilling data suggest that the largest solution cavities are associated with these formations (NNSA 2011). As shown in Figure 3-10, the density of karst features within or near Y-12 appears low.

Soils. Undisturbed soils within Bear Creek Valley consist of the Armuchee-Montevallo-Hamblen, the Fullerton-Claiborne-Bodine, and the Lewhew-Armuchee-Muskinghum associations. These soils are typically well- to moderately well-drained. Finer textured soils of the Armuchee-Montevallo-Hamblen association have been designated as prime farmland when drained (NNSA 2011). However, due to extensive cut-and-fill grading during the construction of Y-12, very few areas have a sequence of natural soil horizons, and developed portions of the valley are designated as urban land. The proposed LPF site is located on urban land soils within a level area, and therefore erosion potential would be low. Soils at Y-12 are generally acceptable for standard construction techniques (NNSA 2011).



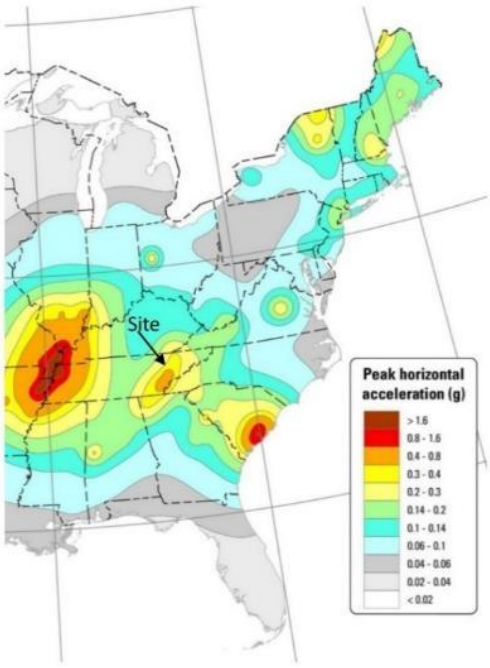
Source: NNSA 2011.

Figure 3-9. Generalized Bedrock Map for Y-12



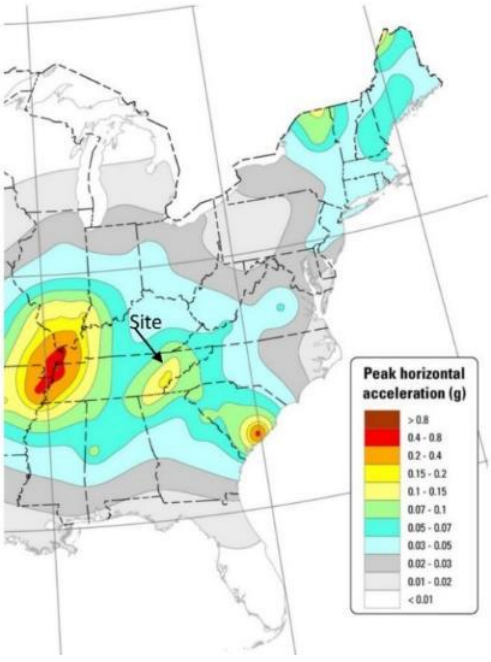
Source: ORNL 2006.

Figure 3-10. Geology and Karst Features in Vicinity of Y-12



Source: USGS 2018.

Figure 3-11. 2018 National Seismic Hazard Model for the conterminous United States Peak horizontal acceleration with a 2% probability of exceedance in 50 years



Source: USGS 2018.

Figure 3-12. 2018 National Seismic Hazard Model for the conterminous United States Peak horizontal acceleration with a 10% probability of exceedance in 50 years

3.7.2 Proposed Action Impacts

Construction. As discussed in section 1.3, the proposed LPF site is currently occupied by the Biology Complex, which is undergoing D&D scheduled for completion in approximately 2022. Prior to the start of construction of the proposed LPF, DOE-EM plans to gain regulatory concurrence that no further action will be required to address any potential soil contamination at the site related to past operations of the Biology Complex. Additionally, NNSA would conduct a geotechnical investigation to characterize the soil, rock, and groundwater conditions, to develop a suitable design for the facility's foundation.

Construction activities would cause minor impacts to the existing geologic and soil conditions at the site. The near surface geologic conditions and existing soil column would be disturbed by construction, especially within the facility footprint. However, the proposed LPF site would be constructed on previously disturbed land. The proposed site for the LPF was heavily disturbed/highly impacted by construction in the early 1940's to accommodate the current Biology Complex facilities. The LPF is being sited on top of this formerly highly-graded and highly-impacted area.

No viable geologic or soil resources would be lost from construction activities. Grading, excavation, and other site development activities associated with the Proposed Action would occur within a previously disturbed 13.9 acre parcel. Grading would temporarily disturb soils, and site contours would be permanently changed from site grading to support building foundations and site drainage. Additionally, soils would be excavated to accommodate the site's stormwater detention pond/basin. The site soils are designated as urban soils. Because of soil disturbance, the potential for increased soil erosion due to stormwater runoff and wind would increase. However, the site is generally level, which would reduce potential stormwater velocity and sediment transport.

In general, potential impacts from erosion would be minimized through the development and implementation of a SWPPP in accordance with the state of Tennessee, Division of Water Resources; implementation of erosion and sediment control measures during construction, and the implementation of a revegetation plan for areas disturbed by construction. Although the site soils are not classified as prime farmland, site topsoil could be stripped and conserved prior to grading activities, and re-applied post-construction to facilitate revegetation. Soils in areas used to stage equipment and materials have the potential to be compacted; such areas could be mechanically de-compacted prior to the revegetation phase of the project to facilitate re-growth. With implementation of the above measures, impacts to geology and soils during construction would be minimized.

Hazards posed by geological conditions are expected to be minor. The earthquake risk near the site is considered moderate due to the presence of historic thrust faults (USGS 2018). There are no quaternary faults (i.e., faults less than 1.6 million years old) near the site. The seismic design of the LPF structures, systems, and components (SSCs) is based on the DOE-STD-1020-2016, *Natural Phenomena Hazards Analysis and Design Criteria for Department of Energy Facilities*, ASCE 7-16 and the IBC 2015 using a site-specific seismic hazard study to define the design earthquake ground motions. The site-specific hazard study was performed in 2003 working with the USGS and other outside consultants, and was made very conservative to avoid future changes due to later USGS and industry studies. An update to the site-specific seismic hazard study is

presently ongoing and the results indicate that the 2003 site-specific study is still conservative. The updated seismic hazard study is considering all of the latest 2018 USGS studies, the Nuclear Regulatory Commission and the Electric Power Research Institute studies, along with the studies conducted by Robert Hatcher, Cox et al, and Adhikari et al. The results indicate that the design earthquake ground motions for the LPF site are controlled by a Moment Magnitude 6.9 earthquake at a distance from the site of about 174 miles for the low frequency ground motions and a Moment Magnitude 6.1 earthquake at a distance of about 62 miles from the site.

Due to the mixture of soil types (i.e. range in soil grain-size) and shallow depth to bedrock the subsurface conditions are not susceptible to liquefaction from a seismic event. Other potential hazards such as subsidence from karst and landslides are low risk. Surface karst features were not discovered in the vicinity of the site. Landslide risk is low because the site is generally flat.

Operation. Once construction is complete, areas used for laydown would be restored to pre-construction conditions. Meanwhile, open areas around the facility building would be cleaned up, restored, and revegetated. Although erosion from stormwater runoff and wind action would occur occasionally during operation, it is anticipated to be minimal.

3.7.3 No-Action Alternative Impacts

Under the No-Action Alternative, no new facilities would be constructed. There would be no impacts to geology and soils.

3.8 Biological Resources

3.8.1 Affected Environment

This section describes the biological resources on the ORR, which includes Y-12 and is intended to provide a baseline characterization of the ecology prior to any disturbances associated with construction or operation of the new LPF.

Vegetation and Habitat. The ORR is situated in the Great Valley of East Tennessee between the Cumberland and Great Smoky Mountains (DOE 2019a). At approximately 35,000 acres, the ORR is the largest contiguous and protected land ownership in the southern Valley and Ridge Physiographic Province of East Tennessee. The ORR contains approximately 25,000 acres of forestland. The ORR's natural resources are managed for DOE by the ORNL Natural Resources Management Program.

More than 1,100 vascular plant species have been identified at the ORR (Mann et al. 1996). Of the 168 non-native plant species on the ORR, 54 are considered severe or significant threats to natural areas or the ORR mission. The Invasive Plant Management Plan for the ORR addresses the impacts of invasive plants on facility operations and natural areas (ORNL 2017).

The eastern deciduous hardwood forest on the ORR provides habitat for numerous wildlife species. The diversity of wildlife species ranges from common species found in urban and suburban environments to more specialized species such as interior forest bird species. The ORR hosts more than 70 species of fish; about 71 species of reptiles and amphibians (68 species confirmed); 213

species of migratory, transient, and resident birds; and 49 species of mammals, as well as many invertebrate species (NERP 2020). In addition, the Bald Eagle may also be present and is protected under both the *Migratory Bird Treaty Act* and the *Bald and Golden Eagle Protection Act* (USFWS 2020).

The overall goals of wildlife management on the ORR are directed toward preserving populations and habitat, maintaining and enhancing biodiversity, integrating multiple use objectives, and minimizing wildlife damage to property and public safety (ORNL 2007).

Y-12 occupies a highly-industrialized area of 811 acres in the east end of Bear Creek Valley between Pine Ridge to the north and Chestnut Ridge to the south. Approximately 600 acres are presently enclosed by a perimeter fence. Within the Y-12 fenced boundary, there are no wetlands and limited forested areas. Building and parking lots dominate the landscape at Y-12, with limited vegetation present. Fauna within the Y-12 area is limited due to the lack of large areas of natural habitat. Grass and unvegetated areas surround the entire facility for security purposes. The eastern portion of Y-12 is occupied by Lake Reality and the former New Hope Pond (now closed), maintenance facilities, office space, training facilities, change houses, and former ORNL Biology Division facilities. The far western portion consists primarily of waste management facilities and construction contractor support areas. The central and west-central portions encompass the high-security portion, which supports the core NNSA missions.

The proposed LPF would be located at the existing Biology Complex (*see* Figure 2-1). The Biology Complex is located within limits of the Y-12 PPA, which is secured with a perimeter fence, but outside the Y-12 PIDAS. The site is an industrialized and developed area of the Y-12 Complex. Currently, the Biology Complex site is occupied by two major buildings (9207 and 9210) and several ancillary facilities that are currently being demolished by DOE-EM and in accordance with the Federal Facility Agreement.

Wildlife. The eastern deciduous hardwood forest on the ORR provides habitat for numerous wildlife species. The diversity of wildlife species ranges from common species found in urban and suburban environments to more specialized species such as interior forest bird species. The ORR hosts more than 70 species of fish; about 71 species of reptiles and amphibians (68 species confirmed); 213 species of migratory, transient, and resident birds; and 49 species of mammals, as well as many invertebrate species (NERP 2020).

The overall goals of wildlife management on the ORR are directed toward preserving populations and habitat, maintaining and enhancing biodiversity, integrating multiple use objectives, and minimizing wildlife damage to property and public safety (ORNL 2007). Game-species management is conducted for public recreation and public health and safety reasons. Active hunting programs are conducted for white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), and Canada goose (*Branta canadensis*). Nuisance wildlife species include raccoon (*Procyon lotor*), skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*), and woodchuck (*Marmota monax*).

Fish species representative of the Clinch River in the vicinity of the ORR include shad and herring (Dlupeidae), common carp (*Cyprinus carpio*), catfish and bullheads (Ictaluridae), bluegill

(*Lepomis macrochirus*), crappie (*Pomoxis spp.*), and freshwater drum (*Aplodinotus grunniens*) (DOE 2019a).

There is limited natural habitat available to support wildlife on Y-12. Building and parking lots dominate the landscape at Y-12, with limited vegetation present and lack of large areas of natural habitat.

Threatened, Endangered, or Sensitive Species. Federally listed species are protected under the *Endangered Species Act of 1973* (16 U.S.C. 1531-1534). Species listed in the State of Tennessee are protected under the *Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974* (TCA § 70-8-101 – 112) and the *Rare Plant Protection and Conservation Act of 1985* (TCA §§70-8-301 – 314).

State and federally listed species of concern known to have occurred on the ORR are listed in Table 3-10. Some of these species, such as the hellbender (*Crytobranchus alleganiensis*), have been seen only once or a few times; others, including the wood thrush (*Hylocichla mustelina*), are comparatively common and widespread on the ORR.

Table 3-10. Threatened, Endangered, or Sensitive Animal Species on the ORR

Scientific name	Common Name	Status[a]		
		Federal	State	PIF
Fish				
Phoxinus tennesseensis	Tennessee dace		NM	
Amphibians and Reptiles				
Crytobranchus alleganiensis	Hellbender		T	
Hemidactylium scutatum	Four-toed salamander		NM	
Birds				
Ixobrychus exilis	Least bittern		NM	
Egretta caerulea	Little blue heron		NM	
Nycticorax	Black-crowned night heron		NM	
Mycteria americana	Wood stork	T		
Haliaeetus leucocephalus	Bald eagle	MC		
Bonasa umbellus	Ruffed grouse			RC
Colinus virginianus	Northern bobwhite			RC
Caprimulgus carolinensis	Chuck-will's-widow			RC
Caprimulgus vociferus	Eastern whip-poor-will			RC
Chaetura pelagica	Chimney swift			RC
Megaceryle alcyon	Belted kingfisher			RC
Melanerpes erythrocephalus	Red-headed woodpecker			RC
Colaptes auratus	Northern flicker			RC
Contopus virens	Eastern wood-pewee			RC
Empidonax virescens	Acadian flycatcher			RC
Progne subis	Purple martin			RC
Hirundo rustica	Barn swallow			RC
Hylocichla mustelina	Wood thrush		NM	RC
Lanius ludovicianus	Loggerhead shrike		NM	
Vermivora chrysoptera	Golden-winged warbler		T	RC
Setophaga cerulea	Cerulean warbler		NM	RC

Scientific name	Common Name	Status[a]		
		Federal	State	PIF
Setophaga discolor	Prairie warbler			RC
Mniotilta varia	Black-and-white warbler			RC
Protonotaria citrea	Prothonotary warbler			RC
Geothlypis formosa	Kentucky warbler			RC
Cardellina canadensis	Canada warbler			RC
Icteria virens	Yellow-breasted chat			RC
Piranga rubra	Summer tanager			RC
Pipilo erythrophthalmus	Eastern towhee			RC
Spizella pusilla	Field sparrow			RC
Ammodramus savannarum	Grasshopper sparrow			RC
Ammodramus henslowii	Henslow's sparrow		T	RC
Melospiza Georgiana	Swamp sparrow			RC
Spinus tristis	American goldfinch			RC
Bats				
Myotis grisescens	Gray bat	E	E	
Myotis lucifugus	Little brown bat		T	
Myotis sodalist	Indiana bat	E	E	
Myotis septentrionalis	Northern long-eared bat	T		
Myotis leibii	Eastern small-footed bat		NM	
Perimyotis subflavus	Tri-colored bat		T	
Corynorhinus rafinesquii	Rafinesque's Big-eared bat		NM	
Sorex dispar	Long-tailed shrew		NM	

[a] Status Codes: E = endangered; T=threatened; MC=of management concern; NM=in need of management; RC=regional concern

[b] Partners in Flight (PIF) is an international organization devoted to conserving bird populations in the Western Hemisphere
Source: DOE 2019a.

The only federally listed animal species observed on the ORR in recent years are mammals. Of particular interest is the potential presence of forest-dwelling bats that may inhibit development during significant portions of the year. Two of the federally listed bat species, Indiana bat (*Myotis sodalist*) and northern long-eared bat (*Myotis septentrionalis*) roost in trees. The other federally listed bat species, the gray bat (*Myotis grisescens*), may use the area as foraging habitat. Additionally, two state listed bat species, little brown bat (*Myotis lucifugus*) and tricolored bat (*Perimyotis subflavus*), may roost in trees to some extent and forage throughout the area. Both species are under federal review for listing. Any trees, either dead or alive, with exfoliating bark, cracks or crevices can provide potential roosting habitat.

Aquatic resources on the ORR include perennial streams, perennial – ephemeral streams, wet weather conveyance (potential streams that will require hydrologic determination), and seeps/springs (see Section 3.6). All streams contain contemporary observations of the state listed species In Need of Management Tennessee dace (*Chrosomus tennesseensis*), which represents an ORNL Focal Species for management and ongoing research. The ORNL Natural Resources Program also expects that the wetlands within the western portion of the ORR support the state-listed species In Need of Management, four-toed salamander (*Hemidactylium scutatum* – also an ORNL focal species). Importantly, the Tennessee dace and both state-listed salamanders rely on

ephemeral (in addition to perennial) aquatic resources as core habitat during important life history events.

Four plant species known to be on the ORR (spreading false foxglove, Appalachian bugbane, tall larkspur, and butternut) have been under review for listing at the federal level and were previously listed under the C2 candidate designation. The U.S. Fish and Wildlife Service now informally refers to these as special concern species. The State of Tennessee lists 17 plant species potentially occurring on the ORR as endangered, threatened, or of special concern; these are included in Table 3-11.

Table 3-11. Threatened, Endangered, or Sensitive Plant Species on the ORR

Scientific name	Common Name	Habitat on the ORR	Status	
			Federal	State
Aureolaria patula	Spreading false foxglove	River bluff	SC	SC
Berberis canadensis	American barberry	Rocky bluff		SC
Bolboschoenus fluviatilis	River bulrush	Wetland		SC
Delphinium exaltatum	Tall larkspur	Barrens and woodlands	SC	E
Diervilla lonicera	Northern bush-honeysuckle	Rocky river bluff		T
Draba ramosissima	Branching whitlow-grass	Limestone cliff		SC
Elodea nuttallii	Nuttall waterweed	Pond, embayment		SC
Eupatorium godfreyanum	Godfrey's thoroughwort	Dry woods edge		SC
Fothergilla major	Mountain witch-alder	Woods		T
Helianthus occidentalis	Naked-stem sunflower	Barrens		SC
Juglans cinereal	Butternut	Lake shore	SC	T
Juncus brachycephalus	Small-head rush	Open wetland		SC
Liparis loeselii	Fen orchid	Forested wetland		T
Panax quinquifolius	American ginseng	Rich woods		SC, CE
Platanthera flava var. herbiola	Tuberculed rein-orchid	Forested wetland		T
Spiranthes lucida	Shining ladies'-tresses	Boggy wetland		T
Thuja occidentalis	Northern white cedar	Rocky river bluffs		SC

[a] Status Codes: CE = status due to commercial exploitation; SC=special concern; E=endangered; T=threatened.
Source: DOE 2019a.

Federally listed plant and animal species are considered unlikely within Y-12. No critical habitat for threatened or endangered species, as defined in the *Endangered Species Act,* exists on the ORR or Y-12.

3.8.2 Proposed Action Impacts

Potential impacts to biological resources are evaluated based on the degree to which various habitats or species could be affected by the Proposed Action and No-Action Alternative. Impacts to wildlife are evaluated in terms of disturbance, displacement, or loss of wildlife.

Construction. Under the Proposed Action, construction of the LPF would be on previously disturbed land. The total area of land disturbed during construction of the LPF would be approximately 13.9 acres and the permanent facility footprint, including roads, would be

approximately 12.9 acres. There would be some disturbance to terrestrial biotic resources due to associated utility hook-ups and rerouting, site access by construction vehicles, and parking lot relocations. Some dislocation of small urban type species (i.e., rodents) could be expected. Large animals would be largely excluded from controlled areas. Because the area on which the LPF would be constructed is developed and paved, there would be minimal terrestrial biotic impacts.

The land to be used for the LPF is already developed and is accessible via existing roads. Impacts to threatened and endangered or special status species would be minimal. Monitoring to assure that threatened and endangered or special status species, such as the gray bat and Indiana bat, which have been observed on the ORR (but not on Y-12) would continue.

Rain events that occur during construction could cause erosion and transport of soil and other materials from the construction site. NNSA would utilize appropriate storm water management techniques to prevent pollutants or extreme soil erosion from entering local waterways, and thus aquatic resources should not be negatively impacted.

Operation. Impacts to biological resources from the operation of the LPF would be similar to currently observed operations at Y-12. The Biological Monitoring and Abatement Program, which monitors the health of East Fork Poplar Creek, would continue and would be used to ascertain any impacts from the LPF on local biota. Monitoring to assure that there are no negative impacts to threatened and endangered or special status species would continue. Conservation easements exist at Y-12 and will continue in order to protect, restore, and enhance wildlife and suitable habitat.

3.8.3 No-Action Alternative Impacts

The No-Action Alternative would result in no additional effects on biological resources. Under the No-Action Alternative, the LPF would not be constructed. Biological resources would remain unchanged when compared to existing conditions.

3.9 Cultural Resources

Cultural resources are physical manifestations of culture, specifically archaeological sites, architectural properties, ethnographic resources, and other historical resources relating to human activities, society, and cultural institutions that define communities and link them to their surroundings. They include expressions of human culture and history in the physical environment, such as prehistoric and historic archaeological sites, buildings, structures, objects, and districts. The National Register of Historic Places (NRHP) is a listing maintained by the National Park Service which consists of prehistoric, historic, and ethnographic buildings, structures, sites, districts, and objects that are considered significant at a national, state, or local level. Cultural resources listed on the NRHP, or determined eligible for listing, have been documented and evaluated according to uniform standards, found in 36 CFR 60.4, and, regardless of age, are called *historic properties*.

3.9.1 Affected Environment

Regulatory Setting. Several federal laws, regulations, and EOs addressing cultural resources and federal responsibilities regarding them are applicable to the ORR. Foremost among these statutory

provisions, and most relevant to the current analysis, is the *National Historic Preservation Act* (NHPA) (54 U.S.C. 300101 et seq.). Section 106 of the NHPA and its implementing regulations at 36 CFR Part 800 require federal agencies to take into account the effects of their undertakings on historic properties and to consult to find ways to avoid, minimize, or mitigate any adverse effects. As part of the Section 106 process, agencies are required to consult with the State Historic Preservation Officer (SHPO) on their determinations early in the planning process to allow time to resolve any adverse effects. The Tennessee Historical Commission (THC) serves as the SHPO.

Cultural Resource Management at Y-12. The *Cultural Resource Management Plan, DOE Oak Ridge Reservation, Anderson and Roane Counties* (DOE 2001) addresses DOE compliance with cultural resource statutes, ensures that cultural resources are addressed early in the planning process of proposed undertakings, and ensures needed protection is provided or appropriate documentation is prepared before an undertaking is initiated. Two site-wide Programmatic Agreements (PAs) among the DOE, SHPO, and the President's Advisory Council on Historic Preservation were executed for the ORNL and Y-12 (DOE 2019a). In addition, to better fulfill the requirements of the NHPA, DOE developed a historic preservation plan (HPP) for each site. These HPPs ensure compliance with Section 106 of the NHPA and provides for more efficient and effective review of DOE undertakings having the potential to impact historic properties. The PAs and HPPs provide for the systematic management of all archeological and historic resources at the sites under these documents. The Cultural Resource Management program ensures compliance with all applicable state and federal requirements.

In addition, on November 10, 2015, DOE and the U.S. Department of Interior signed a *Memorandum of Agreement Between the United State Department of Interior and the United States Department of Energy for the Manhattan Project National Historical Park* establishing the Manhattan Project National Historical Park. The park includes facilities and lands in Los Alamos, New Mexico; Hanford, Washington; and Oak Ridge, Tennessee. The MOA defines the respective roles and responsibilities of the departments in administering the park and includes provisions for enhanced public access, management, interpretation, and historic preservation (DOE 2015).

Cultural Resources at the ORR and Y-12. The ORR had 168 facilities that were eligible for inclusion on the NRHP. The reservation contains more than 45 known prehistoric sites (primarily burial mounds and archaeological evidence of former structures), more than 250 historic pre-World War II structures, 32 cemeteries, and several historically significant structures from the Manhattan Project era. Seven historic ORR properties are currently listed individually in the NRHP (DOE 2019a). The Manhattan Project National Historical Park commemorates the history of the Manhattan Project and protects many structures associated with the Manhattan Project. The park includes facilities located on the ORR including the X-10 Graphite Reactor at ORNL; Buildings 9731 and 9204-3 at Y-12; and the K-25 Building Site at the ETTP.

Y-12 currently has a proposed National Register Historic District (Figure 3-13) of historic buildings associated with the Manhattan Project that are eligible for listing in the NRHP (NNSA 2011). The district and its contributing properties are eligible under Criterion A for its historical associations with the Manhattan Project, development as a nuclear weapons component plant within the post-World War II scientific movement, and early nuclear activities. The historic district is also eligible under Criterion C for the engineering merits of many of the properties and

their contributions to science (NNSA 2011). Within the proposed district, buildings 9731 and 9204-3 are part of the Manhattan Project National Historical Park. At present, neither is available for regular public access. Limited public access to both facilities occurred in 2015, when DOE facilitated public tours of both buildings to celebrate the establishment of the park (DOE 2019a).

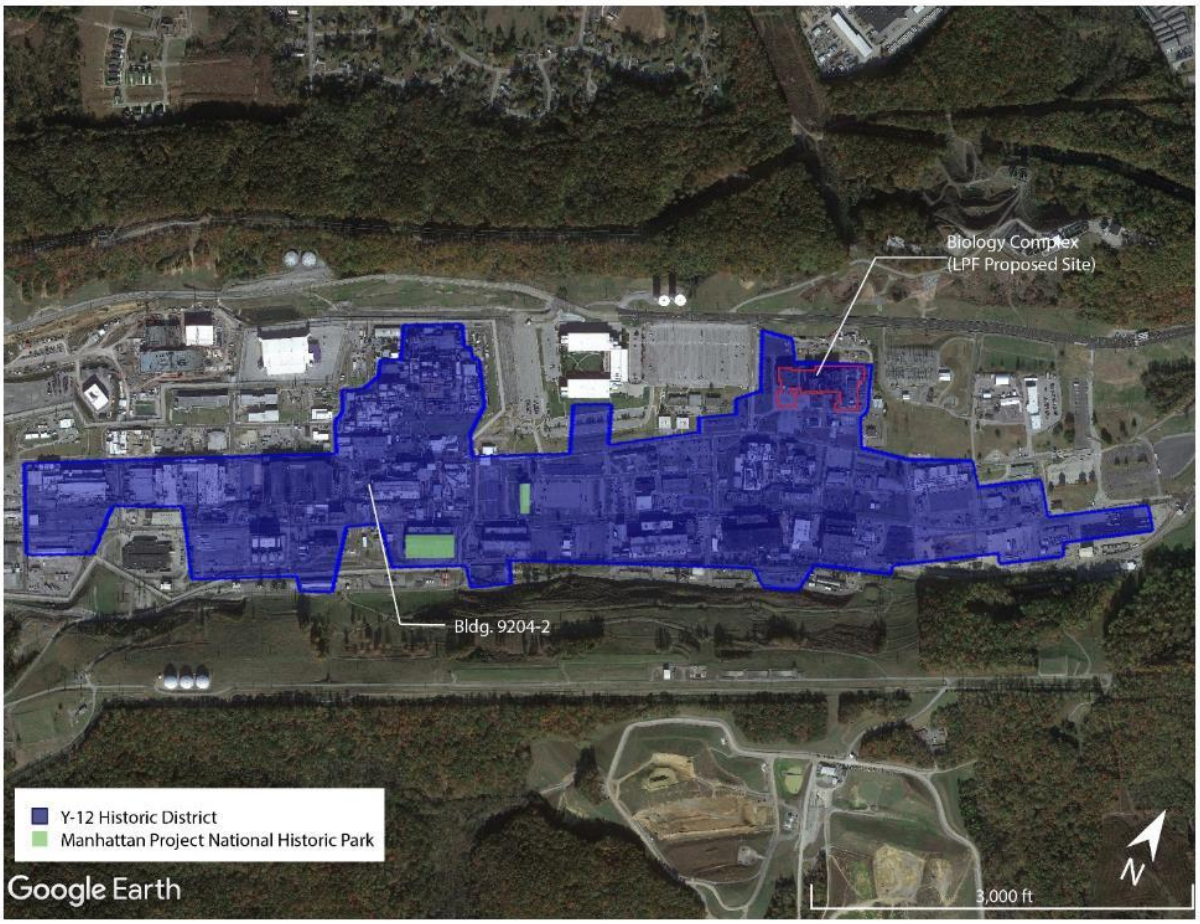


Figure 3-13. Y-12 Proposed Historic District

The HPP for Y-12 provides an effective approach for preserving the historically significant features of Y-12, while facilitating continued use of the site for ongoing and future missions. The preservation strategy outlined in the HPP ensures historic preservation is an integral part of the comprehensive planning process. As a part of this strategy and based on the dynamics of Y-12's planning efforts, the existing historic properties were categorized into four groups (NNSA 2011):

- Category 1: Historic facilities having an identified future mission need for foreseeable future;
- Category 2: Historic facilities determined to be excess to future mission needs;
- Category 3: Historic facilities whose mission need is uncertain at this time;
- Category 4: Facilities reclassified as non-contributing.

Cultural Resources in the Project Area. The proposed LPF would be sited at the Biology Complex site (*see* Figure 2-1) and is part of the proposed Y-12 Historic District. As stated in the Y-12 HPP, the Biology Complex is currently categorized as "historic facilities determined to be excess to future mission needs" (NNSA 2011). Currently the Biology Complex site is occupied by two major buildings (9207 and 9210) and several ancillary facilities (*see* Figure 2-2). Buildings 9207 and 9210 were designed and built by Stone & Webster and constructed at Y-12 in 1944–1945 to provide added capacity to existing chemical processing operations already in use in Y-12 Buildings 9202 and 9203. Processes in 9207 and 9210 were designed to refine mined uranium ore to the point where it would be acceptable as feed material for the Y-12 calutrons used to separate U-235, the isotope capable of sustaining fission, from U-238, the more common, non-fissile isotope of uranium. When the gaseous diffusion process being developed at K-25 proved to be more efficient for uranium enrichment than electromagnetic isotope separation employed at Y-12, multiple Y-12 processing facilities associated with the calutrons were shut down. Consequently, in December 1946, Buildings 9207 and 9210 were included in a list of Y-12 buildings slated for closure. In 1947 the buildings were transferred to the control of Clinton National Laboratories (later known as ORNL) for transformation into facilities for the Biology Division (Andrews and Heavrin 2018).

Currently, the Biology Complex site facilities will be demolished under CERCLA. As part of the Section 106 process, DOE consulted with the SHPO regarding the demolition of Buildings 9207 and 9210. In December 2018, the THC approved the demolition of Buildings 9207 and 9210.

3.9.2 Proposed Action Impacts

Potential impacts to cultural resources are assessed by applying the criteria of adverse effect as defined in 36 CFR Part 800.5[a]. An adverse effect is found when an action may alter the characteristics of a historic property that qualifies it for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, workmanship, feeling, or association.

Construction. Construction-related activities and ground disturbance conducted for construction of the LPF and related utilities and facilities would occur on previously disturbed lands. The construction and laydown areas would be fenced during all construction activities to prevent activities from being conducted outside these areas, and erosion control measures would be implemented during construction. Careful consideration would be given to the planning of the LPF to ensure there would be no adverse impacts to facilities within the Y-12 Historic District. To ensure the new construction would not have an adverse impact on facilities within the Y-12 Historic District, the exterior of the new LPF would be designed to be compatible with existing historic properties.

Unanticipated discoveries of archaeological materials during construction would be evaluated and, if needed, mitigated in accordance with the HPP. Therefore, no notable impacts to archaeological resources are anticipated.

Operation. Operational activities are not expected to have an impact on cultural resources at Y-12, as all operations under the Proposed Action would be similar to existing operations.

3.9.3 No-Action Alternative Impacts

Under the No-Action Alternative, no new facilities would be constructed. There would be no impacts to cultural resources under this alternative.

3.10 Socioeconomic Resources and Environmental Justice

This section discusses the existing socioeconomic resources and environmental justice conditions within the LPF ROI and the impacts associated with the Proposed Action and No-Action Alternative.

3.10.1 Affected Environment

Socioeconomic Resources. Socioeconomics considers the attributes of human social and economic interactions associated with the proposed DOE actions to construct and operate the LPF and the impacts that such action may have on the ROI. The ROI is a four-county area in Tennessee comprised of Anderson, Knox, Loudon, and Roane counties where a majority of the Y-12 workforce resides. Figure 3-14 shows the location of the proposed LPF and surrounding counties. Socioeconomic areas of discussion include the regional and local economy, local demographics, local housing, and community services. Socioeconomic impacts may be defined as the environmental consequences of a proposed action in terms of potential demographic and economic changes.

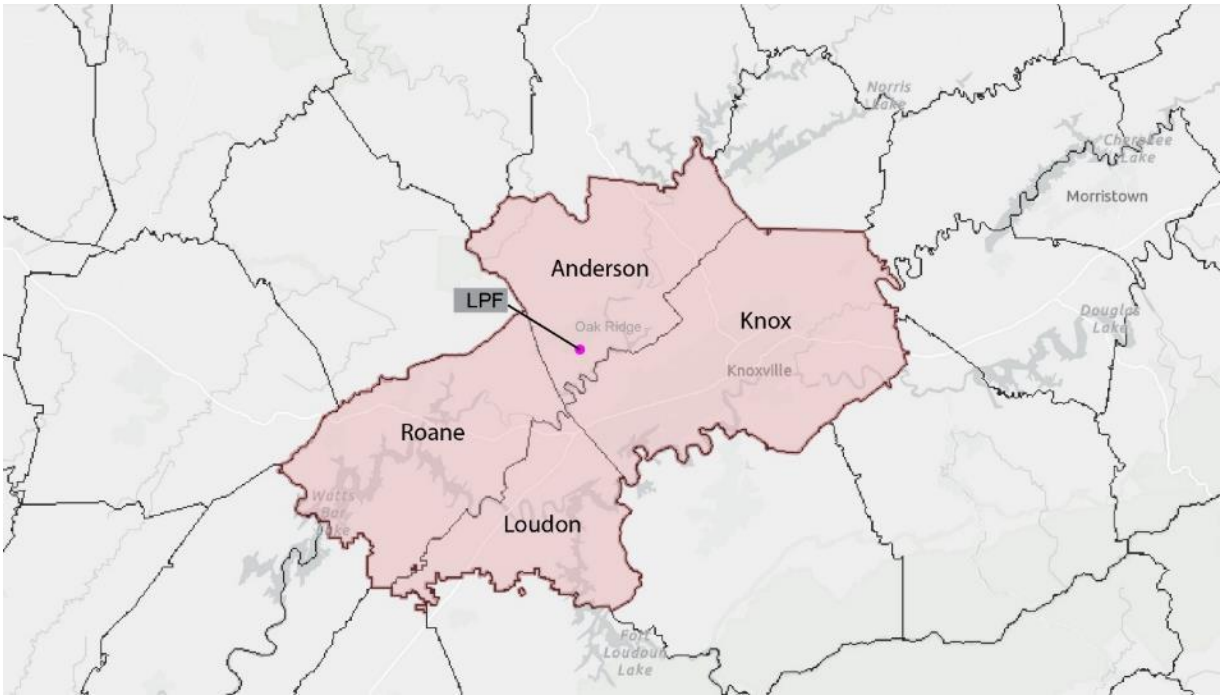


Figure 3-14. Location of Proposed LPF and Region of Influence

From 2010 through 2019, the labor force in the ROI increased 5.5 percent to 330,508 persons. During the same time period, employment in the ROI increased by 11 percent to 320,374 persons, and the number of unemployed decreased by 54.3 percent, reflecting economic recovery after the

recession of 2008–2010. Over that same period, the unemployment rate declined from 8.5 percent to 3.7 percent. Tennessee experienced similar trends in unemployment rates, decreasing from 9.7 percent to 3.4 percent in 2019 (BLS 2019). Table 3-12 presents the employment profile in the ROI and Tennessee for 2010 and 2019.

Table 3-12. ROI Employment Profile

Area	Labor Force		Employed		Unemployed		Percent Unemployed	
	2010	2019	2010	2019	2010	2019	2010	2019
Anderson	34,926	34,949	31,675	33,708	3,251	1,241	9.3%	3.6%
Knox	229,800	246,227	212,757	239,090	17,043	7,137	7.4%	2.9%
Loudon	22,352	23,696	20,280	22,895	2,072	801	9.3%	3.4%
Roane	24,323	23,617	22,089	22,662	2,234	955	9.2%	4.0%
ROI	313,411	330,508	288,811	320,374	26,610	12,153	8.5%	3.7%
Tennessee	3,090,795	3,344,849	2,792,063	3,231,501	298,732	113,348	9.7%	3.4%

Source: BLS 2019.

The proposed LPF would be constructed at Y-12, located in Anderson County. Anderson County had a per capita personal income of $41,853 and ranked 19th in the state in 2018. In 2008, the per capita was $34,018. The 2018 per capita income reflected an increase of 4.4 percent from 2017 (BEA 2018a). The median income for households in Anderson County was $50,003 in 2018 (USCB 2018a). Anderson County had a total of 1,545 business establishments in 2018, with a combined annual payroll of approximately $2.5 billion (USCB 2019).
Major employment sectors in the ROI and Tennessee are presented in Figure 3-15. In Anderson County, manufacturing accounted for approximately 21.9 percent of the total employment in the county. Government and government enterprises accounted for approximately 10.7 percent, with professional, scientific, and technical services at 10.2 percent of total employment (BEA 2018a). In Tennessee, government enterprises were the largest employer, accounting for approximately 11 percent of total employment, followed by health care and social assistance accounting for 10.5 percent and retail trade accounting for approximately 10.2 percent of total employment (BEA 2018b).

In 2018, the population in the ROI was estimated to be 636,467 (USCB 2018b). From 2010 to 2018, the total population in the ROI increased 4.3 percent, which was lower than the growth rate in Tennessee (USCB 2018b). Between 2019 and 2030, the population of the ROI is projected to steadily increase. In 2030 the population in the ROI is projected to be 706,193 (Boyd Center 2019). Table 3-13 presents the historic and projected population of the ROI and Tennessee.

As of 2018, the ROI had 254,979 housing units of which 10.7 percent were vacant. Of the estimated 30,656 vacant units, 5,749 were estimated to be vacant rental units, or two percent of the housing stock. A majority of vacant rental units are for seasonal, recreational, or occasional use (USCB 2018c). Temporary housing is available in the form of daily, weekly, and monthly rentals in motels, hotels, and campgrounds, and recreational vehicle parks. The demand for temporary housing in the project area is generally greatest during the summer months when tourism is at its highest.

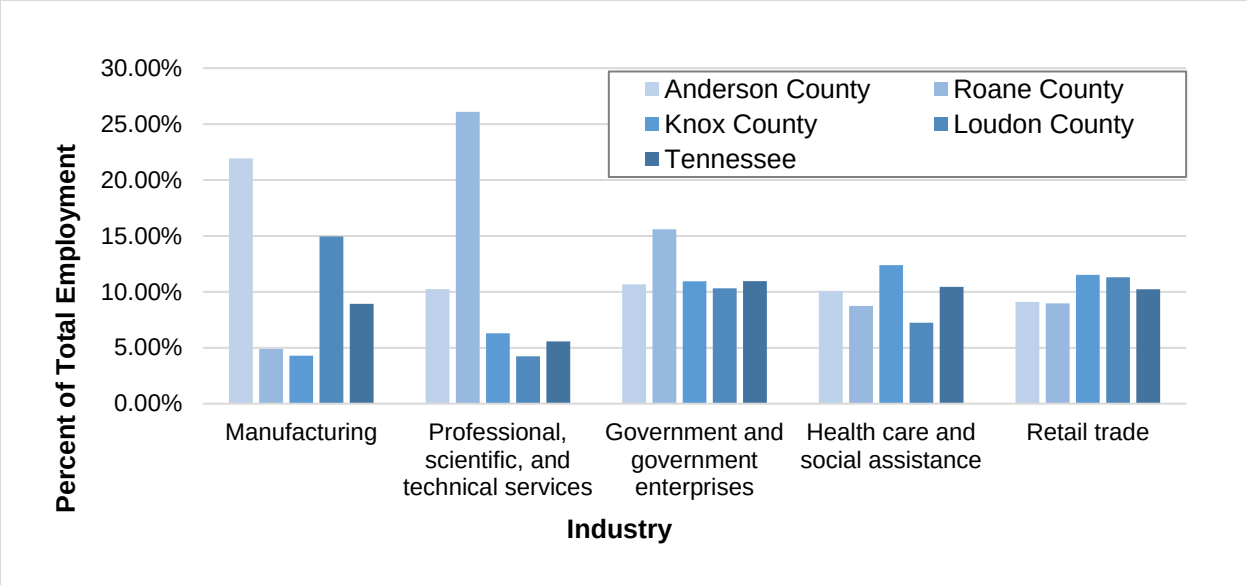


Figure 3-15. Major Employment Sector Distribution

Table 3-13. County and State Historic and Projected Population

Area	2010	2015	2018	2020	2025	2030
Anderson	75,129	75,430	75,775	77,151	78,500	79,454
Knox	432,226	444,348	456,185	473,996	494,503	513,318
Loudon	48,556	50,229	51,610	54,454	57,606	60,311
Roane	54,181	53,162	52,897	53,285	53,386	53,111
ROI	610,092	623,169	636,467	658,886	683,995	706,193
Tennessee	6,346,105	6,499,615	6,651,089	6,886,369	7,153,758	7,393,069

Source: USCB 2010, 2015, 2018b, Boyd Center 2019.

Community services within the ROI include public schools, hospitals, and public safety. The ROI has seven school districts with a total of 151 schools serving a student population of 86,895 during the 2018-2019 school year (NCES 2020). There are eleven hospitals serving the ROI with the majority located in Knox County. There are 29 fire departments in the ROI made up of career and volunteer firefighters. County Sheriff's Offices provide police protection services in cooperation with Tennessee Highway Patrol. In 2018, there were 1,361 total law enforcement employees including 563 officers and 798 civilians (FBI 2018).

Environmental Justice. Under EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, federal agencies are responsible for identifying and addressing the possibility of disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands. Minority populations refer to persons of any race self-designated as Asian, Black, Native American, or Hispanic. Low-income populations refer to households with incomes below the federal poverty thresholds.

Environmental justice concerns the environmental impacts that proposed actions may have on minority and low-income populations, and whether such impacts are disproportionate to those on the population as a whole in the potentially affected area. The threshold used for identifying minority populations surrounding specific sites was developed consistent with CEQ guidance (CEQ 1997, Section 1-1) for identifying minority populations using either the 50 percent threshold or another percentage deemed "meaningfully greater" than the percentage of minority individuals in the general population. CEQ guidance does not provide a numerical definition of the term "meaningfully greater." CEQ guidance was supplemented using the *Community Guide to Environmental Justice and NEPA Methods* (EJ IWG 2019) and provides guidance using "meaningfully greater" analysis.

For this analysis, meaningfully greater is defined as 20 percentage points above the population percentage in the general population. The significance thresholds for environmental justice concerns were established at the state level. The potentially affected area considered is the area within a 50-mile radius of Y-12 with a focus on the 4-county ROI. The state of Tennessee was used as the reference community to determine "meaningfully greater" thresholds. Areas are assumed to contain disproportionately high percentages of minority populations if the percentage of minority persons in the area significantly exceeds the state average or if the percentage of minority population exceeds 50 percent of the population. Meaningfully greater low-income populations are identified using the same methodology described above for identification of minority populations. Table 3-14 presents the state thresholds used for the analysis.

Table 3-14. Thresholds for Identification of Minority and Low-Income Communities (percentage)

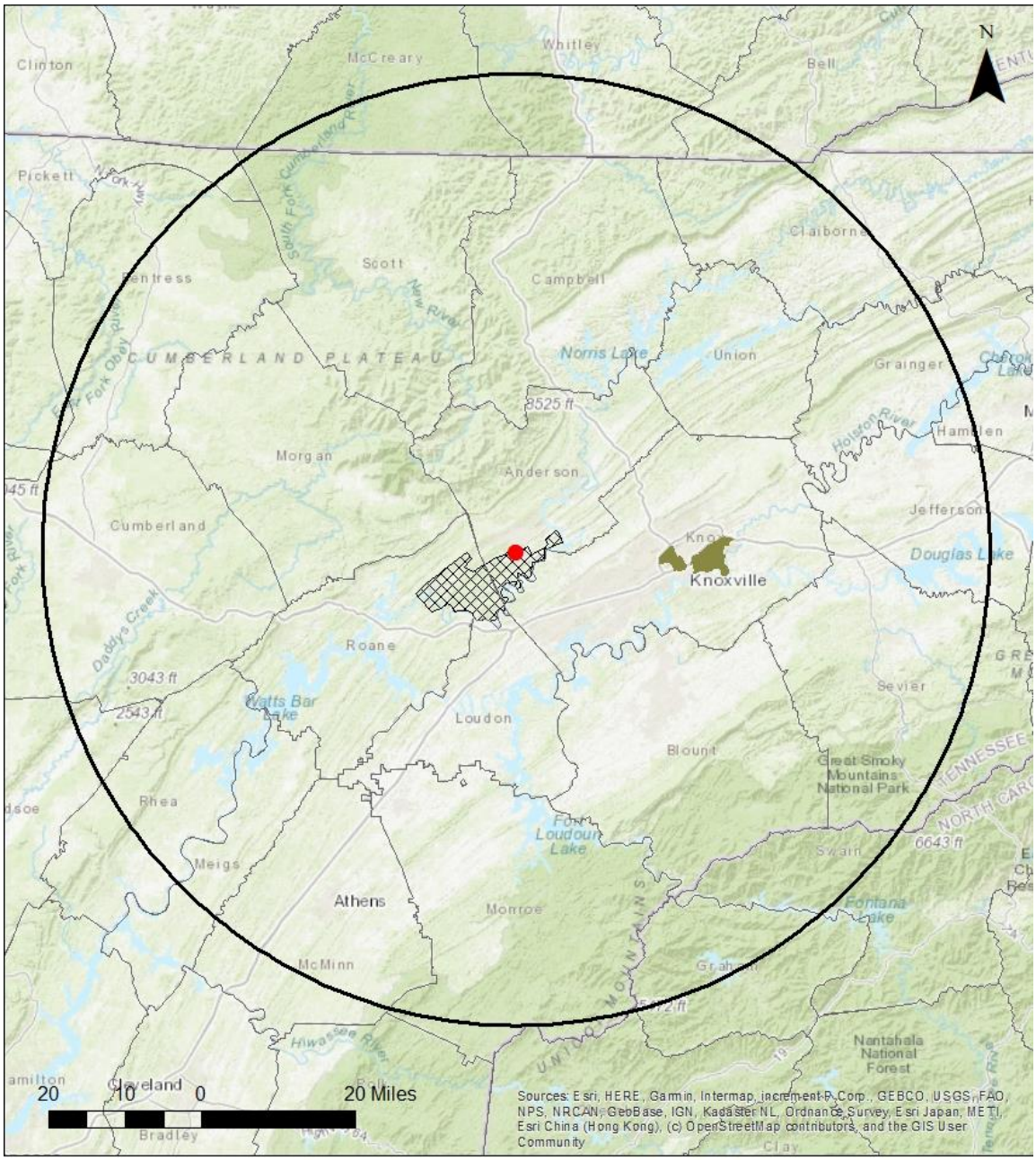
Area	Minority Population	Low-Income Population
Tennessee	46.0%	36.1%

The analysis used estimates from the U.S. Census Bureau's 2013-2018 American Community Survey 5-Year estimates ((https://data.census.gov/cedsci/) to identify minority and low-income populations. There are 151 census tracts in the 4-county ROI. Of the 151 census tracts, 16 exceed the thresholds for minority and/or low-income populations. Census tracts that exceed minority and/or low-income thresholds are predominantly located in the Knoxville area, approximately 15 miles from the proposed LPF. There are four census tracts immediately surrounding the proposed LPF (9801, 201, 202.01, and 202.02). The proposed LPF is located in Census Tract 9801. None of the tracts surrounding the proposed LPF exceed the thresholds for minority and/or low-income populations. Table 3-15 lists minority and low-income data for census tracts immediately surrounding the proposed LPF and for tracts that exceed state thresholds for minority and low-income populations in the 4-county ROI. Figures 3-16 and 3-17 show the geographic distribution of minority and low-income populations within the 50-mile radius of Y-12.

Table 3-15. Minority and Low-Income Populations, 2018

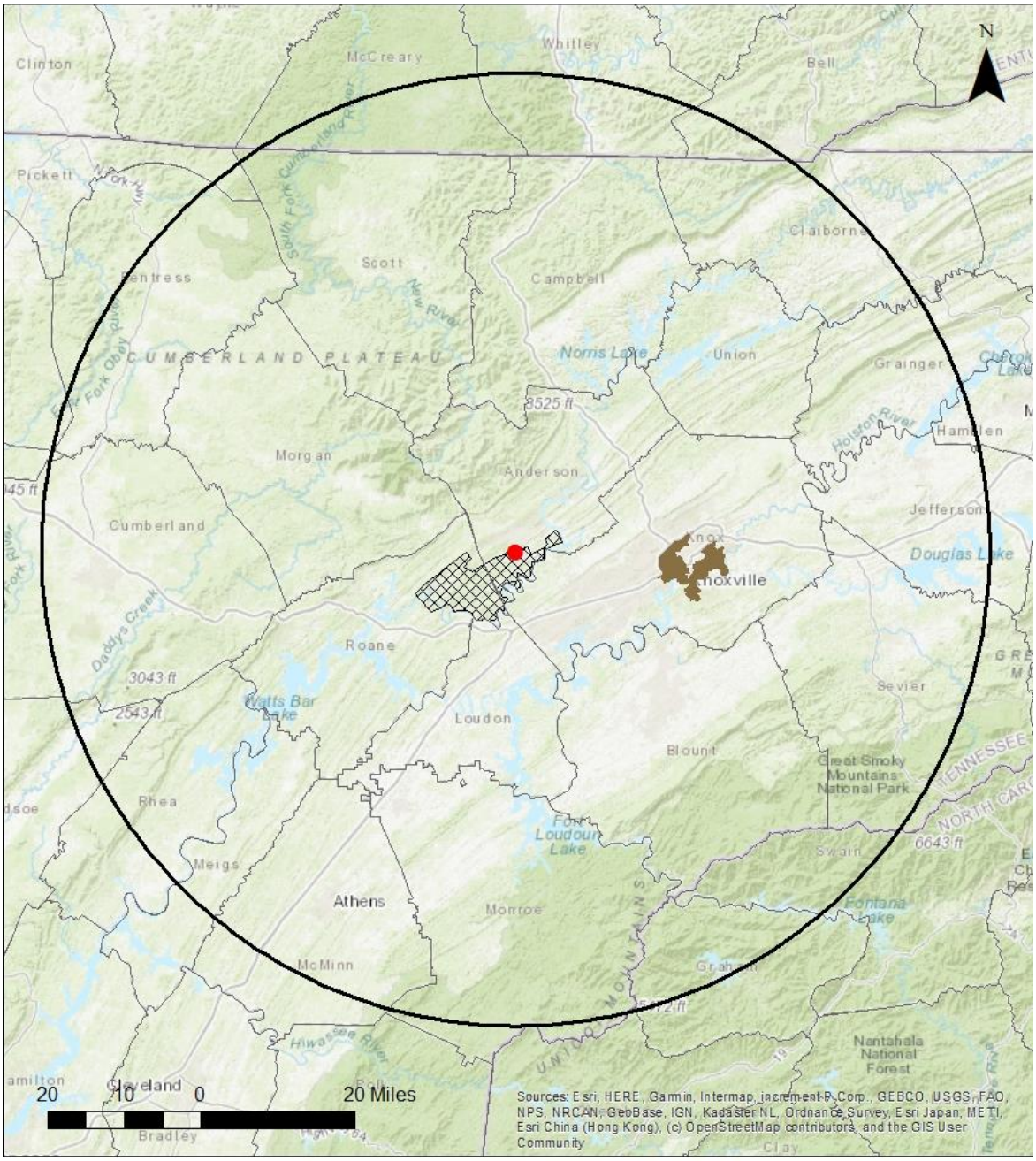
Area	% Minority	% Below Poverty
Census Tract 201, Anderson County, Tennessee[a]	32.8%	21.8%
Census Tract 202.01, Anderson County, Tennessee[a]	17.9%	4.1%
Census Tract 202.02, Anderson County, Tennessee[a]	18.3%	17.4%
Census Tract 9801, Anderson County, Tennessee[a]	0%	0%
Census Tract 8, Knox County, Tennessee	32.5%	55.5%
Census Tract 9.02, Knox County, Tennessee	16.3%	66.4%
Census Tract 14, Knox County, Tennessee	47.1%	63.4%
Census Tract 19, Knox County, Tennessee	74.9%	38.6%
Census Tract 20, Knox County, Tennessee	82.8%	43.9%
Census Tract 21, Knox County, Tennessee	72.9%	36.6%
Census Tract 24, Knox County, Tennessee	32.0%	37.9%
Census Tract 26, Knox County, Tennessee	43.7%	41.2%
Census Tract 27, Knox County, Tennessee	23.0%	39.1%
Census Tract 28, Knox County, Tennessee	59.8%	46.1%
Census Tract 29, Knox County, Tennessee	36.5%	52.3%
Census Tract 32, Knox County, Tennessee	64.6%	30.4%
Census Tract 67, Knox County, Tennessee	65.7%	33.2%
Census Tract 68, Knox County, Tennessee	70.3%	59.8%
Census Tract 69, Knox County, Tennessee	20.5%	65.6%
Census Tract 70, Knox County, Tennessee	65.9%	47.3%

Source: USCB 2018b, USCB 2018d.
Note: Gray shading identifies tracts that exceed minority and/or low-income thresholds.
[a] Census tract immediately surrounding the proposed LPF.
https://data.census.gov/cedsci/table?text=DP05&tid=ACSDP5Y2018.DP05&hidePreview=true&vintage=2018&layer=VT_2018_050_00_PY_D1&cid=DP05_0001E&g=0500000US47001.140000,47105.140000,47093.140000,47145.140000
https://data.census.gov/cedsci/table?q=S1701%3A%20POVERTY%20STATUS%20IN%20THE%20PAST%2012%20MONTHS&tid=ACSST5Y2018.S1701&hidePreview=true&vintage=2018&layer=VT_2018_050_00_PY_D1&cid=DP05_0001E&g=0500000US47145.140000,47001.140000,47093.140000,47105.140000



Source: USCB 2018b.

Figure 3-16. Minority Population – Census Tracts with More than 50 Percent Minority Population or a Meaningfully Greater Percentage of Minority Individuals in the General Population in a 50-Mile Radius of Y-12



Source: USCB 2018b.

Figure 3-17. Low-Income Population – Census Tracts with More than 50 Percent Low-Income Population or a Meaningfully Greater Percentage of Low-Income Individuals in the General Population in a 50-Mile Radius of Y-12

3.10.2 Proposed Action Impacts

Construction and Operation

Socioeconomic Resources. It is anticipated that construction of the LPF would take approximately 4 years. In terms of employment and income, NNSA estimated that there would be 300 peak workers with a total of 800 workers needed for construction (CNS 2020a). It is anticipated that some portion of construction materials would be purchased locally. Payroll and materials expenditures would have a positive impact on the local economies. Estimated direct construction jobs may result in additional indirect jobs providing increased local revenue. Most construction materials and temporary construction workers would most likely be drawn from the local community. As a result, permanent increases in population would not occur and housing and community services would not be permanently impacted. Because the peak construction workforce (300 persons) would be negligible compared to the projected population in the ROI, socioeconomic impacts during construction, although beneficial, are expected to be negligible. The increase in economic activity would be temporary and would subside when construction is completed.

Future operations would have a positive impact on regional economics. Operation of the LPF would require 70 permanent workers. Those workers would be the same workers who currently conduct lithium operations in Building 9204-2. In terms of other operational impacts:

- Population. Based on the estimated number of new direct jobs and the assumption that existing Y-12 workers would fill direct jobs and local workers in the ROI would fill indirect jobs, impacts to population would be negligible.

- Housing. Based on the estimated number of jobs and the assumption that existing Y-12 workers would fill direct jobs and local workers in the ROI would fill indirect jobs, there would be no need for additional housing. Local personnel would not require temporary housing and, thus, would have neither adverse nor beneficial impacts on temporary housing. If there was a need for temporary housing, the current market would be able to meet that need.
- Community Services. Based on the number of estimated jobs created and the assumption that existing Y-12 workers would fill direct jobs and local workers in the ROI would fill indirect jobs, no impact to public schools, law enforcement, or firefighting capabilities is anticipated.

Environmental Justice. Environmental impacts from most projects tend to be highly concentrated at the actual project site and tend to decrease as distance from the project site is increased. There are 27 census tracts that meet the definition of minority and/or low-income populations. During construction and operation related activities, it is anticipated that environmental, health, and occupational safety impacts would be minimal, temporary, and confined to the Y-12 site (*see* Section 3.11). Based on the impacts analysis for resource areas, no notable adverse effects are expected from construction and operation activities of the LPF. For impacts that would occur, it is expected that impacts would affect all populations in the area equally. There would be no

discernable adverse impacts to any populations, land uses, visual resources, noise, water, air quality, geology and soils, biological resources, socioeconomic resources, or cultural resources.

While NNSA acknowledges the existence of low-income and minority populations in the Scarboro and Woodland communities, the low-income and minority populations in those census tracts do not exceed the thresholds used by NNSA to be classified as low-income or minority populations for the purpose of Environmental Justice analysis. However, even if those census tracts were specifically analyzed for Environmental Justice impacts, as discussed in Section 3.11, there would be no notable adverse impacts offsite; consequently, there would be no disproportionately high and adverse human health impacts on minority populations and low-income populations from LPF construction and operation.

3.10.3 No-Action Alternative Impacts

Under the No-Action Alternative, no new facilities would be constructed. There would be no additional socioeconomic or Environmental Justice impacts.

3.11 Health and Safety, Accidents, and Intentional Destructive Acts

3.11.1 Affected Environment

The proposed LPF would utilize hazardous chemicals but not radiological materials. Consequently, the discussions related to human health and potential accident impacts are focused on occupational injuries to the construction and operating workforce and chemical hazards to LPF workers and the public. During the four year construction period, the peak employment is expected to be approximately 300 personnel. Once operational, there would be approximately 70 personnel working at the LPF. With regard to the public, the analysis focuses on whether LPF operations could cause offsite exposures to hazardous chemicals that would result in adverse health effects.

3.11.2 Proposed Action Impacts

Construction. Potential impacts to workers were evaluated using Bureau of Labor Statistics (BLS) occupational injury/illness and fatality rates. NNSA values are historically lower than BLS values due to the increased focus on safety fostered by integrated safety management, and the voluntary protection program. The potential risk of occupational injuries/illnesses and fatalities to workers constructing the proposed LPF would be bounded by injury/illness and fatality rates for general industrial construction. Table 3-16 lists the potential estimates of injuries/illnesses and fatalities estimated for the peak year of construction and the total 4-year construction period. Over the full construction period, approximately 7.7 days of lost work from illness/injury and 0 (0.06) fatalities would be expected.

Table 3-16. Occupational Injury/Illness and Fatality Estimates for LPF Construction

Injury, Illness, and Fatality Categories	Results
Peak Construction	
Peak construction workforce (persons)	300
Lost days due to injury/illness	3.2
Number of fatalities	0.03
Total Construction (4 years)	
Total construction worker-years	125
Lost days due to injury/illness	7.7
Number of fatalities	0.06

Sources: CNS 2020a, BLS 2020.

Operation. Occupational impacts during operations would involve approximately 70 personnel. The potential risk of occupational injuries/illnesses and fatalities to workers during operations would be expected to be similar to the general injury and fatality rates for all industries. Table 3-17 presents the potential estimates of injuries/illnesses and fatalities for the average year of operations at the LPF. In an average year, 0.6 days of lost work from illness/injury and 0 (0.001) fatalities would be expected.

Table 3-17. Occupational Injury/Illness and Fatality Estimates for LPF Operations

Injury, Illness, and Fatality Categories	Results[a]
Operational workforce (persons)	70
Lost days due to injury/illness	0.6
Number of fatalities	0.001

a. Results reflect average annual impacts.
Sources: CNS 2020a, BLS 2020.

Work control processes are implemented utilizing Integrated Safety Management Systems (ISMS) in accordance with DOE Policy 450.4, *Safety Management System Policy*. The core functions of ISMS include defining the scope of work, analyzing the hazards and risks, developing and implementing hazard controls, performing work within controls and providing feedback and continuous improvement.

DOE's Worker Safety and Health Program, 10 CFR Part 851, regulates the health and safety of workers at all NNSA sites. This comprehensive standard directs NNSA contractor's to establish the framework for an effective worker protection program that will reduce or prevent injuries, illnesses, and accidental losses by providing NNSA federal and contractor workers with a safe workplace. Baseline exposure assessments are outlined in this requirement, along with day-by-day health and safety responsibilities.

With regard to chemical hazards to workers, the primary chemicals of concern at the LPF would be hydrochloric acid, chemicals containing lithium (i.e., LiCl, LiH, and LiD), and chlorine gas. Table 3-18 provides relevant information regarding these chemicals.

Table 3-18. LPF Chemicals of Concern and Potential Health Effects

Chemical	Pathway	Health Effects
HCl	Contact, inhalation, or ingestion	When contacted, causes severe burns. Vapor or spray may cause eye damage, impaired sight, or blindness. When inhaled, is corrosive and may cause damage to mucous membranes in nose, throat, lungs and bronchial system. When ingested, is corrosive and harmful if swallowed. May produce burns to the lips, oral cavity, upper airway, esophagus and digestive tract. Target Organs: Skin, respiratory system, eyes, lungs. Chronic health effects can be serious tissue damage.
LiCl, LiH, LiD (note1)	Contact, inhalation, or ingestion	When contacted, causes irritation to skin or eyes. When inhaled, causes irritation to the respiratory tract. When ingested, causes irritation (nausea, vomiting and diarrhea) to the gastrointestinal tract. In severe cases, lithium can cause apathy, sluggishness, drowsiness, slurred speech, blurred vision, heart effects, brain effects, tremors and muscle twitching, central nervous system damage, kidney effects, thyroid changes, coma, pulmonary edema, and renal failure. Death may occur from large repeated oral doses.
Chlorine gas	Contact, but primarily inhalation	Chlorine is a toxic gas with corrosive properties. Vapors are heavier than air. They will spread along the ground and collect and stay in poorly-ventilated, low-lying, or confined areas. Chlorine gas is highly soluble in water; therefore, it is severely irritating on contact with moist tissues, such as the eyes, skin, nose, throat, and upper respiratory tract. At low concentrations, chlorine can cause eye and nose irritation, sore throat, and cough. At high exposure levels, irritation of the upper respiratory tract and accumulation of fluid in the lungs (pulmonary edema) contribute to a sensation of choking. Suffocation is the characteristic initial complaint of patient/victims exposed to chlorine. The majority of deaths occur within 24 hours and are due to respiratory failure.

Note 1: LiCl, LiH, and LiD are grouped together because the predominant health effects are associated with lithium, which each of these chemical compounds contain.

Industrial hygiene limits for occupational chemical exposures at Federal sites are contained in 29 CFR 1910 and 29 CFR 1926, *Occupational Safety and Health Standards*, including the permissible exposure limits (PELs) set by the Occupational Safety and Health Administration (OSHA). NNSA requires that all sites comply with the PELs unless a lower limit (more protective) exists in the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs). During normal operations, workers would not be exposed to chemicals above PELs, which would be protective of worker health. Potential impacts of accidental exposures are discussed below.

Accidents. In June 2018, a Preliminary Hazards Analysis (PHA) was prepared for the proposed LPF (CNS 2018b). The purpose of the PHA is to identify and analyze the significance of potential hazards associated with the LPF operations. The PHA contains: (1) a preliminary list of major hazardous materials and energy sources; (2) a preliminary evaluation of accident scenarios; and (3) a preliminary list of hazard control measures needed to prevent or mitigate notable consequences to LPF workers, collocated workers, and the off-site public. The PHA helps the LPF design team make decisions for improving safety and reducing the consequences of unwanted or unplanned releases of hazardous chemicals (Parsons 2019). Although the PHA is not a publicly-releasable document, this EA uses information that was developed in a publicly-releasable document (CNS 2020c) to analyze the potential impacts of accidents for the LPF.

Hazardous chemicals could be released from the LPF as a result of a fire or a loss of containment (such as spills or a release caused by an explosion or external event). The closest potential public access to the proposed LPF is at the Y-12 Emergency Response Boundary (ERB). Because this is

the closest distance to the LPF that can be publicly accessed, this distance is used to assess whether LPF operations could cause adverse health effects to a member of the public. It is unlikely that a member of the public would be present at this location at any time. The distances from the proposed LPF to the Y-12 ERB is approximately 0.4 miles.

To determine potential impacts, exposures to hazardous chemicals are compared to Emergency Response Planning Guidelines (ERPGs). ERPGs are community exposure guidelines derived by groups of experts in industrial hygiene, toxicology, and medicine. ERPGs are published by the American Industrial Hygiene Association (AIHA) after review and approval by their ERPG Committee. ERPGs are defined as follows:

- ERPG-1 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild, transient adverse health effects or perceiving a clearly defined objectionable odor.

- ERPG-2 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.

- ERPG-3 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects (AIHA 2020).

Human responses to chemical exposure do not occur at precise exposure levels, but rather, vary over a wide range of concentrations. The values derived for ERPGs do not protect everyone, but are applicable to most individuals in the general population. Furthermore, the ERPG values are planning guidelines, not exposure guidelines. They do not contain the safety factors normally associated with exposure guidelines (AIHA 2020).

In developing an ERPG, emphasis is given to the use of acute or short-term exposure data. Human experience data are emphasized, but usually only animal exposure data are available. When it is believed that adverse reproductive, developmental, or carcinogenic effects might be caused by a single acute exposure, the data are considered in the ERPG derivation.

Table 3-19 presents the accident scenarios that have been considered for the LPF (CNS 2020c). As shown in that table, NNSA considered many potential initiating events, including explosions, fires, loss of containment, and natural phenomena hazards such as earthquakes and floods. NNSA also considered a spectrum of accident probabilities (i.e., "frequency"), ranging from anticipated to beyond extremely unlikely (BEU). Consequences of accidents are characterized as none, low, minor, moderate, and high (*see* Note 2 of Table 3-19).

As shown on Table 3-19, there are no LPF accidents that would result in "high" consequences.[16] This means that no member of the public would be exposed to chemical concentrations that could

[16] A "high" consequence would be greater than ERPG-2 (or equivalent) at or beyond the Y-12 ERB.

Table 3-19. Accident Scenarios for LPF

Accident/Scenario	Frequency (Note 1)	Consequences (Note 2)	Materials of Concern (Note 3)
Hydrogen explosion due to gas buildup in the dissolution system	Unlikely	Low	LiH/LiD
Natural gas or steam explosion due to gas buildup in the electrolytic cell	BEU Anticipated	Low None	Li Metal Natural Gas
Hydrogen explosion due to gas buildup in the cell pan wash station	Unlikely	Low	Li Metal
Hydrogen explosion due to gas buildup in a hydrider furnace	Anticipated BEU BEU	None Low Low	Hydrogen LiH/LiD Li Metal
LiH/LiD dust explosion in mold loading station	Anticipated	Moderate	LiH/LiD
LiH/LiD dust explosion in the machine dust mold loading station	Anticipated	Moderate	LiH/LiD
LiH/LiD dust explosion in a crusher grinder	Anticipated	Moderate	LiH/LiD
Explosion due to overpressure with isostatic press	Anticipated	Low	High Hydraulic Pressure
LiH/LiD dust explosion in machining glovebox	Unlikely	Moderate	LiH/LiD
LiH/LiD dust explosion in a vacuum cleaner	Anticipated	Minor	LiH/LiD
LiH/LiD dust explosion in portable kerf collector	Anticipated	Moderate	LiH/LiD
Hydrogen explosion in a salvage vat	Unlikely	Low	LiH/LiD/Li Metal
Hydrogen explosion in the open salvage vat	Unlikely	Low	LiH/LiD/Li Metal
Hydrogen explosion in the reactor/lid wash station	Unlikely	Low	LiH/LiD
Fire in a LiH/LiD storage area	Unlikely	Moderate	LiH/LiD
Fire in a lithium metal storage area	Unlikely	Moderate	Li Metal
Loss of confinement for large HCl storage tank	BEU	Moderate	HCl
Earthquake	Unlikely	Moderate	HCl LiH/LiD/Li Metal
High wind	Unlikely	Moderate	HCl LiH/LiD/Li Metal
Flood	Anticipated	None Minor Minor	HCl LiH/LiD Li Metal
Roof ponding or heavy snow accumulation	Unlikely	Moderate	LiH/LiD/Li Metal
Large area fire	Extremely Unlikely	Moderate	LiH/LiD Li Metal
Explosion in a flammable gas line	Unlikely	Moderate None	Hydrogen/Deuterium Natural Gas
External fire	Extremely Unlikely	Moderate Moderate	LiH/LiD Li Metal
External explosion	Unlikely	Moderate	LiH/LiD/Li Metal
Evacuation	Anticipated	None None None	HCl LiH/LiD Li Metal

Note 1: Estimates of occurrence (frequency) are as follows: Anticipated: once every 10-100 years; Unlikely: once every 100-10,000 years; Extremely Unlikely: once every 10,000-1,000,000 years; BEU: once in more than 1,000,000 years.

Note 2: Consequences are classified as follows: High: greater than ERPG-2 (or equivalent) at or beyond the Y-12 ERB; Moderate: greater than ERPG-2 (or equivalent) at or beyond 100 meters; Minor: qualitative consequences that could result in significant health effects to personnel close to the event; and Low: less than minor.

Note 3: Materials of concern are chemical materials whose release can result in potentially harmful airborne respirable concentrations of hazardous materials. Those release accident scenarios which could result in an airborne release of hazardous material were compared to the ERPG values (or equivalent, such as Temporary Emergency Exposure Limits [TEEL] values if ERPG values are not established).

Source: CNS 2020c.

result in irreversible or other serious health effects or symptoms that could impair their abilities to take protective action. The highest unmitigated consequences that could occur are characterized as "moderate," with facility workers and collocated workers being most at risk. A combination of engineered and administrative controls to provide preventive and/or mitigative measures will be determined and applied as appropriate by the applicable safety management programs (CNS 2020c).

For some of the accidents evaluated (such as explosions), there is a potential for severe injury or death to facility workers in close proximity to the accident. Engineered and administrative controls, including safety management programs, are in place to mitigate the consequences of such an accident (CNS 2020c).

Because there would be no effects greater than ERPG-2 (or equivalent) at or beyond the Y-12 ERB, secondary effects (i.e., chemical contamination) from accidents are not expected to occur offsite. However, in the event of an accident, NNSA would coordinate with the Tennessee Emergency Management Agency (TEMA), TDEC, and other applicable regulatory agencies to ensure the safety of the public and the environment.

Emergency Preparedness and Response. Local, state, and federal emergency response organizations are fully involved in the Y-12 emergency drill and exercise program. The annual drill and exercise schedule is coordinated with all organizations to ensure maximum possible participation. At a minimum, the TEMA Operations Office and the DOE Headquarters Watch Office participate in all Y-12 emergency response exercises.

NNSA's first responders are located at Y-12 and there are many access points/means of reaching any facilities on site, even for any supporting responders from offsite. In addition, site emergency response plans address such scenarios and first responders are trained to handle such events. First responders are also trained to respond to situations involving collapsed structures. First responders would also wear personal protective equipment (PPE) to minimize inhalation of hazardous materials. Because inhalation of hazardous materials is the primary pathway for exposure, doses to first responders would be kept as low as reasonably achievable. NNSA acknowledges that first responders face similar risks as involved workers— they could be acutely injured or killed by physical effects of the accident.

Intentional Destructive Acts. NNSA is required to consider intentional destructive acts, such as sabotage and terrorism, in the NEPA documents it prepares. As at any location, the possibility exists for random acts of violence and vandalism. The risk of terrorist acts at the proposed LPF is considered minimal given that quantities of hazardous materials would be less desirable than hazardous/radiological materials at other Y-12 facilities. It is also anticipated that security measures (e.g., gates and fences) would serve as an impediment to assault by trucks or other vehicles. Because the accident analysis conservatively estimates the quantities of hazardous materials that could be released, NNSA expects that the impacts presented in Table 3-19 would be representative of any impacts from an intentional destructive act (CNS 2020a).

3.11.3 No-Action Alternative Impacts

Under the No-Action Alternative, the LPF would not be constructed and the potential occupational injuries discussed in Section 3.11.2 would not occur. Operations in Building 9204-02 would continue and NNSA would take steps to improve worker safety to the extent practicable. Nonetheless, as described in Section 1.2, conditions in Building 9204-2 would continue to degrade and cannot be easily reversed or rectified. The resulting corrosion of underlying steel rebar will continue to lead to cracking and spalling of concrete, subjecting workers to occupational injury risks.

3.12 Waste Management

3.12.1 Affected Environment

DOE operates and maintains solid waste disposal facilities located near Y-12, called the ORR Landfills, three of which are active (Table 3-20). The TDEC Division of Solid Waste Management (DSWM) regulates the management of waste streams under the Tennessee Solid Waste Management Act (TSWMA). TDEC performs a monthly audit of DOE's landfills on the ORR. TDEC also reviews DOE practices to ensure that radioactive waste is not disposed of in these landfills. Each landfill has established criteria to determine whether waste is acceptable for disposal. In general, the wastes must be non-hazardous, non-radioactive, and non-RCRA-regulated. DOE must use approved operations in receiving, compacting, and covering waste.

Table 3-20. Active Landfills at the ORR

Waste Disposal Facility	Type	Waste Received	Statistics
Construction/ Demolition Landfill VII	TDEC Permit	Construction/ demolition debris	• 30.4-acre site, opened in 2001 • Total capacity of 2.08 million yd^3 • Current percentage full is not known • Constructed airspace: 1.1 million yd^3
Industrial Landfill IV	TDEC Permit	Classified, sanitary/industrial waste (including office waste, equipment, construction/ demolition debris)	• 4.2-acre landfill, opened in 1989 • Permitted total capacity of 89,000 yd^3 • Currently about 50 percent full • Constructed airspace: 71,000 yd^3
Industrial Landfill V	TDEC Permit	Sanitary/industrial waste (including office/cafeteria waste, equipment, construction/demolition debris)	• 25.9-acre landfill, opened in 1994 • Total capacity of 2.1 million yd^3 • Currently about 40 percent full • Constructed airspace: 1.3 million yd^3

Note: In addition to the three active landfills, there are other CERCLA-related waste disposal facilities at the ORR, including the Environmental Management Waste Management Facility (EMWMF), which is a 28-acre disposal facility used for low-level radiological and/or hazardous waste from CERCLA cleanup of the ORR and associated sites; and the Environmental Management Disposal Facility (EMDF), which is currently conducting a second phase of characterization to support facility design, supporting infrastructure, and road reroutes.
Source: DOE 2017.

Landfills IV and V can also dispose of approved special waste. Approved special wastes have included asbestos materials, empty aerosol cans, materials contaminated with beryllium, glass, fly ash, coal pile runoff sludge, empty pesticide containers, and Steam Plant Wastewater Treatment

Facility sludge. Disposal of special waste is approved on a case-by-case basis by the State of Tennessee.

In 2018, approximately 39,990 cubic yards (yd^3) of waste were disposed in the landfills, which marks a 27 percent decrease from 2017 volumes.[17] Operation of the ORR landfills generated approximately 2.7 million gallons of leachate that was collected, monitored, and discharged into the Y-12 sanitary sewer system (DOE 2019a).

3.12.2 Proposed Action Impacts

Construction. Although construction debris would be generated, no notable quantities of nonhazardous waste would be generated during construction (CNS 2020a). To the extent practicable, NNSA would implement pollution prevention/recycling measures to minimize waste generation and disposal requirements. During construction, there is the possibility that legacy waste or contaminated materials may be encountered. Prior to construction, NNSA would perform soil sampling, as required, and develop and implement a waste handling plan for the LPF which would detail how NNSA would manage any such wastes or contaminants.

Operation. During operations, approximately 25.7 tons of nonhazardous waste would be generated at the LPF annually. At a typical density of 250 pounds per cubic yard of municipal waste, 25.7 tons equates to approximately 205 cubic yards of nonhazardous waste that would be generated annually by LPF operation. Compared to the 39,990 cubic yards of nonhazardous waste that was disposed of in the ORR landfills in 2018, the LPF operations would increase wastes by 0.5 percent.[18] The LPF would not generate any hazardous or radiological wastes. All wastes generated would be evaluated and managed in accordance with the TSWMA.

3.12.3 No-Action Alternative Impacts

Under the No-Action Alternative, the LPF would not be constructed and there would be no changes to the existing waste management operations discussed in Section 3.12.1.

3.13 Transportation

3.13.1 Affected Environment

Y-12 is located within 50 miles of three interstate highways: I-40, I-75, and I-81. As shown on Figure 3-18, collector roads serving Y-12 include S. Illinois Avenue, the Oak Ridge Turnpike, Bethel Valley Road, Bear Creek Road, Union Valley Road, and Scarboro Road. Bear Creek Road has restricted access around Y-12 and is not a public thoroughfare. Bethel Valley Road is also closed to public access. The daily traffic counts for various roads in the vicinity of Y-12 are provided in Table 3-21. The data in that table shows that area roads have generally handled more traffic in the past than currently. In the vicinity of the site, the collector roads have traffic speed limits of between 25 and 35 miles per hour.

[17] As shown in Table 2-2, LPF operations would not generate any hazardous wastes; consequently, the discussion in this section addresses nonhazardous wastes only.

[18] As discussed in Section 5.15, operational wastes for the LPF would not be notably different than existing wastes from lithium operations, and thus, do not represent an actual "increase" in wastes compared to current wastes.

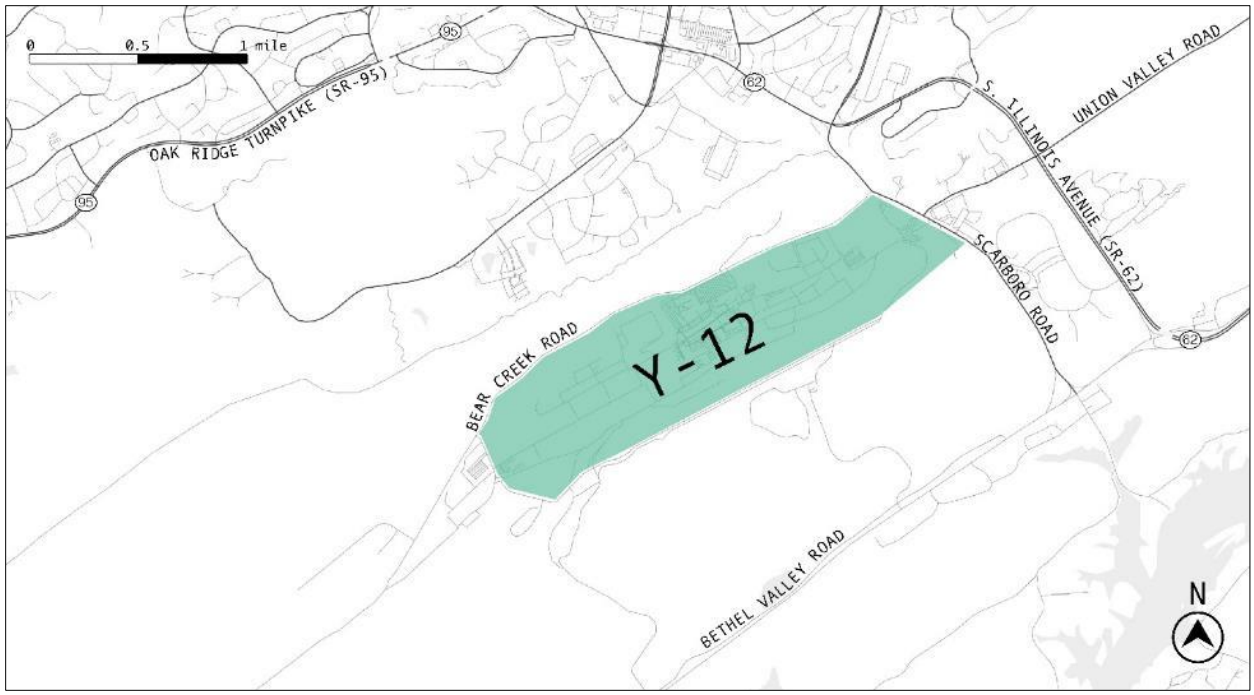


Figure 3-18. Roads in the Vicinity of Y-12

Table 3-21. Average Daily Traffic Counts on Roads in Vicinity of Y-12

Road	2018	2017	2016	Highest Traffic Count in Past 10 Years/(Year)
Oak Ridge Turnpike (near downtown Oak Ridge)	24,351	23,675	21,582	25,223/(2010)
S. Illinois Avenue (east of Y-12 entrance)	33,680	34,180	33,293	34,180/(2017)
Scarboro Road (near Y-12 entrance)	11,065	11,040	9,013	12,076/(2010)
Bethel Valley Road (near Scarboro Road intersection)	6,777	7,547	7,579	10,109/(2014)

Source: TDOT 2020.

3.13.2 Proposed Action Impacts

Construction. Table 3-21 shows recent and historical average daily traffic counts for roads in the vicinity of Y-12. The data in that table show that roads in the Y-12 vicinity have handled more traffic in the past than current traffic. This, along with the existing road condition, suggests that no significant modifications would be required to support the LPF construction and operation. During peak construction, the addition of 300 vehicles to daily traffic counts of the Oak Ridge Turnpike, S. Illinois Avenue, and Scarboro Road would result in a 0.9-2.7 percent increase in traffic counts. The addition of 300 construction workers would represent less than a one percent increase in the Anderson County employment, which also suggests that area traffic would not be adversely affected. NNSA also notes that LPF construction would largely occur after UPF construction has been completed. UPF construction has required a significantly higher construction workforce than is estimated for the LPF, and adverse traffic impacts in the vicinity of

Y-12 have not been experienced (CNS 2020a); consequently, it is not expected that traffic associated with LPF construction would adversely impact traffic in the vicinity of Y-12.

Operation. During operations, there would be no impact on area roads because the same employees who currently work in Building 9204-2 would transfer to the LPF.

3.13.3 No-Action Alternative Impacts

Under the No-Action Alternative, the LPF would not be constructed and there would be no additional impacts to transportation or traffic on area roads.

3.14 Site Infrastructure

3.14.1 Affected Environment

Site infrastructure includes those basic resources and services required to support the construction and operation of Y-12. For the purposes of this EA, infrastructure is defined as roads and railroads, electricity, natural gas, steam, water, wastewater, chilled water, industrial gases, and communications.

The proposed LPF development sits on the site of the old Biology Complex and will tie into existing infrastructure at Y-12. The following section outlines the availability and capacity of utilities at Y-12 and the anticipated infrastructure needs of the LPF. Projected utility usage is discussed in Section 3.14.2. Table 3-22 identifies the utility providers and size of infrastructure available at Y-12.

Table 3-22. Y-12 Primary Utilities

Utility	Provider	Service Size	Notes
Electrical	TVA	13.8-kV distribution systems	430 megawatts (capacity)
Natural Gas	Sigcorp Energy Services	14-inch, 125-pounds per square inch gauge	1,729,000 million BTU (annual consumption)
Water (Raw)	City of Oak Ridge	18-inch main, 16-inch main	obtained from Clinch River
Water (Treated)	City of Oak Ridge	24-in main (1), 16-inch main (2)	24 million gallons per day (capacity)
Wastewater	City of Oak Ridge	18-inch main line	1.5 million gallons per day (capacity)

Electricity. The TVA generates electric power for the region. Within Y-12, power is transmitted to the major distribution systems by three 161-kilovolts (kV) overhead radial feeder lines. There are eleven 13.8-kV distribution systems that range in size from 20 megavolt amperes (MVA) to 50 MVA, and reduce the 161 kV to 13.8 kV and distribute that power to unit substations located at facilities throughout Y-12. Each distribution system consists of a high-voltage outdoor transformer with indoor switchgear, 15-kV feeder cables, power distribution transformers, and auxiliary substation equipment. In total, the 13.8-kV distribution systems include approximately 30 miles of overhead lines, 10 miles of underground cable, and 740 pole- and pad-mounted transformers (NNSA 2011).

At Y-12, the average monthly power usage is approximately 15-18 megawatts (MWe). The available capacity, approximately 430 MWe, greatly exceeds current demands. This is due to the fact that the original uses of Y-12 required a large, robust electrical system to support the uranium enrichment mission. The change in mission, from uranium enrichment to weapon components manufacturing, and subsequent evolution to the current missions, has greatly reduced Y-12's electrical needs (DOE 2018).

Y-12 also has a significant emergency and standby power generator system to provide backup power to critical safety-related facilities. The emergency and standby power generator system is composed of 37 fixed generator systems and 11 portable generator systems. The combined capacity of the emergency and standby power generator system is 2.6 MWe (NNSA 2011).

Natural Gas. Sigcorp Energy Services supplies natural gas to the ORR and Y-12. Natural gas, which is used for Y-12 steam plant and facilities, is supplied via a pipeline from the East Tennessee Natural Gas Company at "C" Station located south of Bethel Valley Road near the eastern end of Y-12. A 14-inch, 125-pounds per square inch gauge (psig) line is routed from "C" Station to the southwest corner of the Y-12 perimeter fence. From this point, an 8-inch line feeds the steam plant and a 6-inch branch line serves the facilities near the proposed site for the LPF (NNSA 2011).

Steam. Steam is vital to the operation of Y-12. It is the primary source of building heat, both for personnel comfort and for freeze protection for critical services such as fire protection systems during the winter months. Steam is also necessary to support the production mission in current facilities. Other uses of steam in support of the production mission include the regeneration of dehumidification systems and the operation of steam-powered ejectors.

In June 2010, Y-12 brought a new, environmentally efficient steam plant online (Building 9401-07). This new facility replaced the legacy 1955 coal-fired steam plant. The modern plant uses natural-gas-fired package boilers with new burner technology instead of coal, creating much cleaner emissions. The steam plant operates 24 hours per day, 365 days per year. Steam is distributed throughout the plant at 235 psig through main headers ranging in size from 2 to 18 inches in diameter. Condensate is collected and returned to the steam plant using a similar network of pipes; a majority of the returned condensate is used as feed to the demineralized water system. Gross steam produced at Y-12 is approximately 1.5 billion pounds per year (NNSA 2011).

Water. Raw water for the ORR is captured from the Clinch River south of Y-12 and pumped to the water treatment plant located on Pine Ridge northeast of Y-12. Ownership and operation of the treated water system was transferred to the City of Oak Ridge from DOE in April 2000. The water treatment plant can deliver water to two water storage reservoirs at a potential rate of 24 million gallons per day. Water from the reservoirs is distributed to Y-12, ORNL, and the City of Oak Ridge. Separate underground piping systems provide distribution of raw and treated water within Y-12. Raw water is routed to Y-12 by two lines: a 16-inch main from the booster station, installed in 1943, and an 18-inch main from the 24-inch filtration plant feed line. The raw water system has approximately five miles of pipes with diameters ranging from 4 inch to 18 inch. The total treated water system contains approximately 19 miles of pipe ranging in size from 1 to 24 inches in diameter. In 2016, potable water consumption at Y-12 averaged 1.5 million gallons per day or 560 million gallons per year. Table 3-23 displays water end use utilization (CNS 2016).

Table 3-23. Y-12 Water Usage

Category	Use (Million Gallons/Year)	Percent of Total Water Use
Steam Plant	133.6	22%
Cooling Towers	104.5	18%
Once Through Cooling – Space Conditioning	91.6	15%
Once Through Cooling – Vacuum Pumps	64.1	11%
Laboratory Equipment/Miscellaneous	64.1	11%
Plumbing	14.3	2%
Demineralization Water	10.0	2%
Unknown and System Losses	110.4	19%

Source: CNS 2016.

Y-12's potable water system supplies sanitary water to numerous Y-12 facilities. The potable water system supports:

- fire protection systems, including sprinkler systems and fire hydrants, and emergency firefighting water storage;
- sanitary water systems, including emergency showers and eyewash stations, personnel decontamination facilities, drinking fountains, restrooms, change houses, and the cafeteria;
- process water systems, including make-up feed water for the steam plant and demineralizer, makeup water for cooling towers, process cooling, cleaning and decontamination systems, chemical makeup systems, laboratories, and other miscellaneous needs; and
- 16-in. emergency backup water feed for ORNL.

In 2019, the City of Oak Ridge secured a *Water Infrastructure Finance and Innovation Act* loan from the EPA to help finance a new drinking water treatment plant. This loan will enable Oak Ridge to replace the existing 80-year-old conventional plant with a new ultrafiltration membrane plant. In addition to the modern treatment plant, the project will also modernize or replace ancillary infrastructure including the intake pumps, traveling screens, finished water pump station, pipelines, and water tanks. This new facility will ensure that Oak Ridge will continue to reliably deliver high-quality water to ORR and the greater Oak Ridge community (EPA 2019).

Demineralized water is used to support various processes at Y-12 that require high-purity water. A central system located in and adjacent to Building 9404-18 serves the entire plant through a distribution piping system. The primary source of feedwater is condensate return, which is cooled and stored in two storage tanks of 13,000-gallon and 30,000-gallon capacity. The secondary source of feedwater is softened water from the steam plant. Feedwater from the storage tanks is filtered, demineralized, de-aerated, and stored until needed.

Wastewater. The Y-12 Site's sanitary sewer system was first installed in 1943 and expanded as the plant grew. Sewage from most buildings flows to an 18-inch sewer main that leaves the east end of the plant near Lake Reality and connects to the city main near the intersection of Bear Creek Road and Scarboro Road. The current system capacity is approximately 1.5 million gallons per

day. The average daily flow has been approximately 750,000 gallons per day (NNSA 2011). Y-12 has a sanitary sewer users permit, issued by the City of Oak Ridge, which regulates water discharges.

Chilled Water. Y-12 has many functional needs for chilled water, including: air conditioning and dehumidification systems required for maintaining environmental conditions (i.e., temperatures and humidity) within production facilities, including precision machine shops, low-humidity areas, inspection areas, and general manufacturing facilities; process cooling applications, including air compressor after coolers, ultrasonic cleaners, spindle air, and machine tool coolant systems; and conventional air conditioning for offices, laboratories, and other support facilities. The chilled water systems were renovated and upgraded during the mid-1990s. Most chillers that were more than 20 years old were replaced, and the newer chillers were inspected and renovated to eliminate the use of chlorofluorocarbons and to restore the chillers to optimal mechanical condition (NNSA 2011).

Industrial Gases. Industrial gases include compressed air, liquid nitrogen, liquid oxygen, liquid argon, helium, and hydrogen. For the LPF, argon, nitrogen, and hydrogen are the primary gases that would be utilized. As such, the discussion below focuses on those three gases.

Liquid nitrogen is normally delivered to Y-12 by trailer truck. The Y-12 nitrogen supply system consists of four low-pressure and one high-pressure liquid-nitrogen storage tanks, a bank of atmospheric vaporizers, and a steam vaporizer. Nitrogen is delivered to all production facilities and laboratories at 90 psig through a network of 2-inch, 3-inch, and 4-inch pipes. Y-12 uses approximately 190 million standard cubic feet of nitrogen annually (NNSA 2011).

Liquid argon also is delivered to Y-12 by trailer truck. The Y-12 argon system consists of five vacuum-insulated liquid storage tanks and 12 atmospheric fin-type vaporizers. The storage tanks have a combined capacity of 30,737 gallons equivalent to approximately 3.4 million standard cubic feet of gas. Gas is distributed to production areas and laboratories through a network of 2-inch and 3-inch pipes. Y-12 uses approximately 30 million standard cubic feet of argon annually (NNSA 2011).

The hydrogen supply at Y-12 consists of multi-cylinder tube trailers in open concrete block stalls. Four trailers are used on a rotating basis: one is in service, one is in ready standby, one is in emergency standby, and one is being refilled. Each trailer has a capacity of approximately 30,000 standard cubic feet, providing a total capacity of 90,000 standard cubic feet. Stored gas is pressurized at 2,000 psig. A two-stage pressure-reducing station delivers 50 psig gas through a meter. The hydrogen gas is then distributed through a 2-inch overhead pipeline to Y-12 facilities. Y-12 uses approximately 0.3 million standard cubic feet of hydrogen annually (NNSA 2011).

Communications. The four basic telecommunications systems within Y-12 are the Oak Ridge Federal Integrated Communications Network, the Cable Television Network (CATV), the unclassified Y-12 Intrasite Network, and the Y-12 Defense Programs Network (Y-12 DPNet). The Oak Ridge Federal Integrated Communications Network consists of copper cable distributed throughout Y-12 and within all its buildings; this network is used for telephone, Fax and special data and alarm circuits and is operated by USWest. The CATV network consists of coaxial cable

that is run to selected sites within Y-12. The unclassified Y-12 Intrasite Network consists of a fiber-optic backbone network with connectivity to most buildings within Y-12; this network uses routed Ethernet service to separate Internet protocol sub-nets for each building. The Y-12 DPNet is the Classified Services Network and presently consists of a coaxial broadband network and a fiber-optic backbone network with fiber-optic connectivity to most buildings within the protected areas of Y-12.

3.14.2 Proposed Action Impacts

Construction and Operation. Existing underground utilities that traverse the site include stormwater drains, firewater, electrical conduits and duct banks, communications, sanitary sewer, domestic water, natural gas, compressed air, instrument air, chilled water, cooling tower water, nitrogen, and argon. During site preparation, all of these utilities would be removed and new connection points to the existing utilities would be established based upon the LPF utility requirements (Parsons 2019). The LPF would tie into the existing Y-12 infrastructure for the following utilities: electricity, natural gas, steam, water (potable/firewater), wastewater (sanitary sewer), and communications. Other utility demands would be supplied by LPF or would be supplied by vendor-delivery to the facility. Because the proposed LPF site and immediate surrounding areas have been previously disturbed, re-establishing utility connections are not expected to result in notable impacts, as discussed below.

***Electricity*.** The primary electrical power distribution system for the LPF would intercept two independent aerial 13.8 kV circuits from existing power poles running along First Street immediately south of the proposed LPF site. These circuits would be routed underground adjacent to the poles into underground duct banks. Two new outdoor electrical substations would be constructed on covered pads near the LPF— one on the south side of the LPF and one on the east side (Parsons 2019). The TVA electrical system has sufficient capacity for the proposed LPF, which is expected to use approximately 3,050,000 kilowatt-hours annually. The LPF would be equipped with an outdoor emergency diesel-engine generator system to power LPF loads during a utility power outage.

***Natural Gas*.** Natural gas would be used for building heating through a heating hot water (HHW) recirculating system. The hot water boilers would be installed in the mechanical room of the LPF (Parsons 2019). Approximately 3,250,000 cubic feet of natural gas would be required annually for the LPF. Sigcorp Energy Services has sufficient supply capacity to support the natural gas demands of the proposed LPF.

***Steam*.** Small quantities of low pressure steam would be used to support LPF process loads (Parsons 2019). Adequate capacity exists within the Y-12 steam system to support operations.

***Water*.** A new 10-inch combined domestic water and firewater main line would be provided around the LPF to form a loop to furnish the required domestic and fire suppression water flow and pressure demands of the facility. During construction, the LPF would require 2,600,000 gallons/annually to support potable water requirements and dust suppression. Once operational, the water demand for the LPF would ultimately be determined by the number of water fixture units within the building as design progresses according to the 2018 International Plumbing Code. However, generally the system can be sized by looking at the wastewater demand flows. City of

Oak Ridge Standard Construction Requirements regulates a flow of 25 gallons per day per person per 8-hour shift within institutional and office use buildings. The LPF would be manned by a staff of approximately 70 people. The annual demand of potable water is estimated to be approximately 1,100,000 gallons per year. Process water usage is estimated at 500,000 gallons/year. The water requirements of the LPF would be less than one percent of the Y-12 current usage.

Wastewater. Wastewater collection would be serviced by the City of Oak Ridge. There is an 18-inch sewer main that leaves the east end of Y-12 near Lake Reality and connects to the city main near the intersection of Bear Creek Road and Scarboro Road. Wastewater generation based on a calculation of 25 gallons/person/day is estimated at 1,750 gallons/day. This quantity would be minimal compared to the average flow of approximately 750,000 gallons per day.

Other Utility and Security Demands. Other utility demands would be supplied by LPF or would be supplied by vendor-delivery to the facility. Access to the LPF would be via a security system at each entrance (Parsons 2019).

3.14.3 No-Action Alternative Impacts

Under the No-Action Alternative, the LPF would not be constructed and there would be no additional infrastructure demands.

3.15 Impacts of Phasing-out Lithium Operations in Building 9204-2

Once the LPF is operational in approximately 2030, operations would be phased-out of the existing Building 9204-2. Because Building 9204-2 is oversized and inefficient for today's lithium mission, utility reductions would be a primary benefit of ceasing operations in that facility. Utility requirements to operate Building 9204-2 are estimated to be more than double the requirements of the proposed LPF (CNS 2020a). Consequently, the annual utility requirements of the proposed LPF would represent annual savings of approximately three million kilowatt-hours of electricity and three million cubic feet of natural gas. These reductions in electricity and natural gas usage would have a minor positive impact on operational air quality. For example, the operational air emissions shown in Table 3-4 would be more than offset by the utility reductions. Reductions in water usage, sanitary wastewater, and nonhazardous wastes would be less notable, as these parameters are largely a function of the number of operational workers, which would not be different than current lithium operations.

Worker safety would be expected to improve as a result of operations in a modern facility built to modern safety standards. Similarly, the probabilities of accidents could be reduced. However, because accident consequences do not account for accident probabilities (i.e., the accident consequences presented for the LPF in Section 3.11.2 assume the accident occurs), notable decreases in consequences would not be expected. Nonhazardous waste generation could also be reduced as a result of more efficient operations.

3.16 Decontamination and Decommissioning Impacts

If the Proposed Action is implemented, Building 9204-2 could undergo D&D. Such D&D, which would not occur until at least 2030, would likely be conducted in accordance with the Excess

Facilities Disposition Program (EFDP) (*see* Section 4.1) and CERCLA requirements. Prior to the initiation of D&D activities, the responsible program office would prepare a detailed D&D plan that would contain a detailed description of the site-specific D&D activities to be performed. All buildings and systems would require regulatory planning, document preparation, and characterization and deactivation before any D&D activities would be allowed to commence. Facilities would be characterized to identify waste types (e.g., hazardous and nonhazardous waste), construction material types (e.g., steel, roofing, concrete), presence of equipment, levels of contamination, expected waste volumes, and other information that would be used to support safe demolition and clarify requirements for developing facility-specific plans. Active systems (e.g., electric, water, telecommunications) would be identified and deactivated, as appropriate. Adaptive reuse of such infrastructure would be considered, and recyclable materials would be sorted and managed separately, to the extent practicable. Although the extent and amount of D&D associated with the Proposed Action cannot be estimated without a detailed assessment of the facilities-- which would not be conducted until closer to the year 2030-- NNSA acknowledges that approximately 325,000 square feet of facility space would need to undergo D&D.

D&D activities would generate intermittent and temporary nonradiological air emissions that could adversely impact air quality, similar to past and ongoing D&D activities at Y-12. Given that ambient air concentrations in Anderson County are in compliance with the NAAQS (*see* Section 3.4), it would be reasonable to expect that the D&D of Building 9204-2 would not cause ambient air concentrations to exceed the applicable NAAQS.[19]

Potential impacts to ecological resources during D&D operations could occur from changes in land use and human disturbance and noise. However, given the lack of ecological resources within the PIDAS, no impacts are expected. Infrastructure demands associated with D&D are expected to be less than construction demands of the LPF, and the Y-12 infrastructure has adequate supply to meet demand.

D&D activities would also cause health and safety impacts to workers. Lessons learned from D&D at other DOE sites would be applied to minimize impacts to workers and the public. Experience with other D&D operations has shown that while occupational impacts to workers are expected, best management practices can reduce impacts. For example, at the Rocky Flats Plant, occupational impacts during D&D were considerably less than impacts in the construction industry as a whole. At the Rocky Flats Plant, the 12-month total recordable cases rolling average was 0.9 per 100 full-time workers. By comparison, the total recordable cases rolling average in the construction industry for calendar year 2004 was 6.4 per 100 full-time workers (GAO 2006).

While D&D activities would also produce socioeconomic impacts, it would be speculative to quantify the number of jobs that would be created; however, D&D activities at the ETTP created a significant number of temporary jobs relative to the number of operational jobs that were lost when operations ceased.

Most wastes from D&D would be nonhazardous and would be disposed of at the landfills and CERCLA-related waste disposal facilities at the ORR (*see* Section 3.13.1). Based on experience

[19] During the D&D of ETTP, which comprised more than 5 million square feet of facilities (DOE 2019b), NAAQS were not exceeded in the region. This is indicative that D&D of Building 9204-2 (325,000 square feet) would not cause NAAQS to be exceeded.

with the D&D of other facilities, NNSA expects that approximately 365 metric tons of hazardous waste and 4,900 tons of nonhazardous waste would be generated for every 100,000 square feet of facility D&D (LLNL 2019). For Building 9204-2 (325,000 square feet), approximately 1,200 tons of hazardous waste and 16,000 tons of nonhazardous waste would be generated. Wastes generated from the D&D of Building 9204-2 would be a fraction of the wastes that were generated by the D&D of ETTP; those wastes were adequately managed by the existing ORR waste management and disposal infrastructure.[20] Because of the age of Building 9204-2, asbestos containing materials (ACM) are likely to be present. An asbestos demolition notification would be provided in advance, and proper pre demolition surveys would be conducted to identify any regulated ACM present. Prior to any demolition, Building 9204-2 would be examined for ACM and all potential ACM in the buildings proposed for demolition would be handled and disposed of according to applicable federal, state, and local regulations.

[20] D&D of ETTP Buildings K-29, K-31, and K-33 generated more than 159,000 tons of materials and equipment (DOE 2019b).

4 CUMULATIVE IMPACTS

This chapter presents an analysis of the potential cumulative impacts resulting from the Proposed Action evaluated in this EA. CEQ regulations at 40 CFR 1508.7 define cumulative impacts as "the incremental impacts 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."

4.1 Evaluation of Past, Present, and Reasonably Foreseeable Future Actions

Construction of the LPF would occur over approximately a four year period, from 2024 through 2028, with operations beginning in 2030. The LPF is expected to operate for 50 years. Consequently, cumulative impacts associated with operations could occur until approximately the year 2080. The cumulative analysis in this EA focuses on actions and impacts that could occur during LPF construction and initial operations, as forecasts beyond that time period become more speculative and less meaningful. Past operations, and continued operations of existing facilities within Y-12 and the project area, are included in the affected environment section and thus, are already considered in this EA. Consequently, this cumulative analysis focuses on identifying reasonably foreseeable actions.

In preparing this cumulative impact analysis, NNSA considered the inclusion of several future projects that could be located offsite of the ORR. Two such projects at ETTP are the construction and operation of the General Aviation Airport and a proposal to increase the allowable land uses in the Horizon Center (Parcel ED-1) to include hotels, a recreational vehicle park, a motorsports park, a vehicle test facility, residential development, and an amphitheater. Based on reviews of the environmental documents for those projects (DOE 2016a and DOE 2020), NNSA concluded that those projects are unlikely to contribute to LPF cumulative impacts and they were eliminated from detailed analysis.

NNSA identified four actions for detailed cumulative analysis: (1) continued construction of the Uranium Processing Facility (UPF), with operations beginning in approximately 2026; (2) construction and operation of the Oak Ridge Enhanced Technology and Training Center (ORETTC) (an emergency response training facility) on the ORR, approximately five miles west of Y-12; and (3) construction and operation of the Emergency Operations Center (EOC) at Y-12; and (4) continuation of the EFDP/cleanup actions. Construction of the ORETTC is expected to begin in late 2020 and be completed by approximately mid-2022. Construction of the EOC is also expected to begin in late 2020 and be completed by approximately 2022.

4.2 Potential Cumulative Impacts

Table 4-1 presents the cumulative impact analysis of the continued UPF construction and operation, construction and operation of the ORETTC, construction and operation of the EOC, and continuation of the EFDP/cleanup actions.

Table 4-1. Potential Cumulative Impacts by Activity

Resource Area	LPF	UPF	ORETTC	EOC	EFDP/Cleanup
Land Resources	Land disturbance for LPF construction would be approximately 13.9 acres of previously disturbed land at Y-12. Once operational, the LPF footprint would occupy approximately 12.9 acres.	Land disturbance for UPF construction would be approximately 35 acres of previously disturbed land at Y-12. Once operational, UPF facilities would occupy approximately 5.4 acres.	Up to 24.1 acres could be disturbed during construction, which is less than one percent of land at the ORR. Up to 24 acres would be transferred to the RCIDB for construction of the ERTF. ORETTC operations would be consistent with current land uses in the area.	The EOC would be constructed on an existing parking lot on Y-12, southeast of the proposed LPF. Up to 2 acres of previously disturbed land could be disturbed, which is less than one percent of land at Y-12. EOC operations would be consistent with current land uses in the area.	EFDP/cleanup activities would disposition excess facilities and restore disturbed land at Y-12. Those activities are consistent with NNSA's vision to remove/replace older, oversized, and inefficient facilities at Y-12, and cleanup the site.
Visual Resources	Y-12 would remain a highly developed area with an industrial appearance, and there would be no change to the Visual Resource Management classification.	Y-12 would remain a highly developed area with an industrial appearance, and there would be no change to the Visual Resource Management classification.	No appreciable visual resource impacts are expected, as the ORETTC site is largely wooded and would only be visible from traffic on the Oak Ridge Turnpike.	Because of the location within Y-12, no notable visual impacts would be expected.	Activities would improve the density of facilities at Y-12. However, Y-12 would remain a highly developed area with an industrial appearance.
Air Quality	Minor, short-term effects would be due to generating airborne dust and other pollutants during construction. The area is in attainment for all NAAQS and emissions from the Proposed Action would be below *de minimis* thresholds.	Construction activities would result in releases of criteria pollutants but would not exceed any NAAQS or TDEC standards beyond the Y-12 boundary. No notable new quantities of criteria or toxic pollutants would be generated during operations. Impacts would remain well within NAAQS for all criteria pollutants.	Minor, short-term effects would be due to generating airborne dust and other pollutants during construction. The area is in attainment for all NAAQS and emissions from the ORETTC would be below *de minimis* thresholds.	Minor, short-term effects would be due to generating airborne dust and other pollutants during construction. The area is in attainment for all NAAQS.	Minor, short-term effects would be due to generating airborne dust and other pollutants during EFDP/cleanup activities. The area is in attainment for all NAAQS.

Resource Area	LPF	UPF	ORETTC	EOC	EFDP/Cleanup
Noise	There are no sensitive noise receptors in the vicinity of the LPF and there would be no notable noise sources associated with LPF construction and operation.	There would be a potential for minor temporary increases in noise due to additional traffic and construction activities, but noise levels would be below background noise levels at offsite locations.	There are no sensitive noise receptors in the vicinity of the ORETTC and there would be no notable noise sources associated with ORETTC construction and operation.	There are no sensitive noise receptors in the vicinity of the EOC and noise impacts would not be expected beyond the Y-12 site boundary.	There are no sensitive noise receptors in the vicinity of Y-12 and noise impacts from EFDP/cleanup activities would not be expected beyond the Y-12 site boundary.
Water Resources	Construction of the LPF would not impact surface water or groundwater resources. No water quality impacts are expected from operations as stormwater and effluents would be managed under NPDES permits, as required. Water requirements for LPF construction and operation would represent less than one percent of water use at Y-12 and would be within the bounds of historical water use at the site.	Water requirements for UPF construction and operation would represent less than 10 percent of water use at Y-12 and would be within the bounds of historical water use at the site.	Construction of the ORETTC would not impact surface water or groundwater resources. No water quality impacts are expected from operations as stormwater and fire-training runoff water would be managed under NPDES permits, as required. Disturbance in the stream riparian buffers would be limited to approximately 0.05 acres.	Construction of the EOC would not require large quantities of water. Operations would be conducted in accordance with a SWPPP and managed under the existing NPDES permit.	Activities utilize water for dust suppression and worker potable water requirements. Activities would be conducted in accordance with a SWPPP and managed under the existing NPDES permit. Cleanup activities would improve water quality at the site.

Resource Area	LPF	UPF	ORETTC	EOC	EFDP/Cleanup
Geology and Soils	Construction activities would result in a potential increase in soil erosion. Appropriate mitigation, including detention pond/basin, runoff control ditches, silt fences, and protection of stockpiled soils would minimize soil erosion and impacts. No impacts on undisturbed geological resources would be expected. The LPF would be designed and constructed to meet applicable code requirements related to geological hazards.	Construction activities would result in a potential increase in soil erosion. Appropriate mitigation, including detention basins, runoff control ditches, silt fences, and protection of stockpiled soils would minimize soil erosion and impacts. No impacts on undisturbed geological resources would be expected. The UPF has been designed and constructed to meet applicable code requirements related to geological hazards.	Construction activities would cause some minor impacts to the existing geologic and soil conditions; however, no viable geologic or soil resources would be lost as a result of construction activities. Excavated soils would be used to improve storm water drainage on site.	Because the EOC would be conducted on previously disturbed land, no viable geologic or soil resources are expected to be lost as a result of construction activities.	Activities would disposition excess facilities and restore/cleanup disturbed soils at Y-12.
Biological Resources	Construction activities would not impact ecological resources because the facility is being sited on land that has been used for more than 70 years for the Biology Complex. Y-12 would remain heavily industrialized and no change to ecological resources would be expected. No critical habitat for threatened or endangered species is known to exist at Y-12.	Construction activities would not impact ecological resources because the facility is being sited on land that was used as a parking lot. Y-12 would remain heavily industrialized and no change to ecological resources would be expected. No critical habitat for threatened or endangered species is known to exist at Y-12.	Construction of ORETTC would have short- and long-term minor adverse effects on biological resources. Potential impacts on biological resources include loss of habitat and wildlife disturbance. Given the small land disturbance, the ORETTC would not reduce the distribution or viability of species or habitats of concern.	Construction activities would not impact ecological resources because the facility is being sited on land that was used as a parking lot. Y-12 would remain heavily industrialized and no change to ecological resources would be expected. No critical habitat for threatened or endangered species is known to exist at Y-12.	Activities are largely conducted within highly developed areas. Due to the lack of notable ecological resources in these areas, no impacts are expected.

Resource Area	LPF	UPF	ORETTC	EOC	EFDP/Cleanup
Cultural Resources	Construction activities for the LPF would occur outside of the Y-12 Historic District and there would be no cultural resource impacts. The exterior of the new LPF would be designed to be compatible with existing historic properties.	Construction activities for the UPF are occurring outside of the proposed historic district and there would be no cultural resource impacts.	Construction-related activities and ground disturbance would be small and no cemeteries or known prehistoric sites would be affected. No historic properties eligible or potentially eligible for listing in the NRHP would be affected.	Construction-related activities and ground disturbance would be small. The EOC would be compatible with the existing historic facilities located adjacent to the proposed new facility project area.	Activities would be conducted in accordance with regulatory requirements and NNSA would consult with the SHPO as required.
Socioeconomics	Because the peak construction workforce (300 persons) and operational workforce (70 persons) would be negligible compared to the projected population in the ROI, socioeconomic impacts, although beneficial, are expected to be negligible.	Approximately 1,050 direct jobs were estimated during the peak year of construction. After 2025, when construction is completed, the operational workforce at UPF would largely come from existing Y-12 staff, and socioeconomic impacts would be minimal.	Because the peak construction workforce (75 persons) and operational/training workforce (270 persons) would be negligible compared to the projected population in the ROI, socioeconomic impacts, although beneficial, are expected to be negligible.	The construction workforce and operational workforce would be approximately 30-50 and would be negligible compared to the population in the ROI. As such, socioeconomic impacts, although beneficial, are expected to be negligible.	Activities would produce socioeconomic impacts; however, it would be speculative to quantify the number of jobs that would be created. Activities at the ETTP created a large number of temporary jobs relative to the number of operational jobs that were lost when operations ceased.
Environmental Justice	No environmental justice populations were identified within the census tracts where LPF would be located. During construction and operation, no disproportionately high and adverse environmental or economic effects on minority or low-income populations are expected.	No notable health risks to the public; radiological dose would remain below the annual dose limit of 10 millirem. There are no special circumstances that would result in any greater impact on minority or low-income populations than the population as a whole.	No environmental justice populations were identified within the census tracts where ORETTC would be located. During construction and operation, no disproportionately high and adverse environmental or economic effects on minority or low-income populations are expected.	No environmental justice populations are expected within the census tracts where the EOC would be located. During construction and operation, no disproportionately high and adverse environmental or economic effects on minority or low-income populations are expected.	No environmental justice populations are expected within the census tracts where activities would occur. No disproportionately high and adverse environmental or economic effects on minority or low-income populations are expected.

Resource Area	LPF	UPF	ORETTC	EOC	EFDP/Cleanup
Human Health (Normal Operations)	Workers would be subject to occupational risks. Over the full construction period, approximately 7.7 days of lost work from illness/injury and 0.06 fatalities would be expected. Operational impacts would be similar to existing operations. No offsite impacts are expected during normal operations. There would be no radiological impacts associated with LPF operations.	All radiation doses from normal operations would be below regulatory standards with no statistically significant impact on the health and safety of workers or public.	No offsite impacts are expected. During ORETTC construction and operation, 1-2 days of lost work from illness/injury and less than one fatality would be expected. There would be no radiological or hazardous chemical human health impacts associated with ORETTC operations.	No offsite impacts are expected. There would be no radiological or hazardous chemical human health impacts associated with EOC operations.	Activities could cause health and safety impacts to workers. Lessons learned from Experience with other D&D/cleanup operations has shown that while occupational impacts to workers are expected, best management practices can reduce impacts.
Facility Accidents	LPF accidents would not result in high consequences, meaning no member of the public would be exposed to chemical concentrations that could result in irreversible or other serious health effects.	New nuclear facilities such as the UPF would have smaller accident consequences compared to older facilities at Y-12 due to meeting modern nuclear safety requirements (NNSA 2020a).	Approximately 0.002 fatalities could be expected to occur annually at the ORETTC specifically from accidents related to firefighting drills/training. Statistically, one death would be expected to occur for every 500 years of operation at the ORETTC.	Construction of the EOC would enable emergency services and management to better fulfill its mission and improve overall campus security, therefore reducing risk to the Y-12 workers and the surrounding public.	Workers would be subject to occupational hazards/accidents, but offsite accidents would not be expected from EFDP/cleanup activities.

Resource Area	LPF	UPF	ORETTC	EOC	EFDP/Cleanup
Intentional Destructive Acts	The likelihood of sabotage and terrorism is extremely low because of the absence of large quantities of hazardous materials. New facilities can, as a result of design features, better prevent attacks and reduce the impacts of attacks. A variety of measures to control access and maintain security would be used.	NNSA analyzed the potential impacts of intentional destructive acts in a classified appendix. In general, it is easier and more cost-effective to protect new facilities such as the UPF, as new security features can be incorporated into their design. New facilities can, as a result of design features, better prevent attacks and reduce the impacts of attacks.	The likelihood of sabotage and terrorism is extremely low. However, it is possible but highly unlikely that random acts of vandalism could occur. A variety of measures to control access and maintain security would be used.	The likelihood of sabotage and terrorism is extremely low. However, it is possible but highly unlikely that random acts of vandalism could occur. A variety of measures to control access and maintain security would be used.	The likelihood of sabotage and terrorism is extremely low for EFDP/cleanup activities.
Waste Management	The LPF would generate approximately 25.7 tons of nonhazardous waste annually, which would be disposed of at the ORR landfills.	The UPF would generate approximately 6,000 tons of nonhazardous waste annually, which would be disposed of at the ORR landfills.	Solid non-hazardous waste would be recycled or transported to an appropriate ORR landfill for disposal.	Minimal wastes would be generated during construction and operation of the EOC.	Wastes generated from activities would be managed by the existing ORR waste management and disposal infrastructure.
Transportation	Temporary increases in traffic associated with construction activities would not be notable compared to existing activities in the ROI. Operational traffic would be the same as existing lithium operations.	UPF construction has not had a noticeable impact on area transportation. Once operational, transportation impacts should be similar to historic levels.	Temporary increases in traffic associated with construction activities would not be notable compared to existing activities in the ROI.	Temporary increases in traffic associated with construction activities would not be notable compared to existing activities in the ROI.	Temporary increases in traffic associated with activities would not be notable compared to existing activities in the ROI.

Resource Area	LPF	UPF	ORETTC	EOC	EFDP/Cleanup
Infrastructure	Construction of the LPF would have minimal impacts on infrastructure capacity. The capacity of the existing infrastructure at Y-12 would be adequate to support the LPF.	UPF construction and operations would not exceed capacity at Y-12 for electricity, water, or other utility support.	Construction of the ORETTC would have minimal impacts on infrastructure capacity. The capacity of the existing infrastructure in the region would be adequate to support the ORETTC.	Construction of the EOC would have minimal impacts on infrastructure capacity. The capacity of the existing infrastructure at Y-12 would be adequate to support the EOC.	Infrastructure demands associated with activities are expected to be adequately supported by the Y-12 infrastructure.

Source: CNS 2020a, NNSA 2020a, NNSA 2020b, NNSA 2015.

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APPENDIX A

Comments and Responses on the Draft EA

A.1 INTRODUCTION

In December 2020, NNSA published the Draft EA on the NNSA NEPA web page (https://www.energy.gov/nnsa/nnsa-nepa-reading-room) and the DOE NEPA web page (https://www.energy.gov/nepa/public-comment-opportunities) for public review and comment. NNSA announced the availability of the Draft EA in local newspapers and provided an email address and postal address where comments could be submitted. NNSA initially provided an approximately 30-day comment period, which was scheduled to end on January 8, 2021. In mid-December 2020, in response to requests from stakeholders, NNSA extended the public comment period through January 22, 2021.

NNSA received seven comment documents on the Draft EA. Table A-1 provides a list of the commenters who submitted comment documents on the Draft EA. A list of the comments, as well as NNSA's corresponding responses to those comments, are provided in Section A.2. All comment documents received are included in the Administrative Record for this EA. In the process of preparing this Final EA, NNSA reviewed and considered all comments received on the Draft EA. Based on the comments and other considerations, NNSA has made revisions to the EA, as appropriate.

Table A-1. Index of Commenters

Dr. Mark S. Watson; City of Oak Ridge
Wesley Hofer, Stefano Favuzzi, Scott Leroy; Environmental Review, Inc.
Matthew Taylor; Tennessee Department of Environment and Conservation
Ralph Hutchison; Oak Ridge Environmental Peace Alliance
Robin Castleberry
Tennessee Emergency Management Agency
U.S. Environmental Protection Agency

A.2 COMMENTS AND RESPONSES

NNSA reviewed every comment document received and prepared responses to address those comments. The comments and NNSA's corresponding responses are shown below.

1. *Commenter states that the characterization of the proposed LPF as a "high-hazard facility" contradicts other statements in the Draft EA that the proposed LPF is a "moderate" hazard facility.*

Response: The term "high-hazard facility" was used in the Draft EA to indicate that the LPF would be designed and constructed to meet the "high-hazard" classification for occupancy described in Section 307 of the IBC. For a non-nuclear facility like the proposed LPF, the IBC establishes the minimum requirements to safeguard the public safety and safety to life and property from fire and other hazards and provides the classification of buildings based on the purpose or purposes for which they are used. The Final EA has been revised to clarify this. The potential hazards from construction and operation of the proposed LPF are presented in Section 3.11.2 of the EA.

2. *Commenter states that it does not accept "death or other irreversible effects" (i.e. high-hazard threshold) to determine if significant impacts to the public may occur. The proposed LPF, as well as the current facility 9204-2, are rated as "moderate-hazard" facilities. Both facilities have the potential to result in a General Emergency classification. A General Emergency is DOE's most severe and consequential emergency classification. TEMA, as well as DOE, uses the DOE classification system to determine the level of on- and offsite response, and the potential impacts that may occur to the public. Commenter states that a General Emergency at the LPF may result in serious but reversible effects on healthy individuals. However, a "moderate" General Emergency facility may also result in death or other irreversible effects on young or old people, and those that are immune comprised (e.g. school children, nursing home resident, etc.).*

Response: The EA analyzes and presents the potential environmental impacts of the Proposed Action." Depending on the results of this EA, NNSA could: (1) determine that the potential environmental impacts of the Proposed Action would be significant to human health and the environment, in which case NNSA would prepare an EIS; or (2) determine that a FONSI is appropriate, in which case NNSA could proceed with the Proposed Action with no additional NEPA documentation.

DOE Order 151.1D (Comprehensive Emergency Management System) does not breakout "General Emergencies" into "*degrees of* General Emergencies," such as "moderate" or otherwise. A General Emergency reflects, "A condition in which the radiation dose from any release of radioactive material or a concentration in air from any release of other hazardous material is expected to exceed the applicable Protective Action Criterion at or beyond the site boundary." No radioactive release is expected with construction or operation of the LPF. With regard to non-radioactive hazardous material, as presented in Section 3.11.2 of the EA, none of the LPF accidents would cause a "high" consequence (i.e., a maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action) at or beyond the Y-12 ERB, which is approximately 0.4 miles from the LPF. NNSA acknowledges that some segments of the population would be more susceptible to adverse health effects than other segments, and that a General Emergency may also result in death or other irreversible effects on young or old people, and those that are immune comprised (e.g. school children, nursing home resident, etc.). Based on the analysis in this EA, the LPF would not cause a General Emergency under normal operations or in the event of an accident.

3. *Commenter states that Y-12 has only installed sirens in the first two-miles of their five-mile EPZ. Citizens living outside the range of the sirens may experience death or other irreversible effects if they are exposed to a General Emergency level of release longer than 60 minutes. These citizens will be warned only after Y-12 discovers the event, performs offsite notification to five local jurisdictions and TEMA, and TEMA subsequently initiates an EAS message.*

Response: The placement of emergency sirens associated with Y-12 operations is beyond the scope of this EA. As presented in Section 3.11.2 of the EA, none of the LPF accidents would cause a "high" consequence (i.e., a maximum airborne concentration below which it is believed

that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action) at or beyond the Y-12 ERB, which is approximately 0.4 miles from the LPF.

4. *Commenter states that in addition to the adverse health effects from an airborne release of lithium, significant deposition of lithium hydroxide would occur from a release of lithium to include from loss of containment, fire, or severe weather events. The potential widespread contamination would require the evacuation of affected areas, cause long-term displacement from residences, and disrupt schools, roadways, businesses, and water treatment operations.*

Response: The analysis in the EA focuses on the primary impacts of accidents-- the potential health effects. Section 3.11.2 of the Final EA has been revised to discuss potential secondary effects of accidents. Because there would be no effects greater than ERPG-2 (or equivalent) at or beyond the Y-12 ERB, secondary effects (i.e., chemical contamination) from accidents are not expected to occur offsite. However, in the event of an accident, NNSA would coordinate with the TEMA, TDEC, and other applicable regulatory agencies to ensure the safety of the public and the environment. NNSA's first responders are located at Y-12 and there are many access points/means of reaching any facilities on site, even for any supporting responders from offsite. In addition, site emergency response plans address such scenarios and first responders are trained to handle such events. First responders are also trained to respond to situations involving collapsed structures. First responders would also wear PPE to minimize inhalation of hazardous materials. Because inhalation of hazardous materials is the primary pathway for exposure, doses to first responders would be kept as low as reasonably achievable. NNSA acknowledges that first responders face similar risks as involved workers— they could be acutely injured or killed by physical effects of the accident. No long-term health effects are expected from construction and operation of the LPF.

5. *Commenter states that the proposed location poses an unacceptable risk to the public. It is about the closest a new facility could be placed on the Y-12 site to the offsite community. It is 0.4 miles from the nearest offsite boundary and on the side of Y-12 closest to the most populated and most vulnerable citizens in Oak Ridge. These potential impacts could be mitigated if the proposed location was further away from the offsite community.*

Response: As discussed in Section 3.11.2 of the EA, none of the LPF accidents would cause a "high" consequence (i.e., a maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action) at or beyond the Y-12 ERB. Given that no high consequences would occur at 0.4 miles from the LPF location, NNSA does not agree that the LPF poses an unacceptable risk to the public. NNSA also notes that there would be benefits associated with utilizing previously-disturbed land rather than undisturbed land for the LPF.

6. *Commenter states that in addition to being so close to the most vulnerable and concentrated populations, the proposed location is upwind from the most vulnerable populations and most dense populations. Surface winds at Y-12 blow predominately up from the southwest (usually*

predominant during the day), and down from the northeast, along the Bear Creek Valley with limited cross-ridge flows.

Response: The accident analysis in this EA is based on the PHA (CNS 2018b) that was prepared for the proposed LPF. That PHA utilizes current wind rose data (wind speed and direction) for the Y-12 site to determine the chemical concentrations and potential health effects at various locations. Consequently, NNSA has appropriately considered the meteorological conditions, such as wind speed and direction, in the analysis.

7. *Commenter states that tornados in East Tennessee are not a rare occurrence. Tennessee is in "Dixie Alley," a term to describe the southeastern part of the United States that has a high risk from tornados. In 2020 alone, Tennessee saw 35 tornados kill 28 people and cause billions of dollars of damage. Six of these tornados occurred in East Tennessee including an EF-3 (winds of up to 206 mph) that killed three people in Hamilton and Bradley Counties.*

Response: As shown in Table 3-19 ("Accident Scenarios for LPF"), high wind, such as from a tornado, was one of the initiating events NNSA evaluated in the accident analysis.

8. *Commenter states that ORR is in the East Tennessee Seismic Zone, a band that stretches from northeastern Alabama to southwestern Virginia. It is one of the most active quake zones in the United States. Earthquakes in East Tennessee are a common occurrence. Within the last 100 years, six seismic events above magnitude 4.0 occurred in East Tennessee. The strongest earthquake ever recorded in East Tennessee was a 4.7-magnitude in 1973, with an epicenter in Alcoa. In 2020 alone, Tennessee was shaken by two quakes of magnitude 3.0 or above and 132 quakes between 2.0 and 3.0. There were also 211 quakes below magnitude 2.0.*

Response: Section 3.7.1 uses current information to describe the seismic conditions at Y-12. As shown in Table 3-19 ("Accident Scenarios for LPF), earthquakes were one of the initiating events NNSA evaluated in the accident analysis.

9. *Commenter states that the building standard cited in this EA (IBC) is the standard code required of any new residential or commercial facility in the City of Oak Ridge. The EA does not discuss whether enhancements to the facility will be made, beyond these minimum standards, to ensure protection from the potential initiators of a hazardous materials release to include severe weather (high winds or tornados), seismic events, plane crashes, or malevolent acts.*

Response: Because the LPF is a non-nuclear facility, DOE Order 420.1C (Facility Safety), and DOE-STD-1020-2016 (Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities) do not drive enhancements beyond the IBC Risk Category IV requirements. The IBC assigns risk categories to buildings to account for consequences and risks to human life (building occupants) in the event of a building failure. The intent is to assign higher risk categories, and hence higher design criteria, to buildings or structures that, if they experience a failure, would exhibit the availability of essential community services necessary to cope with an emergency situation therefore, have grave consequences to either the building occupants or the population

around the building. The risk category serves as a threshold for a variety of code provisions related to earthquake, flood, snow, wind loads and even the magnitude of special inspections. Particularly noteworthy are the importance factors that are used in the calculation of design, earthquake, snow and wind loads. The value of the importance factor generally increases with the importance of the facility. Structures assigned greater importance factors must be designed for larger forces. The result is a more robust structure that would be less likely to sustain damage under the same conditions than a structure with a lower importance factor. The intent is to enhance a structure's performance based on its use or need to remain in operation during and after a disaster. The impact of a higher risk category classification is not limited to increasing the design loads. Compared to Risk Category I, II or III for instance, a Risk Category IV classification can lead to a higher seismic design category classification that can, in turn, require more stringent seismic detailing and limitations on the seismic-force-resisting system. This can also affect seismic design requirements for architectural, mechanical, and electrical components (Froehling 2020). No enhancements are being made with respect to plane crashes or malevolent acts. Natural phenomena concerns are adequately addressed by the IBC Risk Category IV requirements.

10. *Commenter states that they support the construction of a new LPF, but believes the location should be on the west side of Y-12, much farther from vulnerable and dense populations. They also need to be provided the potential areas (i.e. distance from the LPF) where serious health impacts or devastating economic effects may occur.*

Response: Section 2.4 of the EA describes the Y-12 site alternatives that were initially considered for the LPF, but eliminated from detailed analysis. One site on the west side of Y-12 was considered: Site 1 -- Mod-West Hillside Brownfield Site. That site was eliminated from detailed analysis due to poor access, extensive grading, and its location within the Protected Area. Based on the fact that none of the LPF accidents would cause "high" consequences at or beyond the Y-12 ERB, which is approximately 0.4 miles from the LPF location, NNSA does not think the LPF would cause serious health impacts or devastating economic effects at the proposed location.

11. *Commenter states that DOE should require any new facility on the ORR that may result in a General Emergency be reinforced beyond the minimum required standards. Specifically, the new LPF and any General Emergency building should be able to withstand F3 tornadic wind speeds of up to 206 mph and seismic events up to magnitude 6.9 Mercalli Intensity Scale. It should also be built to withstand airplane crashes and malevolent acts.*

Response: NNSA is committed to designing, constructing, and operating its facilities to protect the health and safety of the public, workers, and the environment. In doing so, NNSA utilizes the appropriate and applicable regulatory requirements. The criteria which the commenter recommends that DOE "should require" are exclusively applied to nuclear facility design and are not applied by DOE to non-nuclear hazardous material facilities.

12. *Commenter states that a revised EA or EIS be developed with an appropriate public comment period that answers the following questions or contains the following information: (a) What specific wind speed will the LPF be designed to withstand? (b) What specific intensity of seismic event will the LPF be designed to withstand? (c) What reinforcement will be made to*

the LPF, if any, to ensure protection against tornados or high winds, seismic events, or accidental airplane crashes and malevolent acts? Commenter asks if DOE has any policy to design and construct new facilities on the ORR, which have a potential for a General Emergency, that are reinforced beyond the minimum standards of the IBC? Commenter states that the EA should provide a full assessment of the scope and levels of the potential deposition from all scenarios, to include full facility fires, tornados and other severe weather events, seismic events, airplane crashes, and malevolent acts. Commenter states that the EA should discuss the maximum distance to the ERPG-2 levels or equivalent (General Emergency levels) for all accident scenarios. This would give citizens and local officials the potential areas where DOE may recommend protective actions at a General Emergency due to the potential serious or irreversible health effects.

Response: Because the facility is a non-nuclear facility, DOE Order 420.1C and DOE-STD-1020-2016 do not drive enhancements beyond the IBC Risk Category IV requirements. No enhancements are being made with respect to plane crashes or malevolent acts. Natural phenomena concerns are adequately addressed by the IBC Risk Category IV requirements. See comment-response 9 for a discussion IBC Risk Category IV requirements. As discussed in Section 3.11.2 of the EA, none of the LPF accidents would cause effects greater than ERPG-2 (or equivalent) at or beyond the Y-12 ERB. Based on the analysis in this EA, the LPF would not cause a General Emergency under normal operations or in the event of an accident.

13. Commenter requests that NNSA make the LPF D&D Plan available to the public upon request.

Response: To the extent that NNSA is the responsible program office for issuance of the LPF D&D Plan, NNSA will follow all applicable requirements for public release of the document.

14. Commenter believes the Draft EA is deficient in significant areas because of its dismissal of the potential environmental impacts resulting from catastrophic failure of systems and structures due to natural phenomena, including seismic activity, and/or intentional destructive acts. Commenter notes that catastrophic failure of the LPF would undermine NNSA's commitment to meeting its national security requirements.

Response: As discussed in Section 3.11.2, NNSA has considered the potential impacts that could result from catastrophic failure of systems and structures due to natural phenomena, including seismic activity and/or intentional destructive acts. NNSA has also revised and expanded the discussion of intentional destructive acts in the Final EA.

15. Commenter states that an EIS should be prepared because operations at the LPF would occur in a "corrosive environment" (p.2-7) and the facility is a "non-nuclear high hazard facility" (p. 2-8), as well as other deficiencies in the EA, as indicated in comments 16-18 below.

Response: The term "high-hazard" facility was used in the Draft EA to indicate that the LPF would be designed and constructed to meet the "high-hazard" classification for occupancy described in Section 307 of the IBC. The Final EA has been revised to clarify this. Section 2.2 of

the EA discusses measures that would be taken to minimize/mitigate effects of operating the LPF in a corrosive environment. Based on the analysis in Chapter 3 of the EA, NNSA has considered the impacts that could occur as a result of operations in such an environment, including the possibilities of equipment failures and releases of hazardous materials. Whether an EIS should be prepared is an issue that will be addressed by NNSA after preparation of this Final EA. Depending on the results of this EA, NNSA could: (1) determine that the potential environmental impacts of the Proposed Action would be significant to human health and the environment, in which case NNSA would prepare an EIS; or (2) determine that a FONSI is appropriate, in which case NNSA could proceed with the Proposed Action with no additional NEPA documentation.

16. *Commenter states that the EA is dismissive of the impacts of an accident or an incident causing release of liquid nitrogen or hydrogen gas. Commenter states that it is not clear if NNSA considered cumulative or cascading effects in the accident analysis (Table 3-19). Commenter also states that the EA does not explain the possible consequences of loss of significant quantities of lithium to the environment/groundwater in the instance of a cascade of disruptive events that could include explosions, fire, and the release of caustic chemical gases.*

Response: As discussed in Section 3.11.2, NNSA prepared a detailed PHA for the LPF which contains: (1) a preliminary list of major hazardous materials and energy sources; (2) a preliminary evaluation of accident scenarios; and (3) a preliminary list of hazard control measures needed to prevent or mitigate notable consequences to LPF workers, collocated workers, and the off-site public. Table 3-19 of the EA presents the accident scenarios that NNSA considered for the LPF (CNS 2020c). As shown in that table, NNSA considered many potential initiating events, including explosions, fires, loss of containment, and natural phenomena hazards such as earthquakes and floods. NNSA also considered a spectrum of accident probabilities (i.e., "frequency"), ranging from anticipated to beyond extremely unlikely. In addition, NNSA considered many types of hazardous materials that could be released in the event of an accident, including hydrogen gas. For each accident analyzed, the EA analysis considered and included releases of all applicable hazardous materials of concern. The PHA and EA did not identify the release of liquid nitrogen as a material of concern compared to other more hazardous materials that are addressed in detail in the PHA and EA. Because it can displace oxygen in confined spaces, liquid nitrogen is primarily a worker hazard. Hazards such as this are addressed and controlled by Y-12 safety management programs and engineering controls.

17. *Commenter states that the location of the LPF outside the PIDAS raises the stakes when one considers an intentional destructive act. Commenter states that the EA downplays the risk with the statement that other sites at Y-12 would be more attractive to terrorists and that security gates would provide effective impediments to assault. Commenter questions whether a sophisticated terrorist could begin a large attack by creating a mini-disaster as a distraction.*

Response: DOE Order 473.3A (*Protection Program Operations*) (DOE 2016b) establishes requirements for the physical protection of interests under DOE's purview, including facilities and government property. Protected Areas are security areas established to protect Category II or greater quantities of special nuclear material (SNM) and may also contain classified matter.

Protected Areas provide concentric layers of security and must be encompassed by physical barriers that identify the boundaries, surrounded by a PIDAS, and equipped with access controls that ensure only authorized personnel are allowed to enter and exit. The LPF would not contain any Category II or greater quantities of SNM and thus, is not required to be located within the PIDAS. NNSA has revised and expanded the discussion of intentional destructive acts in the Final EA. As NNSA discussed in the Draft EA, the possibility exists for random acts of violence and vandalism at any location. However, because the accident analysis conservatively estimates the quantities of hazardous materials that could be released, NNSA expects that the impacts presented in Table 3-19 would be representative of any impacts from an intentional destructive act (CNS 202a).

18. *Commenter states that hazard maps prepared by the USGS and regularly updated indicate the East Tennessee Seismic Zone is a high activity zone. Commenter also states that studies conducted by Robert Hatcher at the University of Tennessee indicate that earthquakes exceeding a magnitude of 6.0 have occurred in the recent (last 2,000 years) geological past in East Tennessee. Commenter states that the EA dismissal of earthquake hazards with "however, there are no quaternary faults near the site" is inappropriate. Commenter recommends that any reference to local geology in the Draft EA be updated with the latest data and information from Cox et al., (2018) and Adhikari et al., (2020) to ensure that all design and operational practices will withstand a large earthquake in the moment magnitude (Mw) range of Mw ≥6 to Mw ≥7.*

Response: The seismic design of the LPF SSCs is based on the DOE-STD-1020-2016, Natural Phenomena Hazards Analysis and Design Criteria for Department of Energy Facilities, ASCE 7-16 and the IBC 2015 using a site-specific seismic hazard study to define the design earthquake ground motions. The site-specific hazard study was performed in 2003 working with the USGS and other outside consultants, and was made very conservative to avoid future changes due to later USGS and industry studies.

An update to the site-specific seismic hazard study is presently ongoing and the results indicate that the 2003 site-specific study is still conservative. The updated seismic hazard study is considering all of the latest 2018 USGS studies, the Nuclear Regulatory Commission and the Electric Power Research Institute studies, along with the studies conducted by Robert Hatcher, Cox et al, and Adhikari et al. The results indicate that the design earthquake ground motions for the LPF site are controlled by a Moment Magnitude 6.9 earthquake at a distance from the site of about 175 miles for the low frequency ground motions and a Moment Magnitude 6.1 earthquake at a distance of about 60 miles from the site.

19. *Commenter states that within the Draft EA it is stated that there are no karst features at the site, but this assessment is dependent upon the definition of karst used. There are contrasting definitions of karst (Worthington et al., 2017), and recent publications show that fractured non-carbonates have hydrological characteristics that include channels and rapid flow (Worthington et al., 2016) that can behave like karst as it relates to groundwater and contaminant movement. This research demonstrates that it should be considered that recharge*

of groundwater is probably rapid and groundwater flow and discharge is also rapid. Investigations and monitoring should be designed accordingly. The commenter encourages NNSA to include these considerations in the Final EA.

Response: There are no identified groundwater contaminant source areas at the proposed LPF site (DOE 2019a). As shown in section 3.7.1, Figure 3-10 of the EA, the occurrence of surface expressions of karst features (i.e. sinkholes or depressions) appears low within or near Y-12. Karst features are dissolutional features occurring in carbonate bedrock. Text has been added to Section 3.6.1 to clarify that "in Bear Creek Valley, groundwater in the intermediate and deep intervals moves through fractures in the aquitard, converging on and then moving through fractures and solution conduits in the Maynardville Limestone. Karst development in the Maynardville Limestone has a significant impact on groundwater flow paths in the water table and intermediate intervals. Groundwater flow rates in Bear Creek Valley vary; they are slow within the deep interval of the fractured non-carbonate rock (less than 10 feet/year) but can be quite rapid within solution conduits in the Maynardville Limestone (10 to 5,000 feet/day)(DOE 2019a)."

As stated above, there are no identified groundwater contaminant sources at the proposed LPF site, though groundwater contamination has been identified in other areas of Y-12. As discussed in section 3.6.2, existing monitoring wells at the site would continue to be used for the ongoing groundwater monitoring program (Parsons 2019), and per DOE Order 458.1, and DOE Order 436.1, a groundwater-monitoring network including upgradient and downgradient monitoring wells, would be established to evaluate baseline and operational site conditions. Potential impacts to groundwater quality are not expected because lithium processing would be contained within the building, and hazardous materials would be properly managed. Any spills would be contained and cleaned up in an appropriate manner under the SPCC Plan, and not released to the environment. Small quantities of process water generated during lithium processing would be characterized to determine treatability in available wastewater treatment facilities during process design and would be disposed of properly. As such, facility operations would not be expected to contaminate the groundwater.

20. Commenter states that during the construction of the Y-12 Uranium Processing Facility it was anticipated that legacy waste might be encountered during the construction phase and a generic waste handling plan was put in place to quickly and safely dispose of such wastes. Commenter encourages NNSA to develop a similar plan for construction of the LPF and include discussion relating to such in the Final EA.

Response: Section 3.12.2 of the Final EA has been revised to include a discussion of legacy waste that might be encountered during the construction and commits NNSA to developing and implementing a waste handling plan for the LPF.

21. Commenter recommends that NNSA review and consider additional reports and data that show rapid traced velocities in Bear Creek and inter-and intrastratigraphic flow elsewhere. Follow up flow tracing work by TDEC at Walker Branch shows that flow does not follow topography (as claimed in the Draft EA); flow is substantial and rapid in the bedrock, and that there is not

different flow through stratigraphic units. In other words, groundwater can easily flow between beds of carbonate or shale, and sandstone to discharge at springs in different stratigraphic units higher in the section (the beds are dipping quite steeply).

Response: The proposed LPF site is located within the UEFPC Hydrogeologic Regime within the Maryville Formation. Near the proposed LPF site, groundwater flow direction flows to the southeast towards EFPC (DOE 2018) (Figure 3-6), which is based on depth to groundwater measurements compiled during groundwater monitoring activities. Near the LPF site shallow groundwater does appear to follow topography. NNSA acknowledges that groundwater flow rates within the Y-12 site vary with location due to the geologic heterogeneity and topographic variability. Text has been added to Section 3.6.1 to provide additional details regarding groundwater flow. NNSA also acknowledges that while water moves rapidly through fractures, the diffusion, sorption, and exchange of solutes into the surrounding earth materials result in extensive retardation and storage of waterborne contaminants as they are transported away from a contaminant source.

22. *Commenter recommends that NNSA review tracing results from TDEC assessments in Bear Creek Valley SW of Y-12 as far as Hwy 95 and nearby springs (SS-7 and SS-8). In addition, it should be carefully noted that groundwater moves rapidly (in all bedrock aquifers) Worthington et al., (2016). Commenter encourages NNSA to review these reports and associated data and consider the evaluation of the potential broader geographic span of affected water resources in the Final EA.*

Response: NNSA revised Section 3.6.1 to provide additional detail regarding groundwater flow (see response to comment #21).

23. *Commenter states that Section 3.6.1 includes information relating to drainage basins and discharge to creeks without any details relating to how the values have been obtained. Commenter encourages NNSA to confirm the position of the inferred groundwater divide through injected tracing, in both high stage and low stage conditions; there are contaminant data (uranium-series) that show that the position of the divide shifts. Additionally, in the Draft EA, the statement that "drainage basins and troughs" is used. Commenter encourages NNSA to clarify this statement (Drainage basins can have potentiometric troughs? Where are the troughs in the basin?).*

Response: As stated in Section 3.6.1, the ORR lies within the Valley and Ridge Physiographic Province, which is composed of a series of drainage basins or troughs containing many small streams feeding the Clinch River. NNSA revised Section 3.6.1 for clarity. With respect to the groundwater divide, the LPF site is located on the eastern side of the Y-12 site where the groundwater elevations consistently indicate southeasterly flow toward the East Fork Poplar Creek, during routine groundwater monitoring. The LPF site is approximately 1.5 miles from the groundwater divide as currently mapped. NNSA notes that the groundwater divide may shift with groundwater levels; however, this does not appear to affect groundwater flow direction at the LPF site, which appears consistently southeast.

24. *Commenter states that the Draft EA does not identify whether associated demolition activities will encounter any building or structure known to contain asbestos. When any structures are proposed to be demolished, an asbestos demolition notification must be provided in advance, and proper pre demolition surveys need to be conducted to identify any regulated ACM present. Prior to any demolition, all facilities must be examined for ACM and all potential ACM in the buildings proposed for demolition must be handled and disposed of according to the applicable federal, state, and local regulations. The commenter encourages NNSA to include these considerations in the Final EA.*

Response: Section 3.16 of the Final EA has been revised to discuss the potential for encountering ACM during D&D of the existing facilities. That section also discusses how the appropriate office will handle and dispose of ACM. The D&D would be conducted by an appropriate DOE program office. If ACM is encountered, proper notification and regulations will be followed.

25. *Commenter states that dust emissions generated by activities associated with the proposed action can vary substantially depending on levels of activity, specific operations, and prevailing meteorological conditions. These emissions are likely to be short-term and temporary in nature. It is recommended that ordinary dust control measures be employed to mitigate any dust emissions generated. These measures may include wetting by water spray any areas likely to generate fugitive dust during on site construction activities as needed. Additionally, commenter recommends that all construction equipment employed on site be well maintained and equipped with the latest emissions control equipment.*

Response: Section 3.4.2 of the Final EA has been revised to discuss dust control measures that would be employed to mitigate any dust emissions generated. That section also includes a discussion of emissions control equipment for construction machinery.

26. *Commenter states that the Draft EA includes a statement that no new stationary sources of air emissions would be associated with the LPF, but then states that the LPF would require a construction permit and would generate airborne emissions during operation, which appears contradictory at first reading (page 3-11). Commenter recommends that the Draft EA be revised so that the intent to move the existing lithium processing equipment to the new location is clear.*

Response: Section 3.4.2 of the EA has been revised to clarify the need for a construction air permit. The section also clarifies that no new stationary sources of air emissions would be associated with the facility, with the exception of a backup emergency diesel generator.

27. *Commenter recommends that should open burning be considered for disposal of wood wastes generated from the proposed project, alternatives to open burning, including chipping, composting or grinding of wood waste, be evaluated first. If open burning is selected for wood waste disposal NNSA should consider implementing a smoke management plan, not burning on air quality alert days, and coordinating burning with other agencies (TDEC, forestry*

agencies and local fire departments). Commenter encourages NNSA to include discussion relating to these considerations in the Final EA.

Response: Section 3.12.2 of the Final EA has been revised to discuss recycling and disposal of wastes from construction activities.

28. *Commenter recommends that the Final EA reflect that any wastes generated in association with the proposed action be evaluated and managed in accordance with the Solid and Hazardous Wastes Rules and Regulations of the State of Tennessee.*

Response: Section 3.12.2 of the Final EA has been revised to acknowledge that all wastes would be evaluated and managed in accordance with the TSWMA.

29. *Commenter states that the area disturbed by the proposed action will be well more than an acre in size and require a construction stormwater permit. The existing/soon to be issued new NPDES permit will need to be modified to account for the new building and operational activities. The proposed activity for the site will fall under one of the Industrial Activities Sectors for a Tennessee NPDES Multi-Sector Stormwater Permit. As a part of the permit a site-specific SWPPP must be developed, as was noted in the Draft EA.*

Response: NNSA agrees with the commenter. The NPDES permit requirements during construction and operation of the LPF are described in section 3.6.2.

30. *Commenter strongly supports the ongoing modernization of Y-12 and, specifically, the construction of a new LPF to help meet national security goals and significantly improve worker safety and the safety of the Oak Ridge community.*

Response: Commenter's support for the Proposed Action is noted.

31. *Commenter states it is unclear why the proposed facility would not be included within the PIDAS given that production, processing, machining and storage of materials and components will occur in various wings of the proposed facility. Fencing alone may be insufficient due to past incidents.*

Response: DOE Order 473.3A (*Protection Program Operations*) (DOE 2016b) establishes requirements for the physical protection of interests under DOE's purview, including facilities and government property. Protected Areas are security areas established to protect Category II or greater quantities of SNM and may also contain classified matter. Protected Areas provide concentric layers of security and must be encompassed by physical barriers that identify the boundaries, surrounded by a PIDAS, and equipped with access controls that ensure only authorized personnel are allowed to enter and exit. The LPF would not contain any Category II or greater quantities of SNM and thus, is not required to be located within the PIDAS.

32. *Commenter urges NNSA to implement the highest emergency response and public safety protocols; for example, continuing all memoranda of agreement with the Oak Ridge Fire Department, including those previously enacted by DOE-EM. Having access to additional highly trained and skilled emergency personnel within the City limits is needed, particularly when dealing with chemicals of concern that include hydrochloric acid, lithium and chlorine gas.*

Response: NNSA is committed to the safety of the public, workers, and the environment. Section 3.11.2 of the EA discusses emergency response. NNSA notes that the LPF would improve public and worker safety and would not introduce any new hazards compared to existing operations. NNSA would continue to coordinate all of its activities with local, state, and federal emergency response organizations, as appropriate, to ensure the safety of the public, workers, and the environment.

33. *Commenter states that the discussion of air emissions, greenhouse gases, and climate change in 3.4.2 is very generalized. Commenter encourages NNSA to coordinate their benchmarks with the City of Oak Ridge Climate Action Plan.*

Response: The Proposed Action would occur in Anderson County, which is used as the ROI for the air quality analysis. According to EPA, Anderson County is in attainment for all criteria pollutants (EPA 2020a). The air quality analysis focuses on modelling air emissions from construction and operation of the LPF to determine if emissions would exceed the general conformity rule *de minimis* (of minimal importance) threshold values, or would contribute to a violation of any federal, state, or local air regulation. As shown in Table 3-5, the estimated emissions from the Proposed Action would be below the *de minimis* thresholds; therefore, the level of effects would be minor. The analysis also evaluates GHG emissions and compares the estimated GHG emissions from the Proposed Action to the global, nationwide, and statewide GHG emissions. As shown in Table 3-5, the estimated increase would be minimal. NNSA reviewed the City of Oak Ridge Climate Action Plan and operations at the LPF would not be inconsistent with that plan.

34. *Commenter states that discussions of operational impacts do not clearly distinguish between the impacts of future operations under the Proposed Action and the impacts of continuing to operate the existing facility under the No-Action Alternative. For example, are the operational air emissions and greenhouse gas emissions discussed in Section 3.4.2 larger than the emissions associated with operational emissions under the No-Action Alternative, or are these impacts are essentially the same as the impacts of No Action? How do the frequencies and consequences of the potential accidents listed in Table 3-19 compare with the frequencies and consequences of potential accidents from current operations?*

Response: The impacts of continuing operations in Building 9204-2 are presented within the context of the No-Action Alternative. For each environmental resource analyzed in the EA, those impacts are accounted for in the descriptions of the affected environment (baseline). While the impacts from continued operations in Building 9204-2 are not broken-out into discrete

contributions to the overall baseline, Section 3.15 of the EA provides a discussion of how impacts would change if operations are transferred from Building 9204-2 to the new LPF.

Because Building 9204-2 is oversized and inefficient for today's lithium mission, utility reductions would be a primary benefit of ceasing operations in that facility. Utility requirements to operate Building 9204-2 are estimated to be more than double the requirements of the proposed LPF (CNS 2020a). Consequently, the annual utility requirements of the proposed LPF would represent annual savings of approximately three million kilowatt-hours of electricity and three million cubic feet of natural gas. These reductions in electricity and natural gas usage would have a minor positive impact on operational air quality. For example, the operational air emissions shown in Table 3-4 would be more than offset by the utility reductions. Worker safety would be expected to improve as a result of operations in a modern LPF built to modern safety standards. Similarly, the probabilities of accidents could be reduced. However, because the accident consequences do not account for accident probabilities (i.e., the accident consequences presented for the LPF in Section 3.11.2 assume the accident occurs), notable decreases in consequences would not be expected.

35. *As noted in previous NEPA comments, the method of using ROI, defined as "the four-county area in Tennessee comprised of Anderson, Knox, Loudon, and Roane counties where a majority of the Y-12 workforce resides" does not accurately represent the degree of impact to the City of Oak Ridge due to Y-12's location within the City. Commenter urges NNSA to further refine their analyses.*

Response: For the discussion of socioeconomic resources, the use of "the four-county area in Tennessee" is consistent with the ROI used in previously prepared NEPA documents for Y-12. An analysis of the City of Oak Ridge indicates that socioeconomic characteristics followed similar trends to those presented for the four-county ROI. The City of Oak Ridge makes up approximately one percent of the labor force of the ROI with an unemployment rate of 3.3 percent, slightly lower than that of the ROI (3.6 percent). In addition, the median income for households in the City of Oak Ridge was $53,395, higher than the median income for Anderson county. In 2018, the population for the City of Oak Ridge was estimated to be 29,030, making up approximately 4.6 percent of the population of the ROI. Also in 2018, the City of Oak Ridge had 30,656 housing units, making up approximately 11 percent of the housing units for the ROI. Impacts from the construction and operation of the LPF to the City of Oak Ridge would be similar to those discussed for the ROI.

The potentially affected area considered for the analysis of Environmental Justice concerns includes the area within a 50-mile radius of Y-12, with a focus on the four-county ROI. There are 151 census tracts within the four-county ROI, of the 151 census tracts, the City of Oak Ridge is made up of all or portions of 12 census tracts. While NNSA acknowledges the existence of minority and low-income populations, the low-income and minority populations in those census tracts do not exceed the thresholds used by NNSA to be classified as minority or low-income population for the purpose of Environmental Justice analysis. However, even if those census tracts were specifically analyzed for Environmental Justice impacts, there would be no notable adverse

impacts offsite; consequently, there would be no disproportionately high and adverse human health impacts on minority populations and low-income populations from the Proposed Action.

36. *Commenter states that the identification of populations potentially exposed to environmental justice impacts is inappropriately limited to a sterile, pro forma analysis of census tract statistical data, resulting in a failure to acknowledge that the nearest residential population to the site (about 0.6 miles away) is a majority African-American neighborhood (the Scarboro neighborhood of Oak Ridge) that was established by the U.S. government as a segregated residential area for African Americans. The statement in the Draft EA that this community is not considered because low-income and minority population percentages in the census tract that includes Scarboro do not exceed the thresholds used by NNSA is an excuse, not a good reason, for not explicitly discussing potential impacts to this community. It is vitally important for the City of Oak Ridge to have good information on the nature and magnitude of any impacts that Oak Ridge citizens in this neighborhood could experience as a result of the proposed facility, particularly from exposures to potential accidents.*

Response: While NNSA acknowledges the existence of low-income and minority populations in the Scarboro and Woodland communities, the low-income and minority populations in those census tracts do not exceed the thresholds used by NNSA to be classified as low-income or minority populations for the purpose of Environmental Justice analysis. As discussed in Section 3.11, no high consequences would occur at 0.4 miles from the LPF location, therefore, any impacts from the construction and operation of the LPF would be small to the Scarboro and Woodland communities, as well as to all other members of the population; consequently, there would be no disproportionately high and adverse human health impacts on minority populations and low-income populations from LPF construction and operation.

37. *Commenter states that it is worth noting that the City of Oak Ridge will be constructing a new, modern water treatment facility that will service the proposed lithium facility. NNSA will be a major customer of that system.*

Response: NNSA has added a discussion of the new water treatment facility to Section 3.14.1 of the EA.

38. *Commenter states that the analysis of potential cumulative impacts should include the socioeconomic and environmental impacts associated with disposal of radiological, mercury-contaminated, and other hazardous materials that would be generated by demolition of the Biology building and Building 9204-2. As currently proposed, the bulk of these materials would be disposed by DOE-EM in a new CERCLA landfill in Oak Ridge and is under review by state and federal regulators. The integration of this analysis by NNSA would give the public and the affected community a better understanding of the long-term impacts associated with permanent institutional controls, long-term maintenance, and loss of economic opportunity.*

Response: As discussed in Section 3.16 of the EA, if the Proposed Action is implemented, Building 9204-2 could undergo D&D. Such D&D, which would not occur until at least 2030,

would likely be conducted in accordance with the EFDP (*see* Section 4.1 of the EA) and CERCLA requirements. Prior to the initiation of D&D activities, the applicable program office would prepare a detailed D&D plan that would contain a detailed description of the site-specific D&D activities to be performed. Most wastes from D&D would be nonhazardous and would be disposed of at the landfills and CERCLA-related waste disposal facilities at the ORR (*see* Section 3.12.1). Based on experience with the D&D of other facilities, NNSA expects that the D&D of Building 9204-2 (325,000 square feet) would generate a fraction of the wastes that were generated by the D&D of ETTP (DOE 2019b); those wastes were adequately managed by the existing ORR waste management and disposal infrastructure. NNSA expects that the wastes from D&D of Building 9204-2 would be a fraction of the total wastes in a new CERCLA landfill, if that is the ultimate disposal site.

39. *Commenter states that the document appears to use the Executive Summary as a high-level explanation of environmental impacts. This approach appears to sidestep meaningful evaluation in the body of the report, and the report does not include a conclusions and recommendations section. Paragraph 1 states that the report assesses the impacts of facility construction but fails to appropriately consider the impacts from implementation (demolition, remediation, construction).*

Response: Details supporting the Executive Summary are presented in Sections 3.2 through 3.16 of the EA. Those sections analyze the construction and operation of the LPF, the phase-out of operations from Building 9204-2, and the eventual D&D of Building 9204-2. The purpose of the EA is to analyze the potential environmental impacts of the reasonable alternatives, not to make judgements regarding the "significance" of any impacts or recommendations. Depending on the results of this EA, NNSA could: (1) determine that the potential environmental impacts of the Proposed Action would be significant to human health and the environment, in which case NNSA would prepare an EIS; or (2) determine that a FONSI is appropriate, in which case NNSA could proceed with the Proposed Action with no additional NEPA documentation.

40. *Commenter questions whether utility lines and a water line would be impacted by contaminants? If so, this section should describe the impacts. Addressing environmental impacts including subsurface contaminants in soil and groundwater should be evaluated and emphasized by adding new sections to the report. Where applicable, commenter states that NNSA should add contaminant plume maps, data tables, and geologic cross sections.*

Response: Actions associated with the ongoing D&D/remediation of the Biology Complex are proceeding independently of the Proposed Action, are appropriately addressed through the CERCLA process, and are beyond the scope of the EA. Contamination at Y-12 is addressed as appropriate in the EA. As discussed in Section 3.6.1 of the EA, groundwater contamination does not appear prevalent in the vicinity of the proposed LPF site; contaminant plumes are delineated south of the proposed LPF site. As discussed in Section 3.7.2, prior to the start of construction of the proposed LPF, the appropriate agency plans to gain regulatory concurrence that no further action will be required to address any potential soil contamination at the site related to past operations of the Biology Complex.

41. *Commenter states that the Draft EA should clarify how the "sliding scale approach" is implemented in the EA and where the proposal falls on a continuum with respect to the environmental impacts.*

Response: As discussed in Section 3.1, certain aspects of the Proposed Action have a greater potential for creating adverse environmental impacts than others. For this reason, a "sliding-scale" approach was used, so that those actions with greater potential impact can be discussed in greater detail than those that have little potential for impact. Preparation of this EA was guided by that sliding-scale approach. With regard to the sliding scale approach, differences in the level of detail of analyses are evidenced in Sections 3.2 through 3.16. For example, because the LPF would not introduce any major sources of noise, the operational noise impacts for the Proposed Action amounts to a single sentence to that effect. In contrast, the air quality analysis (Section 3.4.2) includes detailed air quality modelling of construction and operational emissions. Similarly, the analysis of accidents (Section 3.11.2) includes detailed modelling of potential accidents (*see* Table 3-19).

42. *Commenter states that the discussion in Section 3.1 narrows the scope of the environmental impacts to consider by separating the impacts from phasing out operations in building 9204-2 which was discussed in a different section (section 3.15) and demolition (section 3.16). Review of sections 3.15 and 3.16 indicates that significant work including environmental cleanup will likely occur during the demolition phase. Those activities are major activities so they should be included as environmental impacts (during the construction phase). That approach appears to sidestep the necessity of evaluating environmental impacts.*

Response: Actions associated with the ongoing D&D/remediation of the Biology Complex are proceeding independently of the Proposed Action, are appropriately addressed through the CERCLA process, and are beyond the scope of the EA. With regard to D&D of Building 9204-2, such D&D would not occur until at least 2030 and would likely be conducted in accordance with the EFDP (*see* Section 4.1 of the EA) and CERCLA requirements. Although not required, for completeness, the EA provides an analysis of the potential D&D impacts using the best available information available.

43. *Commenter states that Figure 3-2 does not specify the expected lifespan of the new project. What measures can be implemented to ensure building lifespans reach and exceed expectations? Given the project involves relocation of the lithium processing facility to an existing structure, will this renovation consider the completed project site as a new or existing building?*

Response: Section 4.1 of the EA states that, "The LPF is expected to operate for 50 years." The operational analysis accounts for the actions that NNSA would take to ensure the LPF would operate for its expected lifetime. The LPF would be a new facility, not an existing facility.

44. *Commenter states that "small quantities of process water generated during lithium processing would be characterized and properly disposed." What is the approximate amount of*

wastewater produced on an annual basis? To where will lithium contaminated water be removed? If this contaminated water is being removed off-site, what protocols are in place to prevent spills in the transportation process?

Response: Detailed estimates of process water quantities would be determined during the detailed design of the LPF. Based on current operations in Building 9204-2, the quantities are expected to be "small." As discussed in Section 3.6.2, small quantities of process water generated during lithium processing would be characterized to determine treatability in available wastewater treatment facilities during process design. Any discharges of process water to the sanitary sewer would be subject to requirements under the Industrial and Commercial User Wastewater Discharge Permit 1-91. This permit defines requirements for the discharge of wastewaters to the sanitary sewer system as well as prohibitions for certain types of wastewaters. Additionally, it prescribes requirements for monitoring certain parameters at the East End Sanitary Sewer Monitoring Station (DOE 2019a). Discharges of process water from the LPF directly to EFPC would comply with the general conditions and the specific discharge requirements (including sampling and treatment requirements) of the latest NPDES permit issued to Y-12. The introduction of new waste streams or water priority chemicals would require a revision of the NPDES permit, though this is not expected. Due to the small quantities of process water anticipated during LPF operations and Permit 1-91 and NPDES requirements, LPF operations would not be expected to contaminate sanitary wastewater or surface water.

45. *Commenter states that construction and operation waste, including special waste, will be transported to nearby waste facilities. Is there any protocol to ensure materials in transit to the waste storage facility do not escape and contaminate areas along roadways? If there is a spill, how will it be handled to ensure local roadways and ecosystems are properly protected?*

Response: As discussed in Section 3.12.1, Landfills IV and V can dispose of approved special waste. Approved special wastes have included asbestos materials, empty aerosol cans, materials contaminated with beryllium, glass, fly ash, coal pile runoff sludge, empty pesticide containers, and Steam Plant Wastewater Treatment Facility sludge. Disposal of special waste is approved on a case-by-case basis by the State of Tennessee. Construction and operation of the LPF would not generate any special waste or any hazardous or radiological wastes. Transportation of hazardous wastes are governed by federal and state regulations. If an emergency occurs, emergency responders are dispatched to the scene and trained technical and management staff are called to the Emergency Operations Center. Conditions are assessed to determine what actions are necessary to protect the public and the environment. Information about the emergency will be provided through social media, news releases, and Emergency Alert System messages. The Emergency Alert System messages will provide specific protective actions the public should take, if necessary, as directed by TEMA.

46. *Commenter states that the document should have sections added, including for the environmental impacts during implementation or construction, soil and groundwater contamination from historical industrial operations, conclusions, and recommendations sections.*

Response: Sections 3.2 through 3.14 of the EA present applicable information on the existing environmental conditions ("Affected Environment") for the resources analyzed. Existing contamination is discussed as appropriate. The purpose of the EA is to analyze the potential environmental impacts of the reasonable alternatives, not to make judgements regarding the "significance" of any impacts or recommendations.