ENVIRONMENTAL ASSESSMENT FOR THE OAK RIDGE ENHANCED TECHNOLOGY AND TRAINING CENTER

National Nuclear Security Administration

Draft
August 2020

TABLE OF CONTENTS

Section **Page**

LIST OF FIGURES

Figure **Page**

LIST OF TABLES

Table **Page**

ACRONYMS AND ABBREVIATIONS

ARAP	Aquatic Resource Alteration Permit
BLS	Bureau of Labor Statistics
BMP	Best Management Practices
BTU	British thermal units
CAA	*Clean Air Act of 1990*
CEQ	Council on Environmental Quality
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	Code of Federal Regulations
CNS	Consolidated Nuclear Security, LLC
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
CTF	Central Training Facility
dB	decibels
dBA	A-weighted decibels
DNL	Day-night Sound Level
DOE	U.S. Department of Energy
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERTF	Emergency Response Training Facility
ETTP	East Tennessee Technology Park
FEMA	Federal Emergency Management Agency
FIR	Federal Industry and Research
FONSI	finding of no significant impact
FR	*Federal Register*
GHG	greenhouse gas
gpm	gallons per minute
HPP	historic preservation plan
IPaC	Information for Planning and Consultation
kV	kilovolt
L_{eq}	Equivalent Sound Level
MBTA	*Migratory Bird Treaty Act*
MVA	megavolt-amperes
NAAQS	National Ambient Air Quality Standards
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
NOC	Notice of Coverage
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O_3	ozone
ORETTC	Oak Ridge Enhanced Technology and Training Center
ORIDB	Oak Ridge Industrial Development Board
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
ORUD	Oak Ridge Utility District
OST	Office of Secure Transportation
PA	Programmatic Agreement
PM_n	particulate matter less than or equal to n microns in aerodynamic diameter
PPE	personal protective equipment
psi	pounds per square inch
RCIDB	Roane County Industrial Development Board
RCRA	*Resource Conservation and Recovery Act*
ROD	Record of Decision
ROI	region-of-influence
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
SNRAF	Simulated Nuclear and Radiological Activities Facility
SR	State Route
SSP	Self-Sustaining Parcel
SWPPP	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
THC	Tennessee Historical Commission
TRTA	Technical Rescue Training Area
TVA	Tennessee Valley Authority
U.S.	United States
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFA	United States Fire Administration
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
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. In addition, NNSA works to reduce the global danger from weapons of mass destruction and responds to nuclear and radiological emergencies in the U.S. and abroad. The National Security Enterprise, overseen by the NNSA, includes production sites and design laboratories across the country. The Y-12 National Security Complex (Y-12), which is located on the Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee, is a critical production site, spanning 811 acres, 150 high-security acres, and 7.3 million square feet of laboratory, machining, dismantlement, and research and development and office areas.

In accordance with the Council on Environmental Quality (CEQ) regulations at 40 Code of Federal Regulations (CFR) Parts 1500−1508 and DOE *National Environmental Policy Act* (NEPA) implementing procedures at 10 CFR Part 1021, NNSA has prepared this environmental assessment (EA) to analyze the potential environmental impacts associated with constructing and operating the Oak Ridge Enhanced Technology and Training Center (ORETTC) to train first responders and other experts in nuclear operations, safeguards, and emergency response 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 (EA)

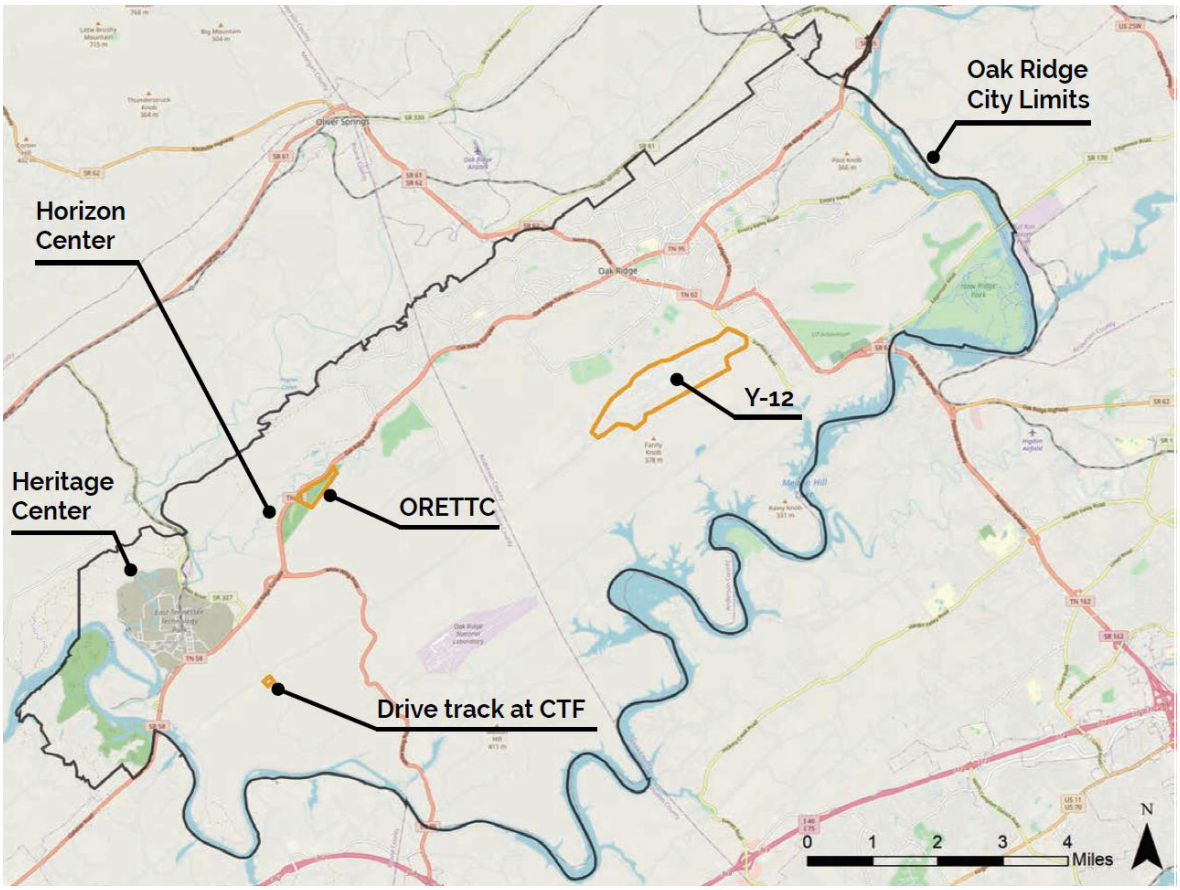
A primary purpose of an EA is to determine if a Proposed Action would have significant environmental impacts. If there would be none, no further NEPA documentation is required. If there would be significant environmental impacts, an EIS is required.

1.2 Purpose and Need for Agency Action

NNSA requires highly specialized industrial training facilities and equipment with national-level emergency response experts to train first responders and other experts in nuclear operations, safeguards, and emergency response to support the National Security Enterprise. Currently, such training occurs in bifurcated facilities at Y-12, across the National Security Enterprise, and in non-NNSA facilities across the country. The lack of a dedicated, centralized training facility reduces the effectiveness and efficiency of training. The ORETTC is envisioned as a state-of-the-art center with highly specialized industrial training facilities and equipment with national-level emergency response experts, which would differentiate this center from other training facilities. The ORETTC would act as the center of excellence for advanced emergency response training, high consequence operations, and processes that would challenge critical thinking and problem solving for key state, regional, national, and global collaborators (CNS 2020a). On average, approximately 200-250 personnel would be trained at the ORETTC daily, with a maximum capacity of 500 personnel.

1.3 Proposed Action Evaluated in this Environmental Assessment

NNSA's Proposed Action is to construct and operate the ORETTC on property currently owned by NNSA on the ORR, approximately 5 miles west of the main facilities at Y-12.[1] The proposed ORETTC facilities would be located on approximately 13.5 acres within an 81-acre area (known as Self-Sustaining Parcel [SSP]-2A) adjacent to the Oak Ridge Turnpike/State Route (SR) 95 (see Figure 1-1).[2] The ORETTC would consist of: (1) a Simulated Nuclear and Radiological Activities Facility (SNRAF) and a Technical Rescue Training Area (TRTA), consisting of a Live Burn Fire Tower and Rubble Pit to be developed by NNSA at the proposed site; (2) an Emergency Response Training Facility (ERTF) at the proposed site, which would be funded by the State of Tennessee and developed by the Roane County Industrial Development Board (RCIDB); (3) a maintenance building; and (4) utilities, roads, and supporting infrastructure. Although ownership of the proposed site has been transferred from ORR to NNSA,



Note: *see* Chapter 4 for a discussion of the Drive Track.
Source: CNS 2020a.

Figure 1-1. Location of Proposed ORETTC Facilities

[1] Legally, land is owned by the United States of America 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 the NNSA."
[2] SSP-2A is part of a larger 950-acre parcel known as SSP-2. As discussed in Section 2.1, SSP-2A was transferred to NNSA on June 8, 2020, for the purpose of siting the ORETTC on a 13.5 site within SSP-2A.

a portion of SSP-2A (approximately 24 acres) needs to be transferred from NNSA to the RCIDB for development of the ERTF (CNS 2020a). A detailed description of the Proposed Action is presented in Section 2.1.

1.4 Scope of this Environmental Assessment and Organization

In addition to analyzing the potential environmental impacts of NNSA's proposal to construct the NNSA-owned portions of the ORETTC, this EA analyzes the impacts associated with the proposed transfer of land (approximately 24 acres) from NNSA to the RCIDB for development of the ERTF. The construction and operation of the ERTF is a connected action, and is also evaluated as part of the Proposed Action in this EA.

The organization of this EA includes:

- 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 ORETTC 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).

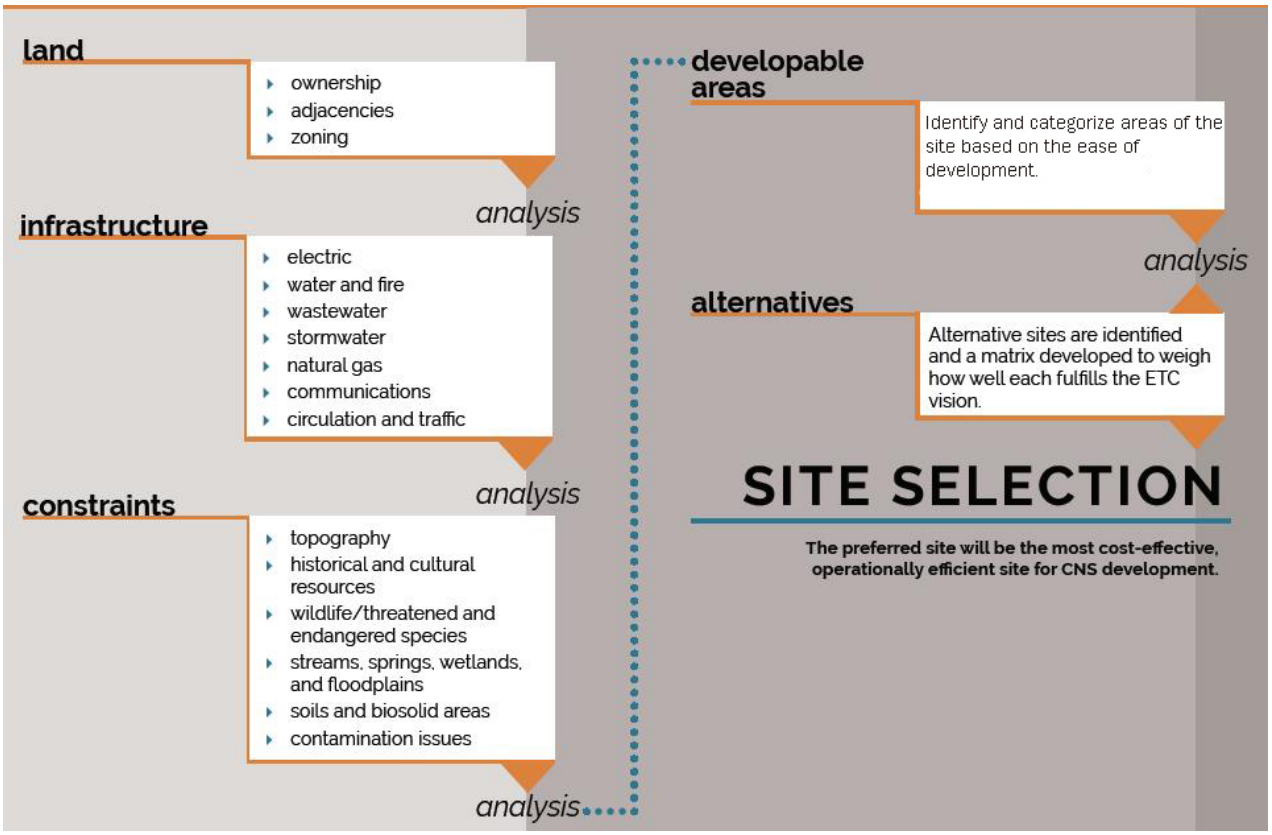
1.5 Public Participation

In August 2020, NNSA published this Draft EA on the NNSA NEPA web page (https://www.energy.gov/nnsa/nnsa-nepa-reading-room) 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 has provided an approximately 30-day comment period. NNSA will consider any comments received on the Draft EA when the Final EA is prepared.

2 PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action: Construct and Operate ORETTC at Proposed Site

As stated in Section 1.3, NNSA's Proposed Action is to construct and operate the ORETTC at the proposed site shown in Figure 1-1. The proposed site was identified through a detailed site-evaluation process which considered the following factors: land, infrastructure, constraints, developable areas, and alternatives (CNS 2020b). Figure 2-1 depicts the site-evaluation process. The proposed site was rated to be the most cost-effective and operationally efficient location for the ORETTC. Section 2.3 discusses other sites that were considered by NNSA for the ORETTC and explains why those sites were eliminated from consideration. In addition, Appendix A provides details on the site evaluation process and explains why the proposed site was selected.



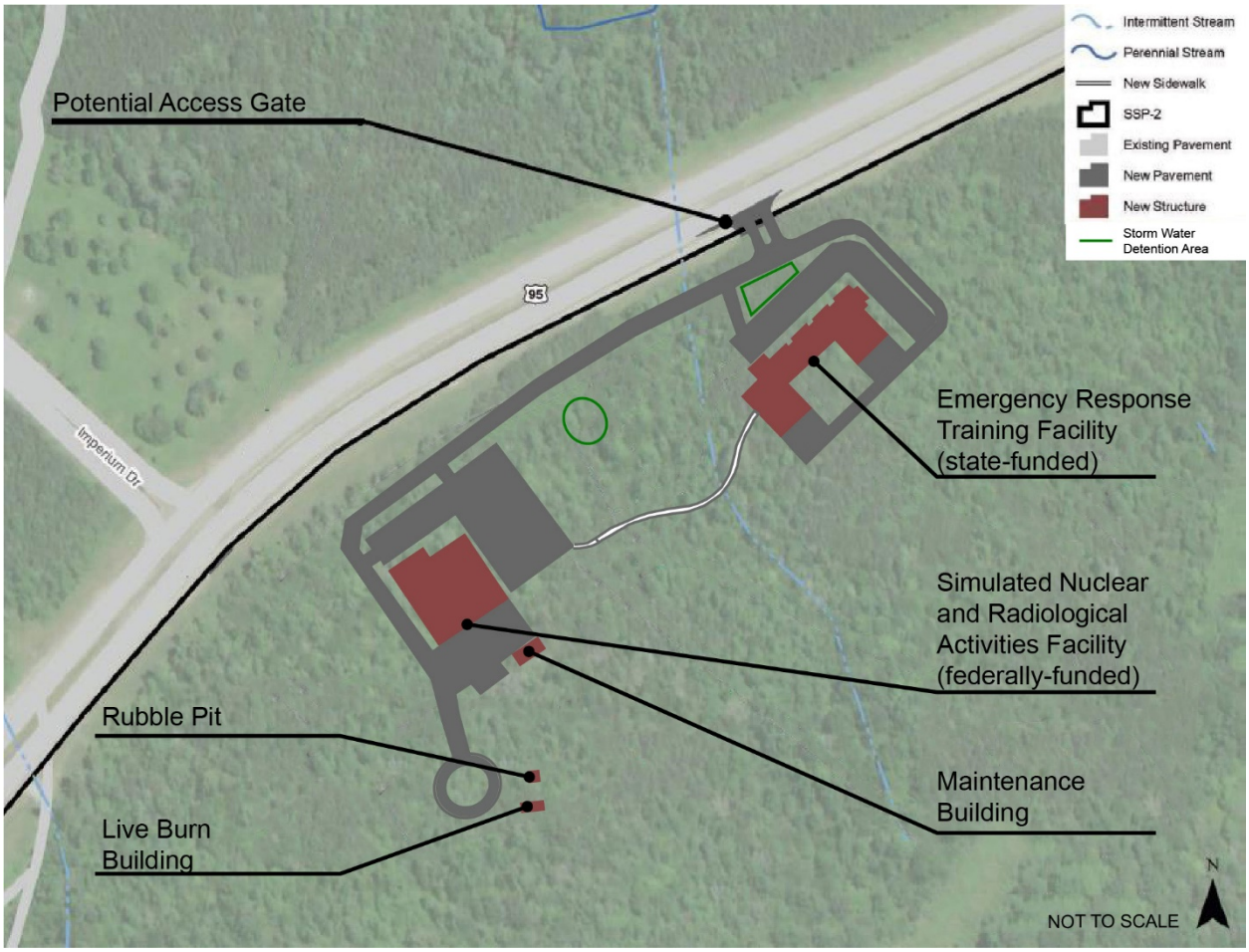
Source: CNS 2020b.

Figure 2-1. Site Evaluation Process for the ORETTC

As shown on Figure 2-2, the ORETTC facilities at the proposed site would consist of: (1) a federally-funded, NNSA-owned SNRAF (process and demonstration training facility) and a TRTA, consisting of a Live Burn Fire Tower and Rubble Pit; (2) a state-funded, RCIDB-owned ERTF; (3) a maintenance building; and (4) utilities, roads, and supporting infrastructure. The SNRAF would feature configurable space to support a variety of high-consequence emergency response training exercises, such as detection and disposition of an improvised explosive device. The ERTF would feature classroom and virtual reality tools to support NNSA and state training

desires. The TRTA would be used for firefighting training, including collapsed building and live fire training.

The proposed site for the ORETTC ("Alternative 1" in Section 2.3) is within an 81-acre area ("SSP-2A) within the ORR and the City of Oak Ridge city limits (Roane County). The land has minimal to moderate slopes and is heavily vegetated. This area is undisturbed, with no previous development, and no existing utilities. Ownership of SSP-2A has been transferred from the DOE Office of Science Consolidated Service Center to NNSA,[3] with a portion still to be transferred from NNSA to the RCIDB (approximately 24 acres) for development of the ERTF.



Source: Modified from CNS 2020a.

Figure 2-2. Conceptual Layout[4] of ORETTC Facilities at the Proposed Site

Construction. Construction activities for the ORETTC would start in November 2020 when hardwoods would be cleared. Site grading would begin in December 2020, followed by facility construction beginning in February 2021. Construction is expected to be completed in 18-months,

[3] On June 8, 2020, custody of SSP-2A was transferred from the DOE Office of Science Consolidated Service Center to NNSA after both organizations determined that the action was categorically excluded from further NEPA review (CX-ORR-24-001).

[4] Layout shown is conceptual and not intended to reflect the potential final design/layout.

in approximately mid-2022. The two main facilities— the SNRAF and the ERTF— would each be two-stories high and each approximately 40,000 square feet in size. Through the planning and design processes, the footprints for one or both facilities may change depending on interior configuration and funding. Each facility would have a dedicated parking lot with a capacity of approximately 200 vehicles at the SNRAF and approximately 100 vehicles at the ERTF. The facilities and parking lots would be joined by sidewalks (CNS 2020a). Table 2-1 presents notable parameters associated with the ORETTC construction, which also includes construction of the state-funded, RCIDB-owned ERTF.

As shown on Figure 2-2, access to the ORETTC would consist of a single frontage road with a single access gate from the Oak Ridge Turnpike approximately 1,200 feet northeast of Imperium Drive. This access would lead into the RCIDB-owned land, providing direct access to support construction. NNSA is continuing to investigate access requirements and will coordinate with the Tennessee Department of Transportation (TDOT) on the permitting for access to the ORETTC (CNS 2020a).

Table 2-1. Construction Requirements for ORETTC

Requirements	Consumption/Use
Total land disturbed during construction at proposed site (acres)	13.5
Permanent facility footprint, including roads, at proposed site (acres)	11.8
Stormwater/firefighting water detention ponds to be constructed at proposed site (acres)	≤1
Water requirement for construction (gallons/year)	1,100,000
Total construction employment (worker-years)	125
Peak construction employment (workers)	75
Construction period (years)	1.5 years

Source: CNS 2020c.

Operation. After the ORETTC is constructed, operations would be expected to begin in approximately mid-2022. The operational workforce at ORETTC (including the state-funded, RCIDB-owned ERTF) is estimated to be 20 persons. In addition, a daily average of 250 to a maximum of 500 personnel are expected to be trained at the ORETTC. Utilities required by the ORETTC would include: electricity, communications (internet and telephone), natural gas, potable and firefighting water, and firefighting water collection.

The Live Burn Fire Tower could utilize large volumes of water to conduct firefighting training at the ORETTC. According to the manufacturers of similar live burn buildings, average training operations with the burn building would likely utilize about 5,000 gallons per day.[5] A common way of managing the runoff from the fire training facilities is through ponds. A pond with a minimum volume of 15,000 cubic feet could be constructed on-site to manage the runoff from the fire training facilities. With regard to stormwater management, a detention pond with a volume of at least 12,000 cubic feet would manage the volume of stormwater runoff from the site. Consequently, two detention ponds– one with a volume of approximately 31,500 cubic feet and one with a volume of approximately 18,000 cubic feet– are proposed to accommodate both

[5] One day per week of live firefighting training is expected at ORETTC, resulting in approximately 5,000 gallons of water use for firefighting training, or approximately 250,000 gallons per year.

firefighting water and stormwater at the proposed site (*see* Figure 2-2).[6] Each pond would be less than one acre foot (43,560 cubic feet). The area the ponds would cover would be less than approximately one acre (CNS 2020c). Table 2-2 displays the operational requirements associated with the ORETTC, including the state-funded, RCIDB-owned ERTF.

Table 2-2. Operational Requirements for ORETTC

Requirements	Consumption/Use
Operational Workers (number of workers)	20
Average Number of Daily Trainees	250
Annual Electricity Use (kilowatt-hours)[a]	1,800,000
Potable Water Use (gallons/year)[b]	2,362,500
Firefighting training water use (average gallons/year)[c]	250,000
Natural gas use (cubic feet/year)[d]	1,920,000
Wastewater (gallons/year)[e]	2,000,000
Waste Generation	
Hazardous waste (yd^3/yr)	0
Nonhazardous waste (tons/yr)[f]	100

a. Based on 22.5 kilowatt-hours/square foot/year. The SNRAF and ERTF would total approximately 80,000 square feet.
b. Based on potable water use of 35 gallons/day/person.
c. Based on 5,000 gallons of water/week of firefighting training.
d. Based on 24 cubic feet/square foot/year. The SNRAF and ERTF would total approximately 80,000 square feet.
e. Based on wastewater generation of 25 gallons/person/day.
f. Based on generation of 3 pounds of nonhazardous waste/person/day.
Source: CNS 2020c.

2.2 No-Action Alternative

Under the No-Action Alternative, NNSA would not construct and operate the ORETTC. First responders and other experts in nuclear operations, safeguards, and emergency response would continue to be trained in facilities at Y-12, across the National Security Enterprise, and in non-NNSA facilities across the country.

2.3 Alternatives Considered but Eliminated from Detailed Analysis

In the process of developing the Proposed Action analyzed in this EA, NNSA considered siting alternatives for the ORETTC at: (1) another ORR location (i.e., the Central Training Facility [CTF], about 9 miles southwest of Y-12); (2) offsite near Bethel Valley Road and Scarborough Road; and (3) onsite at Y-12. Those locations were eliminated from detailed analysis for the reasons that follow.

A location at CTF was determined to be unreasonable because of site access restrictions to U.S. citizens and DOE's Office of Secure Transportation (OST) has reserved that site for other future uses.

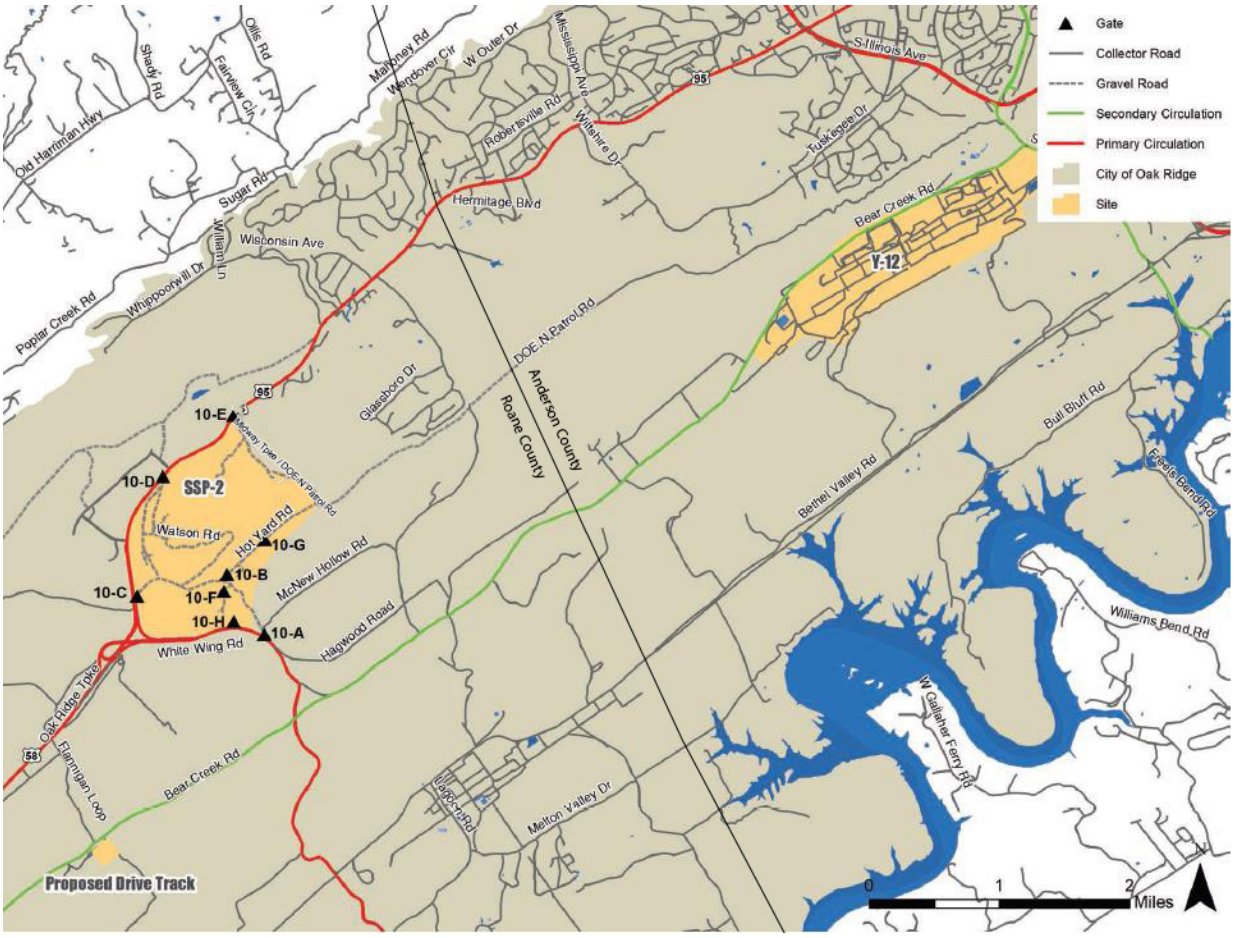
The Bethel Valley Road and Scarborough Road location had several notable disadvantages, including: (1) significant grading/backfill requirements; (2) inadequate utilities; and (3) location

[6] Depending upon final design, the western-most pond shown on Figure 2-2 could be moved further south, closer to the Live Burn Fire Tower.

in Anderson County, which would not allow the RCIDB to develop the state-funded project (CNS 2020c).

Locating the ORETTC at Y-12 was considered unreasonable because the site does not have the required number of contiguous acreage available to construct the ORETTC, as envisioned. In addition, access to the site for foreign national training would not be allowable. Lastly, NNSA would not have been able to provide a location on Y-12 for the ERTF, which is part of the state-federal partnership for the ORETTC.

With regard to the parcel of land evaluated in this EA, NNSA identified approximately 950 acres of undeveloped land for ORETTC siting consideration. That area is referred to as SSP-2 (*see* Figure 2-3).



Source: CNS 2020b.

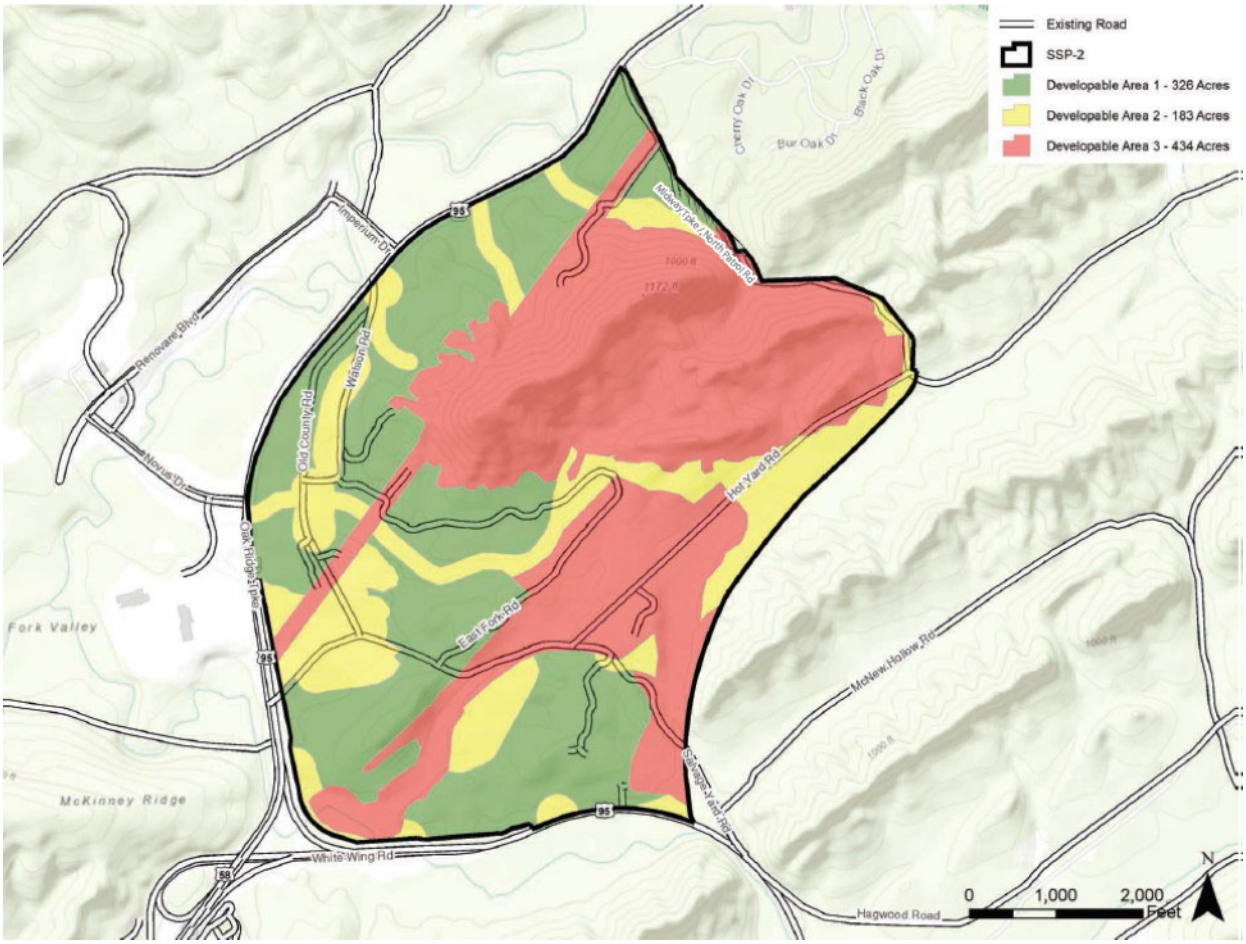
Figure 2-3. Self-Sustaining Parcel-2

Within SSP-2, NNSA characterized the available land into three development categories as shown on Figure 2-4:

- Developable Area 1 (None to Limited Constraints to Development): Land that can be developed with minimal remediation. May contain: minor roads; vegetation that must be cleared; relatively flat areas/minimal to moderate slopes.

- Developable Area 2 (Minor Constraints to Development): Land requiring additional costs and remediation in order to be developed, or that should be preserved. May contain: historical sites (plus 250-foot buffer); biosolid application fields; hydrological features (streams, springs, etc.) (100-foot buffer on streams); known protected fauna and flora habitat; moderately sloped areas.

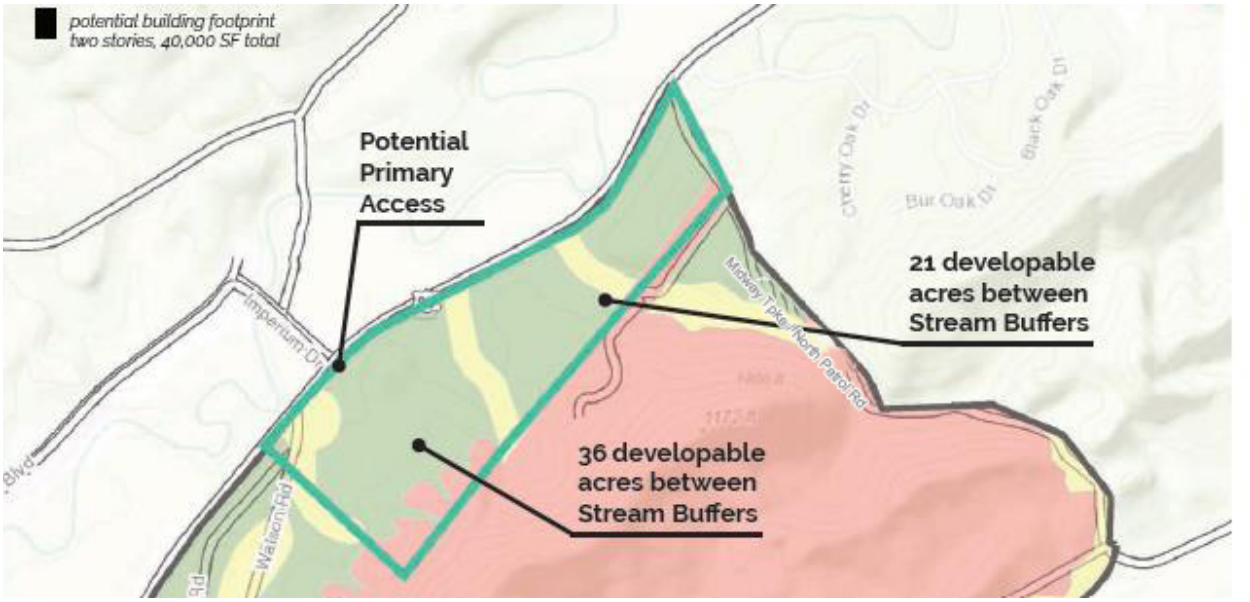
- Developable Area 3 (Major Constraints to Development): Land associated with significant costs or remediation, or areas not available for development. May contain: floodplains; highly-sloped areas (greater than 15 percent); transmission lines (plus 100-foot buffer).



Source: CNS 2020b.

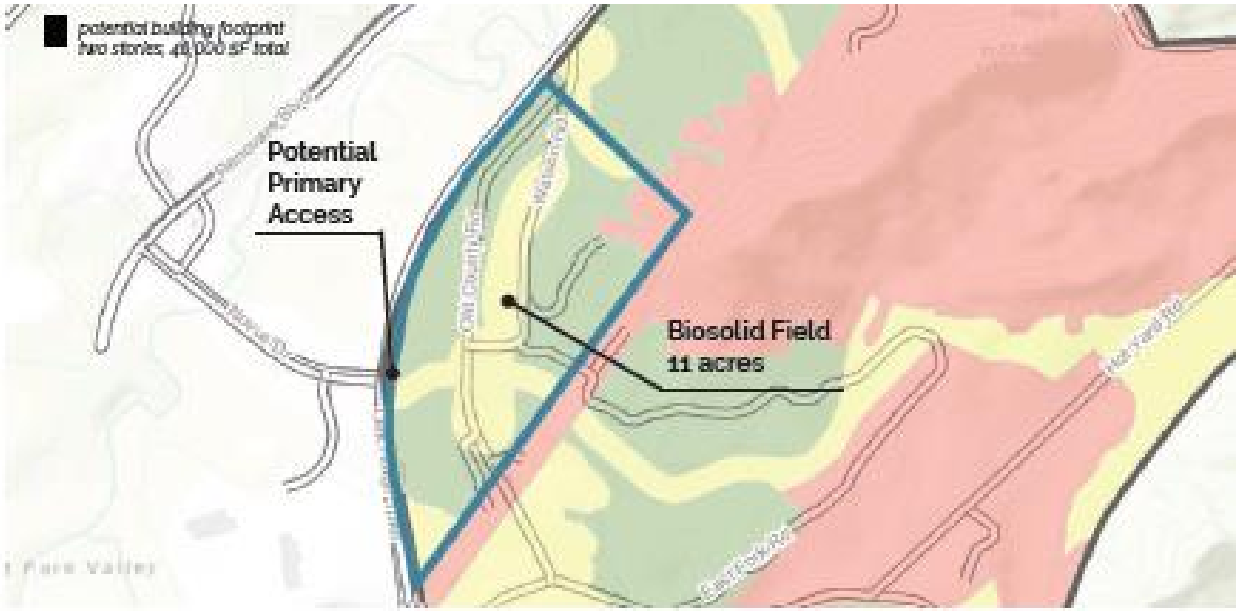
Figure 2-4. Developable Areas within Self Sustaining Parcel-2

Based on the developable areas within SSP-2, NNSA developed and considered four alternative configurations of the ORETTC, as shown in Figures 2-5 through 2-8. NNSA evaluated the four alternative configurations of the ORETTC against 20 criteria (including contiguous developable area, site access, proximity to utilities, and environmental considerations, such as the potential to impact cultural resources, endangered species, and wetlands). As discussed in detail in Appendix A, of the four alternative configurations of the ORETTC, Alternative 1 had the highest net advantages compared to disadvantages, and scored the highest in the comparative analysis. Alternative 1 offers a large portion of undeveloped land adjacent to the Oak Ridge Turnpike, offering ideal access and the least potential for costly- or time-consuming issues during the design-build process (CNS 2020b). Alternatives 2-4 scored the lowest in the comparative analysis. Consequently, those alternatives were eliminated from detailed analysis (CNS 2020b) (*see* Appendix A for more details concerning the site alternative selection process).



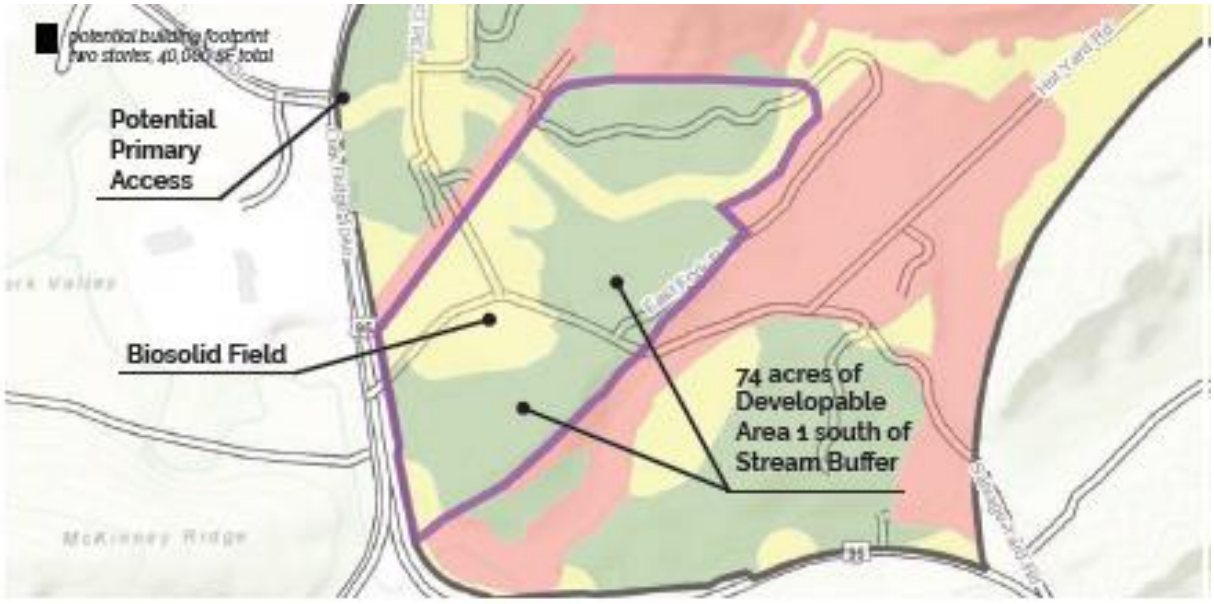
Source: CNS 2020b.

Figure 2-5. Alternative 1 (Proposed ORETTC Site)



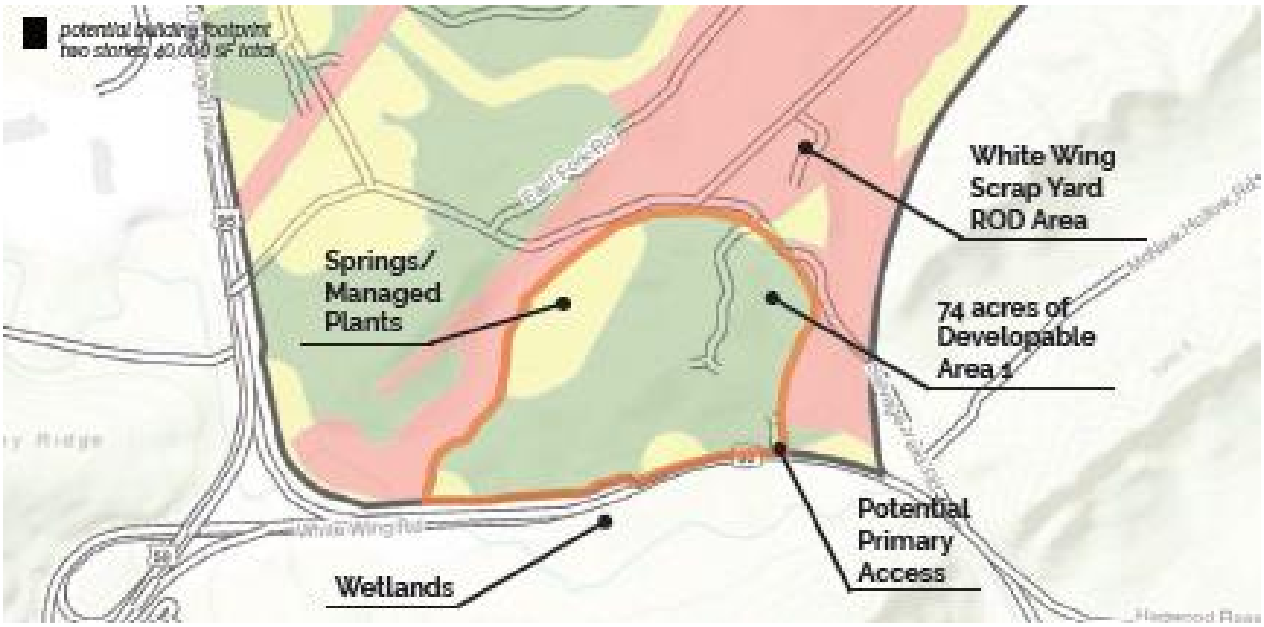
Source: CNS 2020b.

Figure 2-6. Alternative 2



Source: CNS 2020b.

Figure 2-7. Alternative 3



Source: CNS 2020b.

Figure 2-8. Alternative 4

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 (Alternative 1) and the No-Action Alternative. The affected or existing environment is the result of past and present activities in the area 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.[7] 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.

Sections 3.2 through 3.14 present the affected environment and potential environmental consequences for each of the resource areas analyzed in detail. 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, which are presented in Chapter 4, are impacts that result when the incremental impacts on resources from the Proposed Action are added to impacts that have occurred or could occur to that resource from other actions, including past, present, or reasonably foreseeable future actions.

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 and visual resources:** land use practices and land ownership information; visual resources in terms of land formations, vegetation, and the occurrence of unique natural views. The ROI for land use and visual resources is the ORETTC site and areas immediately adjacent to those sites.

  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 ORETTC site and areas immediately adjacent to those sites.

[7] The analysis in this EA includes construction and operation of both the NNSA facilities at the ORETTC as well as the state-funded, RCIDB-owned ERTF.

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

- **Meteorology, air quality, and noise:** climatic conditions such as temperature and precipitation, the quality of the air, and greenhouse gas emissions; baseline noise environment for the ORETTC site. The ROI for meteorology, air quality, and noise is the ORETTC site and nearby offsite areas within Roane 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 ORETTC site 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 ORETTC 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 ORR workforce resides.

- **Waste management:** solid waste generation and management practices. The ROI for waste management is ORR 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 potential accident scenarios. Because the proposed ORETTC would not utilize releasable quantities of radiological materials[8] nor any significant quantities of hazardous materials, no potential impacts related to health, safety, and accidents are expected to occur offsite. Consequently, the human health and safety analysis focuses on impacts to workers and training personnel, and the ROI is the ORETTC site.

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

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

[8] Limited sealed sources will be utilized for training purposes and stored on-site. A sealed source is radioactive material that is permanently sealed in a capsule or bonded and in a solid form. The capsule of a sealed radioactive source is designed to prevent the radioactive material from escaping or being released during normal usage and under probable accident conditions.

3.2 Land Use

3.2.1 Affected Environment

This section summarizes existing onsite and surrounding land uses at the proposed ORETTC site as well as adopted land use plans applicable to surrounding areas. It also describes local land use plans and city programs. The proposed ORETTC site is within an 81-acre undeveloped parcel ("SSP-2A") on the ORR which lies entirely within the city limits of Oak Ridge in Roane County. The proposed site is 25 miles west of Knoxville, Tennessee, five miles west of Y-12, and three miles northwest of the Oak Ridge National Laboratory (ORNL). It is a greenfield site, unconstrained by previous development with minimal to moderate slopes. Figure 3-1 highlights the proposed site for the ORETTC.

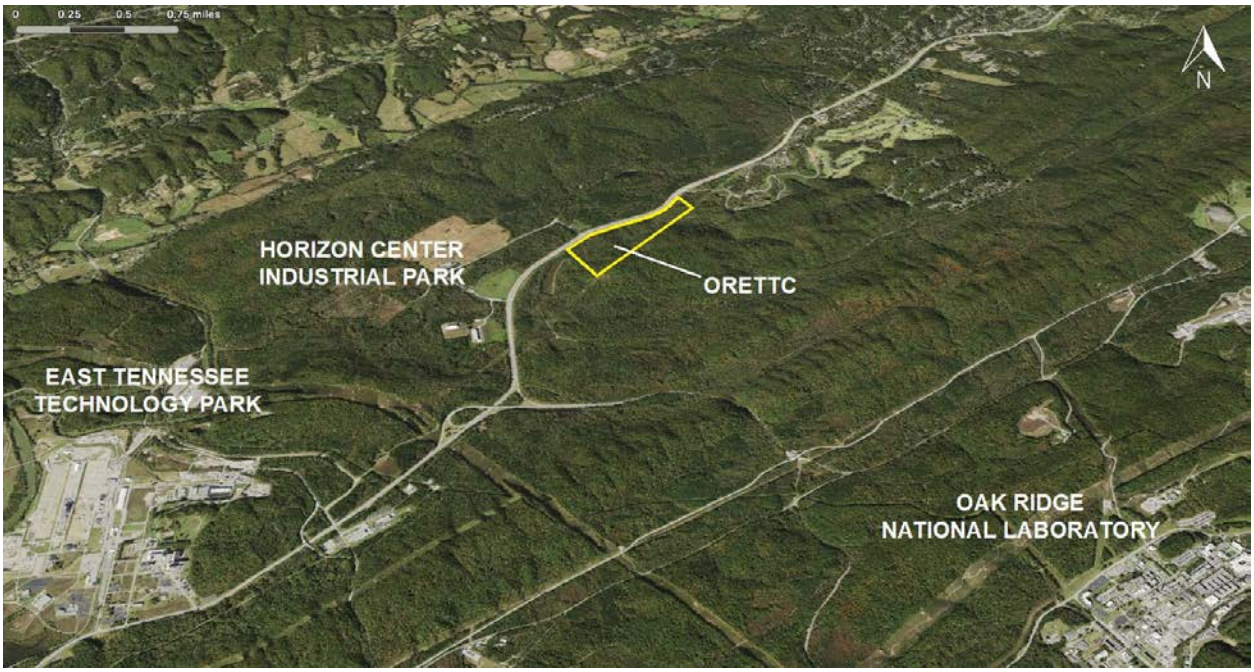
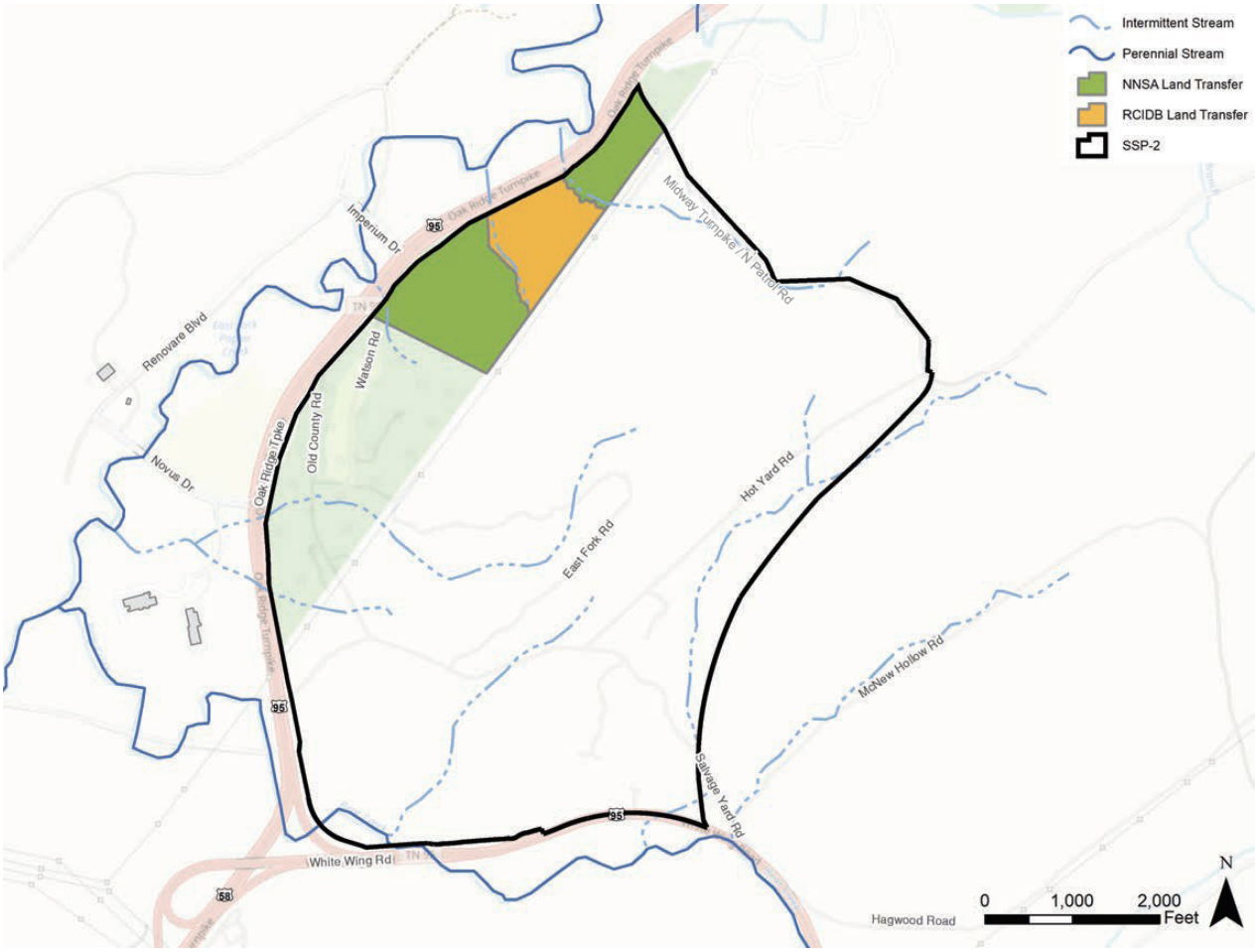


Figure 3-1. Aerial View of Proposed ORETTC Site

The proposed site is bounded by Oak Ridge Turnpike/SR 95 to the northwest and Midway Turnpike/North Patrol Road to the northeast. The remaining portions of the site are constrained by topography and vegetation to the southwest and southeast and buffered against encroachment by a 950-acre parcel owned by DOE known as SSP-2 and outlined in Figure 3-2.

The entire ORR, which includes the proposed ORETTC site, was designated a *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) site by EPA in 1989. The proposed ORETTC site has never had any hazardous substance stored on it for 1 year or more, is not known to have released any hazardous substance, or been used to dispose of any hazardous substance. This was confirmed in a Baseline Environmental Survey (DOE 2013) conducted in 2013. According to that Baseline Environmental Survey, DOE identified no evidence of past activities involving hazardous substances prior to federal land acquisition. Post-acquisition activities primarily include ecological and environmental studies that resulted in no unacceptable

contamination, though several areas have been environmentally contaminated by activities involving hazardous substances. DOE has determined the parcels satisfy the statutory criteria for identification of the parcel as uncontaminated by hazardous substances (DOE 2013).

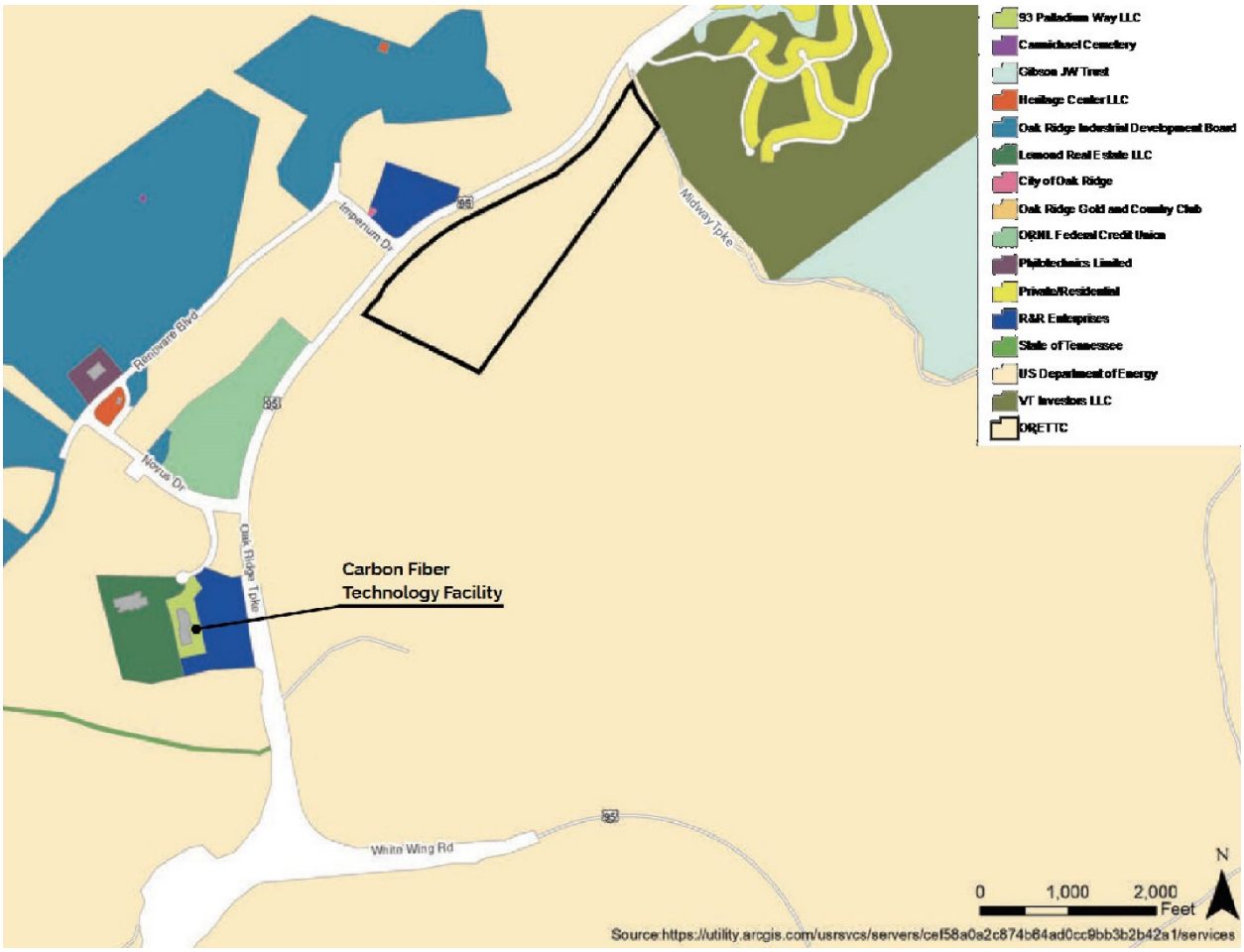


Source: CNS 2020a.

Figure 3-2. ORETTC Land Transfer Map

Land Ownership. The ORETTC site is currently part of the ORR, which is managed by the DOE Office of Science Consolidated Service Center. The entire 81-acre SSP-2A parcel (which is part of SSP-2) was previously transferred from the DOE Office of Science Consolidated Service Center to the NNSA. A second land transfer would change ownership of an approximately 24-acre area from NNSA to the RCIDB. This must be completed prior to initiation of construction of the state-funded ERTF. This area is bounded by the centerline of the intermittent streams. The NNSA would retain the remaining acres as depicted in Figure 3-2.

Figure 3-3 shows the land ownership of adjacent properties and properties in the general vicinity. The majority of land surrounding and bordering the proposed ORETTC is owned by DOE. The land north and west of the proposed ORETTC is part of the Horizon Center Industrial Park. ORIDB manages the Horizon Center Industrial Park, which is focused on development as research facilities, light manufacturing, and office space. The land east of ORETTC is private/residential.



Source: CNS 2020a.

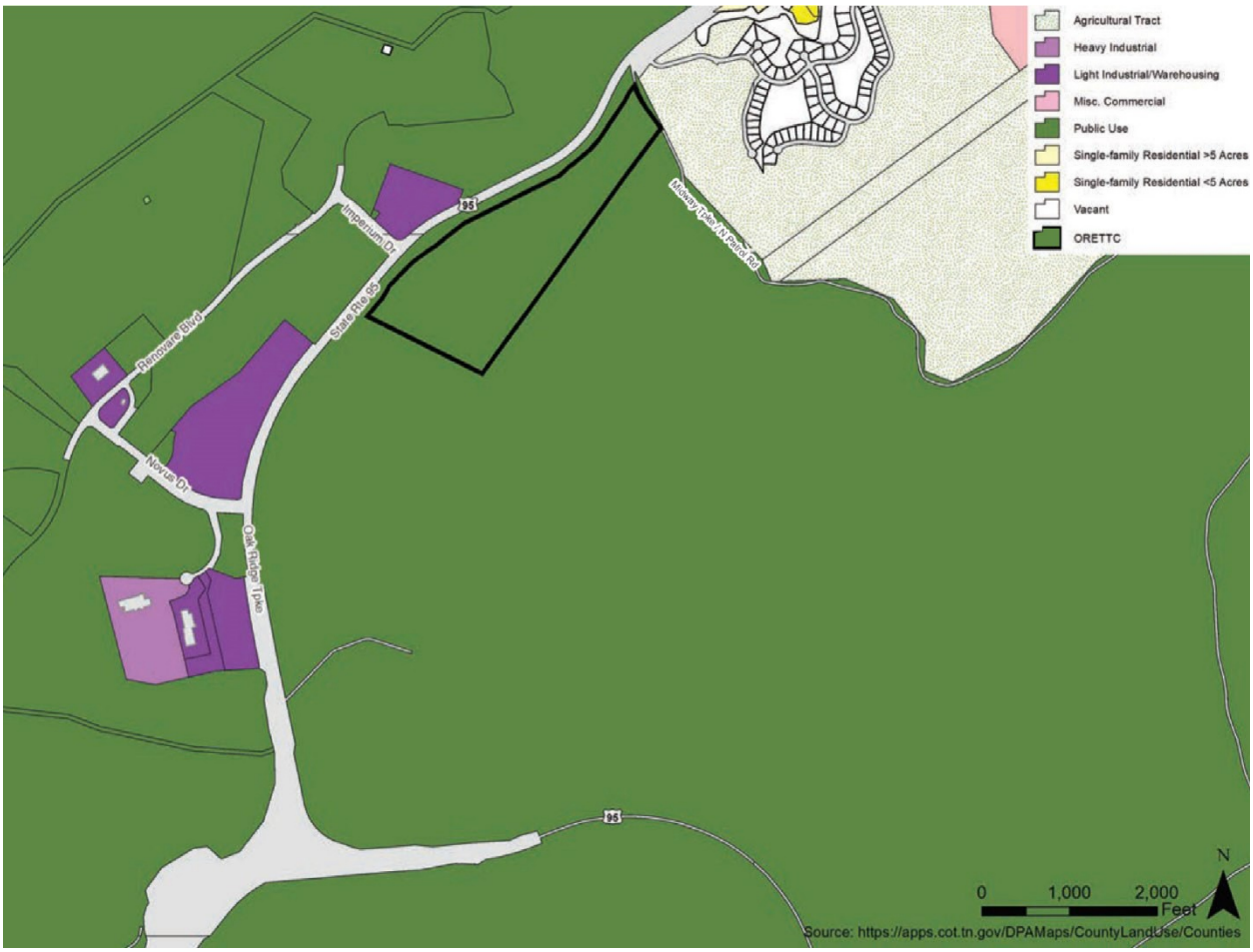
Figure 3-3. ORETTC Land Ownership

Planning. The City of Oak Ridge Comprehensive Plan, updated in 1988 and amended in 1997, includes a Land Use and Development Plan that identifies the ORETTC site as Open Space-Park. While the Plan does not list a specific definition for Open Space, it does define Undeveloped area: "Intended to be undeveloped or used for agriculture or similar activity. May also include occasional, isolated residences with no public sewer or water connection. For DOE property, this category would allow scattered storage or similar activity (CNS 2020a).

Figure 3-4 displays the land use of the area surrounding the ORETTC. The area in green is government-owned (i.e., DOE-owned) and classified as public use. Public use is defined simply as "Parcels owned by either the federal, state, county, or city government." Y-12 is also considered public use. The dark- and light-purple areas are industrial sites that were transferred from the ORIDB's Horizon Center complex. The land to the northeast across Midway Turnpike[9] is

[9] Midway Turnpike is also referred to as "North Patrol Road."

classified as an Agricultural Tract. According to the Tennessee Property Viewer, this land is owned by VT Investors LLC. The Rarity Oaks Subdivision lies within this area (CNS 2020a).



Source: CNS 2020a.

Figure 3-4. ORETTC Land Use

Zoning. The proposed ORETTC site falls into the Federal Industry and Research (FIR) zoning district. Per the City of Oak Ridge Zoning Ordinance, which was last amended in 2019, the FIR district is assigned to areas of the city that are part of the ORR. The ordinance does not provide guidelines on use within the FIR district. If land is transferred from NNSA to the RCIDB for construction and operation of the state-funded ERTF, a zoning change would be required for the transferred land. In that case, "the City of Oak Ridge Regional Planning Commission shall study and make recommendations to City Council concerning the appropriate zoning district designation. Upon receipt of such recommendation, the City Council shall, after public hearings as required by law, adopt an ordinance establishing the zoning district classification as other than FIR" (CNS 2020a).

The nearby Horizon Center is zoned as Industrial (IND-2), which is defined as a general industrial district "established to provide areas in which the principal use of land is for processing,

manufacturing, assembling, fabrication and for warehousing." The permitted primary uses for IND-2 include manufacturing; warehousing and wholesaling facilities; offices, administrative, technical, and professional services; public utility facilities; broadcasting, publishing, recording, and telecommunications; storage facilities for coal, coke, building material, sand, gravel, stone, lumber, open storage of construction contractor equipment and supplies and junk yards; medical isotope manufacturing; and kennel (CNS 2020a).

Per the Oak Ridge Zoning Ordinance Section 8.02, IND-2 regulations include the following: a maximum usable floor area to lot area of 60 percent where usable floor area for nonresidential uses shall be to the exterior face of exterior walls on the first story and any other story connected by a fixed stairway or elevator and shall include the floor area of all accessory buildings measured similarly a minimum setback of 30 feet from the front and 25 feet from the side and rear of buildings, where setback refers to means an open space that must be maintained from the property line. FIR regulations do not include usable floor area to lot area ratio or setbacks (CNS 2020a).

3.2.2 Proposed Action Impacts

Approximately 25,000 of the ORR's roughly 33,500 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. At the time of initial acquisition in the 1940s, the landscape was primarily agrarian in nature and generally considered to be about 50 percent forested. In 1994, remote-sensing analyses revealed an expansion of forest cover to about 70 percent of the ORR (Mann et al. 1996).

The total land disturbed during the construction phase of the ORETTC site would be 13.5 acres, or approximately 0.05 percent of the total forest land at ORR. The permanent footprint of the facility including roads would be 11.8 acres. No change to the zoning designation for the DOE-owned land would be required, and use of the DOE-owned land for the ORETTC would be consistent with the current zoning designation and historic uses of ORR land. A zoning change would be required for the 24-acre area that would be transferred from NNSA to the RCIDB for construction and operation of the state-funded ERTF. As discussed in Section 3.2.1, the City of Oak Ridge Regional Planning Commission would study and make recommendations to the City Council concerning the appropriate zoning district designation. It is likely that parcel would be zoned IND-2, consistent with the zoning for the nearby Horizon Center. Because hazardous substance were not stored for 1 year or more, or were not known to have been released or disposed of on that parcel, Section 120(h) of CERCLA would not apply to the transfer of land from NNSA to the RCIDB. NNSA does not anticipate that any land use controls would be required for the property transfer, although such issues are beyond the scope of this EA.

3.2.3 No-Action Alternative Impacts

Under the No-Action Alternative, no new facilities would be constructed. Land use would remain as is, there would be no land disturbance, and no property transfer from NNSA to RCIDB.

3.3 Visual Resources

3.3.1 Affected Environment

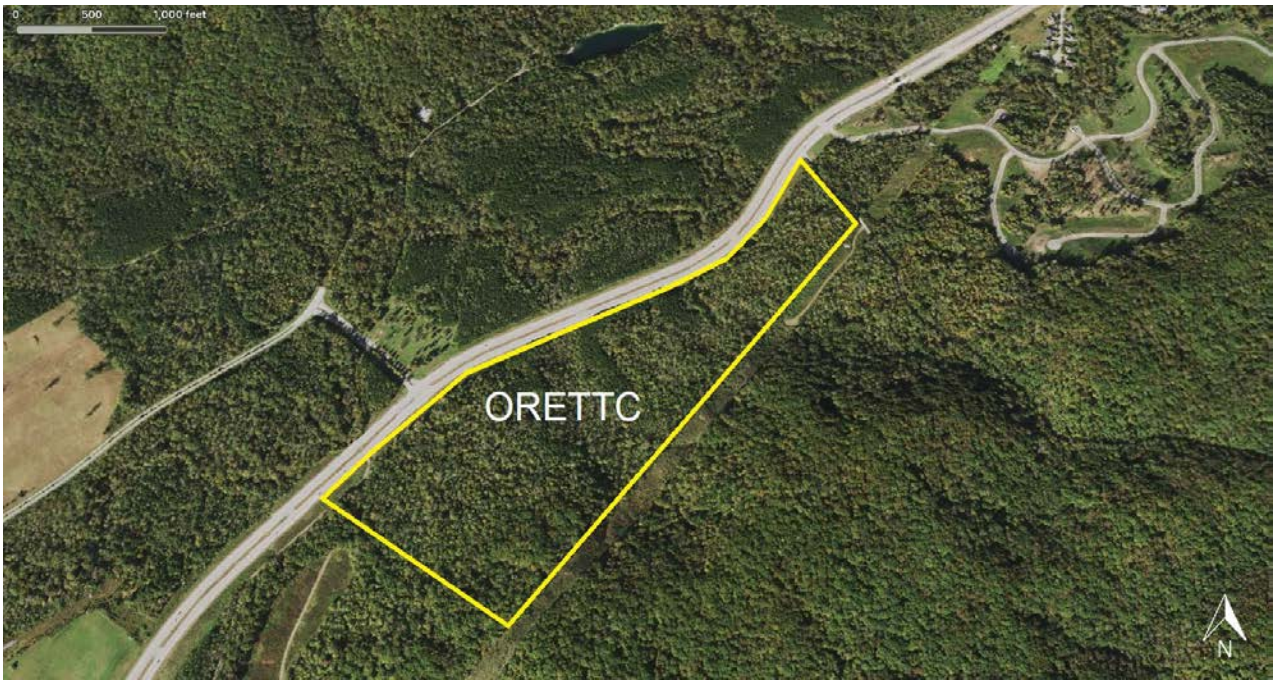
The scenic quality or character of an area consists of the landscape features and social environment from which they are viewed. The landscape features that define an area of high visual quality may be natural, such as mountain views, or man-made, such as city skyline. To assess the quality of visual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

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 ORETTC site.

Oak Ridge lies in the Valley and Ridge geographic region, and the majority of Roane County is of Ordovician-Cambrian geologic age. A series of parallel narrow, elongated ridges and valleys follow a northeast-to-southwest trend in the Oak Ridge area. The topographic relief between valley floors and ridge crests is generally about 300 to 350 feet. The proposed ORETTC site is located in the East Fork Valley between Black Oak Ridge and East Fork Ridge at an elevation of approximately 800 feet. Topography in this valley is relatively flat, characterized by dense forests and mountain streams. As shown in Figures 3-1 and 3-5, the proposed ORETTC site is largely wooded and unremarkable and indistinguishable from the woodlands of the surrounding areas.



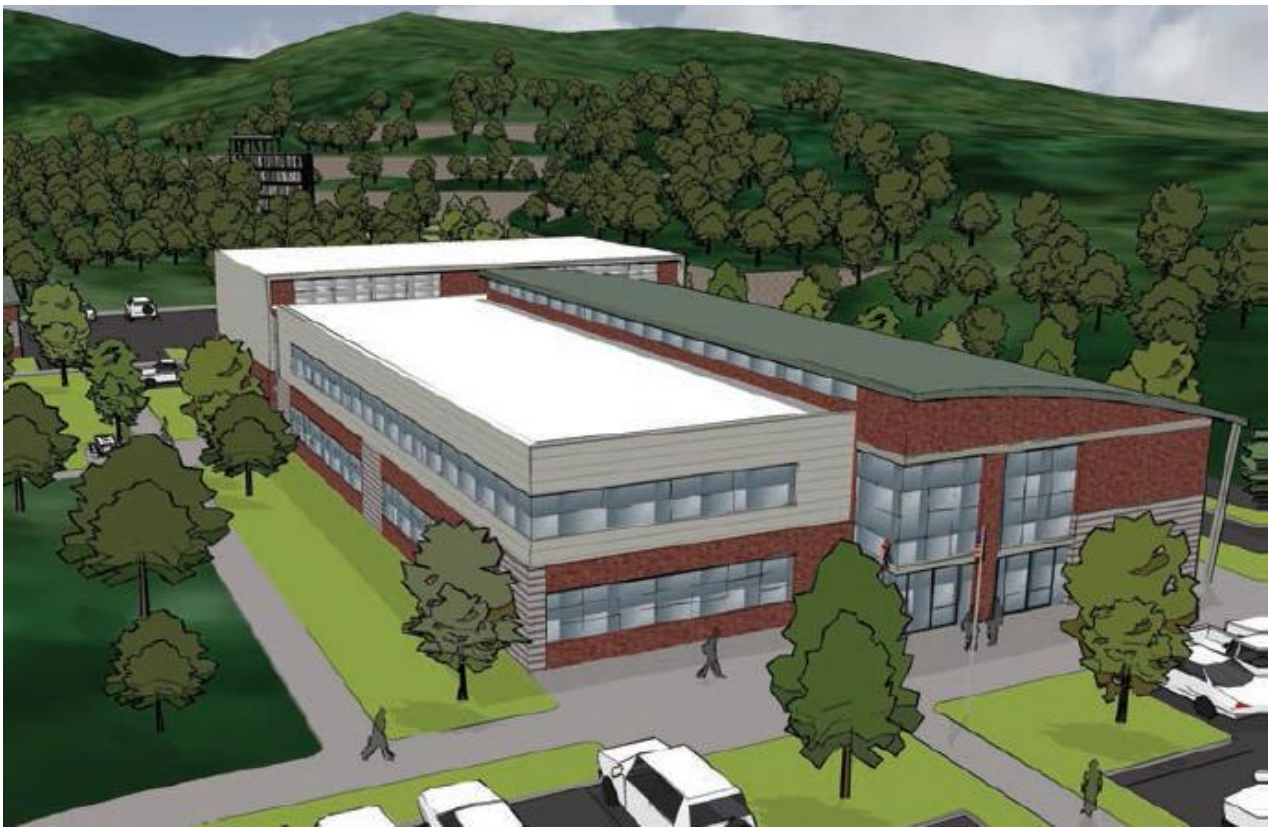
Source: CNS 2020a.

Figure 3-5. Proposed ORETTC Site

3.3.2 Proposed Action Impacts

Development and building design at the ORETTC would be driven by function and purpose and would attempt to create a community hub and campus-like feel. Pedestrian paths and native plantings would be used to enhance the campus and welcome visitors. Figures 3-6 and 3-7 depict preliminary architectural elevations of the two primary ORETTC facilities, the SNRAF and ERTF. Because the ORETTC site is a greenfield site and there are few buildings in the vicinity, there are no common architectural styles to which to adhere. Nearby facilities are zoned Industrial, and their exteriors reflect their use.

The ORETTC facilities would be set back from the site boundary and screened from viewsheds and motor vehicle traffic by existing and new vegetation. Viewsheds in the area around the ORETTC are severely constrained by topography and vegetation. The ORETTC access gate would be visible from the Oak Ridge Turnpike, and the two primary structures may also be visible from the road. Vegetative screening and topography would obscure many of the features associated with the ORETTC, particularly the Live Burn Fire Tower, which would be set back farthest from the Oak Ridge Turnpike. Figure 3-8 shows a vehicular view of the proposed site entrance at the intersection of the Oak Ridge Turnpike and Imperium Drive.



Source: CNS 2020a.

Figure 3-6. Rendering of the Simulated Nuclear and Radiological Activities Facility (looking south toward the Live Burn Fire Tower)

Source: CNS 2020a.

Figure 3-7. Rendering of the Emergency Response Training Facility (looking northwest toward the Oak Ridge Turnpike)

Figure 3-8. View South along Oak Ridge Turnpike at Intersection of Imperium Drive

3.3.3 No-Action Alternative Impacts

Under the No-Action Alternative, no new facilities would be constructed. There would be no changes to existing visual resources.

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 10 microns in diameter [PM_{10}] and particulate matter less than 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 U.S. Environmental Protection Agency (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 Roane County, which is used as the ROI for the air quality analysis. According to EPA, Roane County is in attainment for all criteria pollutants (EPA 2020a). Roane 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 Roane County, TN

Area	Criteria pollutant (tons/year)					
	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOCs
Roane County	17,087	4,369	2,632	1,242	1,778	12,514

Source: EPA 2017.

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."

At this time, a threshold of significance has not been established for the emissions of GHGs. Baseline GHG emissions, which are represented by CO_2e, for Roane County and the State of Tennessee, are presented in Table 3-2.

Table 3-2. Baseline Greenhouse Gas Emissions Inventory for Roane County, TN

Area	Greenhouse gases (million metric tons/year)
	CO_2e
Roane County	5.8
Tennessee	99.8

Source: USEIA 2018.

3.4.2 Proposed Action Impacts

There would be short- and long-term less than significant 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 new facilities. 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 emissions were estimated for fugitive dust, on- and off-road diesel equipment and vehicles, worker trips, and paving off-gasses for the 18-month construction duration (Table 3-3). 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.

No new stationary sources of air emissions would be associated with the ORETTC. During construction, NNSA would take reasonable precautions to prevent fugitive dust from becoming airborne. Reasonable precautions might include using water to control dust from land clearing, building construction, and road grading.

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

Activity/Source	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	*De Minimis Threshold* [tpy]	Exceeds *De Minimis* Thresholds? [Yes/No]
Construction Emissions	3.9	3.9	2.5	<0.1	17.7	0.2	100	No
Operational Emission	6.9	0.8	0.6	<0.1	<0.1	<0.1	100	No

Source: USAF 2020.

Operational emissions were estimated for changes in heated/cooled space and emissions associated with commuting workers and training personnel. 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. The estimated emissions from the Proposed Action would be below the *de minimis* thresholds; therefore, the level of effects would be minor.

The ORETTC would conduct live firefighting drills on a weekly basis, with approximately one live burn weekly. The fires associated with those drills would typically last less than one hour. The live fires would be created with pre-constructed smoke boxes and would not be created with natural gas or burning structures. The smoke plume created from the fire would be a contributor to potential air contamination. Smoke is a mix of particles and chemicals produced by incomplete burning of carbon-containing materials. The same pollutants that are found in smoke from fires are commonly found in the air from sources such as vehicles, power plants, factories, incinerators, restaurants, and wood stoves. A major difference between pollutants released to air from these sources and smoke from fires is that smoke from fires is often more concentrated and poses more of an immediate, short-term health concern to someone breathing it (Purser et al., 2015). No hazardous air pollutants would be emitted from the ORETTC.

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 3-4 compares the estimated GHG emissions from the Proposed Action compared to the global, nationwide, and statewide GHG emissions. The estimated increase would be minimal.

Table 3-4. Global, Countrywide, and Statewide GHG Emissions

Scale	CO_2e Emissions (million metric tons/year)	Change from the Proposed Action
Global	43,125	0.000002%
United States	6,870	0.00001%
Tennessee	99.8	0.001%
Roane County, Tennessee	5.8	0.01%
Proposed Action	0.00085	-

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 3-5 outlines potential climate stressors and their effects from the construction and operation of the ORETTC. The proposed ORETTC 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 3-5. Effects of Potential Climate Stressors

Potential Climate Stressor	Effects on the Proposed ORETTC
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 3-6.

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.

Table 3-6. 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 *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. Neither the state of Tennessee, nor Roane County, maintain noise ordinances that set strict not-to-exceed levels.

Because the proposed ORETTC site is a greenfield site, there are no existing noise sources. There are no sensitive noise receptors (schools, churches, daycare facilities, etc.) within 1 mile of the proposed ORETTC site. The nearest sensitive noise receptor is the George Jones Memorial Baptist Church, which is approximately 1.5 miles southwest of the proposed ORETTC site. The nearest residence to the proposed ORETTC site is approximately 0.75 miles to the northeast, separated by relatively dense trees. That residence is approximately 100 yards south of the Oak Ridge Turnpike, so baseline traffic noise is relatively high near that residence.

3.5.2 Proposed Action Impacts

Construction of the ORETTC would require site preparation and construction of facilities and roads. Maximum noise levels generated by construction equipment types commonly used on this type of project are listed in Table 3-7 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.

The area surrounding the proposed ORETTC is generally used for industrial purposes or transportation corridor (Oak Ridge Turnpike) and is not considered to be noise sensitive. The construction activities associated with the proposed ORETTC would take place in an industrial area that is relatively insensitive to noise. Construction noise would be temporary, lasting only approximately 1.5 years.

Table 3-7. 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.

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.

No long-term increases in the overall noise environment (e.g., L_{eq}) would be expected with the operation of the ORETTC. Most training activities would occur within the SNRAF and the ERTF. Drills conducted at the rubble pit and Live Burn Fire Tower would generate minimal noises that would generally be of short duration and not daily occurrences. There would be no major sources of noise from the ORETTC; therefore, no long-term changes in the noise environment would occur.

3.5.3 No-Action Alternative

Under the No-Action Alternative, no new facilities would be constructed. There would be no impacts to noise resources.

3.6 Water Resources

3.6.1 Affected Environment

Groundwater. The water table at the ORR generally mimics topography with shallow groundwater flowing from higher topographic areas to the nearby surface water bodies. Groundwater flow through bedrock is primarily controlled by fractures, bedding planes, and hydraulic gradient, and specific flow paths are difficult to discern; however, investigations on the ORR have shown that a primary flow direction is along geologic strike (DOE 2018).

Although there are no groundwater monitoring wells at the proposed ORETTC site, based on the topography, fault orientation, and stream drainage, groundwater is expected to flow to the west-southwest towards the East Fork Poplar Creek, a tributary to Poplar Creek, which drains to the Clinch River. Due to the site's location within the East Fork valley and proximity to the East Fork Poplar Creek, groundwater is expected at shallow depth (ORNL 2006). Groundwater studies for the ORR have not identified any groundwater contamination issues near the ORETTC site. In general, groundwater contamination issues within the industrialized areas of the ORR including East Tennessee Technology Park (ETTP), Y-12, and ORNL have been identified. The ORETTC site has not been developed, and is hydraulically upgradient or at distance from these industrial areas, and therefore groundwater contamination is not expected. The ORETTC site is located in the Chickamauga Formation, which is considered an aquitard because of its low permeability. The ORETTC site is about 3.5 miles northwest of a source water protection area for groundwater in Bethel Valley (ORNL 2006). According to that Baseline Environmental Survey, DOE identified no evidence of unacceptable contamination at the proposed site, including from biosolid fields located within SSP-2 (DOE 2013).

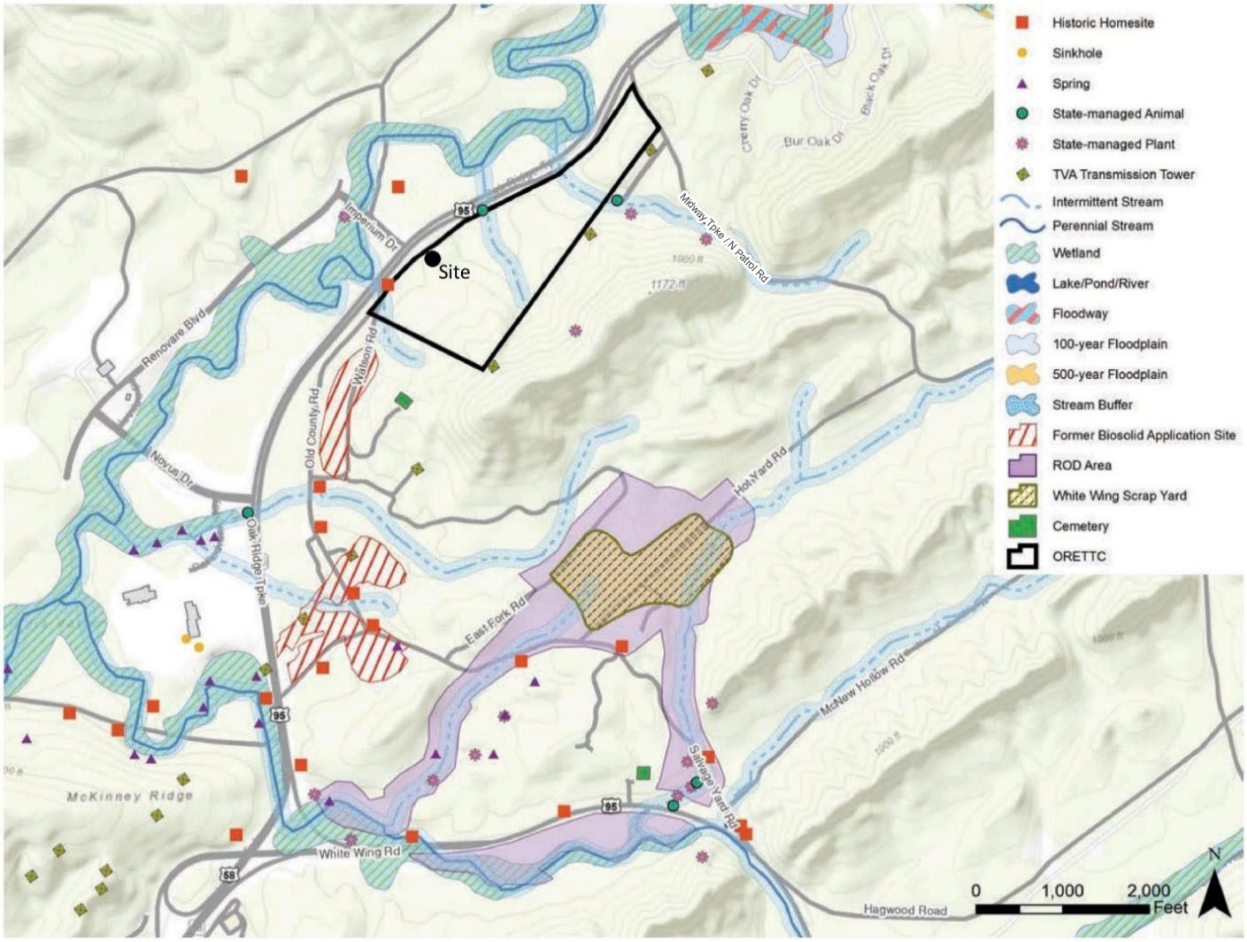
Surface water. The project is located in the Lower Clinch River watershed. Waters drained from the ORR eventually reach the Tennessee River via the Clinch River, which forms the southern and eastern boundaries of the ORR. Surface-water hydrology on the ORR is characterized by a network of small streams that are tributaries of the Clinch River. Water levels in the Clinch River

are regulated by the Tennessee Valley Authority (TVA), and fluctuations in the river can have an effect on streams draining the ORR (DOE 2018).

As shown in Figure 3-9, there are three streams within the ORETTC site, which flow north/northwest to East Fork Poplar Creek. Recent preliminary surveys classify the northern-most stream as perennial, the central stream as perennial along its lower portion, and the southern stream as ephemeral. Additionally, several springs were identified within the stream riparian areas (Figure 3-10). The East Fork Poplar Creek discharges into Poplar Creek east of ETTP, which passes through the ETTP discharging directly into the Clinch River.

The ORETTC site and vicinity were investigated as part of the East Fork Ridge/White Wing (Parcel 4a) investigations during an Environmental Baseline Survey Report completed in 2013. Five surface water samples were collected during this study and analyzed for metals and uranium. The study concluded that low-level metal detections were natural or pre-date federal acquisition; and uranium detections represent potential contamination from the White Wing Scrapyard. The study determined an acceptable human health risk and no further ecological evaluation was warranted. An all-media no-further-investigation determination was recommended (DOE 2013).

Wetlands. The U.S. Army Corps of Engineers (USACE) defines wetlands as "those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Environmental Laboratory 1987). Wetlands usually include swamps, marshes, bogs, and similar areas. In identifying a wetland, three characteristics should be met. First is the presence of hydrophytic vegetation that has morphological or physiological adaptations to grow, compete, or persist in anaerobic soil conditions. Second, hydric soils are present and possess characteristics that are associated with reducing soil conditions. Third, the area is influenced by wetland hydrology, meaning the area is inundated or saturated to the surface at some time during the growing season of the prevalent vegetation (Environmental Laboratory 1987; USACE 2012).

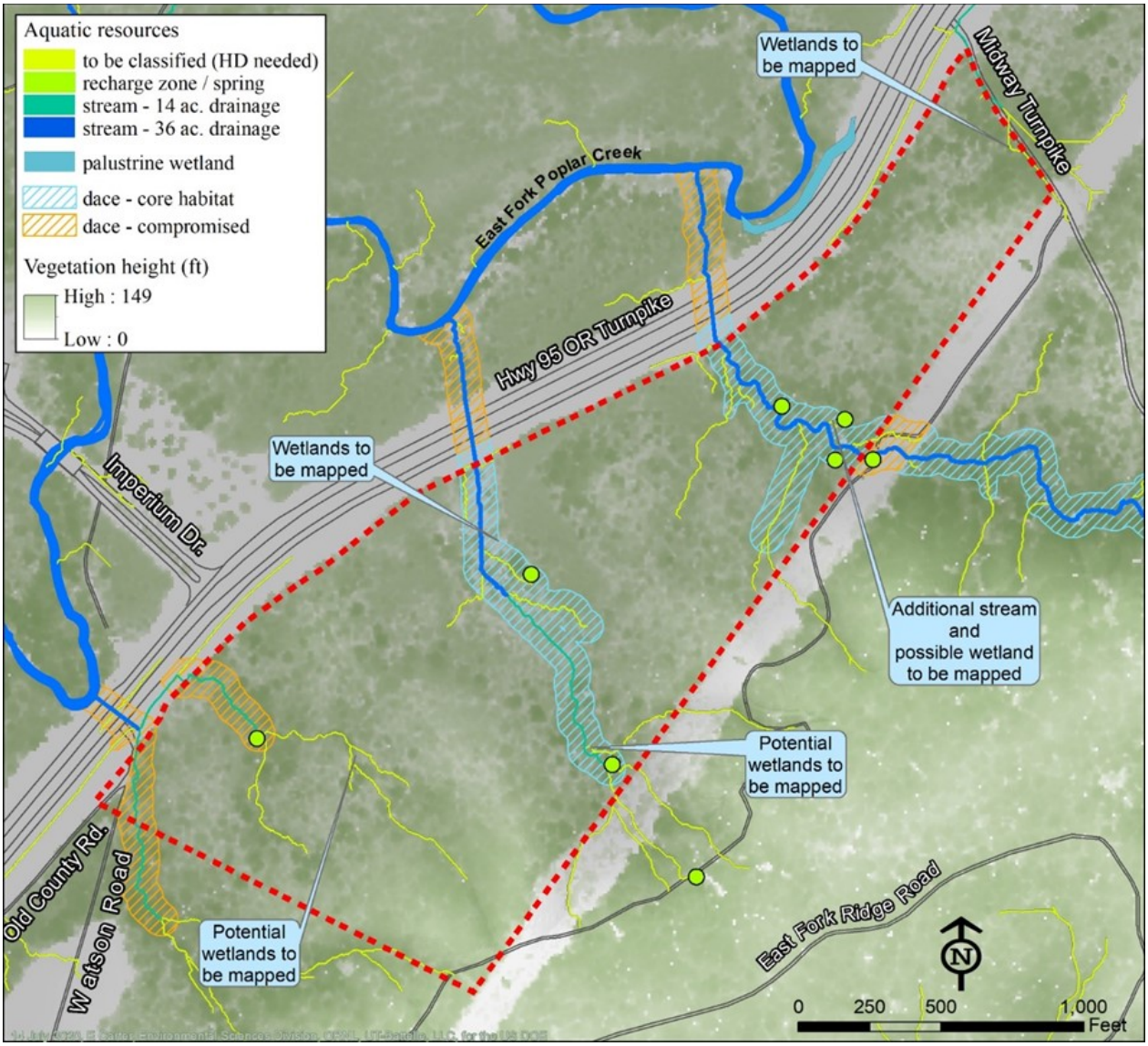


Source: CNS 2020a.

Figure 3-9. Surface Water Features near the Proposed ORETTC Site

About 600 acres of wetlands have been identified on the ORR; most are classified as forested palustrine, scrub/shrub, and emergent wetlands. Wetlands occur across the ORR at low elevations, primarily in riparian zones of headwater streams and receiving streams as well as in the Clinch River embayment (DOE 2018). These wetlands occur in association with springs and seeps along stream bottomlands, in areas of seasonally high groundwater tables and surface water levels on the alluvial islands and floodplains of perennial streams (Bear Creek, East Fork Poplar Creek, Poplar Creek, and Clinch River), and in and adjacent to areas of human disturbance (e.g., utility line rights-of-ways and channelized streams) (DOE 2016). Recent preliminary surveys identified wetlands within the ORETTC site footprint associated with stream riparian areas (ORNL 2020). Wetlands have been identified adjacent to the streams within the ORETTC site footprint (Figure 3-10). An approximately 0.5-acre wetland and several seeps occur within the riparian zone of the central stream. Under the current site design, the wetland does not overlap with the proposed site buildings or parking lot. The proposed SNRAF stormwater detention pond would be sited west of the stream at sufficient distance to avoid wetlands. Outside of the parcel boundary, the nearest wetlands are associated with the riparian area along the East Fork Poplar Creek.

Floodplains. Floodplains are defined by EO 11988, Floodplain Management, as "the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, including at a minimum, the area subject to a 1 percent or greater chance of flooding in any given year" (that area inundated by a hundred-year flood). EO 11988 requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. Flood Insurance Rate Maps prepared by the Federal Emergency Management Agency (FEMA) do not identify any floodplains at the proposed ORETTC site. The site footprint is within an area identified as minimal flood hazard (FEMA 2020).



Source: ORNL 2020.

Figure 3-10. Surface Water Features within the Proposed ORETTC Site Footprint

3.6.2 Proposed Action Impacts

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 no fuels or hazardous materials would be utilized at the ORETTC.

Surface Water. The perennial stream located within the central portion of the parcel is within the proposed construction and operational footprint for the ORETTC facility. As such, this stream would have the highest potential for impacts during construction and operations. However, a 100-foot riparian buffer would be maintained around all of the streams within the construction footprint to reduce the potential for impacts. It should be noted that the central stream would be crossed in two locations to allow pedestrians and vehicles to cross. Bottomless culvert arches (or similar bottomless bridge) would be designed in a manner that would maintain the existing stream bottom contours, and therefore the flow would not be altered or impeded. Clearing of vegetation within the stream buffer-zone at these crossings would occur. By limiting the road corridor to 36 feet wide and the pedestrian corridor to 10 feet wide across the 100-foot riparian buffers on either side of the stream (ORNL 2020), disturbance in the stream riparian buffers would be limited to approximately 0.16 acres and 0.05 acres, respectively.

The northern and southern streams and their associated springs and wetlands are outside of the construction footprint, and therefore would not be directly impacted by construction. 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, filter sock, and temporary slope breakers, would reduce impacts to adjacent surface waters. Installing and maintaining erosion controls around the perimeter of the construction footprint especially along sloped areas would help mitigate the potential for sediment transport into the streams. The potential for adverse impacts to surface water would exist until disturbed areas are stabilized and revegetation is established.

Prior to the start of construction, it would be necessary to obtain a construction storm water National Pollutant Discharge Elimination System (NPDES) permit for discharges of stormwater associated with construction activities, and an Aquatic Resource Alteration Permit (ARAP) from Tennessee Department of Environment and Conservation (TDEC) for work within or near surface waters. 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.

Stormwater ordinances within the City of Oak Ridge may require stormwater management (CNS 2020a, CNS 2020b). 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 (CNS 2020a). To meet this requirement, the construction of a permanent stormwater detention pond would be required for the ORETTC.

In addition, as part of the proposed ORETTC operation, the Live Burn Fire Tower could utilize large volumes of water to conduct firefighting training. A common way of managing the runoff from the fire training facilities is through detention ponds. It is estimated that a pond with a volume of 18,000 cubic feet would be required on-site to manage the runoff from the fire training facilities. No foam or chemical agents would be used for firefighting training.

To provide both stormwater management and management of runoff from fire training, NNSA proposes to construct two detention ponds (*see* Figure 2-2- for locations of ponds). The stormwater detention pond would have a volume of approximately 31,500 cubic feet, and the fire training runoff pond would have a volume of approximately 18,000 cubic feet. Each pond would be less than one acre-foot (43,560 cubic feet). The area the ponds would cover would be less than approximately one acre in order to each drain completely every three days (CNS 2020c). These detention ponds would manage runoff at the acceptable rates and prevent the first inch of precipitation from being discharged into surface waters (CNS 2020a). If required, discharge from facility operations to surface water would be in accordance with limitations established under the applicable TDEC NPDES permit. As part of this permit, information concerning outfall location, discharge date, flow rate, sources of pollution and treatment technologies, production of the effluent, effluent characteristics, and an engineering report on the wastewater treatment would be required (CNS 2020a).

Wetlands. Preliminary surveys identified wetlands within the ORETTC site footprint in association with stream riparian areas. Additionally, wetlands are associated with the riparian area adjacent to the East Fork Poplar Creek, located about 200 feet north of the site boundary. Recently, an approximately 0.5-acre wetland and several seeps were delineated within the riparian zone of the central stream, in vicinity to the eastern side of the proposed parking lot for the SRNAF. However, under current site design, this wetland does not overlap the SRNAF building or its adjacent parking lot. The proposed SNRAF stormwater detention area would be sited west of the stream at sufficient distance to avoid wetlands.

On the northern and central portions of the ORETTC site footprint, the current site design limits the road crossing of the stream riparian zone to 36 feet wide and the pedestrian corridor to 10 feet wide (ORNL 2020). There are no wetlands identified within the proposed road corridor; however, the pedestrian crossing as currently routed would cross through wetland. Disturbance in the stream riparian buffers would be limited to approximately 0.16 acres for the road corridor and 0.05 acres for the pedestrian crossing. The potential wetland disturbance for the roadway is likely to be less than 0.16 acres since wetlands were not identified in the recent survey. Meanwhile, the pedestrian crossing of the stream riparian buffer would disturb 0.05 acres of wetland under the current site design. However, it may be viable to re-route the pedestrian bridge to avoid wetland impact.

Spills, increased sedimentation, and stormwater runoff could potentially impact wetlands associated with on-site and off-site stream riparian areas. However, with the implementation of stream and wetland buffer zones, spill prevention and response plans, NPDES permit requirements, and City of Oak Ridge stormwater ordinances, impacts to on-site and off-site wetlands near East Fork Poplar Creek would be minimal. Appendix B of this EA contains a draft Wetlands Assessment based on preliminary wetland information.

3.6.3 No-Action Alternative Impacts

Under the No-Action Alternative, no new facilities would be constructed. There would be no impacts to water resources. Ongoing and planned reindustrialization and cleanup activities would continue at the ORR. Potential impacts to groundwater and surface waters including wetlands would be addressed under approved NEPA decisions and other applicable regulatory documents.

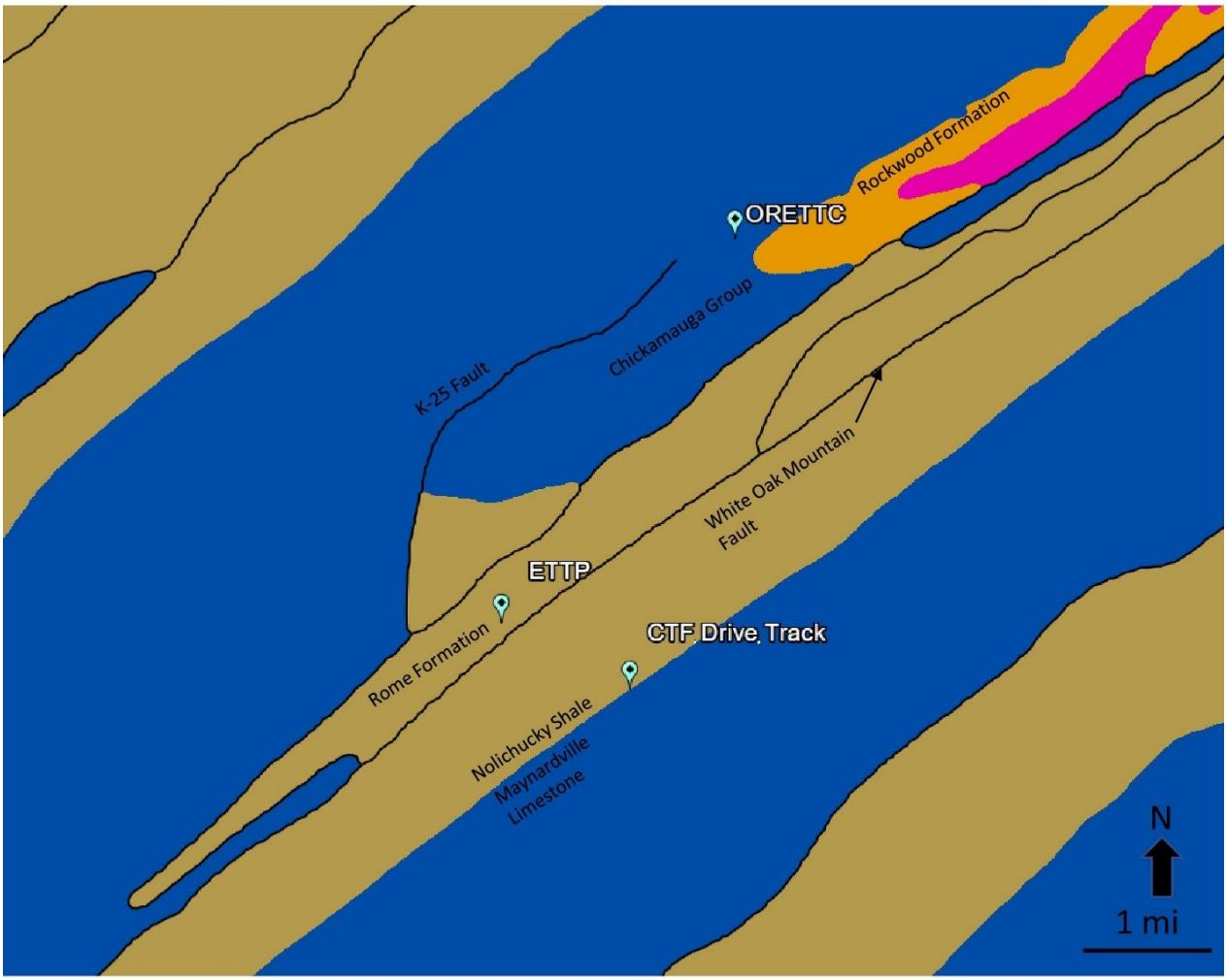
3.7 Geology and Soils

3.7.1 Affected Environment

Geology. The ORR is located in the Valley and Ridge Physiographic Province, 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).

The geology of the study area is complex as a result of extensive thrust faults and folds. As shown in Figure 3-11, the proposed ORETTC site is underlain by bedrock of the Chickamauga Group, which is primarily a limestone with layers of siltstone. Immediately adjacent to the proposed site are rocks of the Rockwood Formation (southwest of the ORETTC site) Clastic bedrock of the older Rome Formation has been placed over the calcareous rocks of the Chickamauga Group and the younger clastic rocks of the Rockwood Formation by the White Oak Mountain thrust fault, which trends generally southwest to northeast in the vicinity of SR 58 (DOE 2016).

Although major thrust faults are numerous in the vicinity of the study area, 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 1973, 139 earthquakes have been recorded within 62 miles of the proposed site with the highest magnitude of 4.7 (USGS 2020a). 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.

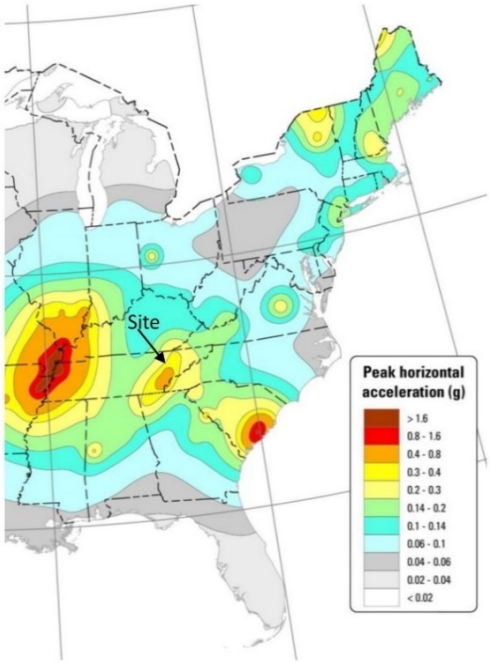


Source: USGS 2020b.

Figure 3-11. Geologic Map in the Vicinity of the Proposed ORETTC Site

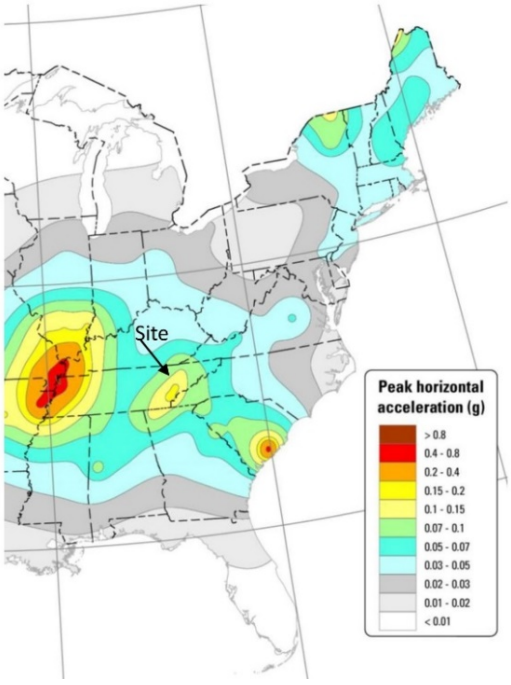
The USGS rates ground motions using peak ground acceleration, which is the maximum acceleration experienced during the course of an earthquake and is measured in units of acceleration due to gravity ("g"). The seismic map for 2014 indicates that the study area is located in an area with a moderate seismic hazard class rating: 0.34g peak horizontal ground acceleration with a 2 percent probability of exceedance in 50 years; and 0.10g peak horizontal ground acceleration with a 10 percent probability of exceedance in 50 years (*see* Figures 3-12 and 3-13). 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 2020).

Pre-construction topographic maps and historical investigations indicate that karst conditions, such as enclosed drainage basins and sinkholes, are present in both the Knox Group and Chickamauga



Source: USGS 2018.

Figure 3-12. 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 3-13. 2018 National Seismic Hazard Model for the conterminous United States Peak horizontal acceleration with a 10% probability of exceedance in 50 years

Group formations in the vicinity of the project area. Because the study area is underlain by Chickamauga Group rocks, the possibility exists for karst conditions to be encountered. Small cavities have been reported in the drilling logs for several of the bedrock wells located near the ETTP. These cavities have ranged in width from 0.3 to 6.5 ft, and have generally been mud-filled. Bedrock conditions in the Chickamauga Group underneath the site are unknown. During recent surveys, karst outcrops and a small unplugged sinkhole were identified near the southeast corner of the planned parking area for the ERTF (ORNL 2020).

Soils. The soil types determined in the study area are based on the 1942 Roane County Soil Survey prepared by the U.S. Department of Agriculture (USDA 1942). Although the Roane County Soil Survey was updated in 2009, the DOE property was not mapped during this effort (DOE 2016); thus, the 1942 survey is the only source for the study area soil types. The ORETTC site is forested and undeveloped. The 1942 soil survey indicates that proposed ORETTC site is within the Armuchee silt loam, which is described as well-drained with weathered bedrock encountered between 20 to 40 inches.

The ORETTC site and vicinity were investigated as part of the East Fork Ridge/White Wing (Parcel 4a) investigations during an Environmental Baseline Survey Report completed in 2013. The study identified no evidence of past activities involving hazardous substances prior to federal land acquisition, and recommended no-further-investigation at the site. Prior to the Environmental Baseline Study, a recommendation of no-further-investigation of soils was also determined during footprint reduction studies in 1997 (DOE 2013).

3.7.2 Proposed Action Impacts

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, no viable geologic or soil resources would be lost from construction activities. Tree-clearing, grading, excavation, and other site development activities associated with the proposed action would occur within an undisturbed 13.5-acre parcel. Tree clearing and grading would temporarily disturb soils, and site contours would be permanently changed from site grading to support building foundations. Additionally, soils and potentially shallow bedrock would be excavated to accommodate the site's stormwater and fire training runoff detention ponds. The site soils contain silt and clay, and are moderately susceptible to wind erosion. Because of soil disturbance and the presence of gentle slopes (5 to 12 percent), the potential for increased soil erosion due to stormwater runoff and wind would increase.

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); however, there are no quaternary faults (i.e., faults less than 1.6 million years old) near the site. To minimize the potential hazards associated with earthquakes, the new facilities would be constructed in accordance with current International Building Code guidelines for facilities in seismic zones, which would minimize life-threatening structural damage during an earthquake. Due to the clay content 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. Karst features were not discovered in vicinity of the site. Landslide risk is low because slopes are gentle and there is a low-incidence rate.

A sinkhole was identified near the southeastern corner of the parking lot for the ERTF (ORNL 2020). Stormwater control measures would be implemented to protect this feature from surface water runoff or sediment transport during construction. If other void spaces are discovered within the operational footprint, further development of the sinkhole may be mitigated by backfilling with grout or impermeable plugs. Based on available survey data, it does not appear that sinkholes and void spaces are prevalent across the site.

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 storm water 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 in Roane County and is intended to provide a baseline characterization of the ecology prior to any disturbances associated with construction or operation of the ORETTC.

Vegetation. ORR is situated in the Great Valley of East Tennessee between the Cumberland and Great Smoky Mountains (DOE 2018). At approximately 33,000 acres, ORR is the largest contiguous and protected land ownership in the southern Valley and Ridge Physiographic Province of East Tennessee. ORR contains approximately 24,000 acres of forestland. 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 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).

Habitat. The ORETTC site is part of the heavily forested SSP-2 area that was identified by the Nature Conservancy in 1996 as very high significance with relatively intact natural communities. Forest comprises approximately 94.2 percent (76.46 acres) of the area of the proposed SSP-2A (81 acres) and right-of-way comprises 5.8 percent (4.67 acres). However, none of the right-of-way is within the ORETTC site. The ORR is mostly contiguous native eastern deciduous oak-hickory (*Quercus-Carya* spp.) hardwood forest. Other forest cover types include hemlock (*Thuja canadensis*), white pine (*Pinus strobus*), and bottomland hardwood forests. Forty-one tree species were identified in 2015. The ORETTC site is not within a designated natural area classified primarily on the basis of the presence of listed species. However, a tributary that crosses the ORETTC site is designated as an aquatic natural area (ORNL 2015).

The ORETTC site contains forest stands that are largely younger, second growth, as characterized by dominant species considered to be pioneering types such as yellow poplar (*Liriodendron tulipifera*), eastern redcedar (*Juniperus virginiana*), loblolly pine (*Pinus taeda*), Virginia pine (*P. virginiana*), and ash (*Fraxinus* spp.). Old-growth characteristics such as large tree size, multiple layers in the canopy, diversity of species, and diversity of ecosystem function occur in areas adjacent to streams, seeps, and smaller wetlands. The site is adjacent to interior forest habitat based on the presence of relatively large contiguous tracts of forest. As habitat in the surrounding Knoxville Metropolitan Area continues to be lost to fragmentation caused by clearing for agriculture, industry, commercial and residential development, roads, and utility corridors, the ORR forests represent an increasingly scarce resource. The ORR interior forest habitat is an important component of biologically diverse systems, offering habitat critical to the survival of neotropical migratory bird species (ORNL 2015). Restoring and maintaining native grass communities along road and utility corridors, fallow fields, remediation sites, and facility buffer zones provides habitat for migratory birds and other wildlife species (ORNL 2018). The Memorandum of Understanding between the U.S. Fish and Wildlife Service (USFWS) and DOE demonstrates DOE's commitment to integrate migratory bird conservation principles, measures, and practices into agency activities (78 FR 68041).

Wildlife. The eastern deciduous hardwood forest on 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 USFWS Environmental Conservation Online System indicates that there are 18 species of Birds of Conservation Concern, plus seven USFWS Birds of Management Concern under the *Migratory Bird Treaty Act* (MBTA) with potential to occur in SSP-2A. In addition, the Bald Eagle may also be present and is protected under both the MBTA 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). The SSP-2A parcel

intersects a known wildlife corridor in East Tennessee, which is the subject of ongoing research in the ORNL Environmental Sciences Division. Featured species management includes installation of nest boxes for wood ducks (*Aix sponsa*), salamander inventories, forest management practices to enhance habitat for woodland bat species, and maintenance of habitat for forest-area-sensitive neotropical birds. 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*). The SSP-2A area has historically had the highest deer harvest numbers on the ORR. Nuisance wildlife species include raccoon (*Procyon lotor*), skunk (Mephitis mephitis), opossum (Didelphis virginiana), and woodchuck (*Marmota monax*).

Threatened, Endangered, or Sensitive Species. The ORNL Natural Resources Program compiled a list of endangered, threatened, rare, or otherwise sensitive focal animal taxa with potential to occur within the SSP-2A parcel, which includes the proposed ORETTC site. The list was compiled using the ORNL Natural Resources database for verified spatial records of sensitive resources within the vicinity of the review area, sensitive animal taxa with reasonable potential to occur within the SSP-2A parcel based on occurrence elsewhere on the ORR, rare and sensitive resources known to occur within the Tennessee counties of Anderson and Roane as identified through the TDEC online Rare Species database (http://environment-online.state.tn.us:8080/pls/enf_reports/f?p=9014:3:0), and resources identified by the USFWS Information for Planning and Consultation tool (IPaC – https://ecos.fws.gov/ipac/, using the SSP-2A parcel as the input area). These taxa were considered contemporary records if they were documented after 1995. All others were considered historical records unless later survey confirmed their presence within the SSP-2A parcel. A list of habitat parameters for each of the potential sensitive resources was compiled through the same sources. Table 3-8 provides the list of animal species with potential to occur within the SSP-2A parcel, with indication of historical and contemporary records and an assessment of whether habitat for that species is present within the SSP-2A parcel.

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).

Of particular concern 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 (endangered) and northern long-eared bat (threatened) roost in trees. The other federally listed bat species (gray bat – endangered) may use the area as foraging habitat. Additionally, two state listed (threatened) bat species, little brown bat and tricolored bat, 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. Biological surveys were conducted in the SSP-2A parcel from 27 June – 7 July 2020. The preliminary results indicate that 10 bat species (Table 3-9) were identified from five acoustic bat detectors within the SSP-2A parcel (ORNL 2020). It is important to note that the vast majority of the SSP-2A site does not have suitable bat foraging habitat due to cluttered mid-story and under-story vegetation.

The USFWS has established a window of April 1 through November 14 when potential roost trees for listed species may not be cut nor surrounding habitat disturbed. This window covers the time period from when bats are emerging from winter hibernaculum (caves), and through the tree roosting/maternity season and "swarming" season when bats mate and get ready to return to winter roosts. Another consideration for avoiding potential impacts is whether the area is within a distance specified by the USFWS from any caves used for hibernation by the listed species. The USFWS and Tennessee Ecological Services Field Office have developed a conservation strategy document to formalize goals and priorities regarding the conservation and recovery of forest-dwelling bats in Tennessee (USFWS 2017).

Aquatic resources in the SSP-2A parcel 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 streams and seeps within the SSP-2A parcel support the listed species In Need of Management, black mountain salamander (*Desmognathus welteri*). This represents the only known populations of black mountain salamander on the ORR, and the only known record for Roane County, Tennessee (ORNL 2020). The ORNL Natural Resources Program also expects that the wetlands within the SSP-2A parcel support the state-listed species In Need of Management, four-toed salamander (*Hemidactylium scutatum* – also an ORNL focal species), based on ongoing habitat-based survey. As with several potential state-listed (and one federal-listed) plants, this species is not readily detectable during the time period that was allotted for field survey of the SSP-2A parcel. 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.

Federally listed plant species are considered unlikely within the SSP-2A parcel. Several seeps and springs are suitable for white fringeless orchid (*Platanthera integrilabia*), which is known from wetlands and stream margins adjacent to the ORR. However, no specimens are known from the ORR. Some state listed species are expected within the SSP-2A parcel, particularly true of the springs and smaller seep wetlands that were recently identified within the SSP-2A parcel and ORETTC site. The ORNL Natural Resources Program plant surveys are ongoing and will be completed by August 15, 2020 (ORNL 2020). Table 3-10 provides the list of plant species and their expected potential to occur within the SSP-2A parcel based on recent field-based inventory and assessment of habitat suitability

Table 3-8. Threatened, Endangered, or Sensitive Animal Species on SSP-2A

Scientific name	Common name	Status			Oak Ridge Reservation			SSP-2A			
		Federal	State	PIF	Historical	Expected	Contemporary	Historical	Expected	Contemporary	Habitat
FISH											
Erimonax monachus	Spotfin chub	T	T		**yes, CH**	**unk**	no	no	no	**unk**	yes
Erimystax cahni	Slender chub	T	T		**no**	**no**	no	no	no	no	no
Hemitremia flammea	Flame chub		NM		yes	**unk**	no	yes	**unk**	**unk**	yes
Noturus flavipinnis	Yellowfin Madtom	T	T		no	no	no	no	no	no	no
Phoxinus tennesseensis	Tennessee dace		NM		yes	yes	yes	yes	yes	yes	yes
AMPHIBIANS											
Desmognathus welteri	Black Mountain salamander		NM		no	yes	yes	no	yes	yes	yes
Hemidactylium scutatum	Four-toed salamander		NM		yes	yes	yes	no	yes	**unk**	yes
REPTILES											
Pituophis melanoleucus	Northern pinesnake		T		yes	**unk**	no	no	**unk**	no	**unk**
Ophisaurus attenuatus	Slender glass lizard		NM		yes	**unk**	no	no	**unk**	no	**unk**
BIRDS											
Anhinga	Anhinga		NM		yes	yes	yes	no	no	no	no
Egretta caerulea	Little blue heron		NM		yes	yes	yes	no	no	no	no
Ixobrychus exilis	Least bittern	BCC	NM		yes	yes	yes	no	no	no	no
Nycticorax	Black-crowned Night-heron		NM		yes	yes	yes	no	**unk**	**unk**	**unk**
Haliaeetus leucocephalus	Bald eagle	BCC,MC, Focal	NM		yes	yes	yes	no	no	no	no
Falco peregrinus	Peregrine falcon	BCC,MC		RC,MA	yes	yes	yes	no	no	no	no
Falco sparverius	American kestrel	BCC,MC			yes	yes	yes	no	yes	no	no
Porzana carolina	Sora	MC			yes	yes	yes	no	no	no	no
Scolopax minor	American woodcock	MC,Focal		YWL,RC	yes	yes	yes	no	**unk**	no	no
Aegolius acadicus	Northern saw-whet owl	MC			yes	yes	yes	no	**unk**	no	yes
Melanerpes erythrocephalus	Red-headed woodpecker	BCC,MC		YWL	yes	yes	yes	no	**unk**	**unk**	yes

Sphyrapicus varius	Yellow-bellied sapsucker	MC			yes	yes	yes	no	yes	yes	yes
Coccyzus americanus	Yellow-billed Cuckoo			CBSD,RC,IM	yes	yes	yes	no	yes	yes	**unk**
Contopus cooperi	Olive-sided flycatcher	BCC,MC		YWL	yes	yes	yes	no	no	no	no
Empidonax trailii	Willow flycatcher	MC			yes	yes	yes	no	no	no	no
Sitta pusilla	Brown-headed nuthatch	BCC,MC			yes	yes	yes	no	no	**unk**	yes
Hylocichla mustelina	Woodthrush	BCC,MC, Focal	NM	YWL,RC,MA	yes	yes	yes	no	yes	yes	yes
Lanius ludovicianus	Loggerhead shrike	BCC,MC	NM	CBSD,FS	yes	yes	yes	no	no	no	no
Vermivora chrysoptera	Golden-winged warbler	BCC,MC, Focal	T	CBSD,RWL	yes	yes	yes	no	no	no	no
Vermivora pinus	Blue-winged warbler	BCC,MC			yes	yes	yes	no	yes	yes	yes
Setophaga cerulea	Cerulean warbler	BCC,MC, Focal	NM	YWL,RC,IM	yes	yes	yes	no	no	no	**unk**
Helmitheros vermivorus	Worm-eating warbler	BCC,MC			yes	yes	yes	no	**unk**	**unk**	yes
Limnothlypis swainsonii	Swainson's warbler	BCC,MC	NM	RC,MA	yes	yes	yes	no	no	no	no
Protonotaria citrea	Prothonotary warbler	BCC,MC		YWL,RC,MA	yes	yes	yes	no	no	no	no
Geothlypis formosus	Kentucky warbler	BCC,MC		YWL,RC,MA	yes	yes	yes	no	yes	yes	yes
Parkesia motacilla	Louisiana waterthrush	MC			yes	yes	yes	no	no	no	no
Ammodramus savannarum	Grasshopper sparrow	MC,Focal		CBSD,RC,IM	yes	yes	yes	no	no	no	no
Ammodramus henslowii	Henslow's sparrow	BCC,MC, Focal	T	IM,RC,YWL	yes	yes	yes	no	no	no	no
Dolichonyx oryzivorus	Bobolink	MC		YWL,RC,MA	yes	yes	yes	no	no	no	no
Dendroica discolor	Prairie Warbler	BCC		YWL,RC,M	yes	yes	yes	no	yes	yes	yes
Icteria virens	Yellow-breasted Chat			RC,MA	yes	yes	yes	no	yes	yes	yes
Pipilo erythrophthalmus	Eastern Towhee			RC,MA	yes	yes	yes	no	yes	yes	yes
Zenaida macroura	Mourning Dove	MC			yes	yes	yes	no	yes	yes	yes
Contopus virens	Eastern-wood Pewee			RC,MA	yes	yes	yes	no	yes	yes	yes
Empidonax virescens	Acadian Flycatcher			RC,MA	yes	yes	yes	no	yes	yes	yes
				MAMMALS							
Sorex dispar	Long-tailed Shrew		NM		yes	yes	yes	no	yes	yes	yes

Synaptomys cooperi	Southern bog lemming		N	yes	**unk**	no	no	**unlikely**	no	yes
Corynorhinus rafinesquii	Rafenisque's big-eared bat		N	yes	yes	yes	no	yes	no	yes
Myotis grisescens	Gray bat	E	E	yes	yes	yes	no	yes	yes	yes
Myotis leibii	Eastern small-footed bat		N	yes	yes	yes	no	yes	no	yes
Myotis lucifugus	Little brown bat	R	T	yes	yes	yes	no	yes	yes	yes
Myotis septentrionalis	Northern long-eared bat	T	T	yes	yes	yes	no	yes	no	yes
Myotis sodalis	Indiana bat	E	E	yes	yes	yes	no	yes	no	yes
Perimyotis subflavus	Tri-colored bat	R	T	yes	yes	yes	no	yes	yes	yes
CLAMS										
Lampsilis virescens	Alabama Lampmussel	E	E	no	no	no	no	no	no	no
Hemistena lata	Cracking Pearlymussel	E	E	no	no	no	no	no	no	no
Dromus dromas	Dromedary Pearlymussel	E	E	yes	no	no	no	no	no	no
Cyprogenia stegaria	Fanshell	E	E	yes	no	no	no	no	no	no
Fusconaia cuneolus	Finerayed Pigtoe	E	E	yes	no	no	no	no	no	no
Plethobasus cooperianus	Orangefoot Pimpleback	E	E	yes	no	no	no	no	no	no
Lampsilis abrupta	Pink Mucket	E	E	yes	no	no	no	no	no	no
Obovaria retusa	Ring Pink	E	E	no	no	no	no	no	no	no
Pleurobema plenum	Rough Pigtoe	E	E	no	no	no	no	no	no	no
Quadrula cylindrica	Rough Rabbitsfoot	E	E	yes	no	no	no	no	no	no
Plethobasus cyphyus	Sheepnose Mussel	E	E	yes	no	no	no	no	no	no
Fusconaia cor	Shiny Pigtoe	E	E	yes	no	no	no	no	no	no
Cumberlandia monodonta	Spectaclecase	E	E	yes	no	no	no	no	no	no
Plethobasus cicatricosus	White Wartyback	E	E	no	no	no	no	no	no	no
SNAILS										
Athearnia anthonyi	Anthony's riversnail	E	E	no	no	no	no	no	no	no
Io fluvialis	Spiny riversnail	UR		yes	no	**unk**	no	**unlikely**	no	**unlikely**

Federal listing status codes:
- FE – Federally listed endangered species
- FT – Federally listed threatened species
- UR – Currently Under Review for federal listing
- CH – Critical Habitat present
- BCC - Birds of Conservation Concern
- MC- Birds of Management Concern
- Focal – Under MC = need additional investment of resources to address conservation or management issues.

Source: ORNL 2020.

State-listing status codes:
- NM – In Need of Management
- SC – Of Special Concern
- T – Threatened
- E – Endangered

Partners in Flight status codes – Bird Conservation Region (BCR) 28:
- RC = Regional Concern, according to the Bird Conservation Regions
- MA = Management Attention needed
- IM = Immediate Management Attention Needed
- YWL = Yellow Watch List
- RWL = Red Watch List

Table 3-9. Acoustic Detection for Bats on SSP-2A

Scientific Name	Common name
Eptesicus fuscus	Big brown bat
Lasiurus borealis	Eastern red bat
Lasiurus cinereus	Hoary bat
Lasionycteris noctivagans	Silver-haired bat
Lasiurus seminolus	Seminole bat
Myotis grisescens	Gray bat
Myotis lucifugus	Little brown bat
Nycteceius humeralis	Evening bat
Perimyotis subflavus	Tricolored bat
Tadarida brisiliensis	Mexican free-tailed bat

Source: ORNL 2020.

Table 3-10. Threatened, Endangered, or Sensitive Plant Species on SSP-2A

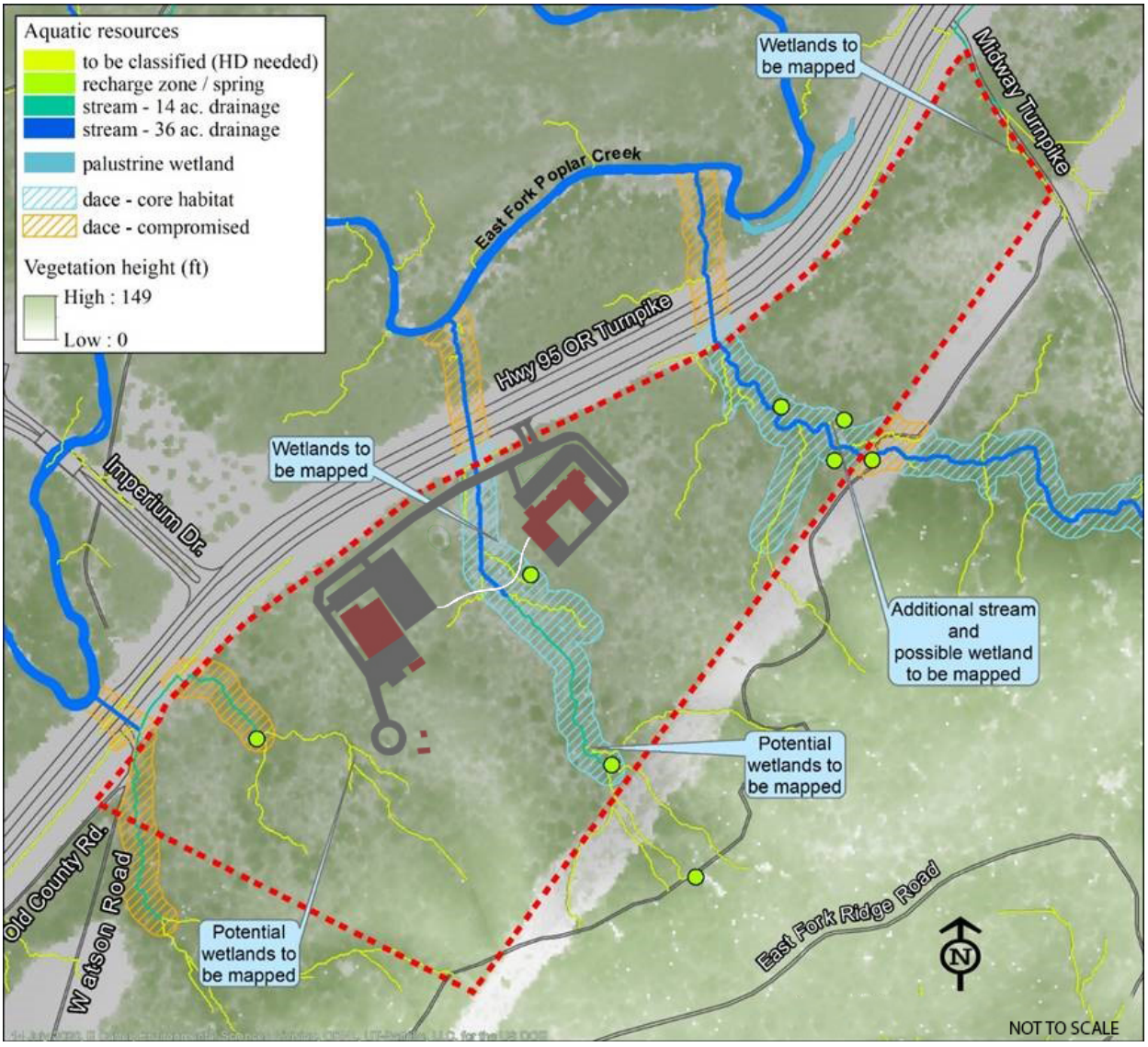
Scientific name	Common Name	Federal	State	Expected within SSP-2A
Spiraea virginiana	Virginia spiraea	T		Unlikely
Platanthera integrilabia	White fringeless orchid	T		Possible
Aureolaria patula	Spreading false foxglove		S	Unknown
Berberis canadensis	American barberry		S	Unlikely
Bolboschoenus fluviatilis	River bulrush		S	Unlikely
Delphinium exaltatum	Tall larkspur		E	Unlikely
Diervilla lonicera	Northern bush honeysuckle		T	Unlikely
Draba ramosissima	Branching Whitlow-grass		S	no
Elodea nuttallii	Nuttall's waterweed		S	no
Eupatorium godfreyanum	Godfrey's thoroughwort		S	Unlikely
Fothergilla major	Mountain witch-alder		T	Possible
Helianthus occidentalis	Naked-stem sunflower		S	Unlikely
Juglans cinerea	Butternut		T	no
Juncus brachycephalus	Small-headed rush		S	Unlikely
Liparis loeselii	Fen orchid		T	Unlikely
Panax quinquefolius	American ginseng		S	Likely
Platanthera flava var. *herbiola*	Tubercled rein-orchid		T	Possible
Spiranthes lucida	Shining Ladies'-tresses		T	Unlikely
Thuja occidentalis	Northern white cedar		S	no

Source: ORNL 2020.

3.8.2 Proposed Action Impacts

Based on avoidance of impacts, where the sensitive species are located, to streams and springs/seeps, and minimization of wetland impacts to the greatest extent practicable, the Proposed Action would not reduce the distribution or viability of species or habitats of concern, including the taking of a listed species. Figure 3-14 shows the ORETTC facilities in relation to aquatic resources at the proposed site. Based on this spatial analysis, the Proposed Action would not impact springs/seeps. The stream through the ORETTC site would be crossed twice by the road and pedestrian walkway (sidewalk) that connect the two training facilities. Use of bottomless culvert arches (for example, as shown in the

image above) or similarly a bottomless bridge would span the stream crossings, thereby avoiding stream impacts, and allow the stream to flow freely. Limiting the road corridor to 36 feet wide and the pedestrian corridor to 10 feet wide across the 100-foot riparian buffers on either side of the stream (ORNL 2020) would minimize impacts to potential wetlands in the riparian buffers to approximately 0.16 acres and 0.05 acres, respectively. Hydrologic determinations are needed to determine the full extent of impacts, but at least 0.21 acres of total wetland could be impacted under the current site design. Use of best management practices such as biodegradable sediment control barriers to protect the stream from erosion would further reduce potential wetland impacts. Therefore, effects on biological resources would be less than significant.



Source: ORNL 2020.

Figure 3-14. Potential Aquatic Resources within the ORETTC Site

The total area of land disturbed during construction for the ORETTC would be approximately 13.5 acres and the permanent facility footprint, including roads, would be approximately 11.8 acres.

Construction activities would be completed in 1.5 years. Pre-construction surveys would be conducted for sensitive resources in the ORETTC site to provide data on resources that might be impacted by the project. Surveys would include inventory and mapping of rare and sensitive natural communities, aquatic resources, and federally listed bat maternity roosts; delineation of aquatic resources and performance of hydrological determinations; inventory and mapping of rare and sensitive plant species; surveys for rare and sensitive animal species; and review of forest and timber resources. As part of the sensitive resource surveys, the ORNL Natural Resources Program team would consult with the USFWS and TDEC regarding federally listed species (particularly bats), wetlands, streams, and state-listed species to ensure compliance with federal and state laws regarding protected species.

Vegetation and Habitat. Site development for construction of the ORETTC would involve clearing of 13.5 acres of undisturbed forest vegetation. Much of the site is largely younger, second growth, as characterized by dominant species considered to be pioneering types. Preliminary field data from the ORNL Natural Resources Program report (in progress) indicate that the mid-story and under-story vegetation are cluttered. A 100-foot buffer would remain undisturbed along the stream that passes through the site, except for the corridors that cross the stream for the road and pedestrian walkway (sidewalk) that connect the two training facilities. The vegetation clearance area for construction of the ORETTC would be approximately 0.05 percent of the total forest land at ORR.

Wildlife. Site development for construction of the ORETTC could cause direct impacts through mortality or injury to wildlife (e.g., construction equipment striking ground-dwelling small mammals) during operation of construction equipment and indirect impacts through loss of wildlife habitat. Wildlife species considered in the overall goals of wildlife management on the ORR (ORNL 2007) that likely occur in the ORETTC site are common in the ORR. In response to the ORETTC development, some species could relocate to similar habitats located immediately adjacent to the disturbed site. Potential effects on the wildlife corridor from development of the ORETTC include temporary disturbance to wildlife movement and activity patterns during construction, long-term disturbance owing to increased traffic and sustained human presence, and direct intersection/obstruction of the least cost path that passes through the SSP-2A parcel. The ORETTC site is a small fraction of the wildlife corridor through East Tennessee. The loss of wildlife habitat for construction of the ORETTC would be approximately 0.05 percent of the total forest land at ORR. Development of the ORETTC would reduce the available area for deer hunting by approximately 30 acres (11.8- acre permanent facility footprint plus 300-foot buffer). Based on an average harvest of 400 deer on ORR and 10,000 acres available for deer hunting, the anticipated reduction in the annual deer harvest from reducing the available area for deer hunting by approximately 30 acres would be one deer. Management options to compensate for the potential decrease in deer harvest as a result of the ORETTC development could include increased hunting of inaccessible parcels by badged employees (ORNL 2007).

Threatened, Endangered, or Sensitive Species. The ORETTC site is not included in the Conservation Focus Areas as a key region for forest-dwelling bat conservation and recovery in Tennessee (USFWS 2017). Therefore, complete avoidance of impacts to caves and other potential hibernacula is not required and conservation measures used to offset habitat loss would generally be appropriate for development projects in Tennessee. According to the maps presented in the

Conservation Strategy for Forest-dwelling Bats in Tennessee (USFWS 2017), there are no known Indiana bat, northern long-eared bat, or forest dwelling bat sites within 20 miles of the ORETTC site. Based on field observations and acoustic surveys at cave entrances, ORNL Natural Resources Program indicated that several caves on the ORR probably contain hibernating Indiana bats. There are no known caves in the ORETTC site. However, there are caves which could serve as hibernacula within 10 miles of the ORETTC site (ORNL 2020). Based on section 7 technical assistance and a summary of Indiana bat ecology, the USFWS considers that a loss of no more than 10 acres or less than 10 percent of the available habitat in any given forest stand during the inactive season is unlikely to lead to detectable adverse effects on Indiana bats.[10] The conservation strategy developed by the USFWS and Tennessee Ecological Services Field Office includes recovery actions that best reflect the specific opportunities and needs of forest-dwelling bats in Tennessee.

Provided that sufficient roosting, foraging, and travel habitat is maintained within a colony's traditional home range (radio-telemetry studies have document foraging up to 10 miles from a hibernaculum), it is unlikely that detectable adverse effects would occur as a result of removal or loss of habitat during the inactive season. As Indiana bat maternity areas contain multiple primary roost trees, it is extremely unlikely that loss of 10 acres or 10 percent of a forested stand (whichever is smaller) would eliminate all primary roost trees within a traditional home range of an Indiana bat maternity colony. Similarly, loss of this magnitude is not likely to noticeably degrade the quality of a roosting or foraging area or render a travel corridor unsuitable. For these reasons, USFWS believes it is extremely unlikely that loss of 10 acres or 10 percent (whichever is smaller) of a forest stand would lead to detectable adverse effects on forest dwelling bats. The loss of bat habitat due to construction of the ORETTC would be approximately 0.05 percent of the total forest land at ORR. No tree removal would be conducted until a final assessment is agreed upon with the USFWS and TDEC. Therefore, effects on bats listed in Table 3-9 from implementation of the Proposed Action would be less than significant, and not measurably different when compared to existing conditions.

Site development for construction of the ORETTC would not impact federally listed bird species. Of the listed bird species with potential to occur on the SSP-2A parcel, none are associated with aquatic habitats, three (Loggerhead Shrike, American Kestrel, and Henslow's Sparrow) are associated with grassland habitats, and the remaining 11 species (e.g., Wood Thrush, Golden-winged Warbler, and Cerulean Warbler) are associated with forested habitats. No impacts to grassland species would occur because the proposed site does not contain grassland habitats. Potential impacts to forest habitat birds would be negligible because the loss of forest habitat due to construction of the ORETTC would be approximately 0.05 percent of the total forest land at ORR.

Based on preliminary field data from the ORNL Natural Resources Program report (ORNL 2020), the stream that intersects the ORETTC site is perennial and contains many fish, including the state-listed Tennessee dace. In addition, the only known Roane County population of state-listed black mountain salamander occurs in the stream and the expected area of occupancy of state-listed flame chub on the ORR encompasses streams within the SSP-2A parcel. The state-listed four-toed salamander and ORNL focal species for research and management, mud salamander (*Pseudotriton*

[10] https://www.fws.gov/midwest/endangered/section7/s7process/mammals/inba/INBAEcologySummary.html

montanus) are expected to be present in the ephemeral streams, seeps, or wetlands on the SSP-2A parcel. As previously stated, potential impacts to aquatic resources would be minimized to the greatest extent practicable. Potential impacts to wetlands in the riparian buffer would be approximately 0.16 and 0.05 acres for each crossing (road and walkway) and use of best management practices to protect the stream from erosion would further reduce potential wetland impacts (*see* Appendix B). The project would not impact the listed reptile species, clam species, or the listed snail species because there is no suitable habitat on the SSP-2A parcel. Therefore, effects on threatened, endangered, or sensitive species listed in Table 3-8 would be less than significant.

The potential for impacts to the listed flowering plants would be negligible because the expected occurrence on SSP-2A is unlikely for most of the species listed in Table 3-10. In addition, pre-construction surveys would be conducted to identify resources that might be impacted by the project. These surveys would be conducted before stream crossings are sited and in close coordination with the ORNL Natural Resources Program. Any occurrence of the listed plant species would be identified for avoidance or mitigation to relocate the plant(s) offsite to an adjacent undisturbed area.

Use of the ORETTC for emergency response training would have minor effects on biological resources. The ORETTC site would be landscaped in a campus-like setting (CNS 2020a). Most of the training would be conducted indoors and have no effect on biological resources. Outdoor activities would be conducted in facilities specifically designed for firefighting training. Wildlife occurrence on the site would primarily be common species adapted to live in developed areas with intermittent human disturbance.

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 ORETTC would not be constructed. Biological resources would remain unchanged when compared to existing conditions.

3.9 Cultural Resources

3.9.1 Affected Environment

Definition of the Resource. 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 Federal Government 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*.

Regulatory Setting. Several federal laws, regulations, and Executive Orders (EOs) address cultural resources and federal responsibilities regarding them and 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 and decisions. The Tennessee Historical Commission (THC) serves as the SHPO.

Cultural Resource Management at the ORR. 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 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 2019). 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.

Cultural Resources at the ORR. 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. The Manhattan Project National Historical Park includes facilities located on ORR including the X-10 Graphite Reactor, Buildings 9731 and 9204-3 at Y-12 and the K-25 Building Site at the ETTP. Seven historic ORR properties are currently listed individually in the NRHP (DOE 2019):

- Freels Bend Cabin
- Graphite Reactor
- New Bethel Baptist Church and Cemetery
- Oak Ridge Turnpike checking Station
- George Jones Memorial Baptist Church and Cemetery
- Bear Creek (Scarboro) Road Checking Station
- Bethel Valley Road Checking Station

Although not included on the NRHP, an area known as the Wheat Community African Burial Grounds was dedicated and a memorial was erected in 2000 (DOE 2019).

Cultural Resources in the Project Area. The proposed ORETTC would be sited on previously undisturbed property located approximately 5 miles west of Y-12 adjacent to the Oak Ridge Turnpike/SR 95. The SSP-2 is thought to contain portions off five historical acquisition parcels

and a number of identified historical dwellings. These sites are expected to be generally small remnants of the aforementioned pre-Manhattan Project-era homesteads. Only one, a historic homesite, is thought to be located on the ORETTC site. That historical dwelling is thought to be located in the southwest corner of the proposed ORETTC site, near the intersection of Old County Road and the Oak Ridge Turnpike in an area unlikely to be developed further in the near future (Figure 3-15) (CNS 2020a).

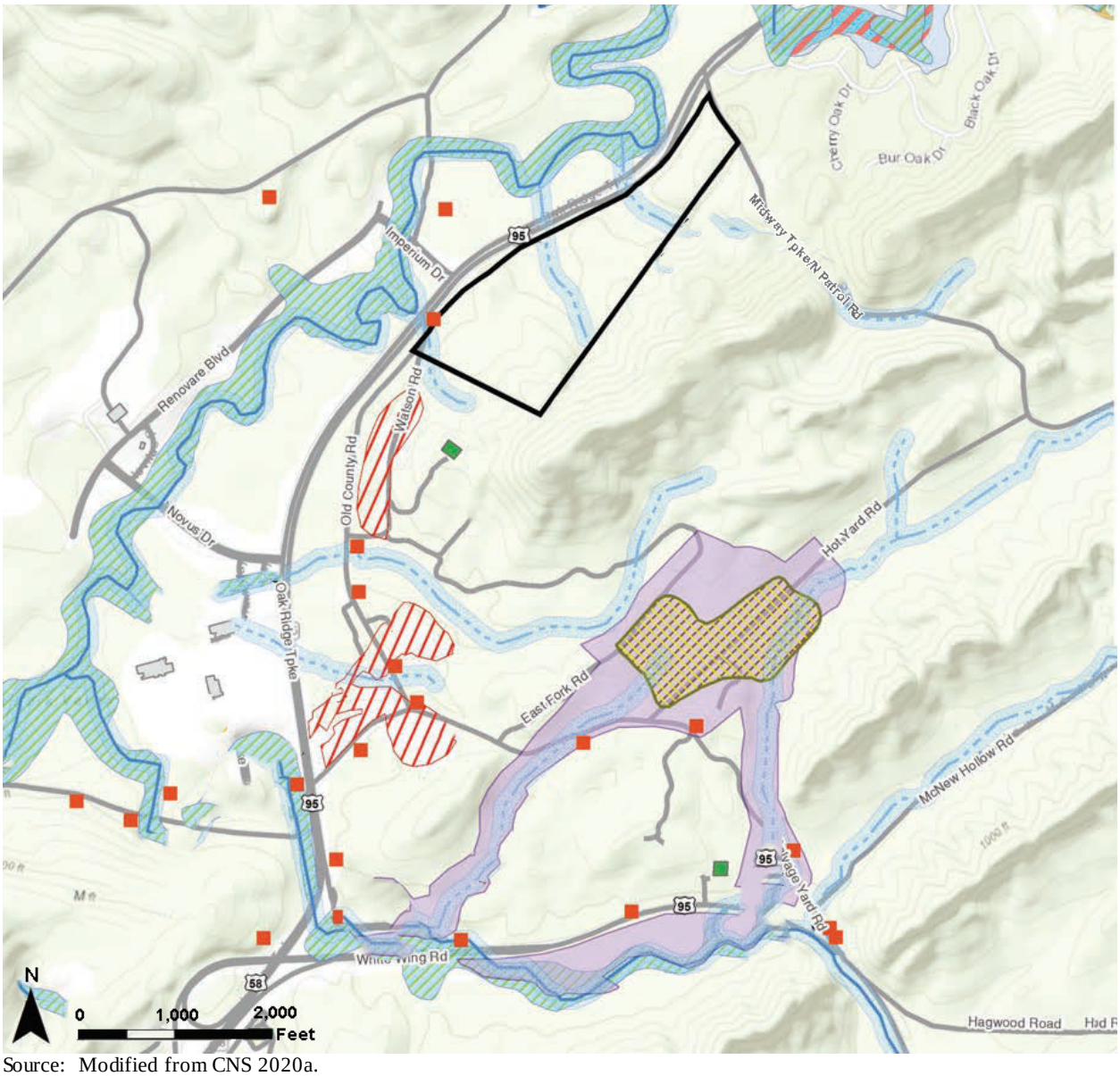
In addition, as shown on Figure 3-15, two cemeteries are located on the SSP-2, but are not located within the 81-acre proposed ORETTC site. The Smith/Gallaher Cemetery, also known as the Alexander Smith Cemetery, is approximately 1,000 ft. from the southwest border of the ORETTC site. It is fenced and contains at least 37 graves (CNS 2020a). The other cemetery is approximately one mile southwest of the ORETTC site. An archeological survey was conducted for the ORETTC site in July 2020. The preliminary results of that survey did not identify any cultural resources within the footprint of proposed ORETTC facilities and did not find any remains of the one homesite that was thought to be located in the southwest corner of the proposed ORETTC site[11] (CNS 2020c). The Tennessee SHPO would be consulted regarding the recommendations outlined in the archeological survey for the proposed ORETTC.

3.9.2 Proposed Action Impacts

Most of the construction-related activities and ground disturbance conducted for construction of the ORETTC and related utilities and facilities would occur on undisturbed lands. Construction activities would not disturb or affect the two cemeteries, neither of which are located within the 81-acre proposed ORETTC Site. Best management practices would be utilized during construction to control drainage and erosion patterns, thereby limiting the potential for erosion impacts to archaeological resources in the vicinity. Unanticipated discoveries of archaeological materials during construction would be evaluated and, if needed, mitigated in accordance with the HPP. Therefore, no significant impacts to archaeological resources are anticipated.

Operational activities are not expected to have an impact on cultural resources because such activities would occur inside newly-constructed buildings, well away from historic homesites and the two cemeteries.

[11] A closer ground examination undertaken during a June 2020 forest assessment survey was unable to recover any evidence of artifacts associated with the homesite or any associated outbuildings. Coordinates determined from the 1942 vintage USGS Bethel Valley, Tennessee topographic quadrangle map placed the foundation's position inside the SR95 right-of-way area (as determined from relocated concrete monuments) which was cleared during 2009-2010 highway widening. There also appears to have been a water main installed within the right-of-way at that time in proximity to the homesite (marker and valve located 116 feet from the homesite). Either or both of these actions appear to have obliterated the site, just outside the SSP-2A area (CNS 2020c).



Source: Modified from CNS 2020a.

Figure 3-15. Location of Existing Cultural Resources on or Near the ORETTC Site

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 and environmental justice conditions within the ORETTC 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 ORETTC 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 ORR workforce resides. Figure 3-16 shows the location of the proposed ORETTC 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.

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 3-11 presents the employment profile in the ROI and Tennessee for 2010 and 2019.

Roane County, where the proposed ORETTC would be located had a per capita personal income of $40,980 and ranked 24th in the state in 2018. In 2008, the per capita was $31,415. The 2018 per capita income reflected an increase of 4.4 percent from 2017 (BEA 2018a). The median income for households in Roane County was $50,003 in 2018 (USCB 2018a). Roane County had a total of 735 business establishments in 2018, with a combined annual payroll of approximately $291 million (USCB 2019).

Figure 3-16. Locaton of Proposed ORETTC and Region of Influence

Table 3-11. 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.

Major employment sectors in the ROI and Tennessee are presented in Figure 3-17. In Roane county professional, scientific, and technical services accounted for approximately 26.1 percent of the total employment in the county. Government and government enterprises accounted for approximately 15.6 percent followed by health care and social assistance with 8.7 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).

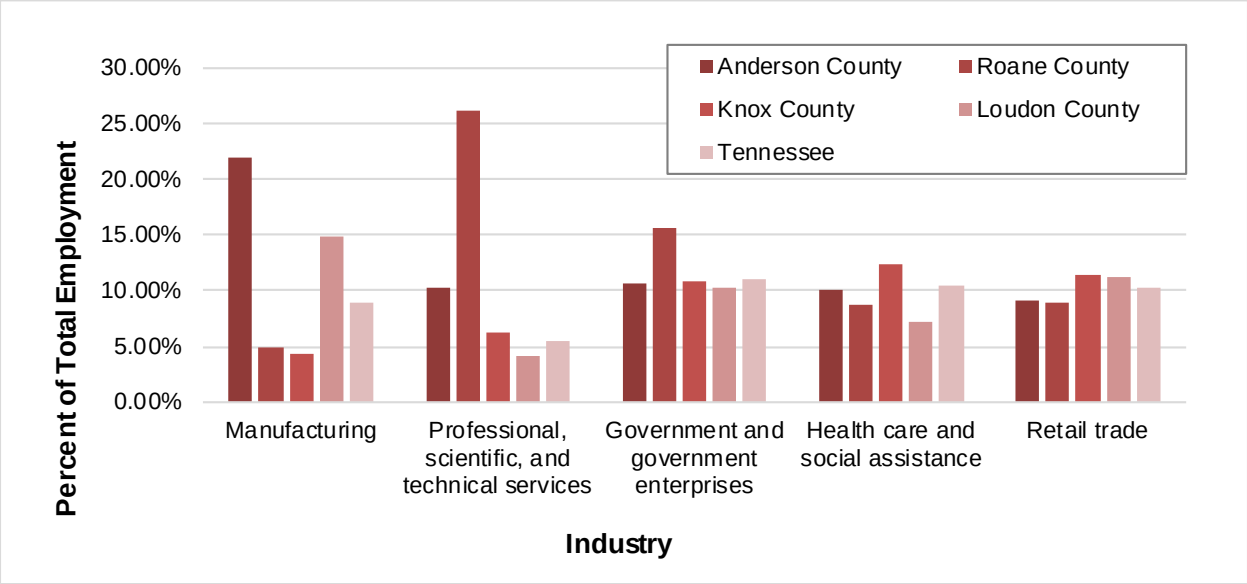


Figure 3-17. Major Employment Sector Distribution

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 3-12 presents the historic and projected population of the ROI and Tennessee.

Table 3-12. 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.

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.

Community services within the ROI include public schools, hospitals, and public safety. There are seven school districts with 151 schools serving the ROI. 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 Executive Order 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 county level. Areas are assumed to contain disproportionately high percentages of minority populations if the percentage of minority persons in the area significantly exceeds the county average or if the percentage of minority population exceeds 50 percent of the population. The lower threshold is used to identify areas with meaningfully greater minority populations surrounding the project area. Meaningfully greater low-income populations are identified using the same methodology described above for identification of minority populations. The area of concern for this analysis are the census tracts in the 4-county ROI (Anderson, Knox, Loudon and Roane counties). Table 3-13 presents the county thresholds used for the analysis.

Table 3-13. Thresholds for Identification of Minority and Low-Income Communities within the 4-County ROI (percentage)

County	Minority Population	Low-Income Population
Anderson	30.7%	41.6%
Knox	27.4%	39.0%
Loudon	32.0%	40.0%
Roane	27.1%	38.4%

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 for the census tracts within the 4-county ROI (USCB 2018b, 2018d). There are 151 census tracts in the 4-county ROI. Of the 151 census tracts, 27 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 28 miles from the proposed ORETTC. There are three census tracts immediately surrounding the proposed ORETTC (9801, 301, and 309). The proposed ORETTC is located in Census Tract 9801. None of these tracts exceed the thresholds for minority and/or low-income populations. Table 3-14 lists minority and low-income data for census tracts immediately surrounding the proposed ORETTC and for tracts that exceed county thresholds for minority and low-income populations in the 4-county ROI.

Table 3-14. Minority and Low-Income Populations, 2018

Area	% Minority	% Below Poverty
Census Tract 9801, Roane County, Tennessee[a]	0%	0%
Census Tract 301, Roane County, Tennessee[a]	17.5%	3%
Census Tract 202.01, Anderson County, Tennessee[a]	17.9%	4.1%
Census Tract 201, Anderson County, Tennessee	32.8%	21.8%
Census Tract 205, Anderson County, Tennessee	33.4%	28.2%
Census Tract 9.02, Knox County, Tennessee	16.3%	66.4%
Census Tract 69, Knox County, Tennessee	20.5%	65.6%
Census Tract 27, Knox County, Tennessee	23.0%	39.1%

Area	% Minority	% Below Poverty
Census Tract 31, Knox County, Tennessee	28.8%	19.2%
Census Tract 17, Knox County, Tennessee	29.2%	20.3%
Census Tract 9.01, Knox County, Tennessee	29.7%	-
Census Tract 38.01, Knox County, Tennessee	29.8%	27.5%
Census Tract 46.15, Knox County, Tennessee	30.0%	28.6%
Census Tract 39.01, Knox County, Tennessee	31.0%	18.8%
Census Tract 40, Knox County, Tennessee	31.1%	22.1%
Census Tract 24, Knox County, Tennessee	32.0%	37.9%
Census Tract 8, Knox County, Tennessee	32.5%	55.5%
Census Tract 30, Knox County, Tennessee	34.5%	22.2%
Census Tract 33, Knox County, Tennessee	36.2%	4.4%
Census Tract 29, Knox County, Tennessee	36.5%	52.3%
Census Tract 26, Knox County, Tennessee	43.7%	41.2%
Census Tract 14, Knox County, Tennessee	47.1%	63.4%
Census Tract 28, Knox County, Tennessee	59.8%	46.1%
Census Tract 32, Knox County, Tennessee	64.6%	30.4%
Census Tract 67, Knox County, Tennessee	65.7%	33.2%
Census Tract 70, Knox County, Tennessee	65.9%	47.3%
Census Tract 68, Knox County, Tennessee	70.3%	59.8%
Census Tract 21, Knox County, Tennessee	72.9%	36.6
Census Tract 19, Knox County, Tennessee	74.9%	38.6
Census Tract 20, Knox County, Tennessee	82.8%	43.9

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 ORETTC.
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

3.10.2 Proposed Action Impacts

Socioeconomic Resources. It is anticipated that construction of the ORETTC would take approximately 1.5 years. In terms of employment and income, NNSA estimated that there would be 75 peak workers with a total of 125 workers needed for construction (CNS 2020c). 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 (75 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 ORETTC would require 20 permanent workers. In addition, operation of the ORETTC could bring in a daily average of 250 personnel to train at the new facility. While some of the personnel would be local personnel residing in the area, most would be non-local personnel traveling to the area for training. It is anticipated that non-local personnel would contribute to the local economy through the purchase of housing, food, gasoline, entertainment, and luxury items. The dollar amount would be dependent on the number of non-local personnel at any given time and the duration of the non-local personnel's residence in the ROI. In terms of other operational impacts:

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

- Housing. Based on the estimated number of jobs and the assumption that workers in the existing labor force in the ROI would fill all direct and indirect jobs, there would be no need for additional housing. Localized impacts on tourism in the ROI could result due to a decrease in available accommodations from the influx of non-local personnel. Local personnel would not require temporary housing and, thus, would have neither adverse nor beneficial impacts on temporary housing. The influx of non-local personnel for training at the ORETTC could result in displacement of tourists or others from individual hotels or other temporary housing. However, 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 all direct and indirect jobs would be filled by workers from the ROI existing labor force, 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. None of the three census tracts immediately surrounding the proposed ORETTC site contained minority or low-income populations that exceeded the county threshold in Roane County. During construction and operation related activities, it is anticipated that environmental, health, and occupational safety impacts would be minimal, temporary, and confined to the ORETTC site (*see* Section 3.11). Therefore, there would be no disproportionately high and adverse environmental or economic effects on minority or low-income populations.

3.10.3 No-Action Alternative Impacts

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

3.11 Health and Safety, Accidents, and Intentional Destructive Acts

3.11.1 Affected Environment

The proposed ORETTC would not utilize releasable quantities of radiological materials, nor any significant quantities of hazardous materials. Consequently, no potential impacts related to health, safety, and accidents are expected to occur offsite. As a result, the discussion in this section focuses on onsite ORETTC workers and personnel who would attend training at the facilities. The potentially affected workforce at the ORETTC is estimated to be 20 personnel. In addition, a daily average of 250 personnel are assumed for training purposes. Thus, for purposes of this human health, safety, and accident analysis, a total of 270 personnel could be potentially affected by activities at the ORETTC.

3.11.2 Proposed Action Impacts

Human Health Impacts During Construction and Normal Operations. 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 ORETTC would be bounded by injury/illness and fatality rates for general industrial construction. Table 3-15 lists the potential estimates of injuries/illnesses and fatalities estimated for the peak year of construction and the total 18-month construction period. Over the full construction period, approximately one day of lost work from illness/injury and less than one fatality would be expected.

Table 3-15. Occupational Injury/Illness and Fatality Estimates for ORETTC Construction

Injury, Illness, and Fatality Categories	Results
Peak Construction	
Peak construction workforce (persons)	75
Lost days due to injury/illness	0.8
Number of fatalities	0.008
Total Construction (1.5 years)	
Total construction worker-years	125
Lost days due to injury/illness	1.2
Number of fatalities	0.01

Sources: CNS 2020c, BLS 2020.

Occupational impacts during operations would involve approximately 270 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 3-16 presents the potential estimates of injuries/illnesses and fatalities for the average year of operations at the ORETTC. In an average year, 2.2 days of lost work from illness/injury and less than one fatality would be expected.

Table 3-16. Occupational Injury/Illness and Fatality Estimates for ORETTC Operations

Injury, Illness, and Fatality Categories	Results
Operational workforce (persons)	270
Lost days due to injury/illness	2.2
Number of fatalities	0.005

Sources: CNS 2020c, BLS 2020.

Accidents. A wide-range of activities would be conducted at the ORETTC, including classroom desktop training, virtual simulations, and live firefighting drills/training. These latter activities have the potential to cause impacts (injury and death) to instructors and students alike, as discussed below.

Firefighting Drills/Training. During the period from 2001 to 2013, the United States Fire Administration (USFA) reported that approximately 11 percent (141 out of 1,305) of the line-of-duty deaths were training-related. The leading cause of training-related deaths was heart attacks (50 percent) followed by traumatic injury (31 percent). The remaining 19 percent were other types of cardiovascular disease and other diverse circumstances. During 2001 to 2013, 77 training-related fatalities (approximately 6 per year) were investigated by the National Institute for Occupational Safety and Health (NIOSH) through the Fire Fighter Fatality Investigation and Prevention Program. Of these fatalities, 62 (80 percent) were cardiac-related and 11 (14 percent) were trauma-related. These investigations included 38 deaths due to physical fitness activities, 23 deaths due to apparatus/equipment drills, 10 deaths due to live-burn exercises, and 5 deaths due to other training associated circumstances. In 2018, there were an estimated 1,115,000 firefighters in the U.S. (career: 370,000; volunteer: 745,000), virtually all of whom participate in live firefighting training/drills. In 2018, nine firefighters died while participating in training activities. This equates to a fatality rate of 0.0008 percent (USFA 2019, USFA 2020). Applying that fatality rate to the average daily population (workers and trainees) that would be at the ORETTC (270 personnel), approximately 0.002 fatalities could be expected to occur annually at the ORETTC specifically from firefighting drills/training. Statistically, one death would be expected to occur for every 500 years of operation at the ORETTC.

To minimize the potential for injuries/deaths associated with training exercises, NNSA would consider implementing the following mitigation measures:

- Establish easy-to-understand, written standard operating procedures for all training activities and ensure they are implemented and enforced.
- Ensure that a sufficient number of qualified instructors are available to conduct the specific training and maintain optimal student-to-instructor ratios.
- Ensure that participants are screened to determine physical capacity and fitness to participate in the training.
- Designate a qualified individual to act as safety officer for all training activities.
- Ensure that all new training curricula undergo comprehensive safety review by management personnel prior to implementation.
- Ensure that the training environment and facilities are safe.
- Ensure that adequate time is allotted to safely carry out the training exercise.

- Ensure that all equipment, including personal protective equipment (PPE), is approved and in good working order.
- Provide pre-training safety briefings, including a facility walk-through, for all participants.
- Ensure that sufficient numbers of fire suppression apparatus and equipment are readily available for live-burn training evolutions.
- Ensure that the proper types and adequate amounts of extinguishing agents are available for live-burn training evolutions.
- Ensure that all established standards and procedures are followed.
- Monitor participants' physical stress and watch for signs of overexertion.
- Ensure training participants wear the appropriate PPE at all times.
- Provide adequate supervision and monitoring of activities.

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 ORETTC is considered minimal given that limited sealed sources and no notable quantities of hazardous materials would be used or stored at the facility. Firearms would not be stored or handled on site. It is also anticipated that security measures (e.g., gates and fences) typical of small industrial parks and other commercial developments would be implemented and serve as an impediment to assault by trucks or other vehicles. No act of sabotage or terrorism has occurred on DOE property at the nearby ETTP during some two decades of cleanup activity (DOE 2016).

3.11.3 No-Action Alternative Impacts

Under the No-Action Alternative, no new facilities would be constructed. There would be no impacts to human health.

3.12 Waste Management

3.12.1 Affected Environment

As discussed in Section 3.2, the proposed ORETTC site is a greenfield site which has never had any hazardous substance stored on it for 1 year or more, is not known to have released any hazardous substance, or been used to dispose of any hazardous substance. No wastes are currently generated on the site. Because the ORETTC would only generate nonhazardous wastes, the discussion in this section is limited to the management of nonhazardous wastes.

The regulations for control of nonhazardous solid waste are also promulgated by TDEC and are found in TCA Chap. 0400-11-01, Solid Waste Processing and Disposal. They regulate all aspects of storage, collection, transportation, and disposal of solid waste, including the regulation of composting facilities. The nearest DOE landfills are the ORR Industrial Waste Landfill V and the ORR Construction Landfill VII and the Y-12 Recycle Program on the ORR in Anderson County operated by UCOR, LLC and CNS, LLC, respectively. Landfill V started operating in 1994 and encompasses 25.9 acres, and Landfill VII started operating in 2001 and encompasses 30.4 acres. Annually, approximately 40,000 cubic yards of solid waste are disposed at the ORR landfills. The landfills V and VII each has a remaining life expectancy of approximately 2 million cubic yards.

The following waste types are accepted at Landfill V: sanitary industrial waste (including office/cafeteria waste, equipment, construction/demolition debris). Landfill VII accepts construction/demolition debris (DOE 2017).

The Y-12 Recycling Program compliantly recycles a wide variety of materials such as ballasts, batteries, circuit boards/electronic equipment, clean consumer plastics #1 and #2, corrugated cardboard, lamps, paper, toner cartridges, scrap metal, and wood/pallets (DOE 2019).

3.12.2 Proposed Action Impacts

The analysis focused on how and to what degree the Proposed Action would affect nonhazardous waste generation and management. A significant impact would occur if implementation of the Proposed Action resulted in the generation of nonhazardous waste types or quantities that could not be accommodated by the current management system or landfill. It is not anticipated that land clearing and grading activities would generate a need for disposal of soil or woody waste. This assumes that excavated soils would be used as fill during construction and woody wastes would be sent off for recycling by the wood or wood pulp or mulch industry or would be chipped and reused as mulch on-site. Therefore, these materials would not be expected to impact solid waste resources. Construction activities associated with the Proposed Action would result in the generation of minimal quantities of nonhazardous waste from construction of the facilities, in wood forms or concreted/asphalt rubble. These materials would be sent off for recycling if possible.

During operations, municipal solid waste— generally paper waste— would be generated. NNSA estimates that approximately 100 tons of nonhazardous solid waste would be generated annually. As discussed previously, the ORR Landfills in Anderson County receives approximately 40,000 cubic yards of solid waste for disposal each year. Based on the estimated quantity of nonhazardous solid waste associated with the Proposed Action, no adverse impacts are expected as sufficient landfill capacity exists to accommodate the additional nonhazardous solid waste generated from construction and operational and activities of the ORETTC.

As discussed previously, the Y-12 Recycling Program compliantly recycles a wide variety of materials and would be utilized to recycle the anticipated routinely generated paper, clean consumer plastics #1 and #2, corrugated cardboard, and toner cartridges as well as the occasionally generated materials such as ballasts, batteries, broken furniture, circuit boards/electronic equipment, glass, lamps, scrap metal, and wood/pallets.

3.12.3 No-Action Alternative Impacts

Under the No-Action Alternative, no new facilities would be constructed. There would be no impacts to waste management.

3.13 Transportation

3.13.1 Affected Environment

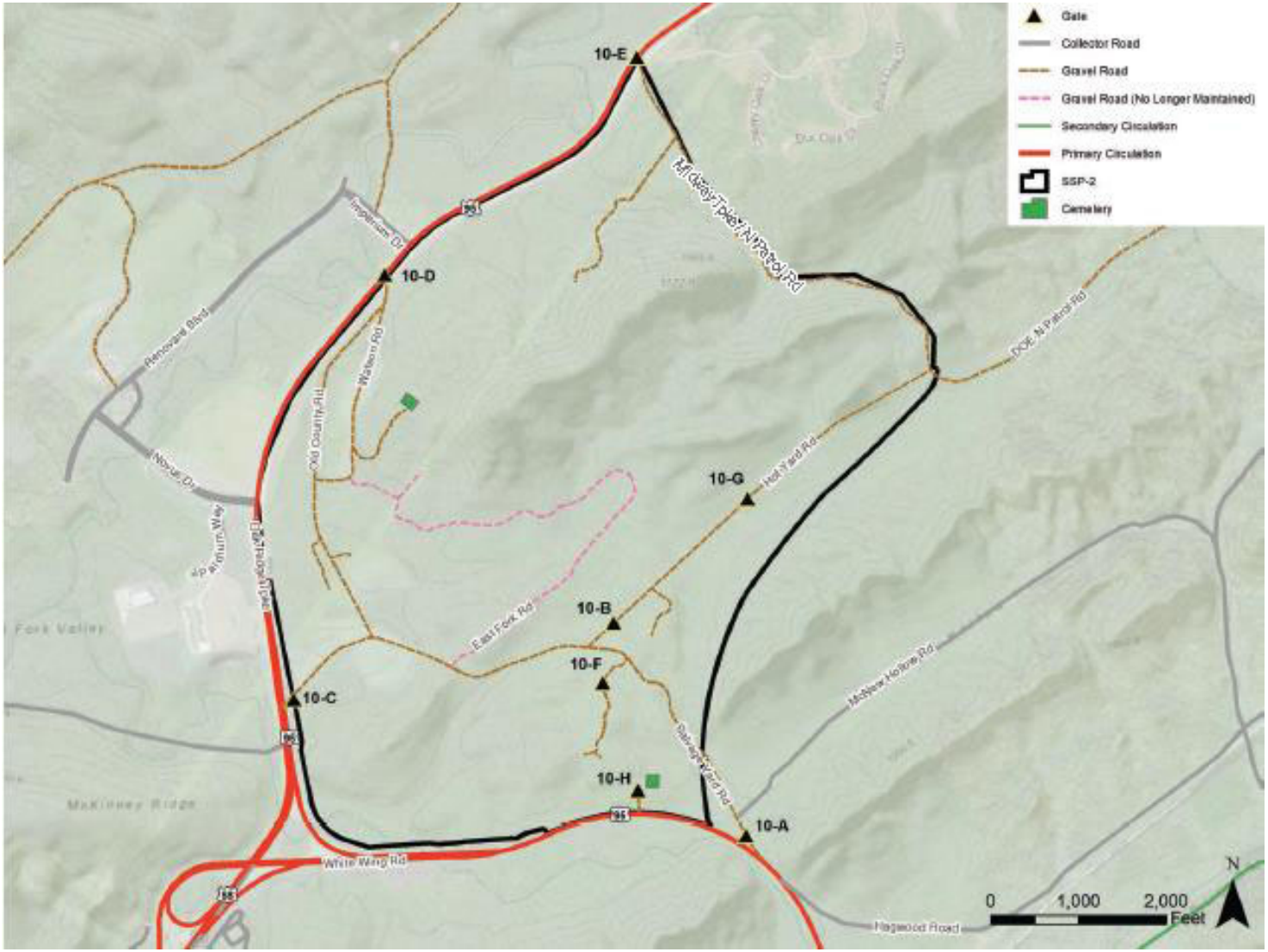
The City of Oak Ridge is framed by several principal interior roads, which include the Oak Ridge Turnpike (SR 95) located on the west side of the town. SR 9 runs along the east side of Oak Ridge while SR 61/62 cuts through the center of town. The downtown area is comprised mostly of major and minor collector roads with traffic speeds between 25 and 35 miles per hour (mph). As shown on Figure 3-18, the proposed ORETTC Site is located near the interchange of SR 58 and SR 95. To the north and west of the site is the Oak Ridge Turnpike, a 4-lane divided highway with a speed limit of 55 mph. To the south is SR 95/White Wing Road, a two-lane highway with a speed limit of 50 mph. On the eastern edge of the proposed ORETTC Site is a narrow paved road, Midway Turnpike/North Patrol Road. The proposed ORETTC Site is easily accessible from the City of Oak Ridge via the Oak Ridge Turnpike.

Average daily traffic counts for SR 95, SR 58, and Bear Creek Road are shown in Table 3-17. The data in that table shows that SR 95, SR 58, and Bear Creek Road have handled more traffic in the past than in 2017.

Table 3-17. Average Daily Traffic Counts of Area Roads

Year	SR 95	SR 85	Bear Creek Road
2017	5,066	11,806	398
2016	5,043	11,531	436
2015	5,496	11,016	432
2014	5,326	10,793	427
2013	5,451	10,373	509
2012	6,618	10,563	461
2011	6,388	11,437	570
2010	6,867	11,592	534
2009	5,810	11,289	518
2008	6,666	12,604	503

Source: CNS 2020a.



Source: CNS 2020a.

Figure 3-18. Transportation Network in the Vicinity of the Proposed ORETTC Site

The ORETTC site includes a short section of Midway Turnpike/North Patrol Road on the northeast side of the site. This narrow paved road is accessed via Gate 10-E, a single-arm manual swing gate. In addition, a short portion of Old County Road and Gate 10-D are located on the southwest portion of the ORETTC site. Gate 10-D is a similar swing gate. Old County Road is among a number of gravel roads on the site that predate the Manhattan Project-era development of Oak Ridge (*see* Figure 3-19). Several single-arm swing gates prevent access. Most of these gravel roads are currently kept as fire roads; however, some of the roads reaching the higher elevations are no longer maintained. Should any of these roads be utilized for the ORETTC, they would need to be redeveloped. Due to location and topography, it is unlikely either of these roads would be used in the near future for the ORETTC. No other existing roads exist on the ORETTC site.

Source: CNS 2020a.

Figure 3-19. Typical Gravel Road in Vicinity of the Proposed ORETTC Site

3.13.2 Proposed Action Impacts

Offsite Circulation. As depicted in Figure 3-18, the ORETTC would be located along the Oak Ridge Turnpike, a 4-lane divided highway with a speed limit of 55 mph. The SR 95-SR 58 interchange is located 1.5 miles west. A single access point is proposed for the ORETTC along Oak Ridge Turnpike/SR 95 (*see* Figure 3-20). The entrance (10-E) would be located approximately 1,200 feet east of Imperium Drive at the next median cut. However, this location

can only be accessed by northbound/eastbound traffic on the Oak Ridge Turnpike. The access point is located in close proximity to existing breaks in the divided highway as well as other roads (i.e., 10-E is near the residential access road to the northeast). For safety and traffic flow, it is recommended that access ways to the ORETTC be relocated to align with existing crossings to allow for traffic from both directions.

Source: CNS 2020a.

Figure 3-20. Diagram of Recommended Access Points Relative to Gate 10-E

The access road to the ORETTC would require a new left-turn lane in the existing median and right turn lane. The existing breaks in the median on Oak Ridge Turnpike are paved. For the proposed ORETTC Site, Novus Drive or Imperium Drive may provide the most cost-effective entrance/egress points. Existing gravel roads could be improved and utilized should they align with site development. Culverts would be required where roads cross streams on the proposed ORETTC Site. Driveway permits would be obtained from TDOT. Depending on the proposed construction of the new access road and the characteristics of SR 95, a traffic control plan may need to be included in the application.

Average daily traffic counts for SR 95, SR 58, and Bear Creek Road are shown in Table 3-17. The data in that table show that SR 95, SR 58, and Bear Creek Road 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 ORETTC construction and operation. During peak construction, the addition of 75 vehicles to daily traffic counts for SR 95 and SR 58 would result in a 0.6-1.5 percent increase in traffic counts. During operations, the addition of up to 270 vehicles on SR 95 and SR 58 would result in a 2.5-5.3 percent increase in traffic counts; overall traffic

counts would be well within historic traffic counts for those roads. Because of the high speed limit, a turn lane from the Oak Ridge Turnpike would be recommended into the ORETTC.

Onsite Circulation. As shown on Figure 2-2, with regard to onsite circulation, a primary road paralleling the Oak Ridge Turnpike would connect the facilities. The circulation plan would accommodate emergency and heavy vehicles. All proposed ORETTC roads are anticipated to allow for two-way traffic. The lanes would be 12-foot paved with curb and gutter. The primary road on the ORETTC site would parallel SR 95 and provide access to the facilities. Continuing west on the access road, a second road would travel south to the Live Burn Fire Tower and rubble pit. Emergency vehicles would be able to access these training facilities via a circular paved area wide enough to accommodate a ladder fire truck.

The access road from the Oak Ridge Turnpike would allow for direct access for construction. Onsite roads would allow emergency vehicles to access the Live Burn Fire Tower and rubble pit without driving through parking lots and passenger vehicle traffic. The ORETTC access road would have an electric roll gate, which could be left open during business hours and would accommodate two-way traffic.

Parking. Each building would have its own parking lot. The total parking area would total more than 63,000 square feet, allowing for approximately 300 vehicles. Parking areas would have no more than 20 contiguous parking spaces without an intervening landscape island. Eighty percent of all islands would have at least one tree planted (CNS 2020a).

Pedestrians. Due to the proximity of the primary facilities, sidewalks have been included in the plan to enhance walkability and synergy between facilities. A 100-foot riparian buffer along the stream between the facilities would also serve as green space. In addition, lawns and landscaping around each facility would establish a sense of place in line with the importance of the building. Green spaces should be preserved for staff and student gathering and quality of life.

3.13.3 No-Action Alternative Impacts

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

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 the ORETTC facilities. For the purposes of this EA, infrastructure is defined as electricity, domestic water (potable and fire), natural gas, wastewater, stormwater, and communications.

The proposed ORETTC development site is a greenfield site with no known utility service. The following section outlines the availability of utilities and anticipated service size that would support the ORETTC. Projected utility usage is discussed in Section 3.14.2. Table 3-18 identifies the utility providers and type/size of infrastructure required at the ORETTC site.

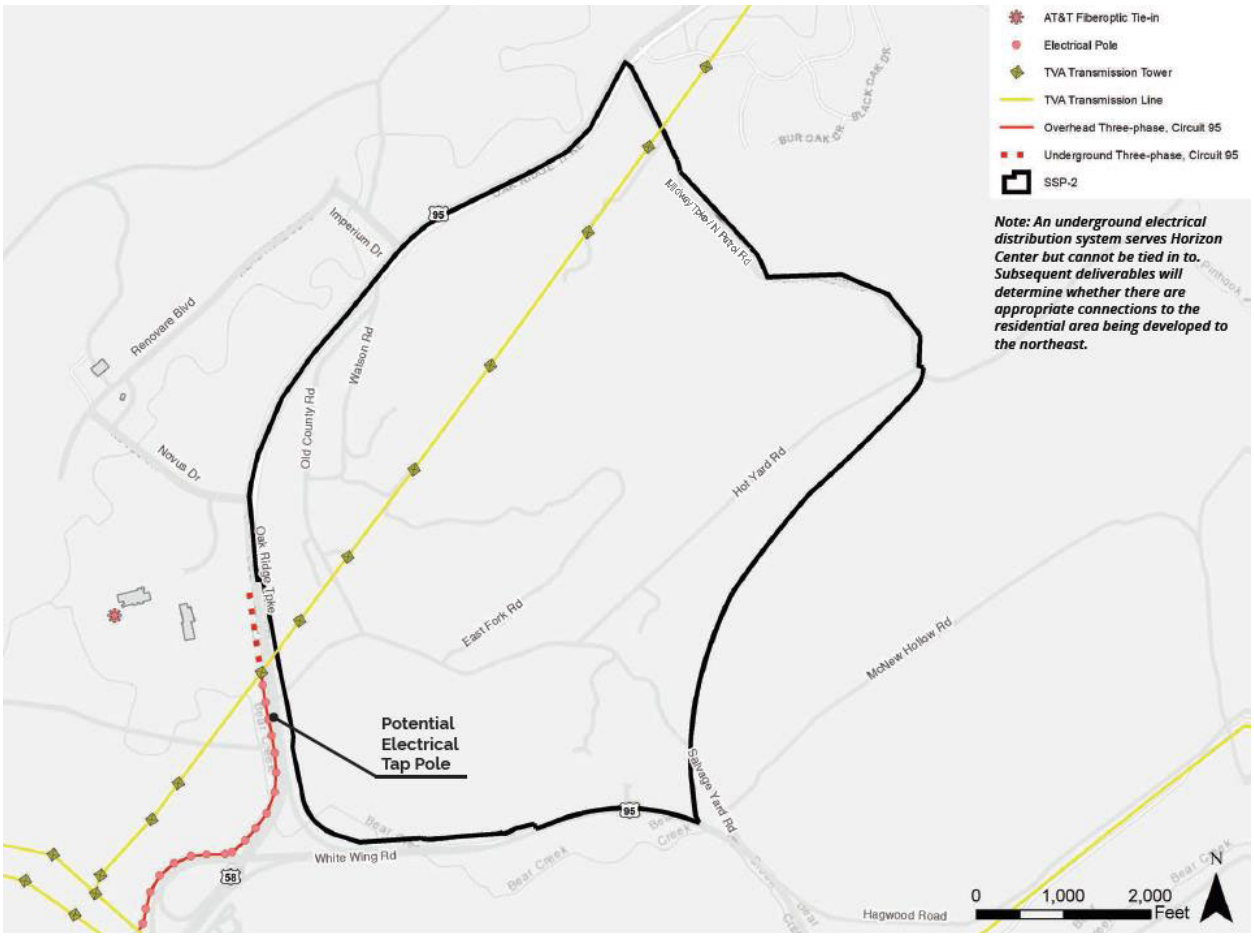
Table 3-18. ORETTC Infrastructure Requirements

Utility	Provider	Anticipated Service Size	Notes
Electrical	City of Oak Ridge	13.2 kV distribution line	1,000 kVA (capacity)
Water (Potable)	City of Oak Ridge	2-inch line	17,000 gpd (estimated usage)
Water (Fire)	City of Oak Ridge	8-inch lines (2)	6 hydrants with minimum of 1,000 gpm @ 20psi
Natural Gas	Oak Ridge Utility District (ORUD)	4-inch line	1,814,000 BTU (estimated usage campus-wide)
Wastewater	City of Oak Ridge	2-inch line	1,758 gph (estimated peak demand)
Communications	AT&T	Fiber Optic	speeds up to 100 Gbps

Notes: BTU = British thermal unit; Gbps = gigabits per second; gpd = gallons per day; gph = gallons per hour; gpm = gallons per minute; kV = kilovolt; kVA = kilovolt-ampere; psi = pound per square inch.
Source: CNS 2020a, DOE 2016.

Electricity. The TVA generates electric power for the region. Most residences and businesses receive their power through distribution companies that purchase wholesale power from TVA. The City of Oak Ridge operates its own electric utility, providing electricity to about 15,000 metered customers. Peak system demand in the city is approximately 120 megavolt-amperes (MVA), while the system's base capacity is just over 200 MVA. There are overhead 13.2 kilovolt (kV) distribution lines owned by the City of Oak Ridge both southwest of the Horizon Center and northeast of the ORETTC site. The line to the southwest has more capacity than that to the northeast (CNS 2020a, DOE 2016). The City of Oak Ridge would provide electricity to the ORETTC. The existing electrical and communications infrastructure is shown in Figure 3-21.

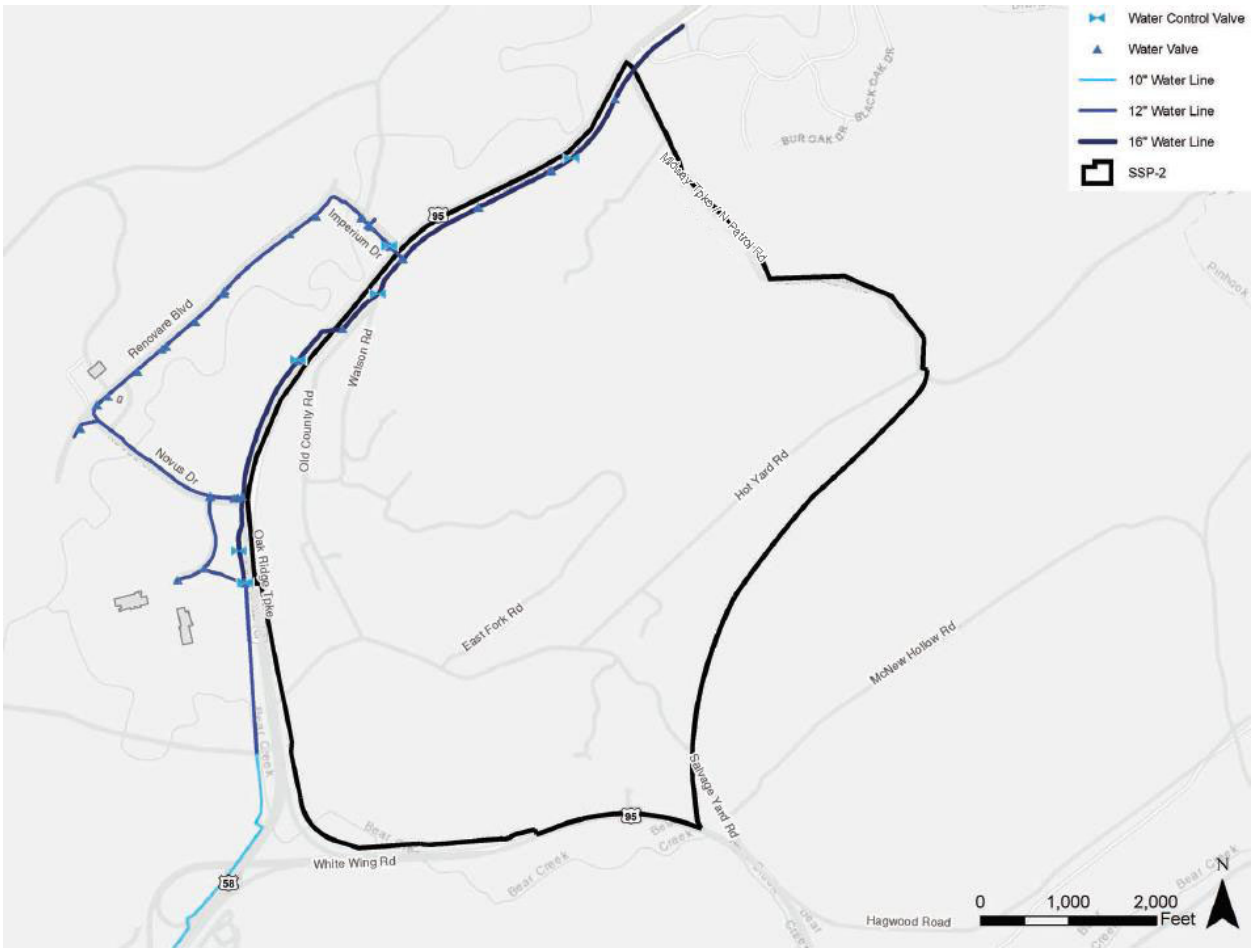
Communications. AT&T has underground fiber optic service to Horizon Center and an existing underground handhole of fiber optic located at the corner of the Oak Ridge Turnpike and Midway Turnpike/North Patrol Road (*see* Figure 3-21). Broadband service would be available ranging from 10 megabits per second to 100 gigabits per second. Fiber optic conductors would share the same trench with electric utility (CNS 2020a).



Source: CNS 2020a.

Figure 3-21. Existing Electrical and Communications Infrastructure

Water and Fire. Water supply for the Oak Ridge area is obtained from the Clinch River. DOE transferred ownership of its water treatment plant to the City of Oak Ridge effective May 1, 2000. This plant is located on Pine Ridge near the Y-12 Complex. The plant produces about 12 million gallons per day and has the capacity to produce up to 28 million gallons per day. A 16-inch ductile iron pipe water main runs along Oak Ridge Turnpike. South of Novus Drive, the water main reduces to 12- inch pipe. The main is located on the western edge of SSP-2 and can be tapped into to provide water for the site. From the SR 95/SR 58 interchange north to Novus Drive, the water main is on the west side of the road. After Novus Drive the 16-inch main crosses to the southeast side of Oak Ridge Turnpike, onto SSP-2 (CNS 2020a, DOE 2016). The existing water infrastructure is shown in Figure 3-22.

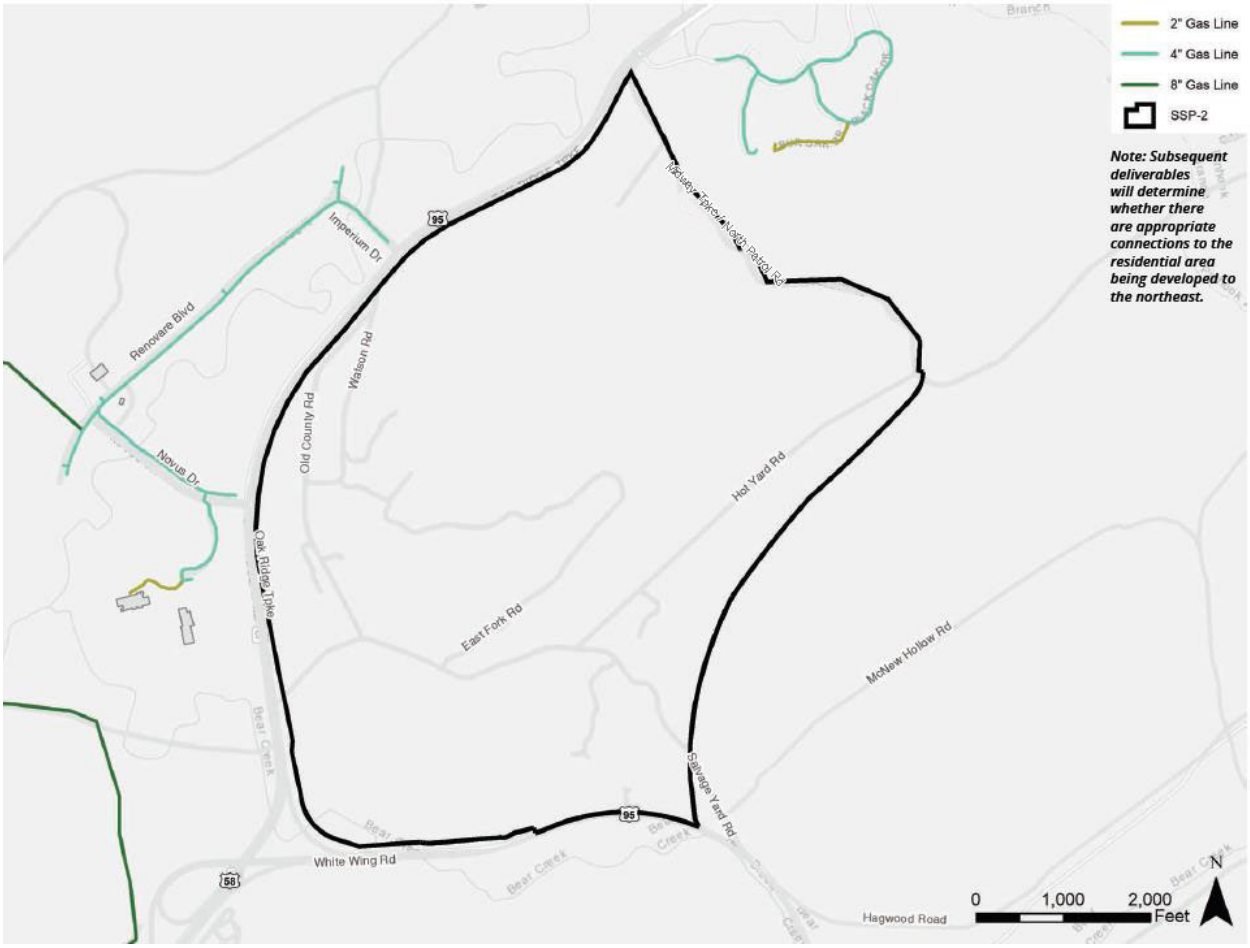


Source: CNS 2020a.

Figure 3-22. Existing Water Infrastructure

Natural Gas. The Oak Ridge Utility District (ORUD) provides natural gas service. There are 4- and 8-inch lines that serve Horizon Center and the developing residential area to the northeast. ORUD would extend its 4-inch gas line at Imperium Drive and Oak Ridge Turnpike across the highway to serve the ORETTC. This would be the shortest distance to existing gas lines (CNS 2020a, DOE 2016). The existing natural gas infrastructure is shown in Figure 3-23.

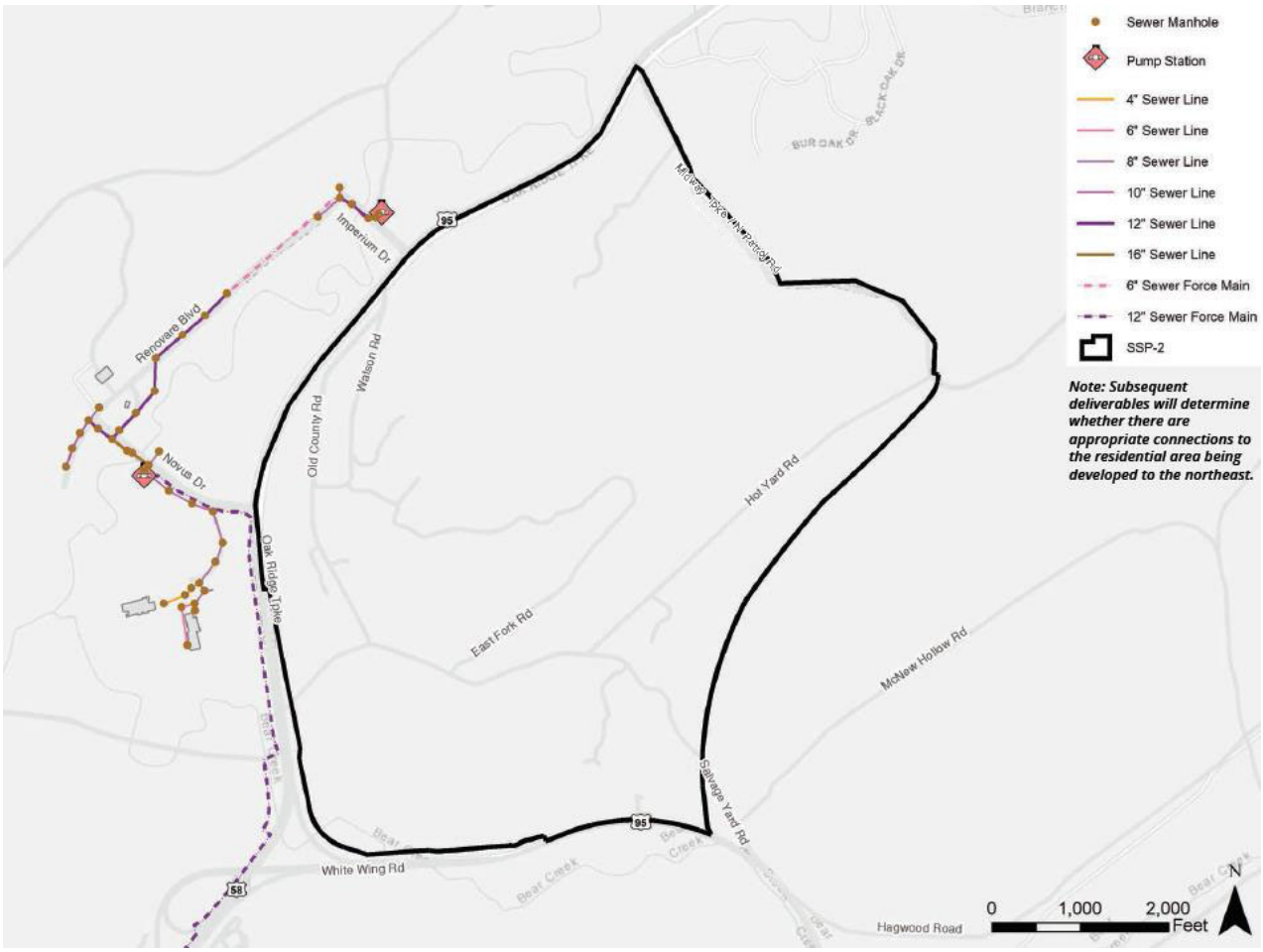
Wastewater. Wastewater collection in the city is maintained by the City of Oak Ridge. There is a 12-inch polyvinyl chloride main sewer line running near the western edge of SSP-2, across Oak Ridge Turnpike and within Horizon Center. A grinder pump station can be purchased for each building, and a 2-inch sewer line can be run from the site to the pump station along Imperium Drive. The sewer line would need to run under Oak Ridge Turnpike/SR 95 in order to connect to the existing pump station (CNS 2020a). The existing wastewater infrastructure is shown in Figure 3-24.



Source: CNS 2020a.

Figure 3-23. Existing Natural Gas Infrastructure

Stormwater. Stormwater flow is all surface flow on the site. There are no manmade stormwater structures on site, although there are two intermittent streams, which flow north to East Fork Poplar Creek. A 100-foot buffer from either side of the streams would be maintained (CNS 2020a).



Source: CNS 2020a.

Figure 3-24. Existing Wastewater Infrastructure

3.14.2 Proposed Action Impacts

Electricity. To service the ORETTC, a new overhead 13.2 kV distribution line would be installed and tied-in to an existing utility pole at the northeast corner of the Oak Ridge Turnpike and Southwood Lane. The overhead line would be approximately 2,872 feet in length and require 11 utility wood poles installed along the east side of Oak Ridge Turnpike. Electricity for the ORETTC would go underground at the Oak Ridge Turnpike/Imperium Drive intersection to the proposed ORETTC facilities. The TVA electrical system has sufficient capacity for the proposed ORETTC, which is expected to use approximately 1,800,000 kilowatt-hours annually (CNS 2020c).

Site lighting would be provided on the exterior of each building, the parking lots, the Live Burn Fire Tower, and the rubble pit. Wall-mounted light fixtures would be installed on the exterior of the buildings. Light poles with pole-mounted light fixtures would be installed within the ORETTC to provide sufficient lighting in the exterior area.

Water and Fire. The ORETTC would require 1,100,000 gallons per year during construction. A 2-inch water line would be tapped at the water main on the eastern side of the northern access gate to service the ORETTC. Once operational, the water demand for the ORETTC would ultimately

be determined by the number of water fixture units within each 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 ORETTC would be manned during normal business hours by a staff of approximately 20 people and would have the capability to staff and operate if needed by a customer over a 24-hour period. On average, approximately 250 people would be trained at the ORETTC daily, and the annual demand of potable water is estimated to be approximately 2,362,500 gallons per year.

Fire protection at the proposed ORETTC site would be based around the City of Oak Ridge requirement that a minimum 6-inch line can provide 1,000 gallons per minute (gpm) at 20 pounds per square inch (psi). Sites in Horizon Center use hydrants for fire water supply, and hydrant tests indicate the water main is provides an average of 1,800 gpm at 20 psi (CNS 2020b).

Each building would require a minimum of two fire hydrants at opposing sides of the building, as per City of Oak Ridge Standards of Construction. The Live Burn Fire Tower would require two hydrants within 200 feet. City of Oak Ridge Standards of Construction require a fire department connection at each building as well. The maintenance building would utilize a fire hydrant from the ORETTC. The ERTF and SNRAF would each require approximately 850 gpm of sprinkler flow. An 8-inch line would be tapped at Imperium Drive to run to the Live Burn Fire Tower location, and an additional 8-inch line would be tapped on the eastern side of the northern access gate to serve as fire protection for the primary training buildings.

Natural Gas. Natural gas would be used for building heating. For planning purposes, the following assumptions were used: ERTF: 800,000 British thermal units (BTU); SNRAF: 800,000 BTU; maintenance building: 134,000 BTU; and Live Burn Fire Tower: 80,000 BTU. Approximately 1,920,000 cubic feet of natural gas would be required annually at the ORETTC. The ORUD has sufficient supply capacity to support the natural gas demands of the proposed ORETTC (CNS 2020c).

Wastewater. Wastewater collection would be serviced by the City of Oak Ridge. There is a 12-inch polyvinyl chloride force main sewer line running near the western edge of SSP-2, across Oak Ridge Turnpike and within Horizon Center. A grinder pump station could be purchased for each building, and a 2-inch sewer line could be run from the site to the pump station along Imperium Drive. The sewer line would need to run under Oak Ridge Turnpike in order to connect to the existing pump station.

City of Oak Ridge Standard Construction Requirements specifies a wastewater demand of 25 gallons per day per employee per 8-hour shift. Using the same calculations used to determine water demand, the peak hour demand for wastewater at the site would be approximately 1,758 gallons per hour. Per City of Oak Ridge personnel, the existing pump station has adequate capacity to handle the peak flows of the ORETTC (CNS 2020b).

Stormwater. Any development or construction activities that disturb more than 1 acre would be required to comply with TDEC General NPDES Permit for Discharges of Stormwater Associated

with Construction Activities. This includes the development and implementation of a SWPPP to help minimize any pollution that might leave the site by stormwater.

The Oak Ridge Stormwater Management Ordinance provides design requirements to follow for stormwater control. An area approximately equal to 5 percent of the total impervious surface area created for the ORETTC would need to be allocated for stormwater ponds, to be used for stormwater management. Stormwater ordinances within City of Oak Ridge require two separate types of stormwater management, runoff and rainfall mitigation. All stormwater runoff from developed areas on site must be managed. The site contains three historical drainage basins that could potentially need to be managed, with post-construction stormwater runoff being managed at pre-construction levels. The site additionally must manage the first inch of rainfall from any precipitation event preceded with 72 or more hours of no rainfall. The water may not be discharged to surface waters and must be 100 percent managed. The first inch of rainfall across the current planned development equates to a volume of 18,150 cubic feet of water that must be retained.

The City of Oak Ridge requires management of 1-, 2-, 5-, 10-, and 25-year Type II 24-hour storms. The allowable runoff rates are shown in Table 3-19. The two proposed ponds would contain enough volume to manage the stormwater runoff from the site and any firefighting water runoff (CNS 2020c).

Table 3-19. Acceptable Stormwater Runoff Discharge Rates

Return Period	Runoff Rate (cubic feet per second)
1-year	24.7
2-year	29.6
5-year	35.2
10-year	40.5
25-year	47.3

Source: CNS 2020a.

Live Burn Fire Tower. The Live Burn Fire Tower would utilize large volumes of water to conduct firefighting training at the ORETTC. According to the manufacturers of similar live burn buildings, average training operations with the burn building would likely utilize about 250,000 gallons of water per year for firefighting training. A common way of managing the runoff from the fire training facilities is through ponds.

Communications. Fiber optic service would share the same trench with electric utility to Horizon Center and an existing underground handhole located at the corner of the Oak Ridge Turnpike and Midway Turnpike/North Patrol Road. Available broadband service would adequately support the ORETTC requirements (CNS 2020b).

3.14.3 No-Action Alternative Impacts

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

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 ORETTC would occur over a 1.5 year period, from November 2020 until approximately mid-2022. The ORETTC is expected to operate for 50 years. Consequently, cumulative impacts associated with operations could occur until approximately the year 2072. The cumulative analysis in this EA focuses on actions and impacts that could occur over the next 10 years (2020-2030), as forecasts beyond that time period become more speculative and less meaningful. Past operations, and continued operations of existing facilities within the ORETTC Project area, such as the Horizon Center Industrial Park, Y-12, and ORNL, are included in the affected environment section and thus, are already considered in this EA. Consequently, this cumulative analysis focuses on reasonably foreseeable actions.

NNSA identified two such actions: (1) construction and operation of the General Aviation Airport at the East Tennessee Technology Park Heritage Center; and (2) construction and operation of a Drive Track at the DOE CTF, which is a separate training facility that would accommodate wet-driving conditions.

4.2 Potential Cumulative Impacts

Table 4-1 presents the cumulative impact analysis of the ORETTC, the General Aviation Airport, and the Drive Track.

Table 4-1. Potential Cumulative Impacts by Activity

Resource Area	ORETTC	General Aviation Airport	Drive Track
Land Resources	Up to 13.5 acres could be disturbed during construction, which is less than one percent of land at 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.	Approximately 132 acres of property needed for the development of the airport would be cleared and graded. There would not be any adverse land use compatibility impacts.	Just like the ORETTC site, the land use for the CTF, where the Drive Track would be sited, is classified as public use. Up to 3.5 acres could be disturbed, which is less than one percent of land at ORR. Drive Track operations would be consistent with current land uses in the area.
Visual Resources	No appreciable visual resource impacts are expected, as the proposed ORETTC site is largely wooded and would only be visible from traffic on the Oak Ridge Turnpike.	The visual character of the area would change from a mix of industrial use and open space with the development of the airport and associated roads.	Because of the location within the CTF, no notable visual impacts would be expected.
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.	There would not be a substantial increase in air emissions and no adverse impacts would occur. Temporary particulate emissions during airport and road construction activities would be the greatest contributor.	Minor, short-term effects would be due to generating airborne dust and other pollutants during construction. The area is in attainment for all NAAQS.
Noise	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.	Construction noise would generate localized temporary increases in noise levels at and near the construction site. The noise would be generated in an industrial area and should not exceed any thresholds that could result in adverse impacts. Aircraft noise levels would remain below 65 dB DNL at all noise-sensitive locations.	There are no sensitive noise receptors in the vicinity of the Drive Track and noise impacts would not be expected beyond the ORNL site boundary.

Resource Area	ORETTC	General Aviation Airport	Drive Track
Water Resources	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 0.16 acres for the road corridor and 0.05 acres for the pedestrian crossing. The potential wetland disturbance for the roadway is likely to be less than 0.16 acres since wetlands were not identified in the recent survey. Meanwhile, the pedestrian crossing of the stream riparian buffer would disturb 0.05 acres of wetland under the current site design. However, it may be viable to re-route the pedestrian bridge to avoid wetland impact.	Construction activities for the airport would directly and indirectly impact five streams and approximately 6 acres of wetlands. Three streams and approximately 1.41 acres of wetlands could be impacted.	Construction of the Drive Track is not expected to require significant quantities of water. Surveys of the proposed site would be performed to identify any surface water resources and support evaluations of impacts to water resources. At least a portion of the Drive Track would be sprinklered to accommodate training in wet driving conditions. At this time, there is not enough known about the Drive Track to estimate water usage. Runoff from a 130,000-foot Drive Track would need to be collected and either reused or held and released at a rate not to exceed the pre-development runoff rate. As design progresses, the City of Oak Ridge rainfall-runoff and acceptable uses would need to be discussed further. Due to the type of operations at the track, an oil/water separator would likely be included in site design (CNS 2020a).
Geology and Soils	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 stormwater drainage on site.	Adverse impacts on site geology are not expected. Affected soils are generally stable and acceptable for standard construction requirements. Erosion prevention and sedimentation control measures would be implemented to minimize the potential for soil erosion.	Minor, temporary soil disturbance during construction; however, no viable geologic or soil resources are expected to be lost as a result of construction activities, although pre-construction surveys would confirm this conclusion.
Biological Resources	Construction of ORETTC would have short- and long-term less than significant 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.	Vegetation and habitats in affected areas would be permanently changed to an urban/industrial cover type. Some wildlife would be destroyed and displaced from the airport development. No state or federally listed threatened and endangered species have been identified as occurring in the project area. The potential for wildlife-aircraft strikes could be minimized with the implementation of a wildlife hazard management plan.	Potential impacts on biological resources include loss of habitat and wildlife disturbance. Given the small land disturbance, the ORETTC would not be expected to reduce the distribution or viability of species or habitats of concern. Biological surveys would be conducted, as appropriate, to identify any biological resources and support evaluations of impacts to biological resources.

Resource Area	ORETTC	General Aviation Airport	Drive Track
Cultural Resources	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.	No cemeteries or known prehistoric sites would be affected. No historic properties eligible or potentially eligible for listing in the NRHP would be affected. Four sites considered to be contributing properties to the potentially NRHP-eligible Wheat Community Historic District could be adversely affected from airport construction. No direct impacts on the proposed K-25 building footprint facilities stipulated as part of the final MOA or adverse impact on the creation of the Manhattan Project National Historic Park.	Construction-related activities and ground disturbance would be small. Cultural resource surveys would be conducted, as appropriate, to identify any cultural resources and support evaluations of impacts to cultural resources.
Socioeconomics	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.	Minor positive employment and income impacts are possible. There would be no impact on population. Positive fiscal impacts include revenue from property and sales taxes.	The peak construction workforce and operational workforce would be less than ORETTC, and negligible compared to the projected population in the ROI. As such, socioeconomic impacts, although beneficial, are expected to be negligible.
Environmental Justice	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 disproportionate adverse health or environmental impacts would occur to any low-income or minority population	No environmental justice populations are expected within the census tracts where the Drive Track would be located. During construction and operation, no disproportionately high and adverse environmental or economic effects on minority or low-income populations are expected.
Human Health	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 impacts expected other than normal safety concerns associated with construction and aircraft operations.	No offsite impacts are expected. There would be no radiological or hazardous chemical human health impacts associated with Drive Track operations.

Resource Area	ORETTC	General Aviation Airport	Drive Track
Facility Accidents	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.	Based on statistical analysis and the estimated number of aircraft operations, there could be a non-fatal aircraft accident occurring once every 5 months, with a fatal accident occurring once every 2 years. A wildlife strike could occur approximately once every 2.9 years, with a damaging strike occurring once every 10.1 years.	Drive Track operations are inherently dangerous and trainees could be adversely impacted by accidents. No offsite impacts would occur.
Intentional Destructive Acts	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. 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.
Waste Management	Solid non-hazardous waste would be recycled or transported to an appropriate ORR landfill for disposal. No hazardous waste would be generated from operations.	Solid non-hazardous waste would be recycled or transported to an appropriate ORR landfill for disposal. Minor quantities of hazardous waste may be generated from airport operations. These wastes would be transported to existing licensed and/or permitted treatment, storage, and disposal facilities.	Solid non-hazardous waste would be recycled or transported to an appropriate ORR landfill for disposal. No hazardous waste would be generated from operations.
Transportation	Temporary increases in traffic associated with construction activities would not be significant compared to existing activities in the ROI.	The existing Haul Road and Blair Road would be impacted, but re-route options could improve existing conditions on the affected roadways.	Temporary increases in traffic associated with construction activities would not be significant compared to existing activities in the ROI.
Infrastructure	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.	Existing utilities have adequate capacity to support the proposed airport, but minor upgrades and modifications would be needed and some existing utilities may need to be relocated.	Construction of the Drive Track would have minimal impacts on infrastructure capacity. The capacity of the existing infrastructure in the region would be adequate to support the Drive Track (CNS 2020a).

Source: CNS 2020c, DOE 2016.

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APPENDIX A

ORETTC Site Selection

A.1 INTRODUCTION

During early project development of the Oak Ridge Enhanced Technology and Training Center (ORETTC) a 15-acre site was analyzed for development of the facility; however, this initial site could not be secured for development, and a secondary site was analyzed. The new site located on the Oak Ridge Reservation included approximately 950 acres of undeveloped land. This area is known as Self-Sustaining Parcel (SSP) 2. The proposed site was identified through a detailed site-evaluation process which considered the following factors: land, infrastructure, constraints, developable areas, and alternatives (CNS 2020b). In February 2020 a Site Analysis Report was prepared to provide analysis and potential location alternatives to help select the most cost-effective, operationally efficient site for development of the ORETTC. Figure A-1 depicts the site-evaluation process.

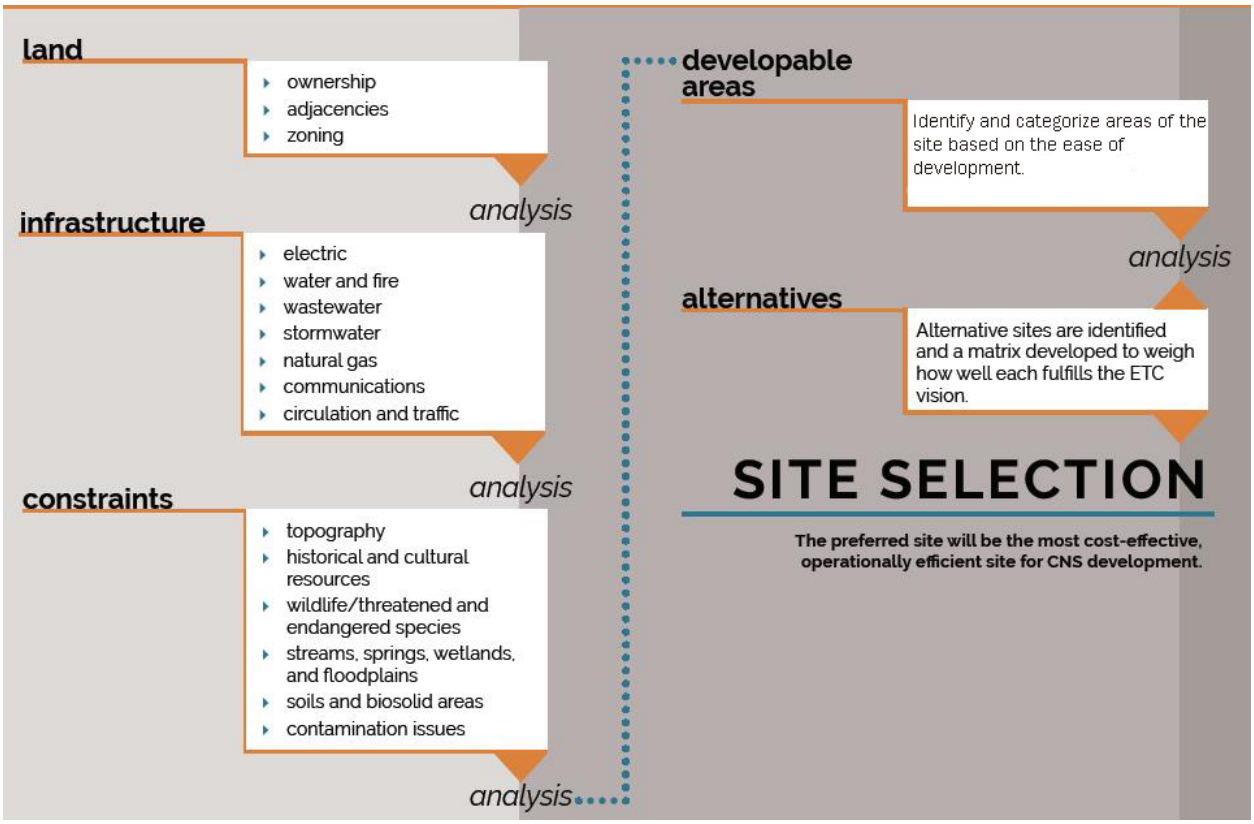


Figure A-1. Site Evaluation Process for the ORETTC

During planning interviews, planning workshop, and meetings with CNS, key assumptions for site development were developed. In addition to the key assumptions, several key challenges were identified that may hinder or delay the ORETTC. Both key assumptions and challenges were considered during the site analysis process.

Based on the developable areas within SSP-2, NNSA developed and considered four alternative configurations of the ORETTC (*see* Figure A-2). Section A.2 presents the four alternative configurations along with advantages and disadvantages.

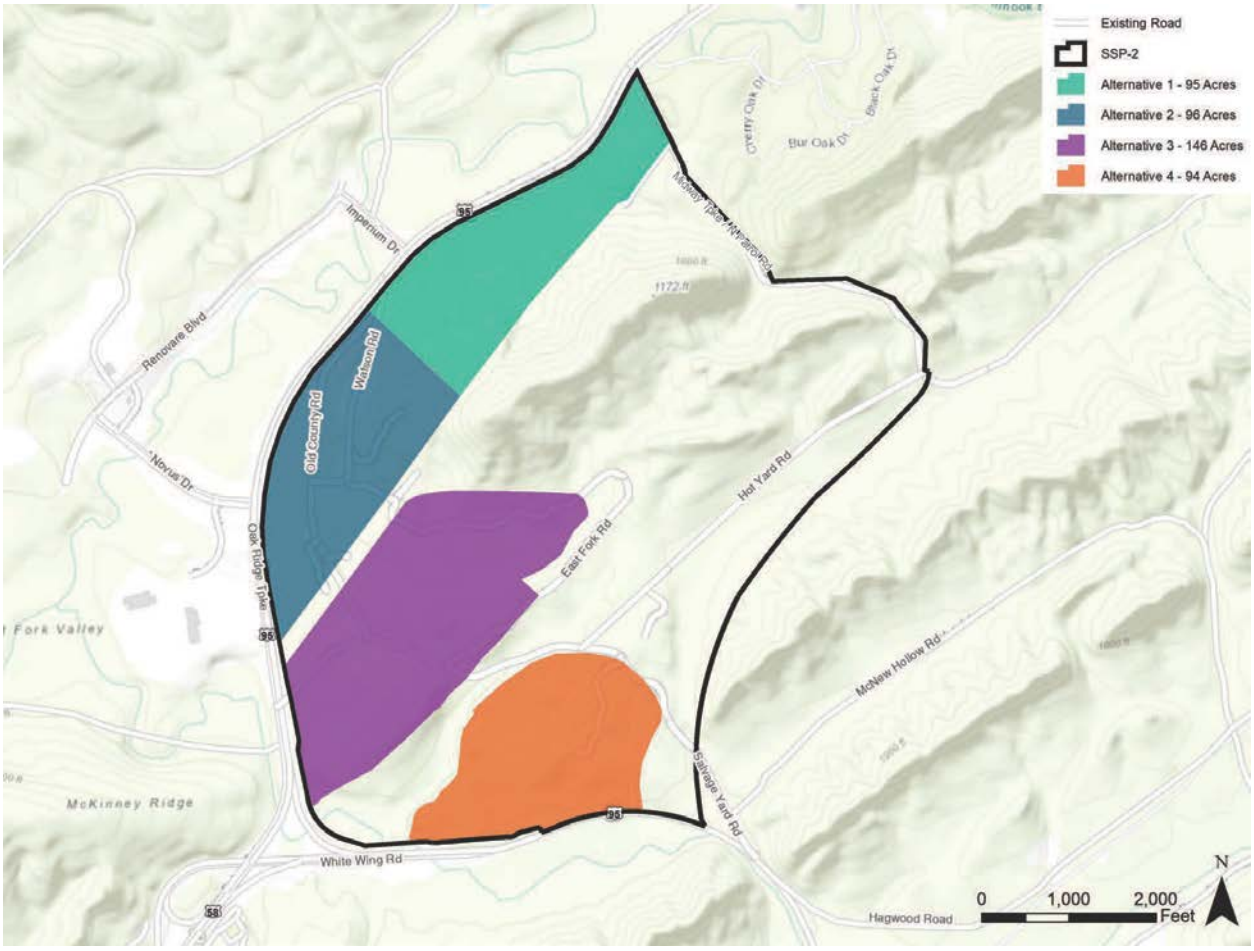


Figure A-2. Development Site Alternatives

A.2 ALTERNATIVE CONFIGURATIONS

This section presents the four alternative configurations along with advantages and disadvantages. In addition, following the description of each development site alternative each site was compared in a matrix against 20 criteria (including contiguous developable area, site access, proximity to utilities, and environmental considerations, such as the potential to impact cultural resources, endangered species, and wetlands). Alternatives 2-4 scored the lowest. Consequently, those alternatives were eliminated from detailed analysis (CNS 2020b).

Alternative 1

Alternative 1, located in the northernmost area of SSP-2, comprises 95 acres, 69.4 of which falls into Developable Area 1. The land has minimal to moderate slopes and is heavily vegetated. This area is free from any previous development.

The only constraints in the area are two intermittent streams, which could be crossed with culverts as needed, and the existing transmission line, which lines the area to the east. No extraneous studies are anticipated that would hinder development or the transfer of land to the RCIDB or a commercial developer. The state-managed Tennessee dace has been identified in the streams in this area but are protected by buffers.

Egress would be developed from Oak Ridge Turnpike across from Imperium Drive, which is an ideal location to allow for two-way access. Gum Hollow Road could potentially serve as a secondary exit.

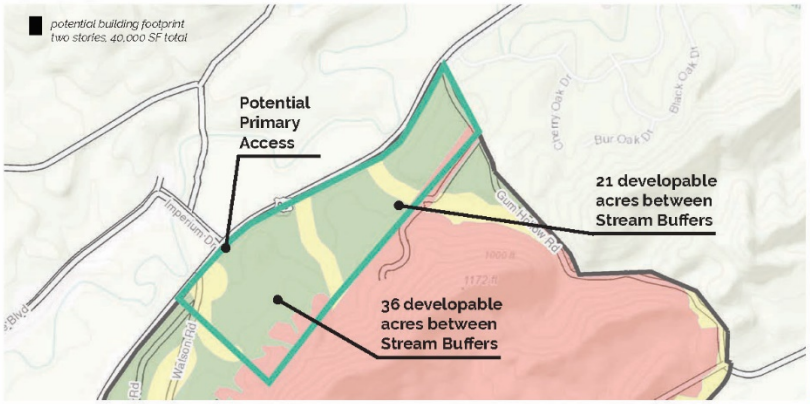
Alternative 1 is ideal for connection to the existing 12-inch water line, which is located on SPP-2. Electrical lines would need to be extended across Oak Ridge Turnpike and north. The existing 12-inch sewer force main is also located to the south and across Oak Ridge Turnpike.

Table 1 | Alternative 1

PROS	CONS
Significant acreage of contiguous developable area, supporting operational efficiencies and potential future development	Heavily vegetated/requires clearing
Minimal to moderate slopes	Does not utilize existing roads or culverts
Ideal egress to allow two-way traffic from Turnpike	Located farther from the electrical line than other alternatives
Constraints are minimal and would not add to the development timeline	Nearest sewer main is 6-inch pipe
Well located for connection to existing water and natural gas lines	
Depending on site layout, stream crossings may not be necessary	

If Alternative 1 is selected, the ETC could fit into the southernmost portion, leaving the other areas for future expansion if needed.

Figure 1 | Alternative 1



Alternative 2

Alternative 2 is located in the western portion of SSP-2 spanning the area west of Gate 10-D. The area comprises 96 acres. Of these acres, 34 are considered Developable Area 2, which requires additional development considerations.

Constraints in this area include three historical homestead sites and one cemetery, which may require THC involvement and review in the development process. Although a significant portion of the area has been clearcut, that area was used as a biosolid application field, and additional study is recommended prior to selecting it as a development site. Building on the biosolid fields, if deemed viable and safe, may require additional building costs for the creation of foundations.

There are multiple options for egress. The existing Watson Road connects to the Turnpike at Gate 10-D; however, this allows access only from eastbound traffic. Making that gate point accessible from both directions of Oak Ridge Turnpike is not an option because it is located only 500 feet from Imperium Drive. A new entrance point could be developed across from Novus Drive; however, special care would need to be taken to protect the stream that flows in close proximity to that area. Alternatively, Watson Road could be extended and a new egress point be developed across from Imperium Drive such as in Alternative 1.

Table 2 | Alternative 2

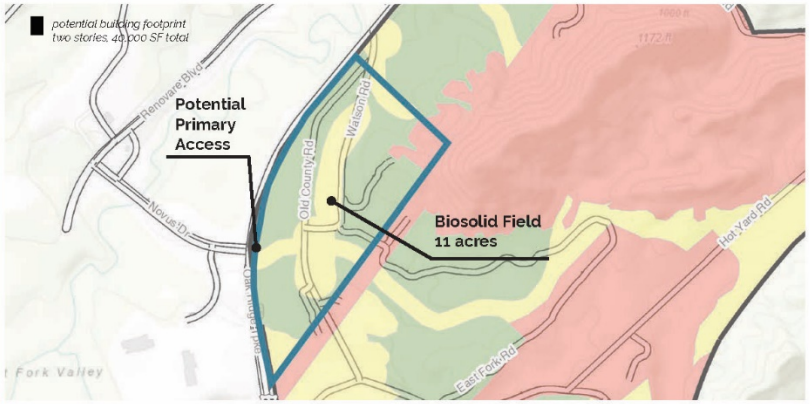
PROS	CONS
Minimal to moderate slopes	Ideal facility areas still require clearing
Existing roadways and culverts may slightly reduce costs	Existing egress is not adequate
Existing clearings may reduce development costs	Developable Area 1 acreage is small and not contiguous
Good location for water, wastewater, and natural gas connections	Development on/near the biosolid field may require additional time, study, management, and costs
	Development may require THC involvement and review
	Potential electrical tap pole is south of Alternative 2

Alternatively, it may be possible to create a new entrance off Watson Road at one of two existing breaks in the divided highway; however, these may not be preferred by TDOT.

Alternative 2 is close to existing water and sewer lines, but the sewer force main is located across Oak Ridge Turnpike.

If Alternative 2 is selected, it is recommended that the biosolid application field be used only as a laydown area at this time and a management plan be developed.

Figure 2 | Alternative 2



Alternative 3

Alternative 3 is located in the southwestern portion of SSP-2, bordered on the north by the transmission line and on the south by the White Wing Scrap Yard ROD Area. The area is 146 acres.

The constraints in this area include four historical homestead sites and one known spring. In addition, there are 26 acres of biosolid application field. The biosolid application field and the spring's presence may require additional environmental study prior to development in those areas. As with Alternative 2, the THC should be involved in any development plans near the historical sites.

However, there are approximately 95.2 acres of Developable Area 1. These are located to the east and south of the biosolid application fields and would likely require more roadway construction than Alternatives 1 or 4.

Egress to the area is currently via Gate 10-C; however, as discussed in the previous section, this is not a recommended access point for the ETC. Instead, it would be preferable to create a new entrance at the nearest existing break in the divided highway, which is across from Novus Drive. This would add roadway construction and maintenance costs when compared with other alternatives. In addition, roadway ROW associated with the Gate 10-C area should be investigated.

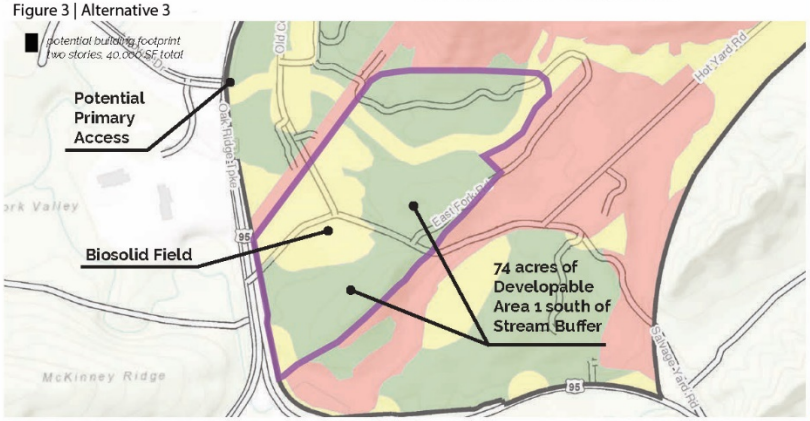
Table 3 | Alternataive 3

PROS	CONS
Significant acreage of developable area	Ideal facility areas still require clearing
Minimal to moderate slopes	Ideal development areas would require more road construction/maintenance than other alternatives
Existing roadways and culverts may reduce development costs	Existing egress is not adequate or safe
Historical sites are located near existing roads	Development may require THC involvement and review
Existing clearings may reduce development costs	Development on/near the biosolid field may require additional time, study, management, and costs
Closest alternative to the potential electrical tap pole	Development near spring may require additional study
	Water and sewer lines are close but across Oak Ridge Turnpike

Water, wastewater, and electrical lines are across Oak Ridge Turnpike.

If Alternative 3 is selected, the southernmost portion of the biosolid application area might serve as a laydown yard during construction. The area south and west of Old County Road offers the most developable land.

Figure 3 | Alternative 3



Aletenative 4

Alternative 4 is located in the southern portion of SSP-2 along SR 95/White Wing Road. The area is approximately 94 acres, 73.9 of which is identified as Developable Area 1.

This area is deemed "Clean" according to the DOE NPL site maps but is surrounded by White Wing Scrap Yard ROD Area. In addition, the area includes four historical homestead sites, one small cemetery, three known springs, and several known locations for state-managed plant species.

Although there are no FEMA-documented wetlands in the area, site visits to the area suggest possible wetland areas associated with the stream and nearby springs. Due to the natural resources considerations and proximity to the ROD area, the National Environmental Policy Act (NEPA) process may be more extensive than for other alternatives. In addition, development near the historical sites should include THC involvement.

As discussed previously, action was taken to remove nuclear materials from the White Wing Scrap Yard in the 1990s; however, it may be wise to conduct testing to ensure the safety of runoff and stream water south of White Wing Scrap Yard prior to development. This area may be better suited for storage or other development rather than that proposed for the ETC due to the number of people likely to train at the site.

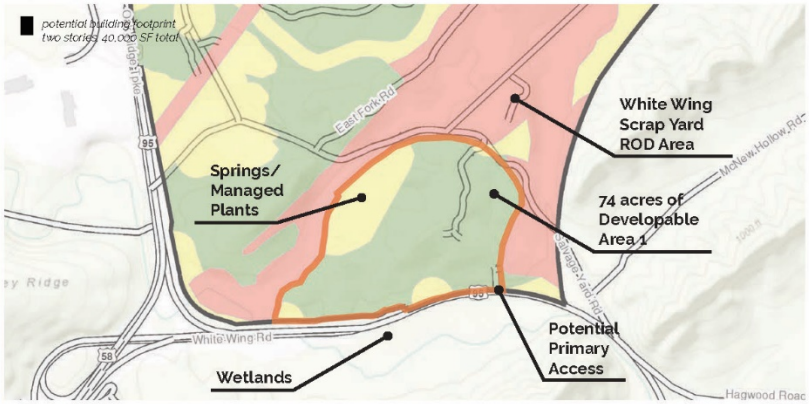
Table 4 | Alternative 4

PROS	CONS
Significant acreage of developable area	Heavily vegetated/requires clearing and grading
Minimal to moderate slopes	Development near springs may require additional study; wetland areas are possible
Existing access point/gate could be maintained and is situated well along SR 95	Development near the ROD area may require additional study to ensure safety
Existing historical areas are unlikely to prevent development	Located farther from existing water, wastewater, electrical, and natural gas lines than the other alternatives
No stream crossings are necessary	

An existing entrance to the site (via Gate 10-H) could be developed into a primary access point. Unlike the other alternatives, this area's access would be from SR 95/White Wing Road, which is a two-lane highway rather than a divided four-lane highway.

If Alternative 4 is selected, the site can easily accommodate planned state and federal facilities; however, development may be more costly due to the utility and infrastructure costs associated with this location.

Figure 4 | Alternative 4



Recommended Alternative

Table 5 provides a matrix to weigh the alternatives in order to select the most cost- and operationally efficient site for the ETC. Each advantage and disadvantage is ranked and a total score is calculated to help guide the selection of the recommended alternative.

Based on the previous analysis and the comparison at right, Alternative 1 is the recommended ETC site. Alternative 1 offers a large portion of unconstrained land adjacent the Oak Ridge Turnpike, offering ideal access and the least potential for costly or time-consuming issues during the design-build process.

Due to its proximity to utilities and existing gravel roadways, Alternative 2 could provide an attractive site for the ETC or future development; however, investigation of the environmental and structural viability development on the biosolid application site is necessary, delaying the design-build process and potentially offsetting any cost savings.

Table 5 | Development Site Alternative Matrix

	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Advantages				
Provides contiguous developable areas of 30 acres or more, supporting operational efficiencies	Yes	No	Yes	Yes
Ideal developable area is in close proximity to optimal access along the Oak Ridge Turnpike	Yes	Yes	No	No
Access point would allow safe, two-way access in proximity to the developable area	Yes	Yes	No	Yes
Utilizes an existing access point	No	No	No	Yes
Utilizes existing gravel roads	No	Yes	Yes	No
Within 2,000 feet of existing electrical service	No	Yes	Yes	No
Within 2,000 feet of existing water service	Yes	Yes	Yes	No
Within 2,000 feet of wastewater service	Yes	Yes	Yes	No
Within 2,000 feet of natural gas service	Yes	Yes	No	No
Access to existing communications (commercial)	No cost	No cost	No cost	No cost
Allows space for nearby future development	Yes	Possibly[1]	Yes	Yes
Disadvantages				
Developable area contains vegetation that will require clearing	Yes	Yes	Yes	Yes
Contains significant slopes	No	No	No	No
Contains streams that must be crossed	Possibly[2]	Yes	Yes	No
Contains springs/potential wetlands	No	No	No	Yes
Contains historical homestead/cemetery	No	Yes	Yes	Yes
Contains biosolid areas	No	Yes	Yes	No
Contains or is in proximity to known protected animal species	Yes	Yes	No	Yes
Contains or is in proximity to known protected plant species	No	No	No	Yes
Close proximity to White Wing Scrap Yard ROD Area	No	No	Yes	Yes

1 Biosolid application field limits developability, and further study is needed to determine the implications of that.

2 Depending on site layout and the size of land, Alternative 1 may not require a stream crossing.

APPENDIX B

Wetlands Assessment

B.1 INTRODUCTION

This draft Wetlands Assessment (Appendix B) has been prepared concurrently with the *Environmental Assessment for the Oak Ridge Enhanced Technology and Training Center* and in accordance with 10 Code of Federal Regulations (CFR) 1022, "Compliance with Floodplain and Wetlands Environmental Review Requirements". This assessment fulfills the U. S. Department of Energy's (DOE)/National Nuclear Security Administration's (NNSA) responsibilities under Executive Order 11990, "Protection of Wetlands." Executive Order 11990 requires Federal agencies to minimize the destruction or degradation of wetlands, and to avoid undertaking new construction located in wetlands unless they find there is no practicable alternative to such construction.

Definition of "Wetland" Under 10 CFR 1022.4

Wetland means an area that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas.

NNSA, in accordance with 10 CFR 1022, seeks to identify, evaluate, and as appropriate, implement alternative actions that may avoid or mitigate adverse wetlands impacts, and provide early and adequate opportunities for public review of plans or proposals for actions that may affect wetlands. This draft Wetlands Assessment serves to document the proposed activities that have the potential to affect the wetlands, and to consider alternatives to the proposed action.

An application for General Aquatic Resource Alteration Permit for Construction or Removal of Minor Road Crossings (form CN-1091), along with any other required information, would be submitted to Tennessee Department of Environment and Conservation (TDEC). Notice of coverage by TDEC of activities that qualify under general permits also serve as a section 401 Water Quality Certification pursuant to the federal Clean Water Act. Work shall not commence until a written Notice of Coverage (NOC) from TDEC is received.

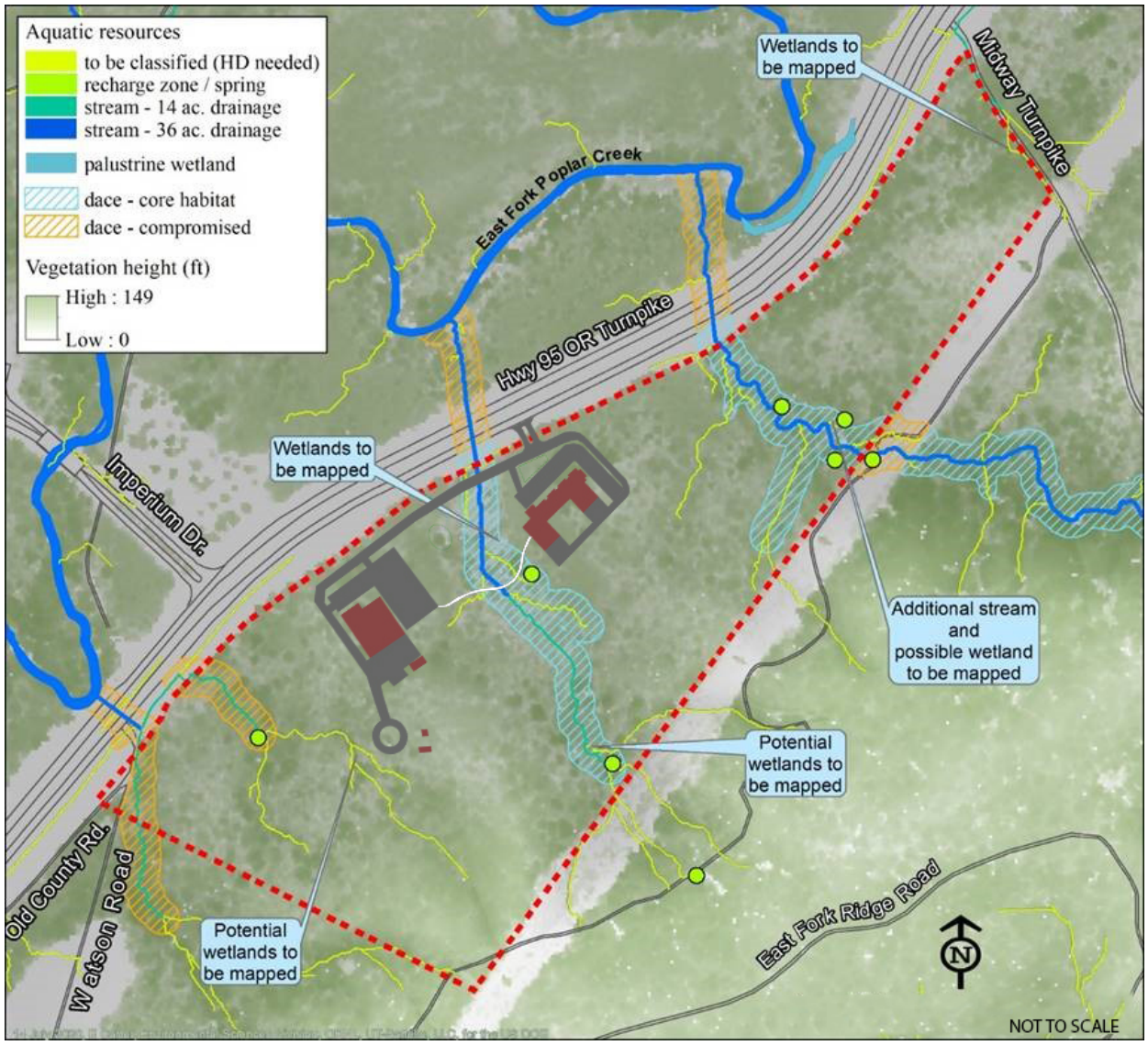
Pursuant to the *Clean Water Act*, an application for Nationwide Permit 14, Linear Transportation Projects would be submitted to the U.S. Army Corps of Engineers (USACE). NNSA would submit a pre-construction notification to the USACE prior to commencing the activity for the loss of waters of the United States greater than 0.1 acres.

B.2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

B.2.1 Proposed Action

The Proposed Action is described in Section 2.1 of the EA. The Proposed Action would require two stream crossings (i.e., the construction of a 36-foot wide roadway and 10-foot wide pedestrian walkway across a perennial stream) (*see* Figure B-1). A single stream would be crossed, and the two crossings would be nearby such that both crossing would be considered a single and complete project for purposes of permit authorization. The width of the stream bed and ordinary high-water marks at the crossings is approximately six feet. Use of bottomless culvert arches would span the stream crossings, thereby avoiding stream impacts, and allow the stream to flow freely. The design

of the roadway and walkway would avoid wetland impacts to the greatest extent practicable, while still providing a safe and functional route for ORETTC operations.



Source: ORNL 2020.

Figure B-1. ORETTC Roadway and Walkway Project Area

B.2.2 No Action Alternative

Under the No Action Alternative, the ORETTC would not be constructed and conditions at the existing site would remain unchanged and wetlands would remain unaffected.

B.2.3 Alternatives Considered but Eliminated

Section 2.3 of the EA discusses site alternatives for the ORETTC that were considered but eliminated from detailed analysis. In the process of developing the Proposed Action analyzed in this EA, NNSA considered siting alternatives for the ORETTC at: (1) another ORR location (i.e.,

the CTF); (2) offsite near Bethel Valley Road and Scarborough Road; and (3) onsite at Y-12. Those locations were eliminated from detailed analysis for the reasons stated in Section 2.3. In developing the Proposed Action, NNSA also considered potential implementation options at the proposed ORETTC site that could potentially avoid wetland impacts. Given that the development of the ORETTC requires the use of land on each side of the perennial stream, and there is an operational need for internal circulation across that stream, there is no practical means to avoid the wetlands.

B.3 POTENTIAL WETLAND IMPACTS

A preliminary wetlands determination and delineation has been performed based on a July 2020 biological survey of the proposed ORETTC site (ORNL 2020). Limiting the road corridor to 36 feet wide and the pedestrian corridor to 10 feet wide across the 100-foot riparian buffer on either side of the stream (CNS 2020a) would minimize potential impacts to potential wetlands in the riparian buffer to approximately 0.16 and 0.05 acres, respectively. Impacts to wetlands would be minimized by crossing the stream at the narrowest point, spanning the stream, crossing at a right angle to the stream, and minimizing the width of the transportation corridor.

The proposed use of a clear span bottomless culvert arch for the sidewalk and road crossings would avoid impacts to the channel (i.e., the stream is untouched). Because the stream crossings would be to a single stream and the two crossings would be nearby, both crossing would be considered a single and complete project for permit authorization. Wetland loss due to construction (road and pedestrian crossings) would total approximately 0.21 acres within the watershed.

The Proposed Action could involve the discharge of fill material into wetlands. All activities would be performed in compliance with associated permits and with the project Storm Water Pollution Prevention Plan (SWPPP) and Best Management Practices (BMPs). The proposed use of BMPs such as biodegradable sediment control barriers to protect the stream from erosion would further reduce potential wetland impacts. No contaminated soil is anticipated to be encountered during the proposed activities (DOE 2013).