

**ENVIRONMENTAL ASSESSMENT FOR THE
OFFSITE HOUSING OF THE Y-12 DEVELOPMENT
ORGANIZATION AT 103 PALLADIUM WAY,
HORIZON CENTER INDUSTRIAL PARK,
OAK RIDGE, TENNESSEE**



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EXECUTIVE SUMMARY

The National Nuclear Security Administration (NNSA), a semi-autonomous agency within the United States (U.S.) Department of Energy (DOE), has the primary responsibility to maintain and enhance the safety, security, and effectiveness of the U.S. nuclear weapons stockpile. One of NNSA's critical production sites is the Y-12 National Security Complex (Y-12), which is located on the Oak Ridge Reservation (ORR) in Oak Ridge, Tennessee. Y-12 is the only source of secondaries, cases, lithium components, and other nuclear weapons components for the NNSA nuclear security mission. The Y-12 Development Organization ("Y-12 Development" or "Development") is essential to the production mission at Y-12, provides a ready pool of subject matter experts to tackle production problems, develops new technology to meet future production requirements, and performs work-for-others as necessary to support the global security mission. To execute their mission, Y-12 Development requires facilities that safely and efficiently house the necessary research equipment and instrumentation, provide modern laboratory facilities to attract and retain top scientists and engineers, and are adaptable to a changing mission.

Y-12 Development operations are currently housed in two 70+-year-old buildings and one 50+ year old building that have structural, plumbing, electrical, laboratory exhaust, contamination, and heating, ventilation, and air conditioning (HVAC) issues. The buildings have deteriorated in such a manner that they currently pose a significant risk to the successful execution of the Y-12 Development missions. Consequently, NNSA has prepared this Environmental Assessment (EA) to analyze the potential environmental impacts associated with relocating most of the Y-12 Development operations to a modern offsite facility located at 103 Palladium Way in Oak Ridge, Tennessee, approximately 9.5 miles west of Y-12.

The analysis in Chapter 3 of this EA shows that impacts associated with relocating the Y-12 Development operations to the proposed offsite facility would be minor. With the exception of expanding the existing parking lot by approximately 0.5 acres, constructing a secure material storage building, and locating a maintenance trailer alongside the facility, only internal modifications of the existing facility would be required. No previously undisturbed land would be disturbed. Visually, there would be no notable change to the appearance of the existing facility. Short-term air quality impacts associated with construction would occur but emissions would be below *de minimis* thresholds. There would be no notable noise sources associated with construction and operation. Water requirements for construction and operation would represent less than one percent of water use in the region. No impacts to groundwater are anticipated from construction activities or normal facility operations. With appropriate stormwater management, implementation of spill prevention and response plans, and compliance with permit requirements, adverse impacts to surface water bodies would not be expected during construction and operations. The site is outside of the 100-year floodplain; however, a portion of the access driveway near the northern boundary of the site appears to overlap with the 500-year floodplain. Wetlands associated with stream riparian areas are present in the vicinity of the site footprint. However, the nearest wetlands are more than 600 feet from the existing facility and would not be affected by the Proposed Action.

Construction activities would not impact ecological or cultural resources. Because the peak construction workforce (50 persons) would be negligible compared to the projected population in

the region of influence (ROI), socioeconomic impacts during construction, although beneficial, are expected to be negligible. The operational workforce would be comprised of the same workers who currently conduct Y-12 Development operations at Y-12. No disproportionately high and adverse environmental or economic effects on minority or low-income populations are expected.

Workers would be subject to minimal occupational risks. Nuclear materials to be stored and utilized at the proposed offsite facility would include: depleted uranium, low-enriched uranium, small quantities of highly enriched uranium (< 400 grams), lithium, and other special materials in laboratory quantities. With regard to radiological exposures, the average dose to a Y-12 Development worker at the offsite facility would remain at approximately 13.5 millirem per year. A dose of 13.5 millirem per year is approximately two percent of the dose that the average individual in the U.S. population receives from natural and man-made radiation sources. The total worker dose would be approximately 1.35 person-rem per year. Statistically, a dose of 1.35 person-rem would be expected to result in an annual risk of 8.1×10^{-4} latent cancer fatalities to the Y-12 Development workforce, which would not be different than current operational risks. Offsite doses to the public would be less than 0.1 millirem per year. Because the quantities of hazardous materials in the offsite facility would be less than threshold quantities of concern, postulated accidents from radiological and non-radiological releases would not result in high consequences, meaning no member of the public or workers would be exposed to hazards that could result in serious health effects.

Y-12 Development operations would generate the same types and quantities of wastes that are currently generated by operations at Y-12. The operations would generate small quantities of low-level radioactive waste (LLW) and mixed-LLW, which would be disposed of at the Nevada National Security Site or an approved offsite commercial vendor. Hazardous and nonhazardous wastes would also be generated, and would be managed by existing Y-12 waste management facilities or commercial vendors. Although the transportation of material and waste between Y-12 and the Palladium Way facility would increase, impacts would be minimal. With regard to utility requirements, the existing infrastructure would be adequate to support the operations.

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ACRONYMS AND ABBREVIATIONS

BLS	Bureau of Labor Statistics
CAA	<i>Clean Air Act of 1990</i>
CEQ	Council on Environmental Quality
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
CFR	Code of Federal Regulations
CNS	Consolidated Nuclear Security, LLC
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	CO ₂ equivalent
CROET	Community Reuse Organization of East Tennessee
D&D	decontamination and decommissioning
dB	decibels
dBA	A-weighted decibels
DNL	Day-night Sound Level
DOE	U.S. Department of Energy
DSWM	TDEC Division of Solid Waste Management
EA	environmental assessment
EIS	environmental impact statement
EMDF	Environmental Management Disposal Facility
EMWMF	Environmental Management Waste Management Facility
EO	Executive Order
EOI	Expression of Interest
EPA	U.S. Environmental Protection Agency
ETTP	East Tennessee Technology Park
FHWA	Federal Highway Administration
FONSI	finding of no significant impact
FR	<i>Federal Register</i>
GHG	greenhouse gas
gpm	gallons per minute
GPP	General Plant Projects
HPP	historic preservation plan
HVAC	heating, ventilation, and air conditioning
IBC	International Building Code
kW	kilowatt
L _{eq}	Equivalent Sound Level
LLW	low-level radioactive waste
LPF	Lithium Processing Facility
MAQ	maximum anticipated quantity
MAP	mitigation action plan
MLLW	mixed low-level radioactive waste
MVA	megavolt amperes
MW	megawatts
NAAQS	National Ambient Air Quality Standards
NCA	National Climate Assessment

NEI	National Emissions Inventory
NEPA	<i>National Environmental Policy Act of 1969</i>
NERP	National Environmental Research Park
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	<i>National Historic Preservation Act</i>
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
NO _x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NRHP	National Register of Historic Places
O ₃	ozone
OMB	Office of Management and Budget
ORETTC	Oak Ridge Enhanced Technology and Training Center
ORIDB	Oak Ridge Industrial Development Board
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PA	Programmatic Agreement
PHA	Preliminary Hazards Analysis
PM _n	particulate matter less than or equal to n microns in aerodynamic diameter
R&D	research and development
RCRA	<i>Resource Conservation and Recovery Act</i>
ROI	region-of-influence
SHPO	State Historic Preservation Officer
SO ₂	sulfur dioxide
SPCC	spill prevention, control, and countermeasures
SR	State Route
SWPPP	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
THC	Tennessee Historical Commission
TSWMA	<i>Tennessee Solid Waste Management Act</i>
TVA	Tennessee Valley Authority
UPF	Uranium Processing Facility
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
U.S.C.	United States Code
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
Y-12	Y-12 National Security Complex

1 INTRODUCTION

1.1 Introduction and Background

The NNSA, a semi-autonomous agency within the DOE, has the primary responsibility to maintain and enhance the safety, security, and effectiveness of the U.S. nuclear weapons stockpile. The National Security Enterprise, overseen by the NNSA, includes production sites and design laboratories across the country. One of the critical production sites is Y-12, which is located on the ORR in Oak Ridge, Tennessee. Y-12 spans 811 acres, with 7.3 million square feet of laboratory, machining, dismantlement, and research and development (R&D) and office areas (Figure 1-1). Y-12 is unique in that it is the only source of secondaries, cases, lithium components, and other nuclear weapons components for the NNSA nuclear security mission. The Y-12 Development Organization is essential to the production mission at Y-12, provides a ready pool of subject matter experts to tackle production problems, develops new technology to meet future production requirements, and performs work-for-others as necessary to support the global security mission (CNS 2020a). To execute their mission, Y-12 Development requires facilities that safely and efficiently house the necessary research equipment and instrumentation, provide modern laboratory facilities to attract and retain top scientists and engineers, and are adaptable to a changing mission (NNSA 2020a).

Y-12 Development Organization

- Essential to Y-12 production mission
- Develops new technology to meet future production requirements
- Performs work-for-others (Strategic Partnership Projects reimbursable work)

In accordance with the Council on Environmental Quality (CEQ) regulations at 40 Code of Federal Regulations (CFR) Parts 1500–1508¹ 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 relocating most of the Y-12 Development operations to a modern offsite facility located at 103 Palladium Way, Oak Ridge, Tennessee, approximately 9.5 miles west of Y-12 (Figures 1-2 and 1-3). Depending on the results of this EA, NNSA could: (1) determine that the potential environmental impacts of the Proposed Action would be significant to human health and the environment, in which case NNSA would prepare an environmental impact statement (EIS); or (2) determine that a finding of no significant impact (FONSI) is appropriate, in which case NNSA could proceed with the Proposed Action with no additional NEPA documentation.

Environmental Assessment

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

¹ On July 16, 2020, the CEQ issued a final rule to update its regulations for federal agencies to implement NEPA (85 *Federal Register* 43304). The effective date for the new regulations is September 14, 2020. Because this project was initiated prior to that effective date, this EA has been prepared in accordance with the CEQ regulations dated 1978, as amended in 1986 and 2005.

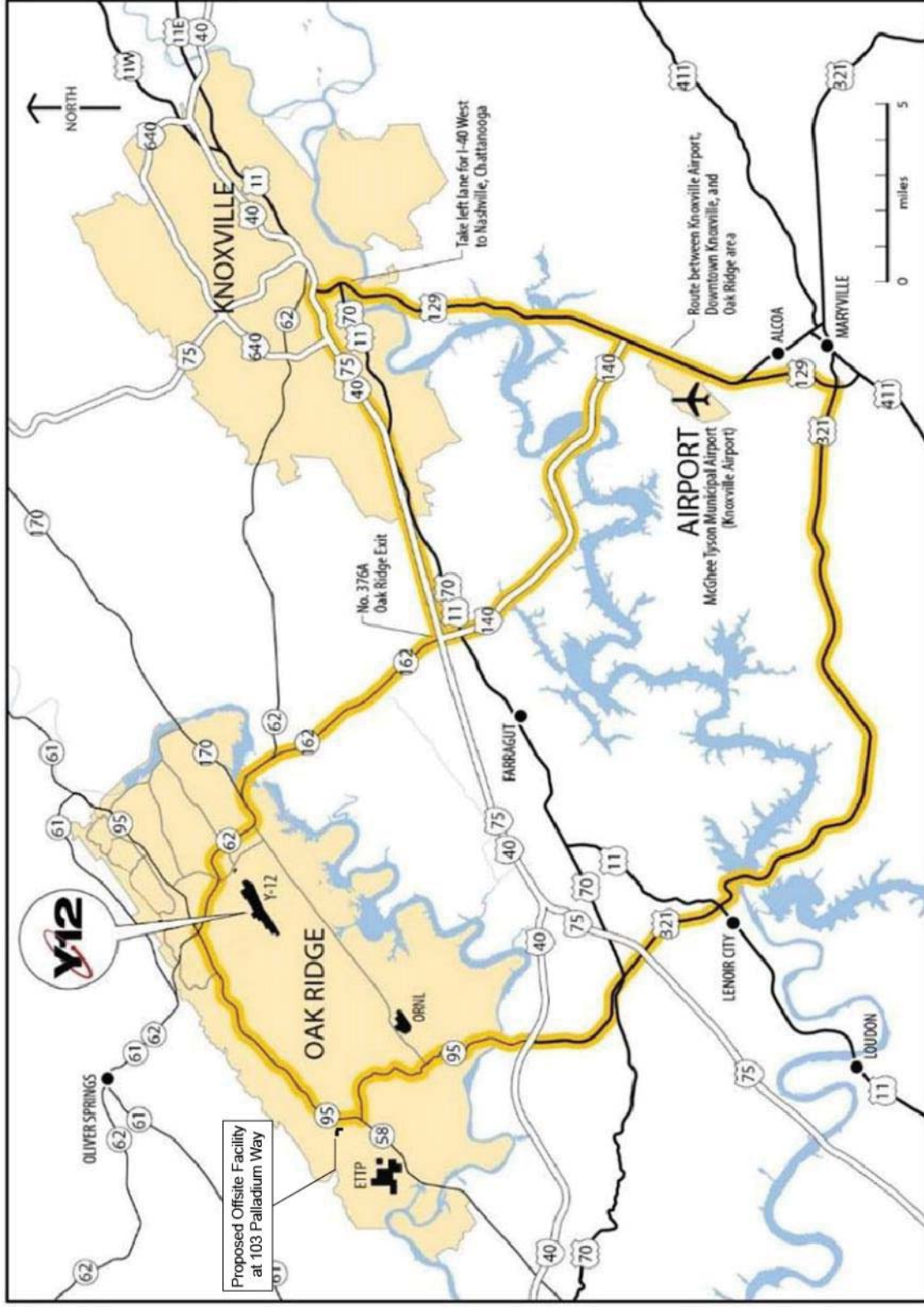


Figure 1-1. Location of Y-12 and Offsite Facility at 103 Palladium Way

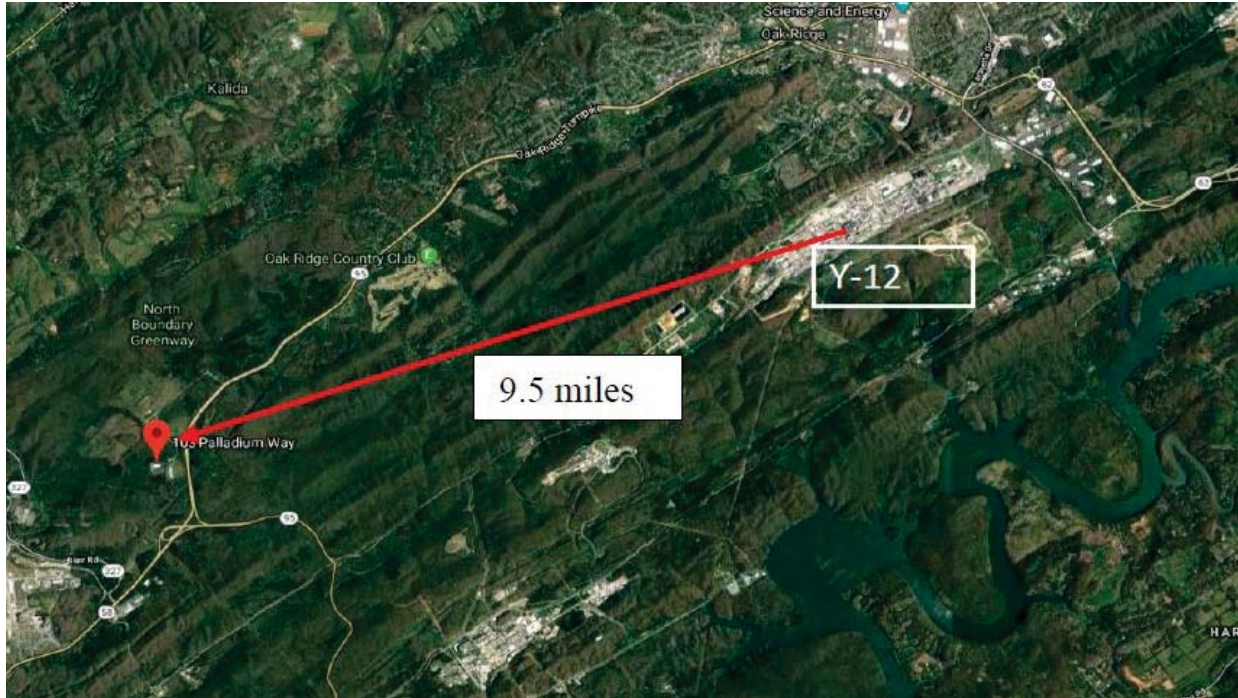


Figure 1-2. Proposed Offsite Facility Relative to Y-12



Figure 1-3. Facility Proposed for Acquisition at 103 Palladium Way, Oak Ridge, Tennessee

1.2 Purpose and Need for Agency Action

Y-12 Development has a long history of providing a vital mission support function to Y-12 for the purpose of R&D, technology development and technology solutions, future technology development, weapons quality assurance, support of national R&D programs, and providing key technical expertise on materials and systems (NNSA 2020a). Y-12 Development operations encompass diverse technical disciplines and include R&D of materials (uranium, uranium compounds, lithium, and lithium compounds), use of robotics, measurement technique studies, computer software development, development of electronic devices, precision machining, methods of waste treatment and process materials recovery, and development of fabrication processes. Y-12 Development operations are currently housed in two 70+-year-old buildings (Buildings 9202 and 9203 each classified as “Mission Critical”) and one 50+ year old building (9203A classified as “Mission Dependent, Not Critical”) that have structural, plumbing, electrical, laboratory exhaust, contamination, and HVAC issues. Combined, these facilities cost more than \$5 million per year to maintain, and currently have deferred maintenance and repair needs that exceed \$39 million. The buildings have deteriorated in such a manner that they currently pose a significant risk to the successful execution of the Y-12 Development missions. Further, the age and condition of existing facilities hinders Development’s ability to attract and retain top talent to support the NNSA (NNSA 2020a).

A multitude of serious issues plague Buildings 9202, 9203, and 9203A include the following:

- The facilities are not constructed to meet today’s seismic or building codes and exhibit typical age-related failures, including concrete spalling and asbestos.
- The facilities have issues with radiological and hazardous material contamination which requires extensive personnel protection equipment and controls to perform work. Roof leaks and water intrusion from pipe failures pose a risk for spread of contamination to other areas of the facility.
- The utility systems (steam, chilled water, process water, HVAC) are in poor condition and require continual maintenance to keep the systems operational.
- Process drains and condensate drains have issues with leaks and plugging that cause leaks.
- The electrical supplies are old, unreliable, and not typically acceptable for systems requiring clean power (NNSA 2020a).

Figures 1-4 through 1-7 display some of the deficiencies associated with the current facilities.



Source: NNSA 2020a.

Figure 1-4. Bulging Wall in Room 270 of Building 9202 (left) and Cracked Brick Façade on the West Wall of Building 9202 (right)



Source: NNSA 2020a.

Figure 1-5. Leaking Chilled Water Coils



Note: Area in picture now has scaffolding to protect personnel from falling concrete.
Source: NNSA 2020a.

Figure 1-6. Spalling Ceiling of Fan Room 1



Source: NNSA 2020a.

Figure 1-7. Unsafe and Unusable Emergency Stairs

The capabilities of Y-12 Development are indispensable to the successful modernization of Y-12's nuclear production capability, yet funding to replace such facilities with a new construction facility is not available due to other ongoing and higher priority major modernization projects, such as the Uranium Processing Facility (UPF) and the Lithium Processing Facility (LPF). Consequently, as discussed in Section 2.1, NNSA has focused on acquiring an existing modern facility and relocating most of the Development missions to that facility (NNSA 2020a). Acquiring and modifying the facility at 103 Palladium Way would provide a timely and cost-effective home for Y-12 Development for the next 15 or more years (CNS 2020a). If implemented, the Proposed Action would provide the following benefits to NNSA: (1) safer operations than currently capable of achieving in the aging facilities; (2) more responsive capabilities to meet customer requests and requirements; (3) stronger technical basis through the attraction and retention of more qualified staff; and (4) reduced operating costs due to lower maintenance burden (CNS 2020b).

If Y-12 Development missions are not relocated from existing facilities, NNSA would:

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

Source: CNS 2020a.

1.3 Proposed Action Evaluated in this Environmental Assessment

NNSA's Proposed Action is to acquire a 21-acre site at 103 Palladium Way, modify the existing facility, relocate equipment and materials, and house the Y-12 Development operations in the modified facility for the next 15 or more years. NNSA secured an Option to Purchase Agreement with the owner of the offsite facility that must be exercised by December 23, 2021. Acquisition of the offsite facility and land would occur in the 2021–2022 timeframe. Relocation/transition of the majority of Y-12 Development operations would occur in the 2022–2024 timeframe. Operations are expected to begin after construction is completed, in 2024 (CNS 2020b). The facility would support an average of 70-100 personnel. The Proposed Action would transition the majority of Y-12 Development future operations to 103 Palladium Way, except as noted in Section 2.2, which contains a detailed description of the Proposed Action.

Once operations are transferred from Buildings 9202 and 9203, those buildings would be put into cold standby, meaning the facilities would no longer be used but would be kept in a safe condition. Decontamination and decommissioning (D&D) of Buildings 9202 and 9203 would occur in the future; however, specific plans for the D&D of these buildings have not been prepared and these activities are not ready for decision-making. This deferral of action is consistent with other older facilities that have been taken out of service. NNSA will prepare a separate NEPA review of the D&D of those buildings once plans are developed, if applicable.

1.4 Scope of this Environmental Assessment and Organization

In accordance with the CEQ regulations at 40 CFR Parts 1500–1508 and DOE NEPA implementing procedures at 10 CFR Part 1021, NNSA has prepared this EA to analyze the potential environmental impacts of NNSA's proposal to acquire the facility and land at Palladium

Way, modify the facility, and conduct Y-12 Development operations in support of Y-12 national security missions. This EA considers the potential direct, indirect, and cumulative impacts. Direct impacts are those that would occur as a direct result of the Proposed Action. Indirect impacts are those that are caused by the Proposed Action but would occur later in time and/or farther away in distance; perhaps outside of the study area. Cumulative impacts result when the incremental impacts on resources from the Proposed Action are added to impacts that have occurred or could occur to that resource from other actions, including past, present, or reasonably foreseeable future actions.

As discussed in Section 2.2, NNSA is not proposing to transfer all Development operations currently conducted in Buildings 9202 and 9203 to the offsite facility. Operations not proposed for relocation to the offsite facility include beryllium laboratory operations, certain lithium operations, and other miscellaneous R&D and production support work. NNSA has determined that these operations are better suited for relocation to other facilities (such as the LPF or another facility). Consequently, these operations are not addressed in this EA. Based on the purpose and need (Section 1.3), NNSA has determined that the Proposed Action in this EA can proceed independently of proposals for these other operations. In addition, any decisions made as a result of this EA would not prejudice any proposals or decisions related to these other operations (NNSA 2020b).

The organization of this EA is as follows:

- An introduction and background discussion of the Proposed Action and the purpose and need for the NNSA action (Chapter 1);
- A description of the Proposed Action and the No-Action Alternative (Chapter 2);
- A description of the existing environment relevant to potential impacts of the Proposed Action and the No-Action Alternative (Chapter 3);
- An analysis of the potential direct and indirect environmental impacts that could result from the Proposed Action and the No-Action Alternative (Chapter 3);
- Identification and characterization of cumulative impacts that could result from the relocation of the Y-12 Development operations to an offsite facility 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 March 2021, NNSA published this Draft EA on the NNSA NEPA web page (<https://www.energy.gov/nnsa/nnsa-nepa-reading-room>) and the DOE NEPA web page (<https://www.energy.gov/nepa/public-comment-opportunities>) for public review and comment. NNSA also provided the Tennessee Department of Environment and Conservation (TDEC) with a copy of this Draft EA. Because the Proposed Action would have minimal or no impact on protected species and historic resources, consultations with the U.S. Fish and Wildlife Service (USFWS) and State Historic Preservation Officer (SHPO) were not required. 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 not conduct a public hearing. When the Final EA is prepared, NNSA will consider any comments received during the comment period on the Draft EA. The Final EA will be made available for public viewing at the NNSA NEPA web page (<https://www.energy.gov/nnsa/nnsa-nepa-reading-room>) and the DOE NEPA web page (<https://www.energy.gov/nepa/public-comment-opportunities>).

2 PROPOSED ACTION AND ALTERNATIVES

2.1 Development of the Proposed Action

The decision to pursue a modern, existing, offsite facility was reached through a detailed two-step evaluation process conducted by NNSA and Consolidated Nuclear Security, LLC (CNS), the management and operating contractor at Y-12, in accordance with Office of Management and Budget (OMB) guidelines and DOE requirements. Initially, six real estate alternatives (Table 2-1) were evaluated in *Business Case Analysis Y-12 Capabilities Modernization* (Parsons 2020), which focused on the life-cycle costs of the alternatives. Alternative 4a (Lease/Purchase Alternative) had the lowest life cycle cost. In March 2020, the NNSA decided to forego the lease-purchase strategy, opting for a direct purchase option (Alternative 4b).

Table 2-1. Alternatives Initially Evaluated for Y-12 Development Operations

Alternative	Alternative Name	Alternative Description
1	Status Quo (No-Action Alternative)	Continue to occupy existing facilities and sustaining current condition addressing deferred maintenance
2	Renovate Buildings 9202, 9203, and 9203A	Renovate existing Buildings 9202, 9203, and 9203A to accommodate enduring capabilities and future production development.
3	Build New Line Item Construction	Construct new facility at Y-12 to accommodate enduring and future capabilities.
4a	Lease/Purchase Offsite facility	Five year lease at existing offsite facility (revitalize to meet requirements) with option to purchase.
4b	Purchase Offsite facility	Purchase existing offsite facility and revitalize to meet requirements
5	Series of General Plant Projects (GPP)	Construct new \$20M facilities to accommodate equal requirement.

Source: Parsons 2020.

Four of these six alternatives (see Table 2-2) were then analyzed in the *Business Case – Technology Development Complex* (CNS 2020c), which compared the alternatives using three major qualitative evaluation factors. The qualitative evaluative factors covered three major categories:

- Strategic Objectives – Emphasis on providing a solution that reduces Development’s footprint at Y-12; leads to a reduction in maintenance and operating costs; and provides a facility with a useful life.
- Implementation – Emphasis on providing a solution that can obtain funding in a timely manner; can obtain required stakeholder approvals in a timely manner; offers close proximity to CNS services; and can be fully implemented in two years or less.
- Programmatic Requirements – Emphasis on providing a solution that meets current and future mission needs, that would attract and retain top talent, and enhances the safety of workers.

Table 2-2. Alternatives Evaluated in Detail for the Y-12 Development Operations

Alternative	Alternative Name	Alternative Description
1	Status Quo (No-Action Alternative)	Assumes continued use of existing facilities with the maintenance and operating budget being increased to support the completion of all previously identified repairs and deferred maintenance within three years.
2	Renovate Buildings 9202, 9203, and 9203A	Assumes continued use of existing facilities, with all previously identified repairs and deferred maintenance being cured within three years and additional federal appropriations are made available to execute additional renovations to extend the life of the current facilities.
3	Build New Line Item Construction	Assumes federal appropriations are made available to fund the construction of a new replacement facility on Y-12 (the Applied Technologies Laboratory).
4	Lease/Purchase Offsite facility	Assumes CNS receives approval to enter into a lease-purchase for a laboratory facility within 5-10 miles of the Y-12 site.

Source: CNS 2020c.

Each alternative was evaluated to the degree to which they fulfilled the stated objectives. Alternative 4 (the Proposed Action in this EA) received a total score of 80, and was viewed as the most feasible option. This alternative exceeded eight (8) out of the (10) evaluation criteria, and received an overall rating of 80. This alternative was rated higher than all of the other alternatives based on its ability to exceed all of the strategic objectives and programmatic requirements, and exceed two of the four implementation requirements. The only two evaluation criteria this alternative did not exceed were “Proximity to CNS services” and “Stakeholder approval within an acceptable timeframe.” This alternative scored extremely high in the strategic objectives as it would enable a reduced footprint at Y-12, would result in reduced maintenance and operating costs, and would provide a facility with a useful life. It also scored extremely well in the programmatic requirements by providing a flexible and responsive facility that enhances the safety of workers and that would attract and retain top scientists and engineers (CNS 2020c).

CNS submitted an “Expression of Interest” (EOI) in November 2019 for a “Lease/Lease-Purchase of Laboratory/Office Space.” In the EOI, it was stated that CNS requires a minimum of 65,000 square feet of laboratory and office space that can be expanded up to an additional 50,000 square feet in the event additional space is needed. CNS only received one qualifying offer, “Hi-Tech Corporate Campus Building,” located at 103 Palladium Way, Oak Ridge, TN 37830 (CNS 2020c).

2.2 Proposed Action: House Y-12 Development’s Current and Future Research and Development Operations at 103 Palladium Way in Oak Ridge, Tennessee

As stated in Section 1.3, NNSA’s Proposed Action is to acquire 103 Palladium Way and the surrounding 21 acres, modify the existing facility, relocate equipment and materials, and conduct Y-12 Development operations in the modified facility for the next 15 or more years. The existing facility is located on a secure and fenced campus with approximately 73,000 square-feet of high-tech interior space. The facility is approximately 9.5 miles (approximately 15 minutes) from Building 9202 using the west entrance of Bear Creek Road, and is just off the Oak Ridge Turnpike. The building was originally built as a secure facility by Theragenics to make medical isotopes in 1999, but was never occupied, and the building was put up for sale in 2005. A number of uses for

the building were proposed over the next 10 years, but the building was unused during this period. LeMond Bicycles, Inc. purchased the building in 2016 for the purpose of carbon composite construction of bicycle frames, but a recent tour of the building showed it to be essentially unoccupied with no evidence of R&D or manufacturing (CNS 2020c).

The building itself is a two-story structure on a concrete slab with concrete panel walls over a steel frame with the following space allocations:

- Common areas (halls, rest rooms, locker rooms)
- Laboratory areas (single story)
- Utility areas (mechanical/electrical rooms, storage areas, communications rooms)
- Office areas (offices and conference rooms)
- Production areas (mostly two stories and high bay with 23 to 40 foot headspace)

The building has extensive high-bay areas and wet-chemical laboratory areas, and has the utilities necessary for a duplicate facility (100,000 square-foot expansion) on the adjacent grounds. The utility areas are very spacious and may be used for either equipment installation or as additional storage. The building has an existing fire sprinkler system (CNS 2020c).

Construction. The offsite facility would meet the Hazard Category II classification for occupancy described in Section 307 of the International Building Code (IBC) (IBC 2018). For a non-nuclear² facility like the proposed offsite facility, the IBC establishes the minimum requirements to safeguard the public safety and safety to life and property from fire and other hazards and provides the classification of buildings based on the purpose or purposes for which they are used.

Acquisition of the offsite facility and land would occur in the 2021–2022 timeframe via a warranty deed between the LeMond Real Estate, LLC, the current owner of the facility, and NNSA. With relatively little renovation, the facility could easily be adapted to house the compatibility and surveillance, the materials synthesis, and the metal forming and welding operations of Y-12 Development (CNS 2020c). The facility would be modified for Y-12 Development's needs and would include the installation of multiple chemical hoods, modifying exhaust ductwork, utility installations or modifications, partitions between radiological and non-radiological areas, sensors and security upgrades, and any necessary upgrades to cyber connectivity. A freight elevator may also be installed. The existing parking lot would be expanded by approximately 0.5 acres to accommodate the operational workforce and a secure storage building and maintenance trailer would be added alongside the facility. Because those actions would occur on previously disturbed land, no additional land would be disturbed.

There would be no change to the constructed footprint, exterior wall structure, or outside appearance of the building, except for the expanded parking lot and addition of a material storage building and maintenance trailer alongside the building (CNS 2020c, CNS 2021a). Y-12 Development would re-locate some 25 laboratories, which would include laboratory instrumentation, prototype/demonstration models, metallurgy machining equipment, foundry

² The facility would have less than Hazard Category 3 threshold quantities of radiological materials, and criticality is precluded; therefore, the facility is not classified as a nuclear facility (CNS 2021a).

equipment, and various other laboratory equipment. Where possible, new equipment/instruments may be purchased to avoid contamination issues (CNS 2020c).

A list of R&D focus areas that would be transitioned to the offsite facility at 103 Palladium Way are as follows:

- Lithium Processing R&D
- Uranium Processing R&D
- Special Materials Processing R&D
- Sensor R&D
- Lifetimes/Aging
- Metallurgical
- Analytical
- Electron Microscopy
- Non-Rad Machining
- Polymer Additive Manufacturing
- Nuclear Security
- Instrumentation
- Electron Beam Additive Manufacturing
- Spray Coatings (NNSA 2020a).

Internal construction activities/relocation/transition of the majority of Y-12 Development R&D missions would occur in the 2022–2024 timeframe. Construction parameters for facility modifications are provided in Table 2-3.

Table 2-3. Construction Parameters for the Proposed Action

Requirements	Consumption/Use
New land disturbance (acres)	0
Disturbance of previously disturbed land (acres)	0.5
Water requirement for construction	minimal
Total construction employment (worker-years)	100
Peak construction employment (workers)	50
Construction period (years)	3

Source: CNS 2021a.

Y-12 Development Operations that Would Not be Housed at 103 Palladium Way. Specialty work that Y-12 Development performs on a routine basis that cannot be relocated offsite would be either transitioned to an appropriate facility or established within a refurbished section of the 9203A facility. This includes the beryllium laboratory operations, special component debonding, lithium chloride purification, direct material manufacturing, and electroplating, testing and analyses, radiation imaging R&D, and other production support work. Y-12 Development would identify all mission critical support work typically performed during the year, and determine a suitable location for the performance of this work to ensure production support is maintained. For operations not listed in this EA, NNSA would prepare a separate NEPA review, as required. Section 1.4 of this EA discusses why NNSA is not proposing to transfer these operations to the offsite facility.

Operation. Operations would be expected to begin in approximately 2024, once construction is completed. The operational workforce for Y-12 Development is estimated to be 70-100 persons. Utilities for the building include 5 megawatts (MW) of 3-phase service expandable to 7.5 MW, natural gas for two boilers for heat and hot water, Oak Ridge City water and sewer, deionized water, cooling water (cooling tower), chilled process water, 3,000 gallons of wastewater storage, liquid nitrogen cryogenic system, nitrogen and argon inert gases, and compressed air. The utilities

(electrical and steam) are oversized for ease of expansion, if ever desired. The facility is fenced and has security systems in place (CNS 2020c).

The proposed Y-12 Development Offsite Facility would be a non-nuclear facility and would house Y-12 Development operations for at least 15 years. Nuclear materials to be stored and utilized at this facility would include: depleted uranium, low-enriched uranium, small quantities of highly enriched uranium (< 400 grams), lithium, and other special materials in laboratory quantities. Such material shall be recovered/salvaged and returned to Y-12 or placed in the secure storage building that would be constructed alongside the facility. NNSA would develop stringent nuclear material movement plans to avoid violations of building limits. It is anticipated that this approach would not only improve conduct of operations, but it would establish a more structured approach to R&D work that would continue as facility upgrades and anticipated exemptions are approved. The front entrance, conference room, and a few offices would be designated as the Property Protection Area, specific area(s) would be designated as a Vault Type Room(s), and the remainder of the facility would be a Limited Area (NNSA 2020a).

During the course of operations at the offsite facility, there may arise a need for housing of administrative or maintenance personnel. If the need arises, a light weight commercial structure may be necessary to house the personnel. The structure would be for the sole purpose of housing excess personnel in support of the facility. No Developmental experimentation would occur in the structure. Other than running utilities to the structure, no disturbance of the existing property is expected. Although the current plan is to house all the personnel in the offsite facility proper, a structure such as the maintenance trailer housing approximately 20 personnel is the upper bound of what may be envisioned (CNS 2021a).

The primary focus for R&D and prototype development activities will be with uranium, uranium compounds, lithium, and lithium compounds. Other elements/chemicals utilized in the facility would include laboratory quantities of acids, bases, solvents, flammable and inert gases. Except for uranium, no other radioactive materials are anticipated. Operations would encompass diverse technical disciplines and many different laboratory and pilot-plant-scale operations and experimental techniques. These include R&D of materials, use of robotics, measurement technique studies, computer software development, development of electronic devices, precision machining, methods of waste treatment and process materials recovery, and development of fabrication processes. Containment of radiological or hazardous material would be accomplished through material packaging, experimental equipment, or special equipment hoods or enclosures. The ventilation system would be configured commensurate with the hazards present, ranging from ordinary room ventilation to hood exhausts to exhaust filtration (CNS 2021a). Table 2-4 displays the operational requirements associated with the offsite facility.

Table 2-4. Operational Requirements for the Proposed Action

Requirements	Consumption/Use
Operational Workers (number of workers)	70-100
Annual Electricity Use (kilowatt-hours) ^a	1,650,000
Potable Water Use (gallons/year) ^b	1,340,000
Natural gas use (cubic feet/year) ^c	1,750,000
Sanitary Wastewater (gallons/day) ^d	2,500
Waste Generation^e	
Solid low-level radioactive waste (LLW) (cubic feet/year)	3,730
Solid mixed LLW (MLLW) (cubic feet/year)	<100
Wastewater LLW (gallons/year)	<10,000
Hazardous waste (cubic feet/year)	60 (8 55-gal drums)
Nonhazardous waste (cubic yards/year)	500

- a. Based on 22.5 kilowatt-hours/square foot/year. The facility is approximately 73,000 square feet.
b. Based on potable water use of 35 gallons/day/person. Process water estimated at 500,000 gallons/year
c. Based on 24 cubic feet/square foot/year. The Y-12 Development would total approximately 73,000 square feet.
d. Based on wastewater generation of 25 gallons/person/day.
e. See Table 3-18 in Section 3.12.2 for a more detailed breakout of the specific waste types and quantities.

Source: CNS 2021a.

2.3 No-Action Alternative

Under the No-Action Alternative, NNSA would not relocate Y-12 Development operations to the offsite facility at 103 Palladium Way, but would continue to operate existing facilities to meet national security requirements for as long as possible. As discussed in Section 1.2, current conditions in Buildings 9202 and 9203 have deteriorated in such a manner that they currently pose a significant risk to the successful execution of Development missions. At some point, a new facility would be needed to house Y-12 Development operations.

The No-Action Alternative does not mean that NNSA would not take necessary actions to safely operate Buildings 9202 and 9203. In fact, NNSA has been taking actions to ensure that those buildings can operate as long and as safely as possible. The No-Action Alternative reflects the current management direction to continue infrastructure and process improvements to enable Y-12 to operate existing facilities to meet national security requirements. Such an approach is consistent with the CEQ requirements that “no-action” may be thought of in terms of continuing with the present course of action until that action is changed (CEQ 1981).

2.4 Alternatives Considered but Eliminated from Detailed Analysis

Renovate the Existing Facilities on Y-12. As discussed in Section 2.1, renovation of the existing Y-12 Development facilities was evaluated as a possible alternative. That alternative received the second lowest score of the alternatives evaluated, and failed to meet the minimum acceptable requirements of the evaluation criteria. From a strategic objectives perspective, this alternative would reduce some maintenance costs and would extend the useful life of the current facilities, but would not result in a reduced footprint. From an implementation perspective, this alternative would require a longer term funding commitment and would require additional stakeholder approval that would not meet the requested timeframe. From a programmatic perspective, even after the requested repairs and updates were made, it still would not result in a laboratory environment with the necessary flexibility, reliability, and adaptability that a modern facility would provide (CNS 2020c). Consequently, this alternative was eliminated from detailed analysis.

Construct a New Facility on Y-12 for Y-12 Development Operations. As discussed in Section 2.1, this alternative was evaluated as a possible alternative. This alternative received the second highest score (behind the Proposed Action in this EA). This alternative scored high in the strategic objectives as it would: (1) enable a reduced footprint at Y-12 (reducing the total square footage and reducing the number of buildings supporting Development onsite from 3 to 1); (2) result in reduced maintenance and operating costs; and (3) provide a facility with a useful life. It also scored well in the programmatic requirements by providing a flexible and responsive facility that would enhance the safety of workers and attract and retain top scientists and engineers. However, this alternative struggled to meet the basic implementation requirements, largely because this option would be too costly and not timely (CNS 2020c). Consequently, this alternative was eliminated from detailed analysis.

Relocate Y-12 Development Operations to an Existing Y-12 Facility. There are no existing facilities on Y-12 with the required attributes (availability, size, age, facility condition) to house the Y-12 Development operations. Consequently, this alternative was eliminated from detailed analysis (CNS 2021a).

Relocate Y-12 Development Operations to a Different Offsite Facility. As discussed in Section 2.1, CNS only received one qualifying offer (i.e., the “Hi-Tech Corporate Campus Building,” located at 103 Palladium Way, Oak Ridge, TN 37830) in response to the EOI. Consequently, this alternative was eliminated from detailed analysis.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

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

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

As discussed in Section 1.4, this EA considers the potential direct, indirect, and cumulative impacts. Sections 3.2 through 3.14 present the affected environment and potential environmental consequences for each of the resource areas analyzed in detail. For the Proposed Action, the analysis in Sections 3.2 through 3.14 focus on the impacts associated with transferring the Y-12 Development missions to the Palladium Way facility and conducting operations at that location. This EA evaluates the environmental impacts of the alternatives within a defined region of influence (ROI), as described for each resource below. The ROIs encompass geographic areas within which any notable impact would be expected to occur. The level of detail in the description of each resource varies with the likelihood of a potential impact to the resource. The following resources are described/evaluated in this chapter.

- **Land use:** land use practices and land ownership information. The ROI for land use is the 21-acre parcel at Palladium Way and adjacent areas.
- **Visual resources:** visual resources in terms of land formations, vegetation, and the occurrence of unique natural views. The ROI for visual resources is the 21-acre parcel at Palladium Way site and areas adjacent to that site.
- **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 21-acre parcel at Palladium Way and adjacent areas.
- **Water resources:** surface-water and groundwater features, water quality, and water use. The ROI for water resources is the 21-acre parcel at Palladium Way 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 21-acre parcel at Palladium Way. The ROI for meteorology, air quality, and noise is the proposed 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 21-acre parcel at Palladium Way 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 21-acre parcel at Palladium Way and adjacent areas.
- **Socioeconomics and environmental justice:** the labor market, population, housing, some public services, and personal income; location of low-income and minority populations in the vicinity of the project location. The socioeconomics ROI is a four-county area in Tennessee comprised of Anderson, Knox, Loudon, and Roane counties where a majority of the Y-12 Development workforce resides.
- **Waste management:** solid waste generation and management practices. The ROI for waste management is the 21-acre parcel at Palladium Way, Y-12, and offsite locations where recycling and waste management activities could occur.
- **Human health and safety:** the existing public and occupational safety conditions and baseline conditions to support analysis of impacts to health and potential accident scenarios. The human health and safety analysis focuses on impacts to workers and offsite members of the public.
- **Transportation:** the existing transportation systems in the area to facilitate analysis of impacts locally. The ROI for transportation is the 21-acre parcel at Palladium Way and adjacent areas where transportation could occur.
- **Infrastructure:** utilities, energy, and site services, including capacities and demands in the immediate area of the proposed site. The ROI for infrastructure is the 21-acre parcel at Palladium Way and adjacent areas.

3.2 Land Use

3.2.1 Affected Environment

This section summarizes existing onsite and surrounding land uses at 103 Palladium Way and the surrounding area. It also describes local land use plans and city programs. City or county organizations have no planning jurisdiction at the site because it would be a Federal facility owned by NNSA. Nevertheless, the NNSA does consider local planning policies, to the extent practicable, in its land-use decisions as a good neighbor policy. Figure 3-1 shows the location of Y-12, Oak Ridge National Laboratory (ORNL), East Tennessee Technology Park (ETTP), and the Horizon Center Industrial Park (highlighted in red), within the highlighted ORR.



Figure 3-1. Aerial View of Installations at the Oak Ridge Reservation

The City of Oak Ridge lies within the Great Valley of Eastern Tennessee between the Cumberland and Great Smoky Mountains and is bordered on two sides by the Clinch River. The Cumberland Mountains are 10 miles to the northwest; and the Great Smoky Mountains are 32 miles to the southeast.

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 Reservation (Mann et al. 1996).

The entire ORR was designated a *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) site by the U.S. Environmental Protection Agency (EPA) in 1989. About 15 percent of ORR is contaminated by hazardous and radioactive materials, including waste sites or remediation areas (TDEC 2005). This legacy of contamination is being cleaned up to levels that comply with current laws, particularly CERCLA. Industrial and mixed industrial areas of the site include ORNL, Y-12, and the ETPP.

The Horizon Center is an approximately 1,000-acre industrial park that is relatively flat with 500 acres set aside for preservation. It is overseen by the Oak Ridge Industrial Development Board (ORIDB) and promotes development for research facilities, light manufacturing, and office space. The 474 acres of developable land is designed to accommodate four million square feet of space

for R&D, light manufacturing, and other industrial uses. Prior to transfer from DOE, the Horizon Center was located entirely within the ORR boundaries (Oak Ridge 2021). Activities at ORR and ORNL have resulted in documented environmental impact to the soil and groundwater in the area. DOE is designated as the Principal Responsible Party for contamination at ORR/ORNL and, as such, DOE is responsible for assessment and cleanup, if warranted, of any soil and groundwater contamination resulting from current or former activities within ORR/ORNL. The proposed site has previously received a “clean parcel determination” under CERCLA Section 120(h)(4) (Terracon 2020).

The proposed site at 103 Palladium Way is an improved parcel in the Horizon Center which lies within the city limits of Oak Ridge in Roane County. Based upon a review of available historical information, the site was undeveloped wooded land from at least 1935 until 1996 (Terracon 2020). The proposed site is located 25 miles west of Knoxville, Tennessee, five miles west of Y-12, and three miles northwest of the ORNL. According to the Roane County Tax Assessor's office the site is further identified by parcel number 021 002.01 which consists of 21.17 acres of commercial land containing a 72,950 square feet office/warehouse building. The building (built in 2000) was used for industrial R&D and office/warehouse space. The current owner of the property is LeMond Real Estate, LLC. No occupants are currently associated with the site.

Land Ownership, Planning, and Zoning. The site and the surrounding property were once part of ORR, or DOE property. In January 1996, DOE executed a lease for an approximate 957-acre Parcel ED-1 (which include the Proposed Action site) to the Community Reuse Organization of East Tennessee (CROET) to develop an industrial/business park. The action was preceded by an EA dated 1996 resulting in a FONSI that was conditional upon the implementation of mitigation and monitoring. In 1996 a Mitigation Action Plan (MAP) was prepared that described the measures to be implemented to monitor and mitigate potentially significant adverse impacts that could occur from development on Parcel ED-1. DOE proposed to transfer title to approximately 426 developable acres of Parcel ED-1 to Horizon Center, LLC, a subsidiary of CROET. Horizon Center, LLC would continue development of the parcel as an industrial/business park for research and development, medical technology, manufacturing, distribution, and corporate headquarters office facilities. The developable portion of the larger parcel consisted of seven major areas, ranging in size from 11 to 148 acres. The site is included as one of the seven major areas and construction of the site building began in 2000. The remaining portion of the parent parcel is protected as a natural area and is not transferred (Terracon 2020).

Figure 3-2 shows the land ownership of adjacent properties and properties in the general vicinity. The majority of land surrounding is owned by DOE. The land surrounding the proposed site is part of the Horizon Center Industrial Park. The 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.

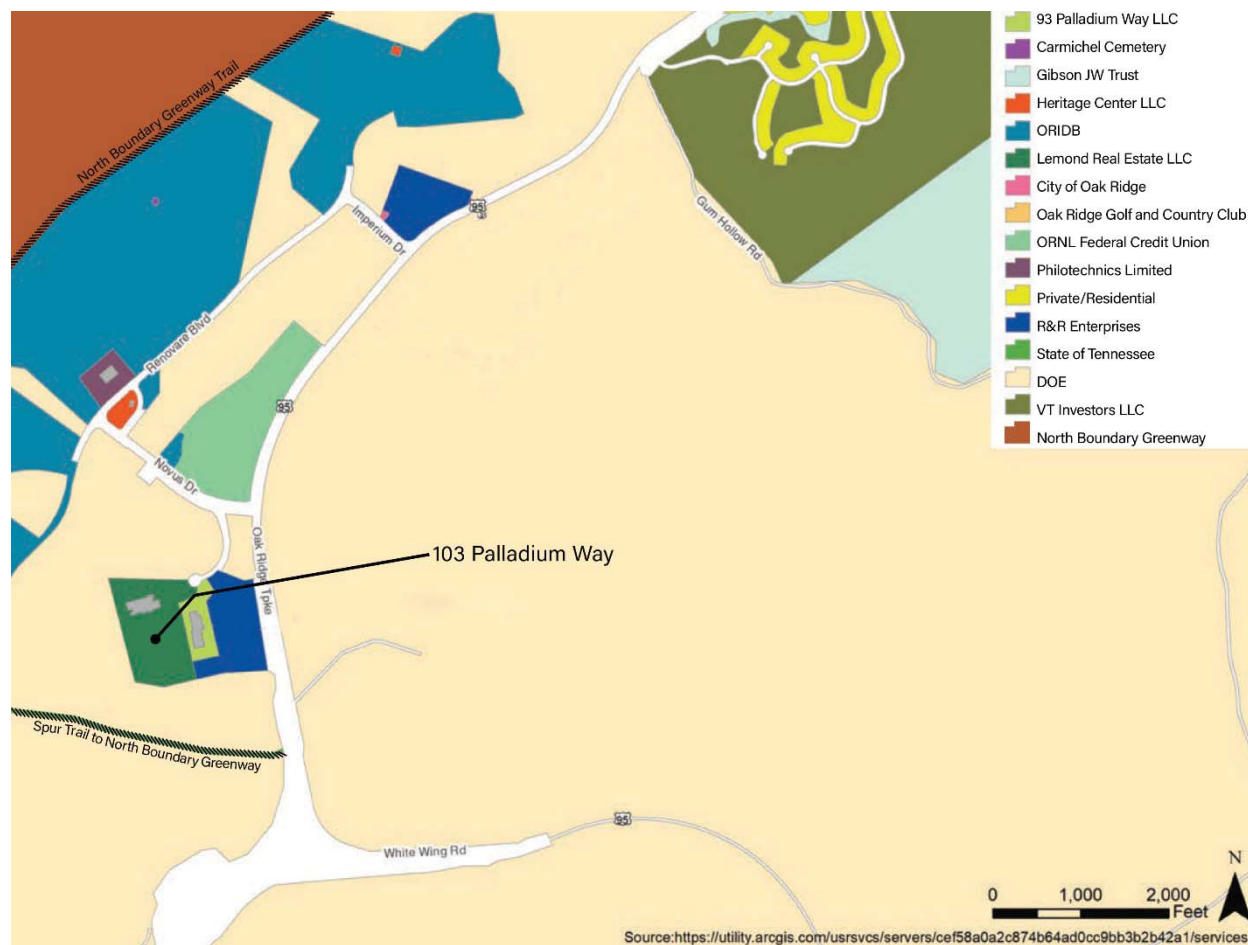


Figure 3-2. Ownership of Nearby Property

Figure 3-3 displays the land use of the area surrounding the proposed site. 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 within the Horizon Center.

The North Boundary Greenway (Figure 3-4) is a protected area featuring 16 miles of trails on the ORR and offering a variety of recreational activities from hiking and biking to seasonal deer and turkey hunting. The greenway boasts forested ridges, laurel-covered bluffs, creeks, and multi-use trails. A small parking area and spur trail are located off the Oak Ridge Turnpike. As shown on Figure 3-3, at its closest point, the trail is approximately 600 feet south of 103 Palladium Way's property line and approximately 1,400 feet south of the offsite facility.

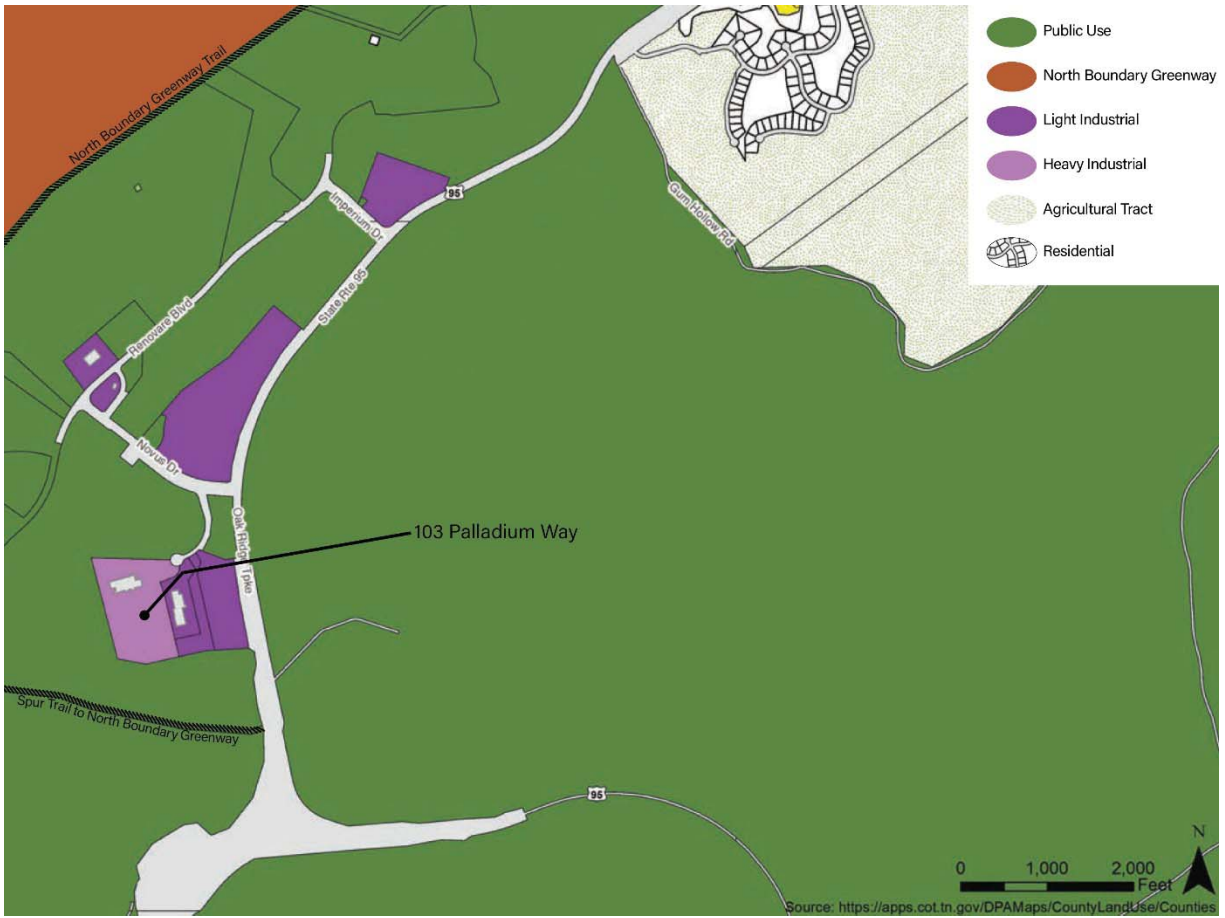


Figure 3-3. Land Uses of Nearby Property



Figure 3-4. North Boundary Greenway

3.2.2 Proposed Action Impacts

Construction. Construction related to relocating Y-12 Development operations to 103 Palladium Way would not disturb any previously undisturbed land. The existing 21-acre, 73,000 square foot structure is ready for immediate occupancy with only an interior build-out needed to meet the needs of Y-12 Development. The existing parking lot would be expanded by approximately 0.5 acres to accommodate the operational workforce and a secure storage building and maintenance trailer would be added alongside the facility. Because those actions would occur on previously disturbed land, no additional land would be disturbed. The existing 73,000 square foot structure represents two percent of the total development capacity of the Horizon Center. The existing footprint of the structure would remain as-is. If the land and facility are transferred to NNSA, the zoning designation would not apply to federal lands and use of the NNSA-owned land for the site would be consistent with the current zoning designation and historic uses of ORR land. No change to the zoning designation for the remainder of Horizon Center land would be required.

Operation. Once operational, long-term impacts from Y-12 Development on land use at the Horizon Center would be compatible with existing uses and future development. Operations in the offsite facility would have no impact on the use of the trails associated with the North Boundary Greenway.

3.2.3 No-Action Alternative

Under the No-Action Alternative, Y-12 Development operations would not be relocated, operations would continue at Y-12 in existing facilities. Land uses and designations would remain unchanged. There would be no impacts to onsite or offsite land use.

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 site.

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

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

Oak Ridge lies in the Valley and Ridge geographic region, and the majority of Roane County is an Ordovician-Cambrian geographic area. 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 subject property at 103 Palladium Way is located in the East Fork Valley between Black Oak Ridge and East Fork Ridge at an elevation of approximately 780 feet. Topography in this valley is relatively flat, characterized by dense forests and mountain streams. Table 3-1 provides a description of the adjoining properties. Land to the immediate north, west, and south is undeveloped and heavily wooded. The adjacent ORNL Carbon Fiber Facility lies to the east and shields the site from motorists traveling the Oak Ridge Turnpike.

Table 3-1. Description of Adjoining Properties

Direction	Description
North	Undeveloped wooded land followed by Novas Drive. Palladium Way is located Northeast of the site.
East	ORNL Carbon Fiber Technology Facility (93 Palladium Way), followed by grassed land, then Oak Ridge Turnpike.
South	Undeveloped wooded land and unnamed tributary of Bear Creek.
West	Undeveloped wooded land and East Fork Popular Creek.

As shown in Figure 3-5, the proposed site is roughly divided into three resource areas: (1) the improved land featuring the 73,000 square foot main building and supporting infrastructure; (2) the 100,000 square foot cleared expansion area immediately to the south; and (3) the wooded land in the remaining third of the property.

3.3.2 Proposed Action Impacts

Construction and Operation. Viewsheds in the immediate area are generally constrained by topography and vegetation. Nearby facilities in the Horizon Center are zoned Industrial, and their exteriors reflect their use. The closest residential areas to the proposed site are the Southwood Lane development (approximately 2 miles) located to the north along Oak Ridge Turnpike, and scattered development west of North Boundary Greenway (approximately 1.75 miles); 103 Palladium Way is not visible from either of these communities. Vegetative screening, distance, and the ORNL Carbon Fiber Technology Facility obscure most of the structure from public viewsheds. There are no visually sensitive locations within the viewshed of the subject property.

Figures 3-6 through 3-11 show the existing visual character from the grounds of the site. With the exception of expanding the existing parking lot (see Figure 3-5) and adding a secure storage building and maintenance trailer alongside the facility, construction would be limited to an interior build-out. Consequently, short-term visual impacts from construction activities are expected to be minimal and would not alter the existing visual character. Furthermore, light construction activities would not be out of character for an industrial complex such as the Horizon Center. No visual impacts are expected during construction or operations.

3.3.3 No-Action Alternative

Under the No-Action Alternative, operations would continue at Y-12 in existing facilities. There would be no impacts to onsite or offsite visual resources.



Note: Fenced area is approximately 15 acres.

Figure 3-5. Aerial View of 103 Palladium Way



Figure 3-6. End of Palladium Way with ORNL Carbon Fiber Facility in background



Figure 3-7. Vehicle entry and eastern façade of 103 Palladium Way



Figure 3-8. Western access drive with cooling towers and Aboveground Storage Tanks



Figure 3-9. Access drive with high bay and Aboveground Storage Tank



Figure 3-10. Access drive with 100,000 ft² expansion area and existing structure



Figure 3-11. Parking lot view west with expansion area and existing structure

3.4 Meteorology and Air Quality

3.4.1 Affected Environment

The City of Oak Ridge lies in a valley between the Cumberland and Great Smoky Mountain ranges and is bordered on two sides by the Clinch River. The Cumberland Mountains are located about 10 miles to the northwest; and the Great Smoky Mountains are 32 miles to the southeast. The climate of the region may be broadly classified as humid subtropical and is characterized by significant temperature changes between summer and winter. The average temperature for the Oak Ridge area during 2018 was 69.1 degrees Fahrenheit. January temperatures were coldest, with temperatures in 2018 averaging about 32.8 degrees Fahrenheit. July was the warmest month, with average temperatures in 2018 of 76.5 degrees Fahrenheit (DOE 2019).

Total rainfall during 2018, measured at the Oak Ridge meteorological tower, was 61.39 inches, which was 5 percent above the 30-year average. In 2018 wind speeds at ORNL Tower C/D (MT2) measured at 49 feet above ground level averaged 2.2 miles per hour. The local ridge-and-valley terrain reduces average wind speeds at valley bottoms, resulting in frequent periods of nearly calm conditions, particularly during clear, early morning hours (DOE 2019).

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 [PM₁₀] and particulate matter less than 2.5 microns in diameter [PM_{2.5}]), sulfur dioxide (SO₂), carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), and lead.

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

The proposed project 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 3-2. 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 3-2. Baseline Criteria Pollutant Emissions Inventory for Roane County, TN

Area	Criteria pollutant (tons/year)					
	CO	NO _x	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 (CO₂e) per year in the United States (74 *Federal Register* [FR] 56260). With regard to this EA, on June 26, 2019, the CEQ published draft guidance on how NEPA analysis and documentation should address GHG emissions (84 FR 30097). Based on that guidance, CEQ stated that, "agencies should attempt to quantify a proposed action's projected direct and reasonably foreseeable indirect GHG emissions when the amount of those emissions is substantial enough to warrant quantification, and when it is practicable to quantify them using available data and GHG quantification tools." CEQ also stated that, "where GHG inventory information is available, an agency may also reference local, regional, national, or sector-wide emission estimates to provide context for understanding the relative magnitude of a proposed action's GHG emissions. This approach, together with a qualitative summary discussion of the effects of GHG emissions based on an appropriate literature review, allows an agency to present the environmental impacts of a proposed action in clear terms and with sufficient information to make a reasoned choice among the alternatives. Such a discussion satisfies NEPA's requirement that agencies analyze the cumulative effects of a proposed action because the potential effects of GHG emissions are inherently a global cumulative effect. Therefore, a separate cumulative effects analysis is not required." Baseline GHG emissions, which are represented by CO₂e, for Roane County and the State of Tennessee, are presented in Table 3-3.

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

Area	Greenhouse Gases (million metric tons/year)
	[CO ₂ e]
Roane County	5.8
Tennessee	99.8

Source: USEIA 2018.

3.4.2 Proposed Action Impacts

Construction. There would be short-term minimal adverse effects to air quality due to generating pollutants during construction and construction worker commutes. 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.

A construction air permit from TDEC would be required. With the exception of expanding the existing parking lot by 0.5 acres and adding a secure storage building and a maintenance trailer alongside the facility, only internal facility modifications would be required and no new land disturbance would occur. During construction, NNSA would take reasonable precautions to prevent fugitive dust from becoming airborne. Reasonable precautions might include wetting by water spray any areas likely to generate fugitive dust during on site construction activities as needed. Additionally, all construction equipment employed on site would be well-maintained and equipped with the latest emissions control equipment. Consequently, there would be minimal emissions associated with fugitive dust and earthmoving equipment. Construction emissions would result from construction worker trips for the 3-year construction duration (Table 3-4). Small changes in facilities site and ultimate design, and moderate changes in quantity and types of equipment used would not substantially change these emission estimates, and would not change the determination under the general conformity rule or level of effects under NEPA. No new stationary sources of air emissions would be associated with the facility.

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

Activity/Source	CO	NO _x	VOC	SO _x	PM ₁₀	PM _{2.5}	<i>De Minimis</i> Threshold [tpy]	Exceeds <i>De Minimis</i> Thresholds? [Yes/No]
Construction Emissions	6.6	0.5	0.6	<0.1	<0.1	<0.1	100	No
Operational Emission	6.9	0.8	0.6	<0.1	<0.1	<0.1	100	No

Source: USAF 2020.

Operation. Non-radiological operational emissions were estimated for changes in heated/cooled space and emissions associated with commuting workers.³ 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 non-radiological emissions from the

³ For backup emergency generators, NNSA would provide TDEC with a copy of the EPA Certification of Conformity to document compliance with air quality requirements. Emergency Standby Power Systems can be run up to 100 hours a year for testing and maintenance. There is no hour limit for true emergency operation.

Proposed Action would be well below the *de minimis* thresholds; therefore, the level of effects would be minor.

With regard to potential radiological emissions, from an air permitting perspective, the emission rates for radiological particulates are based on the maximum amount of radiological materials that may have a chance to become airborne from the facility. Based on an estimated throughput of radioactive material processed in this facility, only about 10 percent or less has the potential to be exhausted to the atmosphere. The potential to be emitted is based on this percentage for air permitting purposes. Radioactive material may be processed through two different stacks. The emission source (stacks) would be equipped with a filtration system (CNS 2021a).

The National Emission Standards of Hazardous Air Pollutants (NESHAP) emission factors taken from EPA 40 CFR 61, Appendix D methods were used to calculate and/or estimate emissions (uncontrolled) for particulate solids from the facility. An emission factor of 0.001 (1 part per 1,000) was used in the calculations. This factor did not take into account any control device efficiency. NNSA has determined that the maximum/potential emissions from this emission source would be approximately 18.28 pounds of hazardous air pollutants (HAPs) per year, consisting of 18.25 pounds of depleted uranium and 0.032 pounds of enriched uranium (CNS 2021a). Based on these radiological emissions, NNSA determined that the maximum potential dose associated with radiological emissions would be 0.048 millirem/year, which is below the regulatory limit of 0.1 millirem/year for monitoring and test requirements in accordance with 40 CFR 61.93, 61.96, and Tennessee Air Pollution Regulations Rule 1200-3-11-.08. Consequently, continuous sampling, analysis, and EPA (NESHAP) approvals would not be required (CNS 2021a).

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

Scale	CO ₂ e 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	0.0005	-

Sources: USAF 2020, EPA 2017, USEIA 2018, EPA 2020b.

Climate-related challenges are expected to involve: (1) resolving increasing competition among land, water, and energy resources; (2) developing and maintaining sustainable agricultural systems; (3) conserving vibrant and diverse ecological systems; and (4) enhancing the resilience of the region's people to the impacts of climate extremes (NCA 2014). Table 3-6 outlines potential climate stressors and their effects from the construction and operation of the new facility. The proposed facility in and of itself is only indirectly dependent on any of the elements associated

with future climate scenarios (e.g., meteorological changes). At this time, no future climate scenario or climate stressor would have appreciable effects on any element of the Proposed Action.

Table 3-6. Effects of Potential Climate Stressors

Potential Climate Stressor	Effects on the Proposed Facility
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, Y-12 Development operations would not be relocated, operations would continue at Y-12 in existing facilities, 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-weighting", measured in A-weighted decibels (dBA), approximates a frequency response expressing the perception of sound by humans. Sounds encountered in daily life and their dBA levels are provided in Table 3-7.

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 3-7. Common Sounds and Their Levels

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

Source: Harris 1998.

The *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. The existing facility is currently unoccupied and there are no existing noise sources. There is one sensitive noise receptor (schools, churches, daycare facilities, etc.) within 1 mile of the existing facility-- the George Jones Memorial Baptist Church, which is approximately 0.75 miles southwest of the existing facility.

3.5.2 Proposed Action Impacts

Construction. Construction activities would consist of internal modifications to the facility, expansion of the existing parking lot, and adding a secure storage building and maintenance trailer alongside the facility. Maximum noise levels generated by construction equipment types commonly used on this type of project are listed in Table 3-8 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 existing facility 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 Action would be temporary and would take place in an industrial area that is relatively insensitive to noise.

Table 3-8. Noise Levels of Common Construction Equipment

Equipment type	L_{max} at 1,000 feet
Crane	55
Dump Truck	50
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 activities would primarily occur during daytime hours;
- Equipment mufflers would be properly maintained and in good working order; and
- Onsite personnel, and particularly equipment operators, would don adequate personal hearing protection to limit exposure and ensure compliance with federal health and safety regulations.

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

3.5.3 No-Action Alternative

Under the No-Action Alternative, Y-12 Development operations would not be relocated, operations would continue at Y-12 in existing facilities, and there would be no additional impacts to noise resources.

3.6 Water Resources

3.6.1 Affected Environment

Groundwater. The water table in the area 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 2018a).

Although there are currently no groundwater monitoring wells at the proposed site,⁴ based on the topography, fault orientation, and stream drainage, groundwater is expected to flow to the west 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 to range from 15 to 20 feet along the crests of the low-lying hills (ORNL 2006, DOE 2020b). The site is located predominantly in a groundwater discharge regime along the axis of the East Fork Valley (DOE 2020b). The site is located in the Chickamauga Formation, which is considered an aquitard because of its low permeability. The site is about 3.5 miles northwest of a source water protection area for groundwater in Bethel Valley (ORNL 2006).

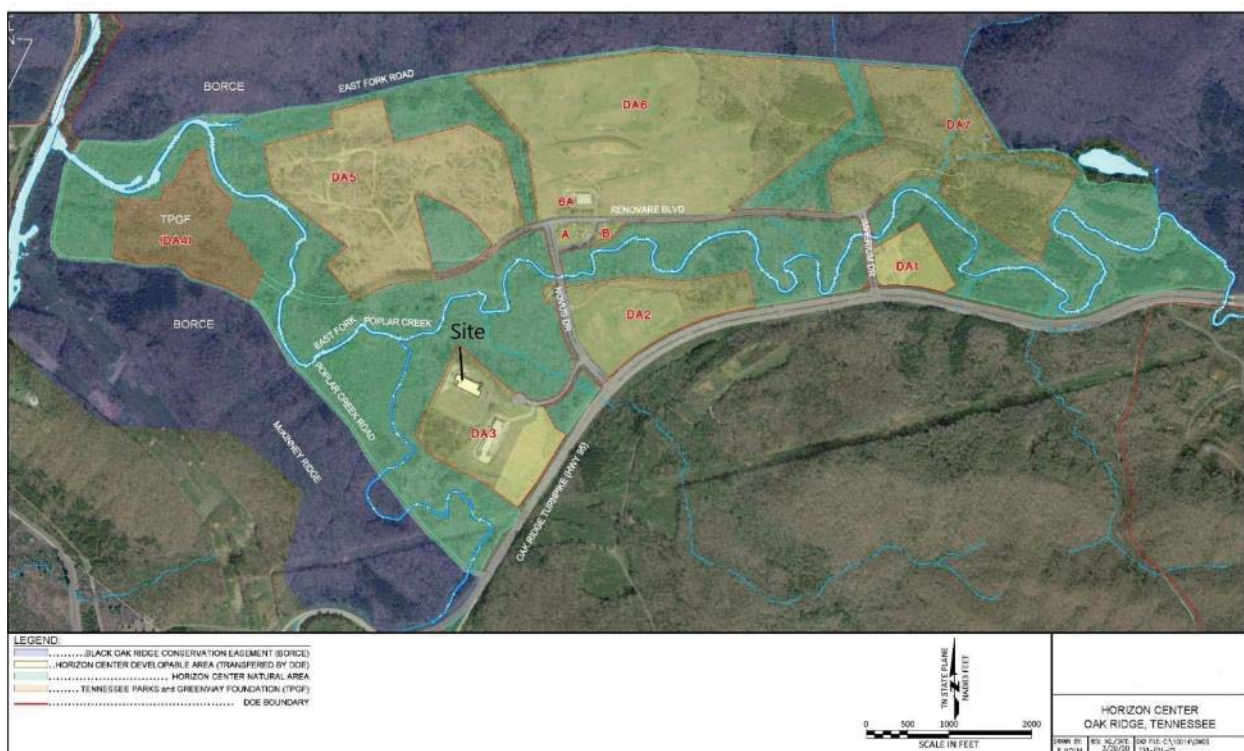
Groundwater studies for the ORR have not identified any groundwater contamination issues near the site. In a letter dated August 21, 1995, and again on August 21, 2001, the EPA concurred with DOE's determination that Parcel ED-1 is not contaminated, with the exception of East Fork Poplar Creek and Bear Creek and their associated floodplains (DOE 2003). Additionally, a recent Phase

⁴ As discussed in Section 3.6.2, NNSA intends to install a groundwater-monitoring network including upgradient and downgradient monitoring wells, at the proposed site.

1 Environmental Site Assessment for the site, did not identify any evidence of spills/stains or other recognized environmental conditions during onsite inspection (Terracon 2020).

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 2018a).

As shown in Figures 3-12 and 3-13, there are three streams near the site including the East Fork Poplar Creek. Two of the streams are tributaries to East Fork Poplar Creek, and flow west/northwest near the northern and southern boundaries of the site. The stream to the north of the site, Dace Branch, and the southern stream, Bear Creek, have perennial flow in vicinity of the site (CNS 2020a). Additionally, several springs were identified within the stream riparian areas. The East Fork Poplar Creek discharges into Poplar Creek east of ETTP, which passes through the ETTP discharging directly into the Clinch River.



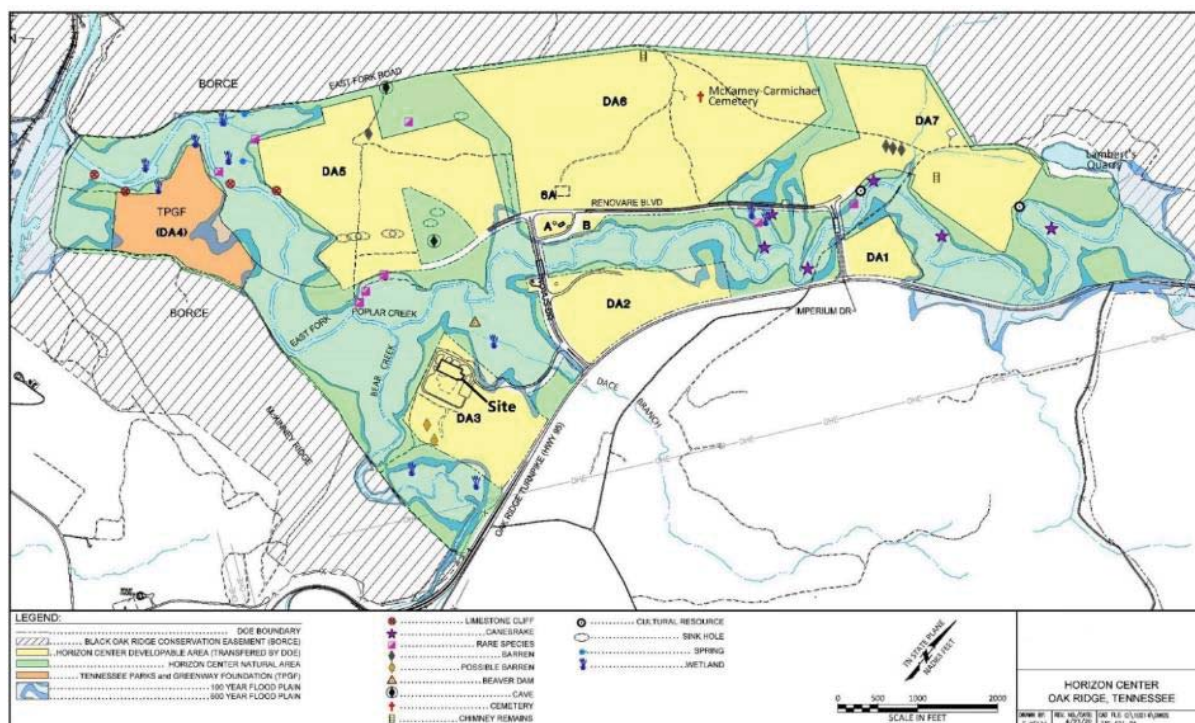
Source: DOE 2020b.

Figure 3-12. Surface Water Features near the Proposed Site

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

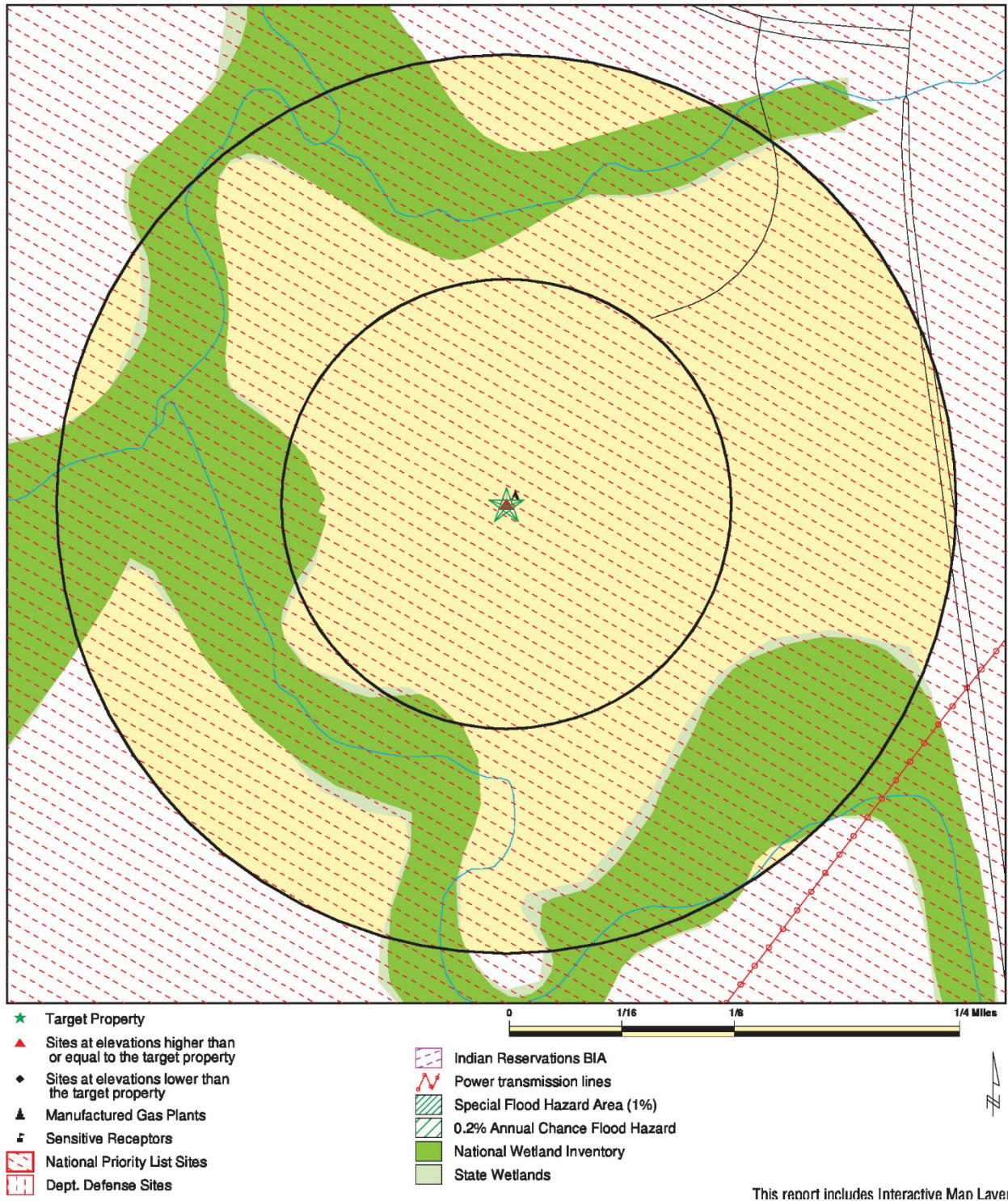
should be met. First is the presence of hydrophytic vegetation that has morphological or physiological adaptations to grow, compete, or persist in anaerobic soil conditions. Second, hydric soils are present and possess characteristics that are associated with reducing soil conditions. Third, the area 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).

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 2018a). 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). Field surveys have identified wetlands associated with stream riparian areas that are more than 600 feet from the existing facility (Figures 3-13 and 3-14) (DOE 2020b, Terracon 2020). Under the current site design for the Proposed Action, the wetlands do not overlap with the site. The area within the fenced boundary has been graded and manipulated, such that the potential construction of a 0.5-acre parking lot and adding the secure storage building and maintenance trailer alongside the facility would not impact any wetlands.



Source: DOE 2020b.

Figure 3-13. Wetlands and Floodplains near the Proposed Site



Source: Terracon 2020.

Figure 3-14. Wetlands near the Proposed Facility

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. The 100- and 500-year floodplains near the site are located along East Fork Poplar Creek and its tributaries, as shown in Figure 3-13 (DOE 2020b). The site is outside of the 100-year floodplain; however, a portion of the access driveway near the northern boundary of the site appears to overlap with the 500-year floodplain (DOE 2020b).

3.6.2 Proposed Action Impacts

Construction and Operation.

Groundwater. No impacts to groundwater are anticipated from construction activities or normal facility operations. Groundwater from the site would not be used as a water source. Potential impacts to groundwater quality are not expected because processing operations would be contained within the building, and hazardous materials would be properly managed. Any spills would be contained and cleaned up in an appropriate manner under the Spill Prevention, Control, and Countermeasures (SPCC) Plan or applicable best management practices to prevent spills at the facility. Small quantities of process water generated during processing would be characterized and properly disposed. As such, facility operations would not be expected to contaminate the groundwater. Per DOE Order 458.1, and DOE Order 436.1, a groundwater-monitoring network including upgradient and downgradient monitoring wells, would be established to evaluate baseline and operational site conditions. Because the monitoring wells would be placed along the interior of the property perimeter fences (*see* Figure 3-5), no additional land clearing or road building would be required to support monitoring well installation (CNS 2021a).

Surface Water. There are three streams near the site including the East Fork Poplar Creek. Two of the streams are tributaries to East Fork Poplar Creek, and flow west/northwest near the northern and southern boundaries of the site. The northern-most stream, Dace Branch and the southern stream, Bear Creek, have perennial flow in vicinity of the site. Additionally, several springs were identified within the stream riparian areas. However, a 100-foot riparian buffer would be maintained around all of the streams as a mitigation measure in accordance with DOE/EA-1113 (DOE 1996, DOE 2013), and no planned disturbance would occur in or near the riparian buffer. Furthermore, the parking lot, secure storage building, and maintenance trailer would be near the facility itself, several hundred feet from stream resources, and only a limited amount of land disturbance (less than 1 acre) would be expected for the Proposed Action. As such, soil disturbance or clearing of vegetation near the stream buffer-zones would not occur, and no adverse impacts to streams or floodplains would be expected.

East Fork Poplar Creek, Bear Creek, and Dace Branch 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 sumps, would reduce impacts to adjacent surface waters. Installing and maintaining erosion controls around the construction footprint, especially along sloped areas, would help mitigate the potential for sediment transport into the streams. The site is generally level, and therefore stormwater erosion potential would be relatively low. The potential for adverse impacts to surface water would exist until disturbed areas are stabilized and revegetation is established.

Because soil disturbance would be less than one acre, it would not be necessary to obtain a construction stormwater National Pollutant Discharge Elimination System (NPDES) permit for discharges of stormwater associated with construction activities, prior to the start of construction. However, NNSA would develop and implement a Stormwater Pollution Prevention Plan (SWPPP) 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 2021a). 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). As such, the City of Oak Ridge as part of their MS4 permit may require a detention pond for stormwater runoff from expansion of the parking lot (CNS 2021a).

During operations, cooling tower blowdown discharge and planned outdoor storage of LLW materials would require an NPDES permit and a SWPPP. Outdoor storage of hazardous waste liquids is not planned. 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). Currently, buildings 9202, 9203, 9203A discharge thru NPDES permitted outfalls 047 and 048. These outfalls have effluent limitations and monitoring requirements for Category II industrial discharges, Stormwater Sector AA requirements for Metal Fabrication and DOE required radiological monitoring, as specified in the Radiological Monitoring Plan for the Oak Ridge National Security Complex (section Y/TS-1704/R3 Surface water) and DOE Order 458.1 (CNS 2021a).

The existing facility has floor drains and process sinks throughout, that are hard-piped to a single building sump, whose contents are pumped to two 1,000 gallon tanks exterior to the building. NNSA intends to cap the first floor drains and those tanks would only be used to collect process wastewater from second floor drains. Because these wastewater storage tanks would be used for the Proposed Action, they would need to meet Y-12 Engineering's Master Design Criteria for process design and piping. The criteria outlines DOE's technical standards and industrial codes for stationary tanks structures, systems, and components - including secondary containment, influent and effluent piping, and transfer stations. Such engineering designs satisfy DOE requirements, US EPA regulations, and state environmental regulations, such as the *Clean Water Act*, *Resource Conservation and Recovery Act (RCRA)*, *Toxic Substance Control Act*, and *CERCLA* (CNS 2021a).

Small quantities of process water generated during processing activity would be characterized to determine treatability in available wastewater treatment facilities during process design. Any discharges of process water to the sanitary sewer would be subject to requirements under an Industrial and Commercial User Wastewater Discharge Permit. This permit would define requirements for the discharge of wastewaters to the sanitary sewer system as well as prohibitions for certain types of wastewaters. Additionally, it would prescribe requirements for monitoring certain parameters. If required, any discharges of process water from the site directly to East Fork Poplar Creek would need to comply with the general conditions and the specific discharge requirements of an NPDES permit issued for the facility. Based on the small quantities of process water anticipated during operations and compliance with any applicable permit requirements, the Proposed Action would not be expected to contaminate sanitary wastewater or surface water.

With appropriate stormwater management, implementation of spill prevention and response plans, and compliance with NPDES permit requirements, if required and including the SWPPP, adverse impacts to surface water bodies would not be expected during construction and operations.

Wetlands. Wetlands are present in vicinity of the site footprint, associated with stream riparian areas (DOE 2020b). Under the current site design, the wetlands do not overlap with the site and there are no outfalls from surrounding wetlands that could impact the site footprint. Any construction would occur in previously disturbed areas and no wetlands would be impacted. A 100-foot riparian buffer would be maintained around all wetland areas as a mitigation measure in accordance with DOE/EA-1113 (DOE 1996, DOE 2013), and no planned disturbance would occur in or near the riparian buffer. Spills, increased sedimentation, and stormwater runoff could potentially impact wetlands associated with offsite 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, adverse impacts to offsite wetlands associated with stream riparian areas would not be expected.

3.6.3 No-Action Alternative Impacts

Under the No-Action Alternative, Y-12 Development operations would not be relocated, operations would continue at Y-12 in existing facilities. There would be no impacts to water resources. Ongoing and planned reindustrialization and cleanup activities would continue at Y-12. Potential impacts to groundwater and surface waters including wetlands would be addressed under approved NEPA decisions and other applicable regulatory documents.

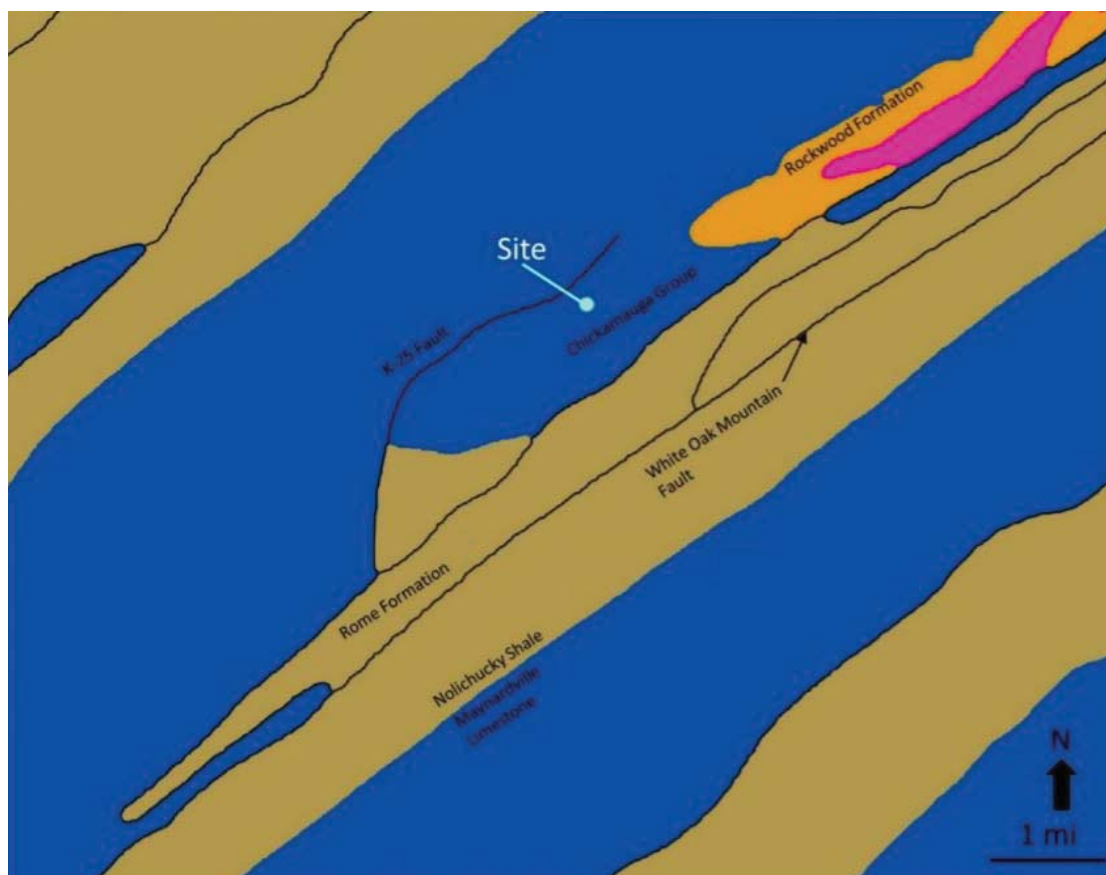
3.7 Geology and Soils

3.7.1 Affected Environment

Geology. The study area 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 3-15, the proposed site is underlain by bedrock of the Chickamauga Group, which is primarily a limestone with layers of siltstone. To the northeast of the proposed site are rocks of the Rockwood Formation. 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.

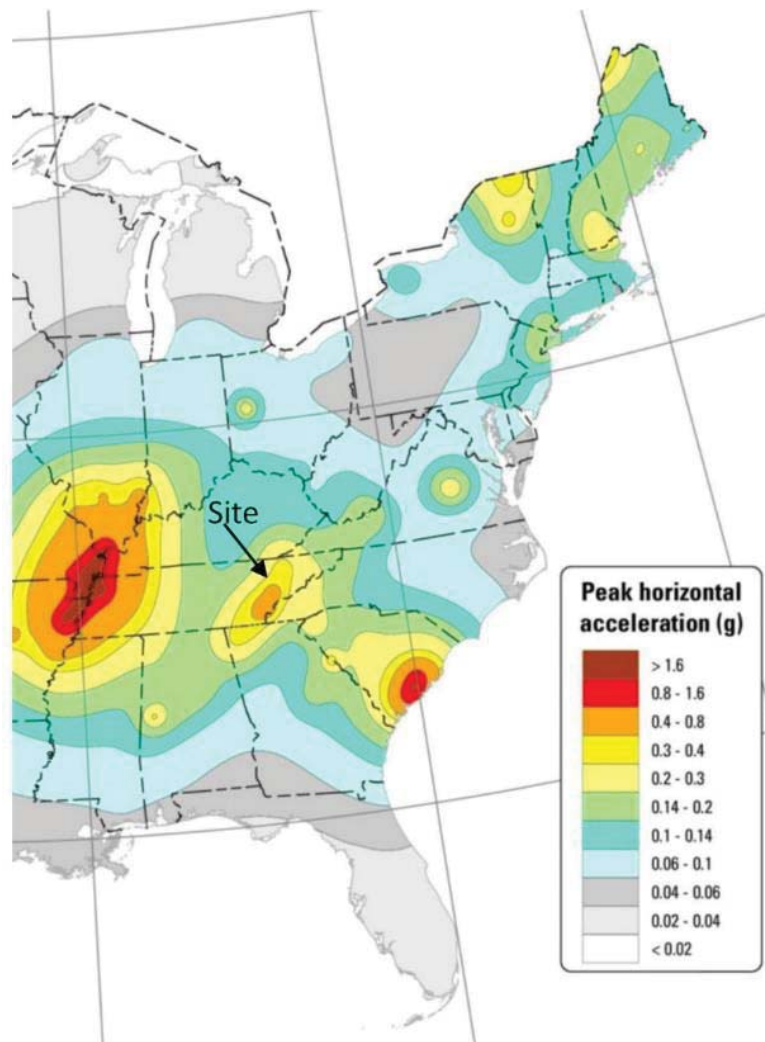


Source: USGS 2020b.

Figure 3-15. Geologic Map in the Vicinity of the Proposed Site

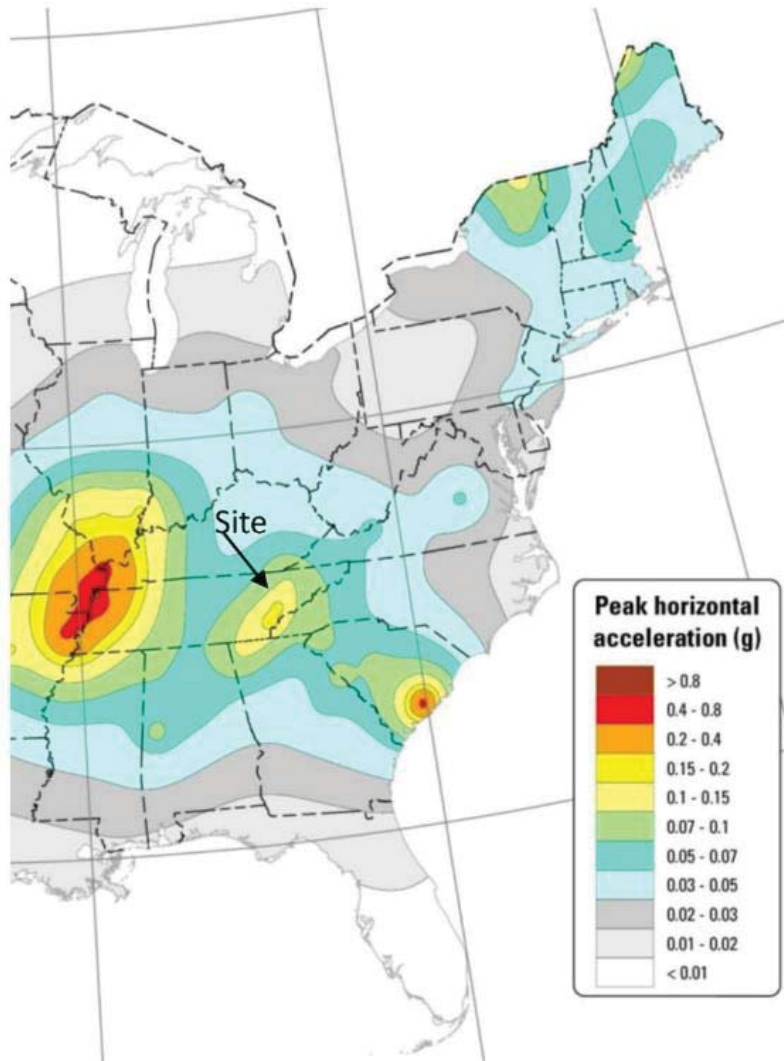
The USGS rates ground motions using peak ground acceleration, which is the maximum acceleration experienced during the course of an earthquake and is measured in units of acceleration due to gravity (“g”). The seismic map for 2018 indicates that the study area is located

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 3-16 and 3-17). 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 2020c).



Source: USGS 2018.

**Figure 3-16. 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 3-17. 2018 National Seismic Hazard Model for the conterminous United States
Peak horizontal acceleration with a 10% probability of exceedance in 50 years**

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 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 feet, and have generally been mud-filled. Bedrock conditions in the Chickamauga Group underneath the site are unknown. During recent surveys, two sinkholes were identified outside of, but near the southeast corner of the site (CNS 2020a).

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 site is developed with on

existing building and parking lot and a manicured lawn area south of the building. Forested area surrounds the developed portion of the site. The 1942 soil survey indicates that proposed site is within the Armuchee silt loam, which is described as well-drained with weathered bedrock encountered between 20 to 40 inches.

3.7.2 Proposed Action Impacts

Construction. 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 the parking lot expansion and addition of a secure storage building and maintenance trailer alongside the facility. However, no viable geologic or soil resources would be lost from construction activities. Because the site is already developed, there would be no tree-clearing, and only minor amounts of grading and excavation are expected. Less than one acre of soil disturbance is expected. Minor grading may be required to establish laydown areas during construction. Additionally, soils and potentially shallow bedrock may be excavated to accommodate a stormwater detention system. The site soils contain silt and clay and are moderately susceptible to wind erosion. The potential for increased soil erosion would occur on areas that are disturbed during construction activity. However, the site is level, and stormwater runoff velocity would be low.

In general, potential impacts from erosion would be minimized through the development and implementation of a SWPPP, if required, and 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 any 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 facility would be operated and modified as needed, in accordance with current IBC guidelines (IBC 2018) 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. There are no identified karst features at the site. Landslide risk is low because the site is level and there is a low-incidence rate.

If karst features (such as sinkholes and void spaces) are discovered within the operational footprint, stormwater control measures would be implemented to protect this feature from surface water runoff or sediment transport during construction. Further development of a 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 or site vicinity.

Operation. Once construction is complete, areas used for laydown would be restored to pre-construction conditions. Meanwhile, open areas around the facility building would be cleaned up, restored, and revegetated. Although erosion from 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, the existing building and site would not be modified for use. There would be no impacts to geology and soils.

3.8 Biological Resources

3.8.1 Affected Environment

This section describes the biological resources in the study area, which includes the proposed project site and the surrounding area within the ORR, and is intended to provide a baseline characterization of the ecology prior to any disturbances associated with construction or operation of the Y-12 Development Organization.

Vegetation and Habitat. The project area is situated in the Great Valley of East Tennessee between the Cumberland and Great Smoky Mountains (DOE 2020a). At approximately 35,000 acres, the ORR is the largest contiguous and protected land ownership in the southern Valley and Ridge Physiographic Province of East Tennessee. The ORR contains approximately 25,000 acres of forestland. The ORR's natural resources are managed for DOE by the ORNL Natural Resources Management Program.

More than 1,100 vascular plant species have been identified at the ORR (Mann et al. 1996). Of the 168 non-native plant species on the ORR, 54 are considered severe or significant threats to natural areas or the ORR mission. The Invasive Plant Management Plan for the ORR addresses the impacts of invasive plants on facility operations and natural areas (ORNL 2017). The 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 proposed project site is the facility at 103 Palladium Way and the surrounding 21 acres, and is located within the 957-acre Horizon Center (Parcel ED-1). The existing facility is located on a secure and fenced campus with approximately 73,000 square-feet of interior space. The facility is located approximately 9.5 miles from Building 9202, west of Y-12. Terrestrial resources at the Parcel ED-1 site are managed through various agencies including the USFWS, TDEC, and the Tennessee Wildlife Resources Agency.

Vegetation within the proposed project site consists mainly of areas of mixed pine-hardwood forests, second-growth loblolly pine forests that naturally revegetated following the 1990's pine beetle outbreaks, and cleared areas that have been replanted with tall fescue. Five sensitive vegetation communities are known to occur in the vicinity or within the proposed project site area (beech-maple forest, limestone cliffs, limestone barrens, canebrakes, and walnut plantations. Limestone barrens have been identified within the proposed project site area (DOE 2020b).

Limestone barrens include areas dominated by vegetation exclusive to rocky sites where tree growth is inhibited or slowed due to the following conditions: shallow soils over bedrock, a high degree of exposed surface rock, or steep easily erodible slopes. Within the proposed project site area, there are two possible barren sites located within the forested area in the southwestern portion of the site. These barrens consist of complexes of small openings dominated by grasses and herbaceous plants in a mixed eastern red-cedar hardwood forest (DOE 2020b).

Wildlife. The eastern deciduous hardwood forest on the ORR provides habitat for numerous wildlife species. The diversity of wildlife species ranges from common species found in urban and suburban environments to more specialized species such as interior forest bird species. The ORR hosts more than 70 species of fish; about 71 species of reptiles and amphibians (68 species confirmed); 213 species of migratory, transient, and resident birds; and 49 species of mammals, as well as many invertebrate species (NERP 2020). In addition, the Bald Eagle may also be present and is protected under both the *Migratory Bird Treaty Act* and the *Bald and Golden Eagle Protection Act* (USFWS 2021).

The proposed project site located within the 957-acre Horizon Center (Parcel ED-1) has conducted pre- and post-development monitoring to assess natural succession and impacts of development on natural communities and populations. Monitoring activities were initiated for birds, benthic invertebrates, and fish in 1996. During late 1998, development activities began, and the initial clearing, road and bridge construction, and utility installations were complete by the end of 2000. Monitoring continued during the first few years of the post-development period until 2011. Wildlife observed at Parcel ED-1 includes eight reptile species, two amphibians, 39 species of birds, and 24 mammals (DOE 2020b). The *Implementation of Mitigation Action Plan for Parcel ED-1 on the Oak Ridge Reservation* (DOE 2013) provides a complete listing of species observed.

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

The USFWS Information for Planning and Consultation online system was accessed to request an *Official Species List* to identify species protected under Sect. 7(c) of the ESA that could occur within the proposed project area. On April 8, 2020, a list was generated by the USFWS Tennessee Ecological Services Field Office containing eight federally listed species with potential to occur in the vicinity of the proposed project site, however none are known to occur. These included three mammals, one fish, two clams, and two plants (DOE 2020b). These species are listed in Tables 3-9 and 3-10.

There are no USFWS federally listed species known to occur within the Parcel ED-1 site (DOE 2020b). Additionally, no critical habitat for USFWS federally species occurs on or near Parcel ED-1. Two of the federally listed bat species, Indiana bat (*Myotis sodalists*) and northern long-eared bat (*Myotis septentrionalis*) occurs within mixed pine-hardwood forests and second-growth loblolly pine forest.

Table 3-9. Threatened, Endangered, or Sensitive Animal Species with Potential to Occur within the Parcel ED-1/Project Area

Common Name	Scientific Name	Habitat	Historically observed within the Parcel ED-1 Site	Status ^a	
				Federal	State
Mammals					
Gray bat	<i>Myotis grisescens</i>	Inhabits caves year-round, but may sometimes use man-made tunnels as their summer quarters.	No <i>However, known roosting habitat occurs within the ORR.</i>	E	E
Indiana bat	<i>Myotis sodalist</i>	Winters in the large, cool limestone caves with high humidity. They rarely inhabit buildings or other man-made structures. Females deliver their young in hollow trees or beneath tree bark.		E	E
Northern Long-eared bat	<i>Myotis septentrionalis</i>	Winters in cool, moist caves and mines. In summer, they roost in a variety of shelters including barns and attics, and under tree bark or shutters. They usually roost singly, except for small maternity colonies. They seem to prefer tight crevices and holes, although they will also frequently hang out in the open.		T	T
Clams					
Finerayed Pigtoe	<i>Fusconaia cuneolus</i>	Freshwater. Inhabits clear, high-gradient streams in firm cobble and gravel substrates.	No	E	E
Shiny Pigtoe	<i>Fusconaia cor</i>	Freshwater. Found in shoals and riffles of small- to medium-sized rivers in clear streams with moderate to fast current. It is typically well-burrowed in sand and cobble substrates. It does not appear tolerant of deeper water or reservoirs.	No	E	E
Fish					
Spotfin Chub	<i>Erimonax monachus</i>	Clear upland rivers with swift currents and boulder substrates.	No	T	T

^a Status Codes: E = endangered; T=threatened
Source: DOE 2020b, TDEC 2021.

The TDEC maintains the state list of Rare Species by County (TDEC 2021). Of the 68 species listed for Roane County, none is known to occur within the Parcel ED-1 site (DOE 2020b).

However, two previously state-threatened plant species have been documented within Parcel ED-1 (goldenseal [*Hydrastis canadensis*] and pink lady slipper [*Cypripedium acaule*]). These are now listed as “apparently secure (S4)” (DOE 2020b). Protected plant species with the potential to occur within the proposed project area are included in Table 3-10.

Table 3-10. Threatened, Endangered, or Sensitive Plant Species with Potential to Occur within the Parcel ED-1/Project Area

Common Name	Scientific Name	Habitat	Observed within the Parcel ED-1 Site	Status ^a	
				Federal	State
White fringeless orchid	<i>Platanthera integrilabia</i>	Grows in wet, boggy areas at the heads of streams and on sloping areas kept moist by groundwater seeping to the surface. It is often associated with Sphagnum in partially, but not fully, shaded areas.	No	T	E
Virginia spiraea	<i>Spiraea virginiana</i>	Occurs along rivers and streams and relies on periodic disturbances, such as high-velocity scouring floods, which eliminate competition from trees and other woody vegetation. However, if the frequency and intensity of these floods is too great, the plant may become dislodged and wash downstream into less suitable habitat.	No	T	E

^a Status Codes: E=endangered; T=threatened.

Source: DOE 2020b, TDEC 2021.

3.8.2 Proposed Action Impacts

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

Construction. Under the Proposed Action, construction activities would consist of internal modifications to the facility, expansion of the existing parking lot, and addition of a secure storage building and maintenance trailer alongside the facility in previously disturbed areas (previously graded or asphalted surfaces). With the exception of those actions, there would be no change to the constructed footprint, exterior wall structure, or outside appearance of the building (CNS 2021a); therefore, there would be minimal terrestrial biotic impacts. Because there would be no notable exterior construction, impacts to threatened and endangered or special status species would be minimal. Monitoring to assure that threatened and endangered or special status species, such as the gray bat and Indiana bat, which have been observed on the ORR would continue.

Operation. Impacts to biological resources from Y-12 Development operations would be similar to currently observed industrial operations within ORR. The Biological Monitoring and Abatement Program, which monitors the health of East Fork Poplar Creek, would continue and would be used to ascertain any impacts from Y-12 Development operations on local biota. Monitoring to assure that there are no negative impacts to threatened and endangered or special status species would occur.

3.8.3 No-Action Alternative Impacts

Under the No-Action Alternative, Y-12 Development operations would not be relocated, operations would continue at Y-12 in existing facilities. Biological resources would remain unchanged when compared to existing conditions.

3.9 Cultural Resources

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

3.9.1 Affected Environment

Regulatory Setting. Several federal laws, regulations, and EOs addressing cultural resources and federal responsibilities regarding them are applicable to the ORR. Foremost among these statutory provisions, and most relevant to the current analysis, is the *National Historic Preservation Act* (NHPA) (54 U.S.C. 300101 et seq.). Section 106 of the NHPA and its implementing regulations at 36 CFR Part 800 require federal agencies to take into account the effects of their undertakings on historic properties and to consult to find ways to avoid, minimize, or mitigate any adverse effects. As part of the Section 106 process, agencies are required to consult with the SHPO when actions may affect historic properties. The Tennessee Historical Commission (THC) serves as the SHPO.

Cultural Resource Management at Y-12. The *Cultural Resource Management Plan, DOE Oak Ridge Reservation, Anderson and Roane Counties* (DOE 2001) addresses DOE compliance with cultural resource statutes, ensures that cultural resources are addressed early in the planning process of proposed undertakings, and ensures needed protection is provided or appropriate documentation is prepared before an undertaking is initiated. Two site-wide Programmatic Agreements (PAs) among the DOE, SHPO, and the President's Advisory Council on Historic Preservation were executed for the ORNL and Y-12 (DOE 2020a). 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. The ORR had 168 facilities that were eligible for inclusion on the NRHP. The reservation contains more than 45 known prehistoric sites (primarily burial mounds and archaeological evidence of former structures), more than 250 historic pre-World War II structures, 32 cemeteries, and several historically significant structures from the Manhattan Project era. Seven historic ORR properties are currently listed individually in the NRHP (DOE 2020a). The Manhattan Project National Historical Park commemorates the history of the Manhattan Project and protects many structures associated with the Manhattan Project. The park includes facilities located on the ORR including the X-10 Graphite Reactor at ORNL; Buildings 9731 and 9204-3 at Y-12; and the K-25 Building Site at the ETPP.

Cultural Resources in the Project Area. Surveys have been conducted as part of previous NEPA analyses for the proposed project site and surrounding area. No archaeological sites or historic resources were identified within the proposed project site (DOE 2020b).

3.9.2 Proposed Action Impacts

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

Construction. Under the Proposed Action, construction activities would consist of internal modifications to the facility, expansion of the existing parking lot, and addition of a secure storage building and maintenance trailer alongside the facility. There would be no notable change to the constructed footprint, exterior wall structure, or outside appearance of the building (CNS 2021a); therefore there would be no impacts to cultural resources. Unanticipated discoveries of archaeological materials during construction, although unlikely to occur, would be evaluated and, if needed, mitigated in accordance with the HPP. Therefore, no notable impacts to archaeological resources are anticipated.

Operation. Operational activities are not expected to have an impact on cultural resources, as all operations under the Proposed Action would be similar to currently observed industrial operations in the vicinity of the proposed project site.

3.9.3 No-Action Alternative Impacts

Under the No-Action Alternative, Y-12 Development operations would not be relocated, operations would continue at Y-12 in existing facilities. No new facilities would be constructed. There would be no impacts to cultural resources under this alternative.

3.10 Socioeconomic Resources and Environmental Justice

This section discusses the existing socioeconomic resources and environmental justice conditions within the ROI for the proposed project site at 103 Palladium Way 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 construction and Y-12 Development operations and the impacts that such action may have on the ROI. The ROI is a four-county area in Tennessee comprised of Anderson, Knox, Loudon, and Roane counties where a majority of the Y-12 workforce resides. Figure 3-18 shows the location of the proposed project site 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.

The proposed project site is located in Roane County. Roane County had a per capita personal income of \$41,917 and ranked 26th in the state in 2019. In 2009, the per capita was \$31,202. The 2019 per capita income reflected an increase of 3.1 percent from 2018 (BEA 2020). The median income for households in Roane County was \$53,367 in 2019 (USCB 2019a). Roane County had a total of 735 business establishments in 2018, with a combined annual payroll of approximately \$292 million (USCB 2019b).

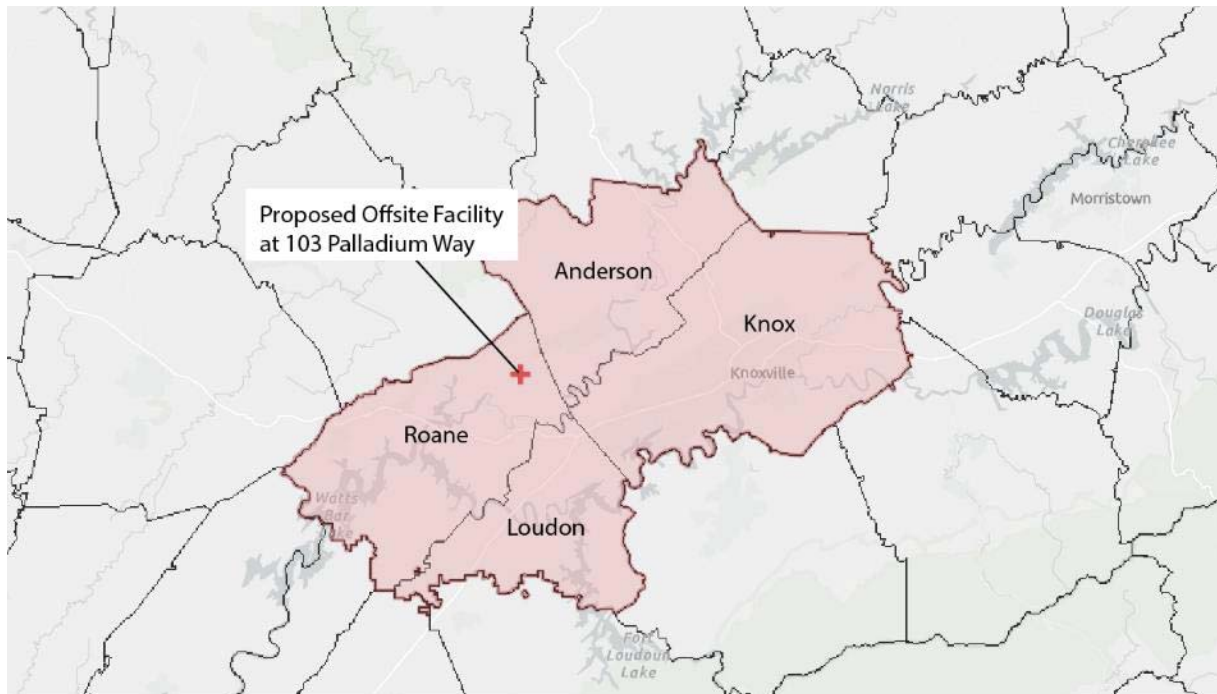


Figure 3-18. Location of Proposed Offsite Facility at 103 Palladium Way and Region of Influence

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 3-19. In Roane County, the professional, scientific, and technical sector accounted for approximately 26.10 percent of the total employment in the county. Government and government enterprises accounted for approximately 15.6 percent, with retail trade at nine 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).

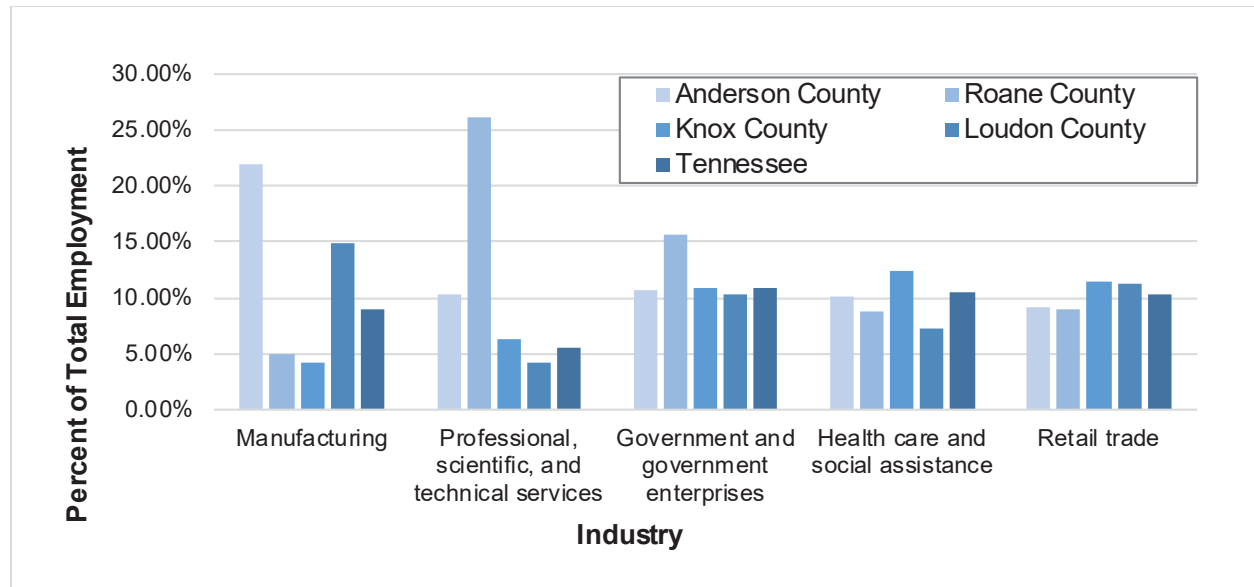


Figure 3-19. Major Employment Sector Distribution

In 2018, the population in the ROI was estimated to be 636,467 (USCB 2018a). From 2010 to 2018, the total population in the ROI increased 4.3 percent, which was lower than the growth rate in Tennessee (USCB 2018a). 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, 2018a, 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 2018b). 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. 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 11 hospitals serving the ROI with the majority located in Knox County. There are 29 fire departments in the ROI made up of career and volunteer firefighters. County Sheriff's Offices provide police protection services in cooperation with Tennessee Highway Patrol. In 2018, there were 1,361 total law enforcement employees including 563 officers and 798 civilians (FBI 2018).

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

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

For this analysis, meaningfully greater is defined as 20 percentage points above the population percentage in the general population. The significance thresholds for environmental justice concerns were established at the state level. The potentially affected area considered is the area within a 50-mile radius of Y-12 with a focus on the 4-county ROI. The state of Tennessee was used as the reference community to determine “meaningfully greater” thresholds. Areas are assumed to contain disproportionately high percentages of minority populations if the percentage of minority persons in the area significantly exceeds the state average or if the percentage of minority population exceeds 50 percent of the population. Meaningfully greater low-income populations are identified using the same methodology described above for identification of minority populations. Table 3-13 presents the state thresholds used for the analysis.

Table 3-13. Thresholds for Identification of Minority and Low-Income Communities (percentage)

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

The analysis used estimates from the U.S. Census Bureau’s 2013-2018 American Community Survey 5-Year estimates (<https://data.census.gov/cedsci/>) to identify minority and low-income populations. There are 151 census tracts in the four-county ROI. Of the 151 census tracts, 16 exceed the thresholds for minority and/or low-income populations. Census tracts that exceed minority and/or low-income thresholds are predominantly located in the Knoxville area, approximately 15 miles from the proposed project site. There are three census tracts immediately surrounding the proposed project site (9801, 301, and 309). The proposed project site is located in Census Tract 9801 in Roane County. None of the tracts surrounding the proposed project site 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 project site and for tracts that exceed state thresholds for minority and low-income populations in the four-county ROI. Figures 3-20 and 3-21 show the geographic distribution of minority and low-income populations within the 50-mile radius of Y-12.

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%	3.0%
Census Tract 309, Roane County, Tennessee ^a	2.4%	19.5%
Census Tract 8, Knox County, Tennessee	32.5%	55.5%
Census Tract 9.02, Knox County, Tennessee	16.3%	66.4%
Census Tract 14, Knox County, Tennessee	47.1%	63.4%
Census Tract 19, Knox County, Tennessee	74.9%	38.6%
Census Tract 20, Knox County, Tennessee	82.8%	43.9%
Census Tract 21, Knox County, Tennessee	72.9%	36.6%
Census Tract 24, Knox County, Tennessee	32.0%	37.9%
Census Tract 26, Knox County, Tennessee	43.7%	41.2%
Census Tract 27, Knox County, Tennessee	23.0%	39.1%

Area	% Minority	% Below Poverty
Census Tract 28, Knox County, Tennessee	59.8%	46.1%
Census Tract 29, Knox County, Tennessee	36.5%	52.3%
Census Tract 32, Knox County, Tennessee	64.6%	30.4%
Census Tract 67, Knox County, Tennessee	65.7%	33.2%
Census Tract 68, Knox County, Tennessee	70.3%	59.8%
Census Tract 69, Knox County, Tennessee	20.5%	65.6%
Census Tract 70, Knox County, Tennessee	65.9%	47.3%

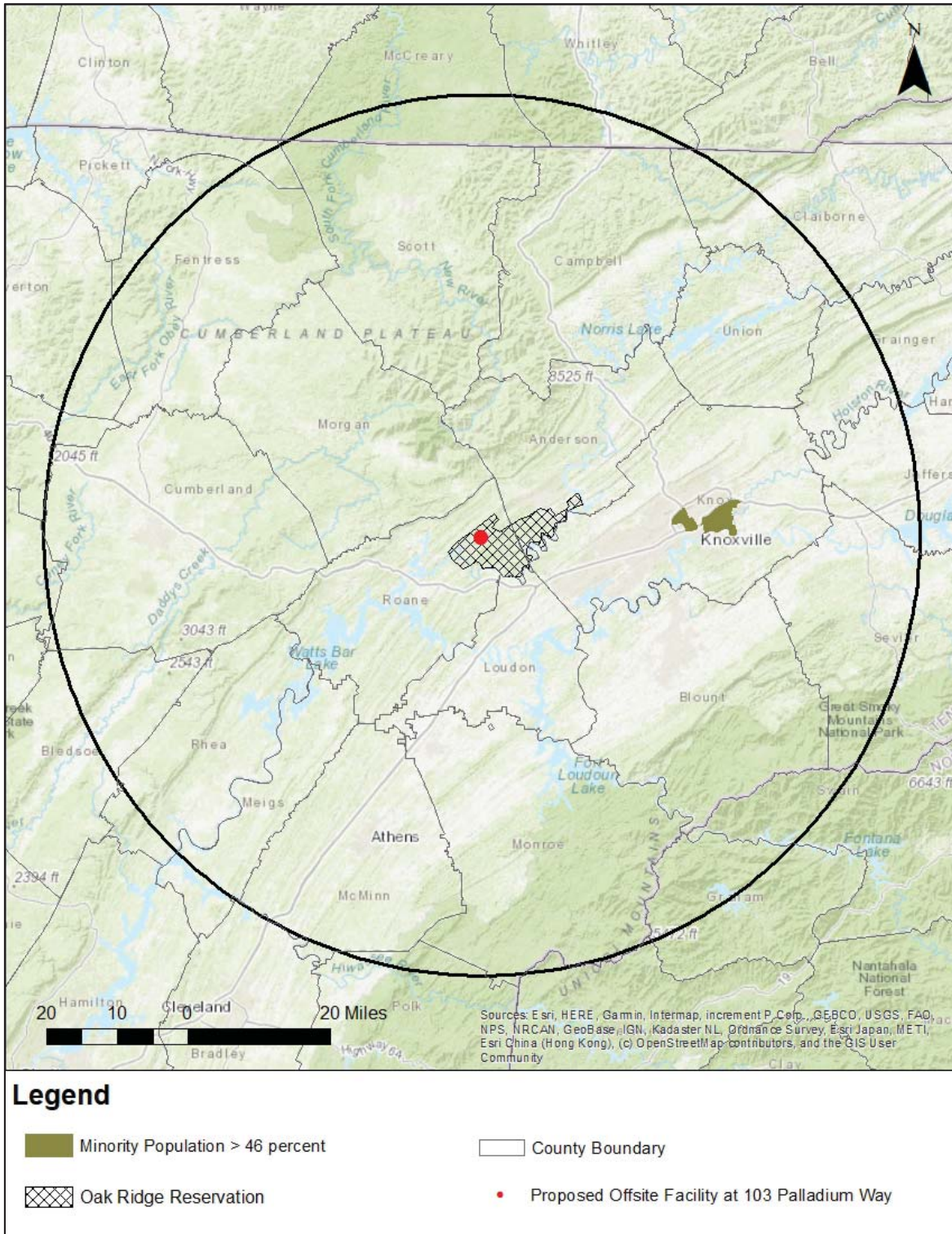
Source: USCB 2018a, USCB 2018c.

Note: Gray shading identifies tracts that exceed minority and/or low-income thresholds.

^a Census tract immediately surrounding the proposed project site.

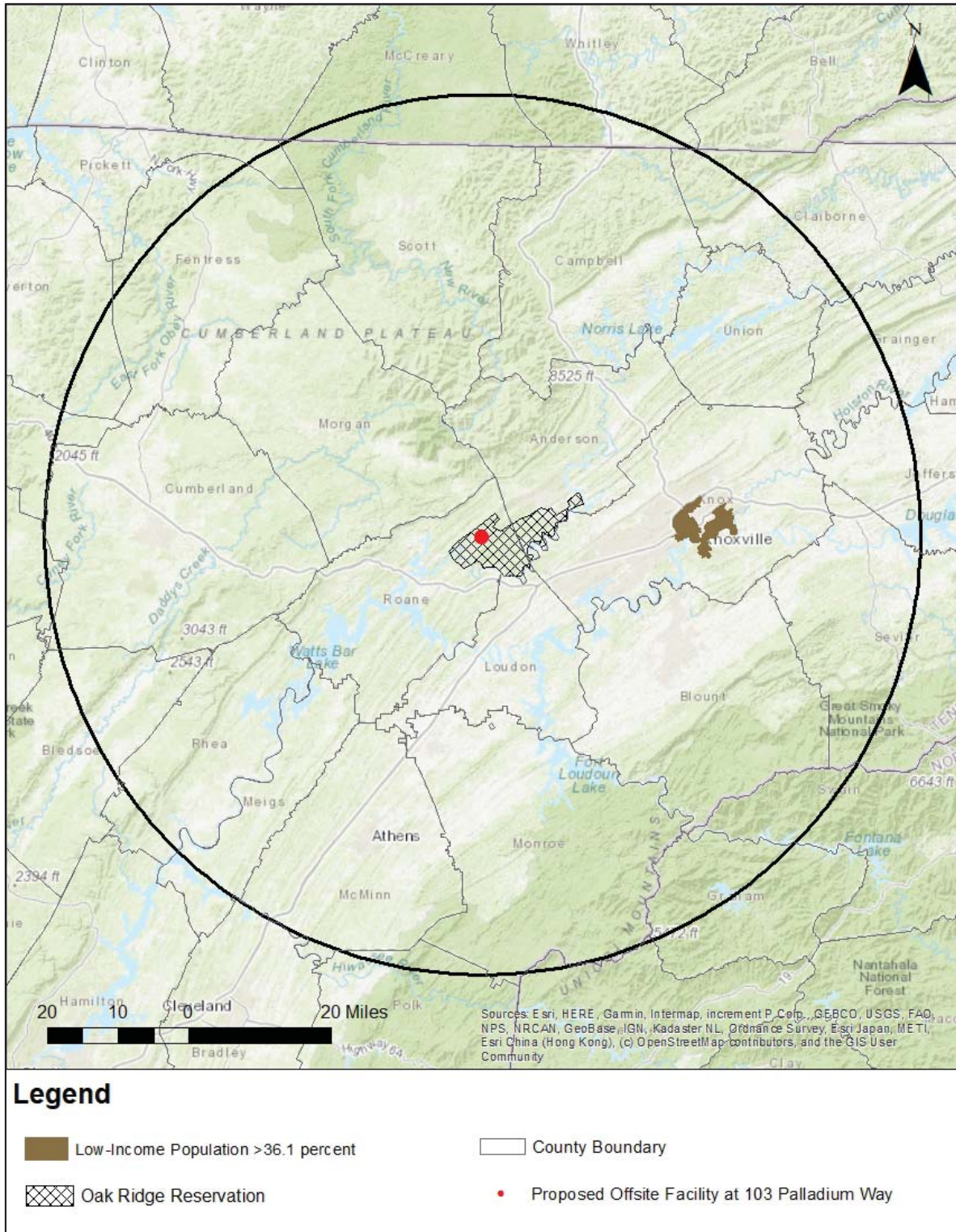
https://data.census.gov/cedsci/table?text=DP05&tid=ACSDP5Y2018.DP05&hidePreview=true&vintage=2018&layer=VT_2018_050_00_PY_D1&cid=DP05_0001E&g=0500000US47001.140000.47105.140000.47093.140000.47145.140000

https://data.census.gov/cedsci/table?q=S1701%3A%20POVERTY%20STATUS%20IN%20THE%20PAST%2012%20MONTHS&tid=ACSST5Y2018.S1701&hidePreview=true&vintage=2018&layer=VT_2018_050_00_PY_D1&cid=DP05_0001E&g=0500000US47145.140000.47001.140000.47093.140000.47105.140000



Source: USCB 2018a.

Figure 3-20. Minority Population – Census Tracts with More than 50 Percent Minority Population or a Meaningfully Greater Percentage of Minority Individuals in the General Population in a 50-Mile Radius of the Proposed Offsite Facility



Source: USCB 2018c.

Figure 3-21. Low-Income Population – Census Tracts with More than 50 Percent Minority Population or a Meaningfully Greater Percentage of Minority Individuals in the General Population in a 50-Mile Radius of the Proposed Offsite Facility

3.10.2 Proposed Action Impacts

3.10.2.1 Socioeconomic Resources

Construction. Acquisition of the offsite facility and land would occur in the 2021–2022 timeframe via a warranty deed. With relatively little renovation, the facility could easily be adapted to house the compatibility and surveillance, the materials synthesis, and the metal forming and welding operations of the Y-12 Development Organization. In terms of employment and income, it is estimated that there would be 50 peak workers with a total of 100 workers needed for construction (CNS 2021a). 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 economy. 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 (50 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.

Operation. Future operations would have a positive impact on regional economics. Y-12 Development operations would require 70-100 permanent workers. Those workers would be the same workers who currently conduct operations in Building 9202. In terms of other operational impacts:

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

3.10.2.2 Environmental Justice

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

are expected from construction and Y-12 Development operations at the offsite facility. For impacts that would occur, it is expected that impacts would affect all populations in the area equally. There would be no discernable adverse impacts to any populations, land uses, visual resources, noise, water, air quality, geology and soils, biological resources, socioeconomic resources, or cultural resources.

While NNSA acknowledges the existence of low-income and minority populations in the Scarboro and Woodland communities (which are approximately 9 miles east of the offsite facility), the low-income and minority populations in those census tracts do not exceed the thresholds used by NNSA to be classified as low-income or minority populations for the purpose of Environmental Justice analysis. However, even if those census tracts were specifically analyzed for Environmental Justice impacts, any impacts would be small to the Scarboro and Woodland communities, as well as to all other members of the population; consequently, there would be no disproportionately high and adverse human health impacts on minority populations and low-income populations from the Proposed Action.

3.10.3 No-Action Alternative Impacts

Under the No-Action Alternative, Y-12 Development operations would not be relocated, operations would continue at Y-12 in existing facilities and no new facilities would be constructed. There would be no additional socioeconomic or Environmental Justice impacts.

3.11 Health and Safety, Accidents, and Intentional Destructive Acts

3.11.1 Affected Environment

It is the policy of NNSA to operate in a manner that protects the health and safety of workers and the public, preserves the quality of the environment, and prevents property damage. Protection of the environment, safety, and health is a priority consideration in the planning and execution of all work activities at ORR. The current offsite facility is unoccupied and there are no health and safety impacts to workers or the public.

3.11.2 Proposed Action Impacts

Construction and Operation. 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 requirements, and the DOE Voluntary Protection Program. The potential risk of occupational injuries/illnesses and fatalities to workers involved in construction activities for the Proposed Action 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 3-year 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/Fatality Estimates: Proposed Action Construction

Injury, Illness, and Fatality Categories	Results
Peak Construction	
Peak construction workforce (persons)	50
Lost days due to injury/illness	0.6
Number of fatalities	0.006
Total Construction (3 years)	
Total construction worker-years	100
Lost days due to injury/illness	0.9
Number of fatalities	0.04

Sources: CNS 2021a, BLS 2020.

Occupational impacts during operations would involve approximately 70-100 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 offsite facility. In an average year, less than one day of lost work from illness/injury and less than one fatality would be expected.

Table 3-16. Occupational Injury/Illness/Fatality Estimates: Proposed Action Operations

Injury, Illness, and Fatality Categories	Results
Operational workforce (persons)	70-100
Lost days due to injury/illness	0.6-0.8
Number of fatalities	0.001 - 0.002

Sources: CNS 20201, BLS 2020.

The proposed facility would utilize small, R&D quantities of radiological and hazardous materials. Nuclear materials to be stored and utilized at this facility would include: depleted uranium, low-enriched uranium, small quantities of highly enriched uranium (< 400 grams), lithium, and other special materials in laboratory quantities. Because the facility would have less than Hazard Category-3 threshold quantities of radiological materials,⁵ there would be no potential for significant consequences off-site, onsite, or locally within the facility. Criticality is also precluded in a facility that has less than Hazard Category-3 threshold quantities of radiological materials (CNS 2021a).

In addition to the occupational injuries/illnesses and fatalities discussed above, workers could be exposed to radiological doses. Currently, the approximately 100 Y-12 Development workers at Y-12 receive an average dose of approximately 13.5 millirem per year. NNSA estimates that the average dose to a Y-12 Development worker at the offsite facility would remain at approximately 13.5 millirem per year. The total worker dose would be approximately 1.35 person-rem per year. Statistically, a dose of 1.35 person-rem would be expected to result in an annual risk of 8.1×10^{-4} latent cancer fatalities to the Y-12 Development workforce. The dose to the maximally exposed worker is estimated to be approximately 150 millirem/year, which equates to an annual latent cancer fatality risk of 9.0×10^{-5} . As described in Section 3.4.2, NNSA estimates that radiological

⁵ As required by 10 CFR Part 830, DOE Standard 1027-2018 (DOE 2018b) provides requirements and guidance for determining if a DOE nuclear facility is a Hazard Category-1, 2, 3, or Below Hazard Category-3 nuclear facility. A facility categorized as Below Hazard Category-3 contains radiological materials in quantities that are less than provided in Table 1 in Appendix A to Subpart B of 10 CFR Part 830.

air emissions from the Proposed Action would result in an offsite dose below 0.1 millirem/year (CNS 2021a).

Accidents. CNS/NNSA is currently preparing a Preliminary Hazards Analysis (PHA) for the proposed relocation of Y-12 Development operations to the offsite facility. The purpose of the PHA is to identify and analyze the significance of potential hazards associated with the Y-12 Development operations at the offsite facility. Once completed, the PHA will contain: (1) a preliminary list of major hazardous materials and energy sources; (2) a preliminary evaluation of accident scenarios; and (3) a preliminary list of hazard control measures needed to prevent or mitigate notable consequences to Development workers, collocated workers, and the off-site public. The PHA will provide a broad hazard-screening tool that includes a review of the types of operations that will be performed in the proposed facility based on the operations that are currently conducted in the existing buildings of the 9202 Complex, the 9203 Complex, and 9731. Although the PHA has not yet been completed, subject matter experts who are preparing that PHA provided accident input for this Draft EA, based on the information that has already been developed for the PHA (CNS 2021a).

An initial step in the PHA process is to identify each hazardous material (both radiological and non-radiological [e.g., chemicals]) that would be present in the facility, as well as the maximum anticipated quantity (MAQ) of that hazardous materials that would be present. The list of identified hazardous materials and associated MAQs will be provided in the PHA. Next, the MAQ of each hazardous material will be compared to threshold quantities established by regulatory requirements (i.e., 40 CFR 302). If the MAQ is below the threshold quantity, the hazardous material can be screened out from further analysis because the potential for impacts to workers or the public from a release of that hazardous material is considered insignificant (CNS 2021a). Based on the initial work that has been completed for the PHA, CNS/NNSA has determined that the MAQ for each hazardous material that would be present at the offsite facility would be less than threshold quantities. Consequently, a more detailed analysis of potential impacts from accidents is not expected to be necessary (CNS 2021a).

To quantify the accident consequences that could occur, and support the conclusion that impacts would be insignificant, CNS/NNSA has estimated the dose that could occur at the fence line of the offsite facility, assuming the entire MAQ of radiological material in the facility were released to the environment in a facility-wide fire.⁶ In such an event, NNSA estimated that the maximally exposed individual could receive a maximum dose of approximately 65 millirem. Statistically, this person would have a 3.9×10^{-5} chance of developing a latent cancer fatality, or about 1 in 25,000. With regard to non-radiological hazardous material releases, NNSA made a similar conservative assumption that the entire MAQ of non-radiological hazardous material in the facility would be released to the environment in a facility-wide fire. NNSA calculated a maximum concentration of less than 1 milligram per cubic meter at the fence line. Such a concentration is below concentrations of concern to the public for any of the chemicals in the offsite facility (CNS 2021a).

⁶ The initiating event for such a fire could be an external event such as an earthquake or an internal event such as an explosion or equipment failure.

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 offsite facility is considered minimal given that only small quantities of radiological and hazardous materials would be used or stored at the facility. Additionally, because the MAQs of hazardous materials in the offsite facility would be below threshold quantities, the potential for impacts to workers or the public from releases, whether by accident or intentional destructive act, would be expected to be insignificant. Firearms would not be stored or handled on site. Existing security measures (e.g., gates, fences, and a 24-hour guard) would 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, Y-12 Development operations would not be relocated, operations would continue at Y-12 in existing facilities, and there would be no changes to worker safety or potential impacts associated with accidents or intentional destructive acts.

3.12 Waste Management

3.12.1 Affected Environment

As discussed in Section 2.2, 103 Palladium Way is an existing, modern facility that could meet Y-12 Development's needs with minimal adaptations and renovations. The existing structure was built in 1999 and most recently owned by LeMond Bicycle, Inc. for the purpose of manufacturing carbon fiber bicycles. Prior to 1999, the site was undeveloped and has never had any hazardous substance stored on it for one year or more, has not been known to have any hazardous substance released/spilled on it, or been used to dispose of any hazardous substance (Terracon 2020). The facility is now vacant and, consequently, no wastes are currently generated on the site. It is anticipated that Y-12 Development would generate small quantities of low-level radioactive waste (LLW) and/or mixed LLW (MLLW), nonhazardous waste, and small quantities of hazardous waste that would be managed at the Palladium Way facility or returned to Y-12.

Y-12 has no active disposal facility onsite for disposal of LLW, MLLW, or hazardous waste. Solid LLW is generally disposed of at the Nevada National Security Site (NNSS) or a Y-12 approved commercial vendor. Liquid LLW is treated in several facilities at Y-12, including the West End Treatment Facility. Hazardous waste is disposed of at a Y-12 approved commercial vendor.

With regard to nonhazardous waste, DOE operates and maintains solid waste disposal facilities located near Y-12, called the ORR Landfills, three of which are active (*see* Table 3-17). In 2019, these three active landfills received 11,100 waste shipments, totaling 123,376 cubic yards of waste (DOE 2020a). The TDEC Division of Solid Waste Management (DSWM) regulates the management of waste streams under the *Tennessee Solid Waste Management Act* (TSWMA). TDEC performs a monthly audit of DOE's landfills on ORR. TDEC also reviews DOE practices to ensure that radioactive waste is not disposed of in these landfills. Each landfill has established criteria to determine whether waste is acceptable for disposal. In general, the wastes must be non-

hazardous, non-radioactive, and non-RCRA-regulated. DOE must use approved operations in receiving, compacting, and covering waste.

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, respectively. The landfills V and VII each has a remaining life expectancy of approximately 2 million cubic yards. Industrial landfills IV and V can also dispose of approved special waste. Approved special wastes have included asbestos materials, empty aerosol cans, materials contaminated with beryllium, glass, fly ash, coal pile runoff sludge, empty pesticide containers, and Steam Plant Wastewater Treatment Facility sludge. Disposal of special waste is approved on a case-by-case basis by the State of Tennessee (DOE 2020a). Y-12 Development operations currently generate LLW and MLLW, which are disposed of at the NNSA or a Y-12 approved commercial vendor.

Table 3-17. Active Landfills at ORR

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

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

Source: DOE 2017.

3.12.2 Proposed Action Impacts

Construction. Because Y-12 Development is moving into an existing facility, waste generation from construction would be minimal. Waste generated would be associated with an interior build-out of the space and a retrofit of the structure to support Y-12 Development’s mission. Although construction debris would be generated, no notable quantities of nonhazardous waste would be generated during construction. Additionally, 103 Palladium Way does not currently contain any radiological materials or contamination.

Construction waste would be expected to include items such as packaging from building materials and equipment installation, as well as residues from consumables (e.g., food and supplies) brought in by the workforce. Sanitary waste generated during construction would not be expected to be unique in nature or otherwise require special handling or management. Wastes would be dispositioned per a Waste Management Plan. NNSA would require construction contractors to

either manage these waste materials on their own (collecting and removing the waste periodically) or direct them to onsite receptacles for placement of such waste. Waste quantities would represent less than one percent of wastes disposed of at the aforementioned ORR landfills.

Operation. Y-12 Development operations would generate the same types and quantities of wastes that are currently generated by Development operations at Y-12. Table 3-18 provides a detailed breakdown of the potential waste types, quantities, transport containers, and disposition paths for the various wastes that are currently generated, and would continue to be generated regardless of whether relocation occurs.

Table 3-18. Y-12 Development Operations Waste Generation Data

Waste Type	Quantity (per year)	Container Type	Disposition Path
LLW – Solid	1	Sealand (1,280 cu ft)	Nevada National Security Site (NNSS) or Y-12 approved commercial vendor
LLW – Solid	24	ST-90 (96 cu ft)	NNSS or Y-12 approved commercial vendor
LLW – Solid	2	55 gal drum (7.5 cu ft)	NNSS or Y-12 approved commercial vendor
LLW – Solid (classified)	4	55 gal drum (7.5 cu ft)	NNSS or Y-12 approved commercial vendor
LLW (wastewater)	< 10,000 gal	Tanker Truck	Y-12 Onsite Treatment
MLLW-Solid	< 90 cu ft.	ST-90 or 55 gal drum	NNSS or Y-12 approved commercial vendor
MLLW (wastewater)	4	55 gal drum	Y-12 Onsite Treatment
Solids (non-radiological, classified)	2	55 gal drum	Y-12 Classified Landfill
Hazardous solid	1	55 gal drum	Y-12 approved commercial vendor
Hazardous liquid	1	55 gal drum	Y-12 approved commercial vendor
Universal Waste (Lamps, batteries, etc.)	10 cu ft.	Box or drum	Y-12 Commercial Vendor for recycle
Sanitary Waste - solids	300 cu yd.	Trash Dumpster	Y-12 Landfill
Used Oil – Non Radioactive/Non-RCRA	3	55 gal drum	Y-12 Commercial Vendor for recycle
Used Oil – Radioactive	3	55 gal drum	Y-12 Commercial Vendor for energy recovery
Used Oil – Mixed Waste	1	55 gal drum	Y-12 Commercial Vendor for mixed waste treatment
Cardboard	150 cu yd.	Dumpster	Y-12 Recycle Vendor
Office Paper	12 cu yd.	Container	Y-12 Recycle Facility
Scrap Metal	30 cu yd.	Truck	Y-12 Recycle Vendor
Off-Spec Chemicals	2	55 gal drum	Y-12 approved commercial vendor

Source: CNS 2021a.

LLW and MLLW. LLW is radioactive waste that is not classified as high-level waste, transuranic waste, spent fuel, or byproduct material and does not contain hazardous waste as regulated under RCRA. MLLW contains both LLW and hazardous waste. The hazardous component of the mixed waste is regulated by EPA under RCRA. The radiological component of mixed waste generated

from DOE/NNSA facilities is regulated by DOE/NNSA. Y-12 Development operations annually generate approximately 3,730 cubic feet of solid LLW, less than 100 cubic feet of solid MLLW, and less than 10,000 gallons of liquid LLW (wastewater). Solid LLW and MLLW would be disposed of at the NNSS or a Y-12 approved commercial vendor. Liquid LLW would be treated onsite at Y-12. In 2018, more than 83 million gallons of liquid LLW was treated onsite at ORR (DOE 2019), so the addition of less than 10,000 gallons would represent less than 1 percent. The disposal of LLW and MLLW at NNSS or a Y-12 approved commercial vendor would account for less than one percent of waste management activities at those facilities (NNSA 2011). Transportation impacts associated with LLW and MLLW are discussed in Section 3.13.2.

Hazardous. Hazardous waste is a waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. Hazardous waste is generated from many sources, ranging from industrial manufacturing process wastes to batteries and may come in many forms, including liquids, solids gases, and sludges. Y-12 Development operations generate approximately 60 cubic feet of hazardous waste annually. This equates to approximately eight 55-gallon drums of hazardous waste. Hazardous waste would be transported to, and disposed of, at a Y-12 approved commercial vendor. Based on the estimated hazardous waste generation rate of eight 55-gallon drums (approximately 60 cubic feet) per year, it is estimated that the facility would be classified as a RCRA small quantity generator. This generator status would require NNSA to submit a RCRA Annual Report to TDEC (CNS 2021a).

Nonhazardous. During operations, approximately 500 cubic yards of municipal waste would be generated annually. Compared to the 39,990 cubic yards of nonhazardous waste that were disposed of in the ORR landfills in 2018, the Y-12 Development operations would represent approximately 1.2 percent of the nonhazardous wastes.⁷

3.12.3 No-Action Alternative

Under the No-Action Alternative, Y-12 Development operations would not be relocated, operations would continue at Y-12 in existing facilities. Waste stream generation, collection, and disposal would remain unchanged. 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 3-22, the alternative sites are 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, a two-lane highway with a speed limit of 50 mph.

⁷ Operational wastes from relocation of Y-12 Development operations would not be different than existing wastes from operations at Y-12, and thus, do not represent an actual “increase” in wastes compared to current wastes.

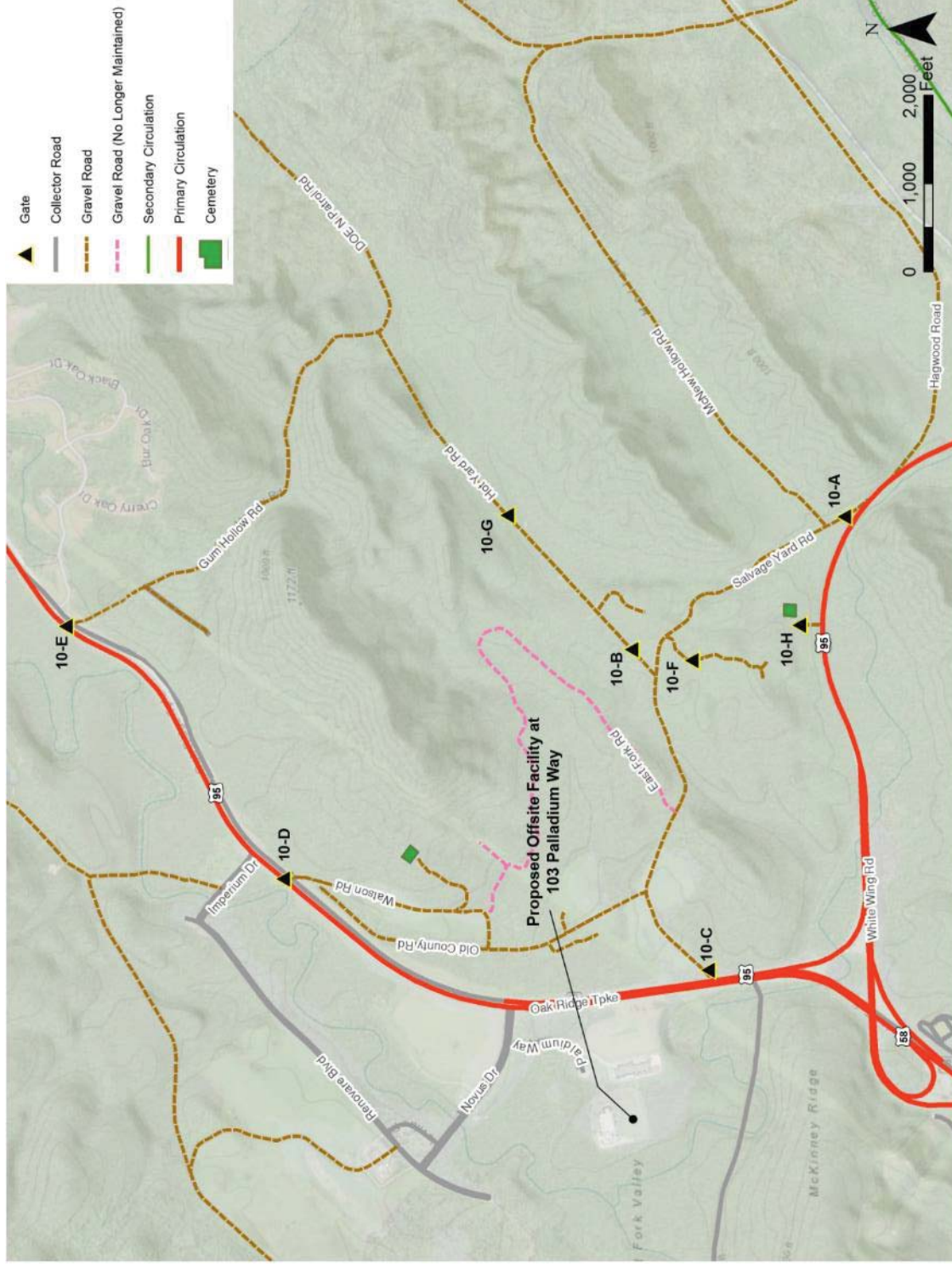


Figure 3-22. Transportation Network in the Vicinity of the Proposed Action

As shown on Figure 3-22, the proposed offsite facility 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 3-19. 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 3-19. Average Daily Traffic Counts of Area Roads (Vehicles/Day)

Year	SR95	SR58	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

Source: TDOT 2020.

3.13.2 Proposed Action Impacts

Construction and Operation.

Offsite Circulation. As depicted in Figure 3-22, the offsite facility is 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 approximately 0.6 miles south. Novus Drive is the single access road that currently connects to the Oak Ridge Turnpike. There are dedicated turn lanes on both the eastbound and westbound sections of the Oak Ridge Turnpike to access Novus Drive. Once on Novus Drive, access to the offsite facility is via Palladium Way. No road-related improvements would be necessary to support access to the offsite facility.

Average daily traffic counts for SR 95, SR 58, and Bear Creek Road are shown in Table 3-18. 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 Proposed Action construction and operation. During peak construction or operations, the addition of up to 50 vehicles on SR 95 and SR 58 would result in a 0.5-1.0 percent increase in traffic counts; overall traffic counts would be well within historic traffic counts for those roads. Because of the dedicated turn lanes onto Novus Drive, no changes to turn lanes from the Oak Ridge Turnpike would be needed.

Parking. The offsite facility has an existing parking lot that would be expanded by approximately 0.5 acres to support the construction and operational workforce at the facility (CNS 2021a).

Radiological Waste Shipments. The U.S. Department of Transportation (USDOT) and Nuclear Regulatory Commission (NRC) have primary responsibility for Federal regulations governing the transport of commercial radioactive materials. DOE/NNSA, through its management directives, orders, and contractual agreements, ensures the protection of public health and safety by imposing on its transportation activities standards that meet those of USDOT and NRC. The primary regulatory approach to promote safety from radiological exposure is the specification of standards for the packaging of radioactive materials. Packaging represents the primary barrier between the

radioactive material being transported and radiation exposure to the public, workers, and the environment. Figure 3-23 depicts the packaging of a typical LLW or MLLW shipment. DOE/NNSA uses licensed commercial carriers for most LLW and MLLW shipments, with shipments conducted in compliance with applicable Federal and State regulations.



Source: DOE 2020c.

Figure 3-23. Example of Packaging for Typical Solid LLW or MLLW

Impacts associated with transporting LLW and MLLW from the Palladium Way facility to NNSS, Y-12, or a Y-12 approved commercial vendor would be similar to the current impacts of shipping these wastes from Y-12 (as previously analyzed in NNSA 2011). Regardless of whether the shipments originated directly from the Palladium Way facility or from Y-12, the impacts would be essentially the same. If the LLW and MLLW from the Palladium Way facility were first shipped to Y-12 (a distance of approximately 9.5 miles), the shipments would be made via Bear Creek Road (*see* Figure 3-24). Approximately 7 miles of the total 9.5 miles is restricted to authorized personnel and/or physically restricted from public use. Consequently, only approximately 2.5 miles of transport would occur on unrestricted public roads. A previous analysis of the impacts of transporting LLW and MLLW across public roads in the vicinity of Y-12 has confirmed that transportation impacts are negligible (*see* Tables 5.4.2-4 and 5.4.2-5 of NNSA 2011). As shown in those tables, the estimated health effects from a shipment of LLW is essentially zero for both incident-free and accident conditions.

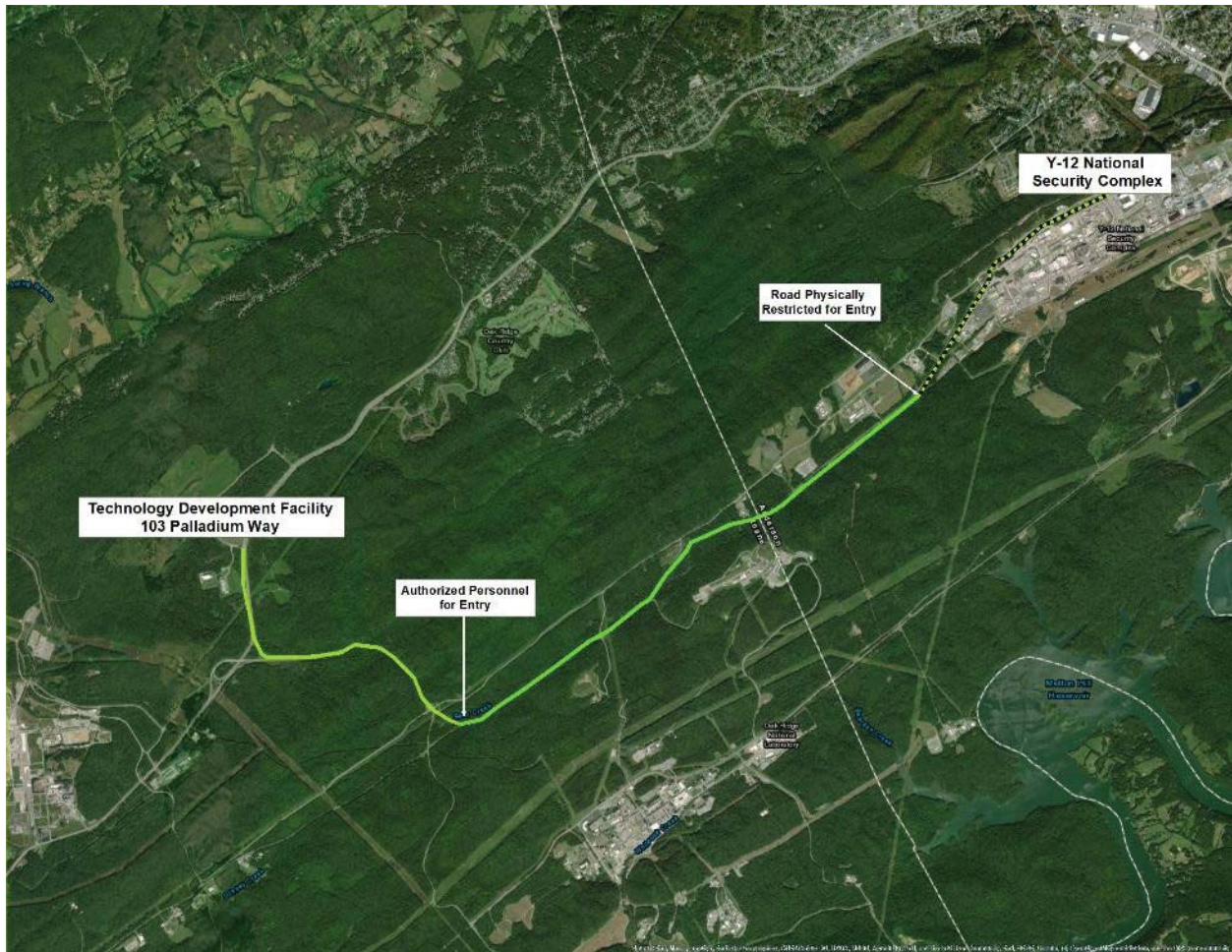


Figure 3-24. Transportation of LLW/MLLW from Proposed Facility to Y-12

3.13.2 No-Action Alternative Impacts

Under the No-Action Alternative, Y-12 Development operations would not be relocated, operations would continue at Y-12 in existing facilities and there would be no additional 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 Y-12 Development Offsite Facility. For the purposes of this EA, infrastructure is defined as communications, electricity, natural gas, water (potable), and wastewater.

The proposed site is an improved property with existing utilities. The following section outlines the availability and service sizes of existing utilities and anticipated infrastructure needs of the Y-

12 Development mission. Table 3-20 identifies the utility providers and type/size of infrastructure present at 103 Palladium Way. Figures 3-25 through 3-30 show the existing infrastructure onsite.

Table 3-20. Existing Site Utilities

Utility	Provider	Existing Service Size
Communications	AT&T	fiber optic
Electrical	City of Oak Ridge	5MW, 3-phase
Natural Gas	Oak Ridge Utility District (ORUD)	4" main to property 2" line to building
Potable Water	City of Oak Ridge	12" main line
Wastewater	City of Oak Ridge	8" sewer line to property 4" line to building

Communications. AT&T has underground fiber optic service to the Horizon Center and 103 Palladium Way. Broadband service would be available ranging from 10 megabits per second (mbps) to 100 gigabits per second (Gbps). A closed-circuit television system is also installed on the site.

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. The existing 3-phase service to the site offers 5MW of capacity, expandable to 7.5MW. A backup, natural-gas fueled generator is also installed on the site for emergency supply.

Natural Gas. The Oak Ridge Utility District (ORUD) provides natural gas service. There are 4- and 8-inch lines that serve the Horizon Center. There is a 4-inch line that runs to the property and a 2-inch line that serves the existing building. Natural gas supplies two boilers at the property providing heat and hot water.

Potable Water. 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 (MGD) and has the capacity to produce up to 28 MGD. A 16-inch ductile iron pipe water main runs along Oak Ridge Turnpike. A 12-inch main serves sites at the Horizon Center including the subject property.

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 within the Horizon Center. Additionally, there is 3,000 gallons of wastewater storage onsite. A 4-inch waste line runs from the building at 103 Palladium Way and connects to an 8" sewer line at Palladium Way.

Other. 103 Palladium Way includes a liquid nitrogen cryogenic system as well as industrial gas storage for nitrogen and argon inert gases, helium, and compressed air. The HVAC system features a 750-ton chiller with 375-ton dual independent compressors.



Figure 3-25. Cooling Towers



Figure 3-26. Outdoor Aboveground Storage Tanks



Figure 3-27. Emergency Generator



Figure 3-28. Heating equipment



Figure 3-29. Indoor Aboveground Storage Tanks



Figure 3-30. Electrical Room

3.14.2 Proposed Action Impacts

Construction and Operation. To service Y-12 Development at 103 Palladium Way, existing utility infrastructure would be utilized. The onsite utilities are oversized for ease of expansion, and the current infrastructure is prepped to support a duplicate 100,000 square foot facility on the expansion grounds. The existing infrastructure has adequate capacity to support their mission. Relocating Y-12 Development to 103 Palladium Way would have no impacts on existing infrastructure at the proposed site or the Horizon Center.

3.14.3 No-Action Alternative

Under the No-Action Alternative, Y-12 Development operations would not be relocated, operations would continue at Y-12 in existing facilities. There would be no impacts to infrastructure.

3.15 Impacts of Phasing-out Development Operations in Buildings 9202 and 9203

Once the offsite facility is operational, the relocated operations would be phased-out of Buildings 9202 and 9203. Operations in Buildings 9202 and 9203 that are not relocated to the offsite facility (see Sections 1.4 and 2.2) would be transferred to Building 9203A until eventual transfer to a long-term facility. Once all operations are transferred out of Buildings 9202 and 9203, operations in those buildings would cease. Together, Buildings 9202 and 9203 contain more than 150,000 square feet of floor space. Because those buildings are oversized and inefficient for today's Y-12 Development mission, utility reductions would be a primary benefit of ceasing the relocated operations. Reductions in electricity and natural gas usage would have a minor positive impact on operational air quality. For example, the operational air emissions shown in Table 3-4 would be more than offset by reductions in air emission associated with utility reductions/phase-outs in Buildings 9202 and 9203, which are more than twice as large as the offsite facility. Reductions in water usage, sanitary wastewater, and nonhazardous wastes would be less notable, as these parameters are largely a function of the number of operational workers, which would not be different than current operations, although they would occur at an offsite location.

Worker safety would be expected to improve as a result of operations in a more modern facility that was built to modern safety standards. Similarly, the probabilities of accidents could be reduced. In addition, because the MAQ of each hazardous material in the offsite facility would be below the threshold quantity, relocation of operations would ensure there would be no potential significant consequences off-site, onsite, or locally. Wastes generated would be the same regardless of whether operations are conducted in the existing buildings or the offsite facility. Transportation impacts would not change notably if operations are phased-out in the existing buildings.

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 activities associated with the Proposed Action would occur over approximately a three year period, from 2022 through 2024, with operations beginning thereafter. The Y-12 Development missions are expected to operate for at least 15 years in the offsite facility. Consequently, cumulative impacts associated with operations could occur until approximately the year 2040. The cumulative analysis in this EA focuses on actions and impacts that could occur during construction and initial operations, as forecasts beyond that time period become more speculative and less meaningful. Past operations, and continued operations of existing facilities within the general area, as well as other facilities on ORNL, ETTP, and the Horizon Center Industrial Park, are included in the affected environment section and thus, are already considered in this EA. Consequently, this cumulative analysis focuses on identifying reasonably foreseeable actions.

In preparing this EA, NNSA identified three actions that would be located in close proximity to the Proposed Action: (1) construction and operation of the Oak Ridge Enhanced Technology and Training Center (ORETTC) (an emergency response training facility) on the ORR, approximately one mile northeast of the Proposed Action; (2) construction and operations of a General Aviation Airport at ETTP, approximately two miles southwest of the Proposed Action; and (3) a proposal to increase the allowable land uses in the Horizon Center (Parcel ED-1) to include hotels, a recreational vehicle park, a motorsports park, a vehicle test facility, residential development, and an amphitheater.⁸ Construction of the ORETTC is expected to begin in early 2021 and be completed by approximately mid-2022. Construction of the General Aviation Airport at ETTP could occur in approximately 2021-2022. The proposal to increase the allowable land uses in the Horizon Center (Parcel ED-1) does not specify a timeframe when development activities could occur.

NNSA also considered other actions that are occurring at Y-12 (such as the continued construction and operation of the UPF, construction and operation of the LPF, and construction and operation of the Emergency Operations Center) but concluded that those projects are unlikely to contribute to cumulative impacts because they are located approximately 10 miles away from the Proposed Action. Consequently, those projects were eliminated from detailed analysis.

⁸ The offsite facility that is the subject of this EA is located within ED-1 in a parcel known as Developable Area 3.

4.2 Potential Cumulative Impacts

Table 4-1 presents the cumulative impact analysis of the construction and operation of the Proposed Action, construction and operations of the ORETTTC, construction and operation of a General Aviation Airport at ETPP, and the increase in the allowable land uses in the Horizon Center (Parcel ED-1).

Table 4-1. Potential Cumulative Impacts by Activity

Resource Area	Proposed Action	ORETTC	General Aviation Airport	Increased Uses in Parcel ED-1
Land Resources	The existing parking lot would be expanded by 0.5 acres and a secure material storage building and maintenance trailer would be added alongside the facility. However, no additional undisturbed land would be disturbed. Use of the offsite facility for Y-12 Development operations would be consistent with current land use designations and historic uses of ORR land.	Approximately 24.1 acres could be disturbed during construction, which is less than one percent of land at ORR. In addition, approximately 3.5 acres of forest would be thinned to reduce wildland fire fuel sources. Up to 24 acres would be transferred to the Roane County Industrial Development Board for construction of the Emergency Response Training Facility.	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.	Potential development of an additional 58 acres. Potential land use impacts would remain within the scope of those analyzed under previous NEPA documentation. Allowing mixed use on Parcel ED-1 and/or improving connectivity between Development Areas 5, 6, and 7 would not result in adverse land use-related impacts. Parcel ED-1 is already zoned for industrial use. Allowing a mixed-use zoning would not result in adverse impacts to surrounding land uses and may prove beneficial from a potential reduction in industrial use over less intrusive types of land uses.
Visual Resources	Relocating Y-12 Development operations would not change the physical appearance of the existing facility or site. Viewsheds in the immediate area are generally constrained by topography and vegetation.	No appreciable visual resource impacts are expected, as the ORETTC proposed 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.	Parcel ED-1 is already planned for industrial/business park development; consequently, there would be no unexpected impacts to the visual character of the land.
Air Quality	Minor, short-term effects would be due to generating pollutants during construction. The area is in attainment for all NAAQS and emissions from construction and operation would be below <i>de minimis</i> thresholds.	Minor, short-term effects would be due to generating airborne dust and other pollutants during construction. The area is in attainment for all NAAQS and emissions from Proposed Action would be below <i>de minimis</i> 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.	Potential impacts from vehicle emissions associated with employees of businesses and visitors to the area would be intermittent and would not be associated with quantities that would result in non-attainment of NAAQS.

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Resource Area	Proposed Action	ORETTC	General Aviation Airport	Increased Uses in Parcel ED-1
Noise	<p>There are no sensitive noise receptors in the vicinity of the proposed site and there would be no notable noise sources associated with the Proposed Action construction and operation.</p>	<p>There are no sensitive noise receptors in the vicinity of the proposed site and there would be no notable noise sources associated with ORETTC construction and operation.</p>	<p>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.</p>	<p>The largest potential noise contributor would be the proposed motorsports park. However, noise levels are not expected to conflict with surrounding land uses. Average background noise levels at nearby residential areas would be between 45 and 50 dBA. While noise from racing events may be noticeable for nearby residential areas, the noise would not be expected to interfere with daily activities. The motorsports park would be at least 0.75 miles from the Y-12 Development facility.</p>
Water Resources	<p>No impacts to groundwater are anticipated from construction activities or normal facility operations. With appropriate stormwater management, implementation of spill prevention and response plans, and compliance with NPDES permit requirements (if required) including the SWPPP, adverse impacts to surface water bodies would not be expected during construction and operations. The site is outside of the 100-year floodplain; however, a portion of the access driveway near the northern boundary of the site appears to overlap with the 500-year floodplain. Wetlands are present in vicinity of the site footprint, associated with stream riparian areas (DOE 2020b). Under the current site design, the wetlands do not overlap with the site.</p>	<p>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 0.70 acres. Approximately 0.05 acres of wetlands could be impacted.</p>	<p>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.</p>	<p>Impacts associated with development activities (e.g., ground disturbance) would be within the scope of those identified in previous NEPA documentation. Surface water resources on and near Development Areas 5, 6, and 7 could be affected by the alteration of local hydrology, soil erosion, runoff, and sedimentation during construction activities, and contaminated stormwater runoff from operations. Prior to construction, an Erosion and Stormwater Management Plan (per guidance from the City of Oak Ridge's Zoning Ordinance) for the proposed action would be required.</p>

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Resource Area	Proposed Action	ORETTC	General Aviation Airport	Increased Uses in Parcel ED-1
<p>Geology and Soils</p>	<p>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.</p>	<p>Construction activities would cause some minor impacts to the existing geologic and soil conditions however, no viable geologic or soil resources would be lost as a result of construction activities. Excavated soils would be used to improve storm water drainage on site.</p>	<p>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.</p>	<p>Potential impacts associated with development activities (e.g., ground disturbance, erosion, etc.) are within the scope of analysis conducted in previous NEPA documentation, and would not be significant.</p>
<p>Biological Resources</p>	<p>The Proposed Action would have minimal effects on biological resources. There would be no loss of habitat or wildlife disturbance. Eight federally listed species were identified with potential to occur in the vicinity of the proposed project site, however none are known to occur.</p>	<p>Construction of ORETTC would have minor short- and long-term 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.</p>	<p>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.</p>	<p>Impacts to terrestrial ecosystems would include: (1) temporary and permanent disturbance, degradation, and/or loss of habitat from land-clearing activities; (2) habitat fragmentation; (3) disturbance or displacement of wildlife due to an increase in noise and human activity associated with construction; (4) potential collisions between wildlife and motor vehicles during construction; and (5) increased noise impacts from the proposed Motorsports Park/Vehicle Test Facility. Because no USFWS federally listed species or designated critical habitats occur within the proposed action area, no impacts to federally listed species would result from implementation of the proposed action.</p>

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Resource Area	Proposed Action	ORETTC	General Aviation Airport	Increased Uses in Parcel ED-1
Cultural Resources	There are no archaeological sites or historic resources that would be affected. Any construction activities (internal modifications to the facility, expansion of the existing parking lot, and addition of a secure material storage building and maintenance trailer alongside the facility) would occur in previously disturbed areas.	Construction-related activities and ground disturbance would be small and no cemeteries or known prehistoric sites would be affected. No historic properties 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.	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.	There are no archaeological sites or historic resources that would be affected by development activities.
Socioeconomics	Because the peak construction workforce (50 persons) and operational/training workforce (70-100 persons) would be negligible compared to the projected population in the ROI, socioeconomic impacts, although beneficial, are expected to be negligible.	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.	Potential impacts associated with proposed development activities and operations are within the scope of analysis conducted in previous NEPA documentation. Socioeconomic impacts identified under previous NEPA documentation were beneficial and associated with job creation associated with development, as well as spending and job creation associated with new businesses entering the park.
Environmental Justice	No environmental justice populations were identified within the census tracts where the Proposed Action would be located. During construction and operation, no disproportionately high and adverse environmental or economic effects on minority or low-income populations are expected.	No environmental justice populations were identified within the census tracts where ORETTTC 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	As discussed in the 1996 and 2003 NEPA documents, there would be no environmental justice impacts associated with industrial development and use of Parcel ED-1; this would hold true as well for a mixed-use land use.

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Resource Area	Proposed Action	ORETTC	General Aviation Airport	Increased Uses in Parcel ED-1
Human Health	No offsite impacts are expected. During construction and operation, 1 day of lost work from illness/injury and less than one fatality would be expected. There would be no change to radiological or hazardous chemical human health impacts to workers compared to existing operations at Y-12.	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.	Patrons participating in inherently risky activities such as operating vehicles at high speed on a racetrack would be expected to be notified of the risks by the operator and would be expected to participate at their own risk via waiver or other such participatory agreement. No otherwise unique health and/or safety risks would be anticipated.
Facility Accidents	Because the quantities of hazardous materials in the offsite facility would be less than threshold quantities of concern, postulated accidents would not result in high consequences, meaning no member of the public or workers would be exposed to hazards that could result in irreversible or other serious health effects	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.	Patrons participating in inherently risky activities such as operating vehicles at high speed on a racetrack would be expected to be notified of the risks by the operator and would be expected to participate at their own risk via waiver or other such participatory agreement. No otherwise unique health and/or safety risks would be anticipated. The motorsports park would be at least 0.75 miles from the Y-12 Development facility and would not impact operations.
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.	Because Parcel ED-1 is essentially public property and has no DOE-related facilities, the risk of terrorist acts is minimal. 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.

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Resource Area	Proposed Action	ORETTC	General Aviation Airport	Increased Uses in Parcel ED-1
Waste Management	Radiological (LLW and MLLW) would be generated and disposed of at NNSS or an approved commercial vendor similar to existing Y-12 Development operations. Hazardous and nonhazardous wastes would be the same as existing operations at Y-12 (9 miles away).	Solid non-hazardous waste would be recycled or transported to an appropriate ORR landfill for disposal. Less than 100 pounds of hazardous waste associated with cleaning supplies and spent training materials would be generated annually, which is less than 0.01 percent of the hazardous waste generate at ORR.	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.	Hazardous material such as petroleum, oils, and lubricants (POLs) would be utilized during both development activities and facility operations. Wastes associated with industrial and mixed-use activities would generally be associated with disposal of POLs (which are not generally considered hazardous wastes in Tennessee), paint-related wastes, and municipal solid wastes. Overall, potential impacts associated with development activities and operations are within the scope of analysis conducted in previous NEPA documentation.
Transportation	Temporary increases in traffic associated with construction and operational activities would not be notably different when compared to existing activities in the ROI. Radiological transportation impacts would remain essentially unchanged compared to existing impacts.	Temporary increases in traffic associated with construction activities would not be notably different when compared to existing activities in the ROI.	The existing Haul Road and Blair Road would be impacted, but route options could improve existing conditions on the affected roadways.	Impacts and associated mitigations/management requirements would be similar to those analyzed previously, with potential benefits associated with minimization of large trucks associated with industrial activities entering/leaving the area. It is also likely that there would be improved traffic management with implementation of traffic control mechanisms such as traffic lights and turn lanes.
Infrastructure	Construction of the Proposed Action would have minimal impacts on infrastructure capacity. The capacity of the existing infrastructure in the region would be adequate to support the relocation of Y-12 Development operations.	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.	Since 1996, there have been significant improvements in Parcel ED-1 infrastructure, as described in the 2013 Mitigation Action Plan. Continued development and utilization of infrastructure at Parcel ED-1 under the proposed action and Alternative 1 would be similar in scope to that analyzed in previous NEPA documentation. Design and construction of stormwater systems would be conducted in accordance with state and local requirements for proper management of stormwater.

Source: NNSA 2020d, DOE 2016, DOE 2020b.

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