DOE/EA-2310

ENVIRONMENTAL ASSESSMENT FOR THE EAST END CAMPUS AT THE Y-12 NATIONAL SECURITY COMPLEX, OAK RIDGE, TENNESSEE

National Nuclear Security Administration

Final
June 2026

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 performance of the U.S. nuclear weapons stockpile, and supports other DOE/NNSA missions. One of NNSA's critical production sites is the Y-12 National Security Complex (Y-12) in Oak Ridge, Tennessee. Y-12 is the only facility in the nuclear security enterprise that produces nuclear weapons secondary stage and radiation cases, which are key components for nuclear weapons. Currently, NNSA retains limited legacy radiation case production capabilities at Y-12 in old and inefficient facilities, many of which require significant upgrades or replacement.

NNSA has prepared this environmental assessment (EA) to analyze the potential environmental effects associated with its Proposed Action to construct and operate the East End Campus, which would provide a robust radiation case manufacturing capability to meet national security stockpile requirements, as well as support other Y-12 missions. This EA was prepared in accordance with the *National Environmental Policy Act* (NEPA) of 1969, as amended (42 U.S.C. 4331, et seq.) and the DOE NEPA Implementing Procedures (DOE 2026a). Based on the analysis in Chapter 3 of this EA, the environmental impacts associated with construction and operation of the East End Campus would be as described below.

Land disturbance would be limited to approximately 40 acres of previously disturbed land at Y-12. Visually, Y-12 would remain a highly developed area with an industrial appearance. Water use for the East End Campus construction and operation would represent less than one percent of water use at Y-12. Stormwater and effluents would be managed under existing permits, as required. Short-term air quality impacts associated with construction would occur, but emissions would be below *de minimis* thresholds. There would not be a change in radiological releases compared to the No-Action Alternative. Because the peak construction workforce (300 persons) would be negligible compared to the population in the region of influence (ROI), socioeconomic impacts during construction, although beneficial, are expected to be negligible. The operational workforce (450 persons) for the East End Campus would be comprised of the same workers who currently conduct these operations at Y-12.

With regard to utility requirements, the existing infrastructure at Y-12 would be adequate to support the East End Campus. The East End Campus would not increase waste generation compared to the No-Action Alternative. Workers would be subject to minimal occupational risks, and there would be no change in the dose to radiation workers compared to the No-Action Alternative. The hazard categories for individual facilities will be below HC-3, determined in accordance with DOE-STD-1027-2018, and will involve facility segmentation arguments as needed. Final hazard determination for at least one facility is expected to include threshold quantity modifications with appropriate technical justification as permitted by DOE-STD-1027-2018. Postulated accidents would not result in high consequences, and no member of the public would be exposed to radiological doses or chemical concentrations that could result in irreversible or other serious health effects.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION AND PURPOSE AND NEED FOR AGENCY ACTION

1.1 Introduction

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 performance of the U.S. nuclear weapons stockpile, and support other DOE/NNSA missions. One of NNSA's critical production sites is the Y-12 National Security Complex (Y-12) in Oak Ridge, Tennessee. Y-12 plays an important role in U.S. national security and is the only facility in the nuclear security enterprise which produces nuclear weapons secondary stage and radiation cases.

NNSA has prepared this environmental assessment (EA) to analyze the potential environmental impacts associated with its Proposed Action to construct and operate the East End Campus. This EA was prepared in accordance with the *National Environmental Policy Act* (NEPA) of 1969, as amended (42 U.S.C. 4331, et seq.) and the DOE NEPA Implementing Procedures issued on February 2, 2026 (DOE 2026a). The DOE NEPA Implementing Procedures are available on DOE's website at https://www.energy.gov/sites/default/files/2026-01/DOE-NEPA-Implementing-Procedures-2026-02-02.pdf.

Depending on the results of this EA, NNSA could: (1) determine that the potential environmental effects of the Proposed Action would be significant to human health and/or 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.

1.2 Purpose and Need for Agency Action

The primary mission supported by Y-12 is ensuring the U.S. stockpile of nuclear weapons remains safe and reliable. Radiation cases are key components for nuclear weapons. Currently, NNSA retains limited legacy radiation case production capabilities at Y-12. Many of these facilities are more than 50-70 years old and would require significant upgrades or replacement. Recent weapon life extension programs have reused radiation cases from existing weapons, and new radiation cases have not been produced for several decades. Future modernization programs, however, will require new production of radiation cases. NNSA is proposing to construct and operate the East End Campus to provide a robust radiation case manufacturing capability to meet national security stockpile requirements for the foreseeable future. In addition, the East End Campus would include facilities to support other Y-12 missions, including the Uranium Production and Weaponization Testbed (UPWT), which would support the global security mission, and the Lithium and Special Material Laboratory, which would support lithium operations (see Chapter 2 for a complete description of the Proposed Action).

1.3 Relationship to Other NEPA Documents

In November 2024, NNSA prepared the Offsite Depleted Uranium Manufacturing EA (DOE/EA-2252, NNSA 2024a) and issued a FONSI (NNSA 2024b) to manufacture DU in existing

commercial facilities in Oak Ridge, Tennessee and Jonesborough, Tennessee. The Offsite Depleted Uranium Manufacturing EA addressed the need to supplement DU production at Y-12 until the East End Campus is operational. Once the East End Campus is operational, some DU production capabilities could be maintained offsite as Y-12 transitions into modern production operations.

1.4 Scope of this Environmental Assessment

NNSA issued a determination to prepare this EA in February 2026 (NNSA 2026a). This EA analyzes the potential environmental effects of NNSA's Proposed Action to construct and operate the East End Campus at Y-12 (see Chapter 2 for a complete description of the Proposed Action). The processes that the East End Campus would replace are not the only activities occurring in the current facilities that house them; therefore, any future uses or disposition (i.e., decontamination, decommissioning, and demolition [DD&D]) of these existing facilities has not been determined, and that issue is not within the scope of this EA. In addition, within the proposed footprint of the East End Campus, the management of legacy materials and hazardous substances may be required and would be conducted under the *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA) regulations. In accordance with the DOE NEPA Implementing Procedures (DOE 2026a), analysis of CERCLA activities is not in the scope of this EA. The scope and level of detail of this EA is consistent with the narrow purpose of an environmental assessment, i.e., to determine whether any reasonably foreseeable effects of the proposal are likely to be significant and set forth the basis of NNSA's FONSI or determination that an EIS is required. In preparing this EA, NNSA focused the analysis on whether the environmental effects of the Proposed Action are significant.

This EA is organized as follows:

- An introduction and discussion of 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 effects of the Proposed Action and the No-Action Alternative (Chapter 3);
- An analysis of the potential environmental effects that could result from the Proposed Action and the No-Action Alternative (Chapter 3); and
- A listing of the references cited in this EA (Chapter 4).

In accordance with NEPA and the DOE NEPA Implementing Procedures (DOE 2026a), the responsible official at NNSA has certified that the text of this EA does not exceed 75 pages, not including citations or appendices; that NNSA has considered the factors mandated by NEPA; that this EA represents NNSA's good-faith effort to prioritize documentation of the most important considerations required by the statute within the Congressionally mandated page limits; that this prioritization reflects NNSA's expert judgment; and that any considerations addressed briefly or left unaddressed were, in NNSA's judgment, comparatively not of a substantive nature that meaningfully informed the consideration of environmental effects and the resulting decision. The responsible official at NNSA has also certified that this EA has been completed within one year of the determination to prepare this EA (NNSA 2026a).

1.5 Review and Copy of this Environmental Assessment

Public and state review of an EA is not required. NNSA requires that each EA and the resulting FONSI be made available to the public. Copies of this Final EA and FONSI have been posted on the DOE NEPA web page (https://www.energy.gov/nepa/doe-environmental-assessments).

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action: Construct and Operate the East End Campus at Y-12

The East End Campus is proposed to be located on approximately 40 acres of previously disturbed land on the east side of the Y-12 (see Figure 2-1). The Proposed Action includes constructing multiple buildings and structures in a phased approach over time (with details on each of those buildings below) and includes related security and utilities upgrades (to include adding fencing to permit construction activities and upgrading physical security measures). The phased construction is expected to last approximately 10 years. During the construction, NNSA is considering leasing or otherwise transferring the property in pieces and parcels to the non-federal developer in order to reduce construction costs. After construction is completed, the property is assumed to be transferred back to NNSA for operations. Because there would be no environmental impacts associated with leases or property transfers, that issue is not addressed in this EA.

For the purposes of this EA, all facilities described in the section below and proposed to be constructed within the 40-acre boundary are included within the East End Campus. The East End Campus would include:

- **Binary Demonstration Facility (BDF)** – First building (pilot) that provides manufacturing capability that can meet production capacity; potentially includes direct casting vacuum induction melting and ancillary support equipment;
- **Radiation Case Analytical Chemistry Laboratory** – Capability and capacity for characterization of all DU and other associated material streams;
- **Lithium and Special Material Laboratory** – Capability and capacity for characterization of lithium and special material streams;
- **Alloying –** Potentially vacuum arc remelts and/or electron-beam cold hearth melter for alloying and/or recycle;
- **Modern Wrought -** Rolling, forging, pressing, hydroforming, and ancillary support equipment;
- **Machining –** Relocate DU and other associated material machining with required capability and capacity;
- **Inspection** – Provide co-located inspection capability;
- **DU Support Building(s) –** Provide the required office space, change house, boundary control stations, restrooms, and canteen for production and support staff;
- **Uranium Chip Disposition –** Stabilize small pieces of DU or other associated materials generated during machining either through oxidation or other methods, permitting recycle back into the feedstock supply;
- **Storage–** Storage of DU and other material feedstock, components, and related tooling;
- **Uranium Production and Weaponization Testbed (UPWT) –** Critical capability for global security missions to develop competencies in uranium processing and metal production (CNS 2026a).

The East End Campus would also include support facilities and infrastructure, such as temporary construction trailers, laydown areas that would later be converted into two large parking lots; a cafeteria; an administrative office building; a change house; and utilities that would tie into

existing Y-12 water, sewer, electrical, and security systems. Argon and other gases could be provided via tanks adjacent to the building ("point of service" utilities) (CNS 2026a).

Figure 2-2 shows a notional layout of the facilities that would comprise the East End Campus. Approximately 485,000 square feet of new facilities would be constructed. Construction of new facilities would require site preparation, development of a laydown yard for construction materials, and then accomplishing the construction itself. Related activities would include physical security improvements (such as upgrading fencing) and mission-enabling infrastructure improvements (to include improving roads in the immediate vicinity of the activity, tying into existing utilities [e.g., sewer, water, electrical, security, and argon] and construction of two parking lots) (CNS 2026a).

Construction of new facilities would occur on previously disturbed land comprising about 40 acres on the eastern end of the Y-12 campus, the majority of which currently consists of slabs from previously demolished warehouses. Construction of the campus would also require demolition or repurposing of some existing buildings (required in order to support construction of later phases of the East End Campus). All East End Campus facilities would be constructed outside the 100-year and 500-year floodplains. However, fill dirt may be required to construct buildings above the current grade, which would provide increased margin from the floodplains along the southern edge of the campus area. NNSA has estimated that up to 32,000 cubic yards of fill material could be used over the 10-year construction period, which equates to an average of approximately 2 dump trucks of fill weekly (CNS 2026a). Fill material would likely be obtained from existing borrow areas on the west end of Y-12. These borrow areas have been used to support the Uranium Processing Facility (UPF) construction. Construction parameters for the proposed East End Campus are provided in Table 2-1.

Table 2-1. Construction Parameters for the East End Campus

Requirements	Consumption/Use
Total land disturbed for East End Campus (acres)	40[a]
Water requirement for construction (average gallons/year)	1,800,000[b]
Peak construction employment (workers)	300
Construction period (years)	10

a. Includes temporary construction laydown areas that would likely be sited in areas that would eventually become parking lots for the East End Campus. Parking lots would total approximately 8 acres.

b. Includes dust suppression of 3,000 gallons/day for each of the 240 construction days/year. Over the 10-year construction period, up to 18,000,000 gallons of water could be used.

Source: CNS 2026a.

Initial operations would be expected to begin in approximately 2029, with phased construction occurring through approximately 2036. Full operations would occur following completion of construction. The operational workforce at the East End Campus is estimated to be 450 persons (CNS 2026a).

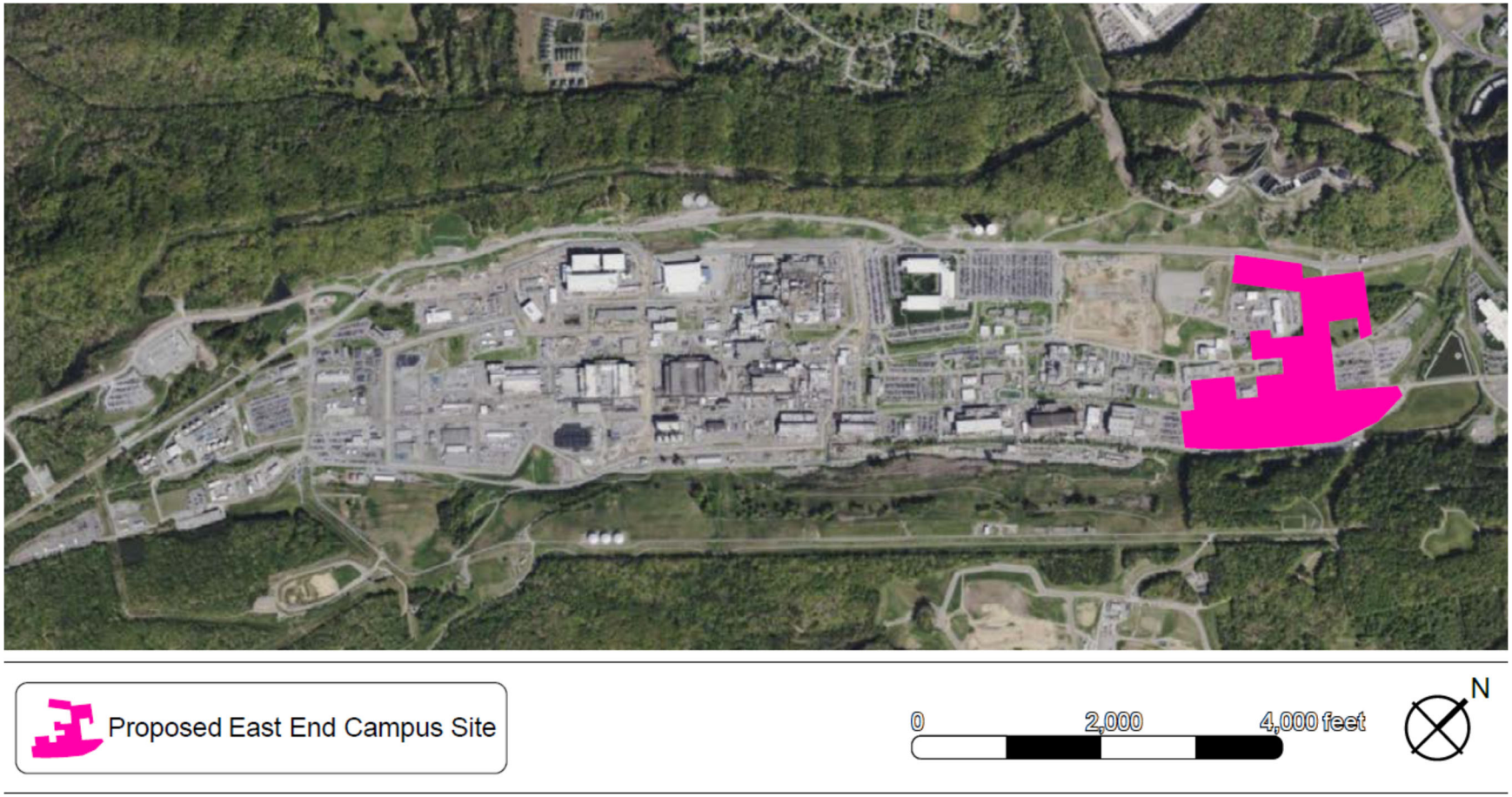
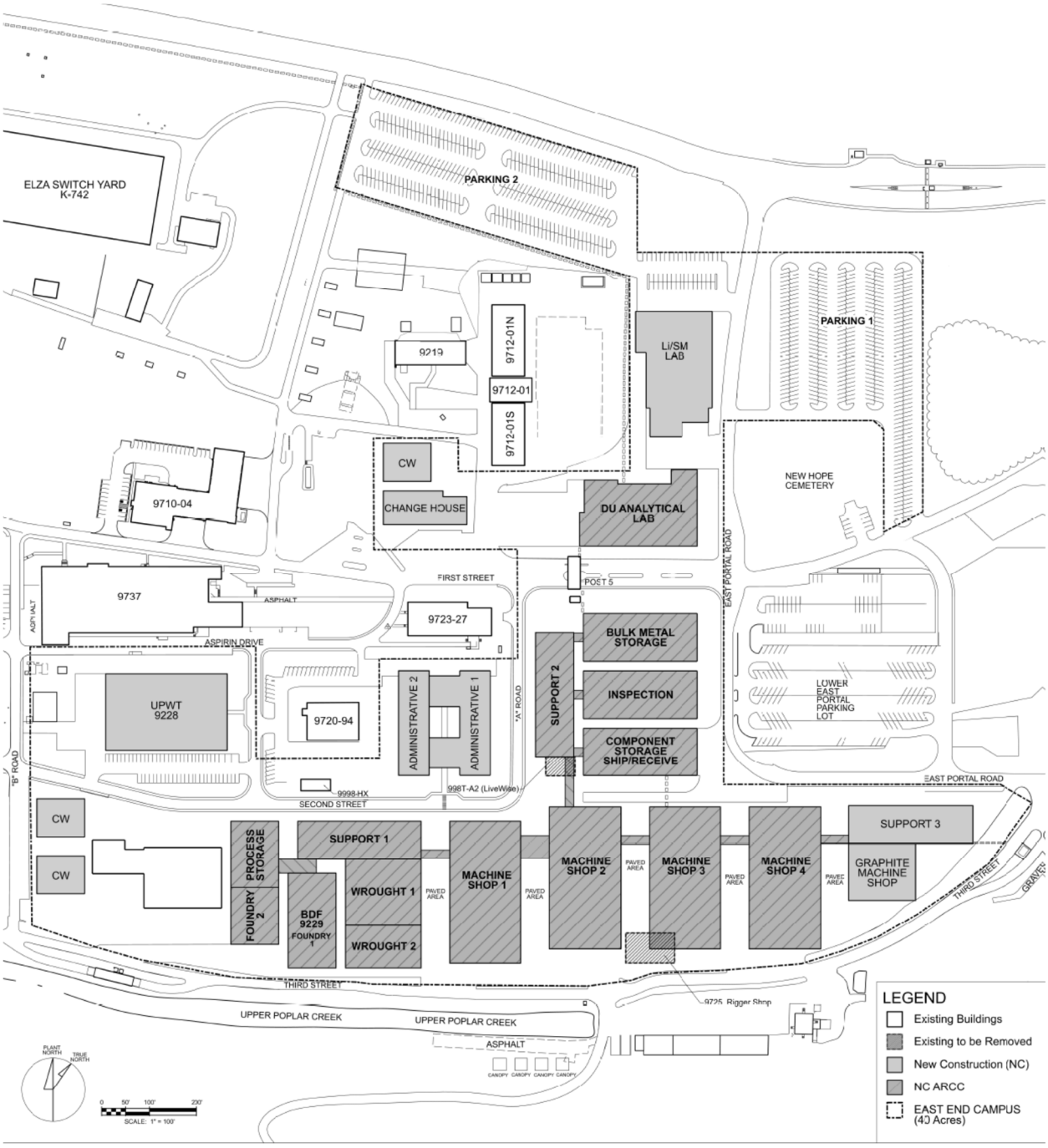


Figure 2-1. Proposed Location of East End Campus at Y-12



Source: CNS 2026a.

Figure 2-2. Notional Layout of Facilities Associated with the East End Campus

Once operational, the majority of the work would involve the use of insoluble bulk DU metal, which is not toxic. Uranium oxides may be created as a product of machining, and the UPWT would use soluble forms of uranium, in limited quantities, which are toxic. Each of the facilities associated with the East End Campus would contain less than HC-3 Thresholds of nuclear materials in accordance with DOE-STD-1027-2018. The process operations would not involve fissile material, and no Criticality Safety Requirements or Criticality Safety Approval documents would be

required.[1] The proposed East End Campus would have an expected operational lifetime of approximately 50 years (CNS 2026a).

DU would be shipped to the East End Campus for storage prior to use. Approximately 200 to 300 metric tons (MT) of DU would be shipped to Y-12 annually from offsite sources, mainly from BWXT-Ordnance Tennessee in Jonesborough, Tennessee. The operations at Y-12 would require transporting components to and from Pantex, where weapons assembly and disassembly operations occur. All transportation of secondary stages and cases is assumed to occur via the NNSA transportation fleet of Safeguards Transporters (SGTs) over Federal and state highways to the extent practicable (CNS 2026a). Table 2-2 displays the operational requirements associated with the East End Campus.

Table 2-2. Operational Requirements for the East End Campus

Requirements	Consumption/Use
Operational Workers (number of workers)	450; No change in operational workers compared to No-Action Alternative
Annual Electricity Use (MWh/year)[a]	15,000
Potable Water Use (gallons/year)[b]	4,300,000
Natural Gas Use (cubic feet/year)[c]	11,640,000
Wastewater Generation (gallons/year)[d]	3,800,000
Radiological Releases (Curies/year)[e]	0.0717 Curies of uranium; No change in radiological releases compared to No-Action Alternative
Number of radiation workers who receive measurable dose	450; No change in number of radiation workers who receive measurable dose compared to No-Action Alternative
Average dose to radiation worker	32 millirem/year; No change in average worker dose compared to No-Action Alternative
Waste Generation	
Low-level radioactive waste (LLW) (yd^3/yr)	61; No change in LLW compared to No-Action Alternative
Hazardous waste (metric tons/yr)	0.23; No change in hazardous waste compared to No-Action Alternative
Nonhazardous waste (tons/yr)[f]	175; No change in nonhazardous waste compared to No-Action Alternative

a. Based on approximately 30 kWh/square foot/year for an industrial facility.
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 East End Campus would total approximately 485,000 square feet.
d. Based on wastewater generation of 35 gallons/person/day.
e. The 0.0717 Curies of uranium released to the atmosphere at Y-12 is based on all site-wide operations. Release data for individual facility operations is not available. DU operations would account for a fraction of the 0.0717 Curies of uranium released.
f. Based on 3 pounds of nonhazardous waste/person/day. Process wastes estimated at 12 tons/year.

Source: CNS 2026a.

[1] Although not required, NNSA could use administrative criticality controls for buildings that only hold DU.

2.2 No-Action Alternative

Under the No-Action Alternative, the East End Campus would not be constructed and current radiation case fabricating and manufacturing capabilities at Y-12 would continue. There would be no change in any operational parameters associated with existing operations. For UPWT, the mission critical nonproliferation testbed would not be constructed and the existing mission gap would remain.

2.3 Alternatives Considered but Eliminated from Detailed Analysis

In developing the Proposed Action in this EA, NNSA initially considered three potential sites on Y-12 for the East End Campus: (1) West End Site; (2) South Ridge Site; and (3) East End Site. To determine which site would be best for the East End Campus, NNSA developed a set of criteria (such as likelihood of meeting schedule requirements, operational efficiencies, and potential conflicts with existing operations, and others) to evaluate the three potential sites. The East End site, which is the site evaluated in this EA, scored the highest of the three site alternatives; consequently, the West End Site and South Ridge Site were eliminated from detailed analysis in this EA (CNS 2025a).

3.0 ENVIRONMENTAL ANALYSIS

3.1 Introduction

As discussed in Chapter 1, NNSA has prepared this EA to analyze the potential environmental effects associated with its Proposed Action to construct and operate the East End Campus. Sections 3.2 through 3.15 present the affected environment and potential environmental consequences or effects that could result from the Proposed Action and the No-Action Alternative. The affected environment, which is the result of past and present activities at Y-12, provides the baseline from which to compare effects from the Proposed Action and the No-Action Alternative.

The purpose of this EA is to enable NNSA to determine if the potential environmental effects 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 effects than others. For this reason, a "sliding-scale" approach is utilized, such that those actions with greater potential effect can be discussed in greater detail in NEPA documents than those that have little potential for effect. Preparation of this EA was guided by that sliding-scale approach.

This EA evaluates the environmental effects 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 effect would be expected to occur. The level of detail in the description of each resource varies with the likelihood of a potential effect 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 Y-12 site 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 Y-12 site and adjacent areas.
- **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 Y-12 site and adjacent areas.
- **Water resources:** surface-water and groundwater features, water quality, and water use. The ROI for water resources is the Y-12 site and adjacent surface water bodies and groundwater.
- **Air quality and noise:** the quality of the air and greenhouse gas emissions; baseline noise environment. The ROI for air quality and noise is Anderson County, where air quality or noise effects 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 Y-12 site and adjacent areas.
- **Cultural and paleontological resources:** historic, archaeological, and paleontological resources of the area and the importance of those resources. The ROI for cultural resources is the Y-12 site and adjacent areas.
- **Socioeconomics:** the labor market, population, housing, some public services, and personal income. The socioeconomics ROI is a four-county area in Tennessee comprised of

Anderson, Knox, Loudon, and Roane counties where a majority of the Y-12 workforce resides.

- **Traffic and radiological transportation:** the existing transportation network (i.e., roads) in the areas of Y-12 to facilitate analysis of traffic effects locally; and the transportation network (i.e., roads) to facilitate the analysis of transporting feedstock, products, and wastes between DOE sites and off-site waste management facilities.
- **Infrastructure:** utilities, energy, and site services, including capacities and demands at Y-12.
- **Waste management:** solid waste generation and management practices. The ROI for waste management is the Y-12 site and off-site locations where waste generation, recycling, and waste management activities could occur.
- **Human health, accidents, and intentional destructive acts:** the existing public and occupational safety conditions and baseline conditions to support analysis of effects to health and potential accident scenarios. The human health and safety analysis focuses on effects to workers and off-site members of the public.

3.2 Land Use

3.2.1 Affected Environment

This section summarizes existing onsite and surrounding land uses at Y-12. Y-12 lies within Oak Ridge's city limits but operates autonomously. City or county organizations have no planning authority at the site because Y-12 is a federal facility owned by DOE/NNSA.[2] Figure 3.2-1 shows the location of Y-12 within the Oak Ridge Reservation (ORR).[3]

Y-12 spans 811 acres in the Bear Creek Valley, 2.5 miles in length between its east and west boundaries down the valley and 1.5 miles in width across the valley. Housed within Y-12 borders are manufacturing, production, laboratory, support, and research and development areas. While modernization/transformation activities have reduced the footprint of operating facilities, Y-12 remains a highly developed area. Nearly 600 of the 800 acres at Y-12 are enclosed by perimeter fences. The eastern portion of Y-12 is occupied by Lake Reality and the former New Hope Pond (now closed), maintenance facilities, office space, training facilities, change houses, and former facilities. The far western portion of Y-12 consists primarily of waste management facilities and construction contractor support areas. The central and west-central portions of Y-12 encompass the high-security portion, which supports core NNSA missions. Real property at Y-12 includes approximately 390 facilities, totaling approximately 7.3 million gross square feet.

Lands bordering Y-12 are mostly rural and are used primarily for residences, small farms, forest land, and pastureland. The City of Oak Ridge has a typical urban mix of residential, public, commercial, and industrial land uses; it also includes almost all of the ORR (NNSA 2011).

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

[3] The other installations located on the ORR are the Oak Ridge National Laboratory (ORNL) and the East Tennessee Technology Park (ETTP) (formerly the Oak Ridge K-25 Site).

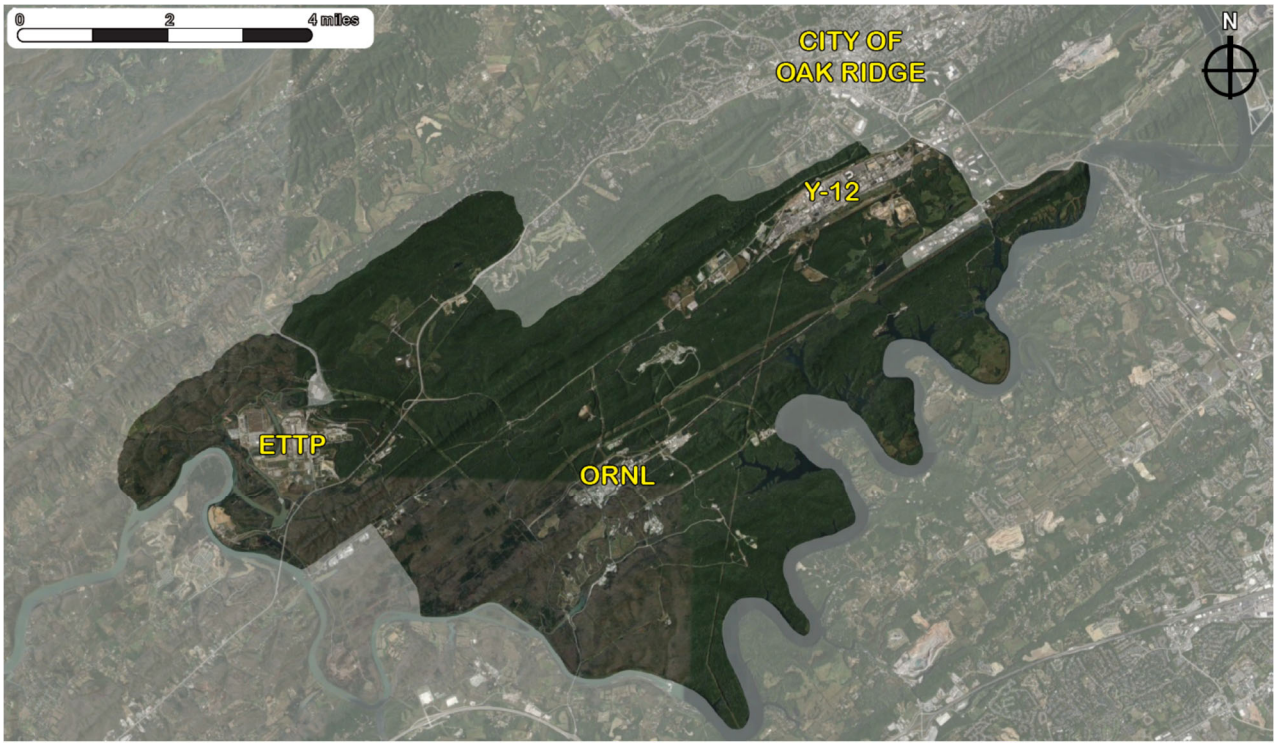


Figure 3.2-1. Aerial View of Y-12 on the Oak Ridge Reservation

3.2.2 Proposed Action Effects

Construction. Construction of the East End Campus would occur on approximately 40 acres at the eastern end of Y-12 (see Figure 2-1) that have been previously disturbed and are currently characterized by concrete slabs remaining from DD&D.[4] Because the area is already developed and located within an established industrial portion of Y-12, construction would not result in conversion of undeveloped land or alter land use designations within Y-12. Temporary land use impacts would include site preparation activities, establishment of construction laydown areas, staging of equipment and materials, and demolition or repurposing of select existing facilities required to enable later phases of the East End Campus development. These activities would be consistent with ongoing modernization and consolidation efforts at Y-12 and would not result in conflicts with adjacent land uses.

Short-term construction related land use impacts would also include localized changes associated with physical security upgrades, road improvements, utility tie-ins, and construction of parking and support infrastructure. While these activities may temporarily limit access to portions of the project area or require temporary reconfiguration of internal circulation patterns, such effects would be confined to the East End Campus construction footprint and immediate vicinity. No displacement of offsite land uses would occur, and construction would not affect undeveloped portions of Y-12.

Operation. Under steady state operations, the East End Campus would occupy a maximum of 40 acres, including approximately eight acres for two large new parking lots. Approximately

[4] To be conservative, this EA assumes all 40 acres of the proposed site could be disturbed during construction.

485,000 square feet of new facilities would be constructed, representing about seven percent of the existing 7.3 million square feet of total facility space at Y-12, while total land disturbed for the project (maximum of 40 acres) would represent approximately five percent of Y-12's 811-acre land area. As a result, the East End Campus would not substantially alter overall land use patterns or the intensity of development at Y-12.

Operational land use would remain industrial and fully compatible with surrounding Y-12 facilities and ongoing modernization initiatives. The East End Campus would consist of contemporary, purpose-built facilities and infrastructure, supporting efficient use of developed land while avoiding expansion into undeveloped areas of Y-12. Long-term land use impacts would therefore be minor and consistent with existing and planned industrial use of the site.

3.2.3 No-Action Alternative Effects

Under the No-Action Alternative, the East End Campus would not be constructed. The approximately 40-acre project area would remain in its existing condition as previously disturbed industrial land, consisting primarily of concrete slabs and remaining infrastructure from former facilities. Absent East End Campus development, land use within the site would continue to support legacy or interim industrial functions or remain unused pending future disposition.

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 East End Campus.

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.

As shown in Figure 3.3-1, Y-12 is situated in Bear Creek Valley, and bounded by Pine Ridge to the north and Chestnut Ridge to the south, which limits views of the site. The area surrounding Y-12 consists of a mixture of wooded and undeveloped areas and the City of Oak Ridge. Structures at Y-12 are mostly low profile, reaching heights of three stories or less, and largely built in the 1940s of masonry and concrete. The tallest structure is the 197-foot-tall meteorological tower erected in 1985 and located on the west end of Y-12. The west tower is located on a slight rise across from the intersection of Old Bear Creek Road and Bear Creek Road. The transmission lines towers installed on Pine Ridge in 2019 and the two water towers are two of the most visible features on the site.

Although facilities at Y-12 are brightly lit at night, the topography limits visibility from offsite locations.

Figure 3.3-1. Aerial View of Y-12, Looking West

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

3.3.2 Proposed Action Effects

Construction. Construction of the East End Campus would occur on the eastern end of Y-12. The project area is not accessible to the public, and no visually sensitive receptors are located within Y-12. Views of Y-12 from offsite locations would be limited by terrain, vegetation, and existing development. For purposes of this analysis, developed areas of Y-12 are considered comparable to a BLM VRM Class IV landscape, representing the highest level of visual modification; therefore, additional development cannot result in a higher VRM classification or further degradation of scenic quality.

Temporary visual impacts would include cranes, construction equipment, laydown areas, and short-term construction lighting. These features would be consistent with the existing industrial character of Y-12 and would not be visually prominent or out of scale with surrounding facilities. Upon completion of construction, cranes and temporary facilities would be removed, and areas not incorporated into the permanent footprint would be restored, eliminating short-term visual effects.

Operation. During steady state operations, the East End Campus would consist of purpose-built, low profile industrial facilities, parking areas, and supporting infrastructure consistent with the scale, form, and function of existing Y-12 development. Exterior lighting and security features would be similar in intensity and character to current site conditions and would not substantially alter nighttime visibility within or beyond the campus. Because Y-12 is already characterized as a VRM Class IV visual setting, operation of the East End Campus would not further diminish scenic quality or alter visual resource classification.

From regional viewpoints, including limited locations along public roadways or from elevated terrain, visibility of East End Campus facilities would remain largely constrained by intervening ridges and vegetation. In those limited areas where the eastern portion of Y-12 is visible, the East End Campus could represent a visual improvement by replacing older structures with consolidated, contemporary facilities. Overall, long-term visual impacts would be minimal and consistent with the established industrial character of Y-12.

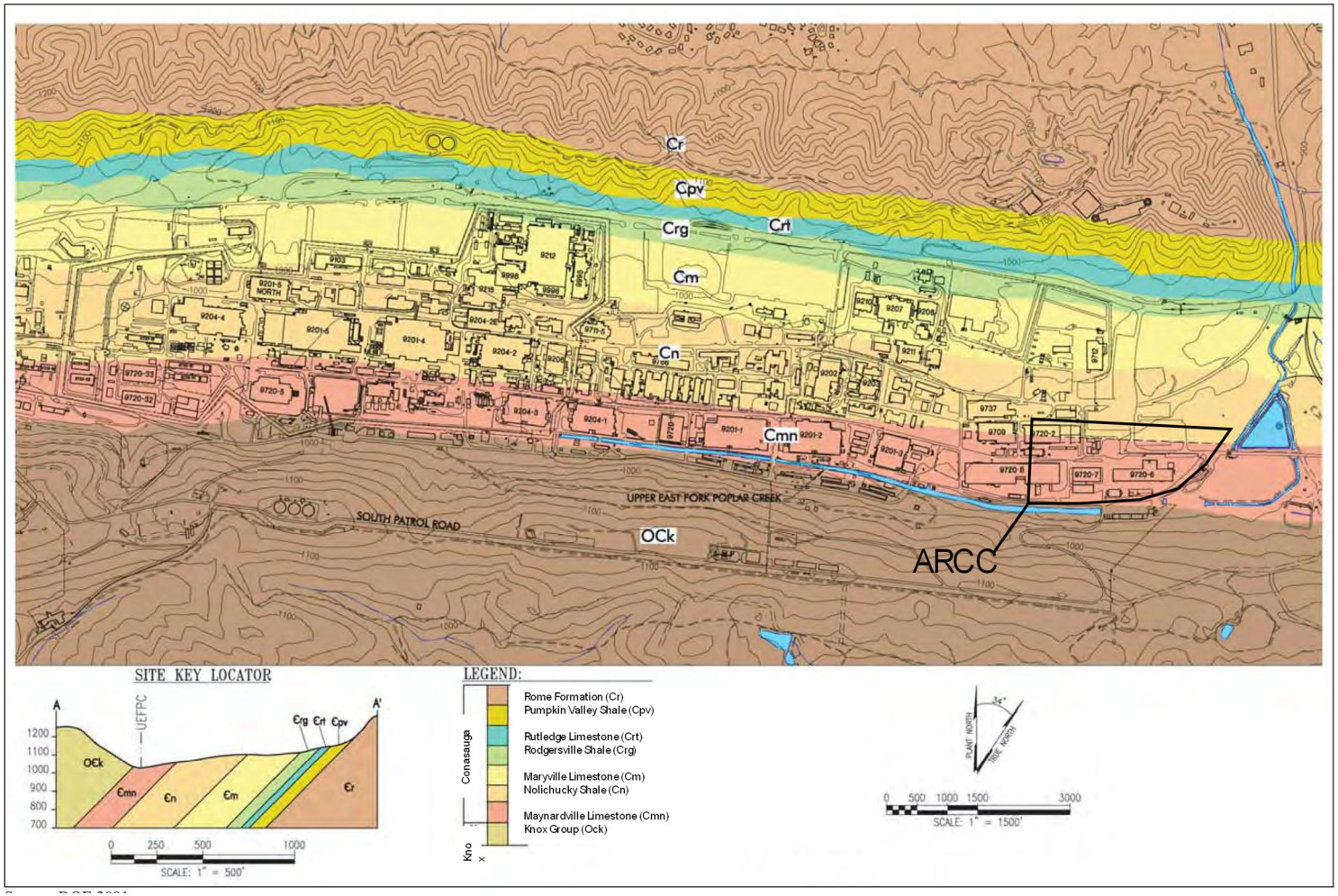
3.3.3 No-Action Alternative Effects

Under the No-Action Alternative, the East End Campus would not be constructed, and the project area would remain in its current condition as previously disturbed industrial land with existing slabs and legacy facilities. No new visual elements would be introduced, and the visual character would continue to reflect a highly developed setting consistent with a VRM Class IV landscape.

3.4 Geology and Soils

3.4.1 Affected Environment

Geology. Y-12 is located within Bear Creek Valley, which is underlain by Middle to Late Cambrian strata of the Conasauga Group (Figure 3.4-1). The Conasauga Group consists primarily of highly fractured and jointed shale, siltstone, calcareous siltstone, and limestone. The upper part of the group is mainly limestone, while the lower part consists mostly of shale (NNSA 2011). This group can be divided into six discrete formations, which are, in ascending order, the Pumpkin Valley Shale, the Rutledge Limestone, the Rogersville Shale, the Maryville Limestone, the Nolichucky Shale, and the Maynardville Limestone. Within Y-12, the proposed East End Campus site is underlain by the Maynardville Limestone formation, which is susceptible to karst formation, and the Nolichucky Shale. Unconsolidated materials overlying bedrock at Y-12 include alluvium (stream-laid deposits), colluvium (material transported downslope), man-made fill, fine-grained residuum from the weathering of the bedrock, saprolite (a transitional mixture of fine-grained residuum and



Source: NNSA 2011.

Figure 3.4-1. Generalized Bedrock Map for Y-12

bedrock remains), and weathered bedrock. The overall thickness of these materials in the Y-12 area is typically less than 40 feet.

The geology in vicinity of Y-12 is complex as a result of extensive thrust faults and folds. Although major thrust faults are numerous in vicinity of Y-12, these faults are associated with mountain building episodes that ended more than 200 million years ago. These faults are no longer active, but stress stored up at depth in these rocks is periodically released as minor earthquakes. Since 1900, 219 earthquakes have been recorded within 62 miles of the proposed East End Campus site (at Y-12) with the highest magnitude of 4.7 (USGS 2025a).

The U.S. Geological Survey (USGS) Earthquake Hazards Program's 2023 Long-term Model (USGS 2023) for the Conterminous United States shows earthquake ground motions for various probability levels across the United States. The USGS rates ground motions using peak ground acceleration, which is the maximum acceleration experienced during the course of an earthquake and is measured in units of acceleration due to gravity ("g"). The Long-Term Model indicates that the study area is located in an area with a high seismic hazard class rating: 0.49g peak horizontal ground acceleration with a 2 percent probability of exceedance in 50 years; and 0.16g peak horizontal ground acceleration with a 10 percent probability of exceedance in 50 years. An earthquake generating 0.49g would produce severe shaking. Damage would be slight in specially designed structures. An earthquake generating 0.16g would be perceived by all, with minimal damage to well-built ordinary structures (USGS 2025b, FEMA 2025).

Karst features are dissolutional features occurring in carbonate bedrock. Numerous surface indications of karst development have been identified at the ORR. Surface evidence of karst development includes sinking streams (swallets) and overflow swallets, karst and overflow springs, accessible caves, and numerous sinkholes of varying size. Karst appears to be most developed in association with the Knox Group and adjacent Maynardville Limestone carbonate units. The highest density of sinkholes occurs in the Knox Group, and drilling data suggests that the largest solution cavities are associated with these formations (NNSA 2011). There are no identified karst features near the proposed East End Campus site.

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

3.4.2 Proposed Action Effects

Construction. Construction of the proposed East End Campus would occur on previously disturbed land comprising about 40 acres on the eastern end of the Y-12, the majority of which

currently consists of slabs from previously demolished warehouses. Construction of the East End Campus would also require demolition or repurposing of some existing buildings.

During construction, there is the possibility that contaminated soils or materials may be encountered. Prior to any new ground disturbance, NNSA would survey planned areas of disturbance to ensure there are no contaminated soils or materials that would require remediation. Uncontaminated soils would be re-used as backfill. Any contaminated soils or materials would be managed in accordance with existing Y-12 waste management practices. Construction activities would cause minor impacts to the existing geologic and soil conditions at the site. The near surface geologic conditions and existing soil column would be disturbed by construction, especially within the facility footprint. The maximum depth of excavation is expected to be approximately 3 to 5 feet, primarily for utility installation. A few pieces of machinery would require pits for hydraulics, but otherwise construction would be slab on-grade, with limited excavation. The proposed East End Campus would be constructed on previously disturbed land, a formerly highly graded and impacted area.

No viable geologic or soil resources would be lost from construction activities. Grading, excavation, and other site development activities associated with the Proposed Action would occur across most of the 40 acre proposed East End Campus. Construction would require a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit. Grading would temporarily disturb soils, and site contours would be permanently changed from site grading to support building foundations and site drainage. As part of the site grading, fill dirt may be required to construct buildings above the current grade, which would provide increased margin from the maximum probable flood extent along the southern edge of the campus area. NNSA has estimated that up to 32,000 cubic yards of fill material could be used over the 10-year construction period, which equates to an average of approximately 2 dump trucks of fill weekly (CNS 2026a). Fill material would be obtained from existing borrow areas on the west end of Y-12, which have been used to support UPF construction.

The site soils are designated as urban soils. Because of soil disturbance, the potential for increased soil erosion due to stormwater runoff and wind would increase. However, the site is generally level, which would reduce potential stormwater velocity and sediment transport. In general, potential impacts from erosion would be minimized through the implementation of a site-specific stormwater pollution prevention plan (SWPPP) (as required by the Construction Stormwater Permit); implementation of erosion and sediment control measures during construction, and the implementation of a revegetation plan for open areas. Notably, most of the proposed East End Campus site is covered by asphalt or concrete. With implementation of the above measures, impacts to geology and soils during construction would be minimized.

The earthquake risk near the site is considered high due to the presence of historic thrust faults (USGS 2023). However, there are no quaternary faults (i.e., faults less than 1.6 million years old) near the site. The East End Campus would be designed and constructed to meet seismic design criteria commensurate with the risk category requirements of the facility. For the East End Campus facilities, the International Building Code (IBC) establishes the minimum requirements to safeguard the public safety and safety to life and property from hazards and provides the classification of buildings based on the purpose or purposes for which they are used. The IBC assigns risk categories to buildings to account for consequences and risks to human life (building

occupants) in the event of a building failure. The risk category serves as a threshold for a variety of code provisions related to earthquake, flood, snow, and wind loads.

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

Operation. Once construction is complete, areas used for laydown would be converted to parking lots. Meanwhile, open areas around the facility buildings would be cleaned up and restored. Although erosion from stormwater runoff and wind action would occur occasionally during operation, it is anticipated to be minimal, and therefore not impacted by the Proposed Action.

3.4.3 No-Action Alternative Effects

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

3.5 Water Resources

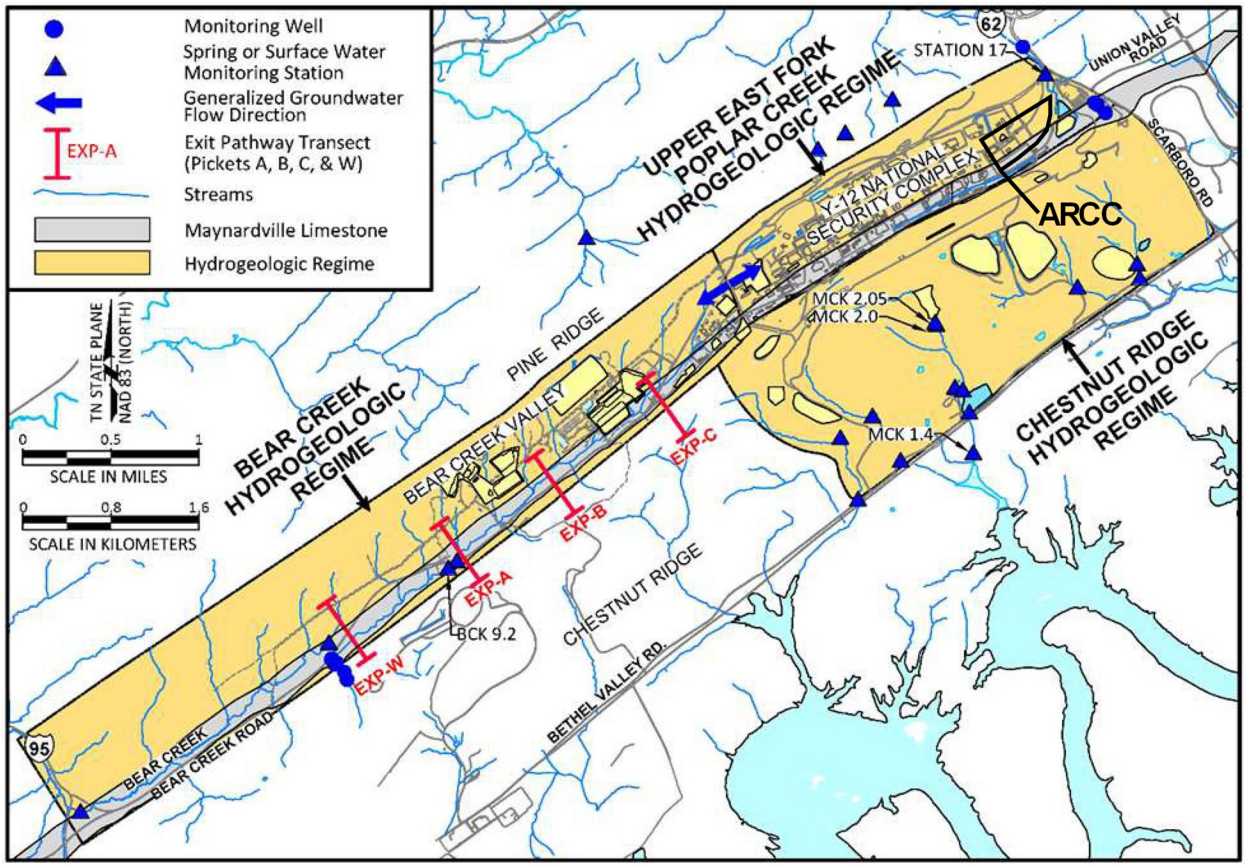
3.5.1 Affected Environment

Groundwater. Y-12 is divided into three hydrogeologic regimes, which are delineated by surface water drainage patterns, topography, and groundwater flow characteristics. The regimes are further defined by the waste sites they contain. These regimes include the Bear Creek Hydrogeologic Regime, the Upper East Fork Poplar Creek (UEFPC) Hydrogeologic Regime, and the Chestnut Ridge Hydrogeologic Regime (*see* Figure 3.5-1). Most of the Bear Creek and UEFPC regimes are underlain by geologic formations that are part of the ORR aquitard. The ORR aquitard is comprised of six geologic formations (Nolichucky Shale, Maryville Limestone, Rogersville Shale, Rutledge Limestone, Pumpkin Valley Shale, and Rome Formation) which collectively have low permeability and low transmissivity. The northern portion of Bear Creek and UEFPC regimes is underlain by aquitard formations including the Nolichucky Shale, Maryville Limestone, and Rogersville Shale. The proposed East End Campus site is located within the UEFPC Hydrogeologic Regime.

In general, groundwater flow in the water table interval (8 to 20 feet below ground surface) follows topography at Y-12; therefore, it flows off areas of higher elevation into the valley and then flows parallel to the valley, along the geologic strike.[5] Shallow flow in the Bear Creek and UEFPC regimes is divergent from a topographic and groundwater divide located near the western end of Y-12. In the Chestnut Ridge regime, a groundwater divide nearly coincides with the crest of the ridge. On Chestnut Ridge, shallow groundwater flow tends to be toward either flank of the ridge, with discharge primarily to surface streams and springs in Bethel Valley to the south and Bear Creek Valley to the north. In Bear Creek Valley, groundwater in the intermediate and deep intervals moves through fractures in the aquitard, converging on and then moving through fractures

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

and solution conduits in the Maynardville Limestone. Karst development in the Maynardville Limestone has a significant impact on groundwater flow paths in the water table and intermediate intervals. Groundwater flow rates in Bear Creek Valley vary; they are slow within the deep interval of the fractured noncarbonate rock (less than 10 feet/year) but can be quite rapid within solution conduits in the Maynardville Limestone (10 to 5,000 feet/day) (DOE 2025). The proposed East End Campus site is located within the UEFPC Hydrogeologic Regime primarily within the Maynardville Limestone. Groundwater in the water table interval in the vicinity of the proposed East End Campus site flows to the southeast towards East Fork Poplar Creek (*see* Figure 3.5-2) (DOE 2025).

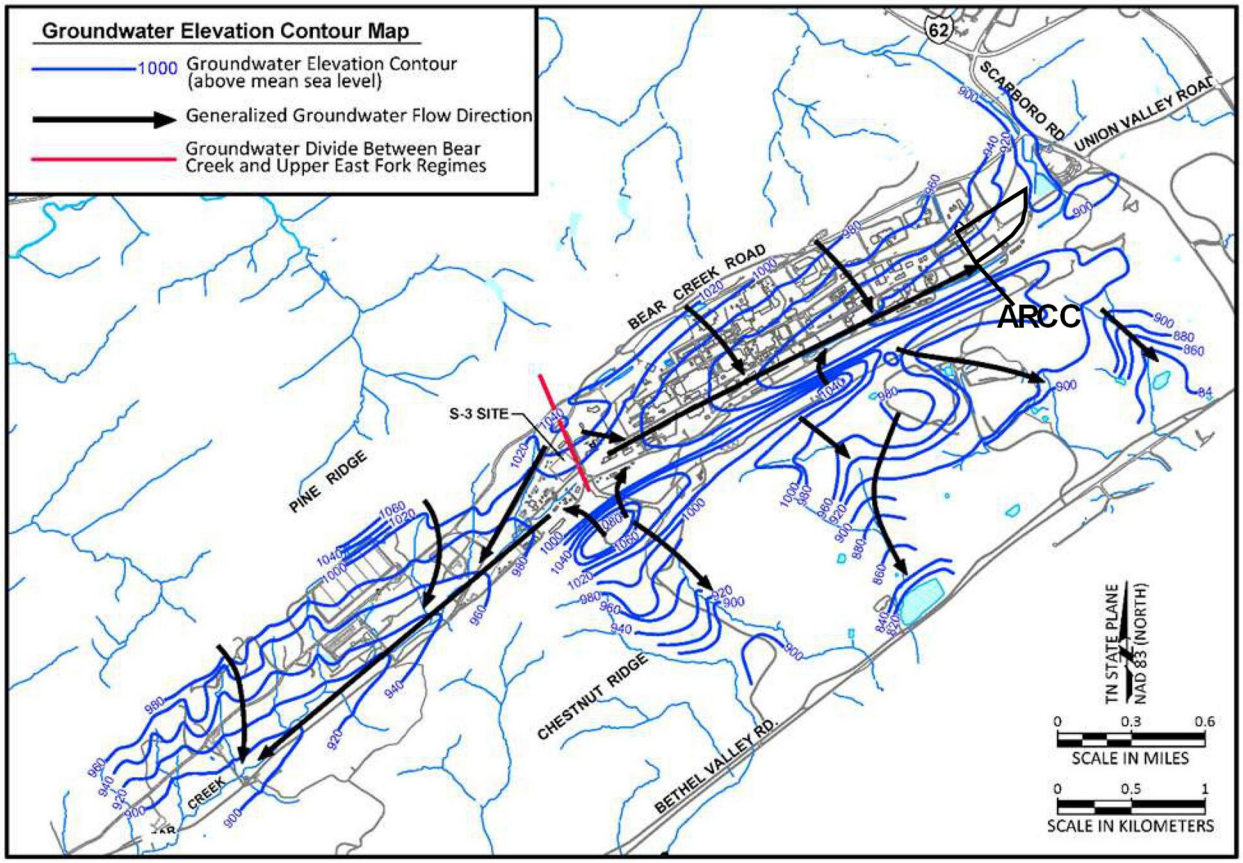


Source: DOE 2025.

Figure 3.5-1. Hydrogeologic Regimes at Y-12

More than 200 sites have been identified at Y-12 that represent known or potential sources of contamination to the environment as a result of past waste management practices (NNSA 2011). Because of that contamination, extensive groundwater monitoring is performed to comply with regulations and DOE orders. Historical monitoring efforts have shown that four types of contaminants have affected groundwater quality at Y-12: nitrate, volatile organic compounds (VOCs), metals, and radionuclides. Of those, nitrate and volatile organic compounds are the most widespread. Some radionuclides, particularly uranium and Technetium-99 were found principally in the Bear Creek regime and the western and central portions of the East Fork Poplar Creek (EFPC) regime. Among the three hydrogeologic regimes underlying the Y-12 Complex, the UEFPC regime encompasses most of the known and potential sources of surface water and

groundwater contamination. Because of the many legacy source areas, VOCs are the most widespread groundwater contaminants in the UEFPC regime and are present within the footprint of the proposed East End Campus site as part of a generalized plume (DOE 2025).



Source: DOE 2025.

Figure 3.5-2. Groundwater Elevation Contours and Flow Directions at Y-12

Groundwater is not used for water supply at Y-12. Industrial and drinking water supplies are supplied by the City of Oak Ridge, which draws water from the Clinch River.

Surface water. The East Fork Poplar Creek (EFPC), which discharges into Poplar Creek east of the ETTP, originates within Y-12 just south of Building 9204-1 and flows northeast along the south side of Y-12. There are no streams, wetlands, or riparian areas within the proposed East End Campus. Various Y-12 wastewater discharges to the upper reaches of EFPC from the late 1940s to the early 1980s left a legacy of contamination (e.g., mercury, polychlorinated biphenyls, uranium) that has been the subject of water quality improvement initiatives over the past two decades. Discharges from Y-12 processes are treated at treatment facilities, including the West End Treatment Facility, Central Pollution Control Facility, and Big Spring Water Treatment System, and flow into EFPC before the water exits Y-12. In recent years, water quality has improved within the EFPC. Bioaccumulation of mercury and PCBs in fish tissue samples have decreased in recent years but still exceed applicable water quality criteria. EFPC eventually flows through the City of Oak Ridge to Poplar Creek and into the Clinch River (DOE 2025).

The current Y-12 National Pollutant Discharge Elimination System (NPDES) permit requires sampling, analysis, and reporting for approximately 62 outfalls including locations within the EFPC. Currently, Y-12 has outfalls and monitoring points in the following water drainage areas: EFPC, Bear Creek, and several unnamed tributaries on the south side of Chestnut Ridge. These creeks and tributaries eventually drain to the Clinch River. The NPDES permit requires regular monitoring and stormwater characterization. The effluent limitations contained in the permit are based on the protection of water quality in the receiving streams. The percentage of compliance with permit discharge limits for 2024 was 100 percent (DOE 2025).

Y-12 implements a stormwater pollution prevention program in alignment with the requirements of a NPDES Permit. It protects the quality of stormwater runoff through identifying and properly managing outdoor stormwater pollutant sources, implementing best management practices, sampling stormwater and interpreting data to evaluate efficacy of pollutant controls, and conducting routine stormwater inspections and surveillances. The results are compared to the applicable permit table alert values and daily maximum benchmark values. Based upon the results of the stormwater sampling and site surveillances, the Y-12 stormwater pollution prevention program is effective at protecting the surface waters at Y-12 from stormwater pollution (DOE 2025).

Y-12 has a radiological monitoring plan to address compliance with DOE Order 458.1. Under the existing plan, effluent monitoring is conducted at four types of locations: treatment facilities, other point source and area source discharges, instream locations, and stormwater runoff from production area roofs. Table 3.5-1 presents the total curies of uranium discharged from Y-12 to the offsite environment as a liquid effluent from 2012 to 2024, at the easternmost monitoring station (Station 17) on Upper EFPC. Radiological data associated with the uranium releases were well below the allowable derived concentration standards[6] (DOE 2025).

Table 3.5-1. Uranium Discharges from Y-12 as Liquid Effluent

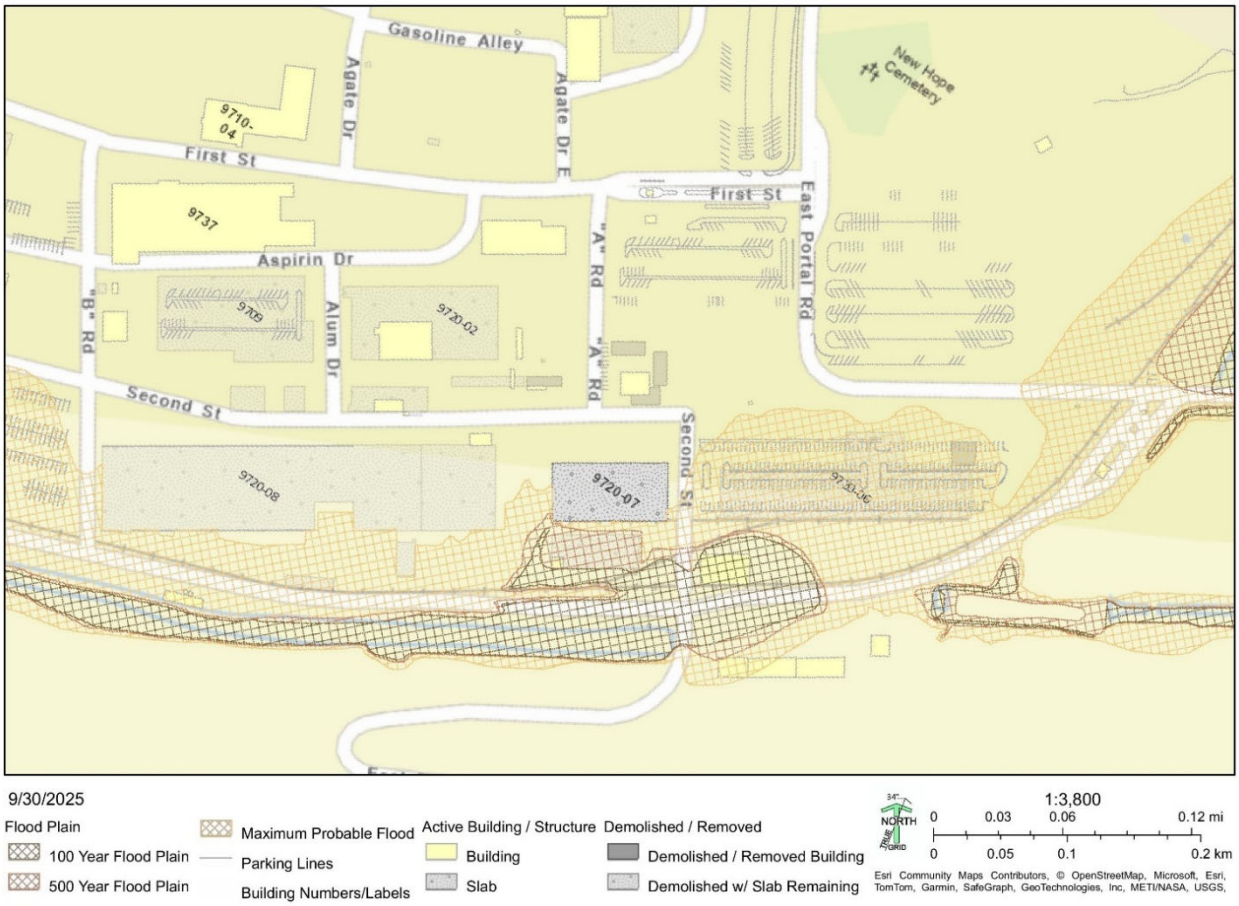
Year	Curies of Uranium
2012	0.039
2013	0.055
2014	0.061
2015	0.068
2016	0.045
2017	0.080
2018	0.084
2019	0.079
2020	0.082
2021	0.063
2022	0.071
2023	0.092
2024	0.177

Source: DOE 2025.

[6] Allowable derived concentration standards for uranium vary by isotope but are typically 6-7 x 10^{-7} microcuries per milliliter to ensure the public dose remains less than 100 millirem per year.

Industrial and Commercial User Wastewater Discharge Permit 1-91 defines requirements for discharging wastewaters to the sanitary sewer system as well as prohibitions for certain types of wastewaters. It prescribes requirements for monitoring certain parameters at the East End Sanitary Sewer Monitoring Station. The permit sets limits for most parameters. Monitoring limits in 2024 were met except for one exceedance for instantaneous flow (DOE 2025).

Floodplains. A floodplain is defined as the valley floor adjacent to a streambed or arroyo channel that may be inundated during high water. The proposed East End Campus site is north of the 100-year and the 500-year floodplain limit for the EFPC, along the southern edge of the proposed campus, as shown in Figure 3.5-3.



Source: CNS 2026a.

Figure 3.5-3. 100- and 500-Year Floodplains and Maximum Probable Flood Extent at the East End Campus Site

3.5.2 Proposed Action Effects

Construction and Operation.

Groundwater. No impacts to groundwater are anticipated from construction activities or normal facility operations. Excavation during construction for utilities would extend to a depth of approximately 5 feet and is not expected to intercept the water table. Groundwater from the site would not be used as a water source. Potential impacts to groundwater quality are not expected because the East End Campus operations would be contained within the newly constructed facilities, and hazardous materials would be properly managed. Any spills would be contained and cleaned up in an appropriate manner under Y-12's spill prevention, control, and countermeasures (SPCC) plan. Small quantities of process water (approximately 500,000 gallons/year) generated during operations would be characterized and treated at the appropriate treatment facility prior to discharge to a permitted outfall. As such, facility operations would not be expected to contaminate the groundwater. In addition, the existing Y-12 groundwater monitoring program would continue, to evaluate groundwater quality across Y-12 including the East End Campus.

Surface Water. Prior to the start of construction, it would be necessary to obtain a construction stormwater NPDES permit for discharges of stormwater associated with construction activities. As part of the NPDES permit, the development and implementation of a SWPPP would be required to help minimize any pollution that might leave the site by stormwater. The SWPPP would contain a detailed site plan and schematics for the installation of temporary and permanent stormwater and erosion control devices to effectively manage the site during construction and facility operation. Any purged groundwater from excavation or trench de-watering would be characterized, and if necessary, containerized and treated at the appropriate Y-12 wastewater treatment facility. During operations, any discharges of process water to the sanitary sewer would be subject to requirements under the Industrial and Commercial User Wastewater Discharge Permit 1-91. Any discharges to EFPC would comply with the general conditions and the specific discharge requirements of the latest NPDES permit issued to Y-12.

The EFPC is immediately adjacent to the southern edge of the proposed East End Campus site. During construction, soil erosion and sedimentation would increase due to increased soil exposure. However, the implementation of erosion prevention and sediment control measures, such as silt fence or filter sock, would reduce the potential for offsite transport of sediment. Installing and maintaining erosion controls around the perimeter of the construction footprint would contain disturbed site soils and reduce potential for offsite transport of sediment. The potential for offsite sediment transport would exist until disturbed areas are stabilized and revegetation is established.

The introduction of new waste streams or water priority chemicals would require a revision of the NPDES permit, though this is not expected. Due to the small quantities of process water anticipated during East End Campus operations and Permit 1-91 and NPDES requirements, East End Campus operations would not be expected to contaminate sanitary wastewater or surface water.

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

Floodplains. All East End Campus facilities would be constructed outside the 100-year and 500-year floodplains. However, fill dirt may be required to construct buildings above the current grade, which would provide increased margin from the maximum probable flood extent along the southern edge of the campus area. No adverse impacts to the floodplain are anticipated.

3.5.3 No-Action Alternative Effects

Under the No-Action Alternative, no new facilities would be constructed and there would be no additional impacts to water resources. Impacts to water resources would continue as discussed in Section 3.5.1. Ongoing and planned cleanup activities would continue at Y-12.

3.6 Air Quality

3.6.1 Affected Environment

Air pollution is the presence in the atmosphere of one or more contaminants (e.g., dust, fumes, gas, mist, odor, smoke, and vapor) such as to be injurious to human, plant, or animal life. Air quality 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*. These standards represent the maximum allowable atmospheric concentration that may occur and still protect public health and welfare. The NAAQS specify acceptable concentration levels of six criteria pollutants: particulate matter (measured as both particulate matter less than or equal to 10 microns in diameter [PM_{10}] and particulate matter less than or equal to 2.5 microns in diameter [$PM_{2.5}$]), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead.

All areas of the U.S. are designated as having air quality better than the NAAQS (attainment) or worse than the NAAQS (nonattainment). “Maintenance areas” are those that were previously classified as nonattainment but where air pollution concentrations have been successfully reduced to levels below the standard. Maintenance areas are subject to special maintenance plans to ensure compliance with the NAAQS.

The Proposed Action would occur in Anderson County, which is used as the ROI for the air quality analysis. According to the EPA, Anderson County is in attainment for all criteria pollutants (EPA 2026a). Anderson County emissions were obtained from the latest EPA National Emissions Inventory (NEI), as shown in Table 3.6-1. The 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.

Table 3.6-1. Baseline Criteria Pollutant Emissions for Anderson County, TN (2020)

Anderson County	Criteria pollutant (tons/year)[a]					
	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	VOCs
Mobile & Area Sources	11,551	1,621	1,659	639	28	12,295
Point Sources	326	532	98	77	247	73
Totals:	11,877	2,153	1,757	716	275	12,368

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

Source: EPA 2026b.

Airborne discharges from Y-12 are subject to regulation by the EPA and the TDEC. Permits issued by the State of Tennessee are the primary vehicle used to convey the clean air requirements that are applicable to Y-12. New projects are governed by construction permits and modifications to the existing operating permits, and eventually the requirements are incorporated into those operating permits. Y-12 is currently governed by a Title V Major Source Operating Permit (DOE 2025). NNSA notes that the renewal process for the Title V air permit is still in the review process by TDEC.

Y-12 has a comprehensive air regulation compliance assurance and monitoring program to ensure that airborne emissions satisfy all regulatory requirements and do not adversely affect ambient air quality. Common air pollution control devices employed include exhaust gas scrubbers, fabric filters, and/or high efficiency particulate air (HEPA) filtration systems designed to remove contaminants from exhaust gases before release to the atmosphere. The releases of non-radiological contaminants into the atmosphere at Y-12 occurs as a result of plant production, maintenance, waste management operations, and steam generation. Most process operations are served by ventilation systems that remove air contaminants from the workplace. TDEC air permits for the non-radiological sources do not require stack sampling or monitoring. For non-radiological sources where direct monitoring of airborne emissions is not required, or is required infrequently, monitoring of key process parameters is done to ensure compliance with all permitted emission limits. Radiological emissions are addressed in Section 3.14.

3.6.2 Proposed Action Effects

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

Construction. A construction air permit from TDEC would be required. NNSA would coordinate the permitting activities with TDEC personnel by preparing and submitting a construction air permit application at least 120 days prior to the estimated starting date of construction of the emission source. Construction emissions were estimated for fugitive dust, on- and off-road diesel equipment and vehicles, worker trips, and paving off-gasses (Table 3.6-2). Small changes in facilities site and ultimate design, and moderate changes in quantity and types of

equipment used would not substantially change these emission estimates and would not change the determination under the general conformity rule or level of effects under NEPA. During construction, NNSA would take reasonable precautions to prevent fugitive dust from becoming airborne. Reasonable precautions might include wetting by water spray any areas likely to generate fugitive dust during on site construction activities as needed. Additionally, all construction equipment employed on site would be well-maintained and equipped with the latest emissions control equipment. Consequently, there would be minimal emissions associated with fugitive dust and earthmoving equipment.

Table 3.6-2. Maximum Annual Air Emissions Compared to *De Minimis* Thresholds

Activity/Source	CO (tpy)	NOx (tpy)	VOC (tpy)	SOx (tpy)	PM10 (tpy)	PM2.5 (tpy)	*De Minimis Threshold* (tpy)	Exceeds *De Minimis* Thresholds? [Yes/No]
Construction Emissions (Note 1)	4.7	4.7	3.2	<0.1	16.0	0.2	100	No
Operational Emissions	8.2	2.1 (Note 2)	0.8 (Note 2)	<0.1 (Note 2)	<0.1 (Note 2)	<0.1 (Note 2)	100	No

tpy = tons per year

Note 1: Air quality model assumes up to 120,000 square feet of construction (i.e., approximately one-fourth of the total East End Campus construction) could occur in peak year.

Note 2: The allowable site-wide emissions in the current Y-12 Title V Major Source Operating Permit 571832 (note: the renewal process for the Title V air permit is still in the review process by TDEC) are as follows: NOx = 483.26 tpy; VOC = 109.15 tpy; SO_2= 39.03 tpy; and PM = 204.95 tpy. NNSA submits an annual compliance certificate that emissions are within the permit requirements. East End Campus operations would be conducted in accordance with the permit requirements, as modified to account for the East End Campus.

Source: USAF 2020; with emission concentrations derived from NNSA 2021.

Operation. Operational emissions were estimated for changes in heated/cooled space.[7] No new stationary sources of air emissions would be associated with the facility, with the exception of a backup emergency diesel generator.[8] Although the area is in attainment and the general conformity rules do not apply, the *de minimis* threshold values were carried forward to determine the level of effects under NEPA. As shown in Table 3.6-2, the estimated emissions from the Proposed Action would be below the *de minimis* thresholds; therefore, the level of effects would be minor. Although NNSA expects that the technologies deployed in the East End Campus would be more efficient and require fewer process steps than existing processes—which could reduce operational emissions—NNSA could not quantify this reduction at this stage of the design process and did not take credit for those potential reductions in this EA analysis. Upon completion of construction, the construction air permit will be incorporated in Y-12 Complex's Title V Operating Air Permit.

[7] Operational workers would be the same as the existing workforce; consequently, there would be no additional emissions associated with commuting workers.

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

3.6.3 No-Action Alternative Effects

Under the No-Action Alternative, no new facilities would be constructed, and no additional air emissions would occur. Air quality would be unaffected compared to baseline levels discussed in Section 3.6.1.

3.7 Noise

3.7.1 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 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 3.7-1.

Table 3.7-1. Common Sounds and Their Levels

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

Source: Harris 1998.

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

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

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

Because Y-12 is an industrial site, there are many existing noise sources. Major noise emission sources within Y-12 include various industrial facilities, equipment, and machines (e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, and vehicles). Most of the Y-12 industrial facilities are at a sufficient distance from the site boundary so that noise levels at the boundary from these sources are not distinguishable from background noise levels. Within the Y-12 site boundary, noise levels from Y-12 mission operations range between 50 and 70 dBA, which is typical for industrial facilities (NNSA 2021). The State of Tennessee has not established specific community noise standards applicable to Y-12; however, Anderson County has quantitative noise-limit regulations as shown in Table 3.7-2 (Oak Ridge 2022).

Table 3.7-2. Allowable Noise Level by Type of Use in the City of Oak Ridge

Types of Use	Maximum Allowable Noise Level (in dBA)	
	7 AM – 10 PM/12 AM[a]	10 PM/12AM[a] – 7 AM
Residential	80	75
Business	80	80
Industrial	80	80

a. For residential use, 10 PM is the applicable hour; for business and industrial use, 12 AM is the applicable hour.
Source: Oak Ridge 2022.

There are no sensitive noise receptors (schools, churches, daycare facilities, etc.) within 0.5 miles of the proposed East End Campus. The nearest sensitive noise receptor is the Oak Ridge Schools' Preschool in the Scarboro neighborhood, which is approximately 1.4 miles northwest of the proposed East End Campus. The nearest residence to the East End Campus is approximately 0.75 miles to the northwest, also in the Scarboro neighborhood. Pine Ridge, which rises more than 150 feet above Y-12 to the north, separates Y-12 from the Scarboro community and provides natural noise attenuation for site activities. There have been no known noise complaints associated with Y-12 operations in the recent past.

3.7.2 Proposed Action Effects

Construction. Construction of the East End Campus would require site preparation and construction of facilities and parking lots. Maximum noise levels generated by construction equipment types commonly used on this type of project are listed in Table 3.7-3 at a reference

distance of 1,000 feet. At this distance, the highest noise level generated by the equipment types listed would be 64 dBA. Under a highly conservative scenario in which all of the listed equipment types are operating during a single day at a single location, the L_{eq} during workday hours at a distance of 1,000 feet would be 64 dBA. Because the nearest residence to the East End Campus is more than 4,000 feet to the northwest, noise levels would be less than 64 dBA. Pine Ridge would further reduce any construction noise. The area surrounding the proposed East End Campus is generally used for industrial purposes and is not considered to be noise sensitive.

Table 3.7-3. Noise Levels of Common Construction Equipment

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

Source: FHWA 2006.

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

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

Operation. There would be no major sources of noise from the East End Campus and no long-term increases in the overall noise environment (e.g., L_{eq}) would be expected from operations. For workers, noise from operations would likely remain the same for machining and would likely decrease or remain consistent due to more efficient manufacturing methods that require fewer steps. Therefore, no long-term changes in the noise environment would occur.

3.7.3 No-Action Alternative Effects

Under the No-Action Alternative, the East End Campus would not be constructed and there would be no changes to noise impacts from current operations discussed in Section 3.7.1.

3.8 Biological Resources

3.8.1 Affected Environment

This section describes the biological resources on Y-12 and is intended to provide a baseline characterization of the ecology prior to any disturbances associated with construction or operation of the East End Campus at Y-12.

Vegetation and Habitat. Y-12 is an 811-acre, highly industrialized portion of the ORR located at the east end of Bear Creek Valley between Pine Ridge to the north and Chestnut Ridge to the south, with roughly 600 acres enclosed by a perimeter fence. Inside that fenced area there are essentially no wetlands and only limited patches of forest; buildings, parking lots and cleared security buffers dominate the landscape, leaving sparse vegetation and constraining local wildlife because of the lack of substantial natural habitat. Y-12's eastern area includes Lake Reality, the now-closed New Hope Pond, maintenance and office spaces, training facilities, change houses and former facilities; the central and west-central areas contain the high-security zones that support core NNSA missions; and the far western portion is primarily occupied by waste management facilities and construction contractor support areas.

The proposed East End Campus is proposed to be located on approximately 40 acres of previously disturbed land on the east side of the Y-12, the majority of which currently consists of slabs from previously demolished warehouses (see Figure 2-1).

Wildlife. There is limited natural habitat available to support wildlife on Y-12. Building and parking lots dominate the landscape at Y-12, with limited vegetation present and lack of large areas of natural habitat. Because the proposed site for the East End Campus is previously disturbed and located within an area of Y-12 where buildings, parking lots, and cleared security buffers have already eliminated large areas of natural habitat, there would be no impacts to wildlife.

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 heavily developed Y-12 footprint contains no known critical habitat for threatened or endangered species and because buildings, parking areas, cleared security buffers, and limited vegetation dominate the site, Y-12 provides little suitable roosting, foraging, or breeding habitat for state- or federally listed wildlife. While the broader ORR supports a number of species of concern, including federally listed bat species (Indiana bat [*Myotis sodalis*], northern long-eared bat [*Myotis septentrionalis*], and gray bat [*Myotis grisescens*]) detected elsewhere on the ORR, and various state-listed birds, reptiles, fish, and plants, these occurrences are reported across ORR and in less disturbed areas; these species are not known to be present within the developed Y-12 fenced area. Y-12's industrialized landscape offers minimal habitat for the threatened, endangered, or sensitive species documented on the ORR.

Wetlands. Wetlands are protected under Executive Order (EO) 11990 (42 FR 26961, May 24, 1977). While the ORR contains roughly 580 acres of wetlands, Y-12 contains no wetlands and none were delineated there in 2024. There are no wetlands at the proposed East End Campus site.

3.8.2 Proposed Action Effects

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

Construction. Under the Proposed Action, construction of the East End Campus would occur on previously disturbed land. There would be some disturbance to terrestrial biotic resources due to associated utility hook-ups and rerouting, site access by construction vehicles, and parking lot/parking garage relocations. Some dislocation of small urban-type species (i.e., rodents) could be expected. Large animals would be excluded from controlled areas. Because the area on which the East End Campus would be constructed is developed and paved, there would be negligible impacts to terrestrial biotic species or threatened and endangered or special status species. Construction of the East End Campus could cause temporary, localized disturbances to urban-tolerant species (e.g., rodents, birds) from noise, light, soil disturbance, and vehicle access, with negligible direct impacts to federally listed or special-status species. Monitoring to assure that threatened and endangered or special status species, such as the gray bat and Indiana bat, which have been observed on the ORR (but not on Y-12) would continue.

Rain events that occur during construction could cause erosion and transport of soil and other materials from the construction site. NNSA would utilize appropriate storm water management techniques to prevent pollutants or extreme soil erosion from entering local waterways, and thus aquatic resources and species should not be negatively impacted. There are no wetlands within or adjacent to the proposed East End Campus site. As such, there would be no impacts to wetlands.

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

3.8.3 No-Action Alternative Effects

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

3.9 Cultural Resources

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

3.9.1 Affected Environment

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. The Y-12 and ORNL Programmatic Agreements (PAs) are currently being updated to reflect new architectural building surveys and revision to each site's historic preservation plan (HPP). Y-12 is working to update a site-wide cultural resource survey, which will evaluate all facilities currently located on the Y-12 site and constructed through 1992 to determine their eligibility for the NRHP and inclusion within the redrawn boundaries of the Y-12 Historic District. This site-wide cultural resource survey is being developed in consultation with the SHPO and will inform the strategies for the updated HPP and PA (DOE 2025).

Y-12 currently has a proposed National Register Historic District (Figure 3.9-1) of historic buildings associated with the Manhattan Project that are eligible for listing in the NRHP (NNSA 2011). The district and its contributing properties are eligible under Criterion A for its historical associations with the Manhattan Project, development as a nuclear weapons component plant within the post-World War II scientific movement, and early nuclear activities. The historic district is also eligible under Criterion C for the engineering merits of many of the properties and their contributions to science (NNSA 2011). In 2024, 27 proposed projects at Y-12 were evaluated for effects on historic properties; one building newly recommended as NRHP-eligible was slated for demolition and Section 106 documentation was submitted to the SHPO under the DOE/NNSA/Y-12 MOA governing demolition of excess buildings. Prior archaeological surveys (1992, 1999) found little potential for intact prehistoric or historic sites at Y-12 because extensive Manhattan Project-era and subsequent construction has heavily disturbed the area.

The proposed East End Campus would occur on previously disturbed land comprising about 40 acres on the eastern end of Y-12 partially within the proposed National Register Historic District. There are no identified cultural resources within the site proposed for the East End Campus. The majority of the project area currently consists of slabs from previously demolished warehouses. Building 9726, which is a high bay currently used by riggers, is also located on the site proposed for the East End Campus but is not listed in the NRHP (CNS 2026a). The New Hope Cemetery, which is maintained as an active cemetery and is located offsite of Y-12 but within the ORR, is near the site proposed for the East End Campus.

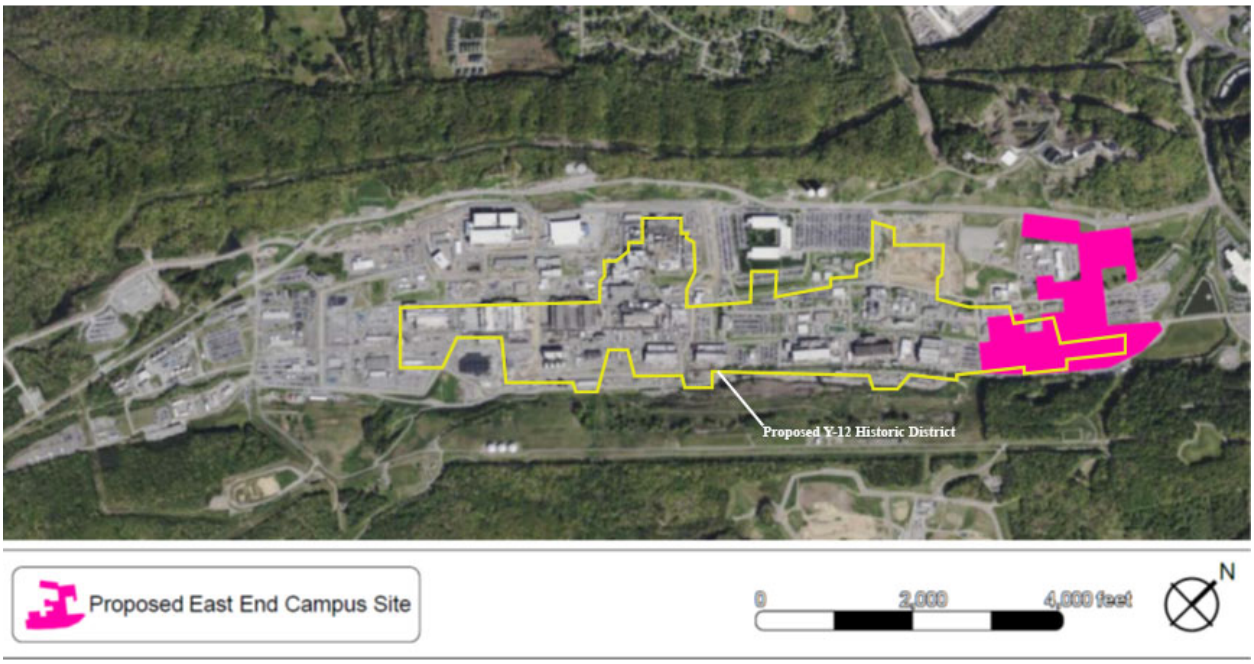


Figure 3.9-1. Proposed Y-12 Historic District

3.9.2 Proposed Action Effects

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

Construction. Construction-related activities and ground disturbance conducted for construction of the East End Campus would occur on previously disturbed lands. Construction phases may require removal or relocation of occupied trailers, removal/repurposing of Building 9726, and removal of existing foundations/slabs from previously demolished warehouses (CNS 2026a). Although there are no identified cultural resources within the site proposed for the East End Campus, because the demolition activities, ground disturbance, and construction would occur within the proposed National Register Historic District, DOE/NNSA consulted with the SHPO regarding this undertaking. On May 18, 2026, the Tennessee SHPO concurred with DOE NNSA's finding of No Adverse Effect as part of the East End Campus NHPA Section 106 consultation. DOE NNSA would initiate additional consultation with the SHPO if new changes to the project could potentially cause an adverse effect. Careful consideration would be given to the planning of the East End Campus to ensure there would be no adverse impacts to facilities within the Y-12 National Register Historic District. Unanticipated discoveries of archaeological materials during construction would be evaluated and, if needed, mitigated in accordance with the HPP. Therefore, no notable impacts to archaeological resources are anticipated. The proposed East End Campus construction activities would not affect the New Hope Cemetery.

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

3.9.3 No-Action Alternative Effects

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

3.10 Socioeconomics

This section discusses the existing socioeconomic resources conditions within the East End Campus ROI and the impacts associated with the Proposed Action and No-Action Alternative.

3.10.1 Affected Environment

Socioeconomic Resources. Socioeconomics considers the attributes of human social and economic interactions associated with the proposed DOE actions to construct and operate the East End Campus 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 3.10-1 shows the location of the proposed East End Campus 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 2023, the labor force in the ROI grew from 313,411 in 2010 to 335,062 in 2023, an increase of 21,651 persons (6.9 percent). Employment increased from 288,811 in 2010 to 325,141 in 2023, an increase of 36,600 persons (12.6 percent). The number of unemployed fell from 26,610 in 2010 to 9,921 in 2023, a decline of 16,689 persons (62.7 percent). Over that same period, the unemployment rate declined from 8.5 percent in 2010 to 3.6 percent in 2023 (BLS 2026a). Tennessee experienced similar changes over the same period. Table 3.10-1 presents the employment profile in the ROI and Tennessee for 2010 and 2023.

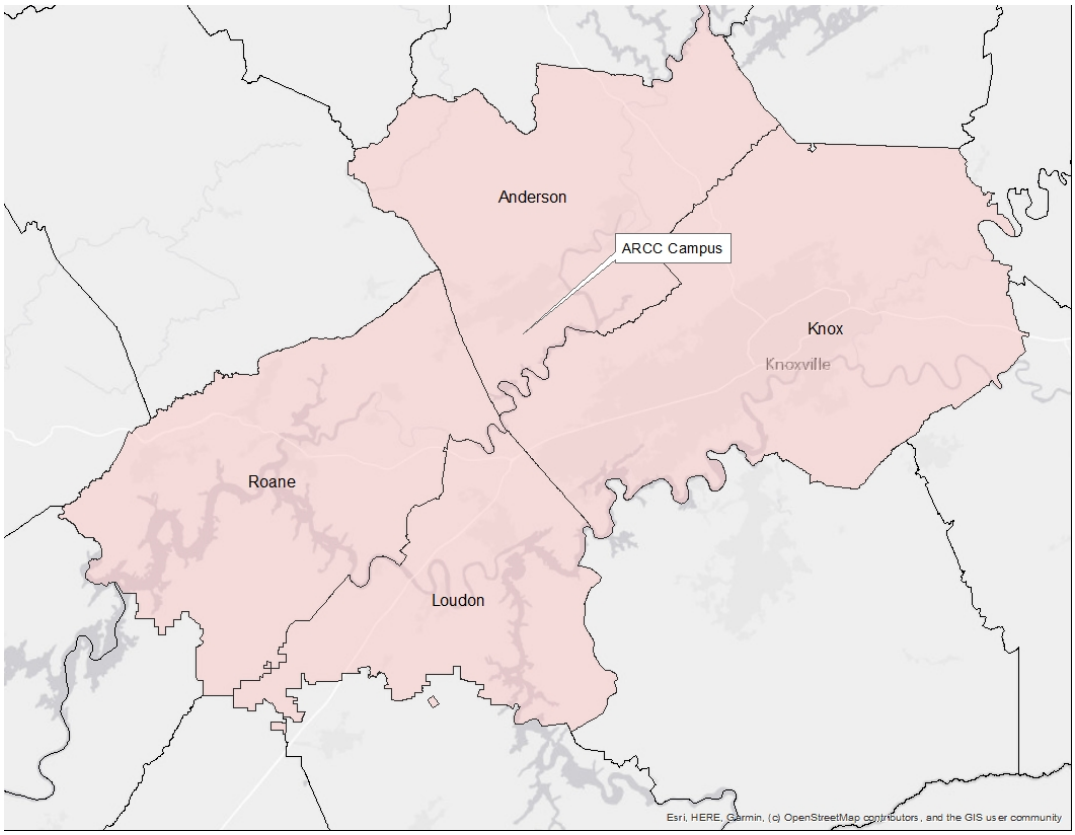


Figure 3.10-1. Location of Proposed East End Campus and Region of Influence

Table 3.10-1. ROI Employment Profile

Area	Labor Force		Employed		Unemployed		Percent Unemployed	
	2010	2023	2010	2023	2010	2023	2010	2023
Anderson	34,926	34,659	31,675	33,530	3,251	1,129	9.3%	3.3%
Knox	229,800	250,209	212,757	243,103	17,043	7,106	7.4%	2.8%
Loudon	22,352	26,430	20,280	25,602	2,072	828	9.3%	3.1%
Roane	24,323	23,764	22,089	22,906	2,234	858	9.2%	3.6%
ROI	313,411	335,062	288,811	325,141	26,610	9,921	8.5%	3.6%
Tennessee	3,090,795	3,380,108	2,792,063	3,270,602	298,732	109,506	9.7%	3.2%

Source: BLS 2026a.

The proposed East End Campus would be constructed at Y-12, located in Anderson County. In 2023 Anderson County's per capita income was $35,460, and median household income was $63,171. Anderson County had 1,599 employer establishments in 2023, with total employment of 48,104 and an annual payroll of approximately $3,849,298,000. In the county's employment mix in 2023, manufacturing accounted for about 11.7 percent of employed residents, government (as a class of worker) accounted for about 14.6 percent, and professional, scientific, and related services represented about 14.2 percent of total employment. At the state level, educational services together with health care and social assistance accounted for the largest

industry share at 22.3 percent, while government (class of worker) comprised roughly 13.6 percent of employment (USCB 2023a).

In 2023, the population in the ROI was 676,975. From 2010 to 2023 the total population in the ROI increased 11 percent, growing from 610,092 in 2010 to 676,975 in 2023. Over the same period, Tennessee's population increased by 639,977 people, or 10.1 percent (from 6,346,105 in 2010 to 6,986,082 in 2023). Between 2023 and 2030 the ROI population is projected to continue rising to 734,530 in 2030 (an increase of 57,555 people, or 8.5 percent from 2023). Tennessee's population is projected to reach 7,513,757 in 2030 (a 7.6 percent increase from 2023). Table 3.10-2 presents the historic and projected population of the ROI and Tennessee (USCB 2023b).

Table 3.10-2. County and State Historic and Projected Population

Area	2010	2015	2020	2023	2025	2030
Anderson	75,129	75,430	77,123	78,175	80627	82,687
Knox	432,226	444,348	478,971	487,401	508654	530,212
Loudon	48,556	50,229	54,886	56,996	61,596	65,897
Roane	54,181	53,162	53,404	54,403	55,607	55,734
ROI	610,092	623,169	664,384	676,975	706,484	734,530
Tennessee	6,346,105	6,499,615	6,910,840	6,986,082	7,242,733	7,513,757

Source: USCB 2010, 2015, 2020, 2023b, Boyd Center 2024.

As of 2023, the ROI had 301,151 housing units, of which 25,807 units (8.6 percent) were vacant (USCB 2023c). Of those vacant units, 4,369 were vacant rental units, representing about 1.5 percent of the housing stock. A large share of vacant units, 3,538 housing units, were classified for seasonal, recreational, or occasional use (USCB 2023d). 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 is served by seven public school districts; as of the 2023–2024 school year the districts in the ROI operated a total of 141 schools serving approximately 78,090 students (CCD 2024). There are multiple hospitals serving residents of the ROI, with the largest concentration of acute-care hospitals located in Knox County (including major systems such as the University of Tennessee Medical Center, Covenant Health hospitals, and other regional facilities). Methodist Medical Center is the primary acute care facility in Anderson County where the East End Campus would be located.

Fire protection in the ROI is provided by a mixture of career and volunteer departments; county and local department networks continue to provide primary fire and rescue coverage across the four counties. County Sheriff's Offices provide police protection services in cooperation with the Tennessee Highway Patrol and municipal police. There are over 1,300 fulltime law enforcement employees in the ROI.

Y-12 also maintains on-site emergency and security capabilities including a full-service, fire department that provides fire suppression, medical first response, HAZMAT/radiological

response, training, and incident command, and an armed, contractor-operated protective force overseen by DOE/NNSA that performs law-enforcement, armed response, detention, and specialized security operations.

3.10.2 Proposed Action Effects

Construction and Operation. It is anticipated that the phased construction of the East End Campus would last approximately 10 years. In terms of employment and income, NNSA estimated that there would be 300 peak construction workers (CNS 2026a). It is anticipated that some portion of construction materials would be purchased locally. Payroll and materials expenditures would have a positive impact on the local economies. Estimated direct construction jobs may result in additional indirect jobs providing increased local revenue. Most construction materials and temporary construction workers would most likely be drawn from the local community. As a result, permanent increases in population would not occur and housing and community services would not be permanently impacted. Because the peak construction workforce (300 persons) would be negligible compared to the projected population in the ROI, socioeconomic impacts during construction, although beneficial, are expected to be negligible. The increase in economic activity would be temporary and would subside when construction is completed.

Future operations would have a positive impact on regional economics. Initial operations would be expected to begin in approximately 2029, with phased construction occurring through approximately 2036. Full operations would occur in 2036. The operational workforce at the East End Campus is estimated to be 450 persons and would be comprised of the same workers who currently conduct these operations at Y-12. 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. There would be no impact to Y-12's on-site fire protection or protective force.

3.10.3 No-Action Alternative Effects

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

3.11 Traffic and Radiological Transportation

3.11.1 Affected Environment

Y-12 is located within 50 miles of three interstate highways: I-40, I-75, and I-81. As shown on Figure 3.11-1, collector roads serving the area around Y-12 include S. Illinois Avenue, the Oak Ridge Turnpike, Bethel Valley Road, Bear Creek Road, Union Valley Road, and Scarboro Road. Bear Creek Road has restricted access around Y-12 and is not a public thoroughfare. Bethel Valley Road is also closed to public access. The daily traffic counts for various roads in the vicinity of Y-12 are provided in Table 3.11-1. In the vicinity of the site, the collector roads have traffic speed limits of between 25 and 40 miles per hour.

Table 3.11-1. Average Daily Traffic Counts on Roads in Vicinity of Y-12

Pointer on Figure 3.11-1	Road	2022	2023	2024	Highest Traffic Count in Past 10 Years/(Year)
A	Oak Ridge Turnpike (near downtown Oak Ridge)	21,750	23,120	24,626	25,151/(2019)
B	S. Illinois Avenue (near Bethel Valley Road intersection)	26,857	35,907	27,595	42,528/(2020)
C	Scarboro Road (near Y-12 entrance)	10,470	10,187	10,248	13,889/(2020)
D	Bethel Valley Road (near Scarboro Road intersection)	10,649	10,964	11,030	12,001/(2020)
E	Lafayette Drive (near Emory Valley Road intersection)	16,402	17,453	19,072	22,321/(2020)

Source: TDOT 2026.

Figure 3.11-1. Roads in the Vicinity of Y-12

3.11.2 Proposed Action Effects

Construction. Construction of the East End Campus would require site preparation and construction of facilities and parking lots. As shown in Table 3.11-1, roads in the vicinity of Y-12 have handled more traffic in the past than current traffic. This, along with the existing road conditions, suggests that no significant modifications would be required to support the Proposed Action construction. During construction, the addition of a maximum of 300 vehicles to daily traffic counts of the area roads would change traffic counts by less than 3 percent. In general, traffic would need to increase by at least 20 percent to cause a level-of-service (LOS) change (Traffic 2021).[11] The addition of 300 construction workers would represent much less than a one percent increase in the Anderson County employment, which also suggests that area traffic would not be adversely affected.

Operation. During operations, there would be no change in traffic compared to current operations because existing workers would perform the operations in the East End Campus facilities.

The transportation of radiological material (DU and LLW) would not change as a result of the Proposed Action because the East End Campus would only change the location of operations within Y-12. DU would be shipped to the East End Campus via Y-12 Shipping & Receiving for storage prior to use. Approximately 200 to 300 MT of DU would be shipped to Y-12 annually from offsite sources, mainly from BWXT-Tennessee Ordnance located in Jonesborough, Tennessee. The operations at Y-12 would require transporting components to and from Pantex, where weapons assembly and disassembly operations occur. All transportation of secondary stage and cases is assumed to occur via the NNSA transportation fleet of SGTs over Federal and state highways to the extent practicable.

The potential impacts of transporting DU materials and the associated LLW has been extensively studied by DOE (*see* DOE 2020 and NNSA 2024a). Although transport of DU materials could occur via either truck or train, truck transport is the most likely mode. Up to 180 shipments of DU per year are expected between Y-12 and offsite locations.

In DOE 2020, DOE analyzed the transport of 46,200 shipments of DU materials over much longer distances than the distances associated with the Proposed Action in this EA. The potential impacts were calculated as follows: (1) Transport crews: 0.08 latent cancer fatalities (LCFs); and (2) Public: 0.2 LCFs (*see* Table 4-18 of DOE 2020). Compared to the impacts associated with transporting 46,200 shipments of DU materials, the potential impacts of transporting about 180 annual shipments of DU materials associated with the Proposed Action in this EA would be: (1) Transport crews: 0.0002 LCFs; and (2) Public: 0.0006 LCFs. Per the analysis in DOE 2020a, the transportation of one LLW shipment resulted in calculated impacts of a maximum of 2×10^{-7} LCFs to both transport crews and the public (*see* Table 4-20 of DOE 2020). NNSA notes that no

[11] The distinctions between LOS ratings are subjective, and many factors can affect how a given traffic change will affect the LOS on a given road, including road design, number of lanes, number of intersections, speed limit, and signalization. Consequently, the ability to make definitive conclusions about an LOS change on a given road is limited.

additional shipments of LLW would occur as a result of the Proposed Action. Accident impacts associated with transport of DU materials are presented in Section 3.14.2.

3.11.3 No-Action Alternative Effects

Under the No-Action Alternative, the Proposed Action would not occur and there would be no additional effects to traffic on area roads or radiological transportation impacts.

3.12 Infrastructure

3.12.1 Affected Environment

The proposed East End Campus would be sited on the east end of Y-12 and would be tied into existing infrastructure. The following section outlines the availability and capacity of utilities at Y-12 and the anticipated infrastructure needs of the East End Campus. Projected utility usage is discussed in Section 3.12.2. Table 3.12-1 identifies the utility providers and size of infrastructure available at Y-12.

Table 3.12-1. Y-12 Utilities

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

Electricity. Electric power for Y-12 is supplied by the Tennessee Valley Authority (TVA). Power is delivered to the site via three 161 kilovolt (kV) overhead radial feeder lines and distributed through eleven 13.8kV systems with capacities ranging from approximately 20 to 50 mega-voltamperes (MVA). These systems step down voltage from 161 kV to 13.8 kV and distribute power to unit substations across the site. The combined 13.8kV system includes approximately 30 miles of overhead lines, 10 miles of underground cable, and about 740 pole-mounted and pad-mounted transformers (NNSA 2011).

Average monthly electrical demand at Y-12 is approximately 15 to 18 MW, compared with an available capacity of roughly 430 MW. This excess capacity reflects the site's original design to support the energy intensive uranium enrichment mission. Subsequent mission changes, including the transition to weapons component manufacturing and current missions, have substantially reduced electrical demand. In 2024, Y-12 consumed approximately 160,000 MWh of electricity (DOE 2025).

In 2022, Y-12 transitioned its primary electrical supply from the legacy Elza1 Substation (constructed in 1952) to the newly constructed Pine Ridge Substation. Built by TVA in support of

the UPF project, the Pine Ridge Substation is a 70MVA facility with a 161kV switchyard and power distribution center that now serves both Y-12 and UPF. As of 2023, Y-12 achieved a 53 percent reduction in energy intensity relative to the 2003 baseline (DOE 2025).

Y-12 maintains emergency and standby power systems to support critical safety related facilities during power outages. These systems include 37 fixed generators and 11 portable generators with a combined capacity of approximately 2.6 MWe (NNSA 2011).

Natural Gas. Sigcorp Energy Services supplies natural gas to the ORR and Y-12. Natural gas, which is used for the Y-12 steam plant and facilities, is supplied via a pipeline from the East Tennessee Natural Gas Company at "C" Station located south of Bethel Valley Road near the eastern end of Y-12. A 14-inch, 125-pounds per square inch gauge (psig) line is routed from "C" Station to the southwest corner of the Y-12 perimeter fence (NNSA 2011). In 2024, Y-12 consumed 635,285 thousand cubic feet of natural gas (DOE 2025).

Steam. Steam is essential to Y-12 operations and is the primary source of building heat for occupant comfort and winter freeze protection of critical systems, including fire protection infrastructure. Steam also supports the production mission, including operation of process equipment, regeneration of dehumidification systems, and steam-powered ejectors.

In June 2010, Y-12 placed into service a high-efficiency, natural gas-fired steam plant that replaced the 1955 coal-fired facility. The plant operates continuously and distributes steam at approximately 235 pounds per square inch gauge (psig) through 2 to 18inch diameter headers, with condensate returned for reuse as demineralized water feed. Annual gross steam production is approximately 1.5 billion pounds (NNSA 2011).

Water. Raw water for Y-12 is withdrawn from the Clinch River south of Y-12 and conveyed to the Pine Ridge water treatment plant northeast of Y-12, which has been owned and operated by the City of Oak Ridge since April 2000. The plant can deliver up to 24 million gallons per day (MGD) to two storage reservoirs serving Y-12, ORNL, and the City of Oak Ridge.

At Y-12, separate underground systems distribute raw and treated water. Raw water is supplied by two mains (a 16-inch line and an 18-inch line connected to the 24-inch filtration feed line) and conveyed through approximately 5 miles of pipe ranging from 4 to 18 inches in diameter, while the treated water system includes approximately 19 miles of pipe ranging from 1 to 24 inches in diameter. Average potable water use in 2024 was approximately 1.9 MGD, or 693 million gallons per year (DOE 2025).

Y-12 potable water system supplies domestic and process water across the site and provides fire protection service, including sprinkler systems, hydrants, and emergency firefighting storage. Potable water also serves sanitary fixtures and safety equipment (showers, eyewashes, decontamination facilities, drinking fountains, restrooms, change houses, and the cafeteria), and supplies process systems (makeup for the steam plant demineralizer, cooling tower makeup, process cooling, cleaning/decontamination, chemical makeup, and laboratory uses). The system includes a 16inch emergency backup feed to ORNL.

In 2019, the City of Oak Ridge obtained a Water Infrastructure Finance and Innovation Act loan to replace the existing 80 year old conventional treatment plant with a new ultrafiltration

membrane facility and to modernize ancillary infrastructure (intake pumps, traveling screens, finished water pump station, pipelines, and tanks), improving long-term drinking water reliability and quality for Y-12 and the Oak Ridge community (EPA 2019).

Wastewater. The Y-12 Site's sanitary sewer system was first installed in 1943 and expanded as the plant grew. Sewage from most buildings flows to an 18-inch sewer main that leaves the east end of the plant near Lake Reality and connects to the city main near the intersection of Bear Creek Road and Scarboro Road. The current system capacity is approximately 1.5 MGD. The average daily flow has been approximately 0.75 MGD (NNSA 2011). Y-12 has a sanitary sewer users permit, issued by the City of Oak Ridge, which regulates water discharges.

Communications. Y-12 operates four primary telecommunications systems: the Oak Ridge Federal Integrated Communications Network (USWest operated copper network for telephone, fax, special data, and alarm circuits distributed sitewide); the Cable Television Network (CATV, coaxial to selected sites); the unclassified Intrasite Network (fiberoptic backbone with routed Ethernet and IP subnets serving most buildings); and the Y-12 Defense Programs Network (DPNet, the classified services network comprising a coaxial broadband layer and a fiberoptic backbone with connectivity to protected area buildings).

3.12.2 Proposed Action Effects

Construction. The East End Campus would connect to existing Y-12 utilities (electricity, natural gas, steam, potable/fire water, sanitary sewer, and communications) via new tie-ins and limited removal/replacement of onsite utility runs. Because the project footprint and adjacent areas are previously disturbed and utility capacities at Y-12 are sufficient to accommodate additional loads, utility tie-ins and trenching are expected to cause only localized, short-term disturbance. Utility disruptions would be minimized through coordination with Y-12 operations and external providers, planned outages, and conventional best management practices (e.g., traffic control, erosion and sediment controls, and prompt restoration of pavement and landscaping).

Short-term resource demands during construction would be limited. An estimated 1.8 million gallons of water annually would be used for dust suppression and construction activities in addition to baseline site usage; other utility demands (electricity, natural gas, steam, sanitary sewer, and communications) are not expected to increase noticeably during construction.

Operation. Until the existing facilities are dispositioned, the operational utility demands associated with the East End Campus would be additive to existing utility demands but well within Y-12's existing capacities; primary impacts would be new service taps, metering, distribution routing, and routine maintenance. No major upgrades to transmission or treatment infrastructure are anticipated.

Electricity. The East End Campus would connect to Y-12's 13.8kV distribution systems which draws from TVA's supply via existing substations. Projected operational demand (15,000 MWh annual consumption) is well within the site's total available capacity (430 MW). Construction of a new 13.8kV electrical distribution system would be required to serve the proposed East End Campus, with the system supplied by the new Elza Substation. A purpose-built distribution system would be designed to provide a high level of reliability and operational

flexibility to support continuous facility operation and maintainability of electrical equipment. Electrical impacts would be limited to installation of new routing of distribution infrastructure, service taps, and associated metering and protective equipment at the point of interconnection. No modifications or upgrades to major transmission facilities are anticipated (CNS 2026b).

Natural Gas. Natural gas would be the primary heating source for the East End Campus. Estimated annual gas use for operations is projected to be 11.64 million cubic feet per year. The East End Campus would tie into the onsite natural gas distribution fed from the Sigcorp/East Tennessee pipeline system. To meet the loads of all facilities within the campus, a new buried 3-inch supply line and pressure regulating station may be required (CNS 2026b).

Steam. There are no projected steam requirements or anticipated steam usage associated with the East End Campus. Accordingly, the campus build-out would result in no impacts to steam use at Y-12. Minor long-term benefits to overall steam demand may occur as legacy facilities are decommissioned and removed from service, resulting in a net reduction in campus-wide steam demand (CNS 2026b).

Water. Operational water demand for the East End Campus is estimated at approximately 4.3 million gallons per year. Y-12's treated water system (24 MGD capacity; separate treated/raw mains and extensive distribution piping) has sufficient capacity to accommodate this incremental demand without system upgrades. To support the campus build-out, approximately 4,500 ft of new buried mains for building connections would be required (CNS 2026b).

Wastewater. The East End Campus would generate approximately 3.8 million gallons per year of sanitary wastewater. This incremental flow is small relative to the City/Y-12 conveyance and treatment capacity (system capacity 1.5 MGD; historical average 0.75 MGD). Impacts would be limited to installing sanitary sewer laterals, flow metering, and possible pretreatment for cafeteria/food service discharges if required by the sewer use permit. All discharges would comply with the existing sanitary sewer users permit and local pretreatment requirements.

Communications. The East End Campus would tie into existing Y-12 telecommunications and security networks. Impacts are limited to fiber/copper cable routing, installation of building network rooms and security interfaces, and short, localized disruptions during splicing or cutovers. Design will include classified/unclassified separations and security upgrades (physical ties, access control), coordinated with Y-12 IT and security to maintain communications continuity and meet classification and cybersecurity requirements.

3.12.3 No-Action Alternative Effects

Under the No-Action Alternative, the East End Campus would not be built and no new utility tie-ins, service taps, or construction related disturbances (excavation, temporary outages, or increased water use) would occur. Existing utility runs and aging infrastructure on the 22acre site would remain in place. Consequently, short-term impacts are avoided but long-term modernization and resilience benefits would be foregone.

3.13 Waste Management

3.13.1 Affected Environment

DOE is authorized to manage radioactive waste that it generates under the Atomic Energy Act of 1954. Y-12 is managed in accordance with DOE Orders, policies, and guidance related to management of radioactive waste. Management of this waste is not directly regulated by the USEPA or TDEC. The TDEC Division of Solid Waste Management (DSWM) regulates the management of both hazardous and non-hazardous waste streams.

Y-12 has no active disposal facility on-site for disposal of low-level radioactive waste (LLW), mixed 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 (NNSA 2024a). Current annual waste generation at Y-12 is summarized in Table 3.13-1.

Table 3.13-1. Annual Waste Generation at Y-12

Waste Type	2023
LLW (solid) (cubic yards/year)	6,037[a]
MLLW (solid) (cubic yards/year)	1,018
Hazardous Waste (metric tons/year)	19.7[b]

a. Includes LLW (liquid)
b. Hazardous waste volume converted to metric tons based on 250 pounds per cubic yard.
Source: CNS 2026a.

With regard to nonhazardous waste, DOE operates solid waste disposal facilities located near Y-12, called the ORR Landfills, three of which are active (*see* Table 3.13-2).

Table 3.13-2. Active Landfills at the ORR

Waste Disposal Facility	Type	Waste Received	Statistics
Construction/ Demolition Landfill VII	TDEC Permit	Construction/ demolition debris	• 30.4-acre site, opened in 2001 • Total capacity of 2.08 million yd^3 • Remaining years of use as of 2022: 48.5
Industrial Landfill IV	TDEC Permit	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 • Remaining years of use as of 2022: 81.7
Industrial Landfill V	TDEC Permit	Sanitary/industrial waste (including office/cafeteria waste, construction/demolition debris)	• 25.9-acre landfill, opened in 1994 • Total capacity of 2.1 million yd^3 • Remaining years of use as of 2022: 14.3

Note: In addition to the three active landfills, there are other CERCLA-related waste disposal facilities at the ORR, including the Environmental Management Waste Management Facility (EMWMF), which is a 28-acre disposal facility used for low-level radiological and/or hazardous waste from CERCLA cleanup of the ORR and associated sites; and the proposed Environmental Management Disposal Facility (EMDF), also for CERCLA cleanup. The final ROD for EMDF was issued on September 30, 2022. The EMWMF and EMDF can only accept CERCLA waste from

cleanup at ORR. Wastes from the Proposed Action would not be disposed of at the EMWMF and EMDF, unless those wastes were classified as CERCLA wastes.
Source: DOE 2017, DOE 2021, UCOR 2022.

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. Between 2019 and 2024, approximately 736,573 cubic yards of waste in total were disposed in the landfills, which amounts to approximately 117,000 cubic yards annually (DOE 2025).

3.13.2 Proposed Action Effects

Construction. Although construction debris would be generated, no notable quantities of nonhazardous waste would be generated during construction and any demolition activities. To the extent practicable, NNSA would implement pollution prevention/recycling measures to minimize waste generation and disposal requirements. During construction, there is the possibility that legacy waste or contaminated materials may be encountered. Prior to construction, NNSA would perform soil sampling, as required, and would manage wastes in accordance with applicable regulatory requirements.

Operation. Although NNSA expects that the technologies deployed in the East End Campus would be more efficient and require fewer process steps than existing processes, which could reduce operational wastes, NNSA could not quantify this reduction at this stage of the design process and did not take credit for those potential reductions in this EA analysis. Consequently, this EA assumes there would be no change in the generation of LLW, hazardous waste, or non-hazardous waste during operations, as compared to the No-Action Alternative. Annually, East End Campus operations would generate approximately 61 cubic yards of LLW, 0.23 metric tons of hazardous waste, and 175 tons of nonhazardous waste. All wastes generated would be evaluated and managed in accordance with DOE Orders, policies, and guidance and the TDEC DSWM, as appropriate.

3.13.3 No-Action Alternative Effects

Under the No-Action Alternative, the East End Campus would not be constructed and there would be no changes to the existing waste management operations discussed in Section 3.13.1.

3.14 Human Health

3.14.1 Affected Environment

The Proposed Action would utilize DU and small quantities of hazardous chemicals. Consequently, the discussions related to human health impacts are focused on occupational injuries to the construction and operating workforce and radiological and chemical hazards to workers and the public. With regard to the public, the analysis focuses on whether normal operations could cause off-site exposures to radiological materials and hazardous chemicals that would result in adverse health effects.

Y-12 operations result in radiological emissions to the air. In 2024, an estimated 0.0717 Curies of uranium was released into the atmosphere as a result of Y-12 process and operational activities. The calculated radiation dose to the maximally exposed individual (MEI)[9] from airborne radiological release points at Y-12 during 2024 was 0.5 millirem. This dose is well below the National Emission Standards for Hazardous Air Pollutants standard of 10 millirem/year (DOE 2025). With regard to the Y-12 workforce, approximately 1,567 workers received a measurable radiation dose, with an average annual worker dose of 32 millirem (DOE 2024), which is well below the 5 rem/ year worker dose limit specified in 10 CFR 835, and the NNSA administrative limit of 2 rem/year. In 2025, the Y-12 workforce lost approximately 600 days due to injury/illness, which represents the lowest impact in the past five years (DOE 2026b). There were no workforce fatalities at Y-12 in 2025.

3.14.2 Proposed Action Effects

Construction. Potential effects to construction workers were evaluated using Bureau of Labor Statistics (BLS) occupational injury/illness and fatality rates. The potential risk of occupational injuries/illnesses and fatalities to workers involved in construction activities at Y-12 are assumed to be represented by injury/illness and fatality rates for general industrial construction. Table 3.14-1 lists the potential estimates of injuries/illnesses and fatalities estimated for construction. In any given year of construction, a total of 2.5 days of lost work from illness/injury and zero (0.004) fatalities would be expected.

Table 3.14-1. Occupational Injury/Illness and Fatality Estimates for Construction

Injury, Illness, and Fatality Categories	Total
Peak annual workforce	300
Lost days due to injury/illness annually	2.5
Number of fatalities annually	0.004

Sources: CNS 2026a, BLS 2026b.

Operation. Occupational effects would be expected to decrease compared to current operations because existing workers would perform the operations in the East End Campus facilities on modern and safer equipment. However, NNSA could not quantify this improvement in worker safety at this stage of the design process. 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 at Y-12.

With respect to radiological impacts to workers, operational workers would be expected to receive radiological doses similar to existing operations at Y-12. In 2023, the average annual dose to a worker who received a measurable dose at Y-12 was 32 millirem (DOE 2024). If the 450 workers at the East End Campus received a dose of 32 millirem, the total annual dose would be 14.4 person-rem. Statistically, this equates to a total worker LCF risk of 0.009, or approximately 1 LCF every 115 years of operation. The individual worker LCF risk would be 1.9×10^{-5}, which is the same as the current worker LCF risk at Y-12. Because radiological and hazardous effluents

[9] The MEI is a hypothetical member of public who would be expected to receive the highest dose from operations at a given facility.

and emissions would not change compared to existing operations at Y-12, no change in health impacts to the public are expected during normal operations.

3.14.3 No-Action Alternative Effects

Under the No-Action Alternative, the Proposed Action would not occur and there would be no additional effects to human health.

3.15 Accidents and Intentional Destructive Acts

3.15.1 Affected Environment

Because the Proposed Action would utilize DU and small quantities of hazardous chemicals, the affected environment consists of the workers at Y-12 and the public surrounding Y-12 that may be affected by a radiological or chemical accident.

3.15.2 Proposed Action Effects

Each of the facilities associated with the East End Campus would contain less than HC-3 thresholds of nuclear materials based upon categorization performed in accordance with DOE-STD-1027-2018, which means there is no potential for significant offsite radiological consequences.

Demonstration-scale quantities of hazardous chemicals could be used in East End Campus facilities such as the Radiation Case Analytical Chemistry Laboratory. NNSA analyzed an accidental release of nitric acid, which is the most hazardous chemical that would be used. The analysis used the American Industrial Hygiene Association's Emergency Response Planning Guide (ERPG) values to develop hazard indices for chemical exposures, as follows:

- **ERPG-1** is the maximum airborne concentration below which nearly all individuals could be exposed for up to one hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor.
- **ERPG-2** is the maximum airborne concentration below which nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.
- **ERPG-3** is the maximum airborne concentration below which nearly all individuals could be exposed for up to one hour without experiencing or developing life-threatening health effects.

The maximum quantity of nitric acid in any facility is expected to be less than 2,500 liters (CNS 2026a). The accident scenario postulates a leak, such as a pipe or tank rupture, and assumes that up to 10 percent of the nitric acid could be released to the environment, which equates to 250 liters (approximately 340 kilograms). Table 3.15-1 provides information on the consequences of such an accidental release.

Table 3.15-1. Chemical Accident Frequency and Consequences at the East End Campus

Chemical Released	Quantity Released (kg)	ERPG-2		Concentration	
		Limit (ppm)	Distance to Limit (meters)	At 100 m (ppm)	At Site Boundary[a] (ppm)
Nitric acid	340	10	38	1.1	<1.1

ERPG = Emergency Response Planning Guide; kg = kilogram; km = kilometer; m = meter; ppm = parts per million
a. Site boundary would be no closer than 100 meters from any East End Campus facility.

The impacts of chemical releases are measured in terms of ERPG-2 protective concentration limits given in parts per million. The distances at which the limit is reached are also provided for the ERPG-2 limit. The concentration of the chemical at the noninvolved worker location (i.e., 100 meters from the accident) is shown for comparison with the concentration limit for ERPG-2. The distance to the site boundary and the concentration at the site boundary are also shown for comparison with the ERPG-2 concentration limits and for determining if the limits are exceeded offsite. Conservative modeling of chemical release over the period of one hour was based on a spill and subsequent pool with evaporation resulting in calculated downwind concentrations. As shown in Table 3.15-1, the concentrations would be much less than the ERPG-2 limit at 100 meters and the site boundary.

DOE has performed extensive and detailed radiological transportation accident analyses in NEPA documents and Documented Safety Analyses (DSAs) for DU operations and for the handling and transportation of DU materials. The DSAs that analyzed the handling and storage of cylinders of DU oxide concluded that no accident scenarios or mechanisms were identified that could result in the airborne dispersion of substantial quantities of DU oxide, and that the hazards associated with DU oxide evaluated resulted in acceptable-risk events (see the *Final Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride* [DOE/EIS-0359-S1 and DOE/EIS-0360-S1]; DOE 2020). All of the operational and natural phenomena-initiated events identified in the DSAs that involved DU oxide were found to have low unmitigated (without preventive or mitigative features) radiological and chemical consequences to facility (involved) or collocated (noninvolved) workers, and negligible radiological and chemical consequences to the public (DOE 2020). Accident risks for the Proposed Action analyzed in this EA are expected to be similar in nature to or less than the accident impacts presented in DOE 2020, as the quantities of DU transported in support of East End Campus operations would be smaller compared to the analyses in DOE 2020.

Intentional Destructive Acts. NNSA is required to consider intentional destructive acts, such as sabotage and terrorism, in the NEPA documents it prepares. The possibility exists for random acts of violence and vandalism. Because of the low hazard posed by DU, the material would not be an attractive target for a terrorist attack or other intentional destructive acts (DOE 2020, NNSA 2024a). Consequently, the risk of terrorist acts associated with the Proposed Action are considered minimal given that there would be minimal quantities of hazardous and radiological materials at the East End Campus facilities, especially in relation to other hazardous material at other Y-12 facilities. Substantial security measures (such as gates and fences) would also be in place to reduce the likelihood of a successful intentional destructive act at the East End Campus.

3.15.3 No-Action Alternative Effects

Under the No-Action Alternative, the Proposed Action would not occur and there would be no additional accident or intentional destructive acts effects.

4.0 REFERENCES

BLS 2026a — Bureau of Labor Statistics (BLS). "Local Area Unemployment Statistics." Available online: https://data.bls.gov/pdq/SurveyOutputServlet. Accessed January 2026.

BLS 2026b — BLS. "Injuries, Illnesses, and Fatalities." Available at: https://www.bls.gov/iif/oshstate.htm#TN. Accessed January 2026.

Boyd Center 2024 — Boyd Center for Business and Economic Research, Tennessee State Data Center (Boyd Center). "Boyd Center Population Projections, 2022-2070 Projections." August 7, 2024. Available online: https://tnsdc.utk.edu/estimates-and-projections/boyd-center-population-projections/. Accessed October 2024.

CCD 2024 — NCES Common Core of Data (CCD). "District Detail 2023–2024 school year." Available online: nces.ed.gov.

CNS 2025a — Consolidated Nuclear Security (CNS). "Agile Radiation Case Capability (ARCC) and Uranium Production and Weaponization Testbed (UPWT) Siting Study Update." August 6, 2025.

CNS 2026a — CNS. "Data Call for the East End Campus EA." January 2026.

DOE 2017 — DOE. "Waste Disposal Capacity for Oak Ridge Reservation Landfills." Powerpoint Presentation by Brian Henry, Y-12 Portfolio Federal Project Director. Available at: https://www.energy.gov/sites/prod/files/2017/02/f34/2017%20February%208%20ORR%20Waste%20Disposal%20Capacity%20Presentation.pdf. February 8, 2017. Accessed January 2026.

DOE 2020 — DOE. "Final Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride" (DOE/EIS-0359-S1 and DOE/EIS-0360-S1). April 2020. Available at: https://www.energy.gov/nepa/doeeis-0359-s1-and-doeeis-0360-s1-supplemental-eis-disposition-depleted-uranium-oxide. Accessed January 2026.

DOE 2021 — DOE. "Ongoing Efforts to Assure Waste Disposal Capacity for the Oak Ridge Reservation." Powerpoint Presentation by Brian Henry, Y-12 Portfolio Federal Project Director. Available at: https://www.energy.gov/sites/default/files/2021-. Accessed January 2026.

DOE 2024 — DOE. "DOE Occupational Radiation Reports 2023." Available at https://www.energy.gov/ehss/listings/annual-doe-occupational-radiation-exposure-reports. Accessed January 2026.

DOE 2025 — DOE. "Oak Ridge Reservation Annual Site Environmental Report 2024." DOE-SC-ORO/RM-2025. September 2025. Available at: https://doeic.science.energy.gov/aser/aser2024/index.html. Accessed January 2026.

DOE 2026a — DOE. *U.S. Department of Energy National Environmental Policy Act (NEPA) Implementing Procedures*. February 2, 2026. Available online: https://www.energy.gov/sites/default/files/2026-01/DOE-NEPA-Implementing-Procedures-2026-02-02.pdf.

DOE 2026b — DOE. "Injury and Illness Dashboard." Available at: https://data.doe.gov/MS/asp/Main.aspx. Accessed January 2026.

EPA 2019 — U.S. Environmental Protection Agency (EPA). "EPA Announces Nearly $21 Million Water Infrastructure Loan to the City of Oak Ridge." Available at: https://www.epa.gov/newsreleases/epa-announces-nearly-21-million-water-infrastructure-loan-city-oak-ridge.

EPA 2026a — EPA. "Tennessee Nonattainment/ Maintenance Status for Each County by Year for All Criteria Pollutants." Available at: https://www3.epa.gov/airquality/greenbook/. Accessed January 2026.

EPA 2026b — EPA. "National Emissions Inventory Background." Available at: https://awsedap.epa.gov/public/single/?appid=20230c40-026d-494e-903f-3f112761a208&sheet=5d3fdda7-14bc-4284-a9bb-cfd856b9348d&opt=ctxmenu,currsel. Accessed January 2026.

FEMA 2025 — Federal Emergency Management Agency (FEMA) 2025, "Resilience Analysis and Planning Tool", Accessed at: https://experience.arcgis.com/experience/0a317e8998534c30a9b2d3861c814d42/#data_s=id%3Awidget_214_output_config_default_geocode_0_0%3A0. Accessed: January 2026.

FHWA 2006 — Federal Highway Administration (FHWA). "FHWA Highway Construction Noise Handbook." Prepared by G. G. Fleming, H. S. Knauer, C. S. Y. Lee, and S. Pedersen, U.S. Department of Transportation, Federal Highway Administration, Washington, D.C. Available at: https://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/design/index.cfm.

Harris 1998 — Harris, C.M . "Handbook of Acoustical Measurement and Noise Control. Acoustical Society of America." Sewickley, PA.

NNSA 2011 — National Nuclear Security Administration (NNSA). "Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex," Department of Energy, NNSA, DOE/EIS-0387, February 2011.

Available at: https://www.energy.gov/sites/prod/files/EIS-0387-FEIS-Summary-2011.pdf. Accessed January 2026.

NNSA 2021 — NNSA. "Environmental Assessment for the Lithium Processing Facility at the Y-12 National Security Complex, Oak Ridge, Tennessee." DOE/EA-2145. March 2021. Available at: https://www.energy.gov/sites/default/files/2021-03/final-ea-2145-lithium-processing-facility-2021-03_0.pdf. Accessed January 2026.

NNSA 2024a — NNSA. "Environmental Assessment for Offsite Depleted Uranium Manufacturing." November 2024. Available at: https://www.energy.gov/nepa/doeea-2252-site-depleted-uranium-manufacturing-multiple-locations-tn. Accessed January 2026.

NNSA 2024b — NNSA. "Finding of No Significant Impact for the Environmental Assessment for Offsite Depleted Uranium Manufacturing." November 2024. Available at: https://www.energy.gov/nepa/articles/doeea-2252-finding-no-significant-impact. Accessed January 2026.

NNSA 2026a — NNSA. "EA Determination for the ARCC Campus at Y-12." February 2026.

Oak Ridge 2022 — Oak Ridge City Council. "Zoning Ordinance." As originally passed June 17, 1959 with Amendments through November 24, 2022. Available at: https://www.oakridgetn.gov/DocumentCenter/View/119/Zoning-Ordinance-PDF. Accessed October 2024.

ORNL 2007 — ORNL. "Wildlife Management Plan for the Oak Ridge Reservation." ORNL/TM-2006/155. August 2007.

TDOT 2026 — Tennessee Department of Transportation (TDOT). "Annual Average Daily Traffic." Available at: https://tdot.public.ms2soft.com/tcds/tsearch.asp?loc=Tdot&mod=TCDS. Accessed January 2026.

Traffic 2021 — The Geography of Traffic Systems. "Levels of Service for Road Transportation." Available at: https://transportgeography.org/contents/methods/transport-technical-economic-performance-indicators/levels-of-service-road-transportation/. Accessed January 2026.

UCOR 2022 — United Cleanup Oak Ridge (UCOR). "2022 Estimate of Remaining Life of Landfill VII, Landfill IV, and Landfill V." August 25, 2022.

USAF 2020 — U.S. Air Force (USAF). "Air Conformity Applicability Model (ACAM)."

USCB 2010 — U.S. Census Bureau. "RACE." Decennial Census, DEC Redistricting Data (PL 94-171), Table P1, 2010. Available online:

https://data.census.gov/table/DECENNIALPL2010.P1?q=population&g=050XX00US47001,47093,47105,47145. Accessed January 2026.

USCB 2015 — U.S. Census Bureau. "Hispanic or Latino Origin By Race." American Community Survey, ACS 5-Year Estimates Detailed Tables, Table B03002, 2015. Available online: https://data.census.gov/table/ACSDT5Y2015.B03002?q=b03002&g=050XX00US47001,47093,47105,47145. Accessed January 2026.

USCB 2020 — U.S. Census Bureau (USCB). "RACE." Decennial Census, DEC Redistricting Data (PL 94-171), Table P1, 2020. Available online: https://data.census.gov/table/DECENNIALPL2020.P1?q=population&g=050XX00US47001,47093,47105,47145. Accessed January 2026.

USCB 2023a — U.S. Census Bureau. "Selected Economic Characteristics." American Community Survey, ACS 1-Year Estimates Data Profiles, Table DP03, 2023. Available online: https://data.census.gov/table/ACSDP1Y2024.DP03?q=dp03&g=050XX00US47001,47093,47105,47145. Accessed January 2026.

USCB 2023b — USCB. "Hispanic or Latino Origin By Race." American Community Survey, ACS 5-Year Estimates Detailed Tables, Table B03002, 2023. Available online: https://data.census.gov/table/ACSDT5Y2023.B03002?q=b03002&g=050XX00US47001,47093,47105,47145. Accessed January 2026.

USCB 2023c — USCB. "Selected Housing Characteristics." American Community Survey, ACS 5-Year Estimates Data Profiles, Table DP04, 2023. Available online: https://data.census.gov/table/ACSDP5Y2022.DP04?q=dp04&g=050XX00US47001,47093,47105,47145. Accessed January 2026.

USCB 2023d — USCB. "Vacancy Status." American Community Survey, ACS 5-Year Estimates Data Profiles, Table B25004, 2022. Available online: https://data.census.gov/table/ACSDT5Y2022.B25004?q=b25004&g=040XX00US47_050XX00US47001,47059,47093,47105,47145,47163,47179. Accessed January 2026.

USGS 2023 — United States Geological Survey (USGS), "Dynamic Hazard Curves, NSHM Conterminous U.S. 2023", Accessed at: https://earthquake.usgs.gov/nshmp/hazard/dynamic?commonReturnPeriods=2475&latitude=35.987&longitude=-84.256&maxDirection=false&model=CONUS_2023&returnPeriod=2475&siteClass=BC&truncate=false&imt=PGA&sourceType=Total&vs30=760. Accessed: January 2026.

USGS 2025a USGS. Earthquake Catalog, https://earthquake.usgs.gov/earthquakes/search/, Accessed: January 2026.

USGS 2025b USGS. "The Modified Mercalli Intensity Scale", Accessed at: https://www.usgs.gov/programs/earthquake-hazards/modified-mercalli-intensity-scale. Accessed: January 2026.

APPENDIX A

Acronyms and Abbreviations

BDF	Binary Demonstration Facility
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
CERCLA	*Comprehensive Environmental Response, Compensation & Liability Act*
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNS	Consolidated Nuclear Security, LLC
CO	carbon monoxide
dBA	A-weighted decibel
DD&D	decontamination, decommissioning, and demolition
DOE	U.S. Department of Energy
DU	depleted uranium
DSWM	Division of Solid Waste Management
EA	environmental assessment
EFPC	East Fork Poplar Creek
EIS	environmental impact statement
EMDF	Environmental Management Disposal Facility
EMWMF	Environmental Management Waste Management Facility
ERPG	Emergency Response Planning Guide
ETTP	East Tennessee Technology Park
FONSI	finding of no significant impact
g	gravity
HC	Hazard Category
HEPA	high efficiency particulate air
HPP	Historic Preservation Plan
IBC	International Building Code
LCF	latent cancer fatality
LLW	low-level radioactive waste
LOS	level-of-service
MEI	maximally exposed individual
MGD	million gallons per day
MVA	megavolt-amperes
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NEPA	*National Environmental Policy Act* of 1969, as amended
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O_3	ozone
ORNL	Oak Ridge National Laboratory

ORR	Oak Ridge Reservation
PA	Programmatic Agreement
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
psig	pounds per square inch gage
ROI	region of influence
SGTs	Safeguards Transporters
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
SPCC	spill prevention, control, and countermeasures
SWPPP	Stormwater Pollution Prevention Plan
T&E	threatened and endangered
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority
UEFPC	Upper East Fork Poplar Creek
UPF	Uranium Processing Facility
UPWT	Uranium Production and Weaponization Testbed
U.S.	United States
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
VRM	Visual Resource Management
Y-12	Y-12 National Security Complex