HALEY ALDRICH

RADIANT

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# ENVIRONMENTAL REPORT
# RADIANT R-50 SITE
# OAK RIDGE, TENNESSEE



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For:
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# List of Acronyms

| Acronym | Definition |
|---|---|
| ACS | American Community Survey |
| AHPA | Archaeological and Historic Preservation Act |
| ALARA | As Low As Reasonably Achievable |
| APC | Air Pollution Control |
| APE | Area of Potential Effect |
| ARAP | Aquatic Resource Alteration Permit |
| ASCE | American Society of Civil Engineers |
| ASOS | Automated Surface Observing System |
| ATL | Hartsfield-Jackson Atlanta International Airport |
| BCC | Birds of Conservation Concern |
| BCR | Bird Conservation Region |
| BGEPA | Bald and Golden Eagle Protection Act |
| BLM | Bureau of Land Management |
| BLS | U.S. Bureau of Labor Statistics |
| BMPs | Best Management Practices |
| BNA | Nashville International Airport |
| BORCE | Black Oak Ridge Conservation Easement |
| CAA | Clean Air Act |
| CDR | Covenant Deferral Request |
| CE | Categorical Exclusion |
| CEQ's | Council on Environmental Quality's |
| CFR | Code of Federal Regulations |
| cis-1,2-DCE | cis-1,2-dichloroethene |
| CO | Carbon Monoxide |
| CRM | Clinch River Miles |
| CROET | Community Reuse Organization of East Tennessee |
| CSA | Combined Statistical Area |
| CSM | Conceptual Site Model |
| CVOC | Chlorinated Volatile Organic Compound |
| CWA | Clean Water Act |
| dB | Decibels |
| DEM | Digital Elevation Model |
| DOE | Department of Energy |
| DOT | Department of Transportation |
| DSWM | Division of Solid Waste Management |
| DVS | Dynamic Verification Strategy |
| DWR | Division of Water Resources |
| EA | Environmental Assessment |
| EDE | Effective Dose Equivalent |

| Acronym | Definition |
|---|---|
| EDR | Environmental Data Resources |
| EIS | Environmental Impact Statement |
| ESA | Environmental Site Assessment |
| ESD | Explanation of Significant Differences |
| ESP | Early Site Permit |
| ETHRA | East Tennessee Human Resource Agency |
| ETTP | East Tennessee Technology Park |
| EUs | Exposure Units |
| FEMA | Federal Emergency Management Agency |
| FIR | Federal Industry and Research |
| FIRM | Flood Rate Insurance Map |
| FTE | Full-Time Equivalent |
| GPS | Global Positioning System |
| HALEU | High Assay Low Enriched Uranium |
| HEPA | High Efficiency Particulate Air |
| HMTA | Hazardous Materials Transportation Act |
| HVAC | Heating, Ventilation, and Air conditioning |
| ICs | Institutional Controls |
| IEA | Internal Energy Agency |
| INL | Idaho National Laboratory |
| ISFSI | Independent Spent Fuel Storage Installation |
| IPaC | Information for Planning and Consultation |
| IRENA | International Renewable Energy Agency |
| KAT | Knoxville Area Transit |
| LLMW | Low-Level Mixed Waste |
| LLRW | low-Level Radioactive Waste |
| LUCs | Land Use Controls |
| MCL | Maximum Contaminant Level |
| MEI | Maximally Exposed Individual |
| MGD | Million Gallons per Day |
| MHI | Median Household Income |
| NAAQS | National Ambient Air Quality Standards |
| NCA | Noise Control Act |
| NEPA | National Environmental Policy Act |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| NFA | No Further Action |
| NHD | National Hydrography Dataset |
| NHP | National Historic Park |
| NHPA | National Historic Preservation Act |
| NLCD | U.S. Geological Survey National Land Cover Dataset |
| NMSS | Nuclear Material Safety and Safeguards |

| Acronym | Definition |
|---|---|
| $NO_2$ | Nitrogen Dioxide |
| NOI | Notice of Intent |
| NPDES | National Pollution Discharge Elimination System |
| NRC | Nuclear Regulatory Commission |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| NWI | National Wetland Inventory |
| NWP | Nationwide Permit |
| $O_3$ | Ozone |
| ORGDP | Oak Ridge Gaseous Diffusion Plant |
| ORNL | Oak Ridge National Laboratory |
| ORR | Oak Ridge Reservation |
| OSHA | Occupational Safety and Health Administration |
| Pb | Lead |
| PDI | Pre-Design Investigation |
| PM | Particulate Matter |
| PMWP | Probable Maximum Winter Precipitation |
| PPE | Personal Protective Equipment |
| Project | R-50 Site |
| PSD | Prevention of Significant Deterioration |
| PTE | Potential To Emit |
| PUDs | Planned Unit Developments |
| Radiant | Radiant Industries |
| RCAs | Radiation Controlled Areas |
| RCRA | Resource Conservation and Recovery Act |
| RCW | Recirculating Cooling Water |
| RECs | Recognized Environmental Conditions |
| ROD | Records of Decision |
| ROI | Region Of Influence |
| SESOIL | Seasonal Soil [compartment] |
| SGMP | Soil and Groundwater Management Plan |
| SHPO | State Historic Preservation Office |
| $SO_2$ | Sulfur Dioxide |
| SWPPP | Stormwater Pollution Prevention Plan |
| T.C.A. | Tennessee Code Annotated |
| TCE | Trichloroethene |
| TDEC | Tennessee Department of Environment and Conservation |
| TDOA | Tennessee Division of Archaeology |
| THC | Tennessee Historical Commission |
| THPO | Tribal Historic Preservation Office |
| TMDLs | Total Maximum Daily Loads |

| Acronym | Definition |
|---|---|
| TMSP | Tennessee Multi Sector Permit |
| TNHP | Tennessee Natural Heritage Program |
| TPWD | Texas Parks and Wildlife Department |
| TPY | Tons Per Year |
| TRISO | Tri-structural Isotropic Particle Fuel |
| TRM | Tennessee River mile |
| TVA | Tennessee Valley Authority |
| TYS | Tyson Airport |
| US | United States |
| USACE | U.S. Army Corps of Engineers |
| USDOI | U.S. Department of Interior |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| VI | Vapor Intrusion |
| VOAP | Voluntary Cleanup Oversight Assistance Program |
| VOCs | Volatile Organic Compounds |
| WMA | Wildlife Management Area |
| WQC | Water Quality Certification |
| WSGS | Wyoming State Geological Survey |
| WYNDD | Wyoming Natural Diversity Database |

# 1. Introduction

This Environmental Report (ER) has been prepared to support Radiant Industries, Inc. (Radiant)'s 10 Code of Federal Regulations (CFR) Part 70 Materials License application to the Nuclear Regulatory Commission (NRC) for the proposed R-50 Site (R-50 or the Project) in the City of Oak Ridge, Roane County, Tennessee to receive Tri-structural Isotropic particle fuel (TRISO) for fueling the Kaleidos self-contained 1-megawatt electric (MWe) reactors. The Proposed Action will include packaging TRISO compacts into monoliths. Later phases, to be licensed separately, will include reactor fueling, testing, and storage prior to deployment to potential customer sites. The Materials License will allow for the receipt and storage of fuel at the radiological portion of the property as well as the loading and storage of monoliths. Site operation at full buildout will include fresh fuel storage, reactor fueling, reactor testing, reactor refueling, reactor staging, and spent fuel storage; subsequent license submittals will support follow up activities. The licensing action related to this Project is limited to fresh fuel receipt and storage, loading TRISO compacts into monoliths, and staging (storage). This ER considers the future plans for the Project site to the best of its ability, and although this ER will likely require modification to address future activities and to support the license and amendment submittals as appropriate, the potential for impacts to the environment have been assessed in a "whole" Project manner, to the degree the Project information is currently available.

## 1.1 PURPOSE AND NEED

The ultimate purpose of the Project is to mass-produce self-contained nuclear reactors for electrical energy generation at selected customer sites using Radiant's Kaleidos technology. A customer site may benefit from a self-contained reactor due to remoteness of the location, unavailability of supporting infrastructure for power connections, difficulty in obtaining fuel sources for conventional electrical generation, or installations that require high amounts of electrical energy usage that could put a strain on other energy resources. The Kaleidos reactor replaces the potential for 72,000 tons of $CO_2$ during the 20-year life span anticipated for the unit as compared to energy production from traditional sources.

The model for deployment would be to transport a non-energized unit over the road or rail to the point of intended installation, place the reactor in a shielded enclosure, complete connections, energize the reactor, continuously monitor its performance from the Radiant operations center, de-energize the unit after approximately 5 years of service, transport it back to the Kaleidos Factory in Oak Ridge, Tennessee, and refuel the reactor to be redeployed to the same or a different customer. The Kaleidos reactor would be refueled up to three times after the initial fueling, for a total of four fueling events and a 20-year unit life. Used/spent fuel will be stored at the Project site until an appropriate disposal option becomes available. Radiant currently has committed interest in the Kaleidos reactor from commercial and military customers to fill a determined energy supply need.

Market research shows a strong and growing demand for resilient, transportable, and carbon-free power systems suitable for diverse applications across civilian, commercial, and government sectors. The International Energy Agency (IEA) reports that more than 730 million people globally lack access to reliable electricity, demonstrating a significant need for energy sources that can operate independently of traditional grid infrastructure (IEA, 2025). In the United States, national preparedness surveys indicate that 63 percent of individuals are concerned about access to dependable energy during an emergency or disaster, especially during major storms and natural hazards which routinely cause long-duration grid outages (Federal Emergency Management Agency FEMA, 2024). The Idaho National Laboratory (INL)

Global Market Analysis of Microreactors identifies strong demand for microreactors in remote mining operations, Arctic communities, islanded grids, defense installations, and data centers (INL, 2021). Additional assessments by the International Renewable Energy Agency (IRENA) highlight the need for resilient and sustainable power solutions in remote and islanded grids seeking to expand economic activity and adapt to climate-driven disruptions (IRENA, 2023). These combined findings demonstrate that the need for dependable, portable, and emissions-free power continues to grow across multiple sectors. The Kaleidos microreactor directly addresses this need by offering a uniquely flexible, transportable, and zero-emissions energy source capable of supporting remote operations, emergency response, and critical infrastructure.

## 1.2 PROPOSED ACTION

The R-50 site addressed in this ER includes the development of a Radiant owned property of approximately 41.1 acres located in the East Tennessee Technology Park in the city of Oak Ridge, Roane County, Tennessee. Radiant is in the process of entering into a lease agreement for an additional area of approximately 42.9 acres adjacent to the Project site prior to its release for purchase to support future operations. At full buildout, Radiant will own approximately 84 acres (Project site). The East Tennessee Technology Park is currently owned by the U.S. Department of Energy (DOE) and sits upon the historic uranium enrichment facility that began operation as part of the Manhattan Project during World War II and continued until the USDOE terminated the program in 1987. The Project site and surrounding region are shown on Figures 1.2-1 and 1.2-2. The Project site is located on the former K-27 and K-29 building sites. The historic enrichment processing buildings were remediated from 2016 through 2020. The Project site is bounded by Poplar Creek to north, west and southwest. The former K-25 building site and other remediated portions of the East Tennessee Technology Park bound the Project site to the east and south. Access to the Project site is from the Oak Ridge Turnpike and Heritage Center Boulevard from the south to Enrichment Street, which terminates at the Project site from the east.

The location for the Proposed Action was determined by reviewing several domestic locations and down selecting to the Oak Ridge property using various factors, which included the following:

- Engaging with states and municipalities with the regulatory structure and interest in the nuclear industry.
- Favorable site features that would reduce the environmental impacts of the Proposed Action.
- Favorable site features that would reduce potential risks from accident scenarios due to natural conditions (seismic, flooding, wildfire).
- Utility availability and transportation accessibility.
- Availability of employees and community resources to support those employees.

The R-50 site under this licensing action will be developed to include the following features:

- a Fueling Building of approximately 30,000 square feet, inclusive of radiological and non-radiological personnel;
- fresh fuel storage area as the Project plans to utilize TRISO fuel; and

Future construction will include an Administrative Building/Area, an Inventory Warehouse, a Subassembly/Integration Building/Area, a Machine Shop, a Reactor Testing Building, a Refueling Building, and an Independent Spent Fuel Storage Installation (ISFSI) under additional licensing actions.

The Proposed Action will also require development of the following:

- entrance roadway to access the Project site;
- connecting paved or concrete areas between buildings and Project site roadways;
- security station at the Project site entrance;
- secure and monitored fence line surrounding the active portions of the Project site;
- employee office space and parking areas;
- emission monitoring stations; and
- connections and onsite conveyance for utilities (potable water, sanitary sewer, stormwater management, electrical, natural gas, fiber cable) from local services.

Conceptual layouts for the Proposed Action are shown on Figure 1.2-3. The Project is anticipated to have an operating life of 40 years after which time the Project will be decommissioned.

Initial employment for the Proposed Action will start with around 20 technical and administrative staff, for the operation of R-50, to 250 or more employees at full scale when the Project site is fully developed. Construction employment will vary based on task, but is estimated to include a peak of 100 workers.

Electrical and natural gas service connections will be accessed through local utility suppliers. The city of Oak Ridge has a 13.8 kV distribution line adjacent to the Project site. To support initial site development, the city is extending a distribution line to Radiant's transformer to supply 1MW of power. In parallel, the city is also planning the construction of a substation nearby to support Radiant's future electricity needs as well as other industrial companies in the area. The Oak Ridge Utility District also has an existing natural gas pipeline nearby and would be able to extend to the Project's service point as another energy source, if needed. Potable water supply from the municipality, storm and sanitary sewers are developed and present in the vicinity of the Project site. According to correspondence with USDOE contractors familiar with the Project site, water supply will be provided by the city of Oak Ridge's water distribution system. There is an existing 12-inch diameter water supply line that traverses the Project site and is anticipated to meet the demands of the proposed Project. Radiant would be responsible for connecting to the city's water line and obtaining approvals based on the required standards and codes.

Energy and water requirements for the Proposed Action are as follows:

- Electrical demand is estimated at 1 megawatt (MW) in 2028 and up to 5 MW by 2032.
- Water use has been estimated at 3,000 gallons per day initially and will range higher based on employee count. The assembly process which will be conducted as a future phase is not anticipated to use high quantities of water, although some hydrostatic product testing is anticipated.

The Proposed Action will initially focus on fuel monolith production; however, this will expand over time to include fueling trailer-mounted mobile reactors. Initially, trailers will be manufactured and assembled at a separate Radiant controlled location and in the future the manufacture and reactor assembly will be in-house at R-50., Additionally, many of the components used in the reactor assembly process are produced by external suppliers; over time, some of this manufacturing may also be brought in house. Construction of the initial support facilities for the Proposed Action is expected to take six to eight

months. It is currently anticipated that all structures will be built as the Project activities expand and then finish with interior build out over the course of 3 years as production scales up to the anticipated capacity of producing 50 self-contained reactors per year.

The R-50 facility will be licensed and constructed in three phases:

- Phase 1 – Licensing and construction of the Fueling Building.
- Phase 2 – Licensing and construction of the Testing Building.
- Phase 3 – Licensing and construction of the Refueling Building and ISFSI.

In Phase 1, which is addressed by this ER, Radiant is requesting NRC review and approval to receive and possess special nuclear material (SNM) in the form of TRISO compacts and load TRISO compacts into monoliths in the Fueling Building. The Phase 1 application contains a license condition that fueled monoliths may not be loaded in the reactor pressure vessel. Phase 1 would be constructed on approximately 11 acres of land out of the total 84 acres Project site.

In Phase 2, Radiant will request a reactor operating license for zero power critical testing of Kaleidos reactors in the Reactor Testing Building and amendment of the Part 70 SNM license. The amendment to the SNM license will request NRC approval to load fueled monoliths into the core in the Fueling Building. The Reactor Testing Building will be located at least 50 meters from the Fueling Building. Any interactions between the Fueling Building and Reactor Testing Building will be addressed in this application.

In Phase 3, Radiant will request approval of the Refueling Building and an ISFSI on the R-50 site. The Refueling Building may be adjacent to the Fueling Building. Any interactions between the Fueling Building and Refueling Building will be addressed in this application. If there are any interactions between these two buildings that invalidate the SAR for the Fueling Building, Radiant will request an amendment to its Part 70 license.

The Project site is located within the former “K-25 Gaseous Diffusion Plant” portion of the Oak Ridge Reservation and was largely undeveloped until construction of uranium enrichment operations infrastructure in 1943. The original uranium enrichment operations supported the development of nuclear weapons as part of the U.S. Army’s Manhattan Project, and later expanded to include production of enriched uranium for fabrication into fuel elements for nuclear reactors. Uranium enrichment continued from 1943 until the USDOE terminated the program in 1987, and subsequently initiated site environmental cleanup and restoration activities. In 1997 the K-25 Gaseous Diffusion Plant site was renamed the “East Tennessee Technology Park,” to support reindustrialization and reuse of former USDOE assets by private industry. The Project site was historically occupied by the former K-25 Gaseous Diffusion Plant Buildings K-27 and K-29. Between 1987 and 2024, more than 500 buildings (including those within the Project site) were demolished and soil cleanup/remediation activities were completed. The Project site continues to be part of an ongoing groundwater investigation and occupied buildings will need to be equipped with subslab vapor mitigation systems in accordance with site remedial documents.

United States Geological Survey (USGS) topographic mapping indicates the Project site is situated in generally flat topography adjacent to the east bank of Poplar Creek. Valley and ridge topography prevails in the surrounding area. Elevation within the Project site ranges from approximately 750 feet

NAVD88 along Poplar Creek to approximately 785 feet NAVD88 in the northeastern portion of the Project site. The existing elevation of the proposed R-50 site is approximately 773 feet NAVD88.

Combustion sources associated with the Project are anticipated to be minimal; no painting or coating operations are initially anticipated. The Project will have limited use of compressed gases (nitrogen, helium, and supercritical carbon dioxide) which will be stored in cylinders and tanks onsite.

Fresh TRISO fuel storage onsite is anticipated to be installed in staged Kaleidos units ready for deployment. Each TRISO particle is made up of a uranium, carbon and oxygen fuel kernel. The kernel is encapsulated by three layers of carbon- and ceramic-based materials that prevent the release of radioactive fission products. TRISO fuel utilizes high-assay, low-enriched uranium (HALEU). The TRISO fuel would be delivered to the Project site from a DOE-authorized or NRC-licensed fuel fabricator in VP-55 packages, each containing up to 635 grams of U-235 enriched to less than 20 weight percent.

For future phases of the project, irradiated fuel will be exchanged for fresh fuel when the Kaleidos units are returned to the Project site (after approximately 5 years of deployment). Storage of these materials will be in dry cask storage on a future constructed concrete storage pad.

The Proposed Action is anticipated to generate solid, nonhazardous, universal, hazardous, and mixed wastes that would be disposed offsite at appropriately permitted commercial disposal facilities. Waste generated by the operation will include metal scrap and turnings to be collected as a solid waste and managed for recycling. Although not anticipated, low-level radioactive waste (LLRW) generated by the Proposed Action will be characterized and routed to offsite disposal at appropriately permitted commercial disposal facilities.

The Proposed Action is anticipated to have no process wastewater discharges (except sanitary) and limited air emissions and these potential environmental impacts are addressed further in Sections 3 and 4. Mitigation of potential environmental impacts for the Proposed Action are included in Section 5. Permits and approvals for the Proposed Action are identified in Section 1.3.

### 1.2.1 References


1. Federal Emergency Management Agency. 2024. “National Preparedness Report”. Accessed: https://www.govinfo.gov/content/pkg/CMR-HS5_100-00193235/pdf/CMR-HS5_100-00193235.pdf.
2. Idaho National Laboratory. 2021. “Global Market Analysis of Microreactors”. Accessed: https://gain.inl.gov/content/uploads/4/2024/04/Document-INL-EXT-21-63214.pdf.
3. International Energy Agency. 2025. “Access to electricity stagnates leaving globally 730 million in the dark”. Accessed: https://www.iea.org/commentaries/access-to-electricity-stagnates-leaving-globally-730-million-in-the-dark.
4. International Renewable Energy Agency. 2023. “Renewable Energy for Remote Communities: A guidebook for off-grid projects.” Accessed: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2023/Nov/IRENA_Remote_Communities_2023.pdf.

## 1.3 APPLICABLE REGULATORY REQUIREMENTS, PERMITS, AND REQUIRED CONSULTATIONS

Construction and operation of R-50 will require a number of federal, state, and local permits, consultations, and approvals. A review of applicable federal, state, and local statutes has been conducted to determine applicable permits and approvals needed during the construction and operation phases. The following sections provide a summary of the applicable requirements, permits and approvals. Table 1.3-1, Regulatory Compliance Status provides a list of the permits, approvals, and consultations sought for construction and operation of the facility as well as the current compliance status. All applicable entities have been contacted regarding the proposed R-50 site.

### 1.3.1 Federal Agencies

The following sections provide a summary of federal permits and consultations for the construction and operation of the Project.

#### *1.3.1.1 U.S Nuclear Regulatory Commission (NRC)*

The NRC ensures the safe use of radioactive materials for beneficial civilian purposes while protecting people and the environment. The NRC complies with the National Environmental Policy Act (NEPA) through its regulations in 10 CFR Part 51. NEPA mandates that federal agencies carefully consider the environmental impacts of their actions prior to making decisions that affect the environment. The NEPA review process is usually initiated by an application for a new license or certification, change to an existing license, or a decommissioning plan submitted to the NRC. This ER has been prepared to support Radiant's 10 CFR Part 70 Materials License application to the NRC for the proposed R-50 site. NRC issues an Environmental Assessment (EA) or Environmental Impact Statement (EIS) for the approval for the construction and operation of a radiation facility in accordance with NEPA.

#### *1.3.1.2 U.S. Environmental Protection Agency (USEPA)*

The U.S. Environmental Protection Agency (USEPA) holds primary authority over compliance with major environmental regulations, including the Clean Air Act (CAA), Clean Water Act (CWA), Safe Drinking Water Act (SDWA), and Resource Conservation and Recovery Act (RCRA). The USEPA has delegated many permitting, monitoring, and reporting responsibilities to the Tennessee Department of Environment and Conservation (TDEC) for these programs. Relevant state-specific requirements, permits, and approvals are detailed in Section 1.3.2, *State Agencies*. The Project is located within USEPA Region 4.

The SDWA safeguards public water supply systems and underground drinking water sources from contamination (40 CFR 141.2). It defines a public water system as one providing water for human consumption to at least 25 individuals or 15 service connections. The Project will not use onsite groundwater or surface water as a water supply source, instead obtaining potable water from public water supplies. The SDWA also protects underground drinking water sources from contaminated releases and spills.

The Emergency Planning and Community Right-to-Know Act (40 CFR Parts 350–372), administered by the USEPA, established regulations for handling trade secrecy claims and toxic chemical release reporting, governing activities such as receiving, possessing, using, transferring, and delivering hazardous chemicals to ensure community access to information and protect public health and the environment. These parts specifically outline requirements for facilities to report hazardous chemical

inventories (Part 370) and toxic chemical releases (Part 372) and would be evaluated for applicability when the Project reaches the operational stage.

#### *1.3.1.3 U.S. Department of Agriculture (USDA)*

Under the Farmland Protection Policy Act (7 U.S.C. § 4201 et seq.), Federal agencies are required to take into account the adverse effects of their programs on the preservation of farmland identified as prime or unique by USDA criteria; to consider alternative actions, as appropriate, that could lessen adverse effects; and to ensure that their programs, to the extent practicable, are compatible with State and units of local government and private programs and policies to protect farmland. USDA Natural Resources Conservation Service (NRCS) mapping does not identify any prime or unique farmland at the Project site, and these requirements are not considered applicable to the Proposed Action.

#### *1.3.1.4 U.S. Army Corps of Engineers (USACE)*

Authorization under Section 404 of the CWA for impacts to "waters of the United States," (which includes relatively permanent tributaries to navigable waterways and non-isolated wetlands) primarily occurs under either the Nationwide Permit (NWP) program or through an Individual Permit from the U.S. Army Corps of Engineers (USACE). No waters of the United States regulated by Section 404 of the CWA will be impacted by the Proposed Action. Therefore, these requirements are not considered applicable to the Proposed Action.

#### *1.3.1.5 Occupational Safety and Health Administration (OSHA)*

The Occupational Safety and Health Act of 1970 (29 U.S.C. §651 et seq.), administered by the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA), ensures safe and healthy working conditions by establishing and enforcing workplace safety standards. OSHA identifies workplace hazards and sets standards to protect workers from risks. OSHA regulations for potential occupational carcinogens are outlined in 29 CFR 1910.1003–1910.1016 and hazardous materials are included in 29 CFR 1910.120. OSHA requires hazard mitigation through engineering controls, personal protective equipment (PPE), and worker training to ensure safe handling of materials. Radiant employees and management must comply with the comprehensive safety and health standards in 29 CFR 1910, including those for chemical handling, radiation safety (29 CFR 1910.1096), and emergency response, to protect workers from occupational hazards. During construction and operation of R-50, all involved personnel will be required to comply with 29 CFR 1926, which governs health and safety standards for the industry.

#### *1.3.1.6 U.S. Department of Interior (USDOI)*

The United States Fish and Wildlife Service (USFWS) is the agency within the U.S. Department of Interior (USDOI) that is responsible for the protection of threatened and endangered species. The USFWS Section 7 consultation process, mandated by the Endangered Species Act, requires federal agencies to ensure their actions do not jeopardize listed species or their critical habitats. The process begins with informal consultation, where the Proposed Action is discussed with USFWS to assess potential impacts, which can often be initiated with automated, online determination keys. If no effects are found, no further action is needed. If impacts are possible but not likely to adversely affect species, USFWS provides written concurrence to conclude informal consultation. If adverse effects are likely, formal consultation follows, lasting up to 90 days, culminating in a Biological Opinion within 45 days, detailing whether the action jeopardizes species or habitats and suggesting mitigation measures.

#### *1.3.1.7 The Noise Control Act of 1972 (42 U.S.C. § 4901 et seq.)*

The Noise Control Act (NCA) of 1972 was designed to promote an environment free from noise that jeopardizes public health and welfare (42 U.S.C. § 4901). The NCA encourages coordination with state and local governments for noise control and emphasizes their role in implementing and enforcing noise control measures, often through local ordinances or state regulations (42 U.S.C. § 4905). The State of Tennessee does not have comprehensive state-level noise control regulations. Instead, noise regulation is primarily delegated to local governments. The Project potential to generate noise will be evaluated and will be mitigated as needed to comply with the applicable noise standards in the Oak Ridge Zoning Ordinance.

#### *1.3.1.8 National Historic Preservation Act of 1966 (16 U.S.C. § 470 et seq.)*

The National Historic Preservation Act (NHPA) of 1966 (54 U.S.C. § 300101 et seq.), administered by the National Park Service and other federal agencies, protects the nation's historic and cultural resources, including sites, buildings, and districts eligible for the National Register of Historic Places. Under Section 106 (54 U.S.C. § 306108), federal agencies must assess and mitigate impacts on historic properties from projects they fund, permit, or undertake. The Archaeological and Historic Preservation Act (AHPA) of 1974 (54 U.S.C. § 312501 et seq.) complements the NHPA by authorizing federal agencies to recover and preserve archaeological and historical data threatened by construction or other federal projects. The Tennessee Historical Commission (THC) is the State Historic Preservation Office (SHPO) and acts on behalf of the state of Tennessee for NHPA Section 106 review (see Tennessee SHPO below under *State Agencies*).

#### *1.3.1.9 Hazardous Materials Transportation Act (49 U.S.C. § 5101 et seq.)*

The Hazardous Materials Transportation Act (HMTA), codified at 49 U.S.C. § 5101 et seq., regulates the transportation of hazardous materials, including radioactive materials, in interstate and intrastate commerce to ensure safety and consistency. States may establish regulations for hazardous material transport, provided they align with HMTA and Department of Transportation (DOT) regulations in 49 CFR Parts 171–177. Specific requirements for packaging radioactive materials for transport are outlined in 49 CFR Part 173, Subpart I.

### 1.3.2 State Agencies

The following sections provide a summary of state permits and consultations required for the construction and operation of the Project.

#### *1.3.2.1 Tennessee Department of Environment and Conservation (TDEC)*

The NEPA requires federal agencies such as the NRC and those working on behalf of federal agencies to consider impacts of Proposed Actions and reasonable alternatives to those actions through the preparation of an EA, EIS, or determination of a CE. TDEC participates in the NEPA process by reviewing and commenting on NEPA documents prepared by federal agencies as a cooperating agency.

In addition to reviewing NEPA documents prepared under the federal regulations, TDEC reviews the potential for impacts to the environment from a proposed project through the permit application, review and issuance processes described in the following sections.

#### *1.3.2.2 TDEC Division of Water Resources*

The USEPA Region IV office in Atlanta, Georgia is responsible for enforcement of the CWA for the State of Tennessee; however, in some cases, authority for implementation of the CWA has been delegated to TDEC as summarized below.

##### 1.3.2.2.1 Clean Water Act, Section 401 – Water Quality Certification

CWA Section 401 is intended to prevent discharges of pollutants into waters of the United States without a permit. Projects that may trigger Section 401 include projects requiring permits for disturbing wetlands, permits required for impacts to navigable waterways protected under Section 10 of the Rivers and Harbors Act, and Federal Energy Regulatory Commission hydropower licenses.

Persons who wish to make an alteration to a stream, river, lake or wetland must first obtain a water quality permit. Physical alterations to properties of waters of the state require an Aquatic Resource Alteration Permit (ARAP) or a Section 401 water quality certification (WQC). A federal CWA Section 404 permit may also be required from the USACE (as noted in Section 1.3.1.3) for projects that include the discharge of dredged or fill material into waters of the United States, including wetlands. When a Section 404 permit is required from the USACE, a Section 401 certification must first be obtained from the TDEC Division of Water Resources (DWR). A Section 401 water quality certification affirms that the discharge would not violate Tennessee's water quality standards. When a Section 401 certification is required, the ARAP also serves as the Section 401 certification. If the proposed activity does not require an ARAP, the applicant for a federal license or permit may obtain a Section 401 certification by submitting a copy of the federal application to the TDEC-DWR and a request for a Section 401 certification.

There are two types of ARAPs: Individual Permits and General Permits. General Permits are developed and maintained by the TDEC-DWR to provide a streamlined, expedited means of authorizing projects that singularly or cumulatively propose minor impacts to water resources. An ARAP Individual Permit or a Section 401 certification requires additional analysis of the Project activity and the issuance of public notice seeking public participation and comment on the planned activity.

TDEC does not grant automatic Section 401 WQC for NWPs 12, 21, 29, 39, 40, 42, 43, 44, 50, 51, 52, 57 and 58, therefore an individual 401 WQC will be required for a project authorized by these NWPs. The remaining NWPs that are in effect in Tennessee include automatic Section 401 WQCs.

No discharges of pollutants into waters of the United States regulated by Section 401 of the CWA are proposed for the Proposed Action. Therefore, these requirements are not considered applicable to the Proposed Action.

##### 1.3.2.2.2 Clean Water Act, Section 402 – National Pollutant Discharge Elimination System

CWA Section 402 National Pollution Discharge Elimination System (NPDES) permitting point source discharges to surface water of the United States has been delegated to TDEC and is managed by the TDEC-DWR. Persons discharging pollutants directly from point sources into surface waters of the state must obtain an NPDES discharge permit. The NPDES program in Tennessee includes stormwater discharge permitting during both the construction and operational phases.

#### *1.3.2.2.2.1 Construction General Permit*

TDEC has established the General Permit for Discharges of Stormwater Associated with Construction Activities, Permit Number TNR100000 (CGP) which is required for construction projects involving disturbance of more than one acre. This permit will expire in September 2026 and will be replaced by an updated version that may contain additional requirements. The Project will require coverage under this permit. Permit coverage will be updated, as necessary, if obtained prior to expiration of the permit in September 2026.

This CGP also authorizes stormwater discharges from support activities associated with a permitted construction activity. Support activities may include concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas and borrow areas. Support activities are authorized provided all the following conditions are met:

a) The support activity is related to a construction activity that is covered under this general permit.
b) The operator of the support activity is the same as the operator of the construction activity.
c) The support activity is not a commercial operation serving multiple unrelated construction projects by different operators.
d) The support activity does not operate beyond the completion of the construction activity of the last construction project it supports.
e) Support activities are identified in the Notice of Intent (NOI) and the Stormwater Pollution Prevention Plan (SWPPP). The appropriate erosion prevention and sediment controls and measures applicable to the support activity shall be described in a site wide SWPPP covering all discharges from the support activity areas.

The permit will not authorize any process (dry weather) wastewater discharges from support activities. Some non-stormwater discharges are allowed as described in the CGP.

Water quality riparian buffer zone requirements will apply to all streams with available water quality parameters adjacent to construction sites. A 30-feet natural water quality riparian buffer shall be preserved between such waterbodies and the disturbed areas, to the maximum extent practicable, during construction activities.

Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited unless managed by appropriate controls. Appropriate controls may include weir tanks, dewatering tanks, gravity bag filters, sand media particulate filters, pressurized bag filters, cartridge filters or other control units providing the level of treatment necessary to comply with permit requirements.

#### *1.3.2.2.2.2 Stormwater Industrial General Permit*

Once construction is complete and operational, stormwater discharges resulting from industrial activities are also required to obtain authorization for discharge. Tennessee's general industrial stormwater discharge permit is known as the Tennessee Multi Sector Permit (TMSP) TNR050000 which

has currently been extended to be effective through June 2030, when a new permit is anticipated to be released. No stormwater discharges from industrial activities are proposed for the Proposed Action.

#### *1.3.2.3 TDEC Division of Air Pollution Control*

The TDEC Division of Air Pollution Control is authorized to implement applicable air emissions programs and regulations. The agency is directed to maintain the purity of the air resources of the State of Tennessee consistent with the protection of normal health, general welfare, and physical property of the people while preserving maximum employment and enhancing the industrial development of the State. The Division establishes emission standards and procedure requirements to monitor industries in the State through the issuance of construction and operating permits. Established to carry out control and abatement of air pollution, the Tennessee Air Pollution Control Board adopts regulations, holds hearings, and initiates court actions to enforce regulations. According to the USEPA records, Roane County and the Project site is within a National Ambient Air Quality Standards (NAAQS) attainment area for air quality.

The New Source Review program pertains to new construction projects or sources that may cause air contaminants to be issued. Unless specifically exempted, any person wishing to construct an air contaminant source or to modify an existing air contaminant source is required to obtain a construction permit from the Tennessee Division of Air Pollution Control (APC). Application timing is 90 days prior to commencement of on-site construction for minor sources. An application for an Operating Permit will also be required once facility is constructed.

TDEC uses the USEPA federal definitions for defining a major air emissions source, all other sources would be considered minor or Non-Title V.

Construction and operation of an electric generation unit will likely require Non-Title V air pollution permits from TDEC.

#### *1.3.2.4 TDEC Division of Solid Waste Management (DSWM)*

Based on planned facility operations, it is anticipated that solid, nonhazardous, universal, hazardous, and mixed wastes would be generated by the Project. The TDEC Division of Solid Waste Management (DSWM) manages the waste regulatory programs as authorized by USEPA. The DSWM regulates the management and disposal of solid waste, nonhazardous waste, universal and hazardous waste and also oversees recycling and reuse. The regulations used by TDEC are found at Chapter 400 of the TN Official Compilation of Rules and Regulations. The regulations largely mirror the federal regulations.

TN also regulates and permits “special waste” a category defined as solid wastes that are either difficult or dangerous to manage and may include sludges, bulky wastes, pesticide wastes, medical wastes, industrial wastes, hazardous wastes which are not subject to regulations under Rule 0400-12-01-.03 through 0400-12-01-.07, liquid wastes, friable asbestos wastes, and combustion wastes. The state issues permits for the disposal of these wastes which are in effect for 3 years. The process of application for these permits will require full analytical characterization of the special waste and updating of analytical characterization every three years.

A USEPA identification number will need to be obtained through submittal of specific forms to TDEC. New generators must submit the registration packet within 90 days of the initial generation. Other

operational requirements including training, record keeping, accumulation periods, and reporting may be required dependent on the volumes of hazardous wastes generated (Generator Status).

LLRW is defined as any radioactive waste that is not high-level radioactive waste, spent nuclear fuel, or byproduct material. Generators may store these wastes for as long as they are permitted to do so under their NRC or NRC-agreement-state license.

#### *1.3.2.5 TDEC Division of Remediation*

The TDEC Division of Remediation will oversee the Voluntary Cleanup Oversight Assistance Program (VOAP) which is the program TDEC uses to review and monitor sites that have been previously impacted by historic industrial activities and that have remaining contamination. In the case of the parcels selected for the Project site, a deed restriction requires that all buildings where employees will have 8 or more hours of occupation to install vapor intrusion mitigation system and enroll in the VOAP program. Designs for the vapor intrusion mitigation system will be reviewed by TDEC, and routine system monitoring will be reported to TDEC.

#### *1.3.2.6 Tennessee SHPO*

Federal funding of the Project is not planned; however, federal permitting and approvals will require NHPA Section 106 review by the Tennessee SHPO.

### 1.3.3 Local Agencies

Discussions with Roane County and city of Oak Ridge officials regarding the proposed development and impacts to surrounding areas are ongoing. Permits and approvals will be sought, consistent with the local requirements. The City of Oak Ridge Planning and Development department is responsible for coordinating the City's planning and code enforcement functions, and oversees the zoning ordinance, subdivision regulations, sign regulations, planned unit developments (PUDs) and site plan reviews.

Building and demolition permits are required for construction or demolition of structures and buildings. Land disturbance permits are required for land disturbing activity that disturbs more than one acre of land. As part of the application for the land disturbance permit, attachment of a TDEC Notice of Coverage under the CGP (described above) is required. Prior to issuance of a building permit or land disturbance permit, a site plan must be submitted for approval. The site plan includes review of the site layout and plans for parking, lighting, landscaping, etc. Additional permits are required for the installation of plumbing, electrical, and mechanical systems as part of building construction.

As described in detail in Section 3.1, the Project site is currently zoned in the City of Oak Ridge as Federal Industry and Research (FIR), which is established for the United States Government Oak Ridge Reservation and operation within its boundaries. Whenever land is transferred from the United States Government Oak Ridge Reservation to the City of Oak Ridge or a private owner for purposes not directly related to the mission of the DOE, the City of Oak Ridge Regional Planning Commission is required to study and make recommendations to the City Council concerning the appropriate zoning district designation. To comply with permitted use requirements in the City of Oak Ridge Zoning Ordinance, a request for rezoning is required to rezone the Project site from FIR to General Industrial Districts (IND-2), which is established to provide areas in which the principal use of land is for processing, manufacturing, assembling, fabrication, and warehousing.

### 1.3.4 Tables

**Table 1.3-1 Regulatory Compliance Status**

| Requirement | Agency | Compliance Status | Comments |
|---|---|---|---|
| ***Federal*** | | | |
| EA or EIS in accordance with NEPA | NRC | To be addressed in this ER. | |
| Special Nuclear Material License | NRC | Operating license application has been submitted. | |
| Clean Water Act Section 404 Permit | USACE | Not applicable. | |
| Endangered Species Act Consultation | USFWS | Formal consultation has not been initiated. | A general ecological habitat survey has been completed for the Project site. However, no species-specific surveys have been completed. |
| Occupational Health and Safety Act | OSHA | No application or registration is required prior to construction or operation. | All personnel will comply with applicable health and safety standards. |
| Hazardous Material Transportation Act | DOT | Registration application has not been submitted. | |
| ***State*** | | | |
| TDEC NEPA Review | TDEC | To be addressed in this ER. | |
| Clean Water Act Section 401 Water Quality Certification | TDEC-DWR | Not applicable. | |
| TDEC Construction General Permit | TDEC-DWR | NOI has not been submitted and SWPPP has not been prepared. | Permit coverage is expected to be obtained in Q2 2026. |
| TDEC Stormwater Industrial General Permit | TDEC-DWR | Not applicable. | |
| Air Pollution Control Construction Permit | TDEC-DAPC | Application has not been submitted. | Required only if natural gas-powered heater installed. |
| Air Pollution Control Operating Permit | TDEC-DAPC | Application has not been submitted. | Required only if natural gas-powered heater installed. |
| Voluntary Cleanup Oversight and Assistance Program (VOAP) | TDEC-VOAP | Application has not been submitted. | |
| EPA Waste Activity ID Number | TDEC-DSWM | Registration application has not been submitted. | |
| National Historic Preservation Act Section 106 Review | THC | A “no adverse impact” concurrence has not been received. | A Phase IA cultural report has been prepared and consultations to Tennessee SHPO and Tribal Historic Preservation Office (THPO) have been submitted (November 2025). |
| ***Local*** | | | |
| Site Plan Application | City of Oak Ridge Planning and Development | Application has not been submitted. | |

| Requirement | Agency | Compliance Status | Comments |
|---|---|---|---|
| Demo Permit | City of Oak Ridge Planning and Development | Application has not been submitted. | |
| Building Permit | City of Oak Ridge Planning and Development | Application has not been submitted. | |
| Land Disturbance Permit | City of Oak Ridge Planning and Development | Application has not been submitted. | |
| Plumbing Permit | City of Oak Ridge Planning and Development | Application has not been submitted. | |
| Electrical Permit | City of Oak Ridge Planning and Development | Application has not been submitted. | |
| Mechanical Permit | City of Oak Ridge Planning and Development | Application has not been submitted. | |
| Zoning Approval | City of Oak Ridge Planning and Development | Request for rezoning from FIR to IND-2 was submitted. | Submitted December 2025. |

# 2. Alternatives

This section provides a discussion of the alternatives to the Proposed Action that were considered by Radiant. As discussed in Section 1.1 of this ER, the purpose and need of the Proposed Action involves the development of a factory location for fueling of Kaleidos microreactors. As such, Radiant's assessment of alternatives focused on the evaluation alternative locations. Alternative locations that were evaluated for the Proposed Action included the following:

- Campbell County, Wyoming
- Natrona County, Wyoming
- Calhoun County, Texas

The potential for environmental impacts for the construction and operation of the Proposed Action at these locations are described below and a comparison of the predicted environmental impacts of the alternatives is made to the environmental impacts of the selected site in Oak Ridge, Tennessee. This section also addresses a "No-Action" alternative, alternatives considered but eliminated, and cumulative impacts.

## 2.1 DETAILED DESCRIPTION OF THE ALTERNATIVES

### 2.1.1 No-Action Alternative

Under the no-action alternative, the NRC would not issue a license for the construction and operation of Radiant's Kaleidos microreactor manufacturing facility. As a result, the facility would not be built, and production of Kaleidos microreactors would not proceed. This would prevent the deployment of microreactors designed to provide power and heat for decentralized generation in civilian, industrial, and defense sectors, as supported by the USDOE Microreactor Program. Led by INL, this program focuses on research and development to advance microreactor technologies, reduce risks related to performance and manufacturing, and ensure commercial entities can license and deploy these systems for specific use cases.

Consequently, remote areas, emergency response operations, and military installations would continue to rely on existing diesel generators, maintaining higher greenhouse gas emissions, air and noise pollution, and logistical challenges associated with diesel fuel supply. The no-action alternative would avoid direct environmental impacts from facility construction, such as land disturbance or potential radiological risks during production. However, it would forgo benefits including reduced carbon emissions, enhanced energy reliability, and local economic growth from job creation. Additionally, it would hinder progress in the DOE Microreactor Program's goals of advancing microreactor technology readiness and supporting commercial deployment for diverse energy needs.

### 2.1.2 Proposed Action

Radiant Industries, Inc.'s Proposed Action is the construction and operation of a Kaleidos microreactor fueling facility to be located on approximately 11 acres within the East Tennessee Technology Park located in the city of Oak Ridge in Roane County, Tennessee (35°55'47.45"N, 84°24'3.46"W). The Proposed Action includes the receipt and storage of TRISO nuclear fuel on-site as well as the production of fuel monoliths. The East Tennessee Technology Park is currently owned by the USDOE and sits upon

the historic uranium enrichment facility that began operation as part of the Manhattan Project during World War II and continued until the USDOE terminated the program in 1987. The Project site and surrounding region are shown on Figures 2.1-1 and 2.1-2. A depiction of the proposed Project layout is provided in Figure 2.1-3. The Project site is bounded by Poplar Creek to north, west and southwest. The former K-25 building site and other remediated portions of the East Tennessee Technology Park bound the Study Area to the east and south. The East Tennessee Technology Park and Project site are located approximately 8 miles southwest of the eastern/downtown portion of the city of Oak Ridge that is in Anderson County, TN. The Project will require approximately 11 acres to accommodate a 30,000 square foot fueling building, transit center, testing facilities, parking spaces, and a security building and additional security fencing.

### 2.1.3 Reasonable Alternatives

#### *2.1.3.1 Alternative Technologies*

These alternatives were not carried forward for detailed analysis because they failed to meet the Project's technical, environmental, or operational objectives as effectively as the Proposed Action.

#### *2.1.3.2 Alternative Designs*

These alternatives were not carried forward for detailed analysis because they failed to meet the Project's technical, environmental, or operational objectives as effectively as the Proposed Action.

#### *2.1.3.3 Alternative Locations*

Radiant evaluated multiple potential locations domestically within the United States and invested in a more thorough evaluation of potential for environmental impacts at the following locations:

- Campbell County, Wyoming
- Calhoun County, Texas
- Natrona County, Wyoming

The potential for environmental impacts at these alternative locations was evaluated based on publicly available resources and generally did not include onsite field evaluations.

##### 2.1.3.3.1 Campbell County, Wyoming

The Campbell County, Wyoming site consisted of approximately 160 acres located within the Pronghorn Industrial Park, which is located due east of the city of Gillette, Wyoming. The site is roughly bounded by the city of Gillette and the Gillette College Rodeo training facility to the west, undeveloped state- and private-owned land to the south and east, and a motorcross track and speedway located on county-owned land to the north.

Protected Species

The Campell County site did not appear to present significant issues related to the presence of rare, threatened, and endangered species based on a review of the publicly available data. The USFWS Information for Planning and Consultation (IPaC) database and the Wyoming Natural Diversity Database (WYNDD) confirmed that there are no designated critical habitats within the site and identified one

federally-listed, threatened plant species, one species proposed for listing as threatened, and one historic observation of a federally-listed, threatened species in the vicinity of the site. Review of the state's WyGISC migration corridor tool did not indicate the presence of mule deer (*Odocoileus hemionus*) or sage grouse (*Centrocercus urophasianus*) corridors within the site. While no field surveys were conducted, no significant protected species implications were anticipated at this site.

### Water Resources and Wetlands

No wetland and stream delineations were conducted for the Campbell County site. However, USFWS National Wetland Inventory (NWI) mapping indicates one small, emergent wetland (NWI Code PEM1Ah) and one riverine system (NWI code R4SBC) are mapped along the southeastern site boundary. The riverine system is associated with Donkey Creek. The NWI Code indicates that this section of Donkey Creek is intermittent; however, National Hydrography Dataset (NHD) mapping indicates the stream is perennial. Federal Emergency Management Agency (FEMA) mapping indicates that relatively small areas of Zone A (one-percent annual chance flood zone) are mapped along Donkey Creek on the southeastern site boundary. The remainder of the site is mapped as Zone X (minimal flood hazard).

The USEPA online Sole Source Aquifer map indicates no sole source aquifers are present in the vicinity of the site. No surface water drinking water sources appear to be present in the immediate vicinity of the site. Wyoming State Geological Survey (WSGS) mapping indicates the site is underlain by the Wasatch Aquifer, a sandstone aquifer, and a Quaternary alluvial aquifer. One livestock well has been installed immediately west of the site for the Gillette College Foundation.

The potential for significant environmental impacts related to wetlands, streams, floodplains, or groundwater were not determined associated with this site.

### Historic and Archaeological Resources

In 2022 an Environmental Narrative was prepared by Campbell County for the Pronghorn Industrial Park, indicating that in 2009 a cursory archaeological study was conducted on a portion of the site. Class I research using the Wyoming State Archives shows there has been one project in Section 32, T50N, R71W involving an Ineligible Lithic Scattering (comprised of two artifacts). The Environmental Narrative includes a 20 September 2021 letter from Wyoming SHPO that concludes no historic properties would be impacted by development of the proposed Pronghorn Industrial Park.

National Register of Historic Places (NRHP) mapping indicates that no listed places are located within the site. The nearest NRHP-listed sites are the Gillette City Hall and Gillette Post Office, which are located approximately 4.4 miles west-northwest of the site in the city of Gillette. Two additional NRHP-listed sites are indicated for Campbell County (Basin Oil Field Tipi Rings and Bishop Road Site) but have restricted location information, presumably because of the archaeological sensitivity of the sites. However, based on the general descriptions provided by the NRHP, these sites do not appear to be located in the vicinity of the site. No Wyoming Historic Sites appear to be located within five miles of the site.

No tribal-owned lands appear to be located in the vicinity of the site. The 2022 Environmental Narrative indicates that all potentially affected tribes were contacted for input regarding development of the Pronghorn Industrial Park, though no indication is provided regarding any responses that may have been received.

The possibility exists that prehistoric artifacts may be found within the site or that potentially affected tribes could have concerns with the Proposed Action.

### Geotechnical Considerations

A geotechnical engineering report was prepared by Advanced Geotechnical Solutions, Inc. for the Pronghorn Industrial Park in 2024. Based on this report and publicly available information, the following were determined to be relevant factors that could impact the Proposed Action if this site was selected:

- For heavily loaded and/or highly settlement sensitive structures, a robust geotechnical design that includes competent deeper rock for bearing (e.g., drilled shafts, excavation to competent soil or rock, ground improvement, etc.) may be needed.
- There has been historical mining activity in the vicinity of the site with active mines located nearby. The potential presence of historical, abandoned mine workings below the site was recommended to be investigated. The presence of historical mine workings within the site would have potential geotechnical implications for future construction such as land subsidence and sinkholes.

### Socioeconomics

According to estimates from the United States Census Bureau, the city of Gillette encompassed a population of about 33,496 people and 12,417 households in 2023. Within a 0.5-mile and one-mile radius of the site specifically, there are approximately 312 people and 1,944 people, respectively. Much of this encompasses a residential neighborhood located within one mile from the site, which also includes a home day care. The immediate vicinity of the site represents a low-density population area in an industrial development zone outside of the City of Gillette. However, the city itself represents the third largest city in Wyoming and its largest density areas lie just five miles from the Pronghorn Industrial Park to the east. There are an estimated 23,412 people within a five-mile radius of the site and over 37,000 people within a ten-mile radius, which encompasses populations from neighborhoods within the western portion of the City of Gillette. The Pronghorn Industrial Park, which includes the site, represents part of the city's economic diversification plan.

The proximity of the Proposed Action to one of Wyoming's largest population centers and the additional scrutiny and concern that would be drawn beyond the immediate community itself was a consideration for this alternative. The planned development of a sports tourism industry with facilities adjacent to the site, which may recurrently bring a surge of visitors to the city and the Project site through the same entry point was also a consideration for this alternative. Concerns would include the challenge of public engagement with transient public, the location of a residential neighborhood and a daycare within a mile of the site, and disruption related to potential truck traffic or road closures during Project development, public misconceptions and fear, and incongruent local development of the region.

Energy projects, including nuclear, are widely supported in Wyoming, though there is some existing opposition to the sector. While the city currently has low unemployment levels, the city is eager to diversify its local economy away from fossil fuel production, which is experiencing a downturn, and which currently represents the largest source of local employment. The Project could potentially offer several opportunities for economic and workforce development and transition that align with the city's economic development plans.

Past Land Use

A desktop Phase I type Environmental Site Assessment (ESA) was completed for Campell County site and included review of a database search report, historic topographic maps, and historic aerial images, as provided by EDR. According to historic aerial photographs (from 1970 to 2019) and historic topographic maps (from 1971 to 2021), the site has historically been undeveloped with some evidence of grazing livestock. Several two-track access roads are visible on aerial images from 1970 through 2019. Electric transmission lines are visible in the northeast corner of the site beginning in 2006. The character of the site has largely remained unchanged and no readily identifiable new construction, renovations, or demolition/redevelopment appears in the topographic mapping or aerial imagery during the period provided by EDR (1970 – 2019).

The EDR electronic environmental database search was used to identify properties that may be listed in the referenced agency records. No records were identified in association with the site. In addition, no records were identified in association with properties located within the varied ASTM-required search radii of the site.

In addition to the EDR report, the Environmental Narrative for the Pronghorn Industrial Park prepared by Campbell County in 2022 indicates the site is considered a Greenfield site because:

- No harmful activities have occurred on the property;
- The land has never been developed;
- The property has been primarily used for grazing purposes;
- No structures have ever been erected; and
- It is an exurban site within one mile of municipal corporate limits.

#### 2.1.3.3.2 Calhoun County, Texas

The Calhoun County, Texas site consisted of approximately 173 acres located approximately 10 miles southwest of Port Lavaca, Texas. The site was roughly bounded by the Victoria Barge Canal to the west, State Highway 35 to the south, State Highway 185, Dyer Road, and the Missouri Pacific Railroad to the east, and undeveloped private land to the north.

Protected Species

The Calhoun County site did not appear to present significant issues related to the presence of rare, threatened, and endangered species based on a review of the publicly available data. The USFWS IPaC and Texas Parks and Wildlife Department (TPWD) indicated the potential presence of state and federal listed threatened and endangered species in the vicinity of the site. However, many of the protected species would not find suitable habitat within the site (e.g., shark, whale, manatee, and sea turtle species). If this Calhoun County site had been selected, it is expected that further communication with the USFWS and TPWD would be needed to determine potential impacts to protected species and whether avoidance and minimization measures would be required during Project construction or operation.

## Water Resources and Wetlands

No wetland and stream delineations were conducted on the Calhoun County site. However, USFWS NWI mapping indicates one mapped resource is located adjacent to the western boundary. This mapped feature coincides with the Victoria Barge Canal, which the NWI classifies as an excavated perennial riverine feature (NWI code R2UBHx). It is identified by the NHD as an Artificial Path. The Victoria Barge Canal flows approximately 8.5 miles south of the site to its confluence with San Antoinio Bay. The Victoria Barge Canal is not included on the Texas CWA 303(b) list of impaired waters. A 2021 Phase I Environmental Site Assessment conducted on the site also indicated the presence of a pond on the northwest portion of the site with a small stream (dry at time of observation) that flows from the pond to the southwest corner of the site. FEMA mapping for the site indicates a relatively narrow area of Zone AE (one-percent annual chance flood zone) is mapped along the Victoria Barge Canal along the western boundary of the site.

The USEPA online Sole Source Aquifer map indicates no sole source aquifers are present in the vicinity of the site. No surface water drinking water sources appear to be present in the immediate vicinity of the site. Texas Water Development Board's Water Data Interactive mapping indicates that no domestic wells are located within or adjacent to the site. The nearest domestic-use water well appears to be located approximately 0.75-mile east of the site. One livestock well is mapped in the site boundary, which was drilled to a depth of 90 feet in 1959, and the current status of this well was unknown. An irrigation well and several livestock wells are located on properties south and east of the site.

In general, significant issues related to wetlands, streams, floodplains, or groundwater were not anticipated if the Calhoun County site were selected for the Proposed Action. A permit for wetland or stream or impacts, if needed, would be expected to be readily achievable. A floodplain permit would not be anticipated as necessary for this site if development along the Victoria Barge Canal was avoided. Given the distance to existing wells and limited groundwater needs for the Project, impacts to groundwater are considered a low risk.

## Historic and Archaeological Resources

NRHP mapping indicates that no listed sites are located in the vicinity of the Calhoun County site. The nearest NRHP-listed site is the LaSalle Monument, which is located approximately 18 miles east of the site. In addition, the Texas Historic Sites Atlas indicates the nearest historic site is the Long Mott (Mexican) Cemetery, which is located approximately 3.4 miles southeast of the site. No tribal-owned lands were identified in the vicinity of the site and no current tribal claims were identified in Calhoun County.

In 2021 a cultural resource review of the site was conducted by a licensed archaeologist with access to THC archaeological resource information. The review indicates that one previously recorded archaeological site (41CL70) is located in the southwestern portion of the site. The prehistoric component of this archaeological site consists of shell and artifact midden eroding from the bank of the Victoria Barge Canal. The historic component of the site consisted of a concrete foundation, the remains of an electrical pole, and artifact scatter related to the previous location of the Taylor Ranch manager's house. It is noted that the prehistoric component of this site may extend further east into the site. The Proposed Action would likely require archaeological investigations if the Calhoun County site were selected.

## Geotechnical Considerations

A preliminary geotechnical engineering report was prepared by Gorrondona Engineering Services, Inc. as part of a previously proposed project (unrelated) on the Calhoun County site in 2021. Based on this report and publicly available information, the following were determined to be relevant factors that could impact the Proposed Action if the Calhoun County site were to be selected:

- Shallow soils across most of the site appear to generally consist of about 10 feet of low to high plasticity clay soils, with interbedded layers of clay and sand below that. Groundwater is expected at depths of about 25 to 30 feet across most of the site.
- The high plasticity clay soils expected within the site are generally not considered to be susceptible to liquefaction, although they may still soften and lose strength during a seismic event. The medium dense to dense sands encountered in the 2021 soil borings do not appear to be susceptible to liquefaction either, based on their dense nature.
- Potential for seismic slope displacements exists, especially near the edge of the barge canal where groundwater is shallower and ground surface slopes are present.
- Saturated clay soils are susceptible to time-dependent consolidation settlement when loaded. Heavily loaded and/or highly settlement sensitive structures may require a robust geotechnical design that relies on ground improvement or deep foundations.
- Native clay soils encountered near the ground surface appear to be generally stiff based on the preliminary data documented in the 2021 report.

## Socioeconomics

The Calhoun County, TX site is located approximately 12 miles west of downtown Port Lavaca and 130 miles southwest of Houston. The closest population centers from the site are Tivoli, in Refugio County, approximately eight miles southwest of the site, and Seadrift, in Calhoun County, approximately ten miles southeast of the site. Port Lavaca and the adjacent area's economy are highly dependent on the industrial manufacturing sector, with numerous facilities located adjacent to the site and across Lavaca Bay in nearby Point Comfort. Among the industrial and commercial facilities within a two-mile radius are chemical plants Union Carbide and Calhoun Chemical, warehouse USA Debusk, and manufacturer Seadrift Coke LP, which will have associated employees that will impact the transient (nonresidential) population in the area.

Population density within a one-mile radius of the site is low at approximately ten people. This area largely encompasses agricultural land, wetland, and industrial facilities. Within two miles of the site, the population encompasses approximately 116 people, increasing to 819 and 6,468 respectively within five and ten miles. Regarding the presence of sensitive populations adjacent to the site, there are no schools, day care centers, or hospitals located within a two-mile radius. Seadrift School, a pre-K-to-eighth grade institution and the closest school, is located approximately ten miles away on Broadway Avenue in Seadrift. The closest hospital, Memorial Medical Center, is located in downtown Port Lavaca.

Given alignment to Port Lavaca's economic and community development efforts aimed at attracting new business, the employment and diversified industry growth opportunities that the Project may bring are likely to see a receptive environment among city officials and members of the community. The region surrounding the site provides a large workforce to support new business; however, workforce

training may be required for new industry like nuclear because the region is above the 90th percentile for lack of high school education.

A range of environmental burdens and social vulnerability factors are present in the site and immediate community that may present sensitivity to potential health concerns and environmental impacts. Among the concerns the community may raise are public health concerns related to the area's vulnerability to tropical storms/hurricanes and the resilience of structures to these hazards, especially given recent experience with this issue in relation to the Lavaca Bay Superfund Site.

Past Land Use

A desktop Phase I type ESA was completed for the Calhoun County site and included review of a database search report, historic topographic maps, and historic aerial images, as provided by EDR. According to historic aerial photographs (from 1964 to 2020) and historic topographic maps (from 1913 to 2022), the Calhoun County site has historically been undeveloped with some evidence of livestock grazing apparent. Several two-track access roads are visible on aerial images beginning in 1964. Several fence lines, corrals, and small buildings are apparent on aerial imagery with the highest amount of activity appearing to occur around 1995. The character of the site has largely remained unchanged and no readily identifiable new construction, renovations, or demolition/redevelopment appears in the topographic mapping or aerial imagery during the period provided by EDR (1913 – 2022). The greatest change in the area appears to be the construction of the Victoria Barge Canal, which is first apparent on topographic mapping in 1973.

The EDR electronic environmental database search was used to identify properties that may be listed in the referenced agency records. No records were identified in association with the site. In addition, no records were identified in association with properties located within the varied ASTM-required search radii of the site.

InControl Technologies conducted a Phase I ESA of the site in 2021. This assessment found no evidence of potential Recognized Environmental Conditions (RECs), Historical RECs, or Controlled RECs in connection with the site.

#### 2.1.3.3.3 Natrona County, Wyoming

The Natrona County, Wyoming site consisted of approximately 214 acres located immediately north of the town of Bar Nunn, Wyoming. The site comprised two parcels bounded by U.S. Interstate 25 to the east and a rock quarry and open range land to the west. Access to the site is from Westwinds Road to the south.

Protected Species

The Natrona County site did not appear to present significant issues related to the presence of rare, threatened, and endangered species based on a review of the publicly available data. The USFWS IPaC database and the WYNDD confirmed that there are no designated critical habitats within the site and identified two endangered animal species (whooping crane and pallid sturgeon), one threatened animal species (piping plover), one threatened plant species (western prairie fringed orchid), and one species proposed for federal listing (monarch butterfly) as species that could potentially occur in the vicinity of the site. Review of the state's WyGISC migration corridor tool did not indicate the presence of mule deer

or sage grouse corridors within the site. Initial field surveys were conducted, and no significant protected species implications were anticipated at this site.

### Water Resources and Wetlands

USFWS' NWI and NHD mapping indicated no wetlands or streams are mapped within or adjacent to the site. Wetland and stream delineations generally confirmed these findings and only documented the presence of two ephemeral swales within the site. FEMA mapping indicates the site is mapped as Zone D – Area of Undetermined Flood Hazard. Considering the local topography and the distance to the nearest named stream (Sand Spring Creek is located approximately 3.4 miles east of the site), flood hazards were not expected to impact the Project and no floodplain permitting was anticipated.

The USEPA's online Sole Source Aquifer map indicates no sole source aquifers are present in the vicinity of the site. No surface water drinking water sources appear to be present in the immediate vicinity of the site. WSGS mapping indicates the site is underlain by the Mesaverde Aquifer, a sandstone aquifer, and a Quaternary unconsolidated-deposit aquifer. WSGS data indicate no water wells have been permitted within the site. Several wells have been permitted in the surrounding area and water right status for these wells are generally cancelled, incomplete, or abandoned.

The potential for significant environmental impacts related to wetlands, streams, floodplains, or groundwater was determined to be minimal.

### Historic and Archaeological Resources

NRHP mapping indicates that no listed sites are located in the vicinity of the site. The nearest NRHP-listed sites are the Roosevelt School and the North Casper Clubhouse, which are located approximately 5-miles south of the site. Additionally, no Wyoming Historic Sites appear to be located within five miles of the site.

No tribal-owned lands appear to be located in the vicinity of the site; however, the possibility exists that prehistoric artifacts may be found within the site or that potentially affected tribes could have concerns with the Proposed Action.

### Geotechnical Considerations

Based on an on-site due diligence level geotechnical investigation and publicly available information, the following were determined to be relevant factors that could impact the Proposed Action if the Natrona County site were to be selected:

- Loose to dense sands with varying amounts of silt and clay were observed in the upper section of all the explorations performed. This unit generally extended to depths of approximately 5 to 15 feet below ground surface. Below this section, weathered bedrock deposits characterized as very dense silty sands and hard clays or silts were observed to extend to the bottom of all borings. Intact bedrock consisting of shale and sandstone (interpreted as Mesaverde Formation) is anticipated to exist below this section. Future explorations targeted for design of heavily loaded or settlement sensitive structures would be required to collect rock cores and better delineate the boundary between the lower subsurface units and determine the engineering qualities of the rock.

- Due to the lack of a near-surface groundwater table, the expected presence of rock relatively near to the ground surface, and generally low seismic hazard, liquefaction is not expected to be a concern.
- Based on geologic hazard mapping performed by the Wyoming Geological Survey, the site lies just north of a regional area where a moderate hazard of expansive soils is expected. The potential for swelling soils would require further investigation.

Socioeconomics

According to 2023 U.S. Census Bureau estimates, Bar Nunn has an estimated population of 2,981. The population of Casper is approximately 59,038, comprising about 70 percent of Natrona County's population of 79,955. Within a 1-mile radius of the site, population density is approximately 1,332 people. Within 2 miles of the site, the population encompasses 2,628 people, increasing to 2,855 and 69,489 respectively within 5 and 10 miles. These numbers do not include commuting workers at adjacent facilities along Westwinds Road and Tonkawa Trail less than two miles from the site. With regards to sensitive populations, Bar Nunn Elementary School is less than 1.5 miles west of the site. A number of other schools in the Natrona County School District are located south of the site in Casper. Lincoln Elementary School and University Park School, adjacent to I-25, are closest to the site approximately 4.5 miles south. Banner Wyoming Medical Center is also located in Casper, approximately 6 miles from the site. A camping area known as Casper KOA Journey is located approximately 2 miles south of the site, adjacent to the Bar Nunn City Hall, recreational fields, and Bar Nunn Baptist Church. The closest tribal reservation, Wind River, is approximately 153 miles west of the Study Area.

The proximity of the Proposed Action to one of Wyoming's largest population centers and the additional scrutiny and concern that would be drawn beyond the immediate community itself was a consideration for this alternative. The planned development of a sports tourism industry with facilities adjacent to the site, which may recurrently bring a surge of visitors to the city and the Project site through the same entry point was also a consideration for this alternative. Concerns would include the challenge of public engagement with transient public, the location of a residential neighborhood and a daycare within a mile of the site, and disruption related to potential truck traffic or road closures during Project development, public misconceptions and fear, and incongruent local development of the region.

No significant environmental burdens or social vulnerability indicators of concern were identified within a 2-mile radius of the site, beyond unemployment. Outside of the 2-mile radius, the denser population areas in Casper, a few miles from the site, exhibit indicators of potential interest for workforce development considerations. The Project appears to be generally aligned to economic development priorities of energy diversification in the region. The broader state environment also appears eager to attract alternative and renewable energy projects and may generate new incentives to encourage growth of this industry within the state. However, at the local community level, legislative activity advancing nuclear storage in the state is receiving opposition.

Past Land Use

A desktop Phase I type ESA was completed for Natrona County site and included review of a database search report, historic topographic maps, and historic aerial images, as provided by EDR. According to historic aerial photographs (from 1947 to 2019) and historic topographic maps (from 1951 to 2021), most of the central and northern portions of the Study Area have historically been vacant or possibly used as rangeland. Several two-track access roads are visible on aerial images in 1947. It appears

construction of U.S Highway 87, adjacent to the eastern boundary of the Study Area, is underway in 1947. Several fence lines appear to be present on aerial imagery beginning in 1971. Significant ground disturbance in the southern portion of the Study Area is apparent by 1989 and expanding through the 2000s. This appears to be associated with development of the Wardwell Pit quarry in the southern portion of the Study Area. No discernable aboveground structures were observed on the aerial imagery or topographic mapping provided by EDR. The character of the Study Area has largely remained unchanged and no readily identifiable new construction, renovations, or demolition/redevelopment, other than Wardwell Pit, apparent in the topographic mapping or aerial imagery during the period provided by EDR (1947 – 2021).

The EDR electronic environmental database search was used to identify properties that may be listed in the referenced agency records. It was determined that no records appear to be associated with the site. Ten records were identified in association with properties located within the varied ASTM-required search radii of the site. However, none of the identified records appear to represent RECs for the site.

In addition to the EDR report, a Phase 1 Environmental Site Assessment prepared for the southern portion of the site found no evidence of potential RECs, Historical RECs, or Controlled RECs in connection with the site.

## 2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED

Radiant did not consider other alternatives to the proposed construction and operation of Radiant's Kaleidos microreactor fueling facility. Radiant is a manufacturer of nuclear microreactors and is not proposing other technologies as part of their business model and therefore no other alternatives than constructing and operating the fueling facility was considered.

## 2.3 CUMULATIVE EFFECTS

This section evaluates the cumulative effects of the proposed action when combined with other past, present, and reasonably foreseeable future actions. Cumulative effects are defined as impacts on an environmental resource resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which federal or non-federal agency or private party undertakes the other actions (40 CFR 1508.1(g)(3)). Cumulative impacts can result from individually minor but collectively significant actions taking place over time (40 CFR 1508.1(g)(3)) The analysis provided in this section considers impacts resulting from both the construction and operation of the Project. Past, present, and reasonably foreseeable future actions in the geographic area that could result in cumulative impacts are listed in Table 2.3-1. Key past and present actions in the geographic area include various federal nuclear and energy development facilities, industrial facilities, site remediation, waste processing and disposal facilities, technology and business park developments, and residential housing developments. Key foreseeable future actions include an airport development project. Section 2.13 of the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, LLC, 2023) provides a description of the potential these projects have for contributing to cumulative effects on resources in the geographic area of interest that is shared between the Kairos project and the Proposed Action. The resources assessed included land use and visual resources; air quality and noise; geologic environment; water resources (hydrology, water use, water quality); ecological resources (terrestrial and aquatic communities); historic and cultural resources; socioeconomics; human health; and waste management.

In general, resource impacts resulting from the Proposed Action will be small and localized to the Project site as described in Section 4 of this Environmental Report. These and any impacts extending beyond the Project site are expected to be equal or less than those assessed by the NRC for the Kairos project. As noted in the relevant cumulative impact assessments included in Section 3 of the *Environmental Impact Statement for the Construction Permit for the Kairos Hermes Test Reactor* (U.S. Nuclear Regulatory Commission, 2023), the NRC concluded that cumulative impacts to all resource areas resulting from the Kairos project would be SMALL. These conclusions were primarily based on the minor scale of the proposed impacts and/or the regulatory requirements and permitting that would apply to the Kairos project, and other past, present, and reasonably foreseeable future actions. This determination is anticipated to be applicable to the Proposed Action considering the relatively minor impacts proposed and the similarity of regulatory and permitting requirements. As a result, the incremental contribution of the Proposed Action to cumulative impacts on all resources is expected to be SMALL as summarized in Table 2.3-2.

### 2.3.1 Conclusion

Table 2.3-2 provides a summary of cumulative impacts that may result from construction, operation, and decommissioning of the Project. When considered with known past, present, and reasonably foreseeable future actions, no significant cumulative impacts are expected to result from the construction, operation, or decommissioning of the Project.

### 2.3.2 Tables

**Table 2.3-1 Past, Present, and Reasonably Foreseeable Future Actions**

| Action | Approximate Location Relative to Project Site | Description | Status | Impact Types |
|---|---|---|---|---|
| East Tennessee Technology Park | Surrounding | Environmental cleanup and restoration of the K-25 site for eventual site transition to public use. | Ongoing | Land use, transportation, geology and soil, water resources, ecological resources, air quality, noise, visual, socioeconomic, public and occupational health, waste management. |
| Kairos Power Hermes Low-Power Demonstration Reactor | Adjacent north of Poplar Creek | Construction and operation of a low-power reactor, which will use TRISO fuel pebble bed design with a molten fluoride salt coolant to demonstrate affordable, clean heat production. | Under construction | Land use, geology and soil, transportation, water resources, air quality, noise, visual, socioeconomic, public and occupational health, waste management. |
| Kairos Power Hermes 2 Demonstration Plant | Adjacent north of Poplar Creek | The Hermes 2 Demonstration Plant will build on lessons learned from the first Hermes reactor to demonstrate KP-FHR technology at a larger scale and supply clean electricity to the grid. | Construction permits issued in November 2024 | Land use, geology and soil, transportation, water resources, air quality, noise, visual, socioeconomic, public and occupational health, waste management. |

| Action | Approximate Location Relative to Project Site | Description | Status | Impact Types |
|---|---|---|---|---|
| Standard Nuclear Pilot Fuel Manufacturing Facility | Adjacent to the southeast | Manufactures TRISO and FCM fuel for clients | Operational | Land use, transportation, noise, visual, socioeconomic. |
| Y-12 Shipping and Receiving Facility | 0.5 miles northwest | Non-hazardous shipping and receiving facility | Operational | Transportation. |
| The Preserve at Clinch River | 1.5 miles southwest | New residential development | Ongoing development | Land use, geology and soil, water resources, ecological resources, visual, socioeconomic. |
| Energy Solutions Bear Creek Processing Facility | 1.5 miles southeast | The facility safely processes and packages radioactive material for permanent disposal or beneficial reuse. | Operational | Air quality, water resources, public and occupational health, waste management. |
| TRISO-X Nuclear Fuel Fabrication Facility | 2.5 miles northeast | The facility will fabricate X-energy's proprietary TRISO fuel, an advanced nuclear fuel designed to withstand extreme temperatures without melting. | Under construction | Land use, geology and soil, air quality, transportation, visual, socioeconomics, public and occupational health. |
| Horizon Center Industrial Park | 2.5 miles northeast | 1,000-acre business park has development sites ranging in size from 11 to 148 acres and can accommodate 4 million square feet of space for research and development, light manufacturing, and office facilities. | Ongoing development | Land use, geology and soil, transportation, water resources, ecological resources, air quality, noise, visual, socioeconomic, public and occupational health, waste management. |
| Clinch River Nuclear Site | 2.75 miles south-southeast | TVA applied for a construction permit for a GE Vernova Hitachi BWRX-300 in May. Once completed, the 300-Mwe SMR will be the first utility-scale unit to come online in the United States. | Approved and under development | Land use, geology and soil, transportation, water resources, ecological resources, air quality, noise, visual, socioeconomic, public and occupational health, waste management. |
| Roane Regional Business and Technology Park | 3.75 miles southeast | 655-acre industrial park geared toward light and medium industry. | Ongoing industrial development | Land use, geology and soil, transportation, water resources, ecological resources, air quality, noise, visual, socioeconomic, public and occupational health, waste management. |
| Forest Creek Village | 4 miles northeast | New residential development. | Ongoing development | Land use, geology and soil, water resources, ecological resources, visual, socioeconomic. |

| Action | Approximate Location Relative to Project Site | Description | Status | Impact Types |
|---|---|---|---|---|
| Oak Ridge National Laboratory | 4.5 miles east | ORNL is a federally funded research and development center with scientific programs focused on materials, nuclear science, neutron science, energy, high-performance computing, environmental science, systems biology and national security. | Established in 1943 | Water resources, air quality, noise, visual, socioeconomic, public and occupational health, waste management. |
| Transuranic Waste Processing Center | 4.75 miles southeast | UCOR operates the regional center for the management, treatment, packaging, and shipment of DOE Transuranic waste legacy inventory. Also responsible for managing and treating Low Level and Mixed Low-Level Waste generated at ORNL. | Completed in 2003 | Water resources, air quality, noise, public and occupational health, waste management. |
| Sludge Processing Mock Test Facility | 4.75 miles southeast | Transuranic sludge waste processing test facility. | Completed in June 2022 | Water resources, air quality, noise, public and occupational health, waste management. |
| Environmental Management Disposal Facility | 5 miles east-northeast | New landfill to dispose of their radioactive, hazardous, and toxic wastes. | Under construction | Land use, geology and soil, water resources, ecological resources, air quality, noise, public and occupational health, waste management. |
| Oak Ridge General Aviation Airport | Undecided | Originally proposed for the ETTP but the project is currently paused while a new site is located. | Reasonably foreseeable | Land use, transportation, visual, noise, socioeconomic. |

**Table 2.3-2 Summary of Potential Cumulative Impacts**

| Impact Category | Cumulative Impact |
|---|---|
| Land Use | SMALL |
| Transportation | SMALL |
| Geology and Soils | SMALL |
| Water Resources | SMALL |
| Ecological Resources | SMALL |
| Meteorology, Climatology, and Air Quality | SMALL |
| Noise | SMALL |
| Historic and Cultural Resources | SMALL |
| Visual/Scenic Resources | SMALL |
| Socioeconomics | SMALL |
| Public and Occupational Health | SMALL |
| Waste Management Impacts | SMALL |

### 2.3.3 References


1. City of Oak Ridge. 2025. “City Blueprint [website].” Available at https://oakridgeblueprint.info/.
2. City of Oak Ridge. 2025. “Oak Ridge Airport[website].” Available at https://www.oakridgetn.gov/242/Oak-Ridge-Airport.
3. Kairos Power, LLC. 2023. “Hermes Non-Power Reactor Environmental Report.” HER-ER-001 Revision 1.
4. U.S. Nuclear Regulatory Commission. 2023. “Environmental Impact Statement for the Construction Permit for the Kairos Hermes Test Reactor – Final Report.” NUREG-2263


## 2.4 COMPARISON OF PREDICTED ENVIRONMENTAL IMPACTS

This section presents a comparison of the predicted environmental impacts associated with the proposed construction and operation of the Project versus the three alternative locations that were evaluated. The evaluation considers potential effects on environmental resources, including air quality, water resources, land use, ecological systems, socioeconomics, and human health. The comparisons are summarized in two tables: one addressing construction-related impacts and the other addressing operational impacts to evaluate whether an alternative would reduce or avoid adverse effects.

### 2.4.1 Tables

**Table 2.4-1 Comparison of Construction Impacts**

| Environmental Category | Proposed Action | Alternative Locations | | |
|---|---|---|---|---|
| | | Natrona County, WY | Victoria, TX | Gillette, WY |
| Land Use | SMALL; site previously developed. | MODERATE; conversion of rural land to industrial. | MODERATE; conversion of rural land to industrial. | SMALL; site is already being developed as an industrial park. |
| Transportation | SMALL; minor impacts related to increased traffic on local roads. | SMALL; minor impacts related to increased traffic on local roads. | SMALL; minor impacts related to increased traffic on local roads. | SMALL; minor impacts related to increased traffic on local roads. |
| Geology and Soils | SMALL; minor impacts from grading and excavation; implementation of best management practices and soil and groundwater management plan. | SMALL; minor impacts from grading and excavation. | SMALL; minor impacts from grading and excavation. | SMALL; minor impacts from grading and excavation. |
| Water Resources | SMALL; no direct impacts to surface water or groundwater proposed. | SMALL; no direct impacts to surface water or groundwater. | SMALL; minor impacts to surface waters and/or wetlands. | SMALL; minor impacts to wetlands, streams or floodplain. |

| Environmental Category | Proposed Action | Alternative Locations | | |
|---|---|---|---|---|
| | | Natrona County, WY | Victoria, TX | Gillette, WY |
| Ecological Resources | SMALL; site previously developed. | SMALL; minor impacts to existing vegetation and wildlife. No significant adverse impact to protected species. | SMALL to MODERATE; impacts to existing vegetation and wildlife, and potential risk of impact to protected species. | SMALL; minor impacts to existing vegetation and wildlife. No significant adverse impact to protected species. |
| Meteorology, Climatology, and Air Quality | SMALL; minor impacts to air quality. | SMALL; minor impacts to air quality. | SMALL; minor impacts to air quality. | SMALL; minor impacts to air quality. |
| Noise | SMALL. | SMALL. | SMALL. | SMALL. |
| Historic and Cultural Resources | SMALL; site previously developed. | SMALL to MODERATE; based on survey results. | MODERATE risk of impact on previously recorded archaeological site. | MODERATE risk of impact to archaeological and/or tribal interests. |
| Visual/Scenic Resources | SMALL; facility consistent with surrounding uses. | SMALL to MODERATE; potential impacts at nearby residences and along local roadways. | SMALL to MODERATE; potential impacts at nearby residences and along local roadways. | SMALL; minor impacts at nearby residences and along local roadways. Site is already being developed as an industrial park |
| Socioeconomic | SMALL. Positive impacts related to employment and increased activity at local businesses. | SMALL. Positive impacts related to employment and increased activity at local businesses. | SMALL. Positive impacts related to employment and increased activity at local businesses. | SMALL. Positive impacts related to employment and increased activity at local businesses. |
| Public and Occupational Health | SMALL. Minor public and occupational health impacts. | SMALL. Minor public and occupational health impacts. | SMALL. Minor public and occupational health impacts. | SMALL. Minor public and occupational health impacts. |
| Waste Management | SMALL; minor impacts related to management of construction waste. | SMALL; minor impacts related to management of construction waste. | SMALL; minor impacts related to management of construction waste. | SMALL; minor impacts related to management of construction waste. |

**Table 2.4-2 Comparison of Operation Impacts**

| Environmental Category | Proposed Action | Alternative Locations | | |
|---|---|---|---|---|
| | | Natrona County, WY | Victoria, TX | Gillette, WY |
| Land Use | SMALL. | SMALL to MODERATE. | SMALL to MODERATE. | SMALL. |
| Transportation | SMALL; minor impacts related to increased traffic on local roads. | SMALL; minor impacts related to increased traffic on local roads. | SMALL; minor impacts related to increased traffic on local roads. | SMALL; minor impacts related to increased traffic on local roads. |
| Geology and Soils | SMALL. | SMALL. | SMALL. | SMALL. |
| Water Resources | SMALL; minor impacts on local water and sewer systems. | SMALL; minor impacts on local water and sewer systems. | SMALL; minor impacts on local water and sewer systems. | SMALL; minor impacts on local water and sewer systems. |
| Ecological Resources | SMALL. | SMALL. | SMALL. | SMALL. |
| Meteorology, Climatology, and Air Quality | SMALL; minor impacts to air quality. | SMALL; minor impacts to air quality. | SMALL; minor impacts to air quality. | SMALL; minor impacts to air quality. |
| Noise | SMALL. | SMALL. | SMALL. | SMALL. |
| Historic and Cultural Resources | SMALL. | SMALL to MODERATE. | MODERATE. | MODERATE. |
| Visual/Scenic Resources | SMALL. | SMALL to MODERATE. | SMALL to MODERATE. | SMALL. |
| Socioeconomic | SMALL. Positive impacts related to employment and increased activity at local businesses. | SMALL. Positive impacts related to employment and increased activity at local businesses. | SMALL. Positive impacts related to employment and increased activity at local businesses. | SMALL. Positive impacts related to employment and increased activity at local businesses. |
| Public and Occupational Health | SMALL. Minor public and occupational health impacts. | SMALL. Minor public and occupational health impacts. | SMALL. Minor public and occupational health impacts. | SMALL. Minor public and occupational health impacts. |
| Waste Management | SMALL; minor impacts related to management of operational waste. | SMALL; minor impacts related to management of operational waste. | SMALL; minor impacts related to management of operational waste. | SMALL; minor impacts related to management of operational waste. |

# 3. Description of Affected Environment

## 3.1 LAND USE

### 3.1.1 Project Site Land Use

The Project site consists of approximately 84 acres of land that was previously disturbed and developed as part of the Manhattan Project and has subsequently undergone remediation. The Project site formerly housed the K-27 gaseous diffusion building as part of the Oak Ridge Gaseous Diffusion Plant. K-27 ceased production in 1964, and demolition of the building was completed in 2017. The site has since undergone remediation and been restored as part of the ETTP. The ETTP was established by the U.S. Department of Energy in 1996 in cooperation with the Community Reuse Organization and its objective is to transform the site into a privately-owned, multi-use industrial park. Core cleanup at the ETTP was completed in 2020 and included demolition of more than 500 structures and addressing major areas of site contamination. Soil remediation within the ETTP was completed in 2024 and involved removing 554,000 cubic yards of soil. Regulators signed two records of decision (ROD) in 2024 that provide the approval and guidance necessary to address groundwater at ETTP, which is the final phase of cleanup at the site. These decisions, along with others under development, will guide future remediation for cleanup at ETTP. Groundwater remedial investigation began at ETTP in 1997. There are 13 permanent unconsolidated monitoring wells are located in or adjacent to the Project site and 9 bedrock monitoring wells located in or adjacent to the Project site. (U.S. Department of Energy, 2024).

The Proposed Action will occur on ETTP Exposure Units (EUs) Z2-14 and Z2-15 (totaling approximately 44.2 acres) with subsequent development to occur on transfer areas Z2-13 (12.9 acres), Z2-12 (14.5 acres), and Z2-11 (10.9 acres) (see Figure 3.1-1). EU Z2-14 is subject to a Covenant Deferral Request (CDR) approved by the U.S. Environmental Protection Agency (EPA) (EPA, 2024a). The CDR indicates the deed transferring the property contains various restrictions and prohibitions on the use of the Property that are subject to enforcement pursuant to State Law Tennessee Code Annotated (T.C.A.) 68-212-225 and real property law. These restrictions and prohibitions are designed to ensure protection of human health and the environment. The unrestricted industrial use of soils (that is, excavation and use of the surface and subsurface soils down to 10 feet below ground surface [bgs]) is permitted. Excavation deeper than 10 feet bgs requires further coordination with the Oak Ridge Reservation Excavation, Penetration and Permit Program until all characterization activities and any necessary remedial actions are complete.

The CDR further states that the Quitclaim Deed for the Property includes various prohibitions and restrictions intended to ensure that the proposed transfer is protective of human health and the environment. The deed prohibits the use of the Property in a manner inconsistent with the land use assumptions of “industrial use.” Industrial use is defined by the Zone 2 ROD as potential exposure to surface conditions for 2,000 hours/year for 25 years. In addition, the deed specifically prohibits residential use, which includes residential housing, elementary or secondary schools, or any childcare facility or children’s playground. Further Institutional Controls (ICs) contained in the deed include a prohibition on groundwater use and a stipulation that any existing or newly constructed buildings intended to be occupied by workers eight hours or more per scheduled workday or by public visitors will be designed and or constructed to minimize exposure to volatile organic contaminant vapors (EPA, 2024a). An approved CDR for EU Z2-15 (EPA, 2024b) and a draft CDR for EUs Z2-11, Z2-12, and Z2-13 (EPA, 2025) include the same deed restrictions.

The Project site is listed as "public use" on the Tennessee Comptroller of the Treasury Existing Land Use Map for Roan County and is zoned in the City of Oak Ridge as Federal Industry and Research (FIR) (Tennessee Comptroller of the Treasury, 2022; City of Oak Ridge, 2020; City of Oak Ridge, 2025). The FIR District Classification is established for the United States Government Oak Ridge Reservation and operations within its boundaries. Whenever land is transferred from the United States Government Oak Ridge Reservation to the City of Oak Ridge or a private owner for purposes not directly related to the mission of the USDOE, the City of Oak Ridge Regional Planning Commission is required to study and make recommendations to the City Council concerning the appropriate zoning district designation. Upon receipt of such recommendation, the City Council will, after public hearings as required by law, adopt an ordinance establishing the zoning district classification as Industrial 2.

Paved access roads, parking areas, gravel and concrete pads, and other imperious surfaces are currently prevalent throughout the Project site. No buildings remain on the Project site from prior operations. Security fencing remains in place in portions of the Project site, particularly along Perimeter Road, as well as electrical distribution lines that are located along access roads. A fenced storage area for old/unused electrical transformers and equipment is located in the southern portion of the Project site along Perimeter Road and will not be utilized for the Proposed Action.

The overall topography of the Project site is relatively flat with areas sloping toward Poplar Creek to the north, west and south. Vegetated areas are primarily herbaceous, including maintained grasses and areas where vegetation has progressed to early successional communities consisting of grasses and forbs. Scattered shrubs and trees are also present on the Project site, particularly on slopes bordering Poplar Creek.

The Project site does not include any American Indian or military reservations, wild and scenic rivers, state or national parks, national forests, designated coastal zone areas, wildlife refuges, wilderness areas or prime and unique farmlands. No mineral resources, economically significant agricultural products, commercial fish or invertebrate catches, or unusual animals, facilities, agricultural practices, game harvests, or food processing operations are present in the Project site.

U.S. Geological Survey National Land Cover Dataset (NLCD) (USGS, 2022) mapping for the Project site is provided on Figure 3.1-2. The NLCD indicates the dominant land cover types within the Project site are Developed, High Intensity (40 percent) and Developed, Medium Intensity (40 percent) followed by Developed, Low Intensity (16 percent), Developed, Open Space (3 percent), Deciduous Forest (less than 1 percent), and Open Water (less than 1 percent).

### 3.1.2 Regional Land Use

Regional land use (within five miles of the Project site) is described in Section 3.1.1.2 (pages 3-1 to 3-2) of the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, LLC, 2023) and Section 3.1 (pages 3-2 to 3-3) of the *Environmental Impact Statement for the Construction Permit for the Kairos Hermes Test Reactor* (U.S. Nuclear Regulatory Commission, 2023). These descriptions remain relevant to Radiant's Proposed Action. In general, the region surrounding the Project site includes a mixture of development and rural uses. Approximately 61.9 percent of the region is forested, followed by 16.3 percent that is maintained in hay or pasture, 13.2 percent that is developed to some extent. The remaining area is composed of smaller areas of open water, barren land, scrub shrub vegetation, herbaceous grassland, cultivated crops and wetlands.

Outside of the City of Oak Ridge, regional land use generally consists of small farms, single family residences, recreational uses, and scattered subdivisions. Recreational land uses in the region primarily involve outdoor, nature-oriented activities such as hunting, camping, bicycling, and hiking. Four national parks are located within the broader region: the Manhattan Project National Historical Park (adjacent to the Project site); Big South Fork National River and Recreation Area (about 39 miles north-northwest of the Project site); Obed Wild and Scenic River (about 14 miles northwest of the Project site); and Great Smoky Mountains National Park (about 53 miles southeast of the Project site).

Several state parks also serve the area, including Frozen Head State Park (approximately 10 miles northwest of the Project site), Fort Loudoun State Historic Park (25 miles south-southeast of the Project site), Cove Lake State Park (27 miles northeast of the Project site), Big Ridge State Park (33 miles northeast), Cumberland Mountain State Park (33 miles west), Head of Sequatchie Cumberland Trail State Park (35 miles west-southwest), Justin P. Wilson Cumberland Trail State Park (35 miles southwest), and House Mountain State Natural Area (37 miles northeast).

Locally, the City of Oak Ridge maintains 17 community parks that provide trails for hiking and bicycling, along with spaces for athletics, picnicking, and large gatherings. In nearby Kingston, additional recreational options include parks, walking trails, a dog park, an amphitheater, a sports complex, and a community center. According to the Tennessee Statewide Public Recreation Areas database and the Tennessee Wildlife Management Area mapping, there is one Wildlife Management Area (WMA), Oak Ridge Reservation WMA, which generally surrounds the East Tennessee Technology Park. Public access is provided via the Dyllis Orchard Road Hiking Trail in the Black Oak Ridge Conservation Easement (BORCE) located approximately 1.25 miles northeast of the Project site.

The City of Oak Ridge developed and approved the City Blueprint plan as a citizen-supported plan for future growth and development in the city. The goals of the City Blueprint include population growth and economic sustainability; enhancement of the city's image and development of high-quality amenities and infrastructure; and improved connectivity and mobility. The City Blueprint identified 26 subareas within the city. The Project site is located within the Department of Energy Reservation Subarea. As noted in the subarea report (2020), the subarea is located largely within the city limits, but the city has no authority to plan for the use of federal land. However, the City of Oak Ridge has an interest in the decisions made by DOE on release of additional Reservation land. Which lands, how much land, to whom, and for what purpose, are all important considerations. These factors can have important consequences in the short term on city tax rates and other budget impacts and, in the long term, on development patterns and character of the city. The City of Oak Ridge and DOE have both committed to an ongoing dialogue in which they try to keep each other informed to the extent possible about their plans and proposals.

### 3.1.3 References


1. City of Oak Ridge. 2020. "Department of Energy Reservation Subarea." Available at https://oakridgeblueprint.info/wp-content/uploads/2020/03/Report_DOE-RESERVATION.pdf
2. City of Oak Ridge. 2025. "City Blueprint [website]." Available at https://oakridgeblueprint.info/
3. City of Oak Ridge. 2020. "Zoning Ordinance with Amendments through November 9, 2020." Available at https://www.nrc.gov/docs/ML2215/ML22157A452.pdf.
5. City of Oak Ridge. 2025. "Zoning Map Updated through September 18th, 2025." Available at https://www.oakridgetn.gov/DocumentCenter/View/3573/COR-Zoning-Map-09182025-Ver-20

6. EPA. 2024a. “Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Unit Z2-14 and Portions of Z2-22, Z2-23, and Z2-24 at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final – Concurred.” February 2024. DOE/OR/01-2955.

7. EPA. 2024b. “Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Unit Z2-15 Proposed Title Transfer Footprint at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final – Concurred.” October 2021. DOE/OR/01-2840.

8. EPA. 2025. “Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Units Z2-11, Z2-12, and Z2-13 at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final for Concurrence.” October 2025. DOE/OR/01-3013.

9. Kairos Power, LLC. 2023. “Hermes Non-Power Reactor Environmental Report.” HER-ER-001 Revision 1.

10. Oak Ridge Office of Environmental Management. 2021. “East Tennessee Technology Park Groundwater Remedies Update.” Available at https://www.energy.gov/sites/default/files/2021-06/June%202021%20ORSSAB%20ETTP%20Update%20Groundwater%20Remedies%20Presentation.pdf.

11. Tennessee Comptroller of the Treasury. 2022. “Existing Land Use – Roane County, Tennessee.” Available at https://comptroller.tn.gov/content/dam/cot/pa/documents/landuse/maps/landuse/county/2022_LU_ROANE.pdf.

12. U.S. Department of Energy. 2024. “Interim Record of Decision for Groundwater in the Main Plant Area at the East Tennessee Technology Park, Oak Ridge, Tennessee.” DOE/OR/01-2949&D2.

13. U.S. Nuclear Regulatory Commission. 2023. “Environmental Impact Statement for the Construction Permit for the Kairos Hermes Test Reactor – Final Report.” NUREG-2263.

## 3.2 TRANSPORTATION

The Project site is served by a well-developed multimodal transportation network that includes interstate highways, state and U.S. routes, active freight rail service, the Tennessee River navigation system, and multiple airports. Transportation facilities at and near the Project site are described in Section 3.7.2.3 (pages 3-122 to 3-124) of the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, LLC, 2023). These descriptions remain relevant to the Radiant-Proposed Action and are summarized, and updated as needed, below.

### 3.2.1 Roads and Highways

The Project site lies within the greater Knoxville-Oak Ridge corridor and has direct access to the national interstate system. Interstate 40 (I-40), a six-lane divided freeway, passes approximately five miles south of the Project site, with multiple interchanges serving the area. Interstate 75 (I-75) is located about 10 miles southeast of the Project site, and Interstate 140 (Pellissippi Parkway) lies approximately 16 miles to the east.

Primary access to the Project site is provided by two state routes immediately adjacent to or bordering the site:

**State Route 58 (Oak Ridge Turnpike)** – Runs along the southern boundary of the Project site. The segment fronting the site is a four-lane roadway with two 12-ft travel lanes in each direction separated by a continuous two-way left-turn lane (no physical median divider in the immediate site-frontage section). Paved shoulders are generally 6 to 10 feet wide. Immediately east and west of the Project site, SR-58 transitions to a fully divided four-lane highway with a grass or concrete median. Current average annual daily traffic (AADT) on the site-frontage segment is 15,271 vehicles per day, with a posted speed limit of 55 mph (Tennessee Department of Transportation, 2025).

**State Route 327 (Blair Road)** – A two-lane collector that forms part of the western boundary of the Project site and provides secondary access. AADT is 2,639 vehicles per day, with posted speeds of 35 to 45 mph (Tennessee Department of Transportation, 2025).

In addition, Perimeter Road is a local route that runs along the western boundary of the Project site and provides direct access to the Project site. Recent traffic analyses prepared for the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, 2023), suggest the roadways providing access to the Project site are under capacity and none of these roadway segments exceed the level of service (LOS) C volume threshold over a given 24-hour day.

### 3.2.2 Public Transit

Public transportation in the region is provided primarily through demand-response and fixed-route services operated by the East Tennessee Human Resource Agency (ETHRA) and the City of Oak Ridge. ETHRA offers door-to-door service across a 16-county area, including medical and general-purpose transportation (City of Oak Ridge Tennessee, 2025; East Tennessee Human Resource Agency. 2025a; East Tennessee Human Resource Agency, 2025b). Oak Ridge Transit operates several fixed routes within city limits, although none currently serve the Project site directly. Knoxville Area Transit (KAT) provides fixed-route bus and paratransit service in the greater Knoxville area.

### 3.2.3 Rail

Two short-line railroads also serve the Oak Ridge area: the 9.5-mile Heritage Railroad Corporation line (which directly serves the ETTP) and the 18-mile Knoxville & Holston River Railroad, both interchanging with rail lines operated by Norfolk Southern Railway Company (Norfolk Southern). A CSX Transportation line passes approximately 12 miles northeast of the site. Norfolk Southern rail lines are located approximately eight miles west and 12 miles southeast of the Project site.

### 3.2.4 Air

The closest commercial service airport is McGhee Tyson Airport (TYS), which is located approximately 12 miles south of downtown Knoxville and approximately 20 miles southeast of the Project site. TYS offers nonstop service to more than 25 destinations on major U.S. carriers, with two runways and an average of 120 to 150 daily commercial operations.

Numerous general aviation and reliever airports are located within a 30-mile radius, including Knoxville Downtown Island Airport (approximately 30 miles east of the Project site) and Rockwood Municipal (located approximately 17 miles west of the Project site). Larger connecting hubs in the region include Nashville International Airport (BNA, located approximately 130 miles west of the Project site) and Hartsfield-Jackson Atlanta International Airport (ATL, located 160 miles south of the Project site).

### 3.2.5 Navigable Waterways

The Project site lies northeast of the Clinch River between Clinch River Miles (CRM) 11 and 13, part of the Melton Hill Lake portion of the TVA reservoir system. The Clinch River is commercially navigable for approximately 61 miles upstream from its confluence with the Tennessee River near Kingston, Tennessee, to Clinton, Tennessee. Navigation is maintained by the Melton Hill Lock (400 feet by 75 feet chamber, 60 feet lift), one of nine locks on the greater Tennessee River system that provide a continuous 652-mile navigable channel from Knoxville to the Mississippi River system at Paducah, Kentucky. (Tennessee Valley Authority, 2020).

### 3.2.6 References


1. City of Oak Ridge. 2025. “Oak Ridge Transit [website]” Available at https://oakridgetransit.org/
2. East Tennessee Human Resource Agency. 2025a. “Our Locations [website]” Available at https://www.ethra.org/locations/
3. East Tennessee Human Resource Agency. 2025b. “Public Transit [website]” Available at https://www.ethra.org/programs/16/public-transit/
4. Tennessee Department of Transportation. 2025. “Annual Average Daily Traffic Maps.” Available at https://www.tn.gov/tdot/driver-how-do-i/look-at-or-order-state-maps/maps/annual-average-daily-traffic-maps.html
5. Tennessee Valley Authority. 2025.”Melton Hill [website]” Available at https://www.tva.com/energy/our-power-system/hydroelectric/melton-hill-reservoir
6. Tennessee Valley Authority. 2020. "Tennessee River Waterway Management Plan 2020." Available at https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/20203428_tn_river_waterway_management_p1.pdf?sfvrsn=76257868_2


## 3.3 GEOLOGY AND SOILS

Previous regional geotechnical investigations are summarized in the Kairos Power *Hermes Non-Power Reactor, Environmental Report* (Kairos Power, 2023) (Section 3.3, pages 3-50 to 3-52) and include:

- *Geologic Mapping of the Oak Ridge K-25 Site, Oak Ridge Tennessee* (Lemiszki, 1994).
- *Final Sitewide Remedial Investigation Feasibility Study for ETTP, November 2007* (U.S. Department of Energy, 2007).
- *Transfer of Land and Facilities within the ETTP and Surrounding Area Environmental Assessment, October 2011* (U.S. Department of Energy, 2011).

The *Geologic Mapping of the K-25 Site* (Lemiszki, 1994) includes stratigraphic and structural data and provides a bedrock map of the ETTP.

The *Final Sitewide Remedial Investigation Feasibility Study for ETTP* (U.S. Department of Energy, 2007) includes soil and geologic information for the ETTP with a map of cut and fill areas that were used during the site preparation for the gaseous diffusion plants.

The *Transfer of Land and Facilities within the ETTP and Surrounding Area Environmental Assessment* (U.S. Department of Energy, 2011) (Section 3.3.1, pages 3-7 to 3-9) provides a geological map and summary of the of the geology and soil conditions within the ETTP area, including the Project site.

These descriptions remain relevant to Radiant's Proposed Action and are summarized below.

### 3.3.1 Geology and Soil

The Project site lies within the Valley and Ridge physiographic province of East Tennessee, a landscape defined by long, narrow, parallel valleys and ridges trending northeast to southwest from Virginia to Georgia. This distinctive topography formed when the collision of Gondwana with ancestral eastern North America resulted in a thrust-fold belt of Cambrian through Pennsylvanian sedimentary strata. Subsequent differential erosion, controlled by rock resistance, orientation, and structure, carved the present-day ridges and valleys. The Project site is generally flat with slopes to the north, west and east towards Poplar Creek. Elevation within the Project site ranges from approximately 750 feet above mean sea level in the northwestern portion of the Project site near Poplar Creek to approximately 795 feet above mean sea level in the central portion of the Project site.

Within 5 miles of the Project site, the same linear ridge-and-valley pattern dominates. Black Oak Ridge rises immediately to the north, followed southward by Pine Ridge, Chestnut Ridge, Haw Ridge, and Copper Ridge. Regional bedrock consists of (from youngest to oldest):

- Upper Ordovician to Lower Mississippian (post-Chickamauga strata);
- Middle to Upper Ordovician (Chickamauga Group);
- Upper Cambrian to Lower Ordovician (Knox Group);
- Middle to Upper Cambrian (Conasauga Group); and
- Lower Cambrian (Rome Formation).

Valleys in the region are typically underlain by less-resistant Chickamauga limestones or by Conasauga Group shale and shaley limestone, whereas the ridges consist of more erosion-resistant Knox Group dolostones or by sandstones and siltstones of the Rome Formation and post-Chickamauga sequence.

As shown on Figure 3-3.1, the Project site is underlain by members of the Chickamauga Group. The stratigraphy of the ETTP area is shown in Figure 3.3-2. From youngest to oldest, bedrock underlying the Project site include:

- Catheys Formation;
- Cannon Limestone;
- Hermitage Limestone; and
- Carters Limestone.

The Catheys Formation is approximately 400 feet thick and consists of medium to dark-gray, thin- to thick-bedded, micrite and occasionally coarse-grained limestone with shale seams and partings. Some beds are very fossiliferous, and *Tetradium* have been found. Near the upper part are interbedded calcareous, green and red shales. Chert and siltstone fragments are common in soil (Lemiszki, 1994).

Cannon Limestone is approximately 90 feet thick and is commonly dark-gray, thick to massive beds, but thin and medium beds also occur. Fossils range from rare to a coquina consisting of crinoids, bryozoans,

and brachiopods. A few large, silicified coral forms were observed. Chert and fucoidal texture is rare, but stylolites are common and produce ridges on weathered outcrops (Lemiszki, 1994).

Hermitage Limestone is a 115 feet thick unit with light-gray to reddish-gray, thin to medium beds of limestone. Fossils are abundant and include crinoids, brachiopods, and bryozoans. A maroon, olive-tan calcareous shale often marks the base of this unit (Lemiszki, 1994).

Beneath the Hermitage Formation lies the Carters Limestone; almost 500 feet of thick-bedded, fossil-poor limestone. This unit transitions from micritic, poorly bedded, mud-cracked limestone at the top, followed by apple-green, or even maroon, micaceous, 1 to 3 feet thick metabentonite beds; then gray-black, fossiliferous cherts in a medium and thick, blue-gray limestone; and finally mud-cracked, olive gray topped, interbedded limestone with gray-black pods and lenses of chert (Lemiszki, 1994).

The USDA has not published a NRCS Soil Survey for the Project site. The NRCS Web Soil Survey indicates the area is classified as Urban Land, a mixture of impervious surfaces along with well-drained, moderately permeable soils. A mixture of silts, clays, and sand characterizes soil at the Project site. Although soils have not been extensively characterized, the Chickamauga Group underlies Project site. Typical weathering of the Chickamauga occurs in place, producing clay and silty clay (U.S. Department of Energy, 2007). No soils classified as Prime Farmland or Farmland of Statewide Importance are mapped within the Study Area. Geotechnical explorations for the adjacent K-25 Museum indicate that fill soils in this portion of the ETTP range in thickness from approximately 0.5 to 6.3 feet and extend to depths of 1.5 to 6.5 feet below ground surface. Fill soil was typically brown, red, yellow and gray fat clay with varying percentages of weathered shale, chert, and limestone fragments. Occasional fine roots and coal fragments were observed within the fill. Soils were typically slightly moist to moist with some intervals observed to be wet. Consistencies ranged from firm to hard with lower consistency materials encountered in the upper approximately 3 to 6.5 feet (S&ME, 2015).

### 3.3.2 Seismicity

The Kairos Power *Hermes Non-Power Reactor, Environmental Report* provides a summary of the region's seismicity and an analysis of potential seismic hazard (Kairos Power, 2023) (Section 3.3.4, page 3-54). These descriptions remain relevant to Radiant's Proposed Action. To summarize, East Tennessee is in a mid-tectonic plate region and thrust faults in the region are inactive. Significant movement occurred nearly 200 million years ago. The region is a relatively active seismic zone of low to moderate intensity with no anticipated catastrophic release of energy. Since 1913, 95 earthquakes of magnitude (Richter) greater than 3.0 have occurred within 124 miles of the Project site (U.S. Geological Survey, 2025). The largest, magnitude 5.2, occurred in 1916 south of Asheville, North Carolina. The Tennessee Earthquake Hazard Map (Figure 3.3-3) indicates that over a 50-year period, there is only a 10 percent probability that peak ground acceleration will exceed 30 percent of the acceleration due to gravity (Tennessee Department of Health, 2020).

### 3.3.3 Other Hazards

The Kairos Power *Hermes Non-Power Reactor, Environmental Report* also provides a summary of other potential hazards in the region (Kairos Power, 2023) (Section 3.3.5, pages 3-54 and 3-55). These descriptions remain relevant to the Radiant-Proposed Action. No tsunami or volcanic hazards are present in the region. Project site soils have very little potential to become saturated and exhibit liquefaction. The probability of land movement due to saturated soil is minimal. While common, karst in

the Chickamauga Group is isolated and poorly developed. Prior to development, several sinkholes were present in the ETTP area. However, site preparation generally included leveling of the site to remove gentle hills and fill sinkholes.

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## 3.4 WATER RESOURCES

### 3.4.1 Hydrology

#### *3.4.1.1 Surface Water*

Poplar Creek flows around the northern, western and southern portions of the Project site and is a tributary of the Clinch River arm of the Watts Bar Reservoir, an impoundment of the Tennessee River (see Figure 3.4-1). Watts Bar Dam is owned and operated by the TVA. Major inflows into Watts Bar Reservoir include Fort Loudoun Dam on the Tennessee River, and Melton Hill Dam on the Clinch River, both of which are also owned by the TVA. The effects of operations at these dams extend to the southernmost portion of Poplar Creek where the Project site is located. Therefore, water levels, flow rates, and flow directions in Poplar Creek adjacent to the Project site are largely controlled by TVA's operation of Watts Bar Dam, Fort Loudoun Dam, and Melton Hill Dam.

Historically, stormwater flow throughout the ETTP, including the Project site, was directed to a stormwater drainage system that discharged to Poplar Creek or the Clinch River through registered outfalls. Areas with the potential for oil and grease contamination were directed to outfalls with oil/water separators. These outfalls were monitored on a scheduled basis as determined in the NPDES permit (TN0002950). The current system is also directed to the numbered outfalls, and the monitoring schedule has been modified to reflect the decommissioned status of the site. Work is currently ongoing in the vicinity of the Project site to clean, repair, and/or remove flow from these outfalls will allow them

to be removed from the permit so that DOE can divest itself from future risks. This work involves pipe cleaning to remove unacceptable sediments, slip-lining, grading, excavation of existing storm drains, removing and repairing asphalt, installing new pipe, removing oil water separators along with contaminants contained within, removing fencing, and installing new ditch lines (United Cleanup Oak Ridge, LLC, 2025).

#### 3.4.1.1.1 Watershed Description

The Project site lies within the Valley and Ridge Physiographic Province, which is composed of a series of drainage basins or troughs containing many small streams. Runoff from the Project site eventually reaches the Tennessee River via Poplar Creek, which flows around the Project site, and the Clinch River Poplar Creek receives drainage from a 136 square-mile area and is the largest drainage basin in the Lower Clinch River watershed. As shown in Figure 3.4-2, Poplar Creek flows from northeast to southwest, approximately through the center of the ETTP, and discharges directly into the Clinch River arm of Watts Bar Reservoir at CRM 12 (Oak Ridge National Laboratory, 2006). TVA manages this section of the Clinch River as a run-of-the-river impoundment, forming the Clinch River arm of Watts Bar Reservoir. Power generation and release schedules at Melton Hill Dam (upstream on the Clinch River), Watts Bar Dam (downstream), and Fort Loudoun Dam (upstream on the Tennessee River) influence water levels and flow patterns in the Clinch River arm of Watts Bar Reservoir and Poplar Creek (see Figure 3.4-3).

Under high-pool conditions (summer reservoir elevation approximately 741 feet above mean sea level (amsl)), Poplar Creek can widen to approximately 220 feet with depths reaching 22 feet, though typical depths are less than 15 feet. During low-pool conditions (winter reservoir elevation approximately 735 feet amsl), the creek narrows to 100 to 130 feet and is largely confined to its pre-impoundment channel. Flow reversals in Poplar Creek have been documented, where Clinch River backwater temporarily drives upstream flow from the creek mouth toward the headwaters, extending past the Black Oak Ridge water gap with decreasing intensity upstream (U.S. Department of Energy, 2024a).

Stage variations in Poplar Creek occur at multiple timescales, producing transient boundary conditions for groundwater. Seasonal changes follow TVA reservoir operations: low pool from early December to early April and high pool from late April through November. Diurnal fluctuations of 1 to 1.5 feet, lasting several hours twice daily, result from pulsed discharges at Melton Hill Dam. Additionally, intense or prolonged winter storms can generate short-term stage increases of up to 8 feet lasting several days to a week, superimposed on normal operations. These variable surface-water levels strongly influence groundwater gradients and discharge rates to the Poplar Creek and Clinch River, resulting in complex and rapidly changing flow patterns (U.S. Department of Energy, 2024a).

The two primary tributary streams to Poplar Creek at the ETTP include Mitchell Branch, located approximately 0.75-mile northeast of the Project site, and an unnamed tributary to Poplar Creek that flows along SR 58 approximately 0.5-mile southeast of the Project site (see Figure 3.4-1). Mitchell Branch originates on Pine Ridge and flows through the northeastern portion of the ETTP before discharging into Poplar Creek. The unnamed tributary to Poplar Creek originates on Pine Ridge east of the ETTP, flows west adjacent to SR 58, and passes under SR 58 through a culvert before it eventually enters the K-1007-P1 Pond and Poplar Creek (see Figure 3.4-1).

Flow and water quality in tributaries draining the ETTP are monitored at three weirs: the K-1700 Weir (Mitchell Branch), K-1007-P1 Holding Pond, and K-901-A Holding Pond. These three weirs serve as integration points for surface water, storm drain, and groundwater discharge from a significant portion of the ETTP site. However, the weirs at these discharge points are not constructed for accurate flow measurement under some high flow conditions (U.S. Department of Energy, 2007). The ETTP maintains a NPDES stormwater permit (TN0002950) for monitoring and controlling stormwater runoff on site (U.S. Department of Energy, 2024b).

#### 3.4.1.1.2 Soil

Soil properties are discussed in Section 3.3.1. As noted, the USDA has not published an NRCS Soil Survey for the Project site. The NRCS Web Soil Survey indicates the area is classified as Urban Land, which is defined as a mixture of impervious surfaces along with well-drained, moderately permeable soils. A mixture of silts, clays, and sand characterizes soil at the Project site. Geotechnical explorations for the adjacent K-25 Museum indicate that fill soils in this portion of the ETTP range in thickness from approximately 0.5 to 6.3 feet and extend to depths of 1.5 to 6.5 feet below ground surface. Fill soil was typically brown, red, yellow and gray fat clay with varying percentages of weathered shale, chert, and limestone fragments (S&ME, 2015).

#### 3.4.1.1.3 Streamflow

No streams are present within the Project site and as noted in Section 3.4.1.1.1, power generation and release schedules at Melton Hill Dam (upstream on the Clinch River), Watts Bar Dam (downstream), and Fort Loudoun Dam (upstream on the Tennessee River) influence water levels and flow patterns in Poplar Creek in the vicinity of the Project site. The nearest streamflow monitoring site on Poplar Creek was a USGS site located approximately 11 miles upstream of the Project site. It appears this site stopped reporting discharge data in 1989. The identifier for the monitoring site is USGS 03538225, and the site has a drainage area of 82.50 square miles (National Water Quality Monitoring Council, 2025). According to the available discharge data for this site, the monthly mean of daily mean values between 1960 and 1989 was 6.543 to 1,031.613 cubic feet per second (cfs) (USGS, 2026a). Additionally, 30 peak streamflow measurements were recorded between 1928 and 1989, with a historic peak flow of 14,000 cfs in 1928, and 11,400 cfs recorded in 1977. The lowest peak flow of 1,100 cfs was recorded in 1981 (USGS, 2026b).

#### 3.4.1.1.4 Dams and Reservoirs

Melton Hill Dam is located on the Clinch River approximately 6.5 miles southeast of the Project site and forms the Melton Hill Reservoir. The dam was completed in 1963 and is 103 feet high and stretches 1,020 feet across the Clinch River. Melton Hill Dam is a hydroelectric facility with two generating units capable of producing a net dependable capacity of 79 MWe. Melton Hill Reservoir has the only dam in the tributary reservoir system with a navigation lock, which has a 75-foot by 400-foot chamber and a maximum lift of 60 feet. The reservoir extends almost 57 miles upstream from the Melton Hill Dam to Norris Dam Tennessee Valley Authority, 2026a).

Unlike most of TVA's multipurpose tributary projects, Melton Hill Dam does not provide any significant flood damage reduction benefits, nor does it provide any significant seasonal flow regulation because of the minimal storage volume available. The average weekly discharge from Melton Hill Dam over its lifetime (1962-present) is 4,832 cfs with a maximum weekly discharge of 25,455 cfs. The minimum

discharge requirement for Melton Hill is 400 cfs average daily flow, but the frequency of this minimum flow continuing for as long as seven days is less than 0.1 percent (Tennessee Valley Authority, 2015).

Watts Bar Dam is located at Tennessee River Mile (TRM) 529.9, approximately 30 river miles southwest of the Project site. Construction on Watts Bar Dam was completed in 1942. Watts Bar Dam is 112 feet high and stretches 2,960 feet across the Tennessee River. Outflows from Watts Bar Reservoir are controlled by releases at Watts Bar Dam. Regulated releases of surface water to Watts Bar Reservoir are made not only from Melton Hill Dam but also Fort Loudoun Dam, located at TRM 602.3, and Tellico Dam, located near TRM 601.1 (Tennessee Valley Authority, 2019). Watts Bar Dam has one lock that is 60 feet by 360 feet and lifts and lowers barges as much as 70 feet between Watts Bar Reservoir and Chickamauga Reservoir downstream. The net dependable hydroelectric capacity at Watts Bar Dam is 182 MWe. In addition to forming a navigable reservoir on the Tennessee River, Watts Bar Dam also creates a slack-water channel for navigation up the Clinch River arm of Watts Bar Reservoir more than 20 miles to Melton Hill Dam and 12 miles up the Emory River (Tennessee Valley Authority, 2026b). To maintain the water depth required for navigation, the minimum winter elevation for Watts Bar Reservoir is 735 feet. The typical summer operating range is between 740 and 741 feet. River flow in Watts Bar Reservoir can be upstream, downstream or quiescent due to the release or retention of water at Melton Hill Dam, Fort Loudoun Dam, and Watts Bar Dam, with release from Fort Loudoun Dam, but not Watts Bar Dam, responsible for reverse flow (Tennessee Valley Authority, 2026b). The dams and reservoirs in the region are depicted on Figure 3.4-3.

Fort Loudoun Dam was completed in 1943. Fort Loudoun Dam is a hydroelectric facility. It has four generating units with a summer net dependable capacity of 151 MWe. The dam is 122 feet high and stretches 4,190 feet across the Tennessee River. Fort Loudoun Reservoir has 379 miles of shoreline and 14,600 acres of water surface. It has a flood-storage capacity of 111,000 acre-feet. To maintain the water depth required for navigation, Fort Loudoun Reservoir is kept at a minimum winter elevation of 807 feet. The typical summer operating elevation is between 812 and 813 feet. The 60- by the 360-foot lock at Fort Loudoun raises and lowers rivercraft about 70 feet between the reservoir and Watts Bar Reservoir (Tennessee Valley Authority, 2026c).

Tellico Dam was completed in 1979 and Tellico Reservoir was planned as an extension of Fort Loudoun Reservoir. The dam is 129 feet high and reaches 3,238 feet across the Little Tennessee River. The reservoir provides 357 miles of shoreline and 15,560 acres of water surface for recreation activities. Tellico has a flood-storage capacity of 120,000 acre-feet. Tellico Dam is not a hydroelectric facility. It has no power generators and produces no electricity. Water from Tellico, however, flows through a short canal into Fort Loudoun Reservoir and helps drive the four generating units at Fort Loudoun Dam Tennessee Valley Authority, 2026d).

Norris Dam and Reservoir are located approximately 25 miles northeast of the Project site on the Clinch River. Norris Dam is a large multipurpose tributary dam which is used for navigation, flood control, hydropower, environmental benefits, water supply, and recreation. Norris Dam is fed by a 2,912 square-mile drainage area and impounds a 73-mile reach of the Clinch River and a 56-mile reach of the Powell River (Tennessee Valley Authority, 1990).

#### 3.4.1.1.5 Estuaries and Oceans

No estuaries or oceans are located near the Project site.

#### 3.4.1.1.6 Floodplains

The Project site is not located within a FEMA 100-year floodplain (see Figure 3.4-4). The FEMA Flood Zone Designation for the site is Flood Zone X (unshaded). This is a low-risk zone for an area of minimal flood hazard that is determined to be outside the Special Flood Hazard Area and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood (Federal Emergency Management Agency, 2026). Flood Rate Insurance Map (FIRM) 4714C0120F, panel 0120, indicates the 100-year flood elevation in the vicinity of the Project site is 747 feet NAVD88 and the existing Project site elevation is 773 feet NAVD88. Based on site grading and drainage considerations, a preliminary building finished floor elevation of 777 feet NAVD88 has been established for preliminary design purposes.

### *3.4.1.2 Groundwater*

In general, groundwater occurrence and flow at the ETTP are influenced by the complex geology, past cut and fill, transient interactions with bounding surface water bodies, and anthropogenic features. The water table within the ETTP occurs at depths ranging from approximately 2 to 50 feet below ground surface (bgs) and typically within the unconsolidated zone above the underlying bedrock. In some areas, bedrock is shallow enough that the water table lies completely within bedrock (U.S. Department of Energy, 2024a). Soil borings performed for the adjacent K-25 Museum documented groundwater at 20.0 to 23.5 feet bgs (S&ME, 2015). Groundwater investigations, monitoring and modeling of contaminant flow remain active at the Project site. A map of the average potentiometric surfaces for the ETTP is provided in Figure 3.4-5 (U.S. Department of Energy, 2025). In general, the shallow potentiometric surface reflects surface topography, indicating flow from the higher elevation areas toward Popular Creek. It is important to note that Poplar Creek transects bedding strike and, consequently, intersects countless shallow, bedding-strike parallel flowpaths, including fractures, solutionally widened fractures and cavities, and potential stratabound flow intervals (U.S. Department of Energy, 2022). No EPA-designated sole-source aquifer is present in the area.

Historically, extensive basement dewatering beneath buildings in the ETTP significantly modified the potentiometric surface, creating steep drawdown zones that limited or directed the migration of dissolved contaminants in the unconsolidated zone and potentially in the bedrock where the water table was drawn down to or below the bedrock surface. Storm drains further complicated the system by functioning as both recharge sources and points of groundwater discharge (Kairos Power, LLC, 2023).

Groundwater discharge is strongly influenced by seasonal, weekly, and daily fluctuations in the stage of Poplar Creek, creating a dynamic and transient boundary condition. During summer months, elevated creek stages raise water tables near Poplar Creek, but reduced recharge from lower rainfall and higher evapotranspiration flattens hydraulic gradients and decreases overall groundwater flux across the Project site. In contrast, winter conditions, characterized by lower creek stages, increased precipitation, and reduced evapotranspiration, produce steeper gradients and substantially greater flux, particularly during intense and prolonged storms (U.S. Department of Energy, 2024a).

## 3.4.2 Water Use

The Kairos Power *Hermes Non-Power Reactor, Environmental Report* provides a description of groundwater and surface water use in the region (Kairos Power, 2023) (Section 3.4.2, pages 3-66 to 3-68), and that description remains relevant for the Proposed Action. The new drinking water treatment plant constructed to replace the existing plant located on Pine Ridge above the entrance to the Y-12

facility is not yet operational. The new modular ultrafiltration membrane system is located south of Bethel Valley Road and will draw water from Melton Hill Lake. The new plant is expected to be operational in Spring of 2026 and will have the capacity to treat 15 million gallons per day (MGD) (City of Oak Ridge, 2025). The existing Y-12 facility continues to supply potable water produced from surface water intakes on Melton Hill Reservoir. The existing facility regularly supplies 4.15 MGD and has a capacity of 12 MGD with the ability to produce 16 MGD on occasion. Both the existing and planned treatment facilities will have sufficient capacity to support the Project (12 and 15 MGD capacity vs existing use of 4.15 MGD). Because of the abundance of surface water resources in the region, groundwater is a small part of the overall water use in the area surrounding the Project site. Additionally, because of the history of activities at the Project site, extraction, consumption, exposure to, or use of groundwater is generally prohibited or would require approval from the DOE, EPA and TDEC (U.S. Department of Energy, 2021; U.S. Department of Energy, 2024c; U.S. Department of Energy, 2025).

### 3.4.3 Surface Water Quality

The Kairos Power *Hermes Non-Power Reactor, Environmental Report* provides a description of surface water quality at the ETTP (Kairos Power, 2023) (Section 3.4.3.1.1, pages 3-69 to 3-70), and that description remains relevant for the Proposed Action. Both Poplar Creek and the Clinch River arm of Watts Bar Reservoir remain on the 2024 Tennessee EPA Approved List of Impaired and Threatened Waters required by Section 303(d) of the Clean Water Act. Poplar Creek is impaired for high levels of PCBs and mercury and the Clinch River is impaired for high levels of chlordane, mercury and PCBs (Tennessee Department of Environment & Conservation, 2024). Currently, no Total Maximum Daily Loads (TMDLs) have been developed for either waterbody. No surface water is present within the Project site and, accordingly, no surface water monitoring is currently conducted. The Kairos Power Environmental Report describes ongoing TDEC monitoring that is conducted in Poplar Creek and the Clinch River in the vicinity of the Project site (Section 3.4.3.1.2, page 3-70).

### 3.4.4 Groundwater Quality

The U.S. Department of Energy developed a conceptual site model (CSM) for the K-27 area of the ETTP, which includes the Project site and is summarized below (U.S. Department of Energy, 2024a). The K-27 and Poplar Creek facilities area was a highly industrialized portion of ETTP that contained numerous facilities associated with uranium enrichment and other processes that used trichloroethene (TCE) and other solvents. There is a chlorinated volatile organic compound (CVOC) plume that underlies this area, with TCE as the primary constituent (Figure 3.4-6). The plume has not been fully delineated. The Volatile Organic Compounds (VOCs) that have been detected above the federal and state drinking water maximum contaminant level (MCL) in these plumes include carbon tetrachloride; methylene chloride; cis-1,2-dichloroethene (cis-1,2-DCE); 1,1-DCE; and TCE. Additional contaminants present in groundwater that have periodically exceeded MCLs include the metals beryllium, cadmium, chromium, nickel, and lead and low concentrations of alpha activity (U.S. Department of Energy, 2024c).

The K-1232 building, located north of EU Z2-14, has been considered to be one potential source of the VOC groundwater contamination plume located beneath EU Z2-14. However, other potential sources for the VOC plume beneath EU Z2-14 have been identified to the north in EU Z2-13 in the K-1131 and K-413 areas, based on more recent soil sample results (U.S. Department of Energy, 2021; U.S Department of Energy, 2024c; U.S. Department of Energy, 2025). Figure 3.4.7 highlights exceedances indicating potential source areas (U.S. Department of Energy, 2024a).

The K-27/K-1232 Area lies on Chickamauga Supergroup limestones near a synclinal axis, with 20 to 60 feet of overburden, except where bedrock is exposed in Poplar Creek, serving as the primary discharge point for unconsolidated zone flow. Pre-construction topography featured drainage swales, karst features, and a prominent ravine (filled up to 30 feet deep) extending south from K-27 through the K-731 switchyard to a former Poplar Creek embayment, which influence current plume migration despite site leveling.

An east-west groundwater divide splits flow: northward toward incised Poplar Creek and southward along the relict embayment, evident in both unconsolidated and bedrock zones. The water table is mostly in the overburden (15 to 35 feet saturated thickness), with Figure 3.4-8 showing average potentiometric surfaces. Vertical gradients are generally upward from bedrock to overburden near K-27 but shift downward within the plume interior and upward at Poplar Creek, indicating discharge.

TCE contamination migrates through both zones but is higher in bedrock, with peak concentrations at well BRW-122 (8,170 µg/L TCE, plus carbon tetrachloride and cis-1,2-DCE above MCLs) in the former K-27 footprint and BRW-133 (806 µg/L). Degradation products are minimal except at BRW-122 (U.S. Department of Energy, 2024a). The plume extends southward from Poplar Creek/K-27 before shifting southwest, likely along pre-construction features (U.S. Department of Energy, 2021; U.S Department of Energy, 2024c; U.S. Department of Energy, 2025). Further data collection during the pre-design investigation (PDI) phase of the MPA ROD will be used to refine the CSM.

Monitoring wells are located within EU Z2-14, which is within the Project site, and in EU Z2-12, located to the east of the Project site, that are downgradient from the soil sample location with a Tc-99 GW SSL exceedance that was located in the northwestern area of the K-27 footprint (Figure 3.4-9)(U.S. Department of Energy, 2024c). All downgradient wells from the GW SSL exceedance for Tc-99 had concentrations that were less than the MCL for 900 pCi/L for Tc-99. A transport model was completed to determine if a revised remediation level for Tc-99-contaminated soil needed to be developed that would be protective of groundwater beneath the source area with the GW SSL exceedance for Tc-99 (DOE/OR/01-2841&D3). The maximum predicted groundwater concentration at the downgradient receptor location, which is Poplar Creek, was 36 pCi/L, and at the contaminated soil area boundary was 339 pCi/L for Tc-99 based on Seasonal Soil [compartment] (SESOIL) and Analytical Transient 1-, 2-, 3-Dimensional (AT123D) modeling results, which are well below the Tc-99 MCL (900 pCi/L). To be conservative, a separate analysis was performed using the maximum value from the range of percolation rate obtained from the Zone 2 ROD. The predicted maximum concentrations of 86 pCi/L at the downgradient receptor location and 759 pCi/L at the downgradient contaminated soil area boundary were used. Even with the maximum percolation rate of 0.15 m/year, the predicted maximum Tc-99 concentration in groundwater at this EU Z2-14 is expected to be below its MCL. Therefore, it was concluded that the Tc-99 soil concentrations at EU Z2-14 do not pose a threat of groundwater contamination; therefore, neither a revised soil remediation level for Tc-99 nor soil excavation was necessary (U.S. Department of Energy, 2024c).

### 3.4.5 References

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## 3.5 ECOLOGICAL RESOURCES

This section describes the terrestrial and aquatic ecological communities of the Project site.

### 3.5.1 General Ecological Conditions of the Project Site

Haley & Aldrich conducted a site visit at R-50 to observe ecological conditions on October 21, 2025. The Project site consisted largely of previously removed building features and disturbed land that has undergone remediation. Paved access roads, parking areas, gravel and concrete pads, and other impervious surfaces are prevalent throughout the Project site. Generally, natural habitat is not present at the Project site; existing habitat only includes lawn and remediated areas that have been reseeded and left to grow with scattered areas of trees. The overall topography was generally flat with areas sloping toward Poplar Creek to the north, west and south. Vegetated areas were primarily herbaceous, including maintained grasses and areas where vegetation has progressed to early successional communities consisting of grasses and forbs. Scattered shrubs and trees are also present on the Project site, particularly on slopes bordering Poplar Creek. An ecological habitat assessment report is presented in Appendix A. Plant species observed during site investigations are included in Table 3.5-1. An ecological cover type map is provided as Figure 3.5-1, and a topographic map is provided as Figure 3.5-2. Animal species, or evidence of species use, observed during the on-site field investigation were generally typical for the region and are summarized in Table 3.5-2. No raptor nests or significant

breeding areas were observed on the Project site, though bald eagles (*Haliaeetus leucocephalus*) are likely to nest in the surrounding area. The *Hermes Non-Power Reactor Environmental Report* (Kairos Power, 2023) contains additional information regarding ecological communities, plant species, animal species, and non-native invasive species that are common in the region (Section 3.5.7, pages 3-89 to 3-93). The *Hermes Non-Power Reactor Environmental Report* also provides a summary of the history of ecological monitoring by the DOE under the Oak Ridge Reservation Biological Monitoring and Abatement Program (Sections 3.5.9 and 3.5.10, pages 3-93 to 3-95).

Poplar Creek, located adjacent to the western half of the Project site, and the Clinch River arm of Watts Bar Reservoir, located approximately 0.3 miles west of the Project site, are the primary aquatic features in the region. No commercial fisheries exist in the vicinity of the Project site, though sport fishing is a popular activity in Watts Bar Reservoir and Poplar Creek.

### 3.5.2 Rare, Threatened, and Endangered Species

Observations of ecological conditions, habitats, and species present at the Project site were completed by two qualified Haley & Aldrich personnel during the 2025 site visit. This site visit and subsequent preparation of an Ecological Habitat Assessment (Appendix E) serve as the technical basis for likelihood of occurrence of federal and state protected species. The USFWS IPaC database, queried June 23, 2026, identified eight federally listed species, or species proposed for listing, that may potentially occur on or near the Project site. These species are discussed below. The IPaC database indicates the Project site is not located within the designated critical habitat of any protected species. Section 3.5.11 (pages 3-95 to 3-98) of the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, LLC, 2023) identifies the northern long-eared bat (*Myotis septentrionalis*) as potentially present. However, the more recent review of USFWS IPaC database indicates this species is no longer listed as potentially present within the vicinity of the Project site.

Gray bat (*Myotis grisescens*, Endangered)

This bat species inhabits caves year-round or occasionally will use man-made tunnels in the summer. Summer caves must be warm or have restricted rooms that can trap the body heat of clustered bats. Winter hibernation sites are often deep vertical caves that trap large volumes of cold air; these caves are naturally very rare. Gray bats hunt over large areas during the breeding season and feed on flying insects over rivers, streams and lakes and other bodies of water. Mayflies, caddisflies and stoneflies make up a major part of their diet, but beetles and moths are also consumed. No caves or other suitable roosting habitats were observed on-site. Foraging could occur along Poplar Creek and this species may transit the Project site.

Indiana bat (*Myotis sodalis*, Endangered)

This bat species overwinters in large caves and, in the summer, roosts in hollow trees or beneath tree bark. Primary roosts usually receive direct sunlight for more than half the day. Roost trees are often within canopy gaps in a forest, in a fenceline, or along a wooded edge. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain habitats, wooded wetlands and upland communities. Indiana bats typically forage in semi-open to closed forested habitats with open understory, forest edges, and riparian areas. Adult males occupy similar habitats but can use a wider range of roosts compared to females. No caves or potential winter hibernacula were observed within

the site. Summer roost trees could be present on the site, with greater potential likelihood in forested areas along Poplar Creek and this species may transit the Project site.

Tricolored bat (*Perimyotis subflavus*, proposed for listing as Endangered)

Tricolored bats are found in caves and mines during the winter, although in the southern United States, where caves are sparse, tricolored bats are often found roosting in road-associated culverts. During the spring, summer and fall, tricolored bats are found in forested habitats where they roost in trees, primarily among leaves. This species typically prefers a dense growth of trees and underbrush covering a large tract. No large, densely forested tracts are present within the Project site though some potential roost trees or foraging habitat may be present for this opportunistic feeder and this species may transit the Project site.

Whooping crane (*Grus americana*, experimental population, non-essential)

Whooping cranes are a very rare migrant and winter resident in East Tennessee. Beginning in 1999, captive raised young from Necedah National Wildlife Refuge in central Wisconsin were conditioned to follow an ultralight aircraft. The aircraft guides them on their first migration south to Chassahowitzka National Wildlife Refuge in Florida. The route takes the birds over East Tennessee where they stop and rest before continuing on their journey. No cranes were observed during field investigations and no stopover habitat is present within the Project site. The lack of observed suitable habitat indicates the Project site is unlikely to be utilized by this species for anything more than individuals passing over to more favorable habitats.

Spotfin chub (*Erimonax monachus*, Threatened)

This species is found in streams with relatively low-silt substrates in good flows and forages commonly on bedrock, boulders, and cobble. Sub-adult spotfin chubs appear more commonly on smaller substrates like sand and small gravel than do adults. No suitable habitat was observed within the Project site and this species is likely restricted to Poplar Creek and/or other streams in the vicinity.

Monarch butterfly (*Danaus plexippus*, proposed for listing as Threatened)

The monarch butterfly can be found in fields, along roadsides, open areas, wet areas, and urban gardens with milkweed and flowering plants. This species is generally noted for consideration at sites nationwide. No habitat that would be uniquely suited to this species was observed on the Project site.

Virginia spiraea (*Spiraea virginiana*, Threatened)

This species occurs on periodically flood-scoured banks of high-gradient mountain streams, meander scrolls, point bars, natural levees, and braided features of lower stream reaches, and occasionally near disturbed rights-of-way. Plants are often found on geologically active areas with erosion, deposition, and slumping, along rivers with dynamic flooding regimes, sandbars, scoured river shore and flatrock habitat with crevices. These areas also are associated with cobbles, boulders, and massive rock outcrops with sandy or clay soils and can be periodically xeric. Plants are often seen in silt, mud, and sand. No suitable habitat was observed within the Project site during field investigations.

White fringeless orchid (*Planthera integrilabia*, Threatened)

This species is found in acidic seeps and boggy areas near the heads of streams in open to partially shaded settings. There are limited occurrences across its native range, mostly occurring on public lands. No suitable habitat was observed within the Project site during field investigations.

The Tennessee Natural Heritage Program (TNHP) maintains data regarding documented occurrences of rare, threatened, and endangered species within the extent of the United States Geological Survey quadrangle where the Project site is located (the Elverton quadrangle) as well as a summary of potential habitat, or lack thereof, observed within the Project site. The TNHP list includes gray bat, which is discussed above. The TNHP list also includes one state-listed, endangered salamander; one-state listed, endangered crustacean; four state-listed, endangered mollusks; three state-listed, endangered plants; and three state-listed, threatened plants. These species, except for gray bat, are discussed in further detail below.

Hellbender (*Cryptobranchus alleganiensis*, State Status – Threatened)

This salamander is found in rocky, clear creeks and rivers with large shelter rocks and abundant cover such as logs. This species would be restricted to streams in the area, and no suitable habitat was observed within the Project site during field investigations.

Valley flame crayfish (*Cambarus deweesae*, State Status – Endangered)

This species is primarily a burrower found in open areas with high water tables. No burrows or suitable habitat were observed within the Project site during field investigations.

Spectaclecase (*Margaritifera monodonta*, Federal Status – Endangered, State Status – Endangered)

This mussel species is found in medium to large rivers with substrates from mud and sand to gravel, cobble, and boulders. This species would be restricted to streams in the area and no suitable habitat was observed within the Project site during field investigations.

Alabama lampmussel (*Lampsilis virescens*, Federal Status – Endangered, State Status – Endangered)

This mussel species is found in sand and gravel substrates in shoal areas of small-to-medium-sized rivers. This species would be restricted to streams in the area and no suitable habitat was observed within the Project site during field investigations.

Finerayed Pigtoe (*Fusconaia cuneolus*, Federal Status – Endangered, State Status – Endangered)

This mussel species is found in riffles of fords and shoals of moderate gradient streams in firm cobble and gravel substrates. This species would be restricted to streams in the area and no suitable habitat was observed within the Project site during field investigations.

Shiny Pigtoe (*Fusconaia cor*, Federal Status – Endangered, State Status – Endangered)

This mussel species is found in shoals and riffles of small to medium sized rivers with moderate to fast current over sand-cobble substrates. This species would be restricted to streams in the area and no suitable habitat was observed within the Project site during field investigations.

Prairie goldenrod (*Oligoneuron album*, State Status – Endangered)

This plant species is typically found in prairie-like barrens and open woods in undisturbed areas. No suitable habitat was observed within the Project site during field investigations.

Earleaved false-foxglove (*Agalinis auriculata*, State Status – Endangered)

This plant species is typically found in prairies, glades, barrens, and open fields, often on calcareous or mafic rocks. No suitable habitat was observed within the Project site during field investigations.

Slender blazing star (*Liatris cylindracea*, State Status – Threatened)

This plant species is typically found in dry, open areas with shallow, well-drained, and often rocky soil. The plant grows in dry to moderate moisture conditions, primarily on limestone outcrops and glades. The soil is characteristically shallow, gravelly, and sits atop limestone bedrock, which dries out quickly. No suitable habitat was observed within the Project site during field investigations.

Tall larkspur (*Delphinium exaltatum*, State Status – Endangered)

This plant species typically grows on well-drained, rich soils, often found on woodland edges or in open glades. No suitable habitat was observed within the Project site during field investigations.

Shining ladies' tresses (*Spiranthes lucida*, State Status – Threatened)

In Tennessee, this species is typically found in sunny, moist habitats like seepage areas over basic rock (limestone), moist banks, and shores of non-tidal rivers. It also prefers habitats with abundant water, such as wet meadows, damp woods, and fens, especially in areas with calcareous (high-pH) soil. Wetlands are generally absent from the Project site and this species was not observed to be present in the small wetland that was observed adjacent to Poplar Creek.

Northern bush-honeysuckle (*Diervilla lonicera*, State Status – Threatened)

This species is typically found in open woodlands, rocky areas, and drier forest understories, often at higher elevations. It can grow in fencerows, thickets, and disturbed areas, tolerating a variety of soils, including sandy, loamy, and clay types, from full sun to partial shade. No suitable habitat was observed within the Project site during field investigations.

### 3.5.3 Birds of Conservation Concern and Species Warranting Special Attention

IPaC also includes birds protected under the Migratory Birds Treaty Act and the Bald and Golden Eagle Protection Act (BGEPA) that are of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention. The site is in Bird Conservation (BCR) Region 28 – Appalachian Mountains. Some BCC birds are only a concern within a specific BCR, while others are listed for their entire range. The BCC and other birds listed for this site are:

- Bald eagle (Haliaeetus leucocephalus) is not a BCC in this area but warrants attention because of the BGEPA or for potential susceptibilities in offshore areas from certain types of development or activities. Breeding occurs from September 1 to May 31. It is anticipated that this species may

nest in the vicinity of the Project site, but no nests or bald eagles were observed at the Project site during the site visit.

- Black-billed cuckoo (*Coccyzus erythropthalmus*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 15 to October 10. Black-billed cuckoos primarily inhabit dense woodlands, forest edges, and thickets, often in proximity to water such as marshes, streams, or lakes. They prefer deciduous or mixed forests but can also be found in coniferous forests, shrubby areas, and even abandoned farmlands. Their habitat needs to have a dense understory for nesting and cover, which is crucial for their survival. Little to no suitable habitat for this species is present within the Project site.
- Canada warbler (*Cardellina canadensis*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 20 to August 10. Canada warbler habitat consists of cool, moist forests with dense undergrowth, often near water sources like streams or swamps. They are commonly found in mixed deciduous-coniferous forests, particularly those with a complex understory featuring shrubs, ferns, and mosses. They also utilize areas recovering from disturbances, such as forest gaps from windthrow or timber removal. Little to no suitable habitat for this species is present within the Project site.
- Chimney swift (*Chaetura pelagica*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from March 15 to August 25. Before European settlement in the United States, chimney swifts used large hollow trees and tree cavities in old growth forests, but most of this habitat has been lost to development. As urban areas expanded, swifts began using masonry chimneys and similar human-made structures in and around towns and cities. Little to no suitable habitat for this species is present within the Project site.
- Chuck-will's-widow (*Antrostomus carolinensis*) is a BCC only in particular BCRs, including Region 28, in the continental USA. Breeding occurs from May 10 to July 10. Chuck-will's-widows inhabit dry, open woodlands like pine and oak forests, with a preference for areas that have open spaces for foraging. Little to no suitable habitat for this species is present within the Project site.
- Eastern whip-poor-will (*Antrostomus vociferus*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 1 to August 20. Eastern whip-poor-wills inhabit dry deciduous or mixed woodlands, especially those with open areas like young, second-growth forests, near fields, or on sand and rock barrens. The degree of openness in the forest understory, along with shade and sparse ground cover, are more important than the specific tree type. Little to no suitable habitat for this species is present within the Project site.
- Golden-winged warbler (*Vermivora chrysoptera*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 1 to July 20. Golden-winged warblers breed in tangled, shrubby habitats such as regenerating clearcuts, wet thickets, tamarack bogs, and aspen or willow stands. Mosaics of shrubby, open areas (for nesting) and mature forest habitats (which offer cover for fledglings from like predators like hawks) are important landscape features. Little to no suitable habitat for this species is present within the Project site.
- Kentucky warbler (*Geothlypis formosa*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from April 20 to August 20. Kentucky warblers inhabit the dense understory of large, mature deciduous forests, particularly those with moist, shady ravines, bottomlands, and swampy edges. They require thick ground cover and are often found near water, with their nests built on the ground at the base of trees or bushes. These birds avoid areas with human disturbance or heavy deer over browsing that can thin the understory. Little to no suitable habitat for this species is present within the Project site.

- Prairie warbler (*Setophaga discolor*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 1 to July 31. Prairie warbler habitat consists of shrubby, overgrown areas like young forests, abandoned fields, and pine barrens, especially where there is a mix of shrubs and young trees. They prefer dry, sunny locations with thickets and can also be found in habitats such as power line corridors and Christmas tree plantations. Little to no suitable habitat for this species is present within the Project site.
- Prothonotary warbler (*Protonotaria citrea*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from April 1 to July 31. Prothonotary warblers breed in flooded bottomland forests, wooded swamps, and forests near lakes and streams, preferring low-lying, flat terrain with slow-moving water and dense canopies. Little to no suitable habitat for this species is present within the Project site.
- Red-headed woodpecker (*Melanerpes erythrocephalus*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 10 to September 10. Red-headed woodpecker habitats are open woodlands, open forests, and riparian forests with mature, scattered trees, especially oaks. They prefer areas with open undergrowth, access to the ground for foraging, and dead trees or limbs for nesting. They are also found in agricultural lands, orchards, parks, and suburban areas. Little to no suitable habitat for this species is present within the Project site.
- Rusty blackbird (*Euphagus carolinus*) is a BCC only in particular BCRs, including Region 28, in the continental USA. This species breeds elsewhere. Rusty blackbirds favor wet habitats, including bogs, fens, and swamps along the edges of ponds and streams, throughout their life cycle. Little to no suitable habitat for this species is present within the Project site.
- Wood thrush (*Hylocichla mustelina*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 10 to August 31. Wood thrushes inhabit mature, moist hardwood or mixed forests with a closed canopy, a well-developed understory, and a leaf-litter-covered floor. They need dense vegetation for nesting and prefer larger forest areas, making them vulnerable to habitat fragmentation. Little to no suitable habitat for this species is present within the Project site.

### 3.5.4 Aquatic Environment

A wetland and stream delineation was conducted by Haley & Aldrich on the Project site on October 21, 2025. One 0.31-acre emergent wetland was delineated within the Project site (Appendix B). The wetland was located within an upland forest area in the northwestern portion of the Project site and was associated with a small channel that drains north to Poplar Creek. Evidence of beaver use (i.e., downed trees and chewed stumps) was observed within the wetland. The observed indicators of wetland hydrology included Surface Water (A1), High Water Table (A2), Saturation (A3), Water-Stained Leaves (B9), Aquatic Fauna (B13), Drainage Patterns (B10), and FAC-Neutral Test (D5). The dominant vegetation included small carpet grass (*Arthraxon hispidus*), devil's beggartick (*Bidens frondosa*), and broadleaf cattail (*Typha latifolia*). The observed hydric soil indicator was Depleted Dark Surface (F7). Poplar Creek was observed along the northern boundary of the Project site. In this section, the stream was approximately 200 feet wide, and the water was turbid at the time of observation. In areas where observation was possible, the channel substrate appears to consist of silt and cobble. The stream flows west adjacent to the northern Project site boundary before passing beneath the Perimeter Road bridge and bending to the southeast and parallelling the southwestern Project site boundary. These resources are depicted on Figure3.5-3. No aquatic threatened/endangered species, commercially important

species, or key aquatic indicator organisms are identified due to the primarily terrestrial nature of the Project site.

The *Hermes Non-Power Reactor Environmental Report* contains additional information regarding potentially affected waterbodies in close proximity to the Project site (Section 3.5.5, pages 3-83 to 3-87).

### 3.5.5 Travel Corridors

No travel corridors for terrestrial species have been identified within the Project site.

### 3.5.6 Ecological Succession

Outside of relatively small, forested and shrubby areas along Poplar Creek, the Project site is maintained in frequently mowed grasses and in early successional communities (i.e., grasses and forbs) that may be mowed less frequently. The amount of historic and current disturbance throughout the Project site has resulted in habitat that is not considered regionally significant.

### 3.5.7 References

1. Kairos Power, LLC. 2023. “Hermes Non-Power Reactor Environmental Report.” HER-ER-001 Revision 1.

## 3.6 METEOROLOGY, CLIMATOLOGY, AND AIR QUALITY

### 3.6.1 Meteorology and Climatology

### 3.6.2 Regional Climatology

Regional climatology is described in Section 3.2.1 (pages 3-9 and 3-10) of the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, LLC, 2023) and Section 3.2.1.1.1 of the *Environmental Impact Statement for the Construction Permit for the Kairos Hermes Test Reactor* (U.S. Nuclear Regulatory Commission, 2023). These descriptions remain relevant to the Radiant-Proposed Action and are summarized, and updated as needed, below.

The Project site is situated in Roane County, eastern Tennessee, in the Valley and Ridge physiographic province, often designated as the Great Valley of East Tennessee (Figure 3.6-1). This area exhibits a humid subtropical climate (Köppen Cfa) featuring well-defined seasonal patterns, limited temperature variability, and consistent year-round precipitation. According to 1991–2020 normals from the Oak Ridge Automated Surface Observing System (ASOS) station (GHCND: USW00053868), the mean daily maximum temperature in January is 48.1° F and the mean daily minimum of 30.0° F. The hottest month, July, shows a mean daily maximum of 89.1° F and a mean daily minimum of 69.0° F (National Centers for Environmental Information, 2021). The annual average relative humidity, based on data from the nearby Knoxville McGhee Tyson Airport station, is about 73 percent (National Centers for Environmental Information, 2024a).

Annual precipitation averages approximately 55.53 inches at the Oak Ridge ASOS, with the highest totals in winter (exceeding 16 inches seasonally) and the lowest in autumn (just over 11.5 inches seasonally) (National Centers for Environmental Information, 2021). Snowfall is typically light and occurs mainly

between November and March. Extended dry spells are rare, owing to recurrent moisture from the Gulf of Mexico and topographic influences from adjacent ridges.

Surface winds are generally aligned with the southwest-to-northeast orientation of the Great Valley, yielding subdued mean annual wind speed of 2.1 miles per hour (mph). The Azores–Bermuda High exerts year-long control, most notably in late summer and early fall, fostering prolonged fair weather and reduced atmospheric mixing. Winter and spring see influences from eastward-progressing mid-latitude systems via the Ohio or Tennessee River valleys, delivering intermittent fronts and rainfall. In summer, warm, moist air from the Gulf of Mexico frequently overruns the area, producing diurnal convective thunderstorms that are occasionally enhanced by orographic lift.

### 3.6.3 Regional Air Quality

The Project site is positioned within the municipal boundaries of Oak Ridge, Roane County, Tennessee, a city that extends across portions of both Roane and Anderson Counties. These counties fall within the broader Knoxville-Sevierville-LaFollette nonmetropolitan statistical area, as defined under the Clean Air Act for air quality management purposes. As of November 2025, Roane and Anderson Counties are classified as attainment areas for all current criteria pollutants under the NAAQS, including ozone ($O_3$), particulate matter ($PM_{10}$ and $PM_{2.5}$), carbon monoxide (CO), nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), and lead (Pb). This attainment status reflects ongoing compliance with federal standards, supported by state monitoring networks that indicate pollutant concentrations remain below applicable thresholds (EPA, 2025).

Historically, portions of Roane County were designated nonattainment for the $PM_{2.5}$ NAAQS but achieved redesignation to maintenance status in 2017. Similarly, Anderson County transitioned from nonattainment to maintenance for the 1997 8-hour $O_3$ NAAQS in 2015 and for the 2006 24-hour $PM_{2.5}$ NAAQS in 2017. Among the ten adjacent counties (Campbell, Cumberland, Knox, Loudon, McMinn, Meigs, Morgan, Rhea, Scott, and Union), only Knox and Loudon, sharing the eastern boundaries with Roane and Anderson respectively, have prior nonattainment designations for 8-hour $O_3$ and $PM_{2.5}$; both are now in maintenance status with no active violations (EPA, 2025).

Under the Clean Air Act, visibility in pristine federal lands is safeguarded through the Federal Class I area program, which imposes stringent protections over large areas managed by the National Park Service, U.S. Fish and Wildlife Service, U.S. Forest Service, and U.S Department of Agriculture (40 CFR Part 81) (EPA, 2024). These Class I areas receive enhanced scrutiny compared to standard Class II designations, particularly via the Prevention of Significant Deterioration (PSD) program, which restricts emissions increases from new or modified major stationary sources to preserve air quality and scenic values (EPA. 2023). EPA guidance mandates a formal Class I visibility impact assessment for any major source proposed within 100 kilometers (approximately 62.1 miles) of such an area to evaluate potential plume intrusion and haze contributions (EPA, 2010).

A review of federal Class I areas within a 65-mile radius of the Project site identifies two protected locations under the Regional Haze Rule (Figure 3.6-2). The identified sites are the Joyce Kilmer-Slickrock Wilderness (approximately 39 miles southeast) and Great Smoky Mountains National Park (approximately 32 miles southeast), which are managed by the U.S. Forest Service and National Park Service, respectively.

### 3.6.4 Severe Weather

Extreme weather occurrences are infrequent overall. Positioned east of the central U.S. tornado corridor, north of principal hurricane paths, and distant from heavy snow belts, the site faces minimal direct threats from such events (NOAA Storm Prediction Center, 2024). The northwestward Cumberland Plateau acts as a buffer, dampening winter cold surges and attenuating the force of meso-scale convective systems during warmer months.

#### *3.6.4.1 Extreme Wind*

Wind events, primarily linked to frontal thunderstorms and cold passages, occur several times annually, peaking in late winter and spring. Hourly observations from Oak Ridge Reservation Towers J and L (2016–2020) indicate the maximum hourly averaged wind speed for Tower J is 24.8 mph at the 20-meter level and for Tower L is 21.4 mph at the 10-meter or 15-meter level and 24.4 mph at the 30-meter level (Oak Ridge National Laboratory, 2025). The maximum hourly wind gust recorded at Tower L was 78.3 mph at the 15-meter level and 84.5 mph at the 30-meter level. In comparison, regional maxima at Oak Ridge ASOS station reach 29 mph sustained and 53 mph gusts, while Knoxville records higher extremes (60 mph sustained, 76 mph gusts). No significant hurricane risk applies to the area due to a greater than 300-mile inland position; tropical remnants have caused downed trees and flooding impacts since 1905, with the most notable events from Hurricane Ivan in 2004 and Hurricane Helene in 2024.

#### *3.6.4.2 Tornadoes and Waterspouts*

Only seven tornadoes (F0–F3 intensity) have been reported in Roane County from 1950 to 2025, per NWS Morristown and NCEI databases (National Weather Service, 2025, National Centers for Environmental Information, 2025). The Federal Emergency Management Agency (2025) National Risk Index indicates a very low tornado risk for Roane County. No waterspouts are documented locally, given the inland setting.

#### *3.6.4.3 Water Equivalent Precipitation Extremes*

Annual precipitation averages 47 to 53 inches, with historic 24-hour maxima less than 10 inches and monthly totals less than 20 inches across nearby NWS/TVA stations; droughts are rare, with 16 severe episodes over two centuries, the most protracted in the 1980s. Probable maximum winter precipitation (PMWP) for a 10 $mi^2$ area is 23.5 inches over 48 hours (January–March), equivalent to the extreme liquid event. Snowfall averages greater than 12 inches annually, with no persistent snowpack hazards.

#### *3.6.4.4 Hail, Snowstorms, and Ice Storms*

Severe hail (greater than or equal to 0.75 inches) events total 36 in Roane County from 1950–2024 (less than one per year), lower than adjacent counties (50–93 events in Loudon and Knox Counties, respectively). Maximum snow depths reach 15 inches (Knoxville, 1960), with 24-hour accumulations up to 20 inches regionally (Chattanooga, 1993). Frost penetration is limited to less than 20 inches. Ice storms in Region V (including Tennessee) yield greater than or equal to 1-inch accumulations five times per 50 years and greater than or equal to 2 inches twice per 50 years. Based on the data provided in American Society of Civil Engineers (ASCE) Standard No. 7-22, the 500-year mean recurrence interval of uniform ice thickness due to freezing rain for Roane County is 1.0 inch with a concurrent 3-second wind gust of 30 mph. For glaze ice, the point probabilities for ice thickness are about 0.20 for greater than or equal to 0.5 inches and 0.36 for greater than or equal to 0.25 inches. These probabilities correspond to

recurrence intervals of once in five years and once in three years, respectively. Glaze ice thicknesses less than or equal to 0.5 inches generally result in little structural damage. However, storms which produce these lesser ice thicknesses can present a hazard to travel in the affected areas, and when combined with strong winds, can damage above-ground utility wires.

#### *3.6.4.5 Thunderstorms and Lightning*

Thunderstorms average 34 to 65 days annually (2001–2020), concentrated in summer (18–40 days, May–August) from diurnal heating. Cloud-to-ground lightning density is four to eight flashes/km²/year (1993–2018), with several strikes occurring on or adjacent to the Project site between 2011 and 2019 (Koehler, 2020; Oak Ridge National Laboratory, 2025)

#### *3.6.4.6 Snowpack and Probable Maximum Winter Precipitation*

ASCE 7-22 specifies a 50-year snow load of 10 pounds per square foot (psf) for Oak Ridge, adjusted to 8.2 psf for 100-year recurrence. Historical maxima (19-inch depth, Chattanooga 1993) equates to 15.3 psf; 100-year 48-hour snowfall (18.8 inches, Knoxville 1960) yields 14.7 psf, while the record 28-inch event (Westbourne 1960) reaches 21.9 psf. Normal and extreme winter loads are thus 21.9 psf, with 48-hour PMWP at 23.5 inches/48 hours (National Centers for Environmental Information, 2024b; American Society of Civil Engineers, 2022).

#### *3.6.4.7 Extreme Temperatures*

Daily average temperatures range from the mid-20's (°F) in winter to upper 70's (°F) in the summer, per temperature readings at Tower L. Records in Oak Ridge include 105°F highs (June/July 2012) and -17°F low (January 1985). Tower L (2018–2019) records include a 0.5°F minimum and 96.2°F maximum (Oak Ridge National Laboratory, 2025; National Centers for Environmental Information, 2021).

#### *3.6.4.8 Restrictive Dispersion Conditions*

For neutrally/positively buoyant releases, low wind speeds (1 meter per second) under moderately stable conditions yield persistent high ground-level concentrations up to 1,400 meters downwind, per DOE dispersion models. Moderate winds (4.5 meters per second) in neutral stability reduce concentrations beyond 1,200 meters. Building-induced turbulence enhances near-field dispersion but may trap ground-level plumes; worst-case scenarios emphasize stable/low-wind regimes for elevated sources (U.S. Department of Energy, 2023b).

### 3.6.5 Local Meteorology

Local meteorology is described in Section 3.2.4 (pages 3-15 to 3-18) of the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, LLC, 2023) and Section 3.2.1.1.1 of the *Environmental Impact Statement for the Construction Permit for the Kairos Hermes Test Reactor* (U.S. Nuclear Regulatory Commission, 2023). These descriptions remain relevant to the Radiant-Proposed Action and are summarized, and updated as needed, below.

#### *3.6.5.1 Topography*

Project site meteorology is shaped by alternating southwest-northeast trending ridges and valleys, including McKinney Ridge and Black Oak Ridge to the east-northeast and a low-elevation gap at the

Clinch River to the south. These features channel prevailing southwest flows while permitting occasional cross-ridge ventilation through gaps, resulting in generally light winds and enhanced orographic precipitation from Gulf-sourced moisture. The Appalachian barrier to the east-southeast attenuates Atlantic influences, promoting subsidence under the Azores-Bermuda High and frequent nocturnal inversions. Elevation profiles within 50 miles confirm valley confinement, with minimal relief to the immediate west but rising terrain to the north and southeast that promotes downslope warming and drainage flows. Wind roses from ORR Towers J, L, and D (Figures 3.2-14 through 3.2-19 of the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, LLC, 2023)) illustrate bidirectional channeling with the prevailing winds coming from the south-southwest to west-southwest directions and northeast to east-northeast directions.

#### *3.6.5.2 Local Data Sources*

Since the 1940s, the ORR has maintained a robust DOE-sponsored meteorological network, initiated by the U.S. Weather Bureau for Manhattan Project dispersion assessments and expanded in subsequent studies (e.g., 2011 ORNL wind field analysis). Current operations (as of 2025) include real-time data from multiple towers and remote sensors, accessible via the Oak Ridge National Laboratory (ORNL) MetWeb portal, supporting routine dispersion modeling, emergency response simulations, and environmental impact evaluations. Key parameters include wind speed/direction (at 10 to 60 meter heights), temperature gradients (ΔT for stability), relative humidity, precipitation, barometric pressure, and solar radiation. Instruments undergo third-party calibration managed by UT-Battelle every six months.

#### *3.6.5.3 Atmospheric Stability*

Stability distributions from Tower L (2018–2019, ΔT method) indicate balanced conditions: unstable (A-C classes) approximately 31 percent, neutral (D) approximately 27 percent, and stable (E-G classes) approximately 42 percent. However, the majority of the stable lapse conditions are only slightly stable (class E), occurring 27 percent of the time.

### 3.6.6 References


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2. EPA. 2010. “Clarification of PSD Requirements for Class I Areas. Memorandum from R. McCurdy to Regional Air Division Directors.” Washington, DC.
3. EPA. 2024. “List of Areas Protected by the Regional Haze Program.” Available at https://www.epa.gov/visibility/list-areas-protected-regional-haze-program.
4. EPA. 2025. “Tennessee Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants.” Green Book. Data current as of November 30, 2025. Available at: https://www3.epa.gov/airquality/greenbook/anayo_tn.html.
5. Federal Emergency Management Agency. 2025. “National Risk Index.” Available at https://hazards.fema.gov/nri/map.
6. Kairos Power, LLC. 2023. “Hermes Non-Power Reactor Environmental Report.” HER-ER-001 Revision 1.

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8. National Centers for Environmental Information. 2021. "1991–2020 U.S. Climate Normals – Oak Ridge ASOS, TN US (GHCND: USW00053868)." NOAA, Asheville, NC. Available at: https://www.ncei.noaa.gov/access/us-climate-normals/.

9. National Centers for Environmental Information. 2024a. "Local Climatological Data Annual Summary – Knoxville McGhee Tyson Airport, TN." NOAA, Asheville, NC.

10. National Centers for Environmental Information. 2024b. "Snowfall Extremes: East Tennessee Stations (1938–2024)." NOAA.

11. National Centers for Environmental Information. 2025. "U.S. Tornadoes." Available at https://www.ncei.noaa.gov/access/monitoring/tornadoes/.

12. National Weather Service. 2025. "NWS Morristown Tornado Database." Available at https://midsouthtornadoes.msstate.edu/index.php?cw=mrx.

13. National Weather Service Weather Forecast Office, Morristown, TN. 2024. "East Tennessee Climate Summary."

14. NOAA Storm Prediction Center. 2024. "Historical Tornado and Severe Weather Climatology for Tennessee Climate Division 1 (East Tennessee)."

15. Oak Ridge National Laboratory. 2025. "Oak Ridge Reservation Meteorology." Available at https://metweb.ornl.gov/page5.htm.

16. U.S. Department of Energy. 2023a. "Annual Site Environmental Report for the Oak Ridge Reservation – Meteorological Monitoring Section." DOE/ORO/2023-001.

17. U.S. Department of Energy. 2023b. "Atmospheric Dispersion Modeling for Oak Ridge Reservation: Restrictive Conditions Analysis." DOE/ORO-2023-002.

18. U.S. Nuclear Regulatory Commission. 2023. "Environmental Impact Statement for the Construction Permit for the Kairos Hermes Test Reactor – Final Report." NUREG-2263.

## 3.7 NOISE

The traditional definition of noise is "unwanted or disturbing sound". Sound becomes unwanted when it either interferes with normal activities such as sleeping, conversation, or disrupts or diminishes one's quality of life. Noise intensity is expressed in decibels (dB), but because the human ear is not equally sensitive to all frequencies, a special filter called A-weighting is applied. The result is the A-weighted sound level, denoted dBA, which closely matches how people actually perceive loudness. The dBA scale reflects both the physical strength of the sound and the ear's varying response across the frequency spectrum. Higher dBA values correspond to greater risk of hearing damage. In general, most people will not notice a change in noise unless it increases (or decreases) by at least 3 dBA. A difference of 5 dBA or more is usually quite obvious. Examples of typical dBA levels for common activities are provided below (U.S. Department of Housing and Urban Development, 2009; IAC Acoustics, 2025; American Speech-Language-Hearing Association, 2025):

- 0 dBA – the softest sound a person can hear with normal hearing;
- 10 dBA – normal breathing;
- 20 dBA – average whispering at 5 feet, rustling leaves;

- 30 dBA – quiet rural area;
- 50 dBA – quiet suburb, moderate rainfall;
- 60 dBA – normal conversation;
- 80 dBA – garbage disposal, freight train at 15 meters;
- 90 dBA – subway, passing motorcycle (25 feet);
- 110 dBA – auto horn at 1 meter;
- 120 dBA – thunder, chain saw; and
- 140 dBA – near jet engine.

Because most real-world noises fluctuate constantly and an instantaneous dBA reading only captures a single moment, additional metrics are needed to describe noise exposure over longer periods. One widely used approach is the equivalent continuous sound level, or $L_{eq}$. $L_{eq}$ represents the steady, unchanging noise level that, over a specified time interval (such as one hour, written $L_{eq(1)}$, or a full day, written $L_{eq(24)}$), that contains the same total acoustic energy as the actual varying noise. Another common metric is the Day-Night Average Sound Level ($L_{dn}$), which calculates a 24-hour $L_{eq}$ but adds 10 dB to all sounds occurring between 10:00 p.m. and 7:00 a.m. to account for people's greater sensitivity to noise during nighttime hours.

A baseline noise survey was conducted from June 15 to June 16, 2021, for the Hermes Non-Power Reactor Project located in the immediate vicinity of the Project site. Survey methods and results are described in Section 3.2.7 (pages 3-19 to 3-20) of the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, LLC, 2023). The baseline conditions described remain relevant to the Radiant proposed action. The measured noise levels were generally represented as an ambient noise environment common to a quiet rural area. As would be expected, ambient noise levels were higher in areas closer to existing industrial activity within the ETTP.

Noise receptors located within five miles of the Project site include several churches, Black Oak Ridge Conservation Easement (which at its closest point is located on the opposite side of Poplar Creek approximately 0.25 miles northwest of the Project site), and the Oak Ridge Country Club (located approximately 4.5 miles northeast of the Project site). The nearest residences appear to be located in The Preserve at Oak Ridge approximately 1.3 miles southwest of the Project site.

Contributors to noise in the vicinity of the Project site include various industrial activities within the ETTP, Perimeter Road (located adjacent to the Project site), the Oak Ridge Turnpike (located 0.6 mile southeast of the Project site), the Preserve Marina (located approximately 1.8 miles southwest of the Project site), the ORNL Carbon Fiber Technology Facility (located approximately 2.2 miles northeast of the Project site), and ORNL (located approximately 4.9 miles east of the Project site). The proposed Clinch River Nuclear site is located approximately 1.7 miles south of the Project site.

### 3.7.1 References


1. American Speech-Language-Hearing Association. 2025. "Loud Noise Dangers [website]." Available at https://www.asha.org/public/hearing/loud-noise-dangers/.
2. IAC Acoustics. 2025. "Comparative Examples of Noise Levels [website]." Available at https://www.iacacoustics.com/article/comparative-examples-of-noise-levels.
3. U.S Department of Housing and Urban Development. 2009. "The Noise Guidebook." Chapter 1 – Basic Overview of the Environmental Noise Problem.

## 3.8 HISTORIC AND CULTURAL RESOURCES

This section identifies and describes the known historic, archaeological, and cultural resources in the vicinity of the Project site. A Cultural Resources Desktop Analysis was prepared in November 2025 (SEARCH, 2025) for the Project site (Appendix C), which identified previous cultural resource surveys and previously recorded cultural resources within one mile of the Project site. The analysis also included a review of environmental variables and historical information to provide a preliminary assessment of the Project site's potential to contain unrecorded cultural resources. The results of consultation with the Tennessee State Historic Preservation Office and potentially interested Tribal Historic Preservation Officers is included as well as a summary of the cultural setting of the Project site that was prepared for the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, 2023; Section 3.6.1, pages 3-114 and 3-115). For the purposes of this EA, the Area of Potential Effect (APE) is defined as the 84 acres Project site.

### 3.8.1 Cultural Setting

As noted in the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, 2023), Eastern Tennessee was inhabited from the Paleo-Indian period (~10,000 B.C.) through the Mississippian period (A.D. 900–1600) and the historic Overhill Cherokee era (A.D. 1600–1838). Cultural evolution progressed from mobile hunter-gatherer economies in the Paleo-Indian and Archaic periods, to pottery, burial mounds, and early agriculture in the Woodland period, and finally to complex, agriculturally based chiefdoms with large mound centers and extensive trade networks during the Mississippian period. No federally recognized tribal lands, sacred sites, or retained legal rights currently exist within the ORR boundaries.

Following the 1798 Cherokee treaty, sparse Euro-American settlement began in the Clinch River Valley. By the early 1940s the area supported four small farming communities (Scarboro, Robertsville, Wheat, and Elza) totaling approximately 1,000 families, supplemented by timbering and later coal mining. The Great Depression severely impacted the region, but establishment of the TVA in 1933 and construction of Norris Dam brought electrification, flood control, and employment while displacing many residents.

The rural setting, ridge-and-valley topography, TVA power, and low land cost led the U.S. Army to select the Clinch River Valley as "Site X" for the Manhattan Project. Between 1942 and 1945 approximately 59,000 acres were acquired, and the ORR was developed to house three major facilities: X-10 (graphite reactor), Y-12 (electromagnetic separation), and K-25 (gaseous diffusion). Peak wartime population exceeded 75,000.

The Atomic Energy Act of 1946 placed the facilities under civilian control (later DOE). Uranium enrichment at K-25 ceased in 1986; decontamination, decommissioning, and reindustrialization of the former K-25 site (renamed ETTP) began in the 1990s. Since 1996 DOE and the Community Reuse Organization of East Tennessee (CROET) have transformed ETTP into the Heritage Center, a multi-use private-sector industrial park and conservation area.

Numerous ORR properties and facilities have historic and scientific significance. The X-10 Graphite Reactor is listed on the National Register of Historic Places and is a designated National Historic Landmark. In 2015 Congress established the Manhattan Project National Historical Park, which

incorporates portions of ORR (including the former K-25 footprint) and additional locations in Hanford, Washington and Los Alamos, New Mexico.

### 3.8.2 Previously Conducted Surveys and Recorded Cultural Resources

The Cultural Resources Desktop Analysis prepared for the Project site found that the Tennessee Division of Archaeology (TDOA) database includes records of six surveys that were conducted within a 1.0-mile buffer of the Project site (Figure 3.8-1, Table 3.8-1). None of these surveys included the Project site. In addition, 17 previously recorded archaeological sites and six previously recorded historic cemeteries are indicated within one mile of the Project site (Figure 3.8-1, Table 3.8-2). [redacted] Therefore, no additional work was recommended at the site.

### 3.8.3 Historic Map Review

The Cultural Resources Desktop Analysis (SEARCH, 2025) prepared for the Project site included a review of historic mapping to identify past land use in the vicinity of the Project site. Historic mapping depicts the rapid transformation of the Project site and surrounding area from rural farmland to a restricted Manhattan Project industrial complex between 1935 and 1953.

**Pre-1942 (1935 and 1941 USGS topographic maps)** The Project site was undeveloped open land with no structures or roads within its boundaries. Nearby features included a transmission line approximately 200 meters southeast, an unpaved road along the west bank of Poplar Creek, and the road to Gallaher Ferry on the Clinch River. Scattered farm buildings and Gallaher Cemetery (approximately 1 km south) were present.

**1943–1945 (Clinton Engineer Works map)** The newly constructed K-27 gaseous diffusion complex is depicted within the Project site, immediately southwest of the K-25 plant and northeast of a new power plant. Railroad tracks ran immediately east, and the Happy Valley temporary worker housing area lay east of the site.

**1953–1967 (USGS topographic maps)** Due to national-security classification, the K-25 and K-27 facilities were omitted from public maps. Oak Ridge Turnpike had become a three-lane highway, and additional cemeteries (Shelton, Ellis, and Slave) were labeled.

**1968 (USGS topographic map)** The map depicts the fully developed K-27 complex with 17 buildings and outbuildings, internal service roads, and a rail spur. Large industrial structures are shown immediately northeast and north (across Poplar Creek), with transmission lines and a secondary highway along the western boundary.

**2007–2023 (Google Earth historic imagery)** The K-27 complex appears to have remained largely intact until around 2007. Imagery from 2023 indicates the Project site no longer included any standing buildings.

### 3.8.4 Cultural Resource Potential

The Cultural Resources Desktop Analysis (SEARCH, 2025) prepared for the Project site assessed that all above-ground buildings associated with the historic K-27 complex were demolished, accompanied by extensive remediation that included excavation to depths of 10 feet across portions of the Project site, therefore the potential for intact historic architectural resources is considered low.

Soils within the Project site are classified as urban land, reflecting heavy twentieth-century disturbance. However, proximity to Poplar Creek (immediately north and west) and the Clinch River, combined with well-drained original landforms (including a low ridge that once extended eastward toward the creek), creates favorable conditions for both precontact Native American and historic archaeological resources. Although mid-twentieth-century construction and later demolition/remediation likely disturbed much of the site, limited areas adjacent to Poplar Creek appear to have remained relatively undisturbed [redacted] in the northwestern portion of the Project site.

Accordingly, while the potential for standing historic structures is low, the potential for encountering subsurface precontact Native American archaeological deposits in less-disturbed areas and historic-period archaeological remains (e.g., foundations, utilities, and artifacts) associated with the K-27 complex is considered high. Development within the Project site is only proposed in areas previously developed [redacted]. Therefore, no additional survey to re-visit this site was conducted.

### 3.8.5 Agency Consultation

Consultations were performed with the Tennessee SHPO and the following Native American Tribes:

- Alabama-Coushatta Tribe of Texas
- Cherokee Nation
- Coushatta Tribe of Louisiana
- Eastern Band of Cherokee Indian
- Muscogee Creek Indians

Copies of related SHPO and THPO correspondence are included in Appendix D.

### 3.8.6 Statement of Site Significance

Informal consultation with SHPO did not raise any substantial concerns. SHPO indicated they would coordinate directly with NRC during the NEPA process. This Section will be updated once a response is received from THPO.

### 3.8.7 Tables

**Table 3.8-1. Previous Cultural Resource Surveys within a 1-Mile Buffer of the Project Site**

| DOA No. | Title | Year | Consultant |
|---|---|---|---|
| 4650 | Archaeological Reconnaissance K-25 Site, Oak Ridge Reservation, Oak Ridge, Tennessee (Roane County). | 1995 | Jacobs Environmental Restoration Team, Oak Ridge Operations |

| | | | |
|---|---|---|---|
| 7189 | Archaeological Survey and Testing of the Happy Valley Worker Camp, Roane County, Tennessee. | 2011 | Valk, Diana, David Price, and J.W. Joseph |
| 8052 | Archaeological Survey with Emphasis on Prehistoric Sites of the Oak Ridge Reservation, Oak Ridge, Tennessee (Anderson and Roane Counties). | 1974 | Fielder, George F. |
| 8053 | Cultural Resource Survey and Evaluation Tennessee Synfuels Associates Site Oak Ridge Reservation Roane County, Tennessee. | 1981 | GAI Consultants, Inc- Houston, Robert J. and Major C. R. McCollough |
| 8174 | Phase I Archaeological Survey TVA Clinch River SMR, Roane County, Tennessee. | 2015 | Hunter, John A., Duane Simpson, and Stephen T. Mocas |
| 9370 | Phase I Cultural Resource Report for the TN Roan MP 2.00 to 2.394 (RMP 153.992 to 154.383) Hydrostatic Test (CE-19-11225) Project Roane County, Tennessee. | 2020 | Erickson, Luke |

**Table 3.8-2. Previously Recorded Archaeological Sites within a 1-Mile Buffer of the Project Site**

| TDOA Number | Cultural Affiliation | Site Type | Level of Investigation |
|---|---|---|---|
| 40RE87 | Not recorded | Village, camp site | Surface collection (intensive, may include shovel testing) |
| 40RE88 | Not recorded | Village | Surface collection (intensive, may include shovel testing) |
| 40RE109 | Mississippian, Archaic, Woodland | Village, mound | Not recorded |
| 40RE110 | Upper Valley Woodland, Middle Valley Woodland | Village, mounds | Not recorded |
| 40RE111 | Upper Valley Woodland, Archaic | Village | Not recorded |
| 40RE126 | Paleo-Indian, Early and Late Archaic, Middle and Late Woodland, Mississippian | Occupation | Surface collection (intensive, may include shovel testing) |
| 40RE127 | Not recorded | Possible habitation | Not recorded |
| 40RE136 | Historical | Historic structure | Not recorded |
| 40RE219 | Historic (non-Indian) | Historic cemetery | No collection |
| 40RE220 | Historic (non-Indian) | Historic cemetery | No collection |
| 40RE221 | Historic (non-Indian) | Historic cemetery | No collection |
| 40RE222 | Historic (non-Indian) | Historic cemetery | No collection |
| 40RE223 | Historic (non-Indian) | Historic cemetery | No collection |
| 40RE224 | Historic (non-Indian) | Historic rural community, cemetery | No collection |
| 40RE232 | Historic (non-Indian) | Historic industrial | Surface collection (intensive, may include shovel testing) |
| 40RE233 | Historic (non-Indian) | Historic military long term encampment | Extensive testing program (Phase II) |
| 40RE577 | Historic (non-Indian) | Historic military long term encampment | Extensive testing program (Phase II) |

### 3.8.8 References

1. Kairos Power, LLC. 2023. “Hermes Non-Power Reactor Environmental Report.” HER-ER-001 Revision 1.

## 3.9 VISUAL RESOURCES

The visual setting of the Project site primarily consists of industrial development and remediation areas within the ETTP to the north, east, and south with forested views to the west and southwest. Forested ridges are generally visible in the background in all directions. Poplar Creek flows north, west and south of the Project site though views are generally limited because of vegetative and topographic screening. Views in the immediate vicinity of the Project site are dominated by various paved and gravel roads, parking areas, abandoned electrical facilities, a railroad, power lines, industrial buildings associated with former uses of and current industrial reuse of the ETTP.

As part of the Project Visual Assessment (Appendix E), a viewshed analysis conducted by Haley & Aldrich, Inc. in 2025 indicates that, based on the screening provided by topography alone, the proposed Project structures will be visible from approximately 53.8 percent of the 1.0-mile radius visual study

area. To better illustrate the potential screening effect of forest vegetation, a vegetation viewshed analysis was also prepared for the proposed structures. The screening effect of NLCD mapped forest vegetation reduces potential visibility of the proposed Project from 53.8 percent (topographic visibility) to 25.3 percent of the visual study area. This reduction reflects the abundance of mapped forest vegetation throughout the visual study area. Areas expected to allow visibility based on the vegetation viewshed analysis are limited primarily to developed areas within the ETTP, cleared road corridors, and rivers and waterbodies.

To more accurately evaluate the potential visibility of the proposed Project, the visual study area was reviewed in the field between October 20 and 21, 2025. During the field visit, views toward the Project site were documented from 19 representative/sensitive viewpoints with photos and field notes. Several sites that were just outside of the 1-mile buffer were visited during field work to provide a conservative analysis of potential visibility for potentially sensitive sites near the 1-mile buffer. Existing structures within the ETTP, adjacent electric transmission lines, and a global positioning system (GPS) unit were used as locational reference points during field review. The photos obtained during this field evaluation were used to determine where the proposed Project might realistically be visible.

Field verification confirmed that the visibility of the existing structures is generally limited to areas at or adjacent to the Project site. This limited visibility is due to the topographic variation and dense forest vegetation that characterize the majority of the visual study area. Longer distance views are generally confined to several transportation corridors, and waterbodies. However, topography and forest vegetation provide partial screening of views in many of these areas. Where visible, the Project site is typically seen at foreground distances (under 0.5 mile) by drivers, local residents, and in some cases, business employees and recreational users.

Field verification found the Project will be screened from a large majority of sensitive sites that were visited. Forest vegetation that occurs at many sensitive sites (e.g., trails/parks, cemeteries, and churches), generally impedes views of the proposed Project from these areas. At sensitive sites where such screening is lacking (e.g., K-25 overlook and Visitor Center) open views of the existing structures are already present, and therefore additional visual change (either negative or positive) will be limited.

The scenic quality of the Project site was rated according to the Bureau of Land Management (BLM) Visual Resource Management System (U.S. Department of Interior, Bureau of Land Management, 1986) using seven primary elements: landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modifications. Scenic quality receives a rating of "A" (highest), "B," or "C" (lowest) in the BLM Visual Resource Management System. The site evaluation performed in November 2025 assigned the area of the Proposed Action an overall "C" rating, largely due to extensive cultural modifications on the site itself and in the neighboring industrial zones. This rating is partially offset by positive contributions from nearby natural features, including Poplar Creek and extensive areas of surrounding forest.

Sensitivity levels, as defined in the BLM Visual Resource Management System, are a measure of public concern for scenic quality and sites may be assigned high, medium, or low sensitivity levels by analyzing the various indicators of public concern. User types, level of use, public interest, adjacent land uses, and any designated management goals for special areas may impact the sensitivity levels of a given site. Under current conditions, the Project site exhibits low to moderate sensitivity. Areas to the north and northeast, including the BORCE, provide opportunities for public recreation such as hiking, hunting, and cycling. Additionally, the K-25 History Center, located adjacent to the Project site, and the K-25 Overlook

and Visitor Center, located along State Route 58 near its intersection with Perimeter Road, offer dedicated viewpoints for members of the public to observe the ETTP area.

### 3.9.1 References


1. U.S. Department of Interior - Bureau of Land Management. 1986. "Visual Resource Inventory Manual H-8410-1."
2. U.S. Department of Interior - Bureau of Land Management. 1984. "Manual 8400 – Visual Resource Management."


## 3.10 SOCIOECONOMICS

This section describes socioeconomic conditions within the region of influence (ROI) surrounding the Project site, serving as a foundation for evaluating potential impacts related to construction and operation of the Proposed Action. It covers demographic trends (including growth rates of both permanent and temporary populations, as well as racial and ethnic composition), community attributes (such as economic activity, housing availability, public services, and transportation infrastructure), and tax-related data. The analysis is conducted across multiple geographic scales to enable meaningful comparisons.

In August 2023, the NRC published Environmental Impact Statement for the Construction Permit for the Kairos Hermes Test Reactor (NUREG-2263). Socioeconomic information about the Kairos Hermes Test Reactor site, which is located less than 1,000 feet north of the proposed Radiant project site, is relevant based on the proximity and similarity of Proposed Actions. Given the recency of this EIS, components of it and the ER upon which it was based (Kairos 2023-TN8172) can reasonably serve as applicable analyses for the purpose of this ER and are referenced, where applicable, in the sub-sections below.

### 3.10.1 Region of Influence Demographics

This following section provides an overview of the population characteristics within the ROI. It leverages population data from American Community Survey 5-year estimates, where possible, to provide an overview of population growth trends, demographic composition, and racial and ethnic distribution.

#### *3.10.1.1 Region of Influence: Resident Population in Nearby Communities*

Consistent with NUREG-1748 guidance for Nuclear Material Safety and Safeguards (NMSS) facilities, the ROI assessed was established at five miles. This radius encompasses five counties surrounding the site: Anderson, Knox, Loudon, Morgan, and Roane. These represent the areas of potential influence with respect to potential impacts from construction and operations associated with the Project. This five-county area represents where temporary and operations workers are likely to reside, leverage public resources, and spend their wages in the local economy.

In 2019, the City of Oak Ridge, Tennessee located in Anderson and Roane Counties approximately 8.9 miles southwest of the site, had a population of 32,088. The City of Knoxville, Tennessee, located in Knox County approximately 26.5 miles west of the site, had a population of 198,708 (U.S. Census Bureau 2023). ROI counties are part of the Knoxville-Morristown-Sevierville, Tennessee Combined Statistical Area (CSA) [(U.S. Census Bureau 2012)].

**Table 3.10-1: Historic Population Growth Rates of ROI Counties**

| County | 1990 | 2000 | 2010 | 2023 | Percent Change 1990-2023 |
|---|---|---|---|---|---|
| Anderson | 68,250 | 71,330 | 75,129 | 80,343 | 17.72% |
| Knox | 335,749 | 382,032 | 432,226 | 501,571 | 49.39% |
| Loudon | 31,255 | 39,086 | 48,556 | 60,581 | 93.83% |
| Morgan | 17,300 | 19,757 | 21,987 | 21,503 | 24.29% |
| Roane | 47,227 | 51,910 | 54,181 | 56,226 | 19.05% |
| Total ROI | 499,781 | 564,115 | 632,079 | 720,224 | 44.11% |
| Tennessee | 4,877,185 | 5,689,283 | 6,346,105 | 7,148,304 | 46.57% |

Note: Table 3.10-1 shows the historic resident population for counties in the ROI and the State. Between 1990 and 2023, population in the ROI increased 44.11 percent overall, from 499,781 to 720,224 (National Bureau of Economic Research 1990). Rates of growth varied from 17.72 percent (Anderson County) to 93.83 percent (Loudon County). During the same period, population grew 46.57 percent in the State, from 4,877,185 to 7,148,304 (U.S. Census Bureau 2000, 2023, and 2010 and Tennessee State Data Center 2025).

### *3.10.1.2 Region of Influence: Resident Population Growth Projection*

Population growth of 3.00 percent is projected in the ROI between 2030 and 2035. As shown in Table 3.10-2, ROI population is projected to increase from 755,109 to 777,284 by 2035. Growth is projected for all ROI counties during this period, with the exception of Roane and Morgan Counties. Morgan County is projected to decrease 3.15 percent and Roane County is projected to decrease 1.05 percent. Loudon County is projected to grow the most (8.78 percent). During the same period, the State is projected to grow 3.0 percent (from 7,513,757 to 7,738,908) (U.S. Census Bureau 2023 and Tennessee State Data Center 2025).

**Table 3.10-2: Projected Population and Growth Rates of ROI Counties**

| County | 2023 | Projected 2030 | Projected 2035 | Percent Change 2023-2030 | Percent Change 2030-2035 |
|---|---|---|---|---|---|
| Anderson | 80,343 | 82,687 | 84,058 | 2.92 | 1.66 |
| Knox | 501,571 | 530,212 | 550,368 | 5.71 | 3.80 |
| Loudon | 60,581 | 65,897 | 67,778 | 8.78 | 2.85 |
| Morgan | 21,503 | 20,579 | 19,931 | -4.30 | -3.15 |
| Roane | 56,226 | 55,734 | 55,149 | -0.88 | -1.05 |
| Total ROI | 720,224 | 755,109 | 777,284 | 4.84 | 2.94 |
| Tennessee | 7,148,304 | 7,513,757 | 7,738,908 | 5.11 | 3.00 |

Note: Table 3.10-2 shows projected population in the ROI and the State. Population is projected to increase 4.84 percent (from 720,224 to 755,109) between 2023 and 2030 in the ROI. Growth is projected in all counties, except for Morgan and Roane. Loudon County is projected to grow the most (8.78 percent). During the same period, the State is projected to grow 5.11 percent (from 7,148,304 to 7,513,757) (U.S. Census Bureau 2023 and Tennessee State Data Center 2025).

### *3.10.1.3 Region of Influence: Transient population within 5 miles*

Transient populations in the ROI are described in Section 3.7.1.1.3 of Kairos 2023-TN8172 (pp 3-120 – 3-121). Due to the lack of accommodations which may provide temporary or seasonal housing, such as lodging, dormitories or classrooms, there are no transient populations within 5 miles of the ROI. No colleges, universities or other lodging facilities were identified in Section 3.7.1.1.3 of Kairos 2023-TN8172.

### *3.10.1.4 Region of Influence: Race and Ethnicity*

The minority population within the ROI was 17.79% in 2023, which is lower than the Tennessee (29.5%) and national average (42.73%). The largest minority groups in this ROI were African American (6.41%) and Hispanic/Latino (5.71%). Among ROI counties, Knox (20.44%) and Loudon (14.21%) had the highest minority representation, while Morgan had the lowest at 6.88%.

**Table 3.10-3a: Demographic (Race and Ethnicity) Characteristics of ROI Counties (1 of 2)**

| County | Total Population | White | | Minority | | Black or African American | | American Indian and Alaska Native | |
|---|---|---|---|---|---|---|---|---|---|
| | | Total | % | Total | % | Total | % | Total | % |
| Anderson | 78,175 | 67,994 | 86.98 | 10,182 | 13.02 | 2,579 | 3.30 | 93 | 0.12 |
| Knox | 487,401 | 387,760 | 79.56 | 99,641 | 20.44 | 39,181 | 8.04 | 426 | 0.09 |
| Loudon | 56,996 | 48,897 | 85.79 | 8,099 | 14.21 | 745 | 1.31 | 20 | 0.04 |
| Morgan | 21,193 | 19,494 | 91.98 | 1,459 | 6.88 | 945 | 4.46 | 18 | 0.08 |
| Roane | 54,403 | 49,590 | 91.15 | 4,813 | 8.85 | 1,294 | 2.38 | 99 | 0.18 |
| **Total ROI** | **698,168** | **573,735** | **82.18** | **124,194** | **17.79** | **44,744** | **6.41** | **656** | **0.09** |
| Tennessee | 7,227,750 | 5,095,402 | 70.50 | 2,132,348 | 29.50 | 1,074,700 | 14.87 | 8,257 | 0.11 |
| United States | 340,110,990 | 191,382,624 | 56.27 | 148,728,366 | 43.73 | 39,959,479 | 11.75 | 1,768,838 | 0.52 |

Reference: U.S. Census Bureau 2025.

**Table 3.10-3b: Demographic (Race and Ethnicity) Characteristics of ROI Counties (2 of 2)**

| County | Asian | | Native Hawaiian and Other Pacific Islander | | Other Race | | Hispanic or Latino | | Two or More Races | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | % | Total | % | Total | % | Total | % | Total | % |
| Anderson | 1,084 | 1.39 | 80 | 0.10 | 421 | 0.54 | 3,000 | 3.84 | 2,925 | 3.74 |
| Knox | 10,813 | 2.22 | 334 | 0.07 | 2,480 | 0.51 | 29,579 | 6.07 | 16,828 | 3.45 |
| Loudon | 519 | 0.91 | 0 | 0.00 | 213 | 0.37 | 5,708 | 10.01 | 894 | 1.57 |
| Morgan | 33 | 0.16 | 2 | 0.01 | 0 | 0.00 | 378 | 1.78 | 83 | 0.39 |
| Roane | 330 | 0.61 | 0 | 0.00 | 76 | 0.14 | 1,225 | 2.25 | 1,789 | 3.29 |
| **Total ROI** | **12,779** | **1.83** | **416** | **0.06** | **3,190** | **0.46** | **39,890** | **5.71** | **22,519** | **3.23** |
| Tennessee | 143,990 | 1.99 | 2,787 | 0.04 | 26,646 | 0.37 | 566,839 | 7.84 | 309,129 | 4.28 |
| United States | 21,036,558 | 6.19 | 581,100 | 0.17 | 1,852,889 | 0.54 | 68,013,553 | 20.00 | 15,515,949 | 4.56 |

Reference: U.S. Census Bureau 2025.

## 3.10.2 Community Characteristics

The following community characteristics encompass local socioeconomic factors such as economic conditions, housing data, public services, major infrastructure including transportation facilities, and tax-related information. This data reflects the U.S. Census Bureau's five-year American Community Survey estimates from 2018-2023 and data from the Bureau of Economic Analysis.

### *3.10.2.1 Economy*

The ROI's economic profile is assessed through the following indicators: household and population income, labor force distribution, unemployment levels, and poverty rates.

#### 3.10.2.1.1 Income (Population and Household)

In 2023, per capita income within the ROI ranged from $30,576 in Morgan County to $41,957 in Knox County, as seen in Table 3.10-4 below. The state average ($37,866) fell within this range, while the national average ($42,289) was higher than both the ROI and state values.

Median household income (MHI) in the ROI during the same year ranged from $57,408 in Morgan County to $80,296 in Loudon County. The U.S. median household income ($81,604) exceeded this range, whereas the state MHI for Tennessee ($67,097) was within the ROI range.

**Table 3.10-4: Median Household and Per Capita Income Levels in ROI Counties**

| | Anderson County | Knox County | Loudon County | Morgan County | Roane County | Tennessee | United States |
|---|---|---|---|---|---|---|---|
| Per capita income (dollars) | 35,460 | 41,957 | 42,817 | 30,576 | 36,357 | 37,866 | 42,289 |
| Median household income (dollars) | 63,171 | 71,662 | 80,296 | 57,408 | 66,218 | 67,097 | 81,604 |

Reference: U.S. Census Bureau 2024a

### *3.10.2.2 Labor Force and Unemployment*

**Table 3.10-5: Civilian Labor Force and Unemployment Status in 2023**

| | Anderson County | Knox County | Loudon County | Morgan County | Roane County | Tennessee | United States |
|---|---|---|---|---|---|---|---|
| Civilian labor force | 35,846 | 255,767 | 25,656 | 8,200 | 24,293 | 3,465,315 | 168,567,852 |
| Unemployment numbers | 1,623 | 8,052 | 593 | 354 | 1,053 | 143,974 | 7,702,095 |

Note: Table 3.10-5 shows unemployment rates and the number of individuals in the labor force in 2023. Unemployment status within the ROI varies from 354 individuals in Morgan County to 8,052 individuals in Knox County. (U.S. Census Bureau 2024b).

**Table 3.10-6: Employment by Industry**

| County | Anderson County | | Knox County | | Loudon County | | Morgan County | | Roane County | | Tennessee | | United States | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % | Total | % |
| Total employment (civilian employed population age 16 or older) | 34,057 | - | 246,587 | - | 24,966 | - | 7,706 | - | 23,124 | - | 3,301,152 | - | 159,808,535 | - |
| Agriculture, forestry, fishing and hunting, and mining | 107 | 0.31 | 737 | 0.30 | 665 | 2.66 | 107 | 1.39 | 189 | 0.82 | 28,819 | 0.87 | 2,552,148 | 1.60 |
| Construction | 2,970 | 8.72 | 17,633 | 7.15 | 1,971 | 7.89 | 1,002 | 13.00 | 1,860 | 8.04 | 229,486 | 6.95 | 11,064,175 | 6.92 |
| Manufacturing | 4,000 | 11.75 | 19,803 | 8.03 | 3,830 | 15.34 | 793 | 10.29 | 2,699 | 11.67 | 422,176 | 12.79 | 15,912,421 | 9.96 |
| Wholesale Trade | 939 | 2.76 | 5,976 | 2.42 | 576 | 2.31 | 99 | 1.28 | 426 | 1.84 | 75,681 | 2.29 | 3,678,210 | 2.30 |
| Retail Trade | 3,870 | 11.36 | 30,903 | 12.53 | 3,360 | 13.46 | 646 | 8.38 | 2,499 | 10.81 | 379,511 | 11.50 | 17,368,629 | 10.87 |
| Transportation and warehousing, and Utilities | 2,007 | 5.89 | 12,425 | 5.04 | 1,977 | 7.92 | 572 | 7.42 | 1,681 | 7.27 | 236,125 | 7.15 | 9,373,191 | 5.87 |
| Information | 268 | 0.79 | 4,737 | 1.92 | 272 | 1.09 | 90 | 1.17 | 324 | 1.40 | 52,153 | 1.58 | 2,998,298 | 1.88 |
| Finance and Insurance, real estate | 1,396 | 4.10 | 17,459 | 7.08 | 1,310 | 5.25 | 195 | 2.53 | 756 | 3.27 | 199,077 | 6.03 | 10,673,893 | 6.68 |
| Professional, scientific, management, administrative, and waste management services | 4,824 | 14.16 | 32,490 | 13.18 | 2,884 | 11.55 | 719 | 9.33 | 3.341 | 0.01 | 347,931 | 10.54 | 19,763,960 | 12.37 |
| Educational Services, health care and social assistance | 7,377 | 21.66 | 59,637 | 24.18 | 4,378 | 17.54 | 1,854 | 24.06 | 5,126 | 22.17 | 734,869 | 22.26 | 37,381,621 | 23.39 |
| Arts, entertainment, recreation, accommodation and food services | 2,536 | 7.45 | 25,638 | 10.40 | 1,555 | 6.23 | 478 | 6.20 | 1,595 | 6.90 | 298,539 | 9.04 | 14,010,750 | 8.77 |
| Other services, except public administration | 2,161 | 6.35 | 11,442 | 4.64 | 1,125 | 4.51 | 226 | 2.93 | 1,172 | 5.07 | 159,068 | 4.82 | 7,514,289 | 4.70 |
| Public Administration | 1,602 | 4.70 | 7,707 | 3.13 | 1,063 | 4.26 | 815 | 10.58 | 1,456 | 6.30 | 137,717 | 4.17 | 7,516,950 | 4.70 |

Note: Table 3.10-6 shows the total number of people employed as well as the types of employment. In the State, Educational Services, health care and social assistance (22.26 percent) and manufacturing (12.79 percent) categories comprised the highest percentage of jobs. In addition to educational services, health care, and social assistance, the second highest employment type in the United States is Professional, scientific, management, administrative, and waste management services (12.37 percent). Within the ROI, Educational Services, health care and social assistance and manufacturing have the highest percentage for type of employment (U.S. Census Bureau 2024c).

#### *3.10.2.3 Poverty Rates*

The overall percentage of individuals with income below the poverty level in the ROI varies between 12.2 percent to 18.8 percent in 2023, as seen in Table 3.10-7 below. In contrast, the poverty rate in Tennessee and nationally during this period was 13.8 percent and 12.4 percent, respectively. The percentage of families with income below the poverty level for the ROI varies between 7.2 percent and 15.7 percent, compared to 9.9 percent and 8.7 percent in the state and nation, respectively.

**Table 3.10-7: Percent of Individuals and Families Living Below the Census Poverty Threshold in ROI Counties in 2023**

| | Anderson County | Knox County | Loudon County | Morgan County | Roane County | Total ROI | Tennessee | United States |
|---|---|---|---|---|---|---|---|---|
| Percentage of individuals whose income is below poverty level for prior 12 months | 14.8% | 12.2% | 12.6% | 18.8% | 12.7% | - | 13.8% | 12.4% |
| Percentage of families whose income is below poverty level for prior 12 months | 9.2% | 7.2% | 9.3% | 15.7% | 8.6% | - | 9.9% | 8.7% |

Reference: U.S. Census Bureau 2023b.

### 3.10.3 Housing

As seen in Table 3.10-8, the total number of housing units within the ROI in 2023 was 309,701, while the total number of occupied and vacant units, respectively, was 282,532 and 27,169. The vacancy rate across the ROI counties ranged from 6.0 percent at the low end (Loudon County) to 14.0 percent at the high end (Roane County). The state median home value in Tennessee was $256,800, compared to the national median of $303,400. Within the five counties' ROI, median home values ranged from $144,000 - $292,600, which is within the range of the state median home value but below the national median value.

**Table 3.10-8: Housing Utilization in 2023**

| | Anderson County | Knox County | Loudon County | Morgan County | Roane County | Total ROI | Tennessee | United States |
|---|---|---|---|---|---|---|---|---|
| Total housing units | 35,570 | 214,606 | 25,415 | 8,550 | 25,560 | 309,701 | 3,095,472 | 142,332,876 |
| Occupied housing units | 32,069 | 197,298 | 23,438 | 7,188 | 22,539 | 282,532 | 2,768,743 | 127,482,865 |
| Vacant housing units | 3,501 | 17,308 | 1,977 | 1,362 | 3,021 | 27,169 | 326,729 | 14,850,011 |
| Homeowner Vacancy rate (%) | 0.9 | 1.1 | 0.6 | 0.8 | 1.4 | 1.1 | 1 | 1 |
| Median home value | $215,800 | $279,700 | $292,600 | $144,000 | $212,300 | $263,094 | $256,800 | $303,400 |

Reference: U.S. Census Bureau 2024d.

### 3.10.4 Transportation

The area surrounding the Project site encompasses a comprehensive transportation network that includes federal and state highways, three freight rail lines, a major navigable river, and two airports. These are described further in the sections below, referencing Kairos 2023-TN8172 where applicable.

#### *3.10.4.1 Roads and Highways*

The Project site is accessible via major transportation corridors, including I-40 (5 miles south), I-75 (10 miles southeast), and I-140 (16 miles east), along with several U.S. and Tennessee state highways. The closest state routes serving the area are Oak Ridge Turnpike - TN 58 (<1 mile), Blair Road - TN 327 (1 mile), and White Wing Rd - TN 95 (2 miles), which connect to Oak Ridge and regional interstates. Workers will commute to the site via TN 58 or TN 327, as no housing is available onsite.

Further details on transportation corridors, anticipated Project workforce transit patterns, and potential impacts on roadway utilization are described in Section 3.7.2.3.1 of Kairos 2023-TN8172 (pp. 3-122 – 3-123).

#### *3.10.4.2 Transit, Rail, Air, and Waterways*

A description of local transit, rail, and air services, along with waterway access, is described in Sections 3.7.2.3.2 – 3.7.2.3.4 of Kairos 2023-TN8172 (pp. 3-123 – 3-124).

### 3.10.5 Tax Payment Information

Tennessee state sales tax, in addition to county and local government sales tax in the ROI are described in Section 3.7.2.4 of Kairos 2023-TN8172 (pg. 3-124).

### 3.10.6 Public Services

Public water and wastewater services in the site's region of influence are provided locally, primarily by the City of Oak Ridge. Most public water is sourced from surface water systems, with some purchased from other suppliers, and current operations are below capacity. Oak Ridge supplies potable water through a conventional treatment plant drawing from Melton Hill Lake, delivering 6–8 MGD with a maximum of 12 MGD, and plans to expand capacity to 12–16 MGD (up to 20 MGD) via a new ultrafiltration plant expected by 2024–2025. The water system includes extensive infrastructure such as storage tanks, pumping stations, and over 219 miles of piping. Wastewater treatment is also managed by Oak Ridge at two Clinch River facilities, with a combined capacity of 30.6 MGD but currently treating 5.6 MGD annually. The secondary plant serving Heritage Center Industrial Park operates near its 0.6 MGD peak during wet weather and is under review for future growth.

Public services in the ROI are further described in Section 3.7.2.5 of Kairos 2023-TN8172 (pp. 3-124 – 3-125).

### 3.10.7 Local Public Schools

The five counties within the Project ROI fall in Tennessee's East District of schools and collectively operate over 150 public schools offering education from prekindergarten through high school. In 2024, these schools served more than 85,000 students across the five-county area, as seen in Table 3.10-9.

**Table 3.10-9: Public Schools in the Region of Influence (2024)**

| | Total # of schools | # of schools | | Total # of students in 2024 | District-Level Expenditure per Student |
|---|---|---|---|---|---|
| Anderson County | 18 | Elementary | 9 | 5,844 | $14,068.33 |
| | | Middle | 4 | | |
| | | High | 2 | | |
| | | Specialized | 3 | | |
| City of Oak Ridge* | 7 | Elementary | 4 | 4,778 | $15,578.25 |
| | | Middle | 2 | | |
| | | High | 1 | | |
| | | Specialized | 0 | | |
| Knox County | 91 | Elementary | 50 | 58,750 | $12,471.01 |
| | | Middle | 16 | | |
| | | High | 13 | | |
| | | Specialized | 12 | | |
| Loudon County | 9 | Elementary | 5 | 4,778 | $12,546.43 |
| | | Middle | 2 | | |
| | | High | 1 | | |
| | | Specialized | 1 | | |
| Lenoir City* | 4 | Elementary | 1 | 2,534 | $13,412.09 |
| | | Middle | 1 | | |
| | | High | 1 | | |
| | | Specialized | 1 | | |
| Morgan County | 8 | Elementary | 2 | 2,679 | $13,891.06 |
| | | Middle | 1 | | |
| | | High | 1 | | |
| | | Specialized | 4 | | |
| Roane County | 18 | Elementary | 7 | 6,132 | $12,876.88 |
| | | Middle | 4 | | |
| | | High | 5 | | |
| | | Specialized | 2 | | |
| * The City of Oak Ridge is a separate system in Anderson County and Lenoir City is a separate system in Loudon County. | | | | | |

Reference: Tennessee Department of Education 2024.

The nearest public school to the site is Dyllis Springs Elementary School, located approximately 5.7 miles northeast at 120 Ollis Road in Oliver Springs, Tennessee. Located in Roane County, this institution provides prekindergarten through fifth-grade instruction to a student population of 317.

### 3.10.8 Public Recreational Facilities

The area surrounding the Project site includes various recreational facilities, including local, state, and national parks. The latter bring high visitor counts within a 50-mile radius of the Project site. These facilities and their distance to the Project are detailed in 3.7.2.5.2 of Kairos 2023-TN8172 (pp. 3-126 – 3-127).

### 3.10.9 References


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9. U.S. Census Bureau. 2024a. Per Capita Income in the Past 12 Months (in 2023 Inflation-Adjusted Dollars)– 2023 American Community Survey 5 Yeas Census – Table Results. Website: https://data.census.gov/table/ACSDT5Y2023.B19301?q=B19301:+Per+Capita+Income+in+the+Past+12+Months+(in+2024+Inflation-Adjusted+Dollars)&g=040XX00US47_050XX00US47001,47093,47105,47129,471, accessed December 2025.

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11. U.S. Census Bureau. 2024c. DP03 Selected Economic Characteristics – 2023 American Community Survey 5 Yeas Census – Table Results *https://data.census.gov/table/ACSDP5Y2023.DP03?q=DP03:+Selected+Economic+Characteristics&g=010XX00US_040XX00US47_050XX00US47001,47093,47105,47129,47145*, accessed December 2025.

12. U.S. Census Bureau. 2024d. *Total Population in Occupied Housing Units by Tenure.* – 2024 American Community Survey 1- Year Estimates – Table Results. Website: *https://data.census.gov/table?q=Occupancy+Status+housing+units&g=0100000_010XX00US_040XX00US47_050XX00US47001,47093,47105,47129,47145*, accessed December 2025.

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## 3.11 PUBLIC AND OCCUPATIONAL HEALTH

### 3.11.1 Potentially Sensitive Receptors

Potentially sensitive receptors may include:

- Residents
- Parks and Public Open Space
- Educational facilities
- Medical facilities
- Religious facilities
- Community centers
- Animal facilities

Figure 3.11-1 depicts the location of sensitive receptors in the vicinity of the Project site. The nearest full-time resident is located approximately 1.5 miles southwest of the Project site. The nearest Park/Public Open Space Area is the Black Oak Ridge Conservation Easement located approximately 0.25 miles from the Project site at its nearest point and the nearest trailhead is located approximately 1.3 miles northeast of the Project site. The nearest educational facility is Mount Pisgah Christian Academy located approximately 5 miles north of the Project site. The nearest religious facility is the George Jones Memorial Baptist Church located approximately 1.7 miles northeast of the Project site. The nearest community center is the Bradbury Community Center located approximately 4.0 miles south of the Project site. The nearest animal facility is Winding Creek Stable located approximately 4.0 miles south of the Project site.

### 3.11.2 Background Radiation Exposure

Background radiation exposure at the Project site is described in Section 3.8.2 (pages 3-146 to 3-148) of the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, LLC, 2023) and is summarized below. There is no background radiation from natural or man-made sources in the vicinity of the Project site that would result in abnormal radiation hazards to the public. The total average annual radiation

dose per person to the public is approximately 625 mrem/yr in the United States, with approximately half resulting from anthropogenic sources and the other half resulting from the natural sources (U.S. Environmental Protection Agency, 2025).

#### *3.11.2.1 Natural Radiation Sources*

Cosmic radiation comes from extremely energetic particles from the sun and stars that enter Earth's atmosphere. The average dose from cosmic radiation is approximately 33 millirem per year (mrem/yr) (U.S. Environmental Protection Agency, 2025).

Naturally occurring internal radiation in humans comes primarily from radioactive potasium-40 (K-40) and carbon-14 (C-14) along with uranium and thorium isotopes. Internal radiation can also occur as a result of ingesting naturally radioactive materials including many foods. The average internal dose from internal radiation is approximately 29 mrem/yr (U.S. Environmental Protection Agency, 2025).

Terrestrial radiation is due to the decay of radioactive materials in the earth. This source represents the majority of the background radiation for an average member of the public. Inhalation of naturally occurring radon and other daughter products of naturally occurring uranium and thorium account for an average dose of 228 mrem/yr and other terrestrial sources account for an average dose of approximately 21mrem/yr (U.S. Environmental Protection Agency, 2025).

#### *3.11.2.2 Anthropogenic Radiation Sources*

Computed tomography, nuclear medicine, interventional fluoroscopy, and conventional radiography/fluoroscopy account for most anthropogenic radiation exposure and account for an average annual dose of approximately 311 mrem/year. Consumer, occupational and industrial sources account for an average annual dose of approximately 13.8 mrem/year (U.S. Environmental Protection Agency, 2025).

### 3.11.3 Radioactive and Nonradioactive Hazardous Material Stored Onsite

No radioactive materials or hazardous materials are currently stored on the Project site. As such, there are no liquid, gaseous, or solid waste management systems or effluent control systems at the Project site. However, as described in Section 3.1.1, the Project site was once the home of the K-27 gaseous diffusion plant. The Project site has been remediated to acceptable risk levels, but the possibility exists that residual radioactive and nonradioactive contaminants could still be present at detectable levels above background, but below the risk-based standards. Therefore, there could be residual radioactive and nonradioactive contaminants at the Project site and in the groundwater that are detectable above background, but below the risk-based standards.

### 3.11.1 Historic Operations

The Project site and immediate surroundings formerly hosted several facilities of the K-25/K-27/K-29 gaseous diffusion cascade that enriched uranium for the U.S. nuclear program from 1948 until final shutdown between 1985 and 1987. Principal structures included the 9-acre K-27 building (540 stages, four-level steel-frame/corrugated asbestos structure, demolished February–September 2016) and the 13.5-acre K-29 building (reinforced-concrete/steel-frame, windowless, two-level design, demolished July 2006). Both contained uranium isotopes, technetium-99, transuranics, PCBs, asbestos, metals, and chlorofluorocarbons. The encircling K-27/K-29 recirculating cooling water (RCW) system, which used

chromate-based corrosion inhibitors until 1977, experienced documented leaks (notably a 1969 leak in the 54-inch line at K-27), resulting in localized soil contamination by total chromium, zinc, and trace hexavalent chromium; the lines remain in place below grade. Also present was the K-1066-C Cylinder Storage Yard (paved $UF_6$ cylinder storage and later parking area, 1961–1987). Based on the Dynamic Verification Strategy (DVS) investigation, no remedial actions were necessary for the pad. Several trailers formerly used for office purposes have been removed from the area. There were no known releases associated with these structures.

### 3.11.2 Current Onsite or Nearby Sources and Levels of Exposure to Members of the Public from Radioactive Materials

DOE (2010a) provides estimates of radiological doses from the Project site. The calculated radiation dose to the maximally exposed off-site individual resulting from airborne releases from the ETTP was about 0.06 mrem during 2009, which is less than 1% of the natural external radiation background EDE to an average Tennessee resident. The maximally exposed individual (MEI) was assumed to be located 0.6 miles southwest of the incinerator stack (K-1435). A hypothetical MEI could have received a total EDE of about 0.3 mrem from radionuclides emitted to the atmosphere from all of the sources on the ORR in 2009; this is well below the National Emission Standards for Hazardous Air Pollutants (NESHAP) standard of 10 mrem for protection of the public and is about 0.1% of the 300 mrem that the average individual receives from natural sources of radiation.

The calculated collective effective dose equivalent (EDE) to the entire population within 50 miles of the ORR (in 2009) was 17 person-rem, which is approximately 0.005% of the 312,012 person-rem that this population received from natural sources of radiation (DOE 2010a).

In the 2019 ORR Annual Site Environmental Report, detailed analysis of the effective dose received by the MEI from air pathways was determined to be 0.4 mrem/yr. The effective dose to the MEI from water, including drinking, bathing, irrigating, recreating, and fish consumption, was determined to be 2 mrem/yr. The effective dose from consumption of wildlife harvested on the ORR, including turkeys, geese, and deer, was determined to be 0.07 mrem/yr. Combined, the annual dose to the hypothetical MEI from normal operations at ORR is 3 mrem/yr. This is approximately 1 percent of the average background radiation dose in the United States.

### 3.11.3 Current Onsite or Nearby Sources and Potential for Exposure to Site Workers from Remaining Hazardous and Radioactive Materials

The site has been remediated to acceptable risk levels, but the possibility exists that residual radioactive and nonradioactive contaminants could still be present at detectable levels above background but below the risk-based standards. Therefore, there could be residual radioactive and nonradioactive contaminants at the site and in the site groundwater that are detectable above background but below the risk-based standards.

The transfer of several parcels associated with the area for the development of the Proposed Action have been accomplished under Covenant Deferral Requests CDR which document the existing conditions at the site with respect to hazardous materials remaining from prior site activities. The CDRs have been approved or are currently under review by USEPA and TDEC.

#### *3.11.3.1 Exposure Unit Z2-15*

The K-40 background concentration for ETTP is 32.12 pCi/g (Table 4 of Soil Background Supplemental Data Set for the East Tennessee Technology Park, Oak Ridge, Tennessee [DOE/OR/01-2105&D1]). Because the K-40 concentration across EU Z2-15 is less than the ETTP background concentration, remediation was not required. This approach is consistent with EPA guidance, Role of Background in the CERCLA Cleanup Program (April 26, 2002, OSWER 9285.6-07P). A radiological survey was conducted for roads contained within EU Z2-15. The results showed no radiological risk concern with the assessed road segment included in the transfer footprint.

The proposed transfer footprint includes those parts of EU Z2-15 that were not previously transferred and portions of 5th Street. EU Z2-15 received regulator concurrence for No Further Action (NFA) for soils on June 3, 2021. Groundwater contaminants on the transfer property include VOCs that present potential for contaminated vapors to enter structures that may be built on the property. Based on the Vapor Intrusion Screening Level model, the groundwater at the transfer property presents a potential unacceptable risk to human health via vapor intrusion in structures built and occupied on the property. A vapor intrusion mitigation will be required for each structure that will be occupied by employees for 8 hours or more per day.

Final remediation of the groundwater at EU Z2-15, and final investigation and remediation of all the Main Plant Area groundwater plumes, have not been proposed by DOE or approved by the EPA. For the ETTP more generally, the CDR states that any remaining potential impacts to human health and ecological receptors from residual contamination will be addressed in remedies to be selected in the following decision documents: 1) the K-31/K-33 Area Groundwater ROD (issued in April 2024), 2) Remaining Ecology/Surface Water/Sediment Final ROD to address ecology, surface water and sediment in Zone 1 and Zone 2 (currently expected by 2032), 3) an Explanation of Significant Differences (ESD) (currently under review) to update the Zone 2 ROD to address wastewaters generated during soil remediation, and 4) a Zone 1 Groundwater ROD (currently expected by 2030).

#### *3.11.3.2 Exposure Unit Z2-14 and portions of Z2-22, Z2-23, and Z2-24*

The property covered by this deferral request (the Property), which DOE has designated as Tract 1 and Tract 2, is located in Zone 2 of the ETTP. Zone 2 consists of approximately 800 acres and has been divided into 44 EUs for purposes of evaluating risk and making remedial decisions under the Record of Decision (ROD) for Soil, Buried Waste, and Subsurface Structure Actions in Zone 2, ETTP, Oak Ridge, Tennessee (DOE/OR/01-2161&D2, April 19, 2005). Facilities formerly located within the EUs were used in the production of enriched uranium as well as for commercial nuclear power, uranium equipment development, and support structures.

Groundwater contamination with VOCs, PCBs, and mercury has been identified beneath the EU Z2-14 footprint. No groundwater contamination has been identified beneath the portions of EU Z2-22, EU Z2-23, and EU Z2-24 that are part of the Property.

VOCs detected in groundwater above the federal and state drinking water MCL at the Property include carbon tetrachloride; methylene chloride; cis- 1,2-dichloroethene; 1,1-dichloroethene; and trichloroethene. Additional contaminants present in groundwater beneath the transfer footprint that have periodically exceeded MCLs include the metals beryllium, cadmium, chromium, nickel, lead and low concentrations of alpha activity.

Due to elevated VOCs in groundwater, there is a potential for an unacceptable inhalation risk due to vapor intrusion (VI) in a portion of the Property (EU Z2-14). As such, a VI mitigation system will be required for structures constructed on the EU Z2-14 part of the Property, in accordance with the Zone 2 ROD land use controls and the TDEC Voluntary Cleanup Oversight and Assistance Program. This requirement will remain in effect until all necessary CERCLA remedial action is completed, VI no longer poses an unacceptable risk, and the CERCLA Section 120(h)(3)(A)(ii)(I) covenant can be provided by the DOE.

Information regarding the nature and extent of contamination and the results of a risk evaluation presented in this CDR support the conclusion that the intended use of the Property for office, commercial, or industrial activities would not cause unacceptable exposures to adults engaged in those activities or be otherwise inconsistent with the protection of human health and the environment.

A radiological survey of the ETTP roads, which included the road segments of Chromium Street, Americus Avenue, Heritage Center Boulevard, and Victorius Boulevard East to be transferred, was conducted in November 2021. Although three areas with slightly elevated readings were identified while conducting the large area tractor survey, the three areas were resurveyed with handheld instruments and the results of those surveys verified that no readings above 10 CFR 835, “Surface Contamination Values,” were present, and no removable contamination was found.

#### *3.11.3.3 Exposure Units Z2-11, Z2-12, and Z2-13*

Characterization activities and any required remediation are still being conducted under the Zone 2 ROD, and the ROD goal of unrestricted industrial use of soils has yet to be determined in all locations; however, NFA has been recommended for soils in EUs Z2-11, Z2-12, and Z2-13.

The deed transferring the Property contains various restrictions and prohibitions on the use of the Property that are subject to enforcement pursuant to State Law T.C.A. 68-212-225 and real property law. These restrictions and prohibitions are designed to ensure protection of human health and the environment. The unrestricted industrial use of soils (that is, excavation and use of the surface and subsurface soils down to 10 feet below ground surface [bgs]) is permitted. Excavation deeper than 10 feet bgs requires further coordination with the ETTP Site Reuse Support Program and adherence to land use controls (LUCs) included in the deed.

A groundwater plume containing VOCs has been identified beneath EUs Z2-12 and Z2-13. The existing VOC plumes have not been fully delineated; thus, the full extent of the groundwater contamination beneath EUs Z2-12 and Z2-13 is uncertain. Sixteen groundwater monitoring wells are located within these parcels, including 5 bedrock wells and 11 unconsolidated zone wells.

A radiological survey of the ETTP roads, which included the road segments of Chromium Street, Americus Avenue, Heritage Center Boulevard, and Victorius Boulevard East to be transferred, was conducted in November 2021. Although three areas with slightly elevated readings were identified while conducting the large area tractor survey, the three areas were resurveyed with handheld instruments and the results of those surveys verified that no readings above 10 CFR 835, “Surface Contamination Values,” were present, and no removable contamination was found.

These parcels of the property have been determined suitable for transfer for the intended industrial use including adherence to the protective covenants that address risks associated with groundwater and soil vapor.

The results of the vapor intrusion evaluation for the commercial/industrial land use scenario indicate that the maximum detected concentration for carbon tetrachloride, chloroform, trichloroethylene, and vinyl chloride exceed the EPA Vapor Intrusion Screening Level. As such, these compounds are identified as contaminants of concern for future commercial/industrial land use, and potential future exposure via vapor intrusion poses a potential concern for commercial/industrial workers that will require a vapor intrusion mitigation system as a part of all occupied buildings.

### 3.11.4 Relevant Occupational Injury and Fatality Rates

Occupational injury and fatality rates for construction, operation, and decommissioning of the proposed facility are estimated using the most recent U.S. Bureau of Labor Statistics (BLS) data. In 2023, a total of 5,283 workers died from a work-related injury in the United States, with a fatal work injury rate of 3.5 fatalities per 100,000 full-time equivalent (FTE) workers (U.S. Bureau of Labor Statistics, 2024a). The BLS reported a national nonfatal recordable injury rate of 2.4 cases per 100 FTE workers in private industry for 2023 (U.S. Bureau of Labor Statistics, 2024b). The construction sector continues to exhibit higher risk, with a nonfatal recordable injury rate of approximately 2.8 per 100 FTE workers and a fatal injury rate of approximately 0.0096 per 100 FTE workers (U.S. Bureau of Labor Statistics, 2024a; U.S. Bureau of Labor Statistics, 2024b).

For the proposed Project, the estimated occupational injury rate during the construction and decommissioning phases is 2.8 recordable cases per 100 full-time workers, based on the construction industry average. During the operational phase, workers will be engaged in activities similar to nuclear electric power generation and general private industry occupations; therefore, the estimated nonfatal injury rate ranges from 0.2 per 100 FTE workers (nuclear electric power generation) to 2.8 per 100 FTE workers (all private industry). The estimated fatality rate during construction and decommissioning is 0.0096 per 100 FTE workers. During operations, the fatality rate is estimated to range from 0.02 per 100 FTE workers (utilities sector) to 0.035 per 100 FTE workers (all private industry) (U.S. Bureau of Labor Statistics, 2024a; U.S. Bureau of Labor Statistics, 2024b).

### 3.11.5 References


1. EPA. 2024a. “Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Unit Z2-14 and Portions of Z2-22, Z2-23, and Z2-24 at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final – Concurred.” February 2024. DOE/OR/01-2955.
2. EPA. 2024b. “Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Unit Z2-15 Proposed Title Transfer Footprint at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final – Concurred.” October 2021. DOE/OR/01-2840.
3. EPA. 2025. “Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Units Z2-11, Z2-12, and Z2-13 at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final for Concurrence.” October 2025. DOE/OR/01-3013.
4. Kairos Power, LLC. 2023. “Hermes Non-Power Reactor Environmental Report.” HER-ER-001 Revision 1.

5. U.S. Bureau of Labor Statistics. 2024a. “Census of Fatal Occupational Injuries Summary, 2023. USDL-24-2564.” Available at https://www.bls.gov/news.release/cfoi.nr0.htm

6. U.S. Bureau of Labor Statistics. 2024b. “Employer-Reported Workplace Injuries and Illnesses, 2023. USDL-24-2268 (injury data only).” Available at https://www.bls.gov/news.release/osh.nr0.htm.

7. U.S. Department of Energy. “Phased Construction Completion Report for Exposure Unit Z2-14 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee.” (DOE/OR/01-2841&D3).

8. U.S. Environmental Protection Agency. 2025. “Radiation Sources and Doses [website].” https://www.epa.gov/radiation/radiation-sources-and-doses#backgroundradiation

9. U.S. Department of Energy. “EA-1640 Environmental Assessment Transfer of Land and Facilities within the East Tennessee Technology Park and Surrounding Area.” Oak Ridge, Tennessee. October 2011.

# 4. Environmental Impacts

This chapter provides an analysis of the impacts of construction, operation, and decommissioning of the Proposed Action. Overall impact rankings are given to each environmental resource evaluated. Unless otherwise defined, criteria followed the guidance given in NRC's Environmental Effect of Renewing the Operating License of a Nuclear Power Plant in 10 CF 51 Subpart A, Appendix B, Table B-1, Footnote 3 as follows:

- SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- MODERATE– Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

## 4.1 LAND USE IMPACTS

This section describes the impacts to land use for the construction, operation, and decommissioning of the Proposed Action and no-action alternative. The impacts discussed below are based on the characterization and description of land from Section 3.1.

### 4.1.1 Site and Region

As described in Section 3.1, the Project site consists of approximately 84 acres of land that was previously disturbed and developed as part of the Manhattan Project. The Project site formerly housed the K-27 gaseous diffusion building as part of the Oak Ridge Gaseous Diffusion Plant. The site has since undergone remediation and been restored as part of the ETTP. The Project site is bounded to the north by 7th Street, to the south by 5th Street, to the east by Avenue R, and to the west by Enrichment Street and Avenue M, all of which are private roads. Regional land use (within five miles of the Project site) generally includes a mixture of undeveloped forest, developed land, and rural land uses. Smaller areas of open water, barren land, scrub shrub vegetation, herbaceous grassland, cultivated crops and wetlands are also present in the surrounding region.

The overall topography of the Project site is relatively flat with areas sloping toward Poplar Creek to the north, west and south. Paved access roads, parking areas, gravel and concrete pads, and other impervious surfaces are prevalent throughout the Project site. Vegetated areas are primarily herbaceous, including maintained grasses and areas where vegetation has progressed to early successional communities consisting of grasses and forbs. Scattered shrubs and trees are also present on the Project site, particularly on slopes bordering Poplar Creek. The area of proposed land disturbance only consists of herbaceous cover, a few scattered trees, and existing gravel/pavement.

The land use impacts to the Project site and near offsite areas will occur due to the construction of R-50. Approximately 11 acres of land within the Project site represents the area of permanent land conversion for the construction of R-50, of which 8 acres are vegetated. Approximately 5 acres of land within the Project site will be used for temporary equipment laydown and staging during construction, of which 2 acres are vegetated. Land use impacts include earth-moving activities, excavation, erection of structures, staging equipment, and construction-related traffic. Site clearing will consist of removal of

surface vegetation including 0.6 acre of trees, existing asphalt and crushed stone, existing fill, topsoil and other debris within the area of the proposed area of land disturbance. Site grading will include cuts and fills necessary to construct the proposed building slab, foundations, parking and loading areas, and access drives around the site and to establish site elevations to allow for adequate surface water runoff and stormwater management measures. Upon completion of construction activities, temporarily impacted herbaceous land will be restored until further development of the Project site occurs in the future. Given that the Project site is located within the ETTP industrial park, permanent conversion of herbaceous cover for R-50 is not anticipated to significantly impact the current land use within the Project site or surrounding region.

The Project site is located within the United States Government Oak Ridge Reservation and is currently zoned in the City of Oak Ridge as FIR. A Rezoning Request has been submitted to the Oak Ridge City Council to re-zone parcels in the Project site from FIR to Industrial District (IND-2) (City of Oak Ridge, 2025). Given the location of the Project site in the existing industrial park, changes to the parcel zoning to IND-2 is not expected to significantly impact the current land use.

### 4.1.2 Special Land Uses

As described in subsection 3.1.2, there are two special land use areas in the region (Oak Ridge WMA and BORCE). Neither area is located on the Project site. Permanent and temporary impacts from construction and operation of R-50 will not occur within these special land use areas. Therefore, direct or indirect impacts to these areas are not expected and impacts to special land use classification areas would be SMALL.

### 4.1.3 Other Significant Land Use Resources

As described in subsection 3.1.1, no mineral resources, economically significant agricultural products, commercial fish or invertebrate catches, or unusual animals, facilities, agricultural practices, game harvests, or food processing operations are present in the Project site. Additionally, no prime farmland or farmland of state-wide importance occurs within the Project site. Therefore, direct and indirect impacts to these land use resources would be SMALL.

### 4.1.4 Institutional Controls

As described in subsection 3.1.1 the Proposed Action will occur on ETTP EUs Z2-14 and Z2-15 (totaling approximately 44.2 acres) with subsequent development to occur on transfer areas Z2-13 (12.9 acres), Z2-12 (14.5 acres), and Z2-11 (10.9 acres). EU Z2-14 is subject to a CDR which indicates the deed transferring the property contains various restrictions, prohibitions, and institutional controls on the use of the property (EPA, 2024a). An approved CDR for EU Z2-15 (EPA, 2024b) and a draft CDR for EUs Z2-11, Z2-12, and Z2-13 (EPA, 2025) include the same deed restrictions as previously imposed on EU Z2-12. Given, the project has been developed in compliance with the past and current land use restriction, land use impacts from institutional controls would be SMALL.

### 4.1.5 Impacts from Decommissioning

The R-50 site is expected to begin operational activities in 2026. The licensed life of the facility is expected to be 40 years. As a result, decommissioning activities would be expected to commence in 2066. Decommissioning activities are similar to construction activities and involve heavy equipment to dismantle buildings and other structures. Resultant land uses following decommissioning are expected

to consist of open space. As such, direct and indirect impacts to land use from decommissioning would be SMALL.

### 4.1.6 No-Action Alternative

Under the no-action alternative, the NRC would not issue a license for the construction and operation of Radiant's Kaleidos microreactor manufacturing facility. As a result, the facility would not be built, and production of Kaleidos microreactors would not proceed. Therefore, no land use impacts would occur.

### 4.1.7 References


1. City of Oak Ridge. 2025. "Zoning Map Updated through September 18th, 2025." Available at https://www.oakridgetn.gov/DocumentCenter/View/3573/COR-Zoning-Map-09182025-Ver-20.
2. City of Oak Ridge. 2025. "Rezoning Request: Seven Parcels in the Heritage Center Industrial Park, FIR Federal Industry and Research District to IND-2 Industrial District." December 2025.
3. EPA. 2024a. "Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Unit Z2-14 and Portions of Z2-22, Z2-23, and Z2-24 at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final – Concurred." February 2024. DOE/OR/01-2955.
4. EPA. 2024b. "Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Unit Z2-15 Proposed Title Transfer Footprint at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final – Concurred." October 2021. DOE/OR/01-2840.
5. EPA. 2025. "Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Units Z2-11, Z2-12, and Z2-13 at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final for Concurrence." October 2025. DOE/OR/01-3013.


## 4.2 TRANSPORTATION IMPACTS

This section describes the transportation impacts for construction, operation, and decommissioning of the proposed action and no-action alternative. The impacts discussed below are based on the characterization and description of the transportation resources in Section 3.2.

### 4.2.1 Roads and Highways

Construction and decommissioning will require the use of over-the-road trucks, ranging from heavy-duty 18-wheeled delivery trucks, concrete mixing trucks, dump trucks and flatbed light-duty trucks. Vehicles and equipment are typical of those used in industrial/commercial construction. The primary transportation mode for the workforce to and from the Project site during construction and operations will be by car, truck or van.

As discussed in Section 3.2.1, primary access to the Project site is provided by State Route 58 (Oak Ridge Turnpike) and State Route 327 (Blair Road). Interstate 40 (I-40), a six-lane divided freeway, passes approximately five miles south of the Project site, with multiple interchanges serving the area. Interstate 75 (I-75) is located about 10 miles southeast of the Project site, and Interstate 140 (Pellissippi Parkway) lies approximately 16 miles to the east. It is anticipated that these roads will be used during the construction, operation, and decommissioning phases of the Project.

The maximum number of construction workers on-site at a given time is estimated at 100. Thus, the maximum potential increase in traffic from the construction workforce is 100 round trips per day, or 200 trips per day. The maximum potential daily increase in traffic from material deliveries and waste removal is estimated at 18 round trips per day (or 36 trips per day) during construction. Thus, the maximum daily increase in construction-related traffic is estimated to be 236 trips per day. Decommissioning is expected to result in impacts that are similar in scale to construction.

Operations will begin with approximately 20 employees and scale in the future to more than 200 employees. During full scale operations between the end of 2026 and the 2030s, fresh fuel shipments are expected every two weeks (several trucks per shipment). TRISO fuel is transported in Versa-Pac 55 (VP-55) packages. The VP-55 package meets the requirements of 10 CFR 71, 49 CFR 100-180, and is approved by the NRC (Docket Number 71-9342). The VP-55 can contain TRISO fuel with a mass limit of 635 grams of U-235 (NRC, 2020). Containers meet the surface dose rate limits of 10 CFR 71.47(a) and 49 CFR 173.441(a) and the group of containers meet the 1-meter (3.3 feet) dose rate limits of 49 CFR 173.441(d).

The TRISO facility anticipated to provide fuel shipments to the Project site is located a short distance away in Oak Ridge which will reduce the miles traveled for fuel deliveries and the return shipment of the empty Versa-Pac packages. TRISO-X, LLC developed an Environmental Report to support the licensing of their facility to manufacture and package the TRISO fuel in Versa-Pac; similarly the Kairos facility prepared an Environmental Report and NRC has issued an EIS to support construction of their facility which will also utilize TRISO fuel. The Kairos ER included an analysis for incident-free transportation: The U.S. Department of Defense (DOD), acting through the Strategic Capabilities Office, has analyzed the transportation of high-activity low-enriched uranium TRISO fuels in VP-110 packages from Lynchburg, Virginia to Idaho using RADTRAN and also determined that the radiological risk measured as a risk of latent cancer fatality is less than 1 in 10,000. The TRISO and Kairos evaluations would be bounding for the Proposed Action, therefore, the impacts from the transportation of TRISO new fuel to the Project site would be SMALL.

In future phases, it is anticipated that 50 new Kaleidos units (200 units total) will be shipped every year. Various other deliveries and/or site visitors are anticipated during operations. Conservatively, the estimated daily increase in operations-related traffic is estimated to be 500 trips per day.

Previous analysis indicates area roadways are under capacity and none of the roadways exceed the LOS C volume threshold over a given 24-hour day (Kairos Power, LLC, 2023). Temporary traffic increases associated with construction and decommissioning will result in traffic impacts that are SMALL. Likewise, sustained traffic increases during operations are also anticipated to be SMALL.

Temporary and unimproved gravel roads exist across the Project site including some areas of previously installed asphalt parking. The Proposed Action will review the current onsite access and improve or relocate temporary roads to support construction activities. These private roadways may be maintained for the operations phase. Onsite roadways including a new entrance way to the Project site security, will be designed and constructed to allow truck traffic and transfer of overweight Kaleidos trailers arriving for fuel assembly. Because these are private roadways in support of the Proposed Action, except for the connection to Perimeter Road for the new entrance, the impact to transportation resources will be SMALL.

### 4.2.2 Rail

The Proposed Action will include the placement of rail tracks and bedding that will allow for transfer of the trailers through the manufacturing process. The private rail lines on the Project site will not be connected to the public/commercial rail system. Two shortline railroads serve the Oak Ridge area and Norfolk Southern and CSX also operate railroads in the broader region. If materials or equipment require shipping by rail during construction, it is expected these shipments would be relatively few and managed as routine freight. Such shipments would be unloaded at a freight yard and trucked to the Project site. No railroads are expected to be used during operation or decommissioning. As a result, anticipated impacts to rail service would be SMALL.

### 4.2.3 Air

As with potential rail shipments, if certain construction equipment or materials are to be shipped by air, it is expected these shipments would be relatively few and managed as routine freight to then be trucked to the Project site from the airport. Minor amounts of air travel may be required for workers during construction and decommissioning of the Project. Any increase would be well within the capacities of the region's airports. As a result, anticipated impacts to air travel would be SMALL.

### 4.2.4 Waterways

No waterways will be used during construction, operation, or decommissioning of the Project and, as a result, impacts to waterways will be SMALL.

### 4.2.5 No-Action Alternative

Under the no-action alternative, the NRC would not issue a license for the construction and operation of Radiant's R-50 site. As a result, the Project would not be built, and production of Kaleidos microreactors would not proceed. Therefore, no transportation impacts would occur.

### 4.2.6 References


1. Kairos Power, LLC. 2023. "Hermes Non-Power Reactor Environmental Report." HER-ER-001 Revision 1.
2. NRC. 2020. "Certificate of Compliance for Radioactive Material Packages, Certificate No. 9342, Revision 15, Docket No. 71-9342, Model No. Versa-Pac VP-55, 2020."
3. U.S. Department of Defense. "Construction and Demonstration of a Prototype Mobile Microreactor, Environmental Impact Statement." Draft. September 2021.


## 4.3 GEOLOGY AND SOIL IMPACTS

This section describes the potential impacts to geologic and soil resources, including regional-scale and local hazards, during the construction, operation, and decommissioning of the Proposed Action and no-action alternative.

Potential regional-scale hazards that may exert an impact on the Proposed Action include earthquakes, volcanic activity, landslides, subsidence, and erosional processes. Potential geological environmental impacts associated with site-specific properties of the soil and bedrock include soil disturbance due to

excavation, soil erosion, potential exposure of residual contaminated soil, the volume of material excavated or used during construction, impacts to rare or unique geologic resources, and impacts to economic rock, mineral, or energy resources.

### 4.3.1 Impacts of Regional-Scale Hazards

The probability of regional-scale impacts due to geologic factors is low. The site is located in the Valley and Ridge physiographic province within the East Tennessee Seismic Zone, characterized by low to moderate seismic intensity and inactive thrust faults. The USGS 2018 National Seismic Hazard Model (updated 2023) indicates a peak ground acceleration with 10 percent probability of exceedance in 50 years of approximately 0.15 to 0.20 g at the site. Volcanic activity is nonexistent in the region. Landslide susceptibility in Roane County is low, with the site's level topography and historic grading minimizing risk; no recent incidents are reported in the immediate vicinity. Karst features in the underlying Chickamauga Group are poorly developed; historical sinkholes observed during original site preparation were filled, and geotechnical investigations show no evidence of active subsidence. Erosional processes are limited on the previously developed, flat site. Consequently, impacts from regional-scale geologic hazards would be SMALL.

### 4.3.2 Impacts to Site-Specific Geology and Soils

#### *4.3.2.1 Proposed Action*

##### 4.3.2.1.1 Impacts of Construction

The total land to be disturbed for construction of the Proposed Action is approximately 16 acres, of which 11 acres (8 acres are vegetated, 3 acres are existing gravel/pavement) will be permanently converted for R-50 and 5 acres will be utilized for temporary equipment staging and laydown areas. Areas used for temporary equipment staging and laydown will not be cleared or graded. Therefore, impacts to geologic and soil resources would be SMALL.

Site clearing for permanent site facilities will consist of removal of surface vegetation including 0.6 acre of trees, existing asphalt and crushed stone, existing fill, topsoil, and other debris within the area of proposed land disturbance. The existing topsoil depth is estimated to be less than four inches and will be stripped and stockpiled during construction for future use in final site stabilization and landscaping.

The overall Project site topography is generally flat with areas sloping toward Poplar Creek to the north, west and south. Site grading for permanent site facilities will include cuts and fills necessary to construct the proposed building slab, foundations, parking and loading areas, and access drives, and establish site elevations to allow for adequate stormwater runoff and stormwater management measures.

The existing site material is assumed to be unsuitable for backfill and will be disposed of at an approved existing off-site landfill. Construction would therefore require the transport of suitable fill material from an existing permitted off-site borrow site. Materials would be stockpiled on level or gently sloped lands to minimize erosion. Where slopes are steeper, appropriate erosion control measures would be used at the downslope. Best Management Practices (BMPs), including silt fences, straw bales, ditch check dams, dust control, and concrete washout containment, would be implemented to minimize erosion and sedimentation during construction.

Construction activities for the Proposed Action would involve the placement of foundations into residual soils (urban land classification with silts, clays, and sand) overlying weathered limestone of the Chickamauga Group. Excavation to depths of two to four feet is anticipated to reach the required subgrades for paved areas, building slab, and building foundations. Deeper excavations, expected to be less than four feet, may be required for utility trenching and installation based on the depth to existing utility tie-in points. Frost depth is assumed to be 18 inches below the ground surface, and all underground utilities would be designed accordingly. The existing elevation at the proposed R-50 site is approximately 773 feet NAVD88. Based on site grading and drainage considerations, a finished floor elevation of 777 feet NAVD88 is currently proposed.

Based on preliminary analyses, the estimated quantity of geologic material required for construction of the Proposed Action would be:

- Excavations for building footings, foundations: 4,000 cubic yards
- Imported fill for the remainder of the site grading: 66,000 cubic yards
- Concrete (Building only): 1,800 cubic yards
- Concrete (Site): 3,300 cubic yards
- Entrance road asphalt (six inches thick): 350 cubic yards
- Entrance road stone (six inches thick): 350 cubic yards

The Project site is located on the former footprints of the historic K-27 and K-29 uranium enrichment facilities that began operation as part of the Manhattan Project during World War II and continued until the USDOE terminated the program in 1987. The Project site has since undergone remediation and been restored as part of the ETTP. Remediation included demolition of more than 500 structures and addressing major areas of site contamination. Soil remediation within the ETTP was completed in 2024 and involved removing 554,000 cubic yards of soil. Groundwater remediation is ongoing within the ETTP.

Based on the environmental investigations completed to date, shallow soils (0 to 10 feet bgs) may be impacted with both chemical constituents of concern (COCs) and radiological contamination. Soil conditions generally below 10 ft bgs have not been investigated for contamination or been remediated. Once below the water table (approximately 20 to 25 feet bgs), groundwater plumes of both chlorinated volatile organic compounds (cVOCs) and dissolved radiological constituents have been documented.

The Proposed Action will occur on ETTP EUs Z2-14 and Z2-15 (totaling approximately 44.2 acres) with subsequent development to occur on transfer areas Z2-13 (12.9 acres), Z2-12 (14.5 acres), and Z2-11 (10.9 acres). According to the quitclaim deed/property transfer requirements (CDR for the specific Exposure Units transferred), any site disturbance that may encounter contaminated soil or groundwater must be monitored and properly managed (EPA, 2024a; EPA, 2024b; EPA, 2025). This ensures worker safety and prevents potential cross-contamination of subsurface and surface areas.

Thus, all construction activities for the Proposed Action resulting in land disturbance would comply with deed restrictions in the CDRs and comply with a site-specific Soil and Groundwater Management Plan (SGMP) currently being developed in conjunction with the DOE, U.S. Environmental Protection Agency (EPA), and TDEC.

No rare or unique geologic resources are present, and no economic rock, mineral, or energy resources have been identified on the Project site.

Based on the implementation of BMPs to minimize erosion and sedimentation, the relatively flat topography of the Project site, shallow proposed excavations, historic remediation of contaminated soils in the Project site, and compliance with existing deed restrictions for land use and the SGMP, direct impacts to geologic and soil resources from construction would be SMALL.

#### 4.3.2.1.2 Impacts of Operation

Impacts to shallow soils after construction is complete and during operation of R-50 are not expected to occur. Potential impacts during operation include those associated with large-scale hazards that may affect the facility (e.g., earthquakes, landslides, subsidence). Geological conditions and natural hazards may exert effects on the Proposed Action include:

- Volcanic Activity: No current or expected volcanic activity in the region; impacts are SMALL.
- Tsunami Threats: Not applicable due to inland, elevated location; no evaluation required.
- Landslide Potential: Low susceptibility in the Project site area due to level terrain and historic fill; no reported incidents nearby; impacts are SMALL.
- Sinkhole Formation/Subsidence: Poorly developed karst in the Chickamauga Group; historical features mitigated during original development, with no active features on the site; impacts are SMALL.
- Direct geological impacts during operation would be SMALL.

#### 4.3.2.1.3 Impacts of Decommissioning

Once R-50 reaches the end of its useful life (approximately 40 years), it would be decommissioned. Decommissioning activities would be similar or less than that of the construction phase and involve heavy equipment to dismantle buildings and facilities. Soil disturbances would be likely, but no new excavations would occur. Decommissioning activities would be subject to the same deed restrictions in the CDRs and would comply with a site-specific SGMP. Therefore, impacts to geological resources would be SMALL.

### *4.3.2.2 No-Action Alternative*

The No-Action Alternative would not involve any construction, grading, excavations, or placement of foundations in the unconsolidated materials or bedrock. Therefore, no impacts related to geological factors such as subsidence, soil compaction, erosion, or disruption of natural drainage patterns would occur under this alternative.

## 4.3.3 References

1. EPA. 2024a. “Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Unit Z2-14 and Portions of Z2-22, Z2-23, and Z2-24 at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final – Concurred.” February 2024. DOE/OR/01-2955.

2. EPA. 2024b. “Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Unit Z2-15 Proposed Title Transfer Footprint at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final – Concurred.” October 2021. DOE/OR/01-2840.

3. EPA. 2025. “Covenant Deferral Request for the Proposed Title Transfer for all of Exposure Units Z2-11, Z2-12, and Z2-13 at the East Tennessee Technology Park, Oak Ridge, Tennessee. Final for Concurrence.” October 2025. DOE/OR/01-3013.

4. Kairos Power. 2023. Hermes Non-Power Reactor Environmental Report, Section 3.3 (Geology and Soils).

5. Lemiszki, P.J. 1994. Geologic Mapping of the Oak Ridge K-25 Site, Oak Ridge, Tennessee.

6. U.S. Department of Energy. 2007. Final Sitewide Remedial Investigation/Feasibility Study for East Tennessee Technology Park.

7. U.S. Department of Energy. 2011. Transfer of Land and Facilities within the ETTP and Surrounding Area Environmental Assessment, Section 3.3.1.

8. U.S. Geological Survey. 2023. 2018 National Seismic Hazard Model (updated probabilistic assessment). Available at: https://www.usgs.gov/programs/earthquake-hazards/science/national-seismic-hazard-model.

## 4.4 WATER RESOURCES IMPACTS

### 4.4.1 Surface Water

Surface runoff flows eastward, away from Poplar creek, and is directed into a stormwater management feature. Based on the planned site layout, an estimate of 40 percent (4.4 acres) of the proposed R-50 site is expected to be impervious surfaces. This includes the combined roof area of buildings, paved areas associated with parking spaces, loading bays, and network of access roads, rail corridors, and connecting pavement. Remaining acreage would consist of landscape buffers, stormwater management features, and limited previous groundcover. The Project does not have access to a municipal storm sewer system. Stormwater generated during construction and operation will be managed through onsite controls.

#### *4.4.1.1 Construction*

No surface waters are present within the Project site boundaries. Poplar Creek flows around the northern, western, and southern portions of the site and serves as a tributary to the Clinch River. All construction activities will occur on land, with no direct impacts to Poplar Creek or the Clinch River proposed. No new intake or discharge structures are planned, though stormwater management features (e.g., detention areas or BMPs) may be installed. Temporary soil disturbance could result in short-term increases in sediment or turbidity from runoff. These effects will be controlled through a construction SWPPP under a NPDES permit for construction discharges, including erosion/sediment controls and BMPs to prevent off-site transport to adjacent waters. Direct and indirect impacts to surface water during construction would be SMALL.

#### *4.4.1.2 Operation*

Potable water for the facility will be obtained from the City of Oak Ridge Public Works and sanitary wastewater will be discharged directed to the public sanitary sewer system. Both systems have sufficient capacity to support the Proposed Action with minimal impact. No process water intake, use, or discharge to the environment is expected, resulting in no effects on surface water hydrologic systems. Direct impacts from operations would be SMALL.

Impervious surfaces (e.g., rooftops, paved areas) would drain to stormwater management features for attenuating volume, peak flows, and improving water quality. The facility would comply with state/local stormwater standards via BMPs. Indirect impacts from operational runoff would be SMALL.

#### *4.4.1.3 Decommissioning*

Similar to construction, Project decommissioning would not result in any direct impact to surface waters. A decommissioning SWPPP with erosion/sediment controls would mitigate runoff risks, similar to construction. Existing stormwater features (e.g., ponds) would likely remain for management. Dewatering, if needed for foundation work, would cause minor temporary effects on surface water quantity/flow and would be managed in coordination with the DOE, EPA, and TDEC. Direct and indirect impacts during decommissioning would be SMALL.

### 4.4.2 Groundwater

Institutional Controls included in the deed for the property prohibit the extraction, consumption, exposure, or use, in any way, of the groundwater without the prior written approval of DOE, EPA, and TDEC in order to ensure the protection of human health by preventing exposure to contaminants present in the groundwater. Additional provisions are included to prevent inadvertent exposure to contaminated groundwater and/or any contamination that could possibly be present in the soils. Such provisions include requiring adherence to land use assumptions of “industrial use” contained in the approved applicable RODs, prohibit any portion of the Property to be used for any residential housing, any elementary or secondary school, or any childcare facility or children’s playground, and prohibition against excavation and digging below 10 feet bgs without approval of the DOE ORR Excavation and Penetration Permit Program. No direct construction impacts to hydrology are anticipated, and any incidental dewatering (if groundwater is encountered) would be minor, temporary, and managed per regulatory approvals. Direct and indirect impacts to groundwater across all phases would be SMALL.

### 4.4.3 Water Use

During operations, water use is estimated to be approximately 3,000 gallons per day (gpd), supplied by the Oak Ridge municipal water distribution system. Industrial water needs are minimal and primarily associated with the hydrostatic testing of piping assemblies and pressure retaining components, equipment cleaning and preparation activities, routine housekeeping, and fire protection system testing. The Project Site will be served by sanitary sewer infrastructure.

#### *4.4.3.1 Surface Water*

Potable water would be sourced from the City of Oak Ridge Public Works (existing capacity 12 MGD, occasional 16 MGD; current use approximately 4.15 MGD). A new drinking water treatment plant

(15 MGD capacity, drawing from Melton Hill Reservoir) is expected operational in Spring 2026. No direct use or release to surface waters is planned. Direct impacts to surface water will be SMALL.

Operational water usage is expected to be 3,000 gpd (sanitary/non-contact), well within municipal excess capacity, with SMALL indirect effects from demand. Wastewater would discharge to the local treatment system with adequate capacity, resulting in SMALL indirect impacts to water quality.

#### *4.4.3.2 Groundwater*

No groundwater use is involved in any phase due to historical restrictions requiring DOE/EPA/TDEC approval. Dewatering is not anticipated during construction, but if necessary, would be managed in coordination with the DOE, EPA, and TDEC. As described, water needs would use municipal supply from Melton Hill Reservoir and avoid any groundwater extraction. Direct and indirect impacts on groundwater from water use will be SMALL.

### 4.4.4 Water Quality

#### *4.4.4.1 Surface Water*

Operational stormwater would comply with an Industrial Storm Water Discharge Permit, including monitoring and BMPs to prevent contaminants reaching Poplar Creek. Wastewater capacity is sufficient. Direct and indirect impacts to surface water quality would be SMALL.

#### *4.4.4.2 Groundwater*

Spills could infiltrate if uncontained, but protections (secondary containment, SWPPP) during all phases would prevent this. No groundwater use occurs, and dewatering would be short-term/managed. Direct impacts to groundwater quality would be SMALL.

## 4.5 ECOLOGICAL RESOURCES IMPACTS

This section describes the ecological impacts for construction, operation, and decommissioning of the Proposed Action and no-action alternative. The impacts discussed below are based on the characterization and description of terrestrial and aquatic ecosystems from Section 3.5.

As described in Section 3.5, the Project site consists of 84 acres of land that has been intensively developed for historical industrial use. The Project site largely includes previously removed building features and disturbed land that has undergone remediation. Paved access roads, parking areas, gravel and concrete pads, and other impervious surfaces are prevalent throughout the Project site. Following demolition, the cleared areas were revegetated with primarily herbaceous cover, including maintained grasses and areas where vegetation has progressed to early successional communities consisting of grasses and forbs. Scattered shrubs and trees are also present on the Project site, particularly on slopes bordering Poplar Creek. Generally, natural habitat is not present at the Project site; existing habitat only includes lawn, scattered areas of trees, and remediated areas that have been reseeded and left to grow.

Baseline conditions on the Project site within areas that would be affected by construction of R-50 consist of no high-quality terrestrial or aquatic habitats. Mitigation measures and management controls are not expected to be needed, and ecological monitoring or maintenance plans are not anticipated at this time.

### 4.5.1 Impacts from Construction

This section describes the potential construction-related ecological impacts to the Project site and nearby offsite areas. Construction is anticipated to begin in early 2026 and last approximately six to eight months. Activities such as earth-moving, excavation, erection of structures, and construction-related traffic would generate potential disturbances to ecological resources during the construction. Direct and indirect impacts associated with construction-related activities would be limited to lands within the Project Site. Figure 4.5.1 depicts the proposed buildings and land disturbances associated with construction of R-50.

The Project site encompasses approximately 84 acres, of which approximately 58 acres are vegetated. The remaining 26 acres are developed paved access roads, parking areas, gravel and concrete pads, and other impervious surfaces. The total area of land that would be disturbed by construction of the R-50 Site is 16 acres, of which approximately 11 acres would be permanently impacted by facility operations. Habitat types expected to be disturbed include 10 acres of herbaceous cover of maintained grasses and early successional grasses and forbs. A few small, scattered trees will also be removed for the R-50 Site and approximately 0.6 acre of tree clearing will occur immediately south of the R-50 site. All tree cutting will occur between October 1 and March 31. The remaining 6 acres of land to be disturbed includes existing gravel/pavement.

Direct impacts within the Project site would result from temporary and permanent impacts to open, historically developed land for the construction and operation of R-50. Permanent conversion of the land to industrial facilities will include construction of facility buildings, reactor fuel transfer, staff and visitor parking lot, perimeter security fence, and improvements to an existing driveway. Temporary impacts from construction include land used for construction parking areas and construction material staging or lay down areas, and utility line installation. Given the historically developed nature of R-50, significant land clearing is not necessary. Furthermore, the Project does not involve clearing along streams or in wetlands. Site clearing will consist of removal of surface vegetation including 0.6 acre of trees, existing asphalt and crushed stone, existing fill, topsoil and other debris within the area of the proposed site disturbance. Areas temporarily impacted during construction would be restored following construction.

#### *4.5.1.1 Aquatic Communities and Wetlands*

As described in Sections 3.5.1 and 3.5.4, Poplar Creek, located adjacent to the western half of the Project site, and the Clinch River arm of Watts Bar Reservoir, located approximately 0.3 miles west of the Project site, are the primary aquatic features in the region. Additionally, one emergent wetland (approximately 0.31 acre) was delineated within an upland forest area in the northwestern portion of the Project site and was associated with a small channel that drains north to Poplar Creek (Appendix B). The *Hermes Non-Power Reactor Environmental Report* contains additional information regarding potentially affected waterbodies in close proximity to the Project site (Section 3.5.5, pages 3-83 to 3-87).

No direct impacts to aquatic communities or wetlands are proposed for construction of R-50. During construction, no surface water or groundwater withdrawals are proposed. Any potential construction-related impacts to aquatic communities or wetlands would be limited to indirect impacts associated with stormwater runoff and siltation. The overall Project site topography is generally flat with areas sloping toward Poplar Creek to the north, west and south.

BMPs would be employed in accordance with the construction SWPPP, as required by TDEC, to prevent soil erosion, sediment transport, and subsequent siltation in nearby streams and waterbodies receiving stormwater runoff during construction. Soil erosion control measures include silt fencing, straw bales, check dams, stabilized construction entrance, dust control, diversion swales, temporary sediment traps, and concrete washout containment. Materials will be stockpiled on level or only gently sloped lands to minimize erosion. Where slopes are steeper, appropriate erosion control measures including berms are used to minimize erosion. The implementation of construction BMPs would prevent or minimize the potential for sedimentation impacts off the site. Therefore, direct and indirect impacts to aquatic communities and wetlands from construction would be SMALL. Additional mitigation measures and management controls beyond BMPs are not necessary.

#### *4.5.1.2 Terrestrial Communities*

As described in Section 3.5.1, the Project site (approximately 84 acres) consists largely of previously removed building features and disturbed land that has undergone remediation. Paved access roads, parking areas, gravel and concrete pads, and other impervious surfaces are prevalent throughout the Project site. Vegetated areas comprise primarily upland herbaceous covertype, including maintained grasses and areas where vegetation has progressed to early successional communities consisting of grasses and forbs. Scattered shrubs and trees are also present on the Project site, particularly on slopes bordering Poplar Creek. Approximately 52.7 acres of the Project site consists of upland herbaceous cover and approximately 5 acres consists of upland deciduous forest and scattered trees and shrubs. The total area of land that would be disturbed by construction of R-50 is 16 acres, of which approximately 11 acres would be permanently impacted by facility operations. Habitat types expected to be disturbed include 10 acres of herbaceous cover of maintained grasses and early successional grasses and forbs. A few small, scattered trees will also be removed for the R-50 Site and approximately 0.6 acre of tree clearing will occur immediately south of the R-50 site. All tree cutting will occur between October 1 and March 31. The remaining 6 acres of land to be disturbed includes existing gravel/pavement.

Direct impacts to herbaceous cover would result in 8 acres of upland herbaceous land to be permanently converted for the construction and operation of R-50 and 2 acres of upland herbaceous land temporarily impacted. Permanent conversion of this land to industrial facilities will include construction of facility buildings, staff and visitor parking lot, perimeter security fence, and improvements to an existing driveway. Temporary impacts from construction include land used for construction parking areas and construction material staging or lay down areas.

Terrestrial communities located within the Project site are described in Table 3.5-1. The vegetation communities may provide some habitat for terrestrial animals. However, given the amount of historic and current development of the Project site, the lack of water resources, and the periodic mowing of herbaceous areas, the wildlife community on site is expected to be in low abundance and diversity. Use of the Project site would be sporadic given the lack of cover, shelter, and water supply. Permanent construction impacts to the herbaceous cover is not likely to represents a significant loss in terrestrial habitat and would not be considered regionally significant.

Mobile wildlife species would likely avoid the Project site during construction. Although cranes and other construction equipment are used to erect building structures, they are not likely to pose a substantial risk for avian collisions, because they are relatively small given the proposed size of the buildings on site (tallest building would be 45 feet). Therefore, occurrences of avian collisions with

construction equipment are expected to be SMALL, relative to avian populations within the vicinity. Wildlife also has the potential to be affected from artificial lighting during nighttime construction activities; however, construction activities are generally expected to occur during daylight hours. Construction activities would result in increases in noise (Section 4.7), which may directly impact local wildlife and result in temporary displacement. These impacts would be temporary and given the industrial nature of the Project site, significant short-term impacts on wildlife are not expected to be significant, relative to overall wildlife populations in the surrounding region.

Given the lack of significant, high-quality habitat within the Project site and area of proposed land disturbance, impacts to wildlife and terrestrial communities from construction would be SMALL and specific mitigation measures and management controls are not necessary.

#### *4.5.1.3 Impacts on Protected Species and Critical Habitats*

Federal listed species identified by the USFWS IPaC database as potentially occurring in the vicinity of the Project site are included in Section 3.5.2. The TNHP also maintains data regarding documented occurrences of rare, threatened, and endangered species within the extent of the USGS quadrangle where the Project site is located (the Elverton quadrangle). The Project site is not located within the designated critical habitat of any protected species.

The potential for protected species to occur on the Project site was estimated based on habitat requirements and its presence on the Project site or in the vicinity of the Project site. Based on habitats present on the Project site and within the limits of proposed land disturbance, direct impacts to the listed rare, threatened, and endangered species are not likely. In general, suitable habitat for these species were not observed on R-50. Aquatic species, such as the spotfin chub, may be found in Poplar Creek and/or other streams in the vicinity of the Project site; however, these resources will not be directly impacted by the project. Bat species, such as the gray bat, Indiana bat, and tricolored bat, require large, densely forested tracts that may be located within the vicinity but are likely not present within the Project site. Additionally, no raptor nests or significant breeding areas were observed on the Project site, though bald eagle (*Haliaeetus leucocephalus*) are likely to nest in the surrounding area along larger rivers and waterbodies. There will be minor tree clearing (0.6 acre). However, significant land clearing or removal of significant forested areas are not proposed.

Due to the general lack of habitat on the Project site, absence of aquatic communities and wetlands in the area of proposed land disturbance, and the implementation of temporary and permanent BMPs, direct and indirect impacts from construction on protected species potentially within the vicinity of the Project site would be SMALL. Therefore, specific mitigation measures would not be required. Table 4.5-1 details potential impacts from construction activities on each listed protected species and Endangered Species Act conclusions of overall effect on the species. No effect is likely on species where no suitable habitat is located on-site. For species where potential habitat may be on-site, such as the gray bat, Indiana bat, tricolored bat, and shining ladies' tresses, no adverse impacts are anticipated. Proposed clearing of two small tree stands (0.6 acre in total) is not likely to adversely affect the tree roosting bat species because tree removal will occur between October 1 and March 31. See Figure 4.5-2 for proposed tree clearing locations.

### 4.5.2 Impacts from Operation

This section provides a description of the potential impacts of operation of R-50 on terrestrial and aquatic ecosystems. The total area of land that would be permanently disturbed by operation of R-50 is 11 acres, of which approximately 8 acres comprise upland herbaceous covertype and the remaining 3 acres consist of pavement/gravel areas.

#### *4.5.2.1 Aquatic Communities and Wetlands*

As described in Sections 3.5.1 and 3.5.4, Poplar Creek, located adjacent to the western half of the Project site, and the Clinch River arm of Watts Bar Reservoir, located approximately 0.3 miles west of the Project site, are the primary aquatic features in the region. Additionally, one emergent wetland (approximately 0.31 acre) was delineated within an upland forest area in the northwestern portion of the Project site and was associated with a small channel that drains north to Poplar Creek (Appendix B). The *Hermes Non-Power Reactor Environmental Report* contains additional information regarding potentially affected waterbodies in close proximity to the Project site (Section 3.5.5, pages 3-83 to 3-87).

No direct impacts to aquatic communities or wetlands will result from the operation of R-50. During operation, no surface water or groundwater withdrawals are proposed. During operations, water use would be supplied by the Oak Ridge municipal water distribution system. Furthermore, the facility would not discharge directly to any nearby waterbody. Facility stormwater systems would be designed to meet NPDES permit requirements. Site grading during construction will include establish site elevations to allow for adequate surface water runoff and stormwater management measures. Therefore, operation impacts on aquatic communities and wetlands would be SMALL.

#### *4.5.2.2 Terrestrial Communities*

Terrestrial plant communities are characterized in Section 3.5.1 for the Project site and areas in proximity to the Project site. The terrestrial communities to be permanently impacted for the operation of R-50 consists of herbaceous cover of maintained grasses and early successional grasses and forbs (8 acres). The remaining land to be permanently disturbed includes existing gravel/pavement. Maintenance practices at R-50 such as periodic mowing and herbicide application on herbaceous areas, and roadway maintenance is expected to be SMALL.

Given the dominance of land affected by historic industrial use and building demolition on the Project site, the quality of wildlife habitat is low and wildlife use of the Project site is minimal. Mobile wildlife species generally would avoid the area due to surrounding industrial activity. As discussed in Section 4.9 buildings on the Project site would have a relatively low profile and operational impacts to bird species and populations from collisions is expected to be minimal. The operation of the facility would result in minor increases in noise (Section 4.7), but operational noise would be localized to the Project site. Therefore, operational impacts on wildlife and terrestrial communities would be SMALL.

#### *4.5.2.3 Impacts on Protected Species and Critical Habitats*

No federal or state-listed rare, threatened, or endangered species have been observed at the Project site or in its immediate vicinity. The Project site is not located within the designated critical habitat of any protected species.

During operation, no surface water or groundwater withdrawals are proposed, and the facility would not discharge directly to any nearby waterbody that may provide habitat for protected species. Habitat for protected species is generally absent from the Project site and even more so in the land to be used for operation of R-50. Additionally, maintenance of herbaceous vegetation at R-50 such as herbicide application and periodic mowing is expected to be minimal. Therefore, potential operation impacts on protected species and their habitat would be SMALL and specific mitigation measures and management controls would not be necessary. Table 4.5-1 details potential impacts from operation activities on each listed protected species and Endangered Species Act conclusions of overall effect on the species. No effect is likely on species where no suitable habitat is located on-site. For species where potential habitat may be on-site, such as the gray bat, Indiana bat, tricolored bat, and shining ladies' tresses, no adverse impacts are anticipated.

### 4.5.3 Impacts from Decommissioning

Once R-50 reaches the end of its useful life (approximately 40 years) it would be decommissioned. Decommissioning activities would be similar to construction activities and involve heavy equipment to dismantle buildings and facilities. Therefore, impacts on ecological resources from decommissioning would be similar to construction and would be SMALL. Specific mitigation measures would not be required. Table 4.5-1 details potential impacts from decommissioning activities on each listed protected species and Endangered Species Act conclusions of overall effect on the species. No effect is likely on species where no suitable habitat is located on-site. For species where potential habitat may be on-site, such as the gray bat, Indiana bat, tricolored bat, and shining ladies' tresses, no adverse impacts are anticipated.

### 4.5.4 No Action Alternative

Under the no-action alternative, the NRC would not issue a license for the construction and operation of Radiant's R-50 site. As a result, the facility would not be built, and production of Kaleidos microreactors would not proceed. Therefore, no ecological resources impacts would occur.

**Table 4.5-1: Endangered Species Act Impact Conclusions for Federal and State Protected Species**

| Species Name | Potential Habitat Present? | Species Observed On-Site? | Potential Impacts from Construction, Operation, and Decommissioning Activities | Endangered Species Act Impact Conclusion |
|---|---|---|---|---|
| **USFWS-Identified Species** | | | | |
| Gray bat (*Myotis grisescens*, Endangered) | Yes – foraging and transit | No | *Construction*: Potential short-term noise impacts from use of construction equipment. Potential short-term noise impacts from use of construction equipment. Construction would occur during daytime hours when bats are less likely to be active.<br>*Operation*: Noise from outdoor equipment may be perceptible in the immediate vicinity.<br>*Decommissioning*: Potential short-term noise impacts from use of construction equipment. Construction would occur during daytime hours when bats are less likely to be active. | Not likely to adversely affect. |
| Indiana bat (*Myotis sodalis*, Endangered) | Yes – transit and summer roosting along Poplar Creek and security fence line perimeter. | No | *Construction*: Approximately 0.6 acre of tree clearing will occur between October 1 and March 31. Potential short-term noise impacts from use of construction equipment. Construction would occur during daytime hours when bats are less likely to be active.<br>*Operation*: Noise from outdoor equipment may be perceptible in the immediate vicinity.<br>*Decommissioning*: Potential short-term noise impacts from use of construction equipment. Construction would occur during daytime hours when bats are less likely to be active. | Not likely to adversely affect. |
| Tricolored bat (*Perimyotis subflavus*, proposed for listing as Endangered) | Yes – foraging and transit. Potential roosting along Poplar Creek and security fence line perimeter. | No | *Construction*: Approximately 0.6 acre of tree clearing will occur between October 1 and March 31. Potential short-term noise impacts from use of construction equipment. Construction would occur during daytime hours when bats are less likely to be active.<br>*Operation*: Noise from outdoor equipment may be perceptible in the immediate vicinity.<br>*Decommissioning*: Potential short-term noise impacts from use of construction equipment. Construction would occur during daytime hours when bats are less likely to be active. | Not likely to adversely affect. |
| Whooping crane (*Grus americana*, experimental population, non-essential) | No suitable habitat on-site | No | *Construction*: Potential short-term noise impacts from use of construction equipment.<br>*Operation*: Noise from outdoor equipment may be perceptible in the immediate vicinity.<br>*Decommissioning*: Potential short-term noise impacts from use of construction equipment. | No effect. |
| Spotfin chub (*Erimonax monachus*, Threatened) | No suitable habitat on site – may be present in Poplar Creek | No | *Construction*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed.<br>*Operation*: No surface or groundwater withdrawals proposed. Maintenance of herbaceous vegetation on site such as herbicide application could run off to adjacent aquatic environments. | Not likely to adversely affect. |

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| | | | *Decommissioning*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed. | |
| Monarch butterfly (*Danaus plexippus*, proposed for listing as Threatened) | No suitable habitat on site – no milkweed plants observed | No | *Construction*: Land clearing of herbaceous vegetation that may include flowering species used for monarch habitat.<br>*Operation*: Maintenance of herbaceous vegetation such as herbicide application and periodic mowing is expected to be minimal but has the potential to impact.<br>*Decommissioning*: Land clearing of herbaceous vegetation that may include flowering species used for monarch habitat. | No effect. |
| Virginia spiraea (*Spiraea virginiana*, Threatened) | No suitable habitat on site – site has been heavily disturbed | No | *Construction*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment.<br>*Operation*: Maintenance of herbaceous vegetation such as herbicide application and periodic mowing is expected to be minimal but has the potential to impact.<br>*Decommissioning*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. | Not likely to adversely affect. |
| White fringeless orchid (*Planthera integrilabia*, Threatened) | No suitable habitat on site – site has been heavily disturbed | No | *Construction*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment.<br>*Operation*: Maintenance of herbaceous vegetation such as herbicide application and periodic mowing is expected to be minimal but has the potential to impact.<br>*Decommissioning*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. | Not likely to adversely affect. |
| **TDEC-Identified Species** | | | | |
| Hellbender (*Cryptobranchus alleganiensis*, State Status – Threatened) | No suitable habitat on site | No | *Construction*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed.<br>*Operation*: No surface or groundwater withdrawals proposed. Maintenance of herbaceous vegetation on site such as herbicide application could run off to adjacent aquatic environments.<br>*Decommissioning*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed. | No effect or unlikely to affect. |
| Valley flame crayfish (*Cambarus deweesae*, State Status – Endangered) | No burrows or suitable habitat on site | No | *Construction*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed.<br>*Operation*: No surface or groundwater withdrawals proposed. Maintenance of herbaceous vegetation on site such as herbicide application could run off to adjacent aquatic environments. | No effect or unlikely to affect. |

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| | | | *Decommissioning*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed. | |
| Spectaclecase (*Margaritifera monodonta*, Federal Status – Endangered, State Status – Endangered) | No suitable habitat on site | No | *Construction*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed.<br>*Operation*: No surface or groundwater withdrawals proposed. Maintenance of herbaceous vegetation on site such as herbicide application could run off to adjacent aquatic environments.<br>*Decommissioning*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed. | No effect or unlikely to affect. |
| Alabama lampmussel (*Lampsilis virescens*, Federal Status – Endangered, State Status – Endangered) | No suitable habitat on site | No | *Construction*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed.<br>*Operation*: No surface or groundwater withdrawals proposed. Maintenance of herbaceous vegetation on site such as herbicide application could run off to adjacent aquatic environments.<br>*Decommissioning*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed. | No effect or unlikely to affect. |
| Finerayed Pigtoe (*Fusconaia cuneolus*, Federal Status – Endangered, State Status – Endangered) | No suitable habitat on site | No | *Construction*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed.<br>*Operation*: No surface or groundwater withdrawals proposed. Maintenance of herbaceous vegetation on site such as herbicide application could run off to adjacent aquatic environments.<br>*Decommissioning*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed. | No effect or unlikely to affect. |
| Shiny Pigtoe (*Fusconaia cor*, Federal Status – Endangered, State Status – Endangered) | No suitable habitat on site | No | *Construction*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed.<br>*Operation*: No surface or groundwater withdrawals proposed. Maintenance of herbaceous vegetation on site such as herbicide application could run off to adjacent aquatic environments. | No effect or unlikely to affect. |

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| | | | *Decommissioning*: Sedimentation into nearby aquatic habitats from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No surface or groundwater withdrawals proposed. | |
| Prairie goldenrod (*Oligoneuron album*, State Status – Endangered) | No suitable habitat on site | No | *Construction*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment.<br>*Operation*: Maintenance of herbaceous vegetation such as herbicide application and periodic mowing is expected to be minimal but has the potential to impact.<br>*Decommissioning*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. | No effect or unlikely to affect. |
| Earleaved false-foxglove (*Agalinis auriculata*, State Status – Endangered) | No suitable habitat on site – site has been heavily disturbed | No | *Construction*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment.<br>*Operation*: Maintenance of herbaceous vegetation such as herbicide application and periodic mowing is expected to be minimal but has the potential to impact.<br>*Decommissioning*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. | No effect or unlikely to affect. |
| Slender blazing star (*Liatris cylindracea*, State Status – Threatened) | No suitable habitat on site | No | *Construction*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment.<br>*Operation*: Maintenance of herbaceous vegetation such as herbicide application and periodic mowing is expected to be minimal but has the potential to impact.<br>*Decommissioning*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. | No effect or unlikely to affect. |
| Tall larkspur (*Delphinium exaltatum*, State Status – Endangered) | No suitable habitat on site | No | *Construction*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment.<br>*Operation*: Maintenance of herbaceous vegetation such as herbicide application and periodic mowing is expected to be minimal but has the potential to impact.<br>*Decommissioning*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. | No effect or unlikely to affect. |
| Shining ladies' tresses (*Spiranthes lucida*, State Status – Threatened) | Yes – one emergent wetland delineated on site along Poplar Creek | No | *Construction*: Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No impacts to wetlands/potential habitat are proposed.<br>*Operation*: No impacts to wetlands/potential habitat are proposed. Maintenance of herbaceous vegetation on site such as herbicide application could run off to adjacent aquatic environments.<br>*Decommissioning*: Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. No impacts to wetlands/potential habitat are proposed. | No adverse effects are anticipated. |

| | | | | |
|---|---|---|---|---|
| Northern bush-honeysuckle (*Diervilla lonicera*, State Status – Threatened) | No suitable habitat on site | No | *Construction*: Land clearing of vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment.<br>*Operation*: Maintenance of herbaceous vegetation such as herbicide application and periodic mowing is expected to be minimal but has the potential to impact.<br>*Decommissioning*: Land clearing of herbaceous vegetation. Sedimentation from runoff from disturbed/cleared land and dust accumulation generated by construction equipment. | No effect or unlikely to affect. |

### 4.5.5 References


1. Kairos Power, LLC. 2023. “Hermes Non-Power Reactor Environmental Report.” HER-ER-001 Revision 1.
2. Tennessee Department of Environmental Conservation Natural Heritage Program. “Rare Species Data Viewer.” Website: https://www.tn.gov/environment/program-areas/na-natural-areas/na-natural-heritage-inventory-program.html. Accessed October 2025.
3. U.S. Fish and Wildlife Service. “Information for Planning and Consultation.” Database: https://ipac.ecosphere.fws.gov/. Accessed October 2025.


## 4.6 AIR QUALITY IMPACTS

Air emissions will be a component of the three life-cycle phases of the Proposed Action for the project. They will be minimal and mitigated to have an overall SMALL impact.

### 4.6.1 Air Emissions During Construction

During the construction phase air emissions from project activities will consist of the following:

- Diesel (products of combustion and greenhouse gases) emissions from construction vehicles, deliveries, portable energy generators, and construction personnel personal vehicle traffic to the site.
- Potential dust (particulate emissions) due to site grading and excavations.
- Emissions from construction activities including application of coating and painting.

Greenhouse gases (GHG) are reported as CO2 equivalent ($CO_{2e}$) and refer to the climate change potential of the greenhouse gases being emitted. All of the above listed emissions will be limited to the construction phase of the Project and are anticipated to last less than one year to construct the proposed R-50 site. The Kairos facility, recently constructed on an adjacent parcel of the ETTP, assessed air emission impacts from construction (including those under the GHG category) over a two-year period, considering similar sources. Because the R-50 site construction involves similar emission sources, will be for a shorter duration of time, and involve fewer construction vehicles and workers, the Kairos evaluation of impacts will be bounding for Radiant’s Proposed Action. The Kairos evaluation determined that the potential impact from greenhouse gases during construction could be up to 8,190 metric tons of $CO_{2e}$ per year. The NRC in its 2023 EIS for the Kairos facility has stated the following:

> *These activities generate combustion product emissions such as CO, $NO_2$ and, to a lesser extent, $SO_2$. Painting, coating, and similar activities during construction generate emissions from the use of volatile organic compounds. Over the two-year construction schedule, the applicant estimates a monthly average of 213 truck deliveries, 4 offsite shipments of construction debris, and an average of 212 onsite workers with a peak construction workforce estimated to be 425 (Kairos 2023-TN8172 | Sec 2.1). Table 3-2 lists the air emission estimates for the project for criteria pollutants during the two-year construction phase. The estimates of air emissions for all criteria pollutants are below the thresholds presented in Table 3-1. The applicant would still be required to apply for any needed state air quality permits for minor sources for construction.*

Radiant does not anticipate it will be required to submit application for a construction minor source.

### 4.6.2 Air Emissions During Operations

The Proposed Action will have air emissions associated with Project operations, including the following:

- Employee vehicle traffic, material supplies, waste shipments and TRISO fuel deliveries
- Building exhaust from TRISO fuel management areas and other production locations
- Subslab vapor mitigation system exhaust (as required by parcel Deed restrictions)
- Maintenance and emergency operation of diesel fueled generators
- Potential operation of a 40 MMBTU/hour rated natural gas-powered heater

Air emissions during normal operations will be minimal and limited primarily to vehicle traffic, maintenance activities, and minor-radiological particulate releases. No airborne radioactive emissions are expected during assembly and fueling. Combustion of natural gas and diesel are anticipated to generate GHG during the operational phase, although the number of these sources is limited due to the size of the facility.

Initial employment for the Proposed Action will start with around 20 technical and administrative staff, for the operation of R-50, to 250 or more employees at full scale when the Project site is fully developed. Weekly deliveries of supplies have been estimated at five delivery trucks. Shipments of TRISO fuel have been estimated to initiate at 50 trucks per year and escalate at future scale to 130 trucks per year. For this Proposed Action, there will be total additional personal vehicle emissions of up to 40 round trips per day and total truck emissions will range from 2 trucks per day to 5 trucks per day.

The Kairos facility recently constructed on an adjacent parcel would have a similar increase in personal and diesel truck traffic to the site. The GHG emissions associated with the Kairos operation were estimated at up to 1,460 metric tons of $CO_{2e}$ per year. The Kairos ER has used the evaluation of the potential emissions associated with the Clinch River EIS as bounding to determine the impact of these emissions in the region. The NRC evaluated the emissions from the Kairos facility associated with additional vehicle traffic to be SMALL, and this analysis is applicable to the additional emissions from vehicle source associated with the Proposed Action.

The R-50 site will be licensed for possession of Special Nuclear Materials and will not irradiate the material under the initial license. The only operations area with potential for uranium contamination will be the Monolith Assembly Area; however, any such quantities would be extremely small due to inherent retention properties of TRISO and would not be sufficient to exceed 10% of Derived Air Concentration or the Annual Limit on Intake needed to classify the area as an airborne radioactivity area. Ventilation systems will be engineered to maintain negative pressure in controlled zones and are equipped with High Efficiency Particulate Air (HEPA) filters, ensuring dust, vapor, and particulate emissions remain minimal. Radiological monitoring sensors will be installed within the workspace and at the air exhaust vents. Radiant has evaluated that radiological emissions will result in an exposure of less than 0.1 millirem/yr to the most exposed member of the public. This criterion is determined to be an insignificant activity with respect to the TDEC Division of Air Pollution Control permitting regulations.

Operational activities that could generate dust, vapors, or particulate are limited to non-radiological sources such as opening transport containers, assembly of graphite and composite components, and

maintenance activities. Additional particulate may arise from HVAC filter changes, mechanical wear on handling fixtures, and routine sweeping/cleaning. These emissions will effectively be controlled by the air exhaust filtration systems. The facility will also utilize gases including helium, carbon dioxide and nitrogen in the assembly operations. These gases will be maintained in dedicated tanks, refilled by the supplier as needed and piped directly to the point of use. No emissions are anticipated as a result of gas management.

Due to the prior historical site activities and issues of remaining site contamination, Radiant will be required under the deed restrictions for the property to install and operate a subslab vapor intrusion mitigation system for all buildings where there will be employee occupation for 8 hours or more per day. This requirement will apply to the site security building and the assembly building. A design for a passive (with ability to convert to active) vapor mitigation system will be provided to TDEC for review. The vapor mitigation system will exhaust (either passively or actively at a low air flow) at the roof lines of the building away from building ventilation intakes. It is anticipated the emissions from the mitigation system would consist of VOCs associated with the site prior contamination and would be very minimal. An operations and maintenance plan which will include monitoring will be developed and submitted to TDEC for review. If emissions were demonstrated to require permitting or control, these actions would be developed in consultation and approval by TDEC Division of Air Pollution Control.

The facility will have between two and three standby emergency power generators that will be fueled by diesel fuel. The range of size for these units will be 500 KW up to 1.5 MW, with approximately 6,000 gallons of total integrated diesel storage. Diesel tanks less than 40,000 gallons are an insignificant source. The emergency generators will only be operated during emergency power needs and during periodic maintenance checks. Intermittent emissions from standby power generation sources would operate less than 100 hr/yr and would produce insignificant emissions (less than 5 TPY for criteria pollutants and less than 1,000 pounds (lb) per year for an individual HAP), as defined in Chapter 1200-03-09 of the Tennessee Air Pollution Control Regulations. If used exclusively for replacement or standby service and at or less than 100 hr/yr, these generator units would not require a construction or operating permit, as outlined in Chapter 1200-3-9-04 (construction and operating permits) of the Tennessee Air Pollution Control Regulations.

GHG emissions associated with the operation of the facility would be limited to typical heating and cooling needed for building comfort and employee hot water use. The GHG emissions for this Proposed Action would be bounded by the emissions evaluated for the Kairos project which were determined by NRC to be SMALL in impact. GHG reporting would be required under federal programs at emission levels of >25,000 MT $CO_{2e}$ and the operational contribution of GHG from the Proposed Action will not require reporting.

The R-50 site may potentially construct and operate a natural gas combustion heater unit with a rating of 40 MMBTU/hour. This unit, if constructed, would be installed with a dedicated emission stack of approximately 35 feet in height. If this unit is brought to the site Radiant will apply for a State Operating Permit for the construction at least 90 days prior to the proposed construction. An operational permit would also be sought within 30 days of the source starting operation. Radiant has evaluated the potential for emissions associated with this heater unit operation using EPA AP42 Section 1.4 Natural Gas Combustion emission factors (Tables 1.4-1 and 1.4-2) for small boilers (<100 MMBTU/Hr), equipped with low $NO_2$ burners. The heater, if constructed, will be a minor source and the potential to emit (PTE) for annual operations are as follows:

- $NO_2$ emissions of <10 tons per year (TPY)

- CO emissions of <15 TPY
- $PM_{total}$ emissions of <2 TPY
- $SO_2$ emissions of << 1TPY
- VOCs emissions of <1 TPY

If Radiant determines this source will be required, it would contribute less than 5 MT of GHG ($CO_{2e}$) emissions during the operations phase of the Proposed Action. Radiant will only operate insignificant sources of air emissions unless the heater is installed and will then seek appropriate approvals under the TDEC air permitting program. The expected impact from air emissions, including GHG emissions during operations is anticipated to be SMALL.

### 4.6.3 Air Emissions During Decommissioning

Air emissions during decommissioning activities will be mainly related to vehicle emissions associated with workers commuting to the site, trucks and demolition equipment to remove structures and haul away wastes from the site. Other air emissions during this stage of the Proposed Action would include potential for dust and particulate. Appropriate dust and particulate control measures will be used to control the emissions. It is anticipated that the emissions associated with decommissioning can be characterized as similar to those generated during the construction phase. The GHG emissions during decommissioning would be similar in nature to those during construction and bound by the Kairos evaluation. The decommissioning activities for the Proposed Action would be bound by the emissions evaluation of similar activities at the Kairos location and will be SMALL.

### 4.6.4 Air Emission Mitigation

Mitigation of air emissions will be a component of all life cycle phases of the operation. During construction best management practices will be employed for control of dust associated with site development. Soils stockpiles will be covered, and areas may be wetted to minimize dust and dust transport. Construction equipment will be inspected to assure proper operation, minimizing diesel fuel combustion emissions. During operations, emissions monitoring will be used, and preventative maintenance will be applied to maintain the HEPA air filters within operating limits. During decommissioning best management practices will again be applied to minimize dust generation and transport from the site.

### 4.6.5 Summary of Air Quality Impacts

The air quality impacts including those from GHG from the Proposed Action will be SMALL due to limited air emission sources and the implementation of mitigation strategies. The occupied buildings on the site will be required to be outfitted with subslab vapor mitigation systems which will be monitored with results submitted to TDEC.

### 4.6.6 References


1. Kairos Power, LLC. 2023. “Hermes Non-Power Reactor Environmental Report.” HER-ER-001 Revision 1.
2. U.S. Nuclear Regulatory Commission. 2023. “Environmental Impact Statement for the Construction Permit for the Kairos Hermes Test Reactor – Final Report.” NUREG-2263
3. EPA. March 1998. AP-42 Emission Factors, Section 1.4 Natural Gas Combustion.

## 4.7 NOISE IMPACTS

This section describes noise impacts from construction, operation, and decommissioning of the Proposed Action.

### 4.7.1 Impacts of Construction

Construction activities will involve the use of heavy equipment for site clearing, grading, excavation, foundation placement, structural erection, and paving. Typical noise generating equipment includes: air compressors, soil compactors/rollers, concrete pumps, saws, and cutting tools, cranes and hoisting equipment, bulldozers, dump trucks, excavators, flatbed delivery trucks, paving machines, and welding, cutting, and grinding equipment.

Construction would have temporary adverse effects on noise and vibration during the likely six to eight-month duration of the project. Construction activities would cause temporary increases and fluctuations in ambient noise levels around the Project site depending on the number and type of equipment in use at any given time. Typical maximum noise levels from equipment likely to be used during construction are listed in Table 4.7-1.

As discussed in Section 3.7, the nearest noise receptors around the Project site include the BORCE, which at its closest point is located on the opposite side of Poplar Creek approximately 0.25 mile northwest of the Project site, and the nearest residences appear to be located in The Preserve at Oak Ridge approximately 1.3 miles southwest of the Project site.

A baseline noise survey was conducted from June 15 to June 16, 2021, for the Hermes Non-Power Reactor Project located in the immediate vicinity of the Project site. Survey methods and results are described in Section 3.2.7 (pages 3-19 to 3-20) of the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, LLC, 2023). The baseline conditions described remain relevant to the Radiant Proposed Action. The measured noise levels were generally represented as an ambient noise environment common to a quiet rural area. As would be expected, ambient noise levels were higher in areas closer to existing industrial activity within the ETTP.

As described in described in Section 4.2.2 (page 4-18) of the *Hermes Non-Power Reactor Environmental Report* (Kairos Power, LLC, 2023), the existing ambient noise level during the quietest daytime hours when construction activities would occur was measured as 38 dBA in $L_{eq}$. Predicted noise impacts from equipment would likely be perceptible (e.g., a greater than 3 dBA increase over the ambient level of 38 dBA) in the nearest receptor and may be perceptible by the nearest residences, depending on equipment use, as shown in Table 4.7.1. The BORCE contains dirt/gravel trails commonly used for hiking, biking, and wildlife watching. The BORCE is located within dense forested areas and the presence of tree cover will likely provide a buffer to minimize noise impacts on potential wildlife and recreational users in the area. The nearest resident is approximately 1.3 miles southwest from R-50 and is separated by forest, also creating a sound buffer. When multiple heavy equipment operates simultaneously, a readily perceptible noise increase would likely be perceived by the nearest residences. Impacts from noise during construction may be moderate. However, given the short-term nature of the proposed construction (six to eight months) and given construction will only occur during normal, daytime working hours, these impacts would be SMALL.

Traffic associated with the construction workforce traveling to and from the Project site also generates noise. The increase in noise relative to ambient background conditions would be most noticeable during shift changes in the morning and late afternoon. Given the short duration of such potential traffic noise increases, potential noise impacts to the community are intermittent and limited primarily to shift changes. The impact from noise from construction-related traffic to nearby residences, schools, churches, and parks would be SMALL.

### 4.7.2 Impacts of Operation

Operation of R-50 would involve equipment that would emit noise levels typical of industrial activities. Anticipated noise generating equipment associated with normal operations include: electrical switchyard equipment (e.g., transformers, breakers, and cooling fans), heating, ventilation, and air conditioning (HVAC) systems on building exteriors (e.g., rooftop units, exhaust fans, and air handlers), periodic rail activity (e.g., locomotive movements, coupling and decoupling operations, and loading/unloading of railcars), delivery truck traffic, outdoor forklift and material handling equipment, and routine employee traffic.

Outdoor equipment would be perceptible in the immediate vicinity of the Project site, particularly during nighttime hours when ambient noise levels are low. The nearest residential noise receptor would be the most sensitive to surrounding noise during nighttime operation. However, the nearest resident is approximately 1.3 miles southwest from R-50 and is separated by forest, creating a sound buffer. Therefore, operational noise is unlikely to be perceptible to the nearest resident. Additionally, noise associated with normal operations and loss of power operations would comply with the City of Oak Ridge Zoning Ordinance noise standards. The intensity level of all sounds shall not exceed the maximum limit of 80 dBA (Oak Ridge, 2020). As a result, noise impacts from facility operations would be SMALL.

### 4.7.3 Impacts of Decommissioning

Once R-50 reaches the end of its useful life (approximately 40 years), it would be decommissioned. Anticipated noise generating equipment associated with decommissioning may include excavators, demolition tools like concrete saws or jackhammers, portable generators, haul trucks and flatbeds. Decommissioning activities, equipment usage, and the noise associated with typical decommissioning operations are expected to be similar or less than that of the construction phase. Short-term noise impacts may occur from the use of heavy equipment but would be SMALL.

### 4.7.4 Tables

**Table 4.7-1. Typical Noise in dBA from Construction Equipment**

| Equipment | $L_{max}$ Noise Level at 50 feet[1] | $L_{max}$ Noise Level at 0.25 mile (BORCE) | $L_{max}$ Noise Level at 1.3 miles (nearest resident) |
|---|---|---|---|
| Backhoe | 80 | 52 | 37 |
| Compressor (air) | 80 | 52 | 37 |
| Compactor (ground) | 80 | 52 | 37 |
| Concrete Mixer Truck | 85 | 57 | 42 |
| Concrete Pump Truck | 82 | 54 | 39 |
| Concrete Saw | 90 | 62 | 47 |
| Crane | 85 | 57 | 42 |

| Equipment | $L_{max}$ Noise Level at 50 feet[1] | $L_{max}$ Noise Level at 0.25 mile (BORCE) | $L_{max}$ Noise Level at 1.3 miles (nearest resident) |
|---|---|---|---|
| Dozer | 85 | 57 | 42 |
| Dump Truck | 84 | 56 | 41 |
| Excavator | 85 | 57 | 42 |
| Flat Bed Truck | 84 | 56 | 41 |
| Grader | 85 | 57 | 42 |
| Pavement Scarifier | 85 | 57 | 42 |
| Paver | 85 | 57 | 42 |
| Pneumatic Tools | 85 | 57 | 42 |
| Pumps | 77 | 49 | 34 |
| Roller | 85 | 57 | 42 |
| Scraper | 85 | 57 | 42 |
| Tractor | 84 | 56 | 41 |
| Welder/Torch | 73 | 45 | 30 |
| [1]Source: USDOT, 2006 | | | |

### 4.7.5 References


1. Kairos Power, LLC. 2023. "Hermes Non-Power Reactor Environmental Report." HER-ER-001 Revision 1.
2. City of Oak Ridge. 2020. "Zoning Ordinance with Amendments through November 9, 2020." Available at https://www.nrc.gov/docs/ML2215/ML22157A452.pdf.
3. U.S. Department of Transportation. Federal Highway Administration Highway Construction Noise Handbook. Final Report. August 2006. [Table 9.1]


## 4.8 HISTORIC AND CULTURAL RESOURCES IMPACTS

This section describes the impacts of construction, operation, and decommissioning of the Proposed Action and no-action alternative on historic and cultural resources.

### 4.8.1 Proposed Action

As described in Section 3.8, a Cultural Resources Desktop Analysis was prepared in November 2025 (SEARCH, 2025) for the Project site (Appendix C). According to the TDOA database, 17 previously recorded archaeological sites and six previously recorded historic cemeteries are indicated within one mile of the Project site. [redacted] No additional work was recommended at the site. Additionally, in 2015 Congress established the Manhattan Project National Historical Park, which incorporates portions of ORR (including the former K-25 footprint), located adjacent to the northeast corner of the Project site and additional locations in Hanford, Washington and Los Alamos, New Mexico.

The Cultural Resources Desktop Analysis concluded that due to the historic demolition of all of the above-ground buildings associated with the historic K-27 complex at the Project site, accompanied by extensive remediation that included excavation to depths of 10 feet across portions of the Project site, the potential for intact historic architectural resources is considered low. The potential for encountering subsurface precontact Native American archaeological deposits in less-disturbed areas and historic-period archaeological remains (e.g., foundations, utilities, and artifacts) associated with the K-27 complex is considered high. However, due to the remediation efforts on the Project site, it is unlikely that any cultural resources would be found in the area, unless material is deeper than 10 feet below surface and is unlikely to be impacted. Therefore, no additional archaeological work on the Project site was recommended.

Additionally, consultations with the Tennessee SHPO and regional Native American Tribes were initiated in November 2025 (Appendix D). Initial conversations with Tennessee SHPO indicated that no further surveys of the Project site would likely be required and that no historic or cultural resources are anticipated to be significantly adversely impacted by the Proposed Action based on their review of the Cultural Resources Desktop Analysis. Tennessee SHPO indicated they would participate in the NEPA process and provide any further comments during that process.

#### *4.8.1.1 Construction, Operation, and Decommissioning*

Consultations with state and tribal historic preservation offices are on-going. Radiant will incorporate/address any comments from state or tribal personnel upon receipt, as applicable.

The Project will be visible from the K-25 History Center, part of the Manhattan Project National Historic Park. Informal consultation with U.S. National Park Service staff indicated that views of R-50 are not expected to have an adverse impact on the park. Informal consultation with SHPO did not raise any substantial concerns. SHPO indicated they would coordinate directly with NRC during the NEPA process. There are no identified historic or cultural resources within the area of proposed land disturbance (see Figure 4.8-1). Development is only proposed in previously developed areas. [redacted] Therefore, direct impacts to nearby resources such as [redacted] the Manhattan Project National Historical Park (located within the former K-25 footprint) from construction and operation of R-50 would be SMALL.

Due to the lack of recorded historic cemeteries and prehistoric mounds within the boundaries of the Project site, and the previous disturbance of the site, the potential presence of human burials or human remains would be SMALL. In accordance with T.C.A. 11-6-107d, if human remains or gravesites are accidentally exposed, all work will stop in the immediate area and construction personnel will contact a representative of Radiant. Radiant will contact the medical examiner, or coroner, and local law enforcement will be contacted (Tennessee Office of the State Chief Medical Examiner - 844-860-4511; Roan County Sheriffs Office – 865-376-5578). The TDEC Division of Archaeology will also be contacted at 615-687-4779. If the human remains are determined to be archaeological in nature, historic preservation officers, in conjunction with Radiant, will determine what further actions will be taken.

Following the cessation of operation, R-50 would be decommissioned. Decommissioning activities would be similar to construction activities and involve heavy equipment to dismantle buildings and facilities.

Therefore, impacts on historic and cultural resources from decommissioning would be similar to construction and would be SMALL.

### 4.8.2 No Action Alternative

Under the no-action alternative, the NRC would not issue a license for the construction and operation of Radiant's R-50 site. As a result, the facility would not be built, and production of Kaleidos microreactors would not proceed. Therefore, no historic and cultural resources impacts would occur.

### 4.8.3 References

1. SEARCH. 2025. "Technical Memorandum: Cultural Resources Desktop Analysis for the Oak Ridge Site, Oak Ridge, Tennessee."

## 4.9 VISUAL AND SCENIC RESOURCES IMPACTS

This section describes the visual and scenic resources impacts from the construction and operation of the Proposed Action and each alternative. The impacts discussed below are based on the characterization and description of visual character of the visual study area from Section 3.9.

The visual setting of the Project site primarily consists of industrial development and remediation areas within the ETTP to the north, east, and south with forested views to the west and southwest. Forested ridges are generally visible in the background in all directions. Poplar Creek flows north, west and south of the Project site though views are generally limited because of vegetative and topographic screening. Views in the immediate vicinity of the Project site are dominated by various paved and gravel roads, parking areas, abandoned electrical facilities, a railroad, power lines, industrial buildings associated with former uses of and current industrial reuse of the ETTP.

The Radiant Project team will fuel, test, store, and eventually assemble and refuel self-contained and trailer-mounted mobile Kaleidos reactors capable of generating 1 MW electric and 1.9 MW heat load when installed and energized at customer's sites. The refueling building will be no more than 45 feet in height and will house a gantry crane inside the building.

### 4.9.1 Visual Impact Analysis

#### *4.9.1.1 Project Visibility*

As outlined in the Visual Assessment (Appendix E), an analysis of potential Project visibility was undertaken to identify those locations within the visual Study Area where it may be possible to view the proposed Project from ground-level vantage points. The analysis includes identifying potentially visible areas on viewshed maps and verifying unobstructed line of sight conditions in the field.

##### 4.9.1.1.1 Viewshed Analysis

Viewshed analyses of the existing and proposed Project site were performed to evaluate potential Project visibility. Currently there are no structures on the Project site and it has been remediated as a brownfield site. Data on the height and location of the proposed Project structures were provided by Radiant. These proposed structures are expected to include one 30,000 square foot fueling building and

a stack for the heater unit that are not expected to exceed 45 feet in height. There will also be a small security building at the entrance which will not exceed 20 feet in height.

Topographic viewshed maps for the Project were prepared using USGS digital elevation model (DEM) data (7.5-minute series); the location and height of the proposed structures, and ESRI ArcGIS® software with the Spatial Analyst extension. The resulting viewshed maps define the maximum area from which the structures could potentially be seen from ground-level vantage points (existing grade plus 1.7 meters to account for viewer height).

The analysis revealed that the proposed structures have potential visibility from approximately 53.8 percent of the visual Study Area based on the screening provided by topography alone. However, because the screening provided by vegetation and structures was not considered in this analysis, the topographic viewshed represents a "worst case" assessment of potential visibility. Topographic viewshed maps assume that no trees exist and are therefore very accurate in predicting where visibility will not occur due to topographic interference. However, they are less accurate in identifying areas from which the Project will be visible.

#### *4.9.1.2 Field Verification*

As mentioned previously, the vegetation viewshed analysis only considers large blocks of mapped vegetation and assume a 50-foot tree height. To more accurately evaluate the potential visibility of the proposed Project, the area within a 1.0-mile radius of the Project site was reviewed in the field October 20 and 21, 2025. During the field review, views toward the Project site were documented from 19 representative/sensitive viewpoints with photos and field notes (see Appendix B of the Visual Assessment). Several sites that were just outside of the 1-mile buffer were visited during field work to provide a conservative analysis of potential visibility for potentially sensitive sites near the 1-mile buffer. All photos were obtained using a Nikon D90 digital SLR camera with the focal length set at approximately 35 mm (equivalent to between 50 and 55 mm on a standard 35 mm film camera). This focal length is the standard used in visual impact assessment because it most closely approximates human perception of spatial relationships and scale in the landscape. Viewpoint locations were documented using a hand-held Trimble TDC6 GPS unit with reported sub-meter accuracy, and the time of each photo was documented on all electronic equipment (cameras, GPS units, etc.) and data sheets (see Appendix E). A compass was used to reference the direction towards the Project site during field review. Documented viewpoints typically offered the most open, unobstructed views toward the Project site, and/or included areas identified as visually sensitive, or having a high level of public use/visitation. Viewpoint locations within the visual Study Area are shown on Figure 4 in Appendix E. The photos obtained during this field evaluation were used to determine where the proposed Project structures might realistically be visible.

Field verification confirmed that the visibility of the existing Project site is generally limited to areas along SR 58 and Perimeter Road. This limited visibility is due to the topographic variation and dense forest vegetation that characterize the majority of the visual Study Area. There are no longer distance views. Where visible, the existing structures at the East Tennessee Technology Park are typically seen at foreground distances (under 0.5 mile) by drivers, local residents, and in some cases, business employees and recreational users. The existing building structures are relatively close to the viewer, unscreened or partially screened. However, these views from local roads are fleeting, and generally completely obscured by existing vegetation once the viewer is outside the limits of the East Tennessee Technology Park.

Field verification found the Project will be screened from a large majority of sensitive sites that were visited. A detailed assessment of sensitive resource visibility is provided in Appendix A of the Visual Assessment. The forest vegetation that occurs at many sensitive sites (e.g., parks, cemeteries, and schools,) generally impedes the viewer's perception of the line and/or cleared ROW from these areas. As noted above, the screening effect of vegetation will be somewhat diminished during the winter in areas where deciduous vegetation was prevalent. At sensitive sites where such screening is lacking (e.g., K-25 Overlook and K-25 History Center) open views of the existing buildings at the East Tennessee Technology Park are already present, and therefore additional visual change (either negative or positive) will be limited. Other than public roads, Project visibility from visually sensitive sites was generally limited by vegetation, built structures, and/or distance. Potential Project visibility from sensitive resources inventoried within the visual Study Area, based on viewshed analysis and field verification, is summarized in Appendix A of the Visual Assessment.

#### *4.9.1.3 Construction and Operation Impacts*

Radiant's proposed Project is consistent with current land use within the ETTP. As described in Subsections 3.1.2 and 4.1.2 of the "*Hermes Non-Power Reactor Environmental Report*." HER-ER-001 Revision 1., the Radiant Project site is similar to the Hermes proposed site, with industrial and undeveloped forested/open water area surrounding the site. In addition, there are no permanent residences within the visual study area. Like at the Hermes site, the area immediately surrounding the proposed Radiant site is a highly developed industrial setting including numerous paved parking lots, impervious surfaces, and structures on the ETTP.

The field effort and photos taken at each viewpoint confirm that the proposed facility would be well-screened by forest at most of the viewpoint locations with the exception of those immediately adjacent to the Project site. Radiant's proposed buildings are almost half the size of the proposed buildings at the Hermes site which will make the Radiant buildings seem smaller and less imposing, and will incorporate well into the existing visual character of the adjacent K-25 complex and the improvements taking place on that site. At distances greater than approximately 0.5 mile, the visibility of the proposed Project would be minimal due to the topographic and vegetation screening provided in the surrounding landscape, even during winter months due to the mixed presence of evergreens in the forested areas. Based on our analysis and the proposed Project facilities, the visual impacts due to the construction and operation of the proposed Project would be SMALL.

#### *4.9.1.4 Decommissioning Impacts*

Once R-50 reaches the end of its useful life (approximately 40 years) it would be decommissioned. Radioactive equipment and materials would be disposed of according to local and federal laws and regulations. Decommissioning activities would be similar to construction activities and involve heavy equipment to dismantle buildings and facilities. Therefore, impacts on visually sensitive resources from decommissioning would be similar to construction and would be SMALL. Specific mitigation measures would not be required.

#### *4.9.1.5 No Action Alternative Impacts*

Under the no-action alternative, the NRC would not issue a license for the construction and operation of Radiant's R-50 site. As a result, the facility would not be built, and production of Kaleidos microreactors would not proceed. Therefore, no impacts to visually sensitive resources would occur.

### 4.9.2 References

1. Kairos Power, LLC. 2023. "Hermes Non-Power Reactor Environmental Report." HER-ER-001 Revision 1.

## 4.10 SOCIOECONOMIC IMPACTS

This section describes the socioeconomic impacts for the construction, operation, and decommissioning of the Proposed Action and no-action alternative. The impacts discussed below are based on the characterization and description of socioeconomics from Section 3.10.

In August 2023, the NRC published an EIS for the Construction Permit for the Kairos Hermes Test Reactor (NUREG-2263). Socioeconomic information about the Kairos Hermes Test Reactor site, which is located less than 1,000 feet north of the proposed Radiant project site, is relevant based on the proximity and similarity of Proposed Actions. Given the recency of this EIS, components of it and the ER upon which it was based (Kairos 2023-TN8172) can reasonably serve as applicable analyses for the purpose of this ER and are referenced, where applicable, in the sub-sections below (Kairos Power 2023).

### 4.10.1 Socioeconomics Impacts

This section describes impacts to population, housing, public services, public education, and tax revenue within the region of interest (ROI) from the proposed Project's construction, operation, and decommissioning phases. Five counties comprise the ROI, including Anderson, Knox, Loudon, Morgan, and Roane. These counties represent the areas of potential influence with respect to potential impacts from construction and operations associated with the Project. Additionally, this five-county area represents where temporary and operations workers are likely to reside, leverage public resources, and spend their wages in the local economy. Potential impacts from construction activities will be influenced by the number of construction staff in the workforce, construction related costs, and tax payments from wages and expenditures. Direct socioeconomic impacts will result from the workforce being present at the Project site, while other socioeconomic impacts will be off-site and result from activities that are indirectly related to the Project.

The estimated operations phase of the Facility will begin with a workforce approximately 20 employees in size in 2028. Over a five-year period, operations at the Facility are expected to grow and the estimated number of employees at the Project is projected to increase to 250 employees in 2032. The majority of these employees will support various operations focused job types on-site; however, other on-site job types at the facility during the operations phase may include engineering, business, and management, as detailed in Table 4.10-1 below.

**Table 4.10-1: Five Year Total Employee Projections and Job Type Break Down for Facility Operations**

| | 2028 | 2029 | 2030 | 2031 | 2032 |
|---|---|---|---|---|---|
| Total Number of Employees | 20 | 75 | 100 | 175 | 250 |

| Estimated Job Types | | | | | |
|---|---|---|---|---|---|
| Operations | 70% | 60% | 60% | 60% | 55% |
| Engineering | 15% | 20% | 20% | 20% | 20% |
| Business | 5% | 10% | 15% | 15% | 15% |
| Management | 10% | 10% | 5% | 5% | 10% |

Note: Total employee projections and job type break-downs were provided by Radiant Industries, Inc. on January 6, 2025.

Construction activities are expected to begin with an estimated on-site initial workforce of 40 to 50 employees. The construction phase of the Project will have an estimated peak on-site workforce of 100 employees during the summertime, as detailed in Table 4.10-2. The duration of the construction workforce on-site will vary based on job type, with types such as carpenters, electricians, laborers, and sheet metal workers on-site for a duration of 43 weeks. Painters and ironworkers are estimated to only be on-site during the construction phase for a duration of 12 weeks.

**Table 4.10-2: Estimated Construction Employee Projections and Job Type Break Down**

| | Full Time Employees | Duration On-Site (Weeks) |
|---|---|---|
| Carpenters | 6 | 43 |
| Electricians | 15 | 43 |
| Ironworkers | 12 | 12 |
| Laborers | 10 | 43 |
| Equipment Operators | 8 | 30 |
| Plumbers/Pipefitters | 8 | 43 |
| Sheet Metal Workers | 12 | 43 |
| Construction Supervisors | 3 | 43 |
| Millwright | 5 | 30 |
| Surveyors | 3 | 43 |
| Cement Masons/Finishers | 13 | 20 |
| Painters | 6 | 12 |
| Total | 101 | - |

Note: Total employee projections and job type break-downs were provided by Radiant Industries, Inc. on January 13, 2026.

#### *4.10.1.1 Population Impacts*

In 2023, the total population within the ROI was 720,224, and growth projections indicate that total population in the ROI is estimated to be 755,109 in 2030 and 777,284 in 2035 (U.S. Census Bureau 2023a), as detailed in Table 3.10-2. The Project's potential impact on population growth from the operations phase of the Project is summarized in Table 4.10-1. The construction and operations workforce will be predominately sourced from the local communities within the ROI. As detailed in Section 3.10 and Sections 3.7.2.1.2 and 4.7.1.1 of Kairos 2023-TN8172 (pp 3-121 – 3-122; 4-42), sufficient workforce the staff the construction and operations phases of the Project is located within the ROI. A smaller number of the workforce, including such roles as current key management personnel, would be expected to move into the area. The impact of the construction, operations, and decommissioning of the facility on the population within the ROI would be SMALL.

#### *4.10.1.2 Housing Impacts*

Section 3.10.3 and Table 3.10-8 provide a summary of housing utilization in 2023 based on the American Community Survey (ACS) 5-Year Estimates available from the U.S. Census Bureau (U.S. Census Bureau 2023b). To analyze the impact of housing demands that would result from the construction, operation and decommissioning phases of the Project, the ACS data was used to evaluate the total number of housing units that may be available.

In 2023, there were 309,701 total vacant housing units in the ROI (See Table 3.10-8), which is greater than the estimated demand for housing due to the construction and operations phases of the facility; and as summarized in Tables 4.10-1 and 4.10-2. It is not anticipated that workers would need to relocate to the ROI to support the Project during the construction, operations, or decommissioning phases. Based on the 2023 housing utilization estimates, there is an adequate supply of vacant housing that can accommodate new workers who may choose to temporarily or permanently relocate into the ROI.

Due to the large number of vacant housing units available within the ROI, and the estimated peak construction workforce and total number of employees needed for the operations workforce, the potential impacts to housing within the ROI would be SMALL.

#### *4.10.1.3 Public Services Impacts*

Potable water will be required during the construction of the facility to support the needs of the on-site workforce. On-site water demand will include construction activities (such fugitive dust suppression), potable water supply, and fire suppression. The City of Oak Ridge will supply water to the site for use during the construction and operations Project phases. In 2015, the USGS estimated that the average per capita water usage in the United States (US) is 82 gallons per day (gpd) per person for personal use (USGS 2018). More recently, in 2019 the USGS estimated that the average per capita water usage in the US ranges between 80 to 100 gpd for personal use, including bathing, laundry, and other household uses (USGS 2019).

During construction it is estimated that workers will be on-site for 8 to 12 hours per day, and it is conservatively assumed that 50 gpd per worker will be required for potable and sanitary use. During the estimated peak usage (summertime during the construction phase), it is assumed that the peak workforce (estimated to be 101) workers on-site will need 5,050 gpd of water for potable and sanitary use. As discussed in 3.10, the current operation of the City of Oak Ridge Public Works are below capacity. Public Services in the ROI are further described in Section 4.7.1.3 of Kairos 2023-TN8172 (pp 4-43 – 4-44), which indicated that the City of Oak Ridge Public Works has an excess water capacity of 4 to 6 MGD. Impacts from the on-site construction workforce for the Project would be SMALL.

Local water supply systems are discussed in Section 3.10. The impact of population related growth within the ROI related to the Project on local water supply systems can be conservatively estimated by multiplying the estimated number of individuals who relocated into the ROI by the 100 gpd per capita estimate. Section 3.10 indicates that estimated workforce within the ROI is abundant, and therefore it is not anticipated that workforce will need to relocate into the ROI for construction, operations, or decommissioning work phases. During the facility's construction phase, the peak number of temporary workforce staff on-site is estimated to be 101 employees, who are anticipated to already reside within the ROI. During facility operations, the maximum estimated total number of permanent employees is 250, who are estimated to already reside within the ROI; therefore, an impact to local water supply

systems from facility related population growth is not anticipated. While it is possible that some temporary workforce may commute to the Site from outside of the ROI, the temporary duration of construction related activities within the ROI is not anticipated to result in a significant increased burden on the public water supply system, and as such, impacts to public water supply due to population increase would be SMALL.

The Project's impact on public wastewater treatment facilities can be determined by calculating the facility-related population increase and the average amount of water used and disposed of by an individual. As discussed above, the average per capita water usage in the US ranges between 80 to 100 gpd. Wastewater treatment within the ROI is also managed by the City of Oak Ridge at two Clinch River located facilities, which have a combined capacity of 30.6 MGD. However, these two facilities are currently only treating 5.6 MGD annually and have the capacity to receive additional load. Impacts on public wastewater treatment facilities, including portions of the workforce that may temporarily relocate to the site or commute in from non-ROI counties, would be SMALL.

#### *4.10.1.4 Public Education Impacts*

Public schools within the Project ROI, including the total number of students in 2024 per county, are discussed in Section 3.10.7 and Table 3.10-9. Based on proximity to the Project Site, the City of Oak Ridge and Anderson County have the closest schools to the Project Site. According to data available from the Tennessee Department of Education for the scholastic year ending June 2024, the ratio of students per licensed teacher was approximately 10 for Anderson County and 11 for the City of Oak Ridge (Tennessee Department of Education 2024). The Tennessee statewide ratio remained 15 students per teacher full time equivalent from 2019 to 2024 (Southern Regional Education Board 2025). The number of students enrolled in the Anderson County School District was 5,844 and the City of Oak Ridge School District was 4,778. Based on the number of schools and students enrolled in 2024, Knox County has the largest school district within the ROI. The average percent population of student age individuals (between ages 5 and 18) in the ROI varies by county, and ranges from 18.7% in both Roane and Loudon Counties, to up to 21% in Anderson County. The average percent population of student age persons (between ages 5 and 18) in Knox County was 20.7% (U.S. Census Bureau 2024).

A significant population increase within the ROI is not expected to result from the construction, operations, or decommissioning workforce estimated for the Project. The potential for large numbers of the workforce to relocated into the ROI is low due to the estimated existing labor force available within the ROI. While it is possible that some temporary workforce may commute to the Site from outside of the ROI, the temporary duration of construction related activities within the ROI is not anticipated to result in a significant impact on the population and therefore is not estimated to cause a perceptible impact on school enrollment or public educational resources. The impact to local public education would be SMALL.

#### *4.10.1.5 Tax Revenue Related Impacts*

An increase in tax collections is estimated for the Project, which will benefit the state of Tennessee, as well as the Counties within the ROI. Tax collection benefits are also estimated for the various school districts within the ROI, as described above in Section 4.10.1.4. Tax revenues, such as payroll taxes on wages and workforce salaries, will be associated with the construction, operations, and decommissioning phases of the facility. Throughout the Project's duration, sale and use taxes would also be associated with purchases made by the workforce. Additionally, property taxes on owned real

property and/or property improvements may also apply to the Project. The Project site is located entirely within Roane County, which would be the only county within the ROI to receive revenue from property taxes.

State and federal payroll taxes would be generated from the workforce during the construction, operations, and decommissioning phases of the Project, in addition to any purchases and/or expenditures made by the workforce within the ROI. The ROI would also be expected to see an increase in sales tax revenue, which in Tennessee is predominately collected at the state level. Sales tax revenues generated for the Project may include those from the workforce, and any purchases made for the Project (such as equipment, materials, and other support or construction services) by Radiant. Depending on the location of these businesses and vendors, those located within the ROI would generate sales tax revenue.

Additional discussion regarding Tennessee state sales tax, county and local government sales tax, and other tax information in the ROI is provided in Sections 4.7.1.5 through Sections 4.7.1.9 of Kairos 2023-TN8172 (pg. 4-45).

Over the lifespan of the Project, including the construction, operations, and decommissioning phases of the Project, tax revenues generated would be significant. However, given the size of the Roane County tax base, tax revenues generated from the Project are estimated to provide a SMALL positive impact observed at the community level.

#### *4.10.1.6 Other Socioeconomics Related Impacts*

Other Socioeconomics related impacts are described in Sections 4.7.1.10 of Kairos 2023-TN8172 (pp. 4-45).

#### *4.10.1.7 Mitigation Measures to Minimize Socioeconomics Impacts*

As discussed above is Section 4.10.1, the Project's socioeconomic impact on the ROI would be SMALL. No mitigation measures are required to minimize socioeconomic impacts resulting from construction, operation, and/or decommissioning of the Project.

### 4.10.2 Transportation

The area surrounding the Project site encompasses a comprehensive transportation network that includes federal and state highways, three freight rail lines, a major navigable river, and two airports. These are described further in the sections below, referencing Kairos 2023-TN8172 where applicable.

#### *4.10.2.1 Roads and Highways*

Section 3.10.4.1 describes the transportation infrastructure surrounding the Project site. Access to the site is available from major transportation corridors, including I-40 (5 miles south), I-75 (10 miles southeast), and I-140 (16 miles east), along with several U.S. and Tennessee state highways. The closest state routes serving the area are Oak Ridge Turnpike - TN 58 (<1 mile), Blair Road - TN 327 (1 mile), and White Wing Rd - TN 95 (2 miles), which connect to Oak Ridge and regional interstates.

A traffic assessment was conducted at the Kairos Site, which indicated that existing roadway capacities was not anticipated to be an issue. The results of the Traffic Assessment are described in Section 4.7.2.1.1 of Kairos 2023-TN8172 (pp. 4-46 – 4-47).

#### *4.10.2.2 Transit, Rail, Air, and Waterways*

A description of local transit, rail, and air services, along with waterway access, is described in Sections 3.7.2.3.2 – 3.7.2.3.4 of Kairos 2023-TN8172 (pp. 3-123 – 3-124), and a potential impact assessment is detailed in Sections 4.7.2.1.2 through 4.7.2.1.4 (pp. 4-47 – 4-48).

Given the proximity of railroad infrastructure within the vicinity of the Project, rail freight may be utilized for equipment and materials deliveries for the Project, which would entail the delivery of goods/materials at a freight yard, and then transport of good/materials via tractor trailer to the Project site. There are no anticipated disruptions to typical rail traffic and freight service resulting from the Project; therefore, the impacts to rail traffic would be SMALL.

It is not anticipated that waterways would be utilized to move equipment or workforce during the construction, operation, or decommissioning phases of the Project. Due to the existing labor workforce population within the ROI, air travel is not expected to significantly increase during the Project's lifespan. Minimal air travel may be required for staff intermittently visiting the site during the Project's lifespan. However, this air travel would occur on an infrequent basis. Potential Project impacts to rail service, air travel, and waterways would be SMALL.

### 4.10.3 References


1. Kairos Power. March 2023. Environmental Report for the Kairos Power Fluoride Salt-Cooled, High Temperature Non-Power Reactor (Hermes), Revision 1. TN8172.
2. U.S. Census Bureau. 2023a. ACS Demographic Estimates - 2023 American Community Survey 5 Year Census - Table Results, Website: https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html, accessed January 9, 2026.
3. U.S. Census Bureau. 2023b. Selected Housing Characteristics, website: *https://data.census.gov/table?q=Occupancy+Status+housing+units&g=0100000_010XX00US_040XX00US47_050XX00US47001,47093,47105,47129,47145*, accessed January 12, 2026.
4. U.S. Census Bureau. 2024. QuickFacts: Morgan County, Loudon County, Knox County, Anderson County, Roane County, Tennessee. Website: https://www.census.gov/quickfacts/fact/table/morgancountytennessee,loudoncountytennessee,knoxcountytennessee,andersoncountytennessee,roanecountytennessee/HSD310219, accessed January 9, 2026.
5. U.S. Geological Survey (USGS). June 2018. Summary of Estimated Water Use in the United States in 2015. Website: https://pubs.usgs.gov/fs/2018/3035/fs20183035.pdf
6. USGS. June 2019. Water Q & A: How much water do I use at home each day? Website: https://www.usgs.gov/water-science-school/science/water-qa-how-much-water-do-i-use-home-each-day#overview, accessed January 12, 2026.

7. Tennessee Department of Education (2024). Annual Statistical Report, for the Scholastic Year Ending June 30, 2024 https://digitaltennessee.tnsos.gov/cgi/viewcontent.cgi?article=1012&context=ed_annual_stat_reports

8. Southern Regional Education Board. 2025. Teacher Quantity Data, 2019-2024 by State, Tennessee. Website: https://www.sreb.org/post/teacher-quantity, accessed January 12, 2026.

## 4.11 PUBLIC AND OCCUPATIONAL HEALTH IMPACTS

This section describes public and occupational health impacts from both non-radiological and radiological sources.

### 4.11.1 Non-radiological Impacts

#### *4.11.1.1 Public Health*

The public health impacts have been reviewed for the construction, operation and decommissioning phases for the proposed action. Any public receptors would be at minimum a half mile from the Project site (see Figure 3.11-1) and are not anticipated to be directly impacted by non-radiological activities associated with any of the life cycle phases of the Project. Air emission mitigations will be used to limit potential for offsite impacts to the public as discussed in Section 4.6. Air emissions are insignificant and would not require TDEC permitting unless an option for construction and operation of a natural gas fired heater is pursued. That minor source would be operated in compliance with issued permits and emission limits, as applicable to limit potential for public impact. A small increase in vehicle traffic and associated emissions from workers commuting and material shipments may be experienced by public. Traffic impacts are addressed in Section 4.2. and have been assessed as SMALL based on similar projects in the vicinity.

Solid and industrial waste generated during the construction, operation, and decommissioning will be limited in volume to the extent possible and all waste generated will be transported offsite to appropriately permitted disposal facilities, no waste will remain on site. No impacts on public health are anticipated from solid or industrial waste generation from the Proposed Action.

No water discharges, other than unimpacted stormwater runoff will be discharged to local surface waters. No impact is anticipated on local surface waters that may be contacted by the public for recreational purposes. It should be noted that the ORR continues a surface water monitoring program under the review of DOE due to potential impacts to surface waters associated with historic site activities at ETTP. Limited wash waters and sanitary waste generated during site operations will be directed to the local publicly owned treatment works (POTW) via sewer and will receive treatment prior to discharge to local surface waters.

#### *4.11.1.2 Occupational Health*

Occupational health for site workers during the three life cycle phases of the Proposed Action would be protected from impact through the implementation of appropriate health and safety measures during construction, operations and decommissioning. Health and safety planning will incorporate best practices to reduce the potential for occupational injuries. Construction staff engaged in intrusive site work will have Hazardous Waste Operations and Emergency Response (OSHA HAZWOPER) training due to the potential for historic site contamination to be encountered. Personal protective equipment (PPE)

will be established using Job Hazard Analysis (JHA) procedures to be protective of the construction worker. Additional OSHA program compliance for working at heights, overhead loads and other applicable construction safety topics will be followed. All accidents will be investigated and learnings for improvement will be implemented. These actions will reduce the potential impacts to occupational health during construction to SMALL.

During operations of the proposed action, occupational health considerations will be part of the operator training and monitoring programs. Tasks will be reviewed for potential health and safety impacts and considerations for engineering controls, administrative controls, and PPE as needed to protect the occupational health of the site operators. Only minor chemical usage is anticipated for manufacturing operations including lubricants, coatings and graphite handling. Appropriate ventilation will be provided to reduce exposure. The proposed action will utilize some gases which will be piped to the point of use and will not represent a potential exposure for the employees. Employees will be informed of workplace hazards through the OSHA hazard communications program.

Operators will receive appropriate training for management of waste generated by the operation. Waste will be containerized and identified by their common name and DOT shipping name and hazard class. Waste generation and period of storage will be minimized as possible.

Operators will also be provided training for facility alarms and evacuation plans, severe weather condition actions and participate in drills to reinforce training.

Due to historic site conditions and the deed restriction, the buildings occupied by workers will be constructed with a vapor intrusion mitigation system that will prevent the transfer of any subsurface volatile chemicals into the occupied workspace. The vapor intrusion mitigation systems will be designed and reviewed by TDEC and will direct any sub-floor slab vapors to discharge vents at the roof of the building. Radiant will monitor the system and determine if the initial passive design will be required to become an active system based on testing results and consultation with TDEC.

Radiant will prioritize the occupational health of their employees and others visiting the Project site. The impact to occupational health is anticipated to be SMALL.

### 4.11.2 Radiological Impacts

This section describes public and occupational health impacts from radiological sources during operational and decommissioning phases of the Project; no radiological impacts to public and site workers are anticipated during construction. The Proposed Action under the current license submittal is for the possession of special nuclear materials which will include Californium-252, Americium-241, Cobalt-60, Strontium-90, Cesium-137, Ytterbium-88, Europiun-152, and Uranium in fission chambers and TRISO kernels. Operational activities involve handling only new, unirradiated TRISO fuel, whose robust coated particle design provides strong containment of radionuclides; as a result, staff doses are expected to be dominated by low-level external exposure in RCAs, with negligible internal dose and near-background conditions at the site boundary.

Bounding accident scenarios are defined as a seismic event followed by full facility fire and criticality. The impacts of these events are evaluated in the SAR for the proposed action.

The historic activities at the Project site involved radioactive materials and evidence of continuing site contamination exists in groundwater and continues to be monitored and studied by the DOE. The Project site has been surveyed and there were no detections of surface radioactive contamination present. Of note, the ORR continues to operate ambient air monitoring stations in the vicinity of the Project site. Background conditions, prior to any site disturbance by Radiant, have been deemed safe for workers and the nearby public.

#### *4.11.2.1 Public Health*

Locations of nearby public receptors are shown on Figure 3.11-1. The Proposed Action is for management of TRISO fuel pellets and assembly into cores that will be used to fuel the Kaleidos microreactors. The Proposed Action will not include irradiating the fuel. This will limit potential for impacts to the public. The Proposed Action will comply with the air emission limit for less than 0.1 mrem/year to the most exposed member of the public during normal operations.

Fuel shipments in Versa Pac 55 packaging will be received from TRISO on a periodic basis starting at approximately 50 trucks/year and scaling in the future to 130 trucks per year. The potential impacts from transportation are evaluated in Section 4.2. The Versa Pac 55 packages have been demonstrated to meet a one meter dose criteria of 10 mrem/hour per 49 CFR Part 173.441(d) and a truckload of packages would meet the conveyance limit applicable to non-exclusive use shipments of 50 mrem/hr at distance of one meter. The fuel shipments to the project site are anticipated to be exclusive. The impact to public health from the transport of TRISO fuel packages to the Project site is SMALL.

Bounding estimate for an accident scenario including seismic event followed by full facility fire is less than 5 rem for a public receptor at 100 meters. The exposure evaluated for a criticality event would be 16 rem for a public receptor at 100 meters and no airborne release would be anticipated due to the fuel granular structure. Additional details for the accident evaluation and bounding estimates are provided in the SAR.

Facility decommissioning activities would be conducted in a manner to limit opportunity for exposure to the public to any radioactive materials or emissions. LLRW would be appropriately characterized, contained and removed from the Project site for disposal at an appropriately permitted facility.

#### *4.11.2.2 Occupational Health*

The activities during the operational phase of the proposed action would include receipt, storage, and handling of unirradiated special nuclear material (enriched uranium at less than 20 wt% U-235) in the form of uranium oxycarbide (UCO) kernels, contained within coated TRISO particles and pressed into cylindrical fuel compacts. Handling activities for site workers would include the assembly of reactor fuel monoliths, followed by loading of the fueled monoliths into the Kaleidos core.

The facility operators will access engineering controls and be appropriately trained for the tasks they will be completing to avoid potential for exposure. Monitoring for radiation levels will be conducted within the manufacturing area and operators will also be initially monitored with badges to indicate potential exposure.

Bounding estimate for an accident scenario including seismic event followed by full facility fire is less than 25 rem for a facility worker at 10 meters. The exposure evaluated for a criticality event would be

greater than 100 rem and no airborne release would be anticipated due to the fuel's granular structure. Additional details for the accident evaluation and bounding estimates are provided in the SAR.

Facility workers would likely be engaged in site decommissioning activities, and it is anticipated their exposures would be similar to normal operations. Engineering controls would be continued during times when radioactive materials were being decommissioned.

The impact to occupational health for site workers would be SMALL due to system safety designs and appropriate controls.

### 4.11.3 References


1. Radiant Bounding Estimates for Radiological Consequences, 2026.
2. TRISO-X, LLC. September 2022. "Environmental Report for the TRISO X Fuel Fabrication Facility".
3. U.S. Nuclear Regulatory Commission. 2023. "Environmental Impact Statement for the Construction Permit for the Kairos Hermes Test Reactor – Final Report." NUREG-2263.
4. Kairos Power. 2023. Hermes Non-Power Reactor Environmental Report


## 4.12 WASTE MANAGEMENT IMPACTS

### 4.12.1 Wastes Generated During Construction Activity

Construction activities to develop R-50, as scoped in the Proposed Action, are anticipated to generate solid waste and waste associated with potential disturbance of the existing site contamination conditions from prior site activities and remedial efforts. Wastes generated during the construction process that are air emissions are discussed in Section 4.6.

Construction solid wastes are anticipated to include excess building, foundation, fencing, and roadway/parking lot materials and scrap as would be typical to construct a high bay building of 30,000 square feet, parking lots and performing road improvements. Solid waste will also be generated during construction associated with the presence of construction workers at the location. Volumes of solid waste would be typical for a construction staff of approximately 200 people. Solid wastes will be managed through traditional disposal methods, allowing for recycling of acceptable materials and landfill disposal of other construction debris. Sufficient disposal capacity at landfills is available in the Oak Ridge area.

During construction, some excavation and grading may be required which would require the removal of soils from the site which may potentially have contamination from historic site activities. Based on information provided at site purchase, Radiant anticipates that soils in the top 10 feet of the site have been previously remediated. If impacted soils or subsurface debris is determined present and in need of removal and excavation to accommodate the construction of R-50, appropriate media management plans will be followed. These will consider screening and analytical testing of materials to determine appropriate offsite disposal in accordance with the characteristics of the wastes. Soil and material wastes may be characterized as hazardous wastes or industrial or "special wastes" in Tennessee. Guidance on appropriate disposal locations for historic contaminated materials will be sought from UCOR and DOE who have previously managed remedial soils at the site. Radiant would follow the guidance of the parties that have previously remediated the site to determine appropriately permitted

facilities for disposal of these wastes. Sufficient capacity for waste disposal at appropriately permitted landfills or other treatment technologies is available but may require transportation out of state.

### 4.12.2 Wastes Generated During Operation

Waste generated during operation of R-50 currently contemplated under the proposed action will include the following types:

- Solid waste from general administrative and office activities
- Sanitary waste discharged to local sewer connection
- Disposable personal protective gear and packaging from operations
- Air filters from air exhaust system in the fuel packaging and fueling areas
- Miscellaneous equipment requiring replacement
- Recyclable materials segregated from solid waste stream
- Recyclable Versa Pak 55 drums following fuel cassette generation
- Potential air emissions which are discussed in Section 4.6

Solid wastes will be generated during office activities and associated with cleaning and basic maintenance of the facility. These wastes may also include packaging for supplies that have not been in contact with TRISO fuel or the fuel cassette and fueling operations. Common recycled materials will be segregated, including plastics, aluminum, glass, and cardboard and stored in an appropriate trash container until they are removed from the site on a periodic basis. Sanitary wastes associated with employee activities will be discharged to the local sewage treatment system which has capacity for the discharges associated with 250 employees at facility full scale. Local disposal options will be available to commercially manage these wastes at landfills or recycling sorting locations.

Materials used in the operation and fuel handling areas such as used personal protective gear, air filters (HEPA) from air exhaust systems, and miscellaneous equipment periodically replaced for preventative or normal maintenance procedures will be collected within a secure location in the fueling area. These materials may be impacted by nuclear material and will be screened and characterized prior to determination of appropriate disposal options. The facility is not anticipating routine generation of impacted LLRW and will identify an appropriately permitted facility if this type of waste is generated. Due to low potential volumes generated, sufficient capacity is available at commercial waste management locations.

The facility will not be using chemicals or oils routinely and will therefore not anticipate generating these wastes as a normal function of the operations. Other materials used in the manufacturing process for the Kairos microreactor will be gases stored in onsite tanks (helium, carbon dioxide, and nitrogen) and will not result in waste generation. Air emissions associated with the operation have been addressed in Section 4.6.

TRISO fuel will be delivered to the site in Versa Pac 55 packages, and the empty containers (once fuel cores have been assembled) will be stored onsite and returned to the TRISO fabricator to be reused for future shipments. Radiant anticipates return shipments will be coordinated with fresh fuel shipments to the site, depending on the volume accumulated. The empty Versa Pac 55 will be managed within the secure indoors portion of the facility. Equipment used in the fuel manufacturing operation such as carts

and cartridges will be reused within the operation until the determination that it should be replaced, at which point the material will be managed with other LLRW as appropriate.

### 4.12.3 Wastes Generated During Decommissioning

Wastes will be generated during the decommissioning of the facility following its anticipated active life. These wastes are anticipated to include the following:

- Scrap equipment, building materials, electronic waste, and infrastructure features
- Excess fuel and nuclear materials
- Excess supplies not consumed during the operation

To the degree possible, Radiant will plan to use all consumables and supplies prior to the start of decommissioning. Excess unirradiated fuel will be returned to the supplier. Unimpacted equipment may be sold for use by other facilities or recycled for scrap. Electronic equipment that has not been impacted by the facility operations will be appropriately recycled. All materials and equipment that have been in contact with nuclear materials will be segregated and managed as appropriate for its contamination level. This waste will be disposed of offsite at appropriately permitted facilities.

The buildings and aboveground structures will be removed and disposed of as construction debris or recycled as appropriate. It is anticipated that waste management commercial options will have capacity to handle the wastes generated during decommissioning. Air emissions associated with the decommissioning activities will be minimal and are discussed in Section 4.6.

### 4.12.4 Summary of Waste Management Impacts

Similar nuclear material possession projects and developments located near the site of Radiant's Proposed Action have recently been evaluated for impact due to waste generation and disposal during the construction, operation and decommissioning phases of the projects. The NRC staff reviewed the Hermes Kairos ER on an adjacent property and performed its own independent assessment of the non-radiological waste management discussion through a combination of independent research and the review of other NRC EISs, including the 2019 NUREG-2226 (NRC 2019-TN6136), Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site, a project located approximately 4 mi from the proposed site. The staff found that the conclusions of the Hermes non-radiological waste component to be consistent with those of the CRN EIS and found that during all three life-cycle phases of the proposed Hermes project, the non-radiological waste impact from liquid, gaseous, and solid wastes would be SMALL, and mitigation would not be needed for releases during normal activities. The NRC staff also concluded that the uranium fuel cycle impacts and radiological waste management impacts from operation and decommissioning of the Kairos Hermes reactor would be SMALL. The waste management impacts from the three life cycle phases of R-50 would similarly be SMALL.

### 4.12.5 References

1. Kairos Power. 2023. Hermes Non-Power Reactor Environmental Report.

# 5. Mitigation Measures

Mitigation measures are those actions or processes that are implemented to avoid or minimize the magnitude of the impact of the Proposed Action on the affected environment, rectify (i.e., repair, rehabilitate, or restore) the affected environment, or compensate for the impact by providing substitute resources or environments as defined in 40 CFR 1508.20, Mitigation. This chapter summarizes the mitigation measures to reduce potential, adverse impacts (see Chapter 4 of this Report, Environmental Impacts) resulting from the construction, operation, and decommissioning of the Radiant R-50 site. This summary does not preclude additional mitigation measures that may be implemented by Radiant based on consultations with other regulatory agencies.

## 5.1 LAND USE

The use of the proposed site for R-50 is consistent with the City of Oak Ridge land use plans and zoning requirements. Decommissioning of R-50 will maintain the suitability of the site for future uses consistent with those same plans and requirements. As such, there are no impacts to onsite or offsite land use. No further mitigative measures are needed or proposed.

## 5.2 TRANSPORTATION

Transportation impacts are minor, consisting of incremental increases in local traffic from the workforce during construction, operation and decommissioning, offsite transportation of earthwork during construction, and transportation of waste materials and products during operation. It is expected that all transportation activities to and from the Project site will be conducted in compliance with all applicable local, state and federal requirements for vehicular transportation, including requirements related to noise, tailpipe emissions, transportation of hazardous and radioactive materials, and public safety. Transportation activities will be operated by appropriately licensed individuals. Radiant will discontinue the use of any transportation providers that cannot meet the applicable requirements.

Transportation activities related to construction generally occur during weekdays and daylight hours in compliance with all applicable restrictions of the City of Oak Ridge. Occasional work may be required during weekends to meet construction deadlines. Offsite transportation of earthwork during construction will be conducted in compliance with the requirements of the City of Oak Ridge, as implemented through the land use and related permits issued by the city. Earthwork trucks will be cleaned onsite prior to travelling on public roadways in compliance with the TDEC NPDES permit for construction activities.

Transportation activities related to decommissioning generally occur during weekdays and daylight hours in compliance with all applicable restrictions of the City of Oak Ridge. Occasional work may be required during weekends to meet decommissioning commitments. Offsite transportation of demolition debris during decommissioning will be conducted in compliance with the requirements of the City of Oak Ridge, as implemented through the required land disturbance and building permits issued by the city.

## 5.3 GEOLOGY AND SOILS

Project construction would require excavation, grading, and other land disturbing activities across the 84 acres site. Soils excavated from the Project site are disposed of at an existing approved off-site landfill, as the excavated material is assumed to be not suitable for backfill. To minimize erosion, excavated materials are stockpiled on level or gently sloped lands. Where slopes are steeper, appropriate erosion control measures including berms, silt fences, straw bales, ditch check dams, geotextiles, riprap, sedimentation basin and storm drain inlet/outlet protection are used to control erosion.

Decontamination and decommissioning of the Project would be conducted in accordance with applicable NRC license termination requirements. Soil testing will also be conducted to determine the presence of areas potentially contaminated by site activities. Any soils with elevated levels of constituents of concern are addressed by excavation and removal or addressed with other mitigative measures as appropriate in accordance with NRC and USEPA guidelines. Decontamination and decommissioning is also to be conducted to minimize soil erosion, compaction and alteration of on-site drainage patterns, to the extent practicable. Soils excavated and removed from the Project site are transported to an appropriate licensed disposal facility.

Other BMPs that are used to minimize impacts include the following:

- Following completion of facility construction, the temporary construction laydown/parking area are graded as needed to reverse the effects of compaction and are replanted with non-invasive herbaceous plant species.
- Establishment and implementation of an approved Decommissioning Plan for ultimate NRC release of the site for unrestricted use and license termination.

Karst features including sinkholes of various sizes, have been previously reported on lands adjacent to the Project site. To further characterize subsurface conditions at the Project site, a geotechnical investigation will be conducted in areas where the Project buildings (including the refueling building) will be located.

The Project will be constructed and operated in accordance with appropriate geotechnical and structural specifications, engineering design criteria, applicable building codes, and relevant NRC Regulatory Guidance. Therefore, additional mitigative measures are not warranted.

## 5.4 WATER RESOURCES

### 5.4.1 Surface Waters

No surface waters are present within the Project site boundaries. Poplar Creek flows around the northern, western, and southern portions of the site and serves as a tributary to the Clinch River. No new intake or discharge structures are planned for R-50. Therefore, the Proposed Action avoids direct impacts to surface water features. Potential indirect impacts to adjacent surface waters due to stormwater runoff will be mitigated through use of a SWPPP in accordance with a NPDES permit for construction discharges. This includes implementation of BMPs for erosion and sediment controls (e.g., silt fencing, straw bales, check dams, stabilized construction entrance, dust control, diversion swales, temporary sediment traps, and concrete washout containment) to prevent off-site transport to adjacent waters. The facility would comply with state/local stormwater standards via appropriate BMPs

and permanent stormwater management systems (e.g., detention areas, conveyance systems) may be installed.

### 5.4.2 Groundwater

Institutional Controls included in the deed for the property prohibit the extraction, consumption, exposure, or use, in any way, of the groundwater without the prior written approval of DOE, USEPA, and TDEC to ensure the protection of human health by preventing exposure to contaminants present in the groundwater. Additional provisions are included to prevent inadvertent exposure to contaminated groundwater and/or any contamination that could possibly be present in the soil. Construction, operation, and decommissioning activities would comply with a site-specific SGMP being developed in conjunction with the DOE, USEPA, and TDEC.

The use of construction materials and equipment can result in the release of liquids and potentially cause impacts to groundwater quality. Such spills can include accidental releases of oil and grease from equipment, including vehicles and hydraulic line failures, cement mixing, fuel leaks, and others. These impacts would be minimized through the following measures:

- Establishment of proposer engineering and design controls.
- Development of a Stormwater Pollution Prevention Plan (SWPPP) plan under the NPDES permit. A SWPPP minimizes or avoids releases to stormwater by regular maintenance and inspection of equipment and rapid response to spills to contain and prevent contaminants from reaching soil, sediment, or water.
- Containment of concrete washout.
- Construction entrance and tire cleaning equipment washing in accordance with the SWPPP.

During operations, outdoor storage tanks would be inspected, tested, and maintained as recommended by applicable industry codes and standards to prevent spills and leaks.

### 5.4.3 Water Use

Potable water for the Proposed Action would be sourced from the City of Oak Ridge Public Works and sanitary wastewater will be discharged directly to the public sanitary sewer system. Operational water usage is expected to be will within municipal excess capacity and wastewater would be discharged to the local treatment system with adequate capacity. Therefore, no mitigative measures are required.

### 5.4.4 Floodplains

The Proposed Action is not located within a mapped 100-year floodplain. As such, there are no impacts to floodplains during construction, operation, or decommissioning. Therefore, no mitigative measures are required.

### 5.4.5 Wetlands

There is one wetland identified within the Project site, but it is not located within the R-50 site footprint and no direct impacts to this wetland are proposed. Potential indirect impacts include increased sedimentation due to vegetational removal and ground disturbance in the vicinity of the wetland. As described in Section 5.4.1, indirect impacts would be minimized through implementation of erosion and

sediment control measures and other BMPs during construction, and appropriate stabilization and revegetation of disturbed areas once construction is complete.

## 5.5 ECOLOGICAL RESOURCES

Site disturbance activities would comply with federal, state, and local regulations. Impacts from the Proposed Action are minimized by site selection on previously disturbed and periodically maintained area with no high-quality habitat or vegetation communities.

In addition to the BMPs described in Section 4.5, which protect aquatic resources in the vicinity of the Project site, and implementation of stormwater controls in accordance with a prepared SWPPP, potential ecological resources mitigation measures could include:

- Re-grading disturbed areas as appropriate and planting with a native seed mix to prevent erosion and limit the invasion of non-native, weedy species.
- Limiting land disturbance for R-50 to areas of herbaceous cover and existing gravel/paved areas with limited tree clearing between October 1 and March 31. This allows for the avoidance of adverse impacts in areas that may provide habitat for roosting and nesting wildlife species.

In addition to the management practices listed above, recommendations from consultations with the USFWS and TDEC would be considered and implemented, as appropriate.

## 5.6 AIR QUALITY

During construction, additional traffic and equipment movement may generate fugitive dust. These emissions are transient, limited to the construction phase and localized near R-50. To mitigate fugitive dust production, BMPs are used to prevent particulate matter and/or suspended particulate matter from becoming airborne. Mitigation measures for fugitive dust production include the following:

- The use of water spray or soil binders on soil surfaces, when necessary, in clearing and grading operations.
- The use of adequate soil containment methods during excavation and similar operations.
- Covering the beds of open-bodied trucks transporting materials likely to give rise to airborne dust when in motion.
- The prompt removal of earthen materials on paved roads accidentally placed there by trucks or earth moving equipment, or by wind erosion.
- Prompt stabilization or covering of bare areas once any earthmoving activities are completed.

Construction equipment may generate transient visible emissions. Proper maintenance of gas and diesel-powered equipment mitigates excessive visible emissions.

During operations, as discussed in Section 4.6.2, dust, vapors, or particulate material may be emitted from building exhaust, subslab vapor mitigation system exhaust, emergency diesel generators, and a potential natural gas-powered heater. During operations, radioactive emissions monitoring will be used, and preventative maintenance will be applied to maintain the HEPA air filters within operating limits.

Air emission sources at R-50 are managed in accordance with federal, state, and local air-quality control laws and regulations. The Proposed Action would comply with all regulatory requirements of the Clean Air Act and TDEC requirements to minimize impacts on state and regional air quality.

Operations will also result in potential air emissions from employee vehicle traffic, materials supplies, waste shipments, and TRISO fuel deliveries. Nominal localized increases in emissions occur due to the increased number of cars, trucks, delivery vehicles, and rail cars traveling to and from R-50. Most of the increased traffic is associated with employees commuting to and from work.

During decommissioning, demolition, vehicle traffic and equipment movement around the Project site may generate transient fugitive dust. As during the construction phase, these emissions may impact localized air quality for short periods of time. To control or mitigate fugitive dust production, BMPs, as discussed above, would be used to prevent particulate matter from becoming airborne.

## 5.7 NOISE

To reduce noise impacts associated with construction, mitigation options that may be considered are listed below:

- Equipping construction equipment with the manufacturer's noise control devices and maintaining these devices in effective operating condition.
- Utilizing quiet equipment or methods to minimize noise emissions during an activity, when possible.
- Operating equipment with internal combustion engines at the lowest operating speed to minimize noise emissions, when possible and practical.
- Closing engine housing doors during operation of the equipment to reduce noise emissions from the engine.
- Avoiding equipment engine idling.
- Utilizing quitter, less-tonal back-up alarms on construction equipment. These alarms should comply with all applicable safety restrictions, such as Occupational Safety and Health Administration (OSHA) standards.
- Performing construction-related activities generally during weekdays and daylight hours to avoid noise impacts when ambient noise levels are low.

As described in Section 4.7.2, noise associated with normal operations and loss of power operations would comply with the City of Oak Ridge Zoning Ordinance noise standards. No mitigation measures are required.

## 5.8 HISTORIC AND CULTURAL RESOURCES

As described in Section 4.8, given the past demolition and remediation at R-50, ground disturbing activities associated with the development are not expected to have a significant impact on historic and cultural resources. Additionally, there are no previously identified historic or cultural resources located within the R-50 site footprint. The following mitigative measures would be employed to minimize impacts in the event of an inadvertent discovery of human remains or archaeological resources during construction:

- Construction personnel will stop work and contact a Radiant representative.
- Radiant will contact the appropriate local law enforcement and historic preservation officers.
- If the human remains are determined to be archaeological in nature, historic preservation officers, in conjunction with Radiant, will determine what further actions will be taken.

In addition, recommendations from consultations with the Tennessee SHPO and regional THPOs would be considered and implemented as appropriate.

## 5.9 VISUAL AND SCENIC RESOURCES

Given the limited public visibility of R-50 and the incorporation of design standards and requirements of the City of Oak Ridge into the facility design, no further mitigation measures are warranted.

## 5.10 SOCIOECONOMICS

Population and community services impacts from construction, operation, and decommissioning of the Proposed Action are minor and economic impacts are beneficial. Therefore, no mitigation measures are needed.

## 5.11 PUBLIC HEALTH

This section describes the mitigation measures to minimize public health impacts of non-radiological and radiological hazards as a result of the Proposed Action.

### 5.11.1 Non-Radiological Hazards

Management measures and regulatory controls are implemented to minimize public and occupational health impacts. These measures include:

- Development of an NRC-required Emergency Plan.
- Inspection, testing, and maintenance of outdoor storage tanks as recommended by applicable industry codes and standards.
- Adherence to the OSHA Occupational Safety and Health Standards (29 CFR 1910) to ensure that in-facility emissions do not exceed OSHA's occupational safety and health standards for toxic and hazardous substances, in accordance with 29 CFR 1910 Subpart Z.

### 5.11.2 Radiological Hazards

As described in Section 4.12.2, operational activities for the Proposed Action involve handling only new, unirradiated TRISO fuel, whose robust coated particle design provides strong containment of radionuclides. As a result, staff doses are expected to be dominated by low-level external exposure in RCAs, with negligible internal dose and near-background conditions at the Project site boundary. Mitigation measures are used to keep the hazard from radiological sources As Low As Reasonably Achievable (ALARA). Both engineered and administrative controls are used. The R-50 site would use the following controls to minimize radiation exposure to the public and workers:

- Radiation source identification
- Confinement around radiation sources

- Ventilation control
- Access control to radiation areas
- Contamination control
- Waste minimization
- Hazard identification and management controls

## 5.12 WASTE MANAGEMENT

General pollution prevention and waste minimization measures include:

- Use of HEPA filters to mitigate gaseous waste, which can be disposed of as industrial waste.
- TRISO fuel handling materials will be reused in the process and would not be considered waste.
- Employee training and education on general environmental activities, pollution prevention, and hazards regarding the facility and operations.
- Requirements for employees to consider pollution prevention and waste minimization in day-to-day activities and engineering.

# 6. Environmental Measurements and Monitoring Programs

This section describes all environmental measurement and monitoring programs as they apply to baseline, operation, and decommissioning conditions for the Proposed Action and each alternative.

## 6.1 EFFLUENT MONITORING PROGRAM

The R-50 site will conduct effluent monitoring as may be required by environmental permit or regulations. Radiant will be required to obtain an air permit if the option to install the natural gas fired heater is pursued. It is not anticipated that direct effluent monitoring will be required for this unit, however, operating parameters may need to be logged and reported to TDEC. Other effluents may include discharges to the sanitary sewer consisting of sanitary waste and some minimal wash waters. Radiant would comply with the effluent monitoring requirement that may be issued under a discharge agreement with the local treatment works. It is likely that stormwater effluent will be required to be monitored consistent with the requirements of the TN General Permit for Stormwater Discharges Associated with Industrial Activity. Those samples will be collected from stormwater outfalls during storm events as required by the permit.

The Project operations will also generate effluents in the form of solid and industrial waste. Radiant will keep records of the volume of generation and will sample the waste for characterization purposes to arrange for offsite disposal.

Radiant will monitor the effluent from the vapor intrusion mitigation systems to determine its effectiveness and to characterize the discharge. This monitoring program will be established with TDEC and documented in an Operations and Maintenance (O&M) Plan for the system. Results will be reported to TDEC.

### 6.1.1 Radiological Environmental Monitoring Program

The R-50 site will perform radiation monitoring within the manufacturing facility to determine occupational exposures and will use sensors on the ventilation system to check on effluent discharges. Because there will be no irradiation of the TRISO fuel during the Proposed Action the radioactive discharges are anticipated to be below measurement.

The ORR continues to operate a network of ambient air monitoring stations and the closest unit to the Project site is Station #35, south of the ETTP. This network is operated by a contractor under DOE and reports are publicly accessible. This monitoring station would provide a source of air detections before the construction (baseline) which can be compared to monitoring results during operation of the Proposed Action.

The Proposed Action does not include irradiation of TRISO fuel, therefore no physiochemical monitoring is proposed to be conducted on the Project site. Baseline information from the physical and chemical parameters in the region is monitored and reported by DOE's ORR Program.

## 6.2 ECOLOGICAL MONITORING

The Proposed Action does not include irradiation of TRISO fuel, therefore no ecological monitoring is proposed to be conducted on the Project site. Baseline information from soil and wildlife in the region is monitored and reported by DOE's ORR Program.

## 6.3 HISTORIC AND CULTURAL RESOURCES MONITORING

No historic and cultural resources monitoring is anticipated at the Project site. Should materials of cultural significance be uncovered during the preparation of the Project site and construction work, the work will cease, and appropriate consultations will be made prior to construction resuming.

### 6.3.1 References

1. https://www.ornl.gov/content/atmospheric-radiation-measurement-arm

# 7. Cost Benefit Analysis

The costs and benefits of the Proposed Action and no-action alternative are considered in this chapter to assist in evaluating environmental consequences. Costs and benefits are presented, where possible, in monetary terms. Some important costs and benefits that cannot be quantified in monetary terms, such as environmental impacts, are presented qualitatively.

## 7.1 PROPOSED ACTION

### 7.1.1 Costs of Construction

The costs associated with the Proposed Action are both monetary and environmental in nature.

Monetary costs include capital expenditures associated with site preparation, facility construction, equipment procurement, and long-term operation and maintenance of the proposed R-50 site in Oak Ridge. Construction and commissioning costs for Phase 1 of the project include site preparation, building construction, machinery/equipment, security systems, and commissioning activities, with capital expenditures estimated at approximately $30-$45 million. Ongoing operational costs include staffing, utilities, maintenance, regulatory compliance, and environmental monitoring, with annual operating costs estimated at approximately $5-$10 million and scaling as production grow.

The project is planned to be developed in phases. This Environmental Report evaluates Phase 1 of the Proposed Action. Additional phases, if pursued, would involve expanded facilities or operations and would incur additional capital and operating costs. These future phases would be subject to separate evaluation and regulatory review, as appropriate.

Environmental costs associated with the Proposed Action primarily occur during the construction phase and include temporary disturbances to land, vegetation, and soils within the project site. Site preparation and construction activities result in short-term increases in noise, dust, and construction-related emissions, as well as the generation of construction debris and solid waste. These impacts are localized and occur within previously developed areas of the site.
Operational environmental costs include routine resource consumption, such as electricity and water, and minor impacts related to air quality, noise, and waste management. These costs are controlled through engineered systems and maintained within applicable permitted limits.

### 7.1.2 Benefits of Construction

The Proposed Action provides economic, environmental, and societal benefits at the local, state, and federal levels. Construction and operation of the proposed facility in Oak Ridge increase tax revenues through property taxes, sales and use taxes, payroll taxes, and corporate income taxes. At this time annual property tax revenues associated with the facility are most readily quantifiable and are estimated to grow to approximately $2-$3 million, based on the anticipated assessed value of site improvements.

Public health and safety benefits result from regulatory oversight under Nuclear Regulatory Commission licensing requirements. Facility design and operations incorporate engineered safety features, radiological protection programs, occupational safety controls, and emergency preparedness planning.

These measures limit worker exposures, protect members of the public, and reduce the likelihood and consequences of accidental releases by applying operational controls and regulatory requirements that are more stringent than those applicable to many conventional industrial activities.

Regional productivity benefits occur through integration with the existing nuclear ecosystem in Oak Ridge. Proximity to other nuclear technology vendors, post-secondary education institutions, and research facilities, supports workforce specialization, knowledge sharing, and supply-chain efficiencies. These factors contribute to increased regional competitiveness and reinforce Oak Ridge's role in advanced nuclear development.

Construction and operation employment supports growth in the local and regional workforce. Construction activities are expected to employ approximately 100 workers over the construction period. Operational employment is expected to ramp from approximately 20 employees at initial operations to 250+ employees at steady-state operations, with average annual wages of approximately $72,000. Increased employment contributes to demand for housing, retail services, and recreational amenities, encouraging additional private investment and community development. These secondary economic effects contribute to long-term economic stability and quality of life in the surrounding area.

Transportation and infrastructure benefits result from increased use of existing roadway networks and supporting services. Construction and operational traffic utilize established transportation corridors, generating additional fuel tax revenues and usage-based funding that support roadway maintenance and incremental improvements. These investments benefit both the project workforce and the surrounding community that relies on the same transportation infrastructure.

Additional benefits include directly supporting the DOE's statutory mission to advance the nation's energy security, promote reliable power generation, and enable the safe development and deployment of next-generation nuclear technologies. It also advances Administration nuclear energy goals identified in the President's Executive Orders related to increasing civilian and military nuclear energy capacity, reactor testing capability, and workforce development.

## 7.2 NO-ACTION ALTERNATIVE

Under the no-action alternative, the NRC would not issue a license for the construction and operation of Radiant's Kaleidos microreactor manufacturing facility. As a result, the facility would not be built, and production of Kaleidos microreactors would not proceed. This would prevent the deployment of microreactors designed to provide power and heat for decentralized generation in civilian, industrial, and defense sectors, as supported by the USDOE Microreactor Program. Led by INL, this program focuses on research and development to advance microreactor technologies, reduce risks related to performance and manufacturing, and ensure commercial entities can license and deploy these systems for specific use cases.

Consequently, remote areas, emergency response operations, and military installations would continue to rely on existing diesel generators, maintaining higher greenhouse gas emissions, air and noise pollution, and logistical challenges associated with diesel fuel supply. The no-action alternative would avoid direct environmental impacts from facility construction, such as land disturbance or potential radiological risks during production. However, it would forgo benefits including reduced carbon emissions, enhanced energy reliability, and local economic growth from job creation. Additionally, it

would hinder progress in the DOE Microreactor Program's goals of advancing microreactor technology readiness and supporting commercial deployment for diverse energy needs.

## 7.3 OVERALL COST-BENEFIT CONCLUSIONS

Overall, the costs associated with the Proposed Action are largely localized, temporary, or managed through established regulatory programs. When considered in combination with the anticipated economic, environmental, and public health benefits, these costs do not represent an unreasonable burden on the human or natural environment.

The broader purpose of the Proposed Action is to support the deployment of self-contained nuclear reactor technology for electrical energy generation at selected customer sites using Radiant's Kaleidos technology. A customer site may benefit from a self-contained reactor due to remoteness of the location, unavailability of supporting infrastructure for power connections, difficulty in obtaining fuel sources for conventional electrical generation, or installations that require high amounts of electrical energy usage that could put a strain on other energy resources. By enabling the manufacture of the Kaleidos units, it replaces the potential for 72,000 tons of $CO_2$ during the 20-year life span anticipated for the unit as compared to energy production from traditional sources. While the deployment of individual units would occur at customer-selected sites and is outside the scope of this Environmental Report, the Proposed Action enables these downstream environmental benefits through the establishment and operation of the proposed facility.

Taken together, the localized and manageable costs of the Proposed Action are outweighed by its contribution to economic development, public health and safety, energy reliability, and long-term environmental benefits.

# 8. Summary of Environmental Consequences

This section summarizes the Project's environmental consequences that cannot be avoided and where no reasonable mitigation options are available to compensate for any resulting impacts. The proposed environmental impacts that would result from the construction, operation, and decommissioning of the Project are presented in Section 4.0 of this ER. The proposed mitigation measures to minimize potential adverse impacts are summarized in Section 5.0 of this ER.

## 8.1 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

The potential environmental impacts by resource category are summarized in Section 2.4 for the construction and operation of the Project. Tables 2.4-1 and 2.4-2 are based on comprehensive impact analysis for each resource category presented in Section 4.0. Unavoidable adverse impacts of the Project after implementation of mitigation measures to control and minimize potential adverse impacts are SMALL for all resources.

## 8.2 IRREEVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The NRC in NUREG 1748 defines "irreversible and irretrievable commitments of resources" as the commitment of environmental resources that cannot be restored and the commitment of material resources that once used cannot be recycled or restored for other uses by any practical means.

### 8.2.1 Irreversible Resource Commitments

No commitments of environmental resources were identified for the construction, operation, and decommissioning of the Project that could not be restored after the closure and decommissioning of the Project site for reuse (excluding the material resources discussed in Section 8.2.2). As stated in Section 4.4.1.2, all water required for Project operation will be obtained from the City of Oak Ridge's public water distribution system. The resulting sanitary wastewater from the Project's water usage will be discharged to the City of Oak Ridge municipal sanitary sewer collection system. As noted in Section 4.4. 1.2, surface water runoff will be redirected into stormwater management features to be constructed for the Project since there is no municipal storm water system. In addition, there are no direct impacts to surface water hydrology or water availability as a result of water use by the facility, therefore there are no irreversible impacts. No solid waste generated by Project operations will be disposed of at the Project site. Radiant will decommission the Project at the end of its operational life. The Project site will be decommissioned as open space. Future use of the Project site will be industrial and will therefore not result in a change to existing land use. The transportation, air quality, noise, visual, and public and occupational health impacts associated with the operation of the Project would cease with the permanent shutdown and decommissioning of the Project.

The Project requires the irreversible commitment of land use resources at the offsite land disposal facilities that are used for the permanent disposal of the waste generated by the construction, operation, and decommissioning of the Project. The proposed waste will include nonhazardous and hazardous waste as described in Section 4.13 of this ER.

### 8.2.2 Irretrievable Resource Commitments

Project construction requires concrete, steel, nonferrous metals, plastics, soil borrow and other material resources necessary for the manufacturing of the equipment and the building of the structures essential for the operation of the Project. The specific types and quantities of these materials ultimately depend on the Project's final design. These materials are considered irretrievable unless they are recycled at decommissioning. In general, use of construction materials in the quantity expected for this Project will have a SMALL impact with respect to the availability of these resources regionally.

Project operation will require TRISO fuel to power the Kaleidos nuclear microreactors. At the end of their use, the material is disposed of and stored on site as spent fuel. Final disposal of spent fuel is an irretrievable resource commitment.

The electrical power required for Project operation will be supplied by the Oak Ridge Electric Department, which provides electricity from the Tennessee Valley Authority to power its grid. At times of electric utility power outages, stand-by power is provided by the Project's on-site diesel electric generator. In addition, diesel fuel and gasoline are used to operate the motor vehicles used for Project construction, operation, and decommissioning. The consumption of fossil and nuclear fuels to provide the energy to operate the Project is an irretrievable commitment of material resources.

Project construction, operation, and decommissioning will generate a combination of nonhazardous and hazardous waste streams. Those waste materials that cannot be recovered or recycled, and, therefore, need to be disposed of (i.e., off-site landfill disposal), represent an irretrievable commitment of material resources. Hazardous and non-hazardous waste shipped off-site to a licensed land-disposal facility results in the permanent removal of a portion of land surface area for other land uses.

## 8.3 SHORT-TERM AND LONG-TERM IMPACTS

The NRC defines the terms "short-term period" and "long-term period" in Section 5.8 of NUREG-1748 (NRC, 2003). Short-term represents the period from start of construction to the end of the Project, including decommissioning. Long-term represents the period extending beyond the end of the Project.

The short-term environmental impacts of the Project are discussed in Section 4.0 and summarized under each sub section by resource. The long-term environmental impacts of the Project are related to available land use beyond the decommissioning and permanent closure of the Project. The Project will be decommissioned in accordance with applicable NRC license termination requirements at the end of its useful life. Radiant plans to decommission and close the Project to reduce the level of radioactivity remaining in the Project facility to residual levels acceptable for release of the Project site for unrestricted use and for NRC license termination. Any radioactive equipment and materials will be disposed of during decommissioning according to local, state and federal laws and regulations. Decommissioning and closure activities include the cleaning and removal of radioactive and hazardous waste contamination that may be present on materials, equipment, and structures.

The future land use of the area on which the Project is located is expected to be legally unrestricted. The actual long-term use of the land will likely remain industrial. Similarly, waste generated by the construction and operation of the Project and sent off-site for disposal removes land associated with the disposal site from future alternative uses.

## 8.4 SHORT-TERM USES OF ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The NRC defines the terms “short-term uses” and “long-term productivity” in Section 5.8 of NUREG-1748 (NRC, 2003). Short-term uses generally affect the present quality of life for the public (i.e., the planned licensing period for the Project). Long-term productivity affects the quality of life for future generations based on environmental sustainability (i.e., the period after license termination for the Project).

Project construction, operation, and decommissioning will require short-term uses of environmental resources that have a minimal impact on the quality of life for the public. Project impacts on the public from the short-term use of these environmental resources are controlled and minimized to the extent practicable with the implementation of mitigation measures and BMPs. However, none of these impacts represent long-term effects that impact future productivity of the Project site. Long-term impacts that affect the future productivity of the site are limited to decommissioning activities. As referenced in Section 4.1.5, decommissioning of the Project site will result in open space, allowing the site to remain available for future industrial purposes.

As stated in Section 4.8, since all the K-27 and K-29 historic buildings have been demolished, the potential for any impacts to historic structures is low. There were six historic cemeteries, and 17 previously recorded archaeological sites identified within 1 mile of the Project site, including one archaeological site within the Project site. However, the Project will not impact this site. The rugged topography of the region, distance of the historic sites from the Project site, and existing vegetation obscures Project visibility from the viewshed of these sites. Therefore, impacts to historic and cultural resources will be SMALL. The Project will result in SMALL impacts to visually sensitive sites (Section 4.9.1.3) outside of the ETTP perimeter vicinity or alter the existing visual character and industrial land use. Potential impacts from soil and geological conditions (Section 4.3) on the Project are SMALL and will be mitigated through institutional and engineering controls.

As discussed throughout Section 4.4, water-quality impacts from construction and operation of the Project are SMALL due to the use of BMPs and standard waste treatment operations. The Project does not propose using surface or groundwater as a source of water. Project impacts on groundwater quality are SMALL. Groundwater levels are not anticipated to change as a result of the construction and operation of the Project. As stated in Section 4.5.2, there are no direct impacts to wetlands. Indirect impacts to wetland resources are SMALL and controlled using BMPs.

As discussed in Section 4.5, construction and operation of the Project may displace some local wildlife populations to adjacent habitat but is not expected to disrupt wildlife travel corridors. No direct impacts to rare or unique habitats or commercially or recreationally valuable species result from the Project. Therefore, the direct and indirect impacts to ecological resources from the Proposed Action are SMALL.

As discussed in Section 4.12, Public and Occupational Health Impacts, workers at the Project site will use appropriate safety equipment and procedures to limit to acceptable levels of any radiation and chemical exposure that occurs during the material-handling and maintenance activities required for fueling and refueling of the Kaleidos reactors. During all phases of the Project, air emissions control systems, monitoring programs, and BMPs (Section 4.6.4) will remain in place to not significantly affect the ambient air concentration levels. As stated earlier, wastewater generated by the Project operation will be discharged to the City of Oak Ridge municipal sanitary sewer collection system. Per Section 4.13**,** all

non-radioactive solid waste is managed on-site in accordance with good waste storage and handling practices and then shipped off-site for recycling, re-use, or final treatment or disposal at licensed facilities appropriate for the specific type of waste. During construction, some excavation and grading may be required which would require the removal of soils from the site which may potentially have contamination from historic site activities. These will consider screening and analytical testing of materials to determine appropriate offsite disposal in accordance with the characteristics of the wastes. As stated throughout Section 4.10.2, adverse population and community services impacts are SMALL. Economic impacts are SMALL and beneficial. The numbers of workers required for construction, operation, and decommissioning of the Project are expected not to significantly affect housing, educational, medical, law enforcement, and fire services in the region (Section 4.10.1). The Proposed Action is not expected to result in disproportionately adverse impacts on low-income or minority residents (Section 4.11.1.1). The beneficial impacts from the in-migration of the construction workforce and indirect economic output and employment resulting from construction and operation cease once the facility is decommissioned. However, this does not affect long-term productivity in the region.

The Project site is located on land previously dedicated to industrial activities. As stated in Section 4.2.1, motor vehicle traffic generated by the construction and operation of the Project will result in an incremental increase in the daily vehicle trips on State Route 58 (Oak Ridge Turnpike), State Route 327 (Blair Road), and other local connecting roadways in the vicinity of the facility. The impacts of the cumulative daily vehicle trips on local traffic flow will be SMALL (Section 4.2.1). On a regional basis, the cumulative transportation impacts from the Project are SMALL. As stated in Section 4.7.2, impacts to adjacent land uses from both normal and loss of power operation as well as associated traffic noise of the Project are SMALL.

The construction, operation, and decommissioning of the Project will permanently consume materials and energy resources that will no longer be available for use by future generations. As discussed previously, upon the permanent closure of the Project, Radiant will decommission the buildings and equipment and restore the land for reuse for future alternative land use.

The construction and operation of the Project require short-term commitment of resources and permanently commits certain resources (e.g., land, uranium ore, energy, construction materials) to the facility's construction and operation. The short-term use of such resources results in the long-term socioeconomic benefits to the local area and the region through continued (and incremental) employment and expenditures as described in Section 4.10 (Socioeconomic Impacts). Long-term productivity is facilitated by investment in dependent businesses in the local area and region and provides further socioeconomic benefits to the local area and the region.

# 9. References

References are provided at the end of each ER Section.

# 10. List of Preparers

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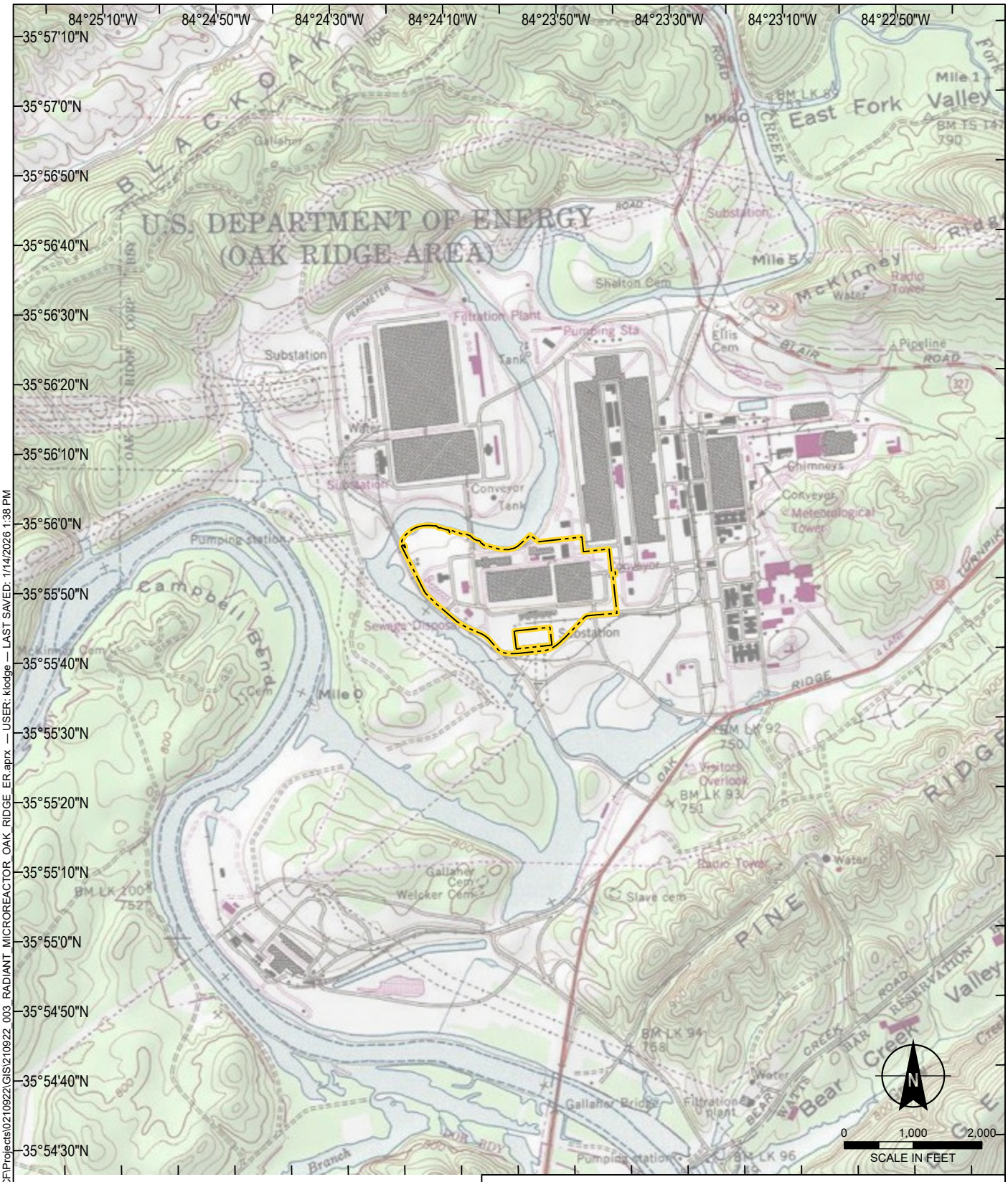
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Cleveland Tarp
Hydrogeologist
M.S. Geology, University of Georgia
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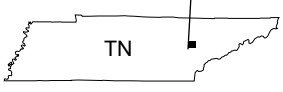
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Lauren Cleeland
Principal Investigator
PhD, Anthropology, University of Oklahoma
B.A., Anthropology, University of Oklahoma

# FIGURES




PROJECT LOCATION




**LEGEND**

PROJECT SITE

MAP SOURCE: USGS USA TOPOGRAPHIC MAP

HALEY ALDRICH

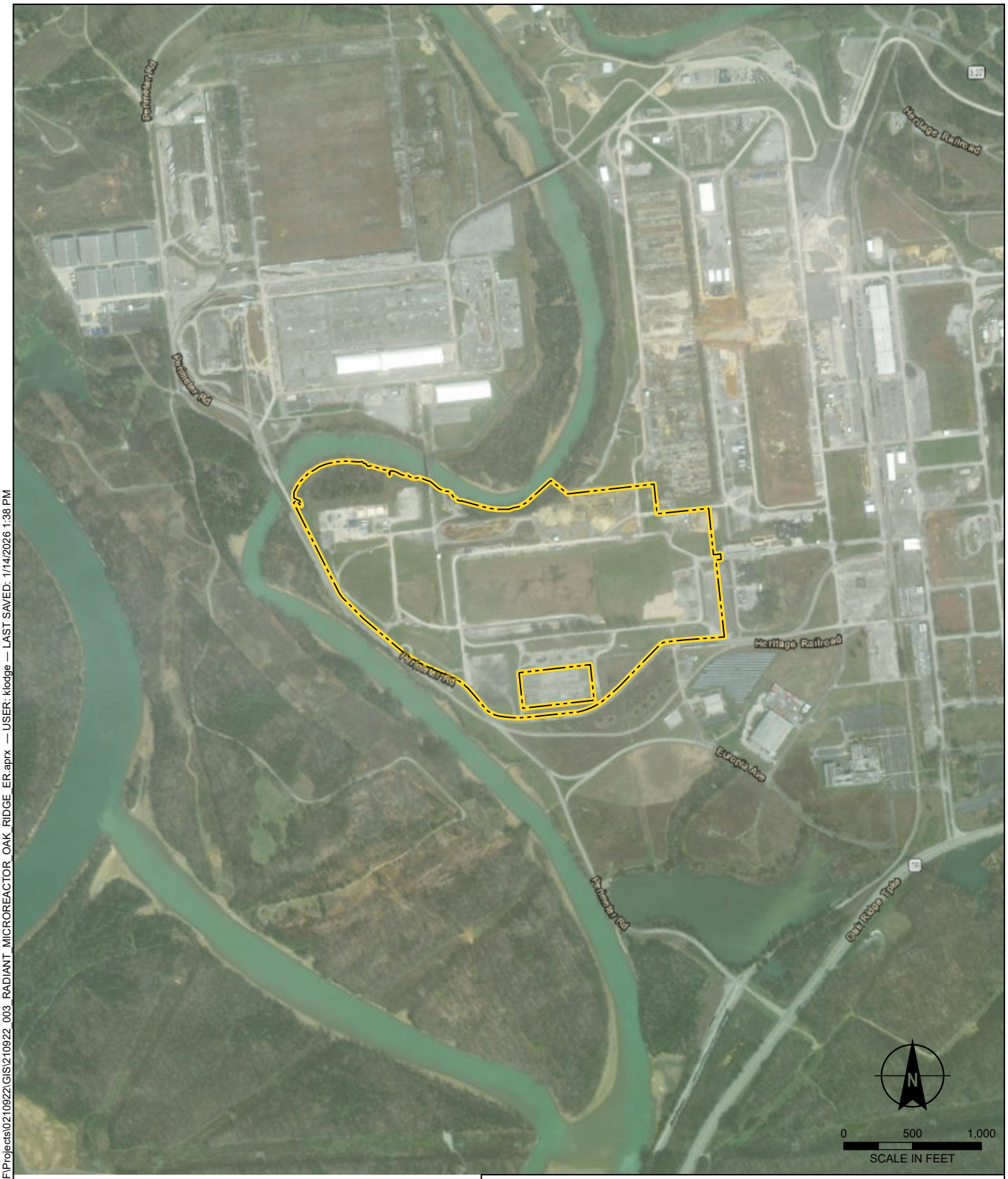
RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# PROJECT SITE LOCATION

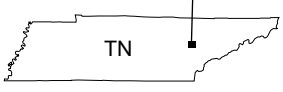
APPROXIMATE SCALE: 1 IN = 2,000 FT
JANUARY 2026

FIGURE 1.2-1

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM




PROJECT LOCATION




**LEGEND**

PROJECT SITE

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (03/10/2023)

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OAK RIDGE, TENNESSEE

# PROJECT SITE ON AERIAL MAP

APPROXIMATE SCALE: 1 IN = 1,000 FT
JANUARY 2026

FIGURE 1.2-2

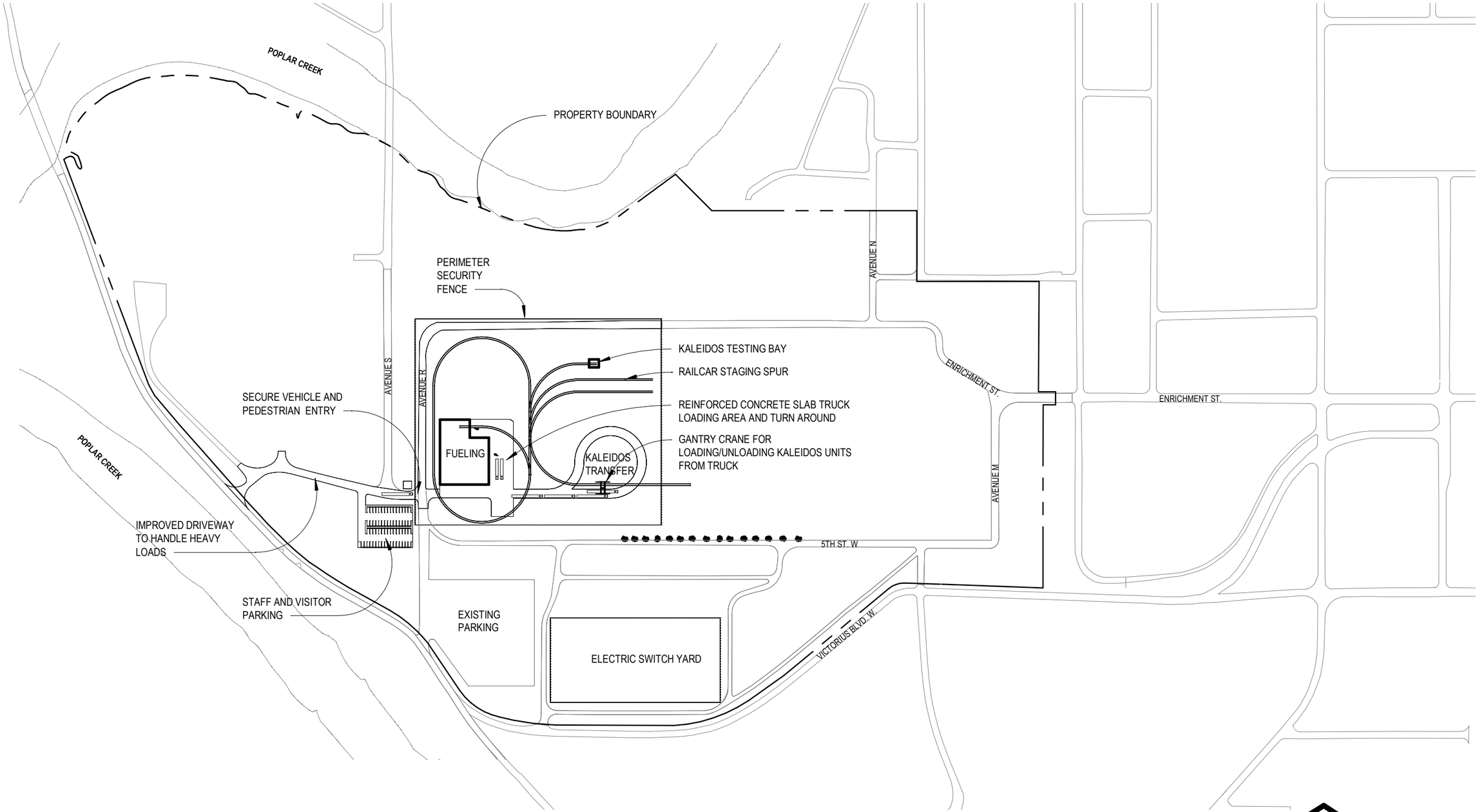
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# RADIANT INDUSTRIES - OAK RIDGE SITE

**Figure 1.2-3: Conceptual Layout**

5455-002-00

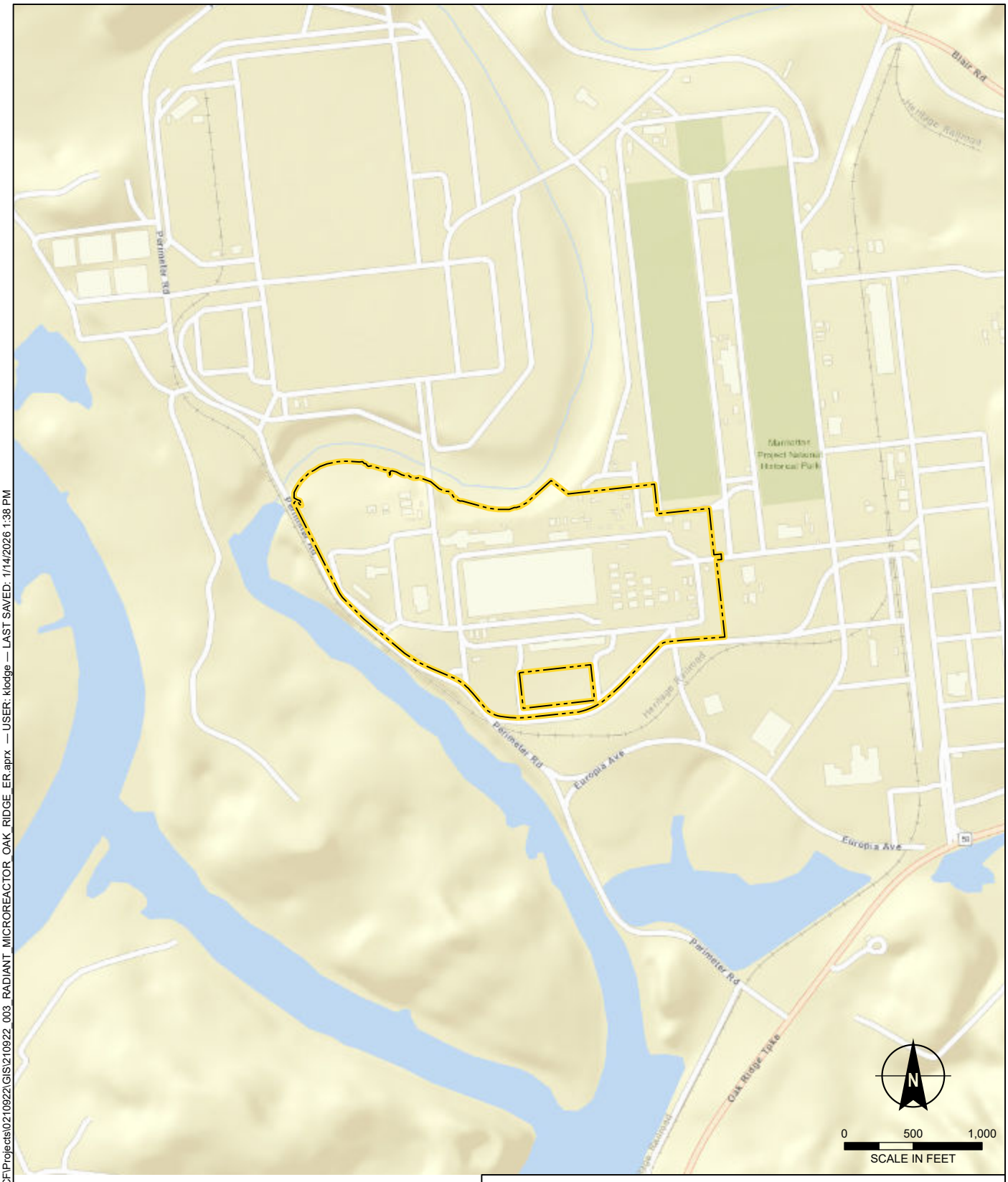
SITE PLAN OVERALL - PHASE 1 ONLY



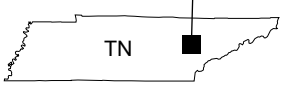

HGA

12.15.25

1" = 300'-0"




PROJECT LOCATION




**LEGEND**

PROJECT SITE

MAP SOURCE: ESRI WORLD STREET MAP

HALEY ALDRICH

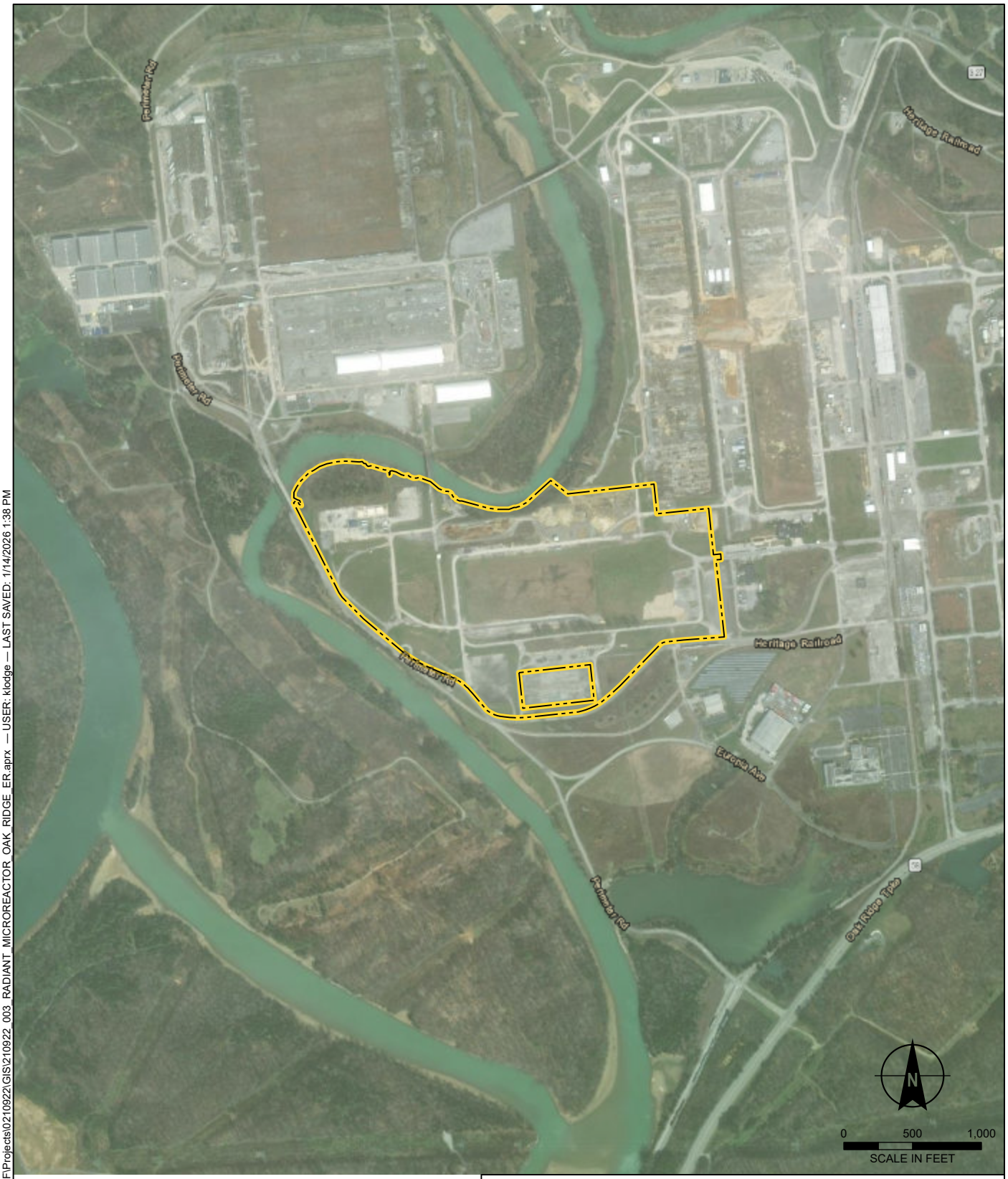
RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# PROJECT LAYOUT WITH HIGHWAYS AND RAILWAYS

APPROXIMATE SCALE: 1 IN = 1,000 FT
JANUARY 2026

FIGURE 2.1-1

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM




PROJECT LOCATION

TN

**LEGEND**

PROJECT SITE

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (03/10/2023)

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# PROJECT LAYOUT WITH AERIAL IMAGERY

APPROXIMATE SCALE: 1 IN = 1,000 FT
JANUARY 2026

FIGURE 2.1-2

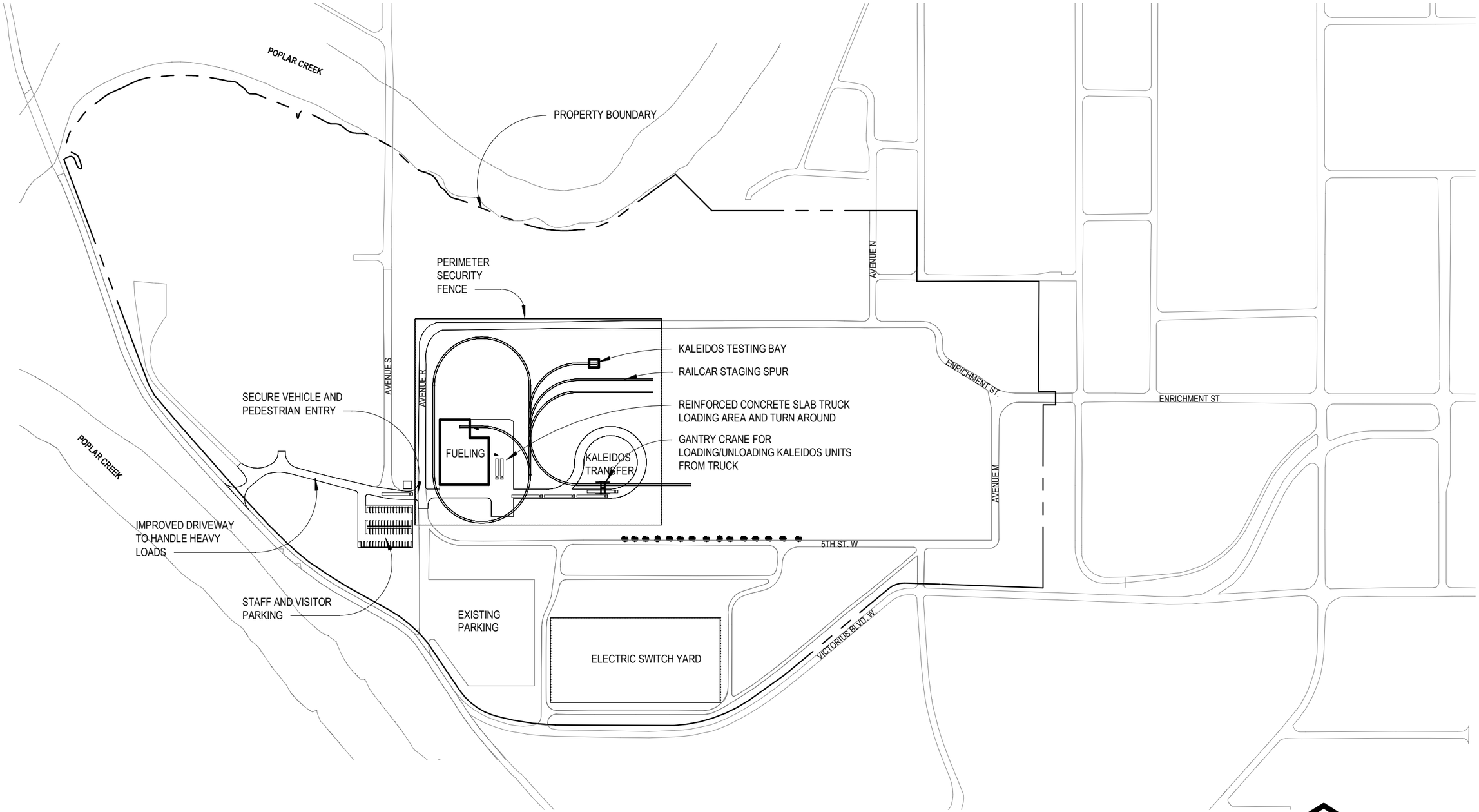
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# RADIANT INDUSTRIES - OAK RIDGE SITE

**Figure 2.1-3: Conceptual Layout**

5455-002-00

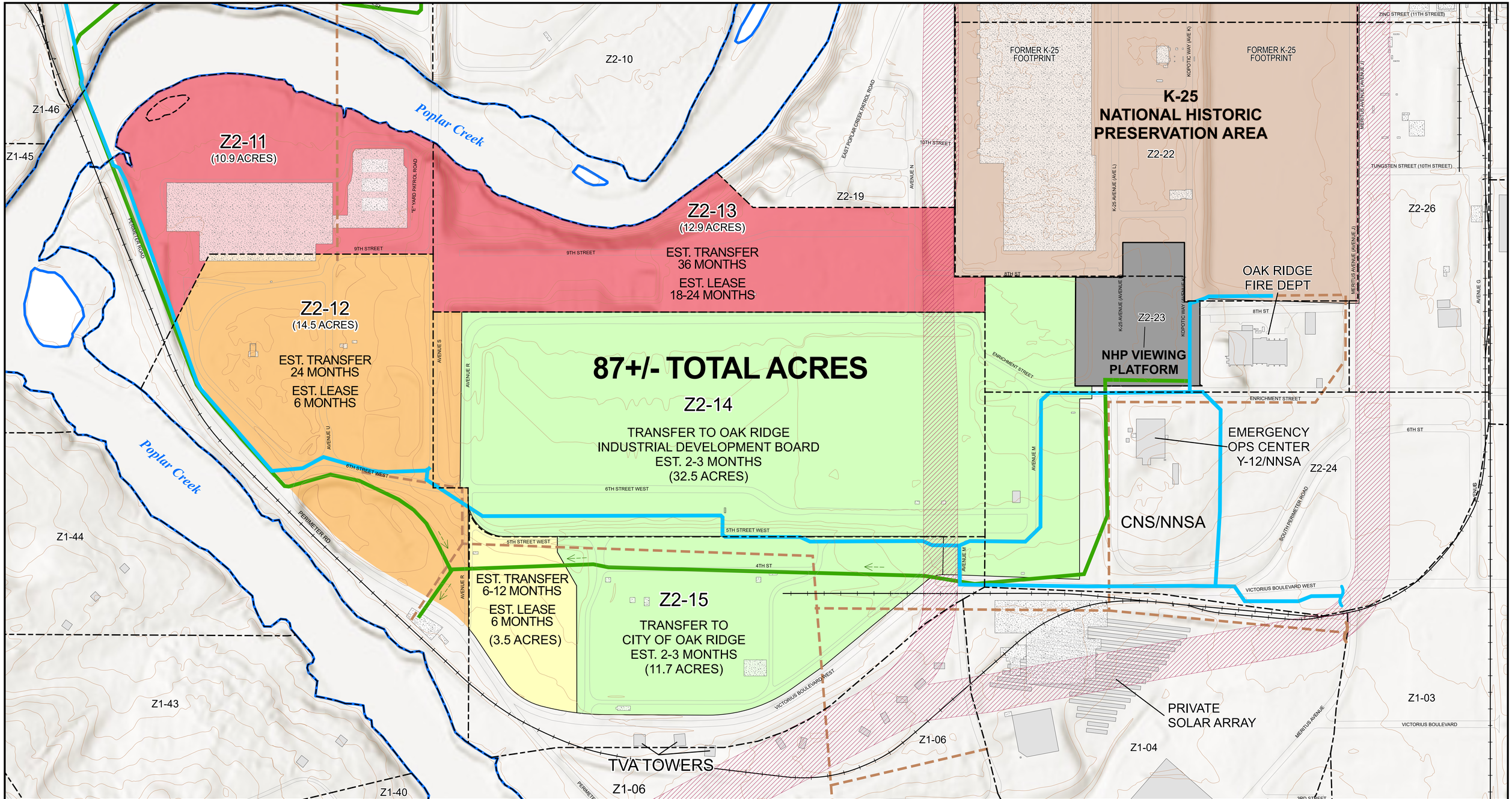
SITE PLAN OVERALL - PHASE 1 ONLY




HGA

12.15.25

1" = 300'-0"




## LEGEND

- 44.2 ACRES
- 3.5 ACRES
- 15.5 ACRES
- 23.9 ACRES
- TOTAL POTENTIAL TRANSFER AREA
- CONCRETE SLAB FOUNDATION
- ELECTRICAL DUCT BANK
- WATER LINE EASEMENT
- SEWER EASEMENT
- ELECTRICAL DISTRIBUTION
- SURFACE WATER
- EXPOSURE UNIT BOUNDARY
- ROAD
- RAILROAD TRACKS
- 5 FT CONTOUR LINE

5.39°±
ETTP GRID
TRUE NORTH

0 100 200 300 400 500
FEET

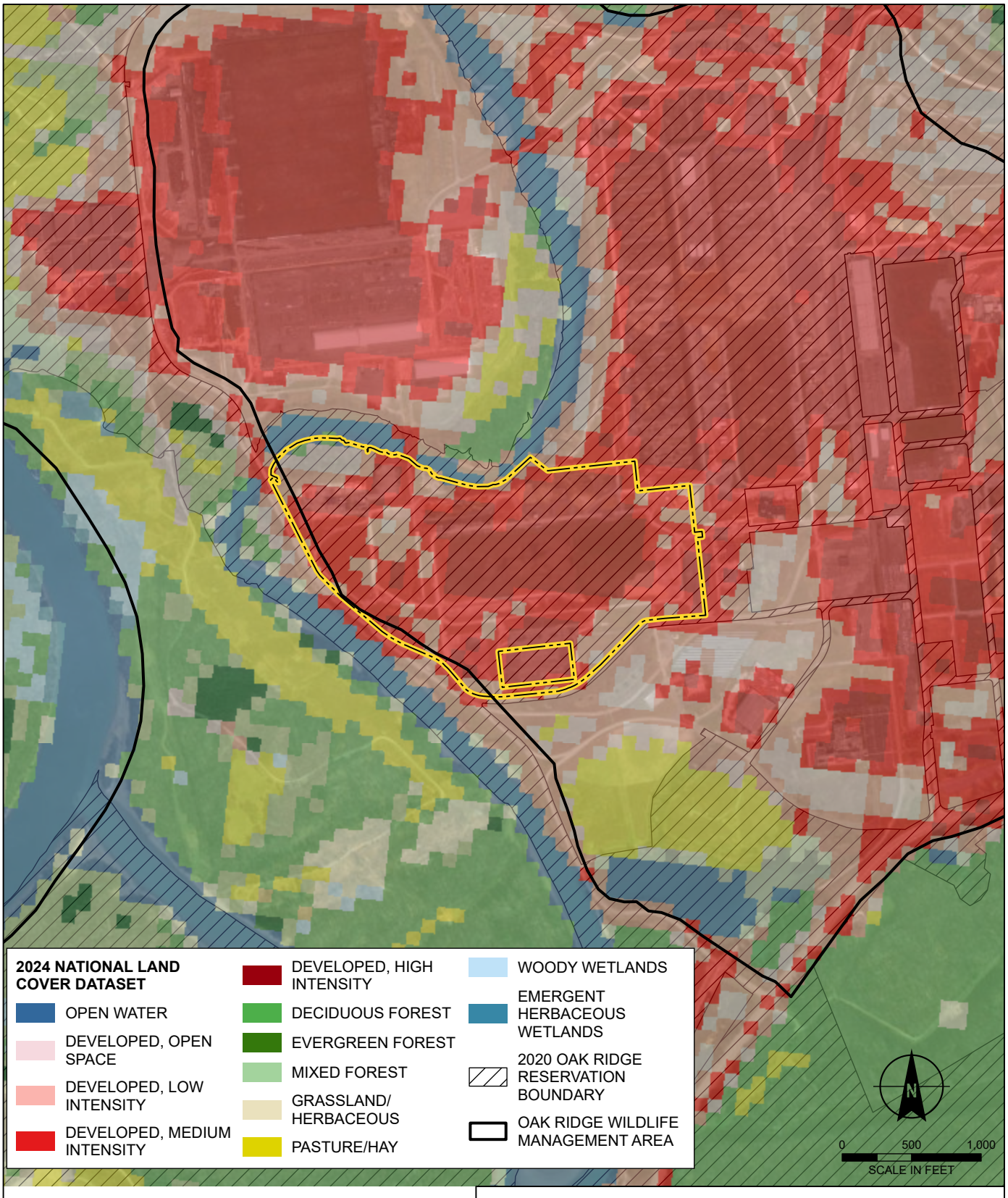
**Figure 3.1-1: Potential Transfer Areas - East Tennessee Technology Park**

UCOR
United Cleanup Oak Ridge LLC

**POTENTIAL TRANSFER AREAS**
**EAST TENNESSEE TECHNOLOGY PARK**
**OAK RIDGE, TENNESSEE**

| DRAWN BY: | REQUESTOR: | DATE: | UNITS: |
|---|---|---|---|
| M.A. O'SHELL | N. SCHMIDT | 6/19/2024 | FEET |

GIS FILE: 24016_POTENTIAL_TRANSFER_AREA_R1




PROJECT LOCATION

TN

**LEGEND**

PROJECT SITE

**NOTES**

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ESRI (03/11/2023)
3. 2024 NLCD AND PROTECTED AREAS DATA SOURCE: US GEOLOGICAL SURVEY
4. ORR BOUNDARY DATA SOURCE: U.S. DEPARTMENT OF ENERGY

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OAK RIDGE, TENNESSEE

# PROJECT SITE LAND USE

APPROXIMATE SCALE: 1 IN = 1,000 FT
JANUARY 2026

FIGURE 3.1-2

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx —
USER: klodge — LAST SAVED: 1/14/2026 1:38 PM

**Figure 3.3-1: Geology**

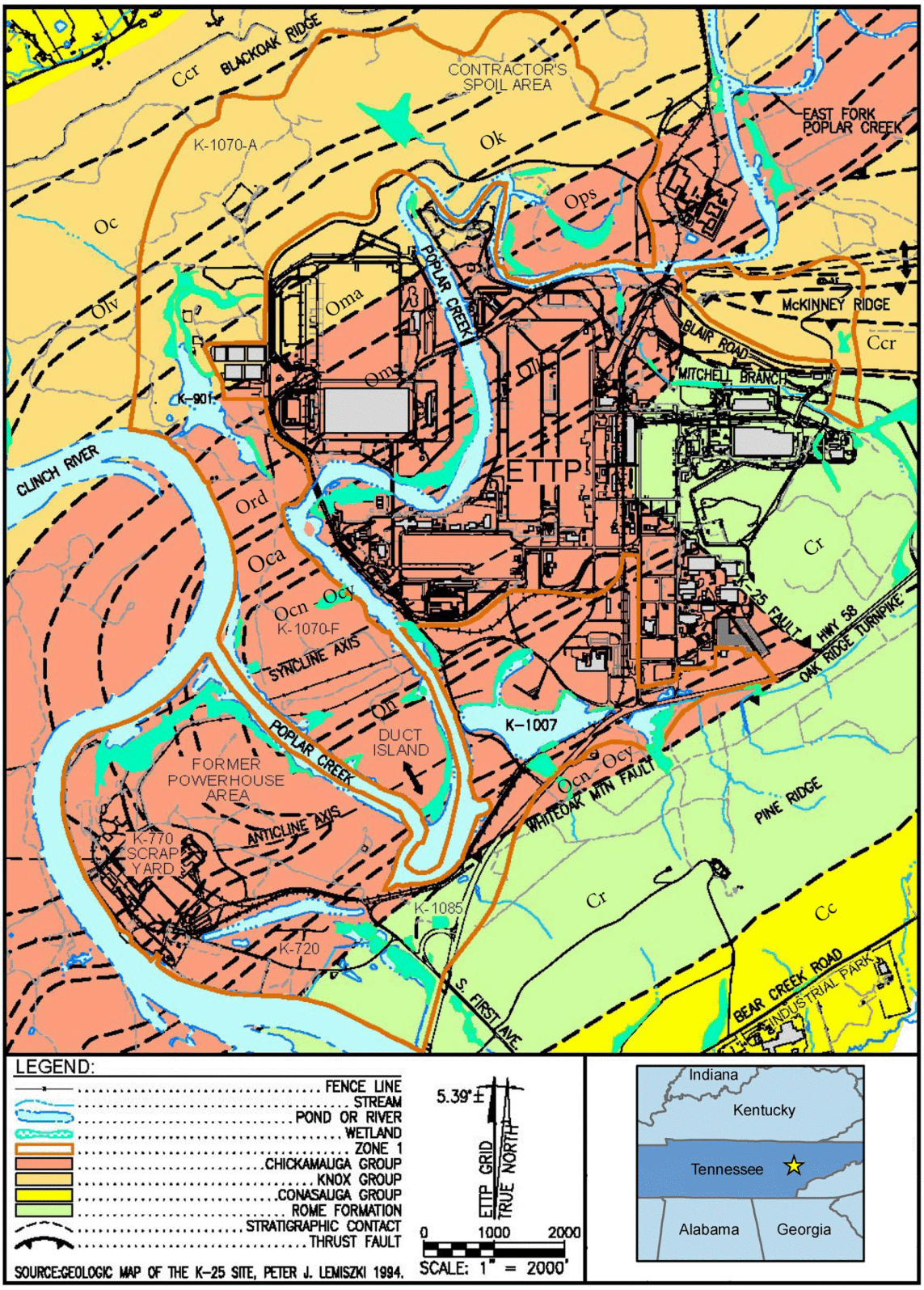
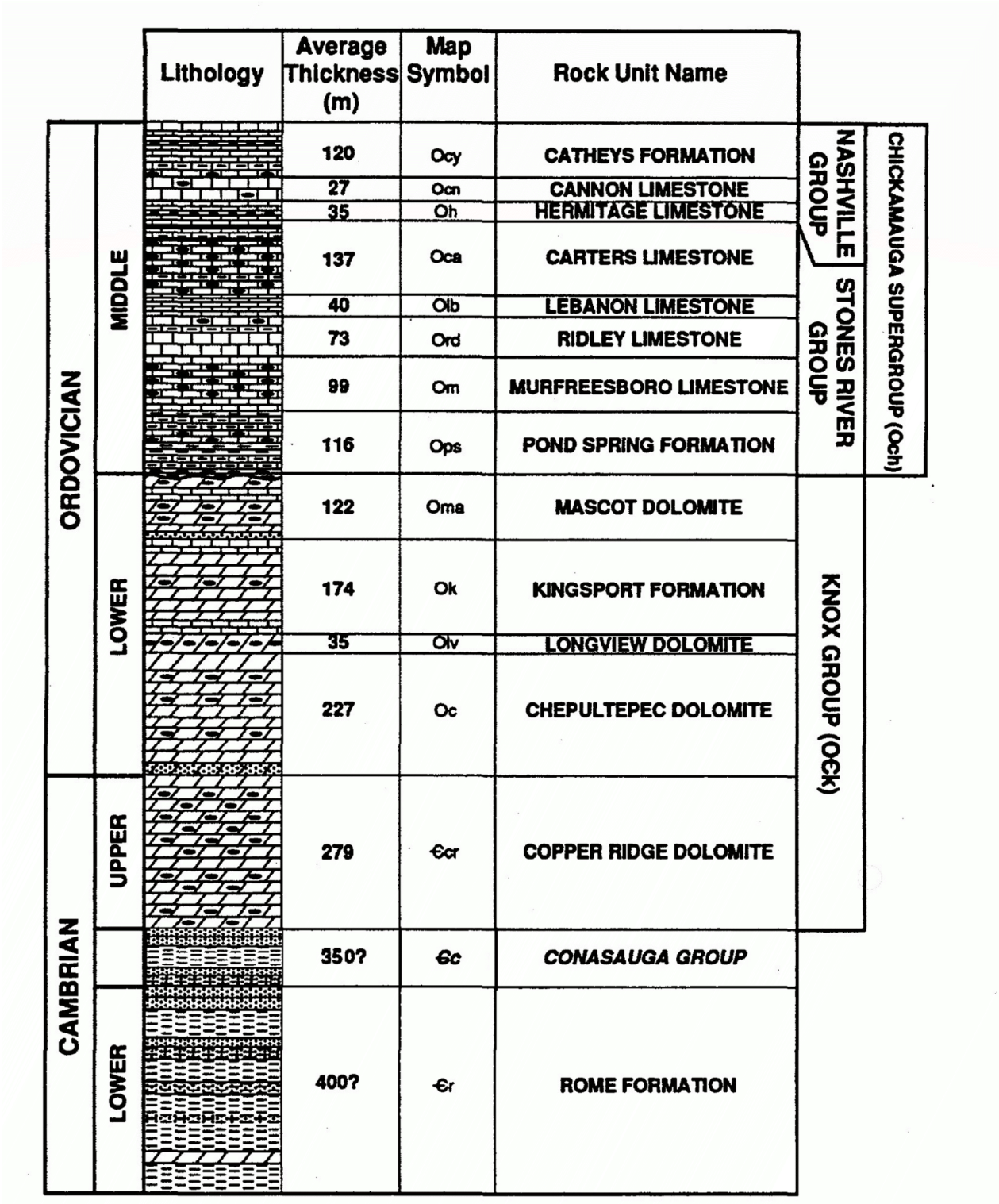
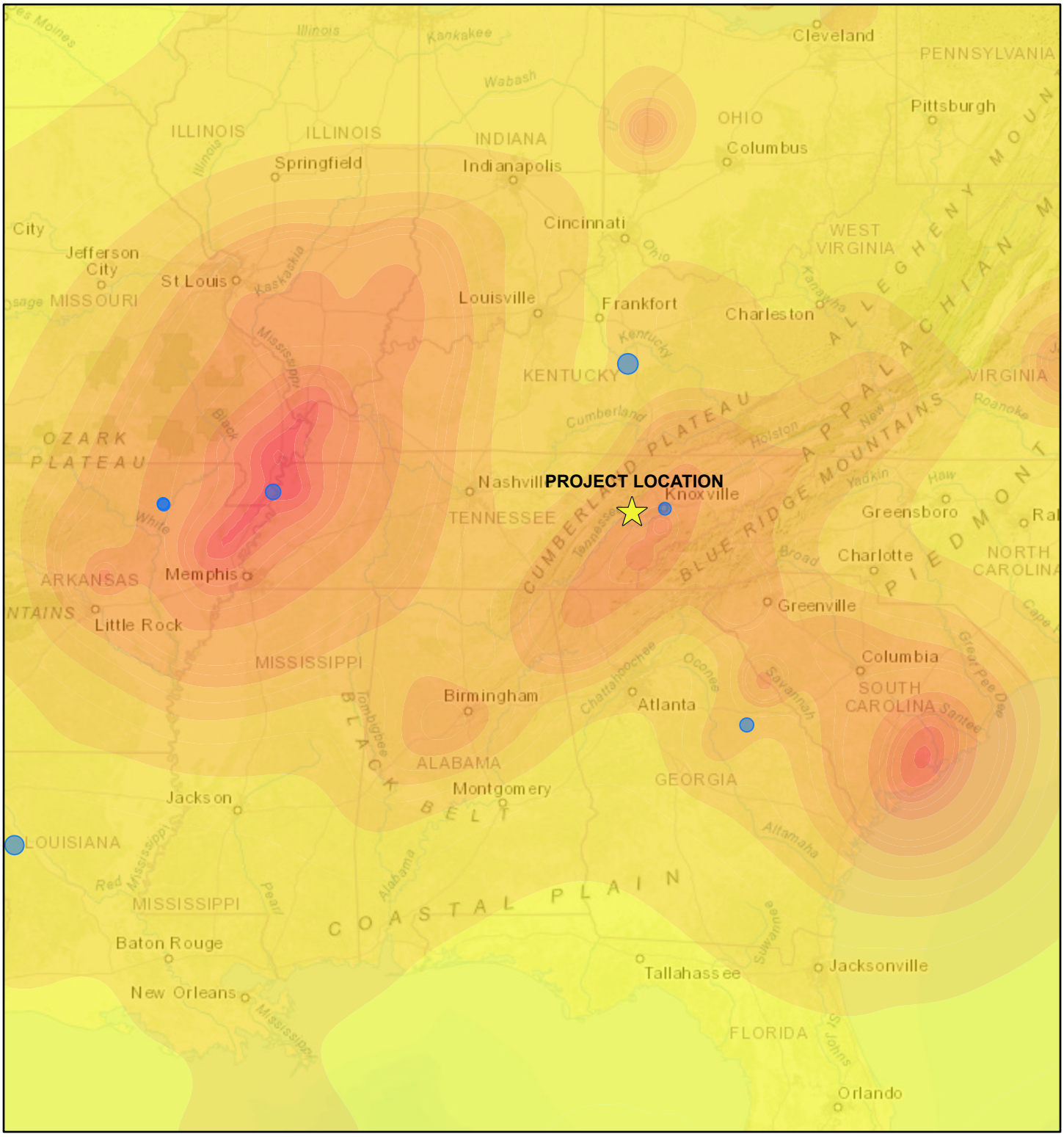


**Figure 3.3-2: Stratigraphy**



# FIGURE 3.3-3 EARTHQUAKE HAZARD




12/29/2025

1:9,067,719

Earthquakes, past week

- 1
- 2.5
- 5
- 7.5
- 10

Earthquake Hazard: Peak Accel. %g

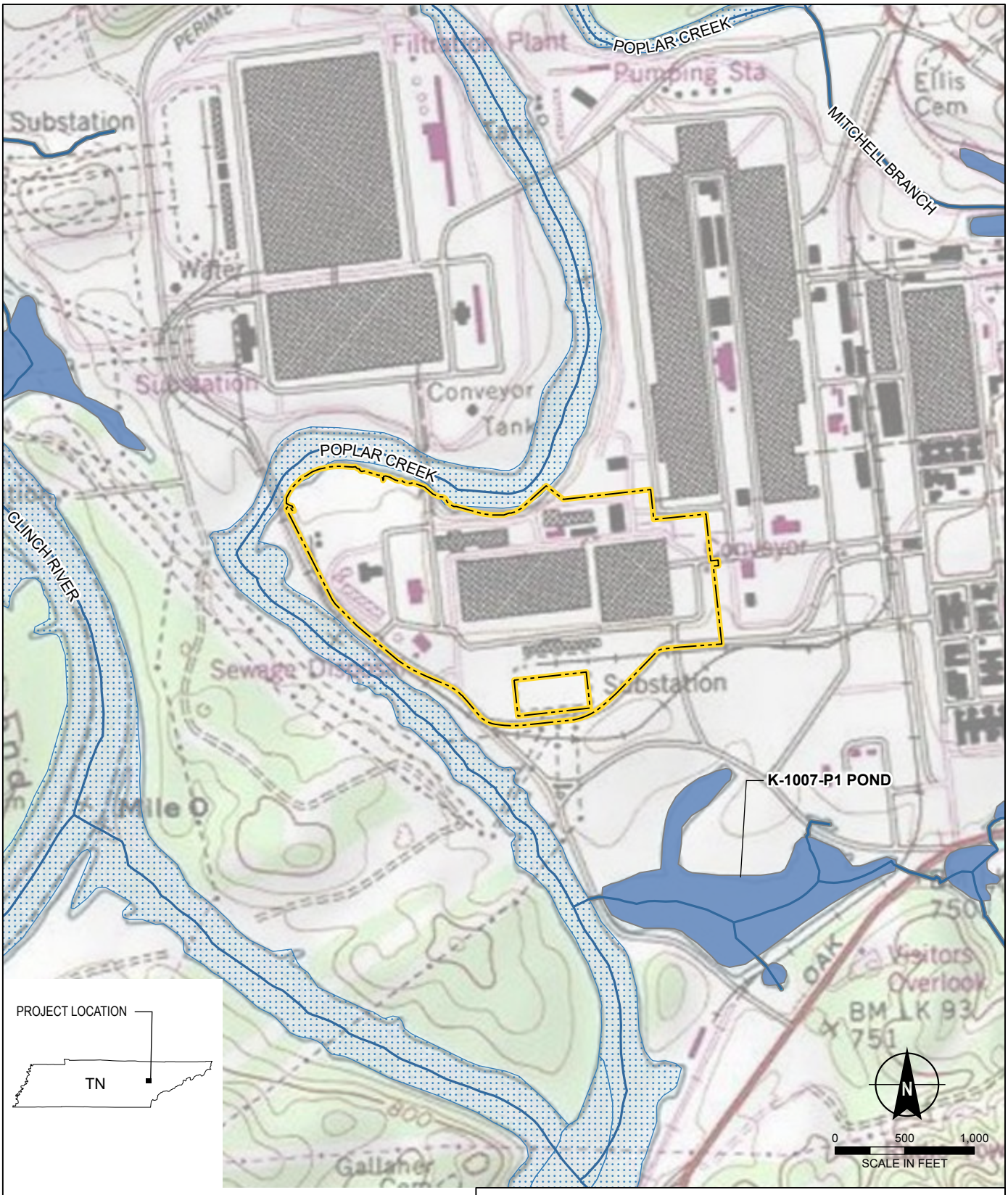
- 0 - 2%
- 3 - 6%
- 7 - 10%
- 11 - 14%
- 15 - 20%
- 21 - 40%
- 41 - 60%
- 61 - 80%
- 81 - 120%
- 121 - 200%

Citations

0 62.5 125 250 mi

0 100 200 400 km

Esri, HERE, Garmin, FAO, NOAA, USGS, EPA




**LEGEND**

- PROJECT SITE
- NHD MAPPED STREAM
- LAKE
- RIVERINE

**NWI MAPPED AQUATIC RESOURCES**

- FRESHWATER POND

**NOTES**

1. NHD DATA SOURCE: U.S. GEOLOGICAL SURVEY (USGS)
2. NWI WETLAND DATA SOURCE: U.S. FISH AND WILDLIFE SERVICE
3. MAP SOURCE: USGS USA TOPOGRAPHIC MAP

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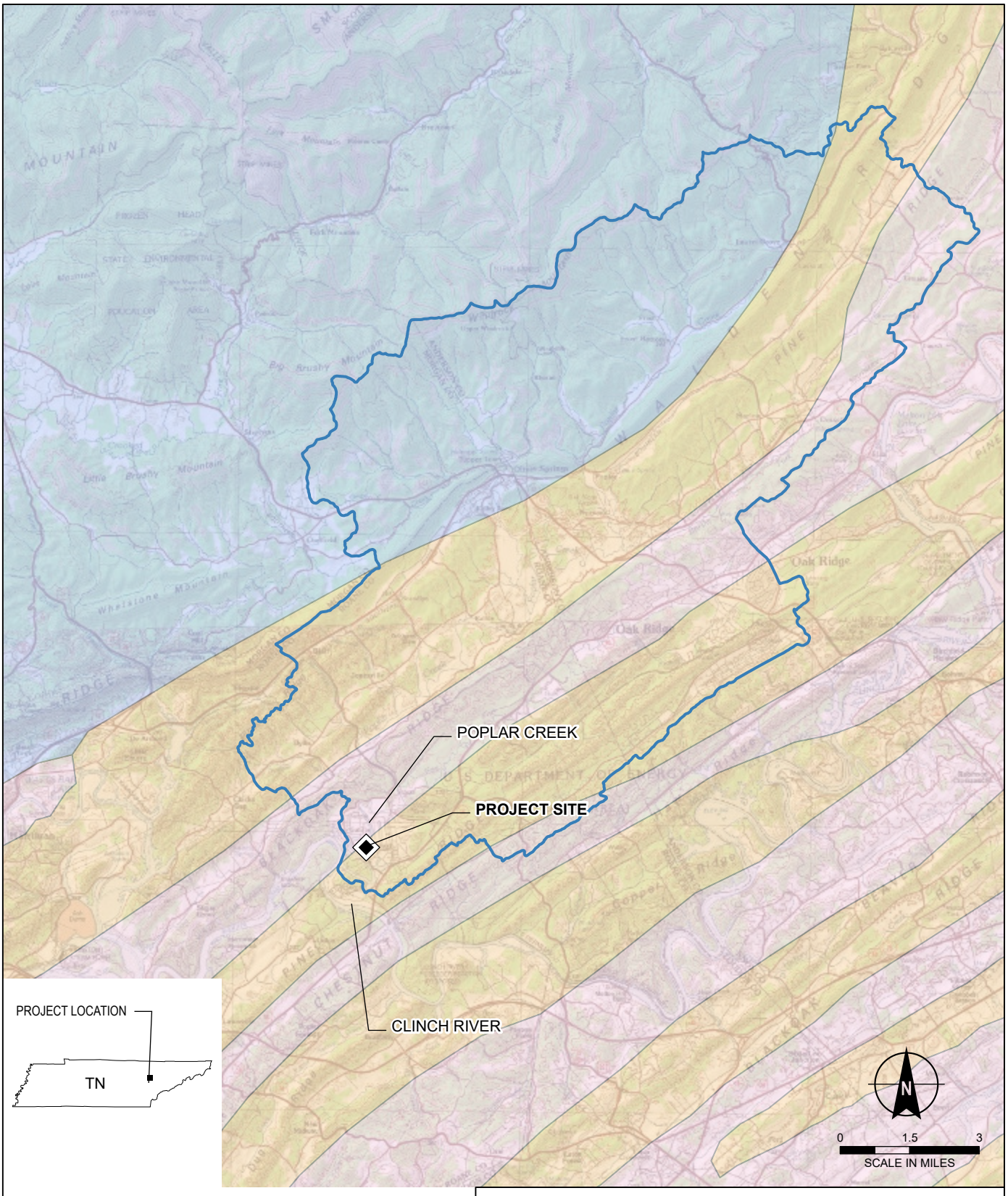
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# SURFACE WATER FEATURES

APPROXIMATE SCALE: 1 IN = 1,000 FT
JANUARY 2026

FIGURE 3.4-1

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM




**LEGEND**

- PROJECT SITE
- POPLAR CREEK WATERSHED (HUC 060102703)
- VALLEY AND RIDGE AQUIFER
- VALLEY AND RIDGE CARBONATE-ROCK AQUIFER
- PENNSYLVANIAN AQUIFER

**NOTES**

1. WATERSHED DATA SOURCE: U.S. GEOLOGICAL SURVEY (USGS)
2. AQUIFER DATA SOURCE: USGS GROUNDWATER ATLAS OF THE U.S.
3. MAP SOURCE: USGS USA TOPOGRAPHIC MAP

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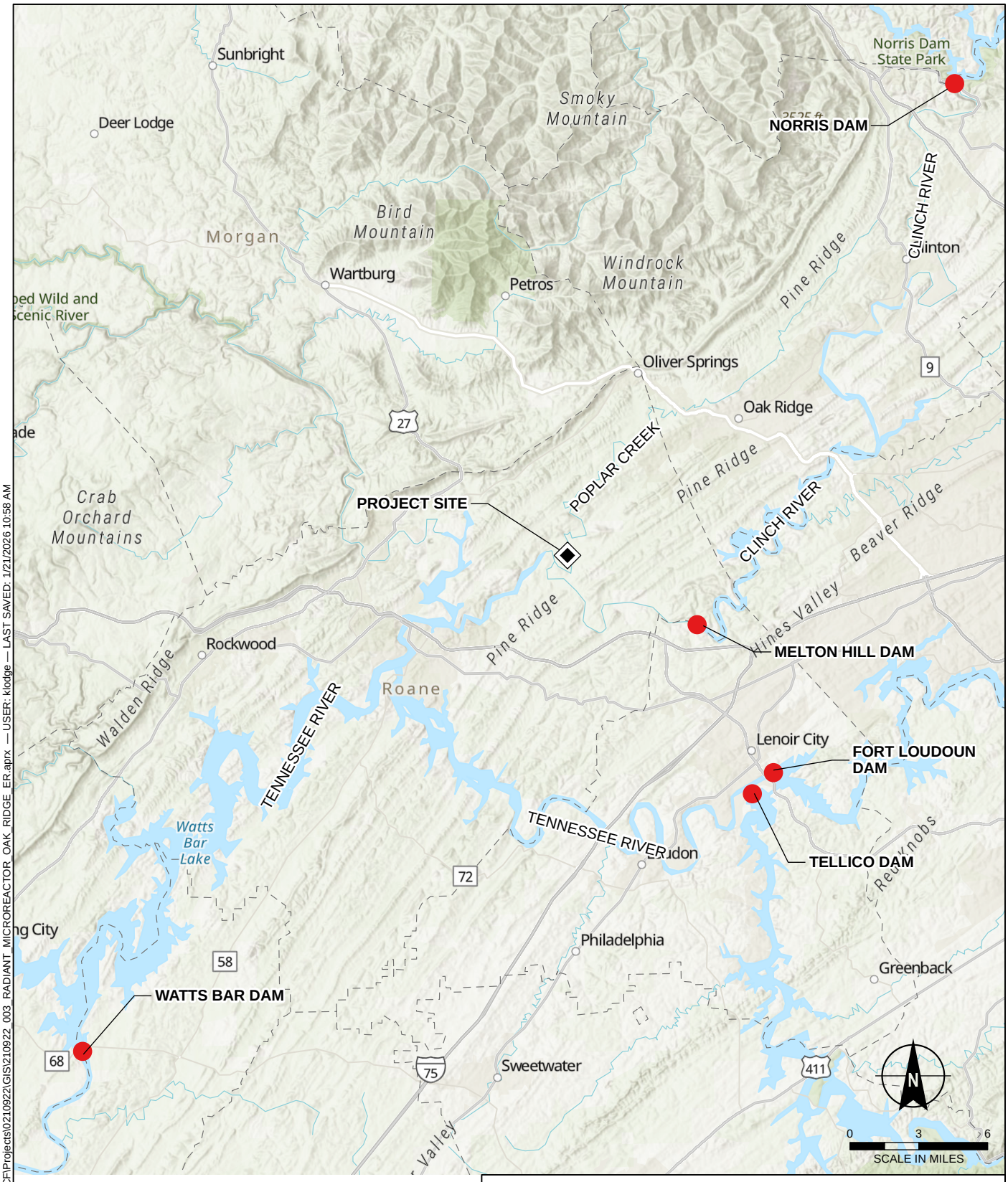
RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# DRAINAGE BASIN FEATURES

APPROXIMATE SCALE: 1 IN = 3 MI
JANUARY 2026

FIGURE 3.4-2

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM




PROJECT LOCATION

LEGEND

PROJECT SITE

MAP SOURCE: ESRI WORLD TOPOGRAPHIC

HALEY ALDRICH

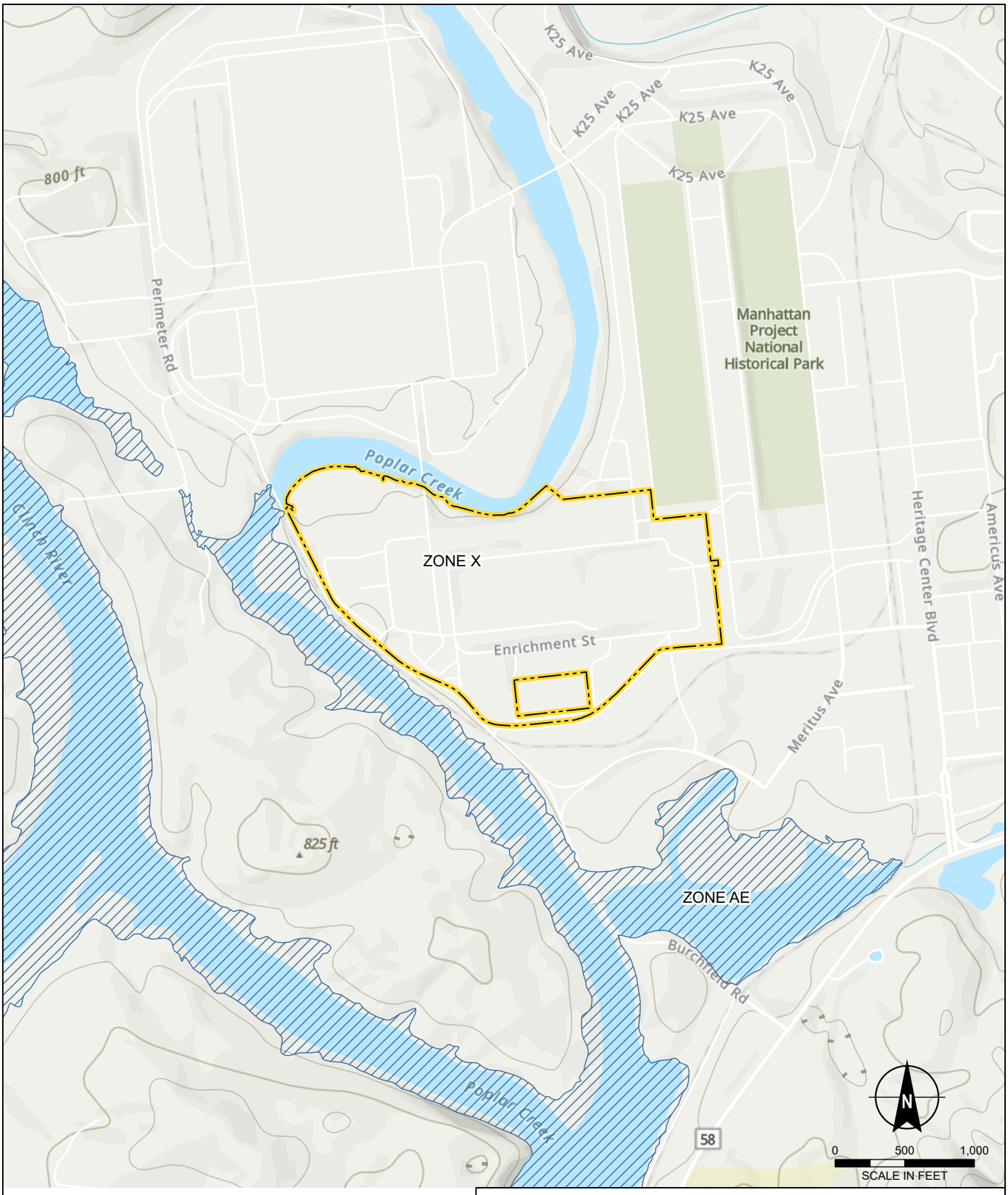
RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# DAMS AND RESERVOIRS

APPROXIMATE SCALE: 1 IN = 6 MI
JANUARY 2026

FIGURE 3.4-3

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/21/2026 10:58 AM




PROJECT LOCATION

TN

**LEGEND**

PROJECT SITE

1% ANNUAL CHANCE FLOOD HAZARD

**NOTES**

1. FLOODPLAIN DATA SOURCE: FEMA NATIONAL FLOOD HAZARD LAYER
2. MAP SOURCE: ESRI WORLD TOPOGRAPHIC MAP

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OAK RIDGE, TENNESSEE

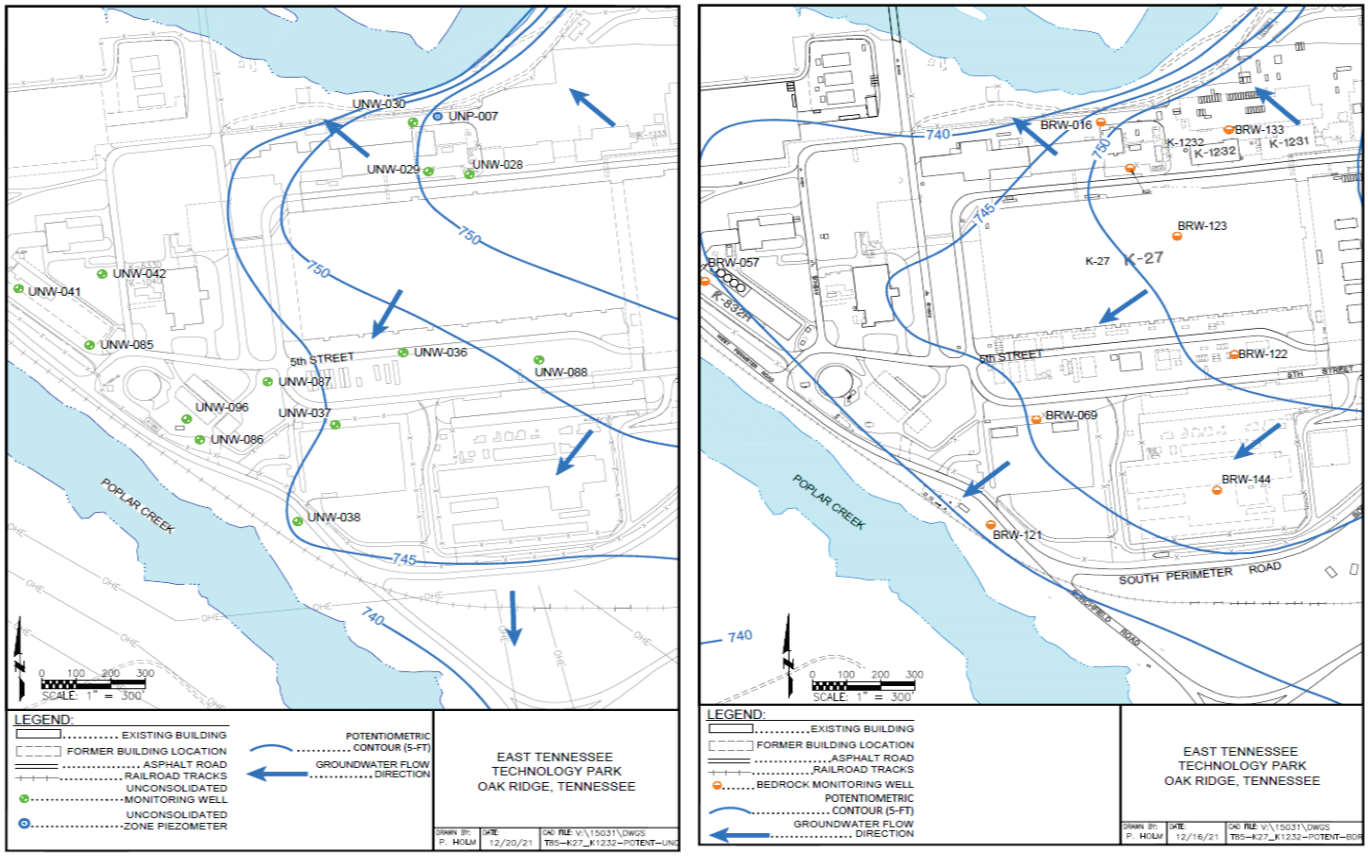
# FLOODPLAIN MAPPING

APPROXIMATE SCALE: 1 IN = 1,000 FT
JANUARY 2026

FIGURE 3.4-4

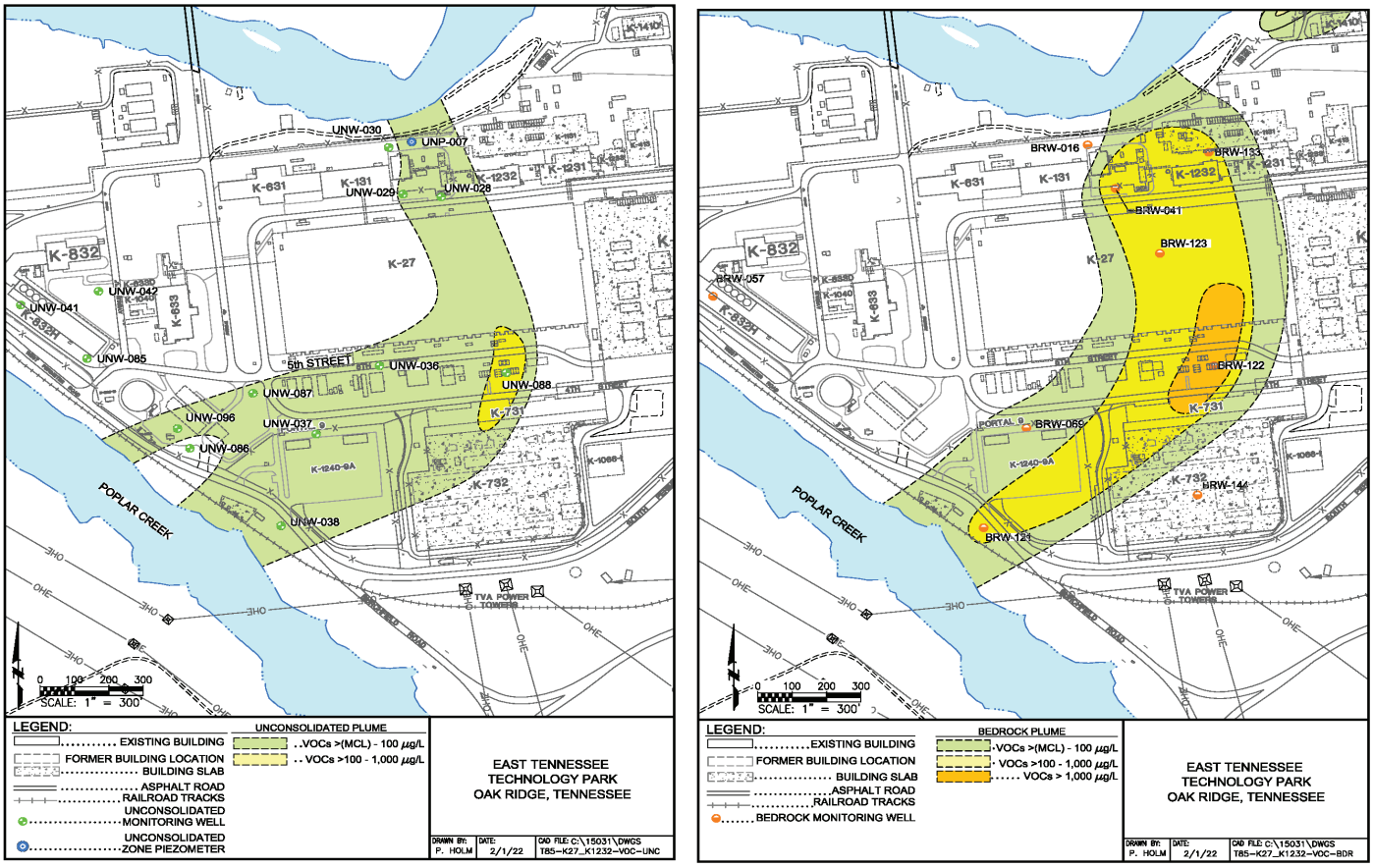
GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM

## Figure 3.4-5: Average Potentiometric Surfaces in ETTP



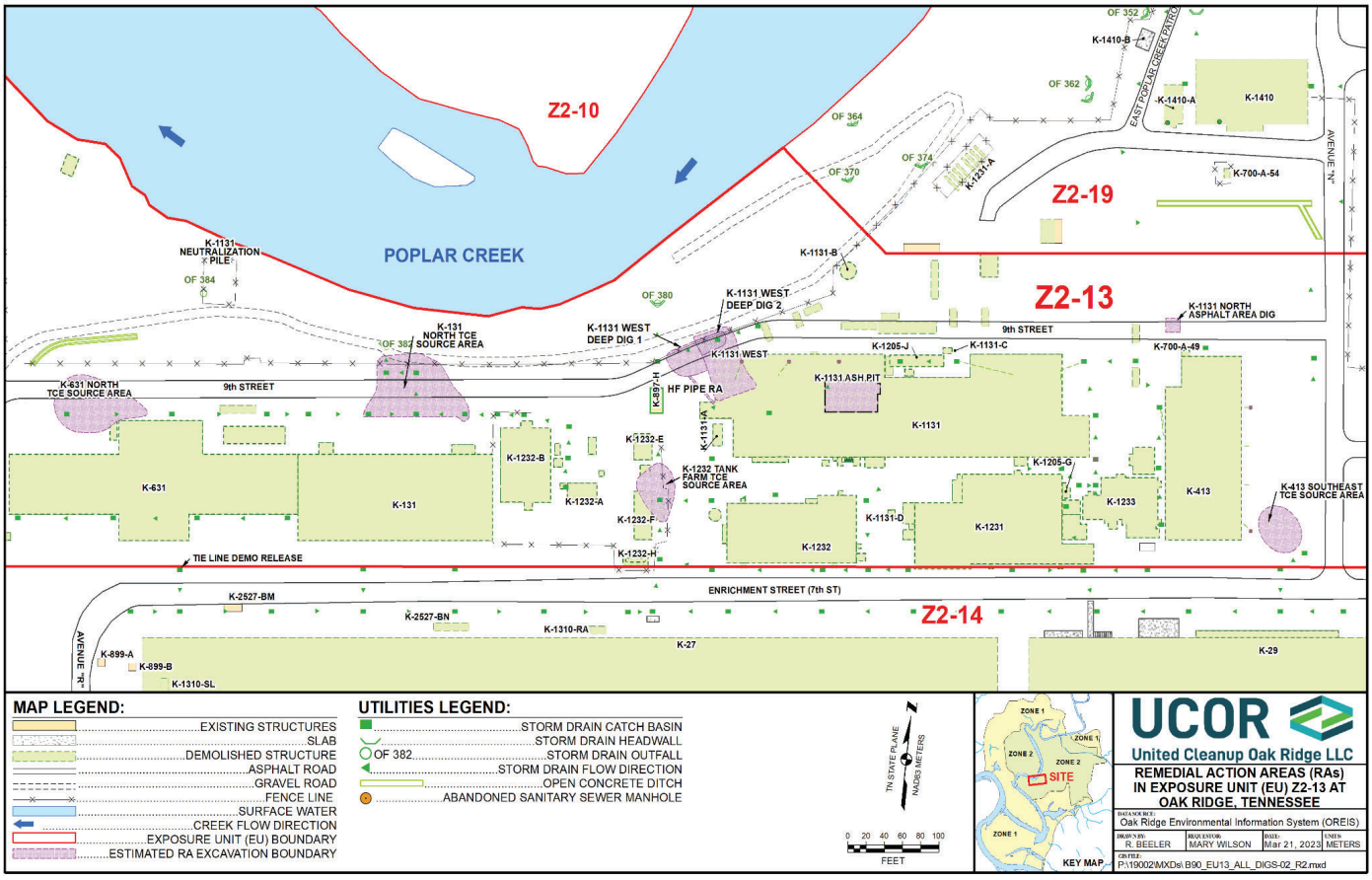

**Average potentiometric surface for unconsolidated zone (left) and bedrock (right) in K-27/K-1232 Area.**

## Figure 3.4-6: Distribution of CVOCs at K-27/K-1232



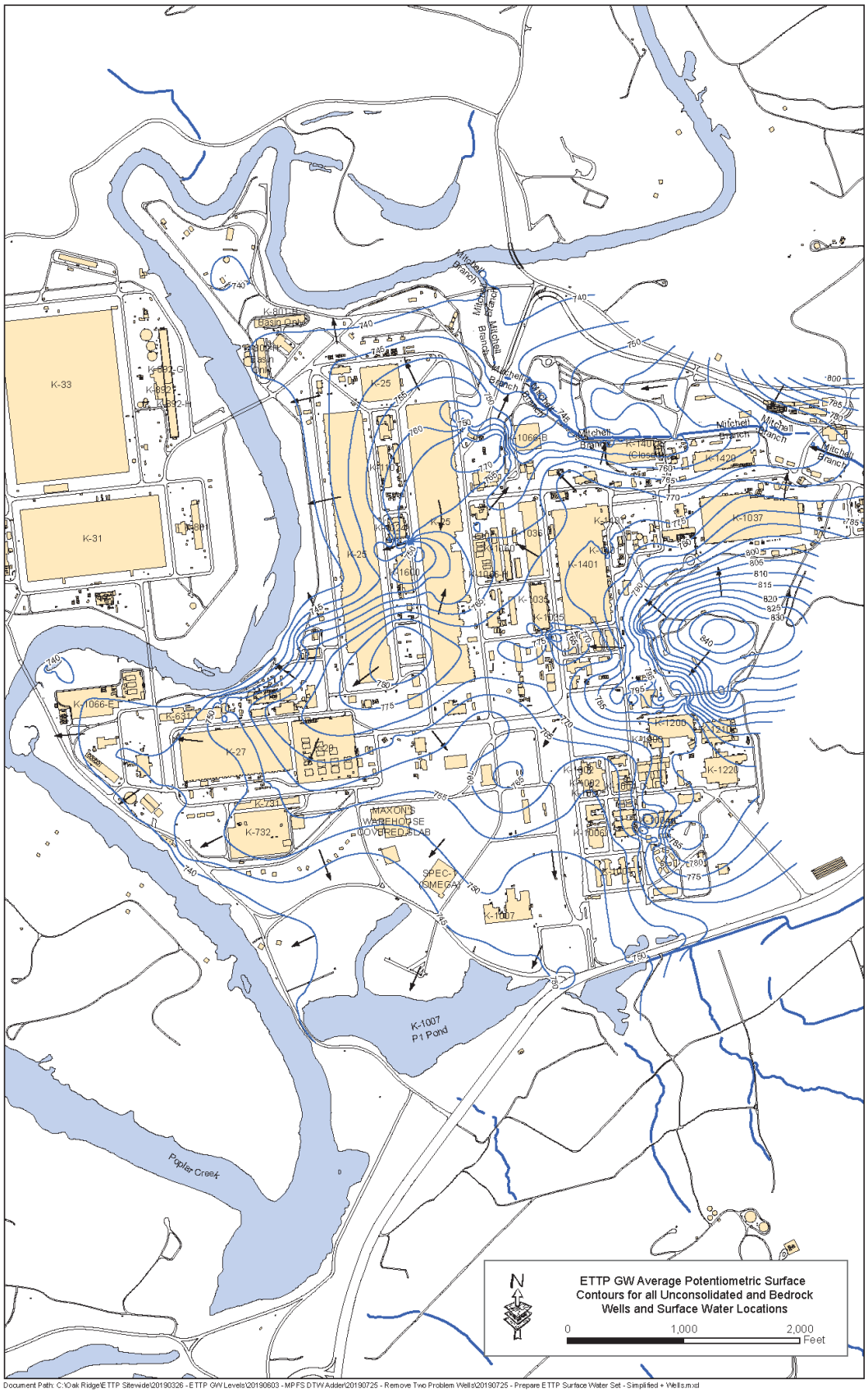

**Distribution of CVOCs at K-27/K-1232 in unconsolidated zone (left) and bedrock (right).**

## Figure 3.4-7: Excavation Areas Exceeding Groundwater SSLs in Poplar Creek Facilities Area



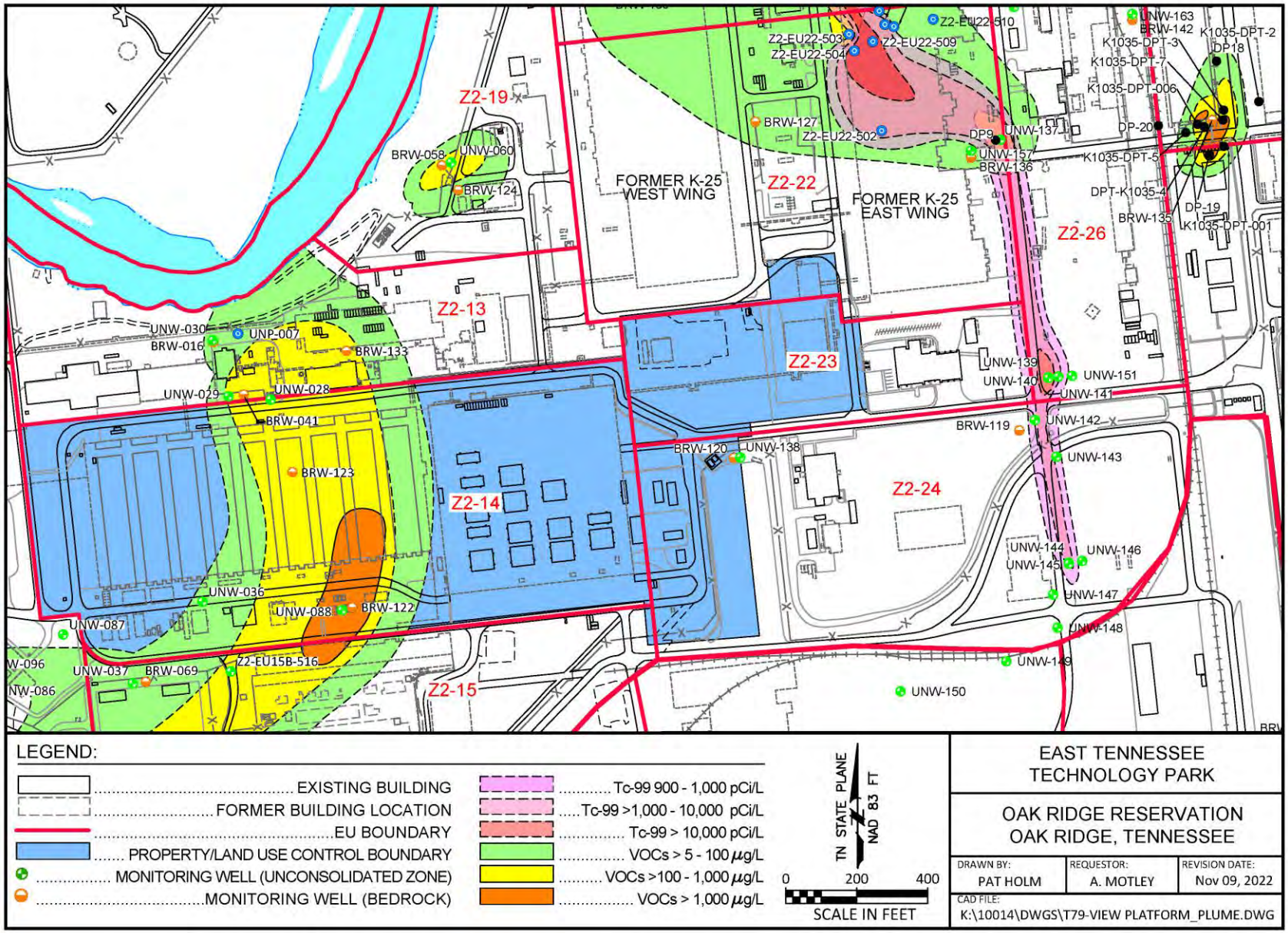

**Excavation areas exceeding groundwater SSLs in Poplar Creek facilities area.**

## Figure 3.4-8: Average Potentiometric Surface for Unconsolidated Zone and Bedrock in K-27/K1232 Area

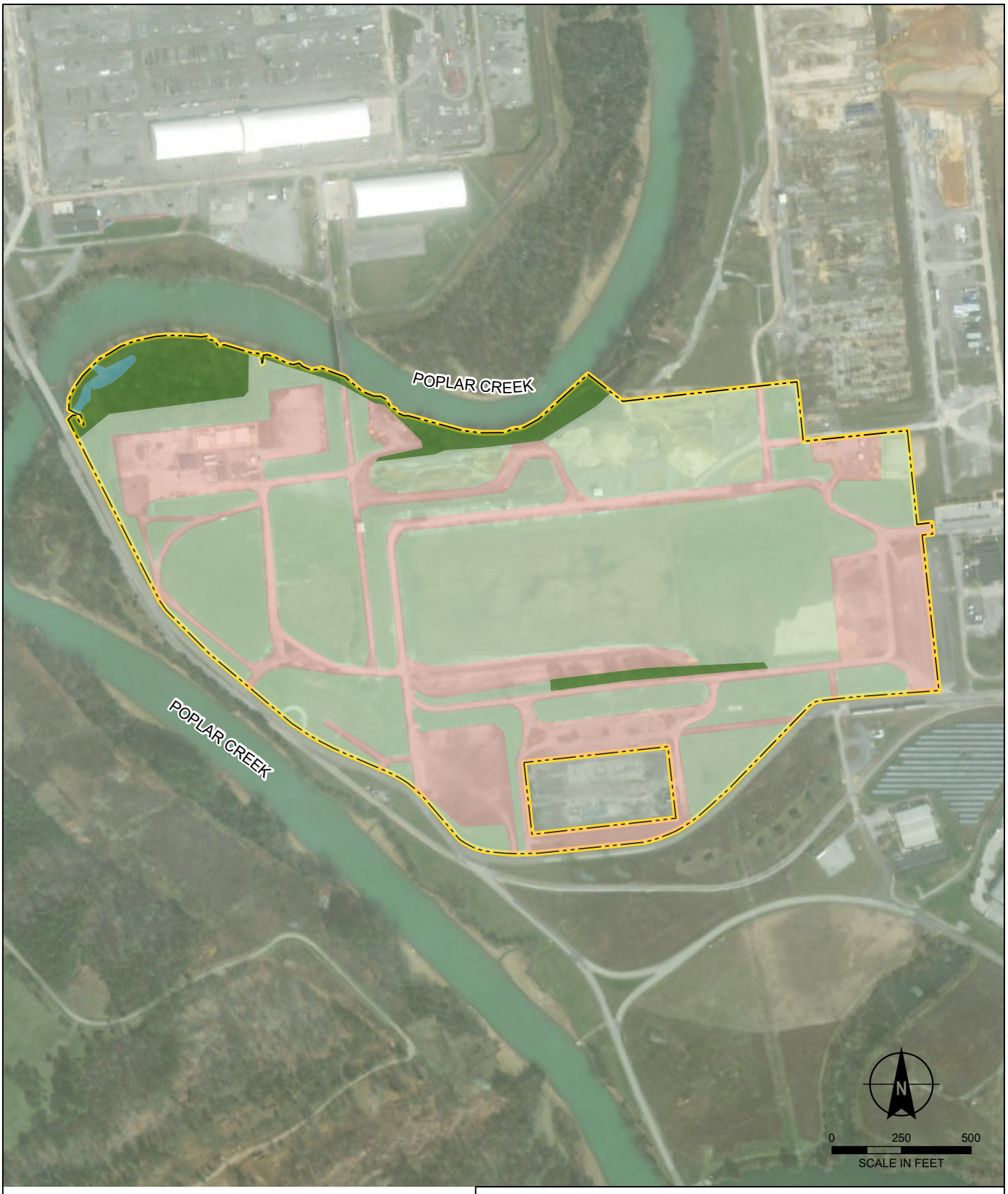



**Average potentiometric surface for the Main Plant Area of ETTP.**

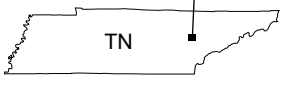
**Figure 3.4-9: Tc-99 Plume Location**




**EUs Z2-14, Z2-22, Z2-23, and Z2-24 Transfer Footprint hydrogeology and monitoring well locations**




PROJECT LOCATION




**LEGEND**

- PROJECT SITE
- EMERGENT WETLAND
- FOREST
- HERBACEOUS
- PAVEMENT/GRAVEL

AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (03/10/2023)

HALEY ALDRICH

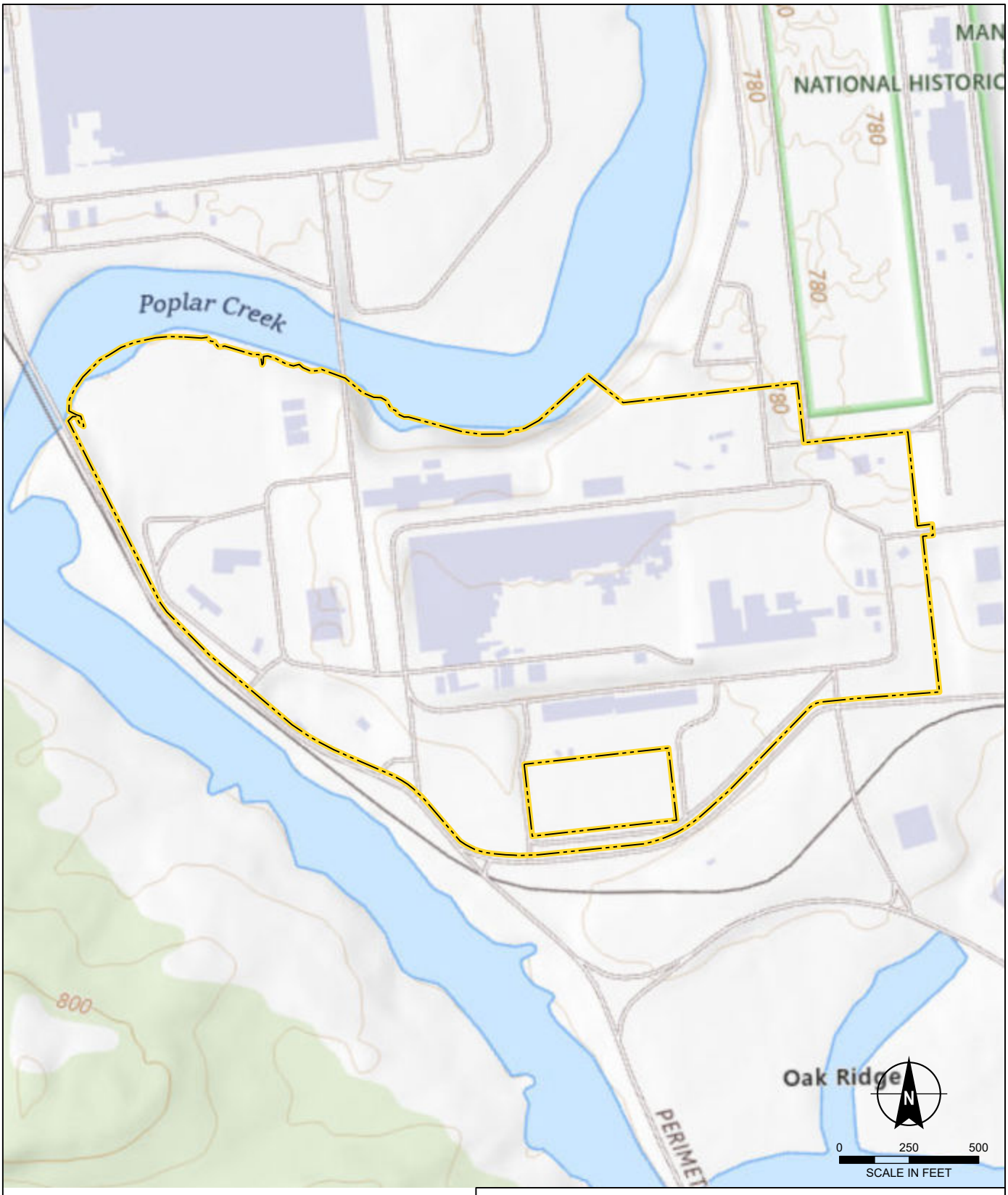
RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# ECOLOGICAL COVER TYPES

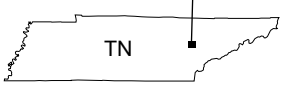
APPROXIMATE SCALE: 1 IN = 500 FT
JANUARY 2026

FIGURE 3.5-1

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM




PROJECT LOCATION




**LEGEND**

PROJECT SITE

TOPOGRAPHIC MAP SOURCE: U.S. GEOLOGICAL SURVEY NATIONAL MAP

HALEY ALDRICH

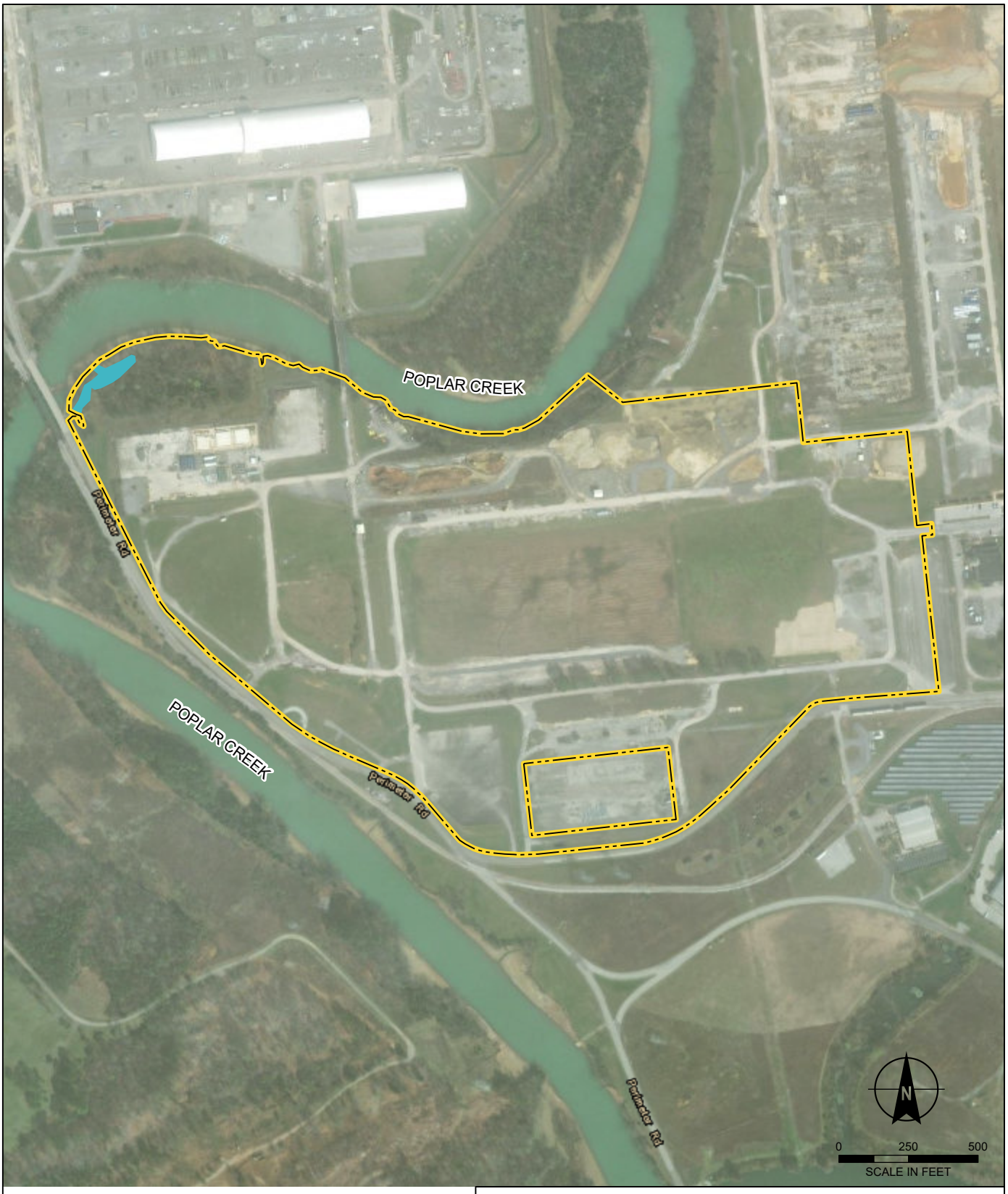
RADIANT INDUSTRIES, INC.
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OAK RIDGE, TENNESSEE

# TOPOGRAPHIC MAP

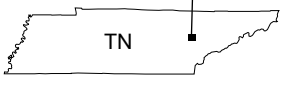
APPROXIMATE SCALE: 1 IN = 500 FT
JANUARY 2026

FIGURE 3.5-2

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM




PROJECT LOCATION




**LEGEND**

- PROJECT SITE
- DELINEATED EMERGENT WETLAND
- NHD MAPPED STREAM

**NOTES**

1. DELINEATED WETLAND TYPES ARE BASED ON COWARDIN CLASSIFICATION.
2. AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (03/10/2023)

HALEY ALDRICH

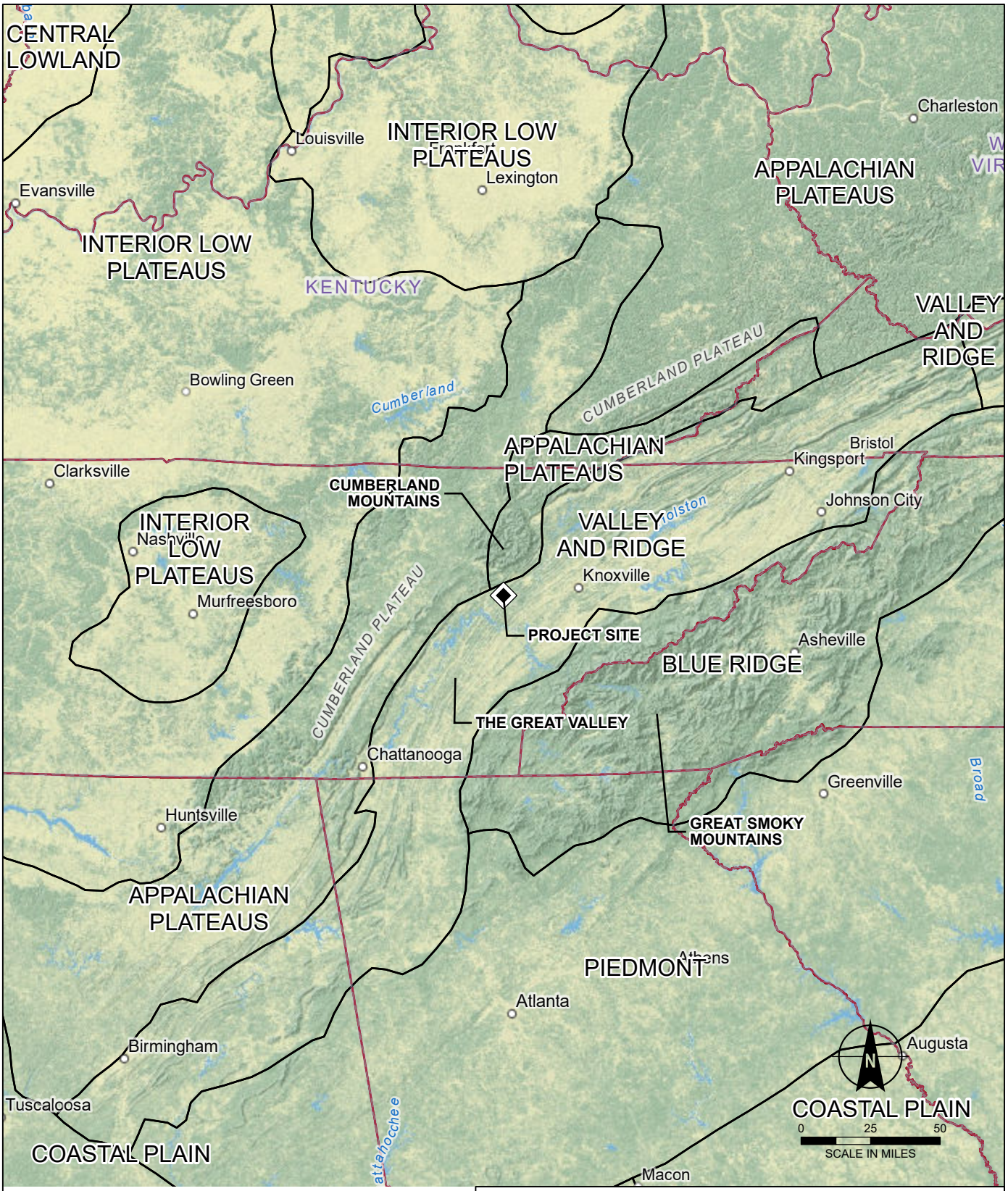
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OAK RIDGE, TENNESSEE

# DELINEATED WETLANDS

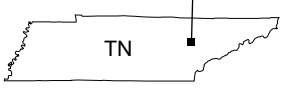
APPROXIMATE SCALE: 1 IN = 500 FT
JANUARY 2026

FIGURE 3.5-3

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM




PROJECT LOCATION




**LEGEND**

- PROJECT SITE
- PHYSIOGRAPHIC PROVINCE
- STATE BOUNDARY

**NOTES**

1. PHYSIOGRAPHIC DATA SOURCE: U.S. GEOLOGICAL SURVEY (USGS)
2. TOPO MAP SOURCE: USGS USA TOPOGRAPHIC MAP

HALEY ALDRICH

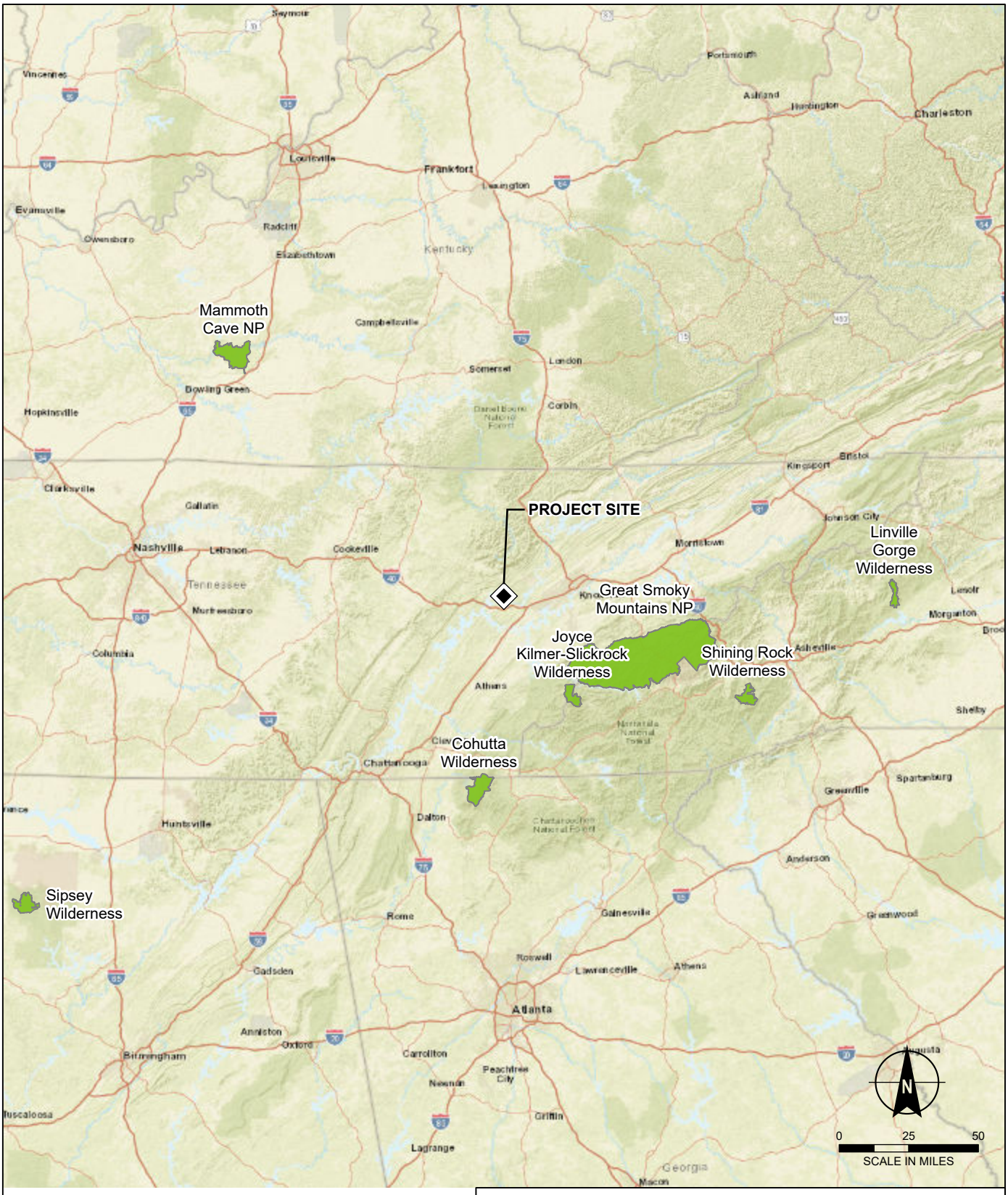
RADIANT INDUSTRIES, INC.
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# REGIONAL TOPOGRAPHY

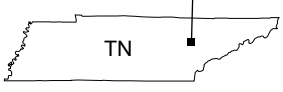
APPROXIMATE SCALE: 1 IN = 50 MI
JANUARY 2026

FIGURE 3.6-1

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\02109222\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM




PROJECT LOCATION




**LEGEND**

PROJECT SITE

FEDERAL CLASS I AREA

**NOTES**

1. CLASS I DATA SOURCE: U.S. DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE
2. MAP SOURCE: ESRI WORLD STREET MAP

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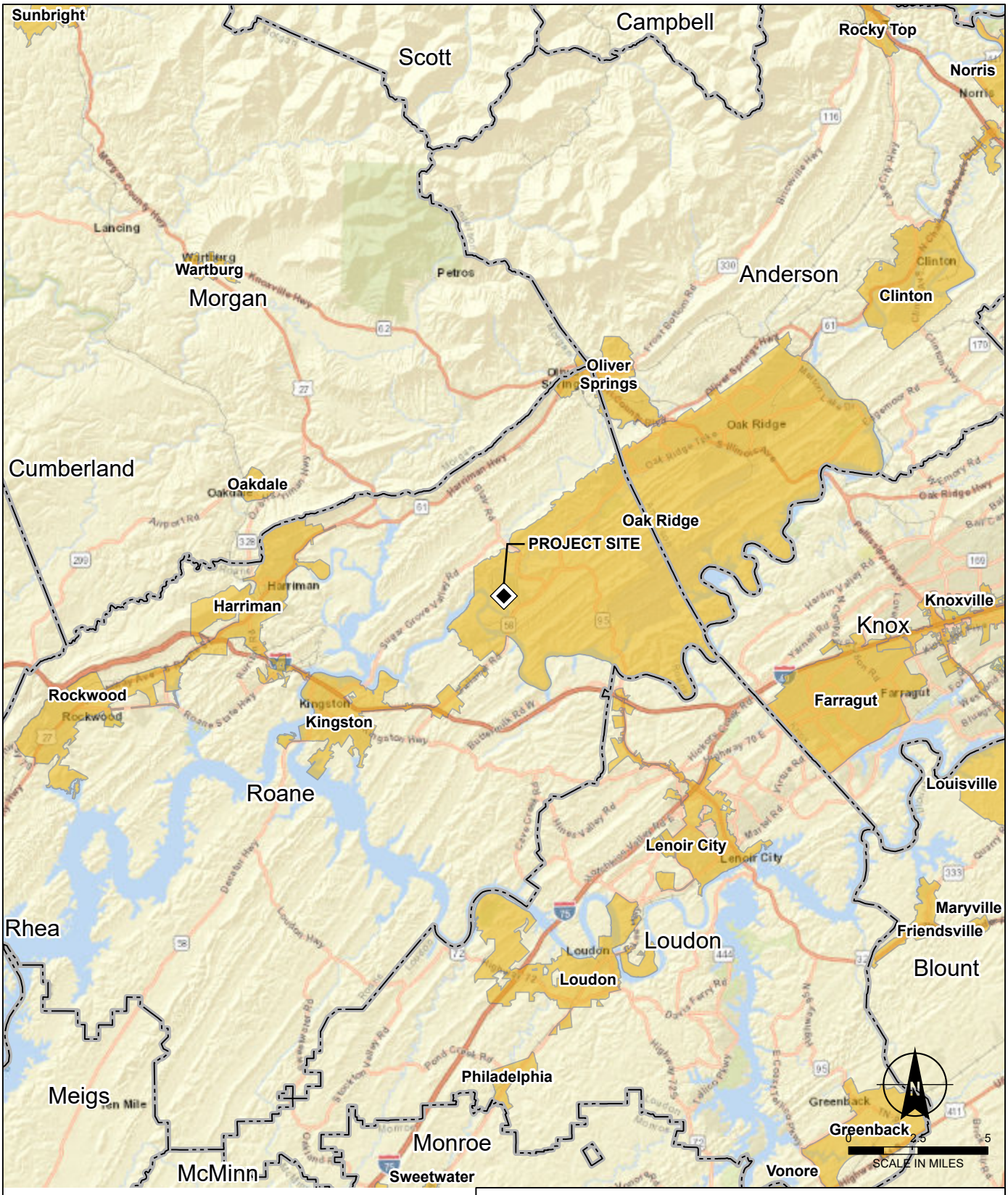
# CLASS I SITES

APPROXIMATE SCALE: 1 IN = 50 MI
JANUARY 2026

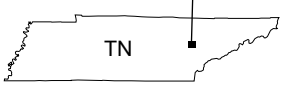
FIGURE 3.6-2

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM

**Figure 3.8-1**
**REMOVED - PRIVILEDGED AND CONFIDENTIAL**
**PROPRIETARY INFORMATION**




PROJECT LOCATION




**LEGEND**

- PROJECT SITE
- CITY AND TOWN BOUNDARY
- COUNTY BOUNDARY

**NOTES**

1. MUNICIPAL AND COUNTY BOUNDARY DATA SOURCE: STATE OF TENNESSEE GEOSPATIAL DATA
2. MAP SOURCE: ESRI WORLD STREET MAP

HALEY ALDRICH

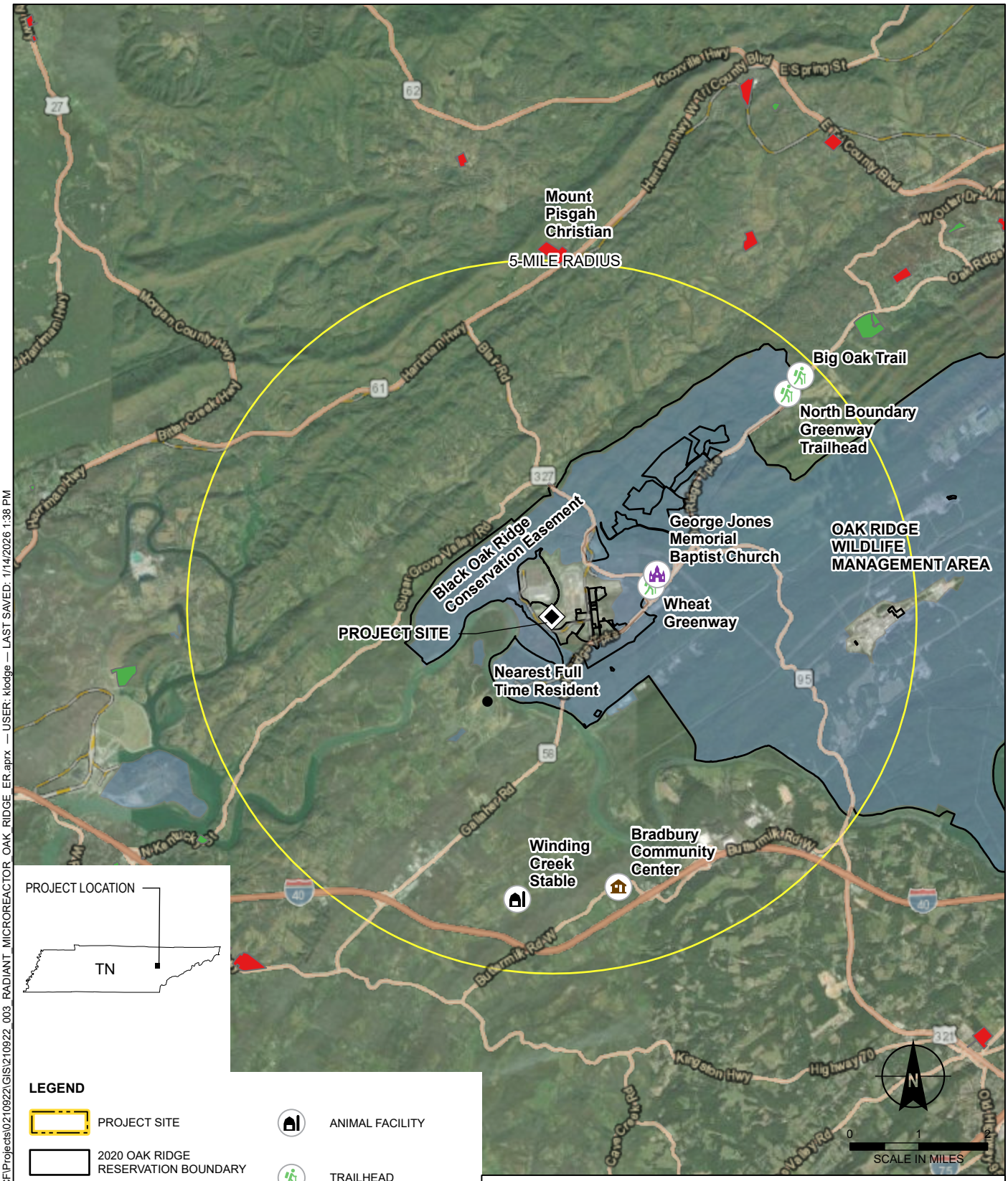
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R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# NEARBY CITIES AND TOWNS

APPROXIMATE SCALE: 1 IN = 5 MI
JANUARY 2026

FIGURE 3.10-1

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM




**NOTES**

1. ORR BOUNDARY DATA SOURCE: U.S. DEPARTMENT OF ENERGY
2. SENSITIVE RECEPTORS DATA SOURCE: STATE OF TENNESSEE GEOSPATIAL DATA
3. PROTECTED AREAS DATA SOURCE: U.S. GEOLOGICAL SURVEY
4. AERIAL IMAGERY SOURCE: ESRI WORLD IMAGERY (03/10/2023)

HALEY ALDRICH

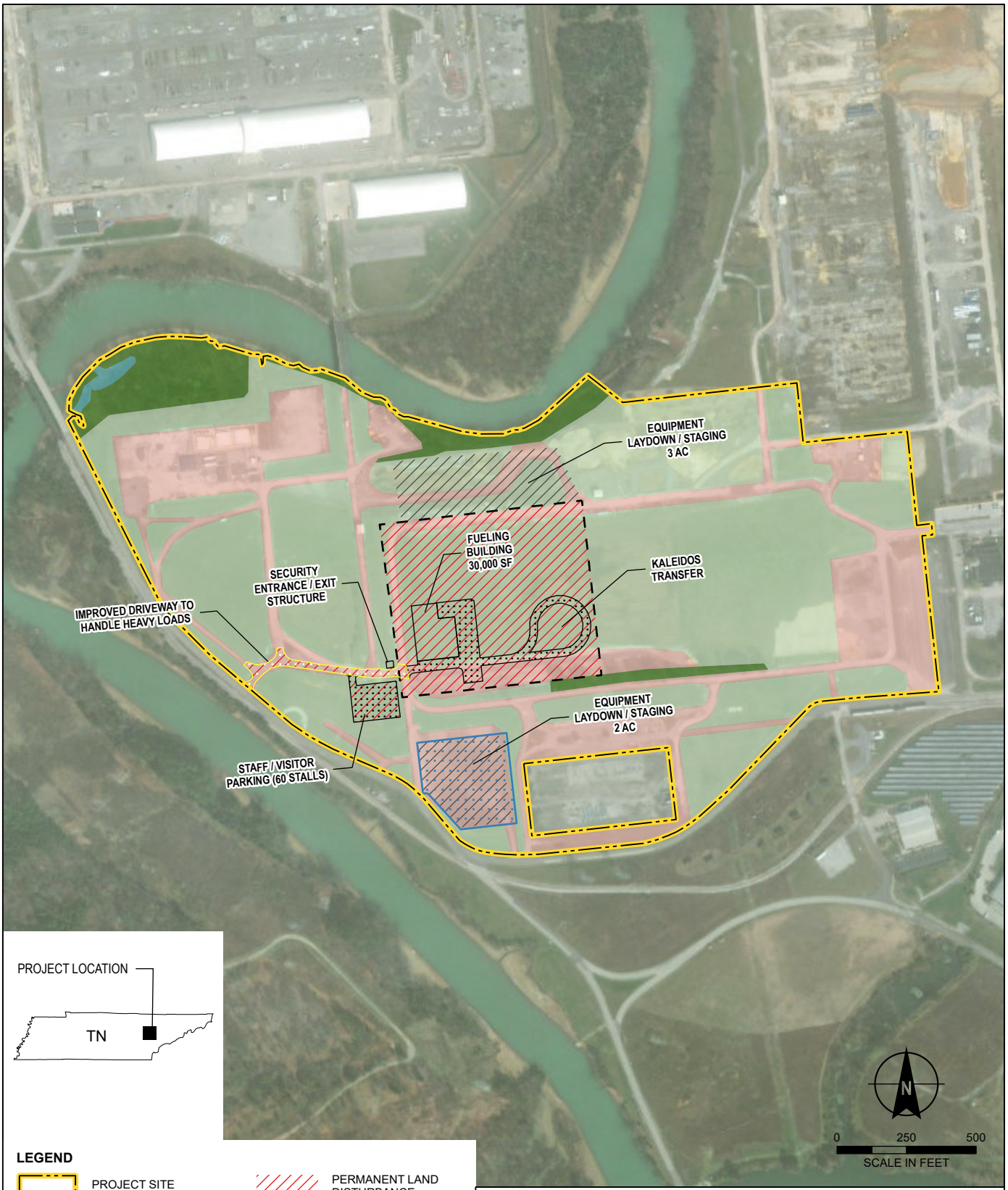
RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# PROJECT SITE DISTANCE TO SENSITIVE RECEPTORS

APPROXIMATE SCALE: 1 IN = 2 MI
JANUARY 2026

FIGURE 3.11-1

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM




GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_ER.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:38 PM

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RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# PROPOSED BUILDINGS AND LAND DISTURBANCE

APPROXIMATE SCALE: 1 IN = 500 FT
JANUARY 2026

FIGURE 4.5-1




HENSEL PHELPS
Plan. Build. Manage.

R-50 Fresh Fueling BLD
Phase 1

**Figure 4.5-2 Tree Removal Area Overview**

N
W E
S

REV DATE: 07/30/2026

**Figure 4.8-1**
**REMOVED - PRIVILEDGED AND CONFIDENTIAL**
**PROPRIETARY INFORMATION**

# APPENDIX A
# Ecological Habitat Assessment Report

HALEY & ALDRICH, INC.
260 East Main Street, Suite 2100
Rochester, New York 14604
585.359-9000

January 20, 2026
File No. 0210922-003

Radiant Industries, Inc.
1921 E. Maple Ave.
El Segundo, California 90245

Attention: Chanson Yang
Director of Licensing

Subject: Rare, Threatened and Endangered Species Review
Radiant R-50 Production Facility Project
Oak Ridge, Tennessee

Dear Chanson:

On behalf of Radiant Industries, Inc. (Radiant), Haley & Aldrich, Inc. (Haley & Aldrich) has reviewed publicly available databases regarding potential presence of rare, threatened, endangered species and important natural communities or natural areas in the vicinity of the proposed R-50 Production Facility Project (Project) site located at the East Tennessee Technology Park in Roane County, Tennessee (See Figure 1, Attachment 1). Our review included the United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) database (see Attachment 2). Haley & Aldrich conducted a site visit to confirm and evaluate the ecological habitat on site. This memo summarizes the results of our database review and site visit.

Habitat observations were made during field investigations at the Project site conducted by Haley & Aldrich on October 21, 2025. The Project site consists largely of previously heavily disturbed land that has undergone various stages of remediation. Paved access roads, parking areas, gravel and concrete pads, and other imperious surfaces are prevalent throughout the Project site. The overall topography was generally flat with areas sloping toward Poplar Creek to the north, west and south. Vegetated areas were primarily herbaceous, including maintained grasses and areas where vegetation has progressed to early successional communities consisting of grasses and forbs. Scattered shrubs and trees are also present on the Project site, particularly on slopes bordering Poplar Creek.

One relatively small emergent wetland was observed in the northwest portion of the Project site associated with a small channel that drains north to Poplar Creek. The wetland is surrounded by a small, forested upland area. Evidence of beaver use (i.e., downed trees and chewed stumps) was observed within the wetland. The dominant vegetation within the wetland included small carpet grass (*Arthraxon hispidus*), devil's beggartick (*Bidens frondosa*), and broadleaf cattail (*Typha latifolia*). Upland vegetation surrounding the wetland was dominated by boxelder (*Acer negundo*), American sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), Japanese honeysuckle (*Lonicera japonica*), and Indian woodoats

(*Chasmanthium latifolium*). These areas are documented in the attached Figure 2 - Ecological Cover Type Map and Photographic Log (Attachments 1 and 3).

Animal species, or evidence of species use, observed during the on-site field investigation were generally typical for the region and are summarized in Tables 1 and 2 below:

**Table 1. Birds Observed**

| Common Name | Scientific Name | Special Status | Observations |
|---|---|---|---|
| Mourning dove | *Zenaida macroura* | | 50+ observed |
| Killdeer | *Charadrius vociferus* | | 4 observed |
| Turkey vulture | *Cathartes aura* | | 12 observed |
| Belted kingfisher | *Megaceryle alcyon* | | 1 observed |
| Northern flicker | *Colaptes auratus* | | 2 observed |
| Blue jay | *Cyanocitta cristata* | | 1 observed |
| American crow | *Corvus brachyrhynchos* | | 4 observed |
| Marsh wren | *Cistothorus palustris* | | 6 observed |
| Northern mockingbird | *Mimus polyglottos* | | 2 observed |
| Eastern bluebird | *Sialia sialis* | | 1 observed |
| White-throated sparrow | *Zonotrichia albicollis* | | 4 observed |
| Vesper sparrow | *Pooecetes gramineus* | | 2 observed |
| Savannah sparrow | *Passerculus sandwichensis* | | 2 observed |
| Song sparrow | *Melospiza melodia* | | 1 observed |
| Eastern meadowlark | *Sturnella magna* | | 2 observed |
| Common grackle | *Zuiscalus quiscula* | | 3 observed |
| Palm warbler | *Setophaga palmarum* | | 2 observed |
| Yellow-rumped warbler | *Setophaga coronata* | | 4 observed |
| Northern cardinal | *Cardinalis cardinalis* | | 5 observed |

Notes:

[1] BCC-BCR = Bird of Conservation Concern – Bird Conservation Region

[2] Bald and Golden Eagle Protection Act

**Table 2. Mammals Observed**

| Common Name | Scientific Name | Observations |
|---|---|---|
| Eastern cottontail | *Sylvilagus floridanus* | 1 observed |
| White-tailed deer | *Odocoileus virginianus* | Tracks observed |
| North American beaver | *Castor canadensis* | Sign observed |

The vascular plants observed during on-site field investigations are listed in Table 3 below:

**Table 3. Plant Species Observed**

| Common Name | Scientific Name | Observations |
|---|---|---|
| Small carpet grass | *Arthaxon hispidus* | Common in wetland adjacent to Poplar Creek |
| Devil's beggartick | *Bidens frondosa* | Common in wetland adjacent to Poplar Creek |

| | | |
|---|---|---|
| Broadleaf cattail | *Typha latifolia* | Common in wetland adjacent to Poplar Creek |
| Green bulrush | *Scirpus atrovirens* | Limited in wetland adjacent to Poplar Creek |
| Boxelder | *Acer negundo* | Common in forested areas adjacent to Poplar Creek |
| American sycamore | *Platanus occidentalis* | Common in forested areas adjacent to Poplar Creek |
| Black willow | *Salix nigra* | Common adjacent to Poplar Creek. |
| Japanese honeysuckle | *Lonicera japonica* | Common adjacent to Poplar Creek. |
| Roundleaf honeysuckle | *Smilax rotundifolia* | Common adjacent to Poplar Creek. |
| Eastern poison ivy | *Toxicodendron radicans ssp. radicans* | Common adjacent to Poplar Creek. |
| Virginia pine | *Pinus virginiana* | Common in forested areas and along edges of remediated sites. |
| Black walnut | *Juglans nigra* | Scattered individuals observed adjacent to Poplar Creek. |
| Slippery elm | *Ulmus rubra* | Scattered individuals observed adjacent to Poplar Creek. |
| Easter red cedar | *Juniperus virginiana* | Scattered individuals observed adjacent to Poplar Creek. |
| Smooth sumac | *Rhus glabra* | Common in shrubby areas. |
| Big bluestem | *Andropogon gerardii* | Common on remediated sites. |
| Little bluestem | *Schizachyrium scoparium* | Common on remediated sites. |
| Aster sp. | *Symphyotrichum sp.* | Common on remediated sites. |
| English plantain | *Plantago lanceolata* | Common on remediated sites. |
| Common yellow wood sorrel | *Oxalis stricta* | Common on remediated sites. |
| Canada goldenrod | *Solidago canadensis* | Common on remediated sites. |
| Hairy false golden aster | *Heterotheca villosa* | Common on remediated sites. |
| Allegheny blackberry | *Rubus allegheniensis* | Common on remediated sites. |
| Sericea lespedeza | *Lespedeza cuneata* | Common on remediated sites. |

On October 31, 2025, Haley & Aldrich queried the IPaC database to identify federally listed threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat that may occur within the Project site. The IPaC database results indicated the following species potentially occur on or near the Project site:

- Gray bat (*Myotis grisescens*, federally listed as Endangered)
- Indiana bat (*Myotis sodalis*, federally listed as Endangered)
- Tricolored bat (*Perimyotis subflavus*, proposed for federal listing as Endangered)
- Whooping crane (*Grus americana*, experimental population, non-essential)
- Spotfin chub (*Erimonax monachus*, federally listed as Threatened)

- Monarch butterfly (*Danaus plexippus,* proposed for federal listing as Threatened)
- Virginia spiraea (*Spiraea virginiana*, federally listed as Threatened)
- White fringeless orchid (*Planthera integrilabia*, federally listed as Threatened)

IPaC results are valid for 90 days and after that time an updated official species list will need to be requested. IPaC also includes birds protected under the Migratory Birds Treaty Act and the Bald and Golden Eagle Protection Act (BGEPA) that are of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention. The site is in Bird Conservation (BCR) Region 28 – Appalachian Mountains. Some BCC birds are only a concern within a specific BCR, while others are listed for their entire range. The BCC and other birds listed for this site are:

- Bald eagle (Haliaeetus leucocephalus) is not a BCC in this area but warrants attention because of the BGEPA or for potential susceptibilities in offshore areas from certain types of development or activities. Breeding occurs from September 1 to August 31.

- Black-billed cuckoo (*Coccyzus erythropthalmus*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 15 to October 10.

- Canada warbler (*Cardellina canadensis*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 20 to August 10.

- Chimney swift (*Chaetura pelagica*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from Mar 15 to August 25.

- Chuck-will's-widow (*Antrostomus carolinensis*) is a BCC only in particular BCRs, including Region 28, in the continental USA. Breeding occurs from May 10 to July 10.

- Eastern whip-poor-will (*Antrostomus vociferus*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 1 to August 20.

- Golden-winged warbler (*Vermivora chrysoptera*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 1 to July 20.

- Kentucky warbler (*Geothlypis formosa*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from April 20 to August 20.

- Prairie warbler (*Setophaga discolor*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 1 to July 31.

- Prothonotary warbler (*Protonotaria citrea*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from April 1 to July 31.

- Red-headed woodpecker (*Melanerpes erythrocephalus*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 10 to September 10.

- Rusty blackbird (*Euphagus carolinus*) is a BCC only in particular BCRs, including Region 28, in the continental USA. This species breeds elsewhere.

- Wood thrush (*Hylocichla mustelina*) is a BCC throughout its range in the continental USA and Alaska. Breeding occurs from May 10 to August 31.

Gray bat

This bat species inhabits caves year-round or occasionally will use man-made tunnels in the summer. Summer caves must be warm or have restricted rooms that can trap the body heat of clustered bats. Winter hibernation sites are often deep vertical caves that trap large volumes of cold air; these caves are naturally very rare. Gray bats hunt over large areas during the breeding season and feed on flying insects over rivers, streams and lakes and other bodies of water. Mayflies, caddisflies and stoneflies make up a major part of their diet, but beetles and moths are also consumed. No caves or other suitable roosting habitat was observed on-site. Foraging could occur along Poplar Creek.

Indiana bat

This bat species overwinters in large caves and, in the summer, roosts in hollow trees or beneath tree bark. Primary roosts usually receive direct sunlight for more than half the day. Roost trees are often within canopy gaps in a forest, in a fenceline, or along a wooded edge. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain habitats, wooded wetlands and upland communities. Indiana bats typically forage in semi-open to closed forested habitats with open understory, forest edges, and riparian areas. Adult males occupy similar habitats but can use a wider range of roosts compared to females. No caves or potential winter hibernacula were observed within the site. Summer roost trees could be present on the site, with greater potential likelihood in forested areas along Poplar Creek.

Tricolored bat

During the winter, tricolored bats are found in caves and mines, although in the southern United States, where caves are sparse, tricolored bats are often found roosting in road-associated culverts. During the spring, summer and fall, tricolored bats are found in forested habitats where they roost in trees, primarily among leaves. This species typically prefers a dense growth of trees and underbrush covering a large tract. No large, densely forested tracts are present within the Project site though foraging habitat may be present for this opportunistic feeder.

Whooping crane

Whooping cranes are a very rare migrant and winter resident in East Tennessee. Beginning in 1999, captive raised young from Necedah National Wildlife Refuge in central Wisconsin were conditioned to follow an ultralight aircraft. The aircraft guides them on their first migration south to Chassahowitzka National Wildlife Refuge in Florida. The route takes the birds over East Tennessee where they stop and rest before continuing on their journey. No cranes were observed during the field investigation and no stopover habitat is present within the Project site. The lack of observed suitable habitat indicates the

Project site is unlikely to be utilized by this species for anything more than individuals passing over to more favorable habitats.

Spotfin chub
This species is found in streams with relatively low-silt substrates in good flows and forages commonly on bedrock, boulders, and cobble. Sub-adult spotfin chubs appear more commonly on smaller substrates like sand and small gravel than do adults. No suitable habitat was observed within the Project site and this species is likely restricted to Poplar Creek and/or other streams in the vicinity.

Monarch butterfly
The monarch butterfly can be found in fields, along roadsides, open areas, wet areas, and urban gardens with milkweed and flowering plants. This species is generally noted for consideration at sites nationwide.

Virginia spiraea
This species occurs on periodically flood-scoured banks of high-gradient mountain streams, meander scrolls, point bars, natural levees, and braided features of lower stream reaches, and occasionally near disturbed rights-of-way. Plants are often found on geologically active areas with erosion, deposition, and slumping, along rivers with dynamic flooding regimes, sandbars, scoured river shore and flatrock habitat with crevices. These areas also are associated with cobbles, boulders, and massive rock outcrops with sandy or clay soils and can be periodically xeric. Plants are often seen in silt, mud, and sand. No suitable habitat was observed within the Project site during field investigations.

White fringeless orchid
This species is found in acidic seeps and boggy areas near the heads of streams in open to partially shaded settings. There are limited occurrences across its native range, mostly occurring on public lands. No suitable habitat was observed within the Project site during field investigations.

Haley & Aldrich performed an online review of TNHP data regarding documented occurrences of rare, threatened, and endangered species in the vicinity of the Project site. Table 4 includes a list of documented occurrences contained in the United States Geological Survey quadrangle where the Project site is located (the Elverton quadrangle) as well as a summary of potential habitat observed within the Project site. The TNHP list includes gray bat, which is discussed above. The TNHP list also includes one state-listed, endangered salamander; one-state listed, endangered crustacean; four state-listed, endangered mollusks; three state-listed, endangered plants; and three state-listed, threatened plants.

**Table 4. TNHP Identified Species**

| Common Name | Scientific Name | State Status | Habitat | Notes |
|---|---|---|---|---|
| Gray bat | *Myotis grisescens* | Endangered | See discussion above. | See discussion above. |

| Common Name | Scientific Name | State Status | Habitat | Notes |
|---|---|---|---|---|
| Hellbender | *Cryptobranchus alleganiensis* | Endangered | This salamander species is found in rocky, clear creeks and rivers with large shelter rocks. | No suitable habitat was observed within the Project site. This species would be restricted to streams in the area. |
| Valley flame crayfish | *Cambarus deweesae* | Endangered | This crustacean is primarily a burrower found in open areas with high water tables. | No suitable habitat was observed within the Project site. |
| Spectaclecase | *Margaritifera monodonta* | Endangered | This mussel species is found in medium to large rivers with substrates from mud and sand to gravel, cobble, and boulders. | No suitable habitat was observed within the Project site. This species would be restricted to streams in the area. |
| Alabama lampmussel | *Lampsilis virescens* | Endangered | This mussel species is found in sand and gravel substrates in shoal areas of small to medium size rivers. | No suitable habitat was observed within the Project site. This species would be restricted to streams in the area. |
| Finerayed pigtoe | *Fusconaia cuneolus* | Endangered | This mussel species is found in riffles of fords and shoals of moderate gradient streams in firm cobble and gravel substrates. | No suitable habitat was observed within the Project site. This species would be restricted to streams in the area. |
| Shiny pigtoe | *Fusconaia cor* | Endangered | This mussel species is found in shoals and riffles of small to medium sized rivers with moderate to fast current over sand-cobble substrates. | No suitable habitat was observed within the Project site. This species would be restricted to streams in the area. |
| Prairie goldenrod | *Oligoneuron album* | Endangered | This plant species is found in barrens. | No suitable habitat was observed within the Project site. |
| Earleaved false-foxglove | *Agalinis auriculata* | Endangered | This plant species is found in barrens. | No suitable habitat was observed within the Project site. |
| Slender blazing-star | *Liatris cylindracea* | Threatened | This plant species is found in barrens. | No suitable habitat was observed within the Project site. |
| Tall larkspur | *Delphinium exaltatum* | Endangered | This plant species is found in glades and barrens. | No suitable habitat was observed within the Project site. |

| Common Name | Scientific Name | State Status | Habitat | Notes |
|---|---|---|---|---|
| Shining ladies'-tresses | *Spiranthes lucida* | Threatened | In Tennessee, this species is typically found in sunny, moist habitats like seepage areas over basic rock (limestone), moist banks, and shores of non-tidal rivers. It also prefers habitats with abundant water, such as wet meadows, damp woods, and fens, especially in areas with calcareous (high-pH) soil. | Wetlands are generally absent from the Project site and this species was not observed to be present in the small wetland that was observed adjacent to Poplar Creek. |
| Northern bush-honeysuckle | *Diervilla lonicera* | Threatened | This plant species is found in rocky woodlands and on bluffs. | No suitable habitat was observed within the Project site. |

No direct impacts to federal listed species discussed above are anticipated, due to either lack of suitable habitat, or by means of avoidance of habitat and implementing best management practices, including time-of-year restrictions for clearing, if applicable. None of the species discussed above were observed during the site investigation. No raptor nests were observed on the Project site. Thus, disturbance to this site is not anticipated to result in significant adverse impacts to protected species.

Sincerely yours,
HALEY & ALDRICH, INC.

Michael Martin
Senior Scientist

James Pippin
Senior Project Manager | Associate

Enclosures:

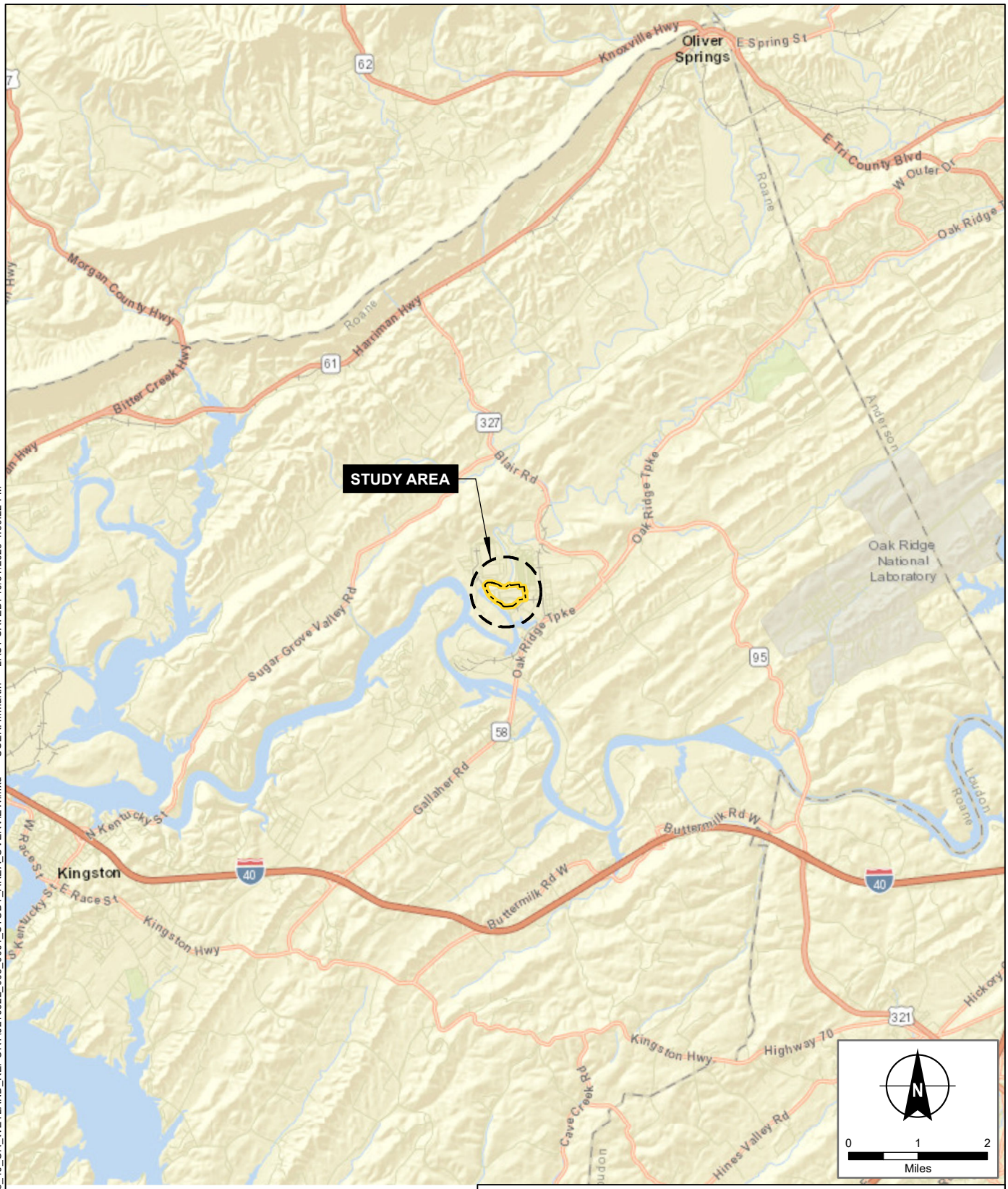
Attachment 1 – Figure 1 - Study Area Overview and Figure 2 - Ecological Cover Type Map
Attachment 2 – USFWS Species Lists
Attachment 3 – Photographic Log

# ATTACHMENT 1

**Figure 1 – Study Area Overview**

**Figure 2 - Ecological Cover Type Map**

HALEY ALDRICH




LEGEND

PROJECT LOCATION

TN

PROJECT SITE

BASEMAP SOURCE: ESRI WORLD STREET MAP

HALEY ALDRICH

RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY PROJECT
OAK RIDGE, TENNESSEE

# STUDY AREA OVERVIEW

APPROXIMATE SCALE: 1 IN = 2 MILES
OCTOBER 2025

FIGURE 1

GIS FILE PATH: Z:\0210922\GISMaps\2025_10_OR_WETLAND_REPORT\0210922_003_0001_STUDY_AREA_OVERVIEW.mxd — USER: mmartin — LAST SAVED: 10/31/2025 1:59:22 PM




**LEGEND**

- EMERGENT WETLAND
- FOREST
- HERBACEOUS
- PAVEMENT/GRAVEL
- STUDY AREA

**NOTES**
1. NHD DATA SOURCE: U.S. GEOLOGICAL SURVEY
2. NWI WETLAND DATA SOURCE: U.S. FISH AND WILDLIFE SERVICE
3. AERIAL IMAGERY SOURCE: ESRI

N

0 250 500
SCALE IN FEET

HALEY ALDRICH

RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY PROJECT
OAK RIDGE, TENNESSEE

# ECOLOGICAL COVER TYPES

SCALE: AS SHOWN
NOVEMBER 2025

FIGURE 2

GIS FILE PATH: Z:\021092\GIS\Maps\2025_10_ECO_RPT\0210922_003_0002_ECOLOGICAL_COVER_TYPES.mxd — USER: mmartin — LAST SAVED: 11/3/2025 12:47:14 PM

# ATTACHMENT 2
## USFWS Species List

HALEY ALDRICH

IPaC U.S. Fish & Wildlife Service

# IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

## Location

Roane County, Tennessee




## Local office

Tennessee Ecological Services Field Office

(931) 528-6481
(931) 528-7075

446 Neal Street
Cookeville, TN 38501-4027

NOT FOR CONSULTATION

# Endangered species

**This resource list is for informational purposes only and does not constitute an analysis of project level impacts.**

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

## Mammals

| NAME | STATUS |
|---|---|
| Gray Bat Myotis grisescens<br>Wherever found<br>No critical habitat has been designated for this species.<br>https://ecos.fws.gov/ecp/species/6329 | Endangered |
| Indiana Bat Myotis sodalis<br>Wherever found<br>There is **final** critical habitat for this species. Your location does not overlap the critical habitat.<br>https://ecos.fws.gov/ecp/species/5949 | Endangered |
| Tricolored Bat Perimyotis subflavus<br>Wherever found<br>No critical habitat has been designated for this species.<br>https://ecos.fws.gov/ecp/species/10515 | Proposed Endangered |

## Birds

| NAME | STATUS |
|---|---|
| Whooping Crane Grus americana<br>No critical habitat has been designated for this species.<br>https://ecos.fws.gov/ecp/species/758 | EXPN |

NOT FOR CONSULTATION

# Fishes

| NAME | STATUS |
|---|---|
| Spotfin Chub Erimonax monachus<br>There is **final** critical habitat for this species. Your location does not overlap the critical habitat.<br>https://ecos.fws.gov/ecp/species/1521 | Threatened |

# Insects

| NAME | STATUS |
|---|---|
| Monarch Butterfly Danaus plexippus<br>Wherever found<br>There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.<br>https://ecos.fws.gov/ecp/species/9743 | Proposed Threatened |

# Flowering Plants

| NAME | STATUS |
|---|---|
| Virginia Spiraea Spiraea virginiana<br>Wherever found<br>No critical habitat has been designated for this species.<br>https://ecos.fws.gov/ecp/species/1728 | Threatened |
| White Fringeless Orchid Platanthera integrilabia<br>No critical habitat has been designated for this species.<br>https://ecos.fws.gov/ecp/species/1889 | Threatened |

# Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

# Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1].
Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are Bald Eagles and/or Golden Eagles in your project area.

**Measures for Proactively Minimizing Eagle Impacts**
For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the National Bald Eagle Management Guidelines. You may employ the timing and activity-specific distance recommendations in this document when designing your project/activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to Bald Eagle Nesting and Sensitivity to Human Activity.

NOT FOR CONSULTATION

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

If disturbance or take of eagles cannot be avoided, an incidental take permit may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the Do I Need A Permit Tool. For assistance making this determination for golden eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

**Ensure Your Eagle List is Accurate and Complete**

If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

**Review the FAQs**

The FAQs below provide important additional information and resources.

| NAME | BREEDING SEASON |
|---|---|
| Bald Eagle Haliaeetus leucocephalus<br>This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.<br>https://ecos.fws.gov/ecp/species/1626 | Breeds Sep 1 to Aug 31 |

# Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

**Probability of Presence** (▄)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

**Breeding Season** (▄)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

**Survey Effort** (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

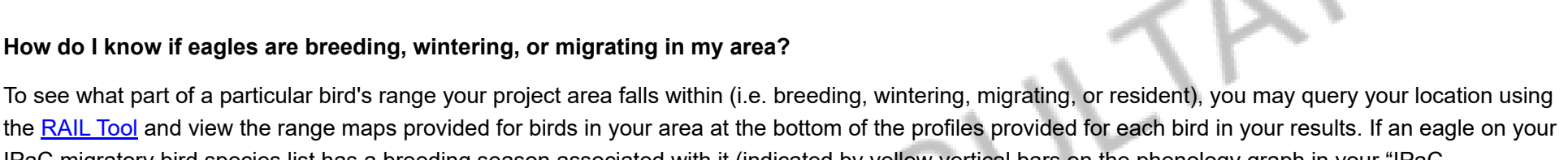
**No Data** (–)

A week is marked as having no data if there were no survey events for that week.

**Survey Timeframe**

NOT FOR CONSULTATION

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.




## Bald & Golden Eagles FAQs

**What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?**

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are an eagle (Bald and Golden Eagle Protection Act requirements may apply).

**Proper interpretation and use of your eagle report**

On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort line or no data line (red horizontal) means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

**How do I know if eagles are breeding, wintering, or migrating in my area?**

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your “IPaC PROBABILITY OF PRESENCE SUMMARY” at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

**Interpreting the Probability of Presence Graphs**

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

***How is the probability of presence score calculated? The calculation is done in three steps:***

The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

**Breeding Season ()**

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

**Survey Effort ()**

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

**No Data ()**

A week is marked as having no data if there were no survey events for that week.

**Survey Timeframe**

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

# Migratory birds

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

NOT FOR CONSULTATION

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

**Measures for Proactively Minimizing Migratory Bird Impacts**

Your IPaC Migratory Bird list showcases birds of concern, including Birds of Conservation Concern (BCC), in your project location. This is not a comprehensive list of all birds found in your project area. However, you can help proactively minimize significant impacts to all birds at your project location by implementing the measures in the Nationwide avoidance and minimization measures for birds document, and any other project-specific avoidance and minimization measures suggested at the link Measures for avoiding and minimizing impacts to birds for the birds of concern on your list below.

**Ensure Your Migratory Bird List is Accurate and Complete**

If your project area is in a poorly surveyed area, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles document, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

**Review the FAQs**

The FAQs below provide important additional information and resources.

| NAME | BREEDING SEASON |
|---|---|
| Bald Eagle Haliaeetus leucocephalus<br>This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.<br>https://ecos.fws.gov/ecp/species/1626 | Breeds Sep 1 to Aug 31 |
| Black-billed Cuckoo Coccyzus erythropthalmus<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br>https://ecos.fws.gov/ecp/species/9399 | Breeds May 15 to Oct 10 |
| Canada Warbler Cardellina canadensis<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. | Breeds May 20 to Aug 10 |
| Chimney Swift Chaetura pelagica<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. | Breeds Mar 15 to Aug 25 |
| Chuck-will's-widow Antrostomus carolinensis<br>This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA | Breeds May 10 to Jul 10 |
| Eastern Whip-poor-will Antrostomus vociferus<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. | Breeds May 1 to Aug 20 |
| Golden-winged Warbler Vermivora chrysoptera<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br>https://ecos.fws.gov/ecp/species/8745 | Breeds May 1 to Jul 20 |
| Kentucky Warbler Geothlypis formosa<br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. | Breeds Apr 20 to Aug 20 |

NOT FOR CONSULTATION

Prairie Warbler Setophaga discolor — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Prothonotary Warbler Protonotaria citrea — Breeds Apr 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-headed Woodpecker Melanerpes erythrocephalus — Breeds May 10 to Sep 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Rusty Blackbird Euphagus carolinus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Wood Thrush Hylocichla mustelina — Breeds May 10 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

# Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

**Probability of Presence** (■)

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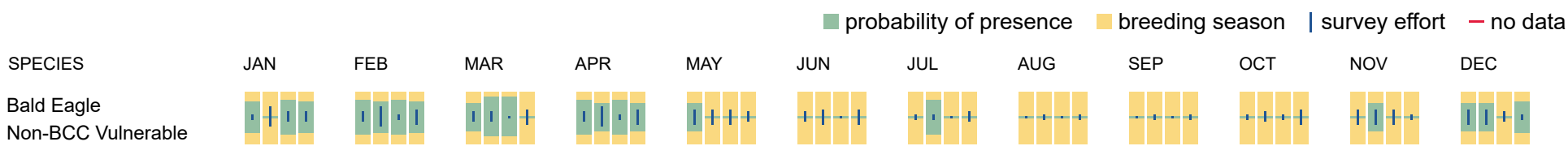
**Breeding Season** (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

**Survey Effort** (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

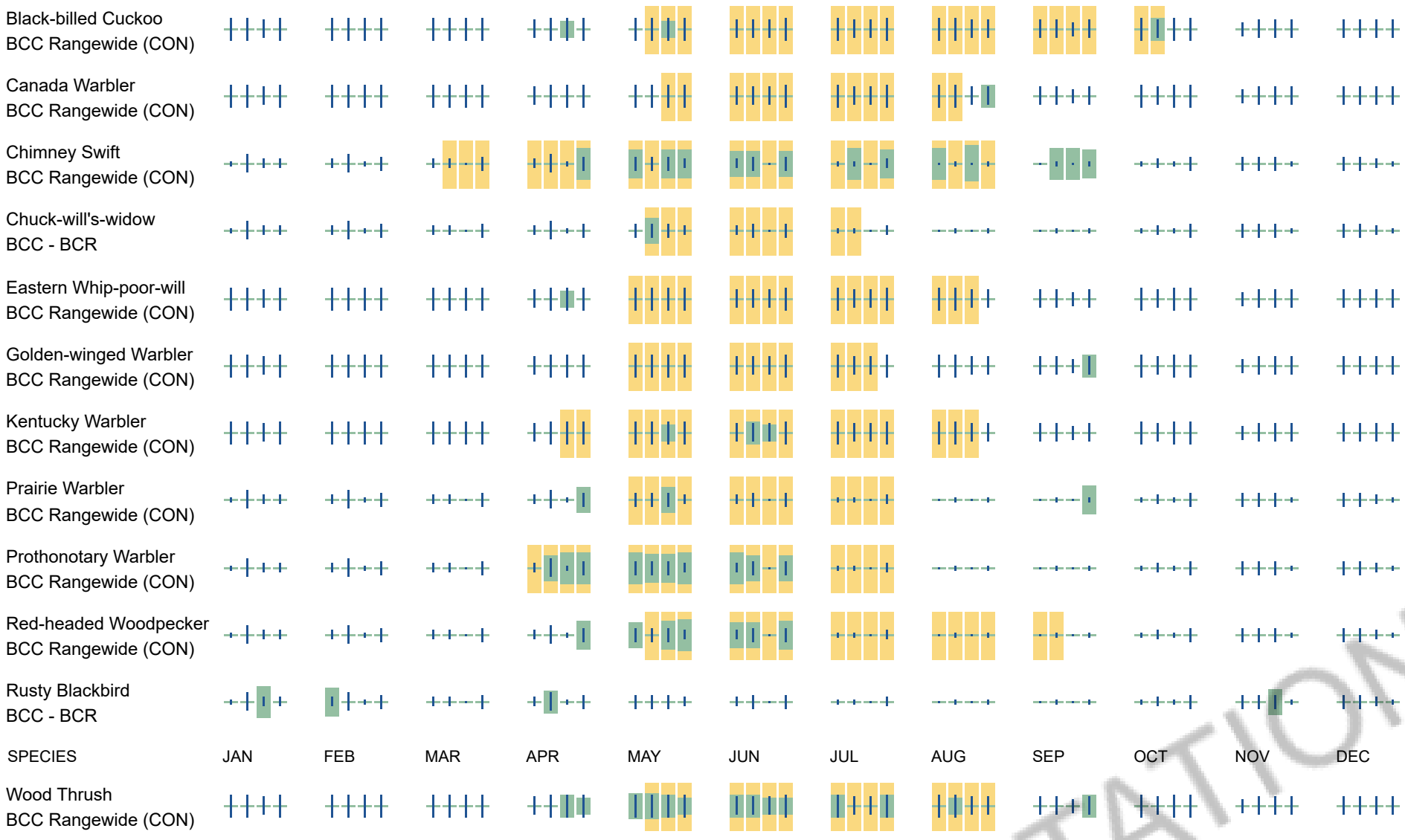
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

**No Data** (–)
A week is marked as having no data if there were no survey events for that week.

**Survey Timeframe**
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.




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## Migratory Bird FAQs

**Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.**

Nationwide Avoidance & Minimization Measures for Birds describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see when birds are most likely to occur and breed in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

**What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?**

The Migratory Bird Resource List is comprised of Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the Bald and Golden Eagle Protection Act and those species marked as “Vulnerable”. See the FAQ “What are the levels of concern for migratory birds?” for more information on the levels of concern covered in the IPaC migratory bird species list.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle (Bald and Golden Eagle Protection Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, and to verify survey effort when no results present, please visit the Rapid Avian Information Locator (RAIL) Tool.

**Why are subspecies showing up on my list?**

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

**What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?**

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

**How do I know if a bird is breeding, wintering, or migrating in my area?**

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your “IPaC

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PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

**What are the levels of concern for migratory birds?**

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Bald and Golden Eagle Protection Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially BCC species. For more information on avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ "Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

**Details about birds that are potentially affected by offshore projects**

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

**Proper interpretation and use of your migratory bird report**

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list does not represent all birds present in your project area. It is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

**Interpreting the Probability of Presence Graphs**
Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

***How is the probability of presence score calculated? The calculation is done in three steps:***
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

**Breeding Season ()**
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

**Survey Effort ()**
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

**No Data ()**
A week is marked as having no data if there were no survey events for that week.

**Survey Timeframe**
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

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# Facilities

## National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

## Fish hatcheries

There are no fish hatcheries at this location.

## Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

LAKE
L1UBHh

A full description for each wetland code can be found at the National Wetlands Inventory website

**NOTE:** This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

**Data limitations**

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

**Data exclusions**

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

**Data precautions**

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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# ATTACHMENT 3
## Photographic Log

HALEY ALDRICH



***Photo 1: View of emergent wetland looking southwest near Poplar Creek.***



***Photo 2: View of emergent wetland looking southeast near Poplar Creek.***



***Photo 3: View of channel draining emergent wetland to Poplar Creek looking northwest.***



***Photo 4: View looking northwest at Poplar Creek.***



***Photo 5: View of upland forest along Poplar Creek.***



***Photo 6: View of upland forest along Poplar Creek.***



***Photo 7: View of herbaceous uplands in the central portion of the Project site.***



***Photo 8: View of herbaceous uplands in the eastern portion of the Project site.***



***Photo 9: View of herbaceous uplands and paved surfaces in the eastern portion of the Project site.***



***Photo 10: View of upland forest on steep slopes adjacent to Poplar Creek.***



***Photo 11: View of paved surfaces and herbaceous vegetation in northwest portion of the Project site.***



***Photo 12: View of herbaceous vegetation and forest in the northwest portion of the Project site.***

# APPENDIX B
# Wetland and Stream Delineation Report

HALEY & ALDRICH, INC.
260 E. MAIN STREET, SUITE 2100
ROCHESTER, NY 14604
585.359.9000

October 30, 2025
File No. 0210922-003

Radiant Industries, Inc.
1921 E. Maple Avenue
El Segundo, California 90245

Attention: Chanson Yang
Director of Licensing

Subject: Wetland and Stream Delineation Report for
R-50 Production Facility Project
Oak Ridge, Tennessee

Dear Chanson:

This Wetland and Stream Delineation Report summarizes the results of field work performed by Haley & Aldrich, Inc. (Haley & Aldrich) to locate and identify wetlands and streams in support of the Radiant Industries, Inc. (Radiant) R-50 Production Facility Project (Project).

Radiant is preparing an application for a radioactive materials license from the U.S. Nuclear Regulatory Commission (NRC) to construct and operate a radiological fueling station and long-term storage unit at Radiant's proposed Project facility to be located within the East Tennessee Technology Park located in the city of Oak Ridge in Roane County, Tennessee (see Figure 1). The Project "Study Area" includes approximately 41.1 acres to support the initial fueling operations of the Project as well approximately 42.9 additional acres to support potential future operations. At full buildout, Radiant will own approximately 84 acres.

## Regulatory Authorities

### WATERS OF THE UNITED STATES

As defined by the U.S. Army Corps of Engineers (USACE), Waters of the United States include lakes, ponds, streams (intermittent and perennial), and wetlands which are regulated under Sections 401 and 404 of the Clean Water Act. Wetlands under federal jurisdiction are defined as "those that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

The USACE also regulates navigable waters under Section 10 of the Rivers and Harbor Act (33 U.S.C. 401 et seq.), which requires a permit from the USACE to construct any structure in or over any navigable water of the United States, as well as any proposed action that would alter or disturb (such as

excavation/dredging or deposition of materials) these waters. If the proposed structure or activity affects the course, location, condition, or capacity of the navigable water, even if the proposed activity is outside the boundaries of the water body, a permit from the USACE is required.

## TENNESSEE WETLANDS AND STREAMS

The Tennessee Department of Environment and Conservation (TDEC) Division of Water Resources regulates wetlands under the Tennessee Water Quality Control Act of 1977 and Section 401 of the federal Clean Water Act. Section 401 requires states to certify that any discharge of dredged or fill material into Waters of the United States complies with state water quality standards. In Tennessee, this certification is typically issued through an Aquatic Resource Alteration Permit (ARAP), which also serves as the state's Section 401 Water Quality Certification when a federal permit (such as a U.S. Army Corps of Engineers Section 404 permit) is required.

Under Tennessee law, "Waters of Tennessee" include any and all water, public or private, on or beneath the surface of the ground, that is contained within, flows through, or borders upon Tennessee or any portion thereof, except bodies of water confined entirely within private property that do not connect with natural surface or underground waters. This definition encompasses streams, rivers, lakes, wetlands, and groundwater. Ephemeral wet weather conveyances are not considered streams under the Water Quality Control Act and generally do not require permits.

Any activity that alters the physical, chemical, or biological properties of waters of the state, including wetlands, requires a permit. Common regulated activities include:

- Discharge of dredged or fill material.
- Dredging or excavation.
- Stream channel modifications.
- Wetland drainage or filling.

Permits are issued as ARAPs, and mitigation may be required to ensure no net loss of resource value.

Recent legislation (effective July 2025) introduced new rules for isolated wetlands, which are wetlands lacking a continuous surface connection to jurisdictional waters. These rules establish four categories—artificial, low, moderate, and high quality, based on ecological function. Permit thresholds and mitigation requirements vary by category:

- Artificial isolated wetlands: No permit required.
- Low-quality: Up to 1 acre without permit; 1 to 2 acres require general ARAP.
- Moderate-quality: Up to 0.25 acre without permit; 0.25 to 2 acres require general ARAP.
- High-quality: Individual permit required.

## Methodology

Prior to initiating field investigations, Haley & Aldrich conducted a desktop review of publicly available data to evaluate the presence of mapped wetlands and streams within the Study Area. Data consulted include United States Geological Survey (USGS) topographic quadrangle maps, National Wetland Inventory (NWI) maps, Natural Resources Conservation Service (NRCS) Web Soil Survey, Federal Emergency Management Agency (FEMA) Flood Insurance maps, historic and recent aerial imagery, and the National Hydrography Dataset (NHD). Information gathered from the desktop review are described in Site Setting section below.

The wetland and stream delineation field survey was performed in accordance with criteria set forth in the *Corps of Engineers Wetland Delineation Manual* (1987) and the *2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont* Region (Version 2.0). Data were collected from one or more sample plots in each delineated wetland (depending on the size of the delineated area) and were recorded on USACE Routine Wetland Determination forms. The boundaries of wetlands were demarcated with pink survey ribbon (flagging) and located with a Trimble TDC6 GPS Unit with reported sub-meter accuracy.

Hydrology was evaluated based on indicators that are divided into two categories, primary and secondary. The 1987 manual and 2012 supplement define hydrology as present when at least one primary indicator or two secondary indicators are identified. One primary indicator is sufficient to evaluate if hydrology is present; however, if primary indicators are absent then two or more of the secondary indicators are required to evaluate hydrology. If other probable hydrology evidence was found, then this was subsequently documented on the Wetland Determination Data Form.

Hydrophytic vegetation was assessed by identifying plant species and their assigned wetland indicator rating of obligate, facultative wet, facultative, facultative upland, and upland according to the *2022 National Wetland Plant List*. Vegetation in both upland and wetland communities was characterized using areal dominance method, with a radius of 30-feet around the soil sample location for trees, a radius of 15-feet radius for saplings/shrubs, and a radius of five-feet for herbaceous plants.

Hydric soil indicators were evaluated using soil characteristics as defined in *Field Indicators of Hydric Soils in the United States (Version 8.2, 2018)*. Evidence of hydric soil indicators was recorded based on the presence of color matrix, hue, and redoximorphic features such as saturation, gleyed matrix, mottling, hydrogen sulfide odor, and organic/peat layers. Soil test pits were dug using a shovel to a depth of approximately 18-inches or refusal due the presence of hard pan layer, rock, or hard fill materials. Soil color was described using the Munsell Color book, texture using USDA hand-texture methods, and the presence/absence of redoximorphic features, including depletions and concentrations.

Additional surface waters, including stream channels and drainage ways, found during field work were investigated, flagged, located with GPS and characterized in the Stream Inventory Datasheets.

# Site Setting

## PHYSIOGRAPHY AND SOILS

The Study Area is located in the Valley and Ridge physiographic province of East Tennessee, which is characterized by a series of narrow, parallel valleys and ridges. Elevation within the Study Area ranges from approximately 750 feet above mean sea level in the northwestern portion of the Study Area along Poplar Creek to approximately 795 feet above mean sea level in the central portion of the Study Area. A topographic map of the Study Area and surrounding region is provided as Figure 2.

Soil series units mapped by the NRCS web soil survey are listed as shown in Table 1 and on Figure 2. The NRCS has classified all soil within the Study Area as Urban land with 5 to 20 percent slopes (UrD) because of the extensive industrial development and remediation activities that have occurred in the past.

**Table 1. Study Area Soils**

| Soil Map Unit Symbol | Soil Map Unit Name | Approximate Acres within Study Area | Drainage Class | Hydric Conditions[1] |
|---|---|---|---|---|
| UrD | Urban land, 5 to 20 percent slopes | 87.4 | None specified | Not Hydric |
| W | Water | <0.1 | None specified | Not Hydric |

Note:

[1] Soils mapping source: USDA, Natural Resource Conservation Service (NRCS) web soil survey.

## HYDROLOGY

The Study Area is located in the Lower Clinch Subbasin (HUC 06010207) watershed. The watershed is defined as the area drained by the Clinch River after it flows out of Norris Lake, eventually emptying into Watts Bar Lake. The Clinch River within this subbasin is fed by tributaries and flows through areas that include the cities of Clinton, Kingston, Maynardville, and Oak Ridge. The subbasin covers approximately 631 square miles and includes 802 stream miles and over 8,000 acres of lake surface area.

The majority of surface hydrology within the Study Area is generated by precipitation and surface water sheet flow from adjacent areas at higher elevations with a total average annual precipitation of 59.7 inches (Source: http://usclimatedata.com as measured in Oak Ridge).

NWI and NHD mapping indicate the only mapped feature within the Study Area is Poplar Creek (NWI code L1UBHh), which bounds the western half of the Study Area and slightly encroaches along the northern Study Area boundary. FEMA mapping indicates the Study Area lies within Zone X – Area of Minimal Flood Hazard. Mapped wetlands and streams in the vicinity of the Study Area are included on Table 2 and are depicted in Figure 3.

**Table 2. Federal and State Mapped Wetland and Streams**

| Name | Classification[1] |
|---|---|
| Poplar Creek | Perennial Stream or River/L1UBHh |

Note:

[1] *USGS National Hydrology Dataset (NHD) and USFWS National Wetlands Inventory (NWI).*

## Results

Field investigations to delineate wetlands and streams within and adjacent to the Study Area were completed by two Haley & Aldrich wetland scientists on October 21, 2025. One wetland was identified within the Study Area and Poplar Creek was observed to flow along the northern boundary of the Study Area. These features are summarized in Table 3 below and are depicted on Figure 4.

**Table 3. Delineated Wetlands and Streams**

| Wetland/ Stream ID | Wetland Community[1] | Stream Type[2] | Length/Area within Study Area[3] | Jurisdiction[4] |
|---|---|---|---|---|
| MMA | PEM | -- | 0.31 ac | USACE |
| Poplar Creek | -- | Perennial | 2,100 ft[5] | USACE |

Notes:

[1] Wetland classifications are based on the Cowardin classification system whereby: (P = Palustrine; EM = Emergent; SS = Shrub Scrub; FO = Forested).

[2] Waterbody type may include perennial, intermittent or ephemeral. A perennial stream has flowing water year-round during a typical year. Perennial streams are identified as solid blue lines on the USGS Topographic maps. An intermittent stream has flowing water during certain times of the year when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Intermittent streams are identified as dashed blue lines on the USGS Topographic maps. An ephemeral drainage feature has flowing water only during and for a short duration after, precipitation events in a typical year. Ephemeral drainage features are not identified on the USGS Topographic map.

[3] Linear feet for stream length and acres for wetlands area. Area of wetlands presented is area mapped (shown on Figure 4) during field delineation and may vary from area within Study Area limits.

[4] Based on field observations of hydrologic connections. If necessary, final federal and state jurisdiction can only be confirmed through consultation with USACE and TDEC.

[5] Located adjacent to the northern boundary of the Study Area.

Representative photos of each delineated feature are included as Attachment A. Completed wetland determination and stream inventory data forms are included as Attachment B. Wetland type was classified according to the Cowardin classification (Cowardin, et al., 1979).

### WETLAND DESCRIPTIONS

Wetland MMA is a PEM wetland associated with a small channel that drains north to Poplar Creek. The wetland is surrounded by a small, forested upland area. Evidence of beaver use (i.e., downed trees and chewed stumps) was observed within the wetland. The observed indicators of wetland hydrology included Surface Water (A1), High Water Table (A2), Saturation (A3), Water-Stained Leaves (B9), Aquatic Fauna (B13), Drainage Patterns (B10), and FAC-Neutral Test (D5). The dominant vegetation included

small carpet grass (*Arthraxon hispidus*), devil's beggartick (*Bidens frondosa*), and broadleaf cattail (*Typha latifolia*). The observed hydric soil indicator was Depleted Dark Surface (F7).

### STREAM DESCRIPTIONS

Poplar Creek was observed along the northern boundary of the Study Area. In this section, the stream was approximately 200 feet wide, and the water was turbid at the time of observation. In areas where observation was possible, the channel substrate appears to consist of silt and cobble. The stream flows west adjacent to the northern Study Area boundary before passing beneath the Perimeter Road bridge and bending to the southeast and parallelling the southwestern Study Area boundary.

## Conclusions

One wetland was delineated during October 2025 as part of an on-site wetland and stream delineation. It is anticipated that Wetland MMA will be considered jurisdictional by the USACE because of its direct hydrological connection to Poplar Creek, which is located adjacent to the northern Study Area boundary and is listed by the USACE as a navigable water. If needed, final determination of jurisdictional status can only be made through consultation with the USACE and TDEC.

Sincerely yours,
HALEY & ALDRICH, INC.



Michael S. Martin
Technical Specialist



James B. Pippin
Associate | Senior Project Manager

Enclosures:

- References
- Figure 1 – Study Area Overview
- Figure 2 – Topography and Soil
- Figure 3 – Mapped Aquatic Resources
- Figure 4 – Delineated Wetlands and Streams
- Attachment A – Photo Log
- Attachment B – Wetland Determination and Stream Inventory Data Forms

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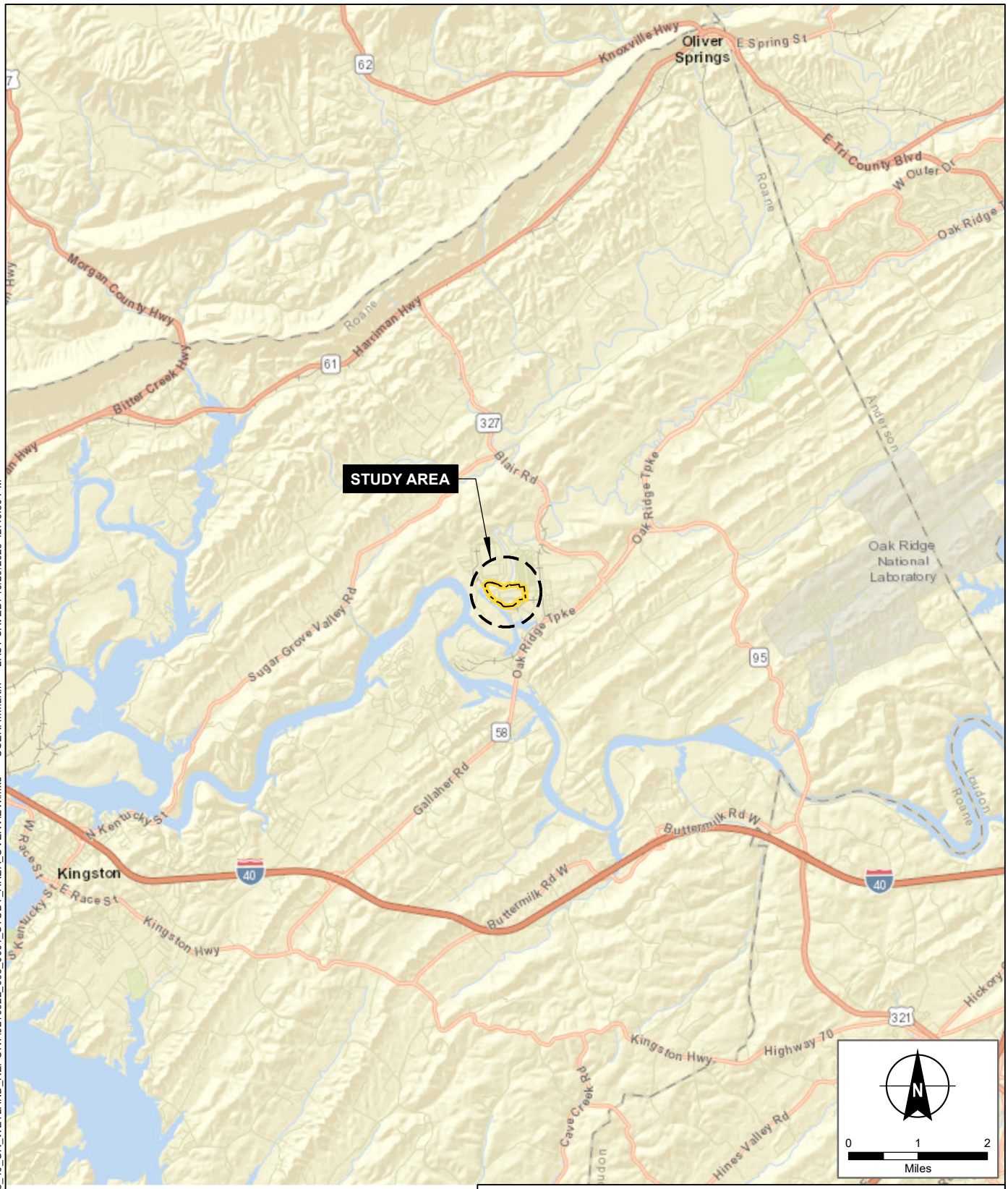
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# FIGURES




GIS FILE PATH: Z:\0210922\GISMaps\2025_10_OR_WETLAND_REPORT\0210922_003_0001_STUDY_AREA_OVERVIEW.mxd — USER: mmartin — LAST SAVED: 10/29/2025 12:40:30 PM

**LEGEND**

PROJECT LOCATION

TN

PROJECT SITE

BASEMAP SOURCE: ESRI WORLD STREET MAP

HALEY ALDRICH

RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILTY PROJECT
OAK RIDGE, TENNESSEE

# STUDY AREA OVERVIEW

APPROXIMATE SCALE: 1 IN = 2 MILES
OCTOBER 2025

FIGURE 1




**SOIL MAP UNITS**

- URD - URBAN LAND, 5 TO 20 PERCENT SLOPES
- W - WATER

**LEGEND**

STUDY AREA

**NOTES**

1. SOILS DATA SOURCE: USDA NRCS WEB SOIL SURVEY
2. TOPO MAP SOURCE: U.S. GEOLOGICAL SURVEY NATIONAL MAP

N

0 250 500

SCALE IN FEET

HALEY ALDRICH

RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY PROJECT
OAK RIDGE, TENNESSEE

# TOPOGRAPHY AND SOIL

SCALE: AS SHOWN
OCTOBER 2025

FIGURE 2

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**LEGEND**

- STUDY AREA
- NHD MAPPED WATERBODY

**NWI-MAPPED AQUATIC RESOURCES**

- LAKE
- POND

**NOTES**

1. NHD DATA SOURCE: U.S. GEOLOGICAL SURVEY
2. NWI WETLAND DATA SOURCE: U.S. FISH AND WILDLIFE SERVICE
3. AERIAL IMAGERY SOURCE: ESRI

N

0 250 500

SCALE IN FEET

HALEY ALDRICH

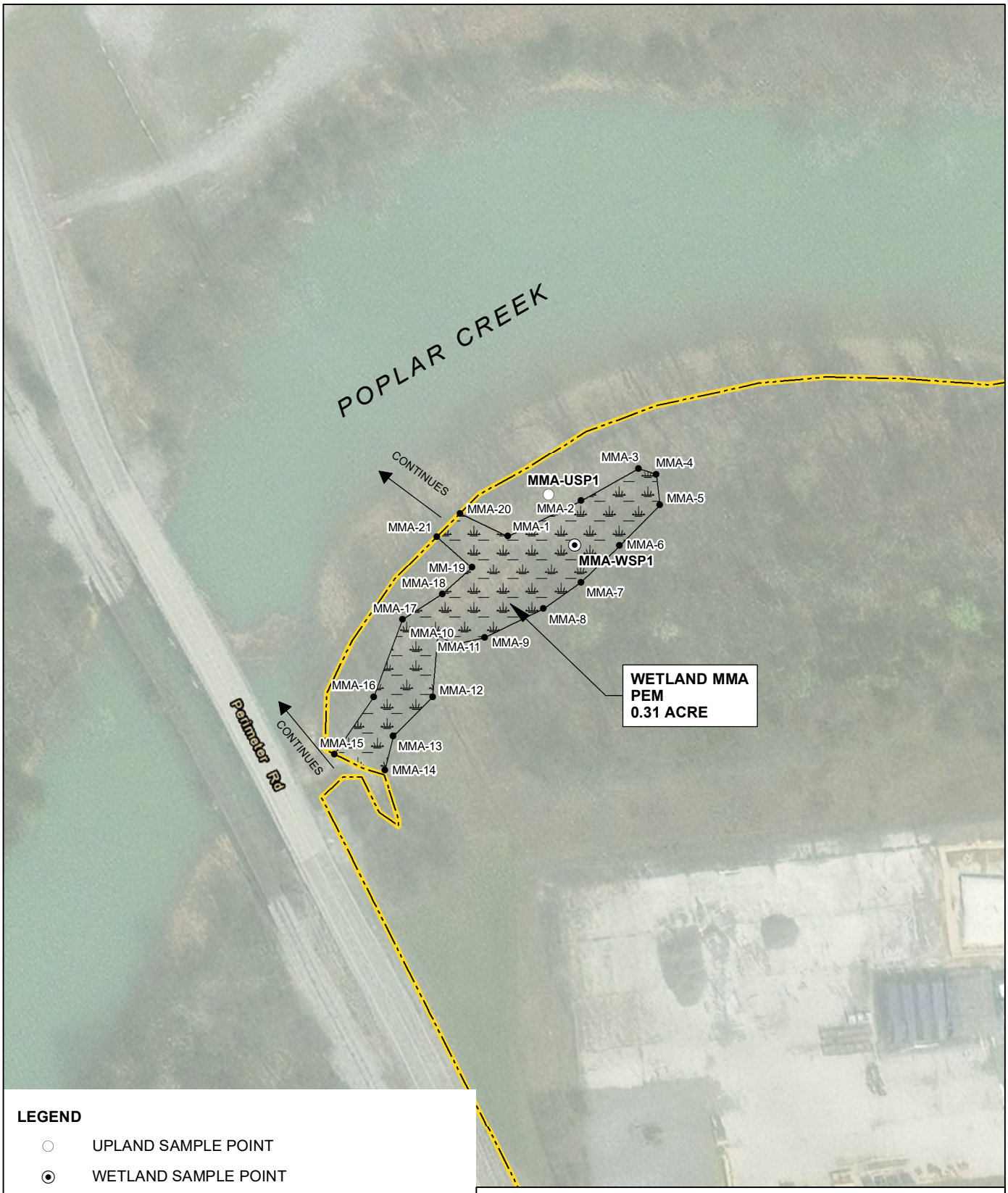
RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY PROJECT
OAK RIDGE, TENNESSEE

# MAPPED AQUATIC RESOURCES

SCALE: AS SHOWN
OCTOBER 2025

FIGURE 3

GIS FILE PATH: Z:\021092\GIS\Maps\2025_10_OR_WETLAND_REPORT\021092_003_0003_MAPPED_AQUATIC_RESOURCES.mxd — USER: mmartin — LAST SAVED: 10/29/2025 1:05:12 PM




**LEGEND**

- UPLAND SAMPLE POINT
- WETLAND SAMPLE POINT
- DELINEATION FLAG
- FEATURE CONTINUES
- DELINEATED WETLAND
- STUDY AREA

**NOTES**
1. DELINEATED WETLAND TYPES ARE BASED ON COWARDIN CLASSIFICATION.
2. AERIAL IMAGERY SOURCE: ESRI

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY PROJECT
OAK RIDGE, TENNESSEE

# DELINEATED WETLANDS

SCALE: AS SHOWN
OCTOBER 2025

FIGURE 4

GIS FILE PATH: Z:\021\0922\GIS\Maps\2025_10_OR_WETLAND_REPORT\0210922_003_0004_DELINEATED WETLANDS.mxd — USER: mmartin — LAST SAVED: 10/30/2025 3:55:32 PM

# ATTACHMENT A
## Photo Log



***Photo 1: View of Wetland MMA (PEM) looking southwest from sample point MMA-WSP1.***



***Photo 2: View of Wetland MMA (PEM) looking southeast from sample point MMA-WSP1.***



***Photo 3: View of channel draining Wetland MMA (PEM) to Poplar Creek looking northwest.***



***Photo 4: View looking northwest at Poplar Creek near Wetland MMA.***



***Photo 5: View looking west at uplands near sample point MMA-USP1.***



***Photo 6: View looking east at uplands near sample point MMA-USP1.***

# ATTACHMENT B

## Wetland Determination and Stream Inventory Data Forms

**U.S. Army Corps of Engineers**
**WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region**
See ERDC/EL TR-12-9; the proponent agency is CECW-COR

*OMB Control #: 0710-0024, Exp: 09/30/2027*
*Requirement Control Symbol EXEMPT:*
*(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Radiant - Kaleidos Factory Site City/County: Roane Sampling Date: 2025-10-21
Applicant/Owner: Radiant Industries, Inc. State: Tennessee Sampling Point: MMA- WSP-1
Investigator(s): Pippin/Martin Section, Township, Range:
Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR or MLRA): Lat: 35.93274923 Long: -84.40458402 Datum: WGS 84
Soil Map Unit Name: Urban Land NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✔ | No ___ | **Is the Sampled Area within a Wetland?** Yes ✔ No ___ |
| Hydric Soil Present? | Yes ✔ | No ___ | |
| Wetland Hydrology Present? | Yes ✔ | No ___ | |

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)

- ✔ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✔ Water-Stained Leaves (B9)
- ✔ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✔ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✔ FAC-Neutral Test (D5)

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface Water Present? | Yes ✔ | No ___ | Depth (inches): 2 |
| Water Table Present? | Yes ✔ | No ___ | Depth (inches): 0 |
| Saturation Present? (includes capillary fringe) | Yes ✔ | No ___ | Depth (inches): 0 |

**Wetland Hydrology Present?** Yes ✔ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Hydrology present and observed. Wetland MMA is connected to Poplar Branch River by a small channel.

**VEGETATION (Four Strata)** – Use scientific names of plants. Sampling Point: MMA- WSP-1

| Tree Stratum (Plot size: 30 ft r ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | =Total Cover | | |
| 50% of total cover: | 20% of total cover: | | |
| **Sapling/Shrub Stratum** (Plot size: 15 ft r ) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | =Total Cover | | |
| 50% of total cover: | 20% of total cover: | | |
| **Herb Stratum** (Plot size: 5 ft r ) | | | |
| 1. Arthraxon hispidus | 60 | ✔ | FAC |
| 2. Bidens frondosa | 60 | ✔ | FACW |
| 3. Typha latifolia | 50 | ✔ | OBL |
| 4. Scirpus atrovirens | 10 | | OBL |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 180 =Total Cover | | |
| 50% of total cover: 90 | 20% of total cover: 36 | | |
| **Woody Vine Stratum** (Plot size: 30 ft r ) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | =Total Cover | | |
| 50% of total cover: | 20% of total cover: | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 60 | x 1 = | 60 |
| FACW species | 60 | x 2 = | 120 |
| FAC species | 60 | x 3 = | 180 |
| FACU species | 0 | x 4 = | 0 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 180 (A) | | 360 (B) |

Prevalence Index = B/A = 2.00

**Hydrophytic Vegetation Indicators:**

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✔ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody Vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ✔ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

**VEGETATION Continued (Four Strata)** – Use scientific names of plants. Sampling Point: MMA- WSP-1

| Tree Stratum | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| 13. | | | |
| 14. | | | |
| | =Total Cover | | |
| 50% of total cover: | | 20% of total cover: | |
| **Sapling/Shrub Stratum** | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| 13. | | | |
| 14. | | | |
| 15. | | | |
| 16. | | | |
| 17. | | | |
| 18. | | | |
| | =Total Cover | | |
| 50% of total cover: | | 20% of total cover: | |
| **Herb Stratum** | | | |
| 12. | | | |
| 13. | | | |
| 14. | | | |
| 15. | | | |
| 16. | | | |
| 17. | | | |
| 18. | | | |
| 19. | | | |
| 20. | | | |
| 21. | | | |
| 22. | | | |
| | 180 =Total Cover | | |
| 50% of total cover: | 90 | 20% of total cover: | 36 |
| **Woody Vine Stratum** | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| | =Total Cover | | |
| 50% of total cover: | | 20% of total cover: | |

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody Vine** – All woody vines greater than 3.28 ft in height.

Remarks: (Include photo numbers here or on a separate sheet.)

**SOIL**

Sampling Point: MMA- WSP-1

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 16 | 2.5Y 3/1 | 100 | | | | | Silt Loam | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ✔ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** ✔ **No** ___

Remarks:

**U.S. Army Corps of Engineers**
**WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region**
See ERDC/EL TR-12-9; the proponent agency is CECW-COR

*OMB Control #: 0710-0024, Exp: 09/30/2027*
*Requirement Control Symbol EXEMPT:*
*(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Radiant - Kaleidos Factory Site City/County: Roane Sampling Date: 2025-10-21
Applicant/Owner: Radiant Industries, Inc. State: Tennessee Sampling Point: MMA-USP-1
Investigator(s): Pippin/Martin Section, Township, Range: Oak Ridge
Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 1
Subregion (LRR or MLRA): Lat: 35.93281922 Long: -84.4047165 Datum: WGS 84
Soil Map Unit Name: Urban Land NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ___ | No ✔ | **Is the Sampled Area within a Wetland?** Yes ___ No ✔ |
| Hydric Soil Present? | Yes ___ | No ✔ | |
| Wetland Hydrology Present? | Yes ___ | No ✔ | |

Remarks:
This is a upland strip between Poplar Branch and the emergent floodplain wetland

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one is required; check all that apply)
- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)
- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface Water Present? | Yes ___ | No ✔ | Depth (inches): ___ |
| Water Table Present? | Yes ___ | No ✔ | Depth (inches): ___ |
| Saturation Present? (includes capillary fringe) | Yes ___ | No ✔ | Depth (inches): ___ |

**Wetland Hydrology Present?** Yes ___ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No hydrology observed.

**VEGETATION (Four Strata)** – Use scientific names of plants.

Sampling Point: MMA-USP-1

| Tree Stratum (Plot size: 30 ft r ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Acer negundo | 10 | ✔ | FAC |
| 2. Platanus occidentalis | 5 | ✔ | FACW |
| 3. Salix nigra | 2 | | OBL |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| | 17 | =Total Cover | |
| 50% of total cover: 8.5 | | 20% of total cover: 3.4 | |

| Sapling/Shrub Stratum (Plot size: 15 ft r ) | | | |
|---|---|---|---|
| 1. Lonicera japonica | 25 | ✔ | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| | 25 | =Total Cover | |
| 50% of total cover: 12.5 | | 20% of total cover: 5 | |

| Herb Stratum (Plot size: 5 ft r ) | | | |
|---|---|---|---|
| 1. Chasmanthium latifolium | 80 | ✔ | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 80 | =Total Cover | |
| 50% of total cover: 40 | | 20% of total cover: 16 | |

| Woody Vine Stratum (Plot size: 30 ft r ) | | | |
|---|---|---|---|
| 1. Smilax rotundifolia | 5 | ✔ | FAC |
| 2. Toxicodendron radicans ssp. radicans | 5 | ✔ | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 10 | =Total Cover | |
| 50% of total cover: 5 | | 20% of total cover: 2 | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60.0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 2 | x 1 = | 2 |
| FACW species | 5 | x 2 = | 10 |
| FAC species | 15 | x 3 = | 45 |
| FACU species | 105 | x 4 = | 420 |
| UPL species | 0 | x 5 = | 0 |
| Column Totals: | 127 (A) | | 477 (B) |

Prevalence Index = B/A = 3.76

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

✔ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody Vine** – All woody vines greater than 3.28 ft in height.

**Hydrophytic Vegetation Present?** **Yes** ___ **No** ✔

Remarks: (Include photo numbers here or on a separate sheet.)

**VEGETATION Continued (Four Strata)** – Use scientific names of plants. Sampling Point: MMA-USP-1

| Tree Stratum | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| 13. | | | |
| 14. | | | |
| | 17 | =Total Cover | |
| 50% of total cover: 8.5 | | 20% of total cover: 3.4 | |
| **Sapling/Shrub Stratum** | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| 13. | | | |
| 14. | | | |
| 15. | | | |
| 16. | | | |
| 17. | | | |
| 18. | | | |
| | 25 | =Total Cover | |
| 50% of total cover: 12.5 | | 20% of total cover: 5 | |
| **Herb Stratum** | | | |
| 12. | | | |
| 13. | | | |
| 14. | | | |
| 15. | | | |
| 16. | | | |
| 17. | | | |
| 18. | | | |
| 19. | | | |
| 20. | | | |
| 21. | | | |
| 22. | | | |
| | 80 | =Total Cover | |
| 50% of total cover: 40 | | 20% of total cover: 16 | |
| **Woody Vine Stratum** | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| | 10 | =Total Cover | |
| 50% of total cover: 5 | | 20% of total cover: 2 | |

**Definitions of Four Vegetation Strata:**

**Tree** – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

**Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

**Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

**Woody Vine** – All woody vines greater than 3.28 ft in height.

Remarks: (Include photo numbers here or on a separate sheet.)

**SOIL**

Sampling Point: MMA-USP-1

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 16 | 10YR 4/4 | 100 | | | | | Silt Loam | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** ___ **No** ✔

Remarks:

# APPENDIX C
# Cultural Resources Desktop Analysis
**REMOVED – PRIVILEDGED AND CONFIDENTIAL PROPRIETARY INFORMATION**

# APPENDIX D

## SHPO and THPO Correspondence

**REMOVED – PRIVILEDGED AND CONFIDENTIAL PROPRIETARY INFORMATION**

# APPENDIX E
# Visual Assessment Report

HALEY ALDRICH

www.haleyaldrich.com

# VISUAL ASSESSMENT REPORT
## RADIANT R-50 PRODUCTION FACILITY
## OAK RIDGE, TENNESSEE



By:
Haley & Aldrich, Inc.
Rochester, New York

For:
Radiant Industries, Inc.
El Segundo, California

File No. 0210922-003
November 2025

HALEY & ALDRICH, INC.
260 EAST MAIN STREET, SUITE 2100
ROCHESTER, NY 14604
585.359.9000

# SIGNATURE PAGE FOR

# VISUAL ASSESSMENT REPORT
RADIANT R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

**PREPARED FOR**
RADIANT INDUSTRIES, INC.
EL SEGUNDO, CALIFORNIA

PREPARED BY:



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Technical Specialist
Haley & Aldrich, Inc.

REVIEWED AND APPROVED BY:



James B. Pippin
Associate | Senior Project Manager
Haley & Aldrich, Inc.

## Executive Summary

Radiant Industries, Inc. (Radiant) is proposing to construct the R-50 Production Facility Project for their self-contained 1-megawatt electric (MWe) Kaleidos reactor in the city of Oak Ridge, Roane County, Tennessee (Project). The development of the Project is proposed on approximately 84 acres located in the East Tennessee Technology Park in the city of Oak Ridge. The East Tennessee Technology Park is currently owned by the U.S. Department of Energy (USDOE) and sits upon the historic uranium enrichment facility that began operation as part of the Manhattan Project during World War II and continued until the USDOE terminated the program in 1987. The Project site and surrounding region are shown on Figures 1.2-1 and 1.2-2. The Project site is located on the former K-27 and K-29 building sites. The historic enrichment processing buildings were remediated from 2016 through 2020. The Project site is bounded by Poplar Creek to north, west and southwest. The former K-25 building site and other remediated portions of the East Tennessee Technology Park bound the Project site to the east and south. Access to the Project site is from the Oak Ridge Turnpike and Heritage Center Boulevard from the south to Enrichment Street, which terminates at the Project site from the east.

The purpose of this visual assessment is to describe the appearance of the proposed Project; define the existing visual setting of the Project; inventory the existing visually sensitive resources within vicinity of the Project; classify the major Landscape Similarity Zones (LSZs) and user groups; evaluate the potential visibility of the Project; and assess the proposed Project's visual impacts. The conclusions of this visual assessment are based on the results of viewshed analysis and field evaluations. We did not perform computer-assisted visual simulations for the Project. The approach used is consistent with established visual impact assessment policies, procedures and guidelines.

Viewshed analysis indicates that, based on the screening provided by topography alone, the proposed structures will be visible from approximately 53.8 percent of the 1.0-mile radius visual study area (Study Area). To better illustrate the potential screening effect of forest vegetation, a vegetation viewshed analysis was also prepared for the existing and proposed structures. The screening effect of National Landcover Dataset (NLCD) mapped forest vegetation reduces potential visibility of the proposed Project from 53.8 percent (topographic visibility) to 25.3 percent of the visual Study Area. This reduction reflects the abundance of mapped forest vegetation throughout the visual Study Area. Areas expected to allow visibility based on the vegetation viewshed analysis are limited primarily to open fields, cleared road corridors, and rivers and waterbodies.

To more accurately evaluate the potential visibility of the proposed Project, the visual Study Area was reviewed in the field between October 20 and 21, 2025. During the field visit, views toward the Project site were documented from 19 representative/sensitive viewpoints with photos and field notes. The existing structures and adjacent electric transmission lines along with a GPS were used as locational reference points during field review. The photos obtained during this field evaluation were used to determine where the proposed Project might realistically be visible.

Field verification confirmed that the visibility of the existing structures is generally limited to areas at or adjacent to the Project site. This limited visibility is due to the topographic variation and dense forest vegetation that characterize the majority of the visual Study Area. Longer distance views are generally confined to several transportation corridors, and waterbodies. However, topography and forest vegetation provide partial screening of views in many of these areas. Where visible, the existing

structures are typically seen at foreground distances (under 0.5 mile) by drivers, local residents, and in some cases, business employees and recreational users.

Field verification found the Project will be screened from a large majority of sensitive sites that were visited. Forest vegetation that occurs at many sensitive sites (e.g., trails/parks, cemeteries, and churches), generally impedes views of the proposed Project from these areas. At sensitive sites where such screening is lacking (e.g., K-25 overlook and Visitor Center) open views of the existing structures are already present, and therefore additional visual change (either negative or positive) will be limited.

For certain views, visibility of the proposed Project structures could be somewhat reduced if vegetative screening was installed. The feasibility and need for this type of mitigation would need to be evaluated on a site-specific basis. However, the results of this visual assessment suggest that mitigation of this sort are not warranted given the limited visual impact of the proposed Project. Location of the Project within the previously disturbed footprint of the K-27 and K-29 buildings is considered the best means of reducing perceived visual contrast and change in land use.

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# 1. Introduction

Haley & Aldrich, Inc. (Haley & Aldrich) was retained by Radiant Industries, Inc. (Radiant) to provide professional environmental services to complete an Environmental Report (ER) for the construction and operation of the R-50 Production Facility Project (Project) in Roane County, Tennessee in compliance with the Nuclear Regulatory Commission (NRC)'s NUREG 1748 to comply with the National Environmental Policy Act (NEPA). Haley & Aldrich conducted an analysis of the potential visibility and visual impact of the Project. The purpose of this visual assessment is to describe the appearance of the proposed Project; define the existing visual setting of the Project; inventory the existing visually sensitive resources in the vicinity of the Project; classify the major Landscape Similarity Zones (LSZs) and user groups; evaluate the potential visibility of the Project; and to assess the proposed Project's visual impacts. The conclusions of this report are based on the results of viewshed analysis, and field evaluations. Computer-assisted visual simulations were not performed for the Project. This modified approach used is consistent with established visual impact assessment policies, procedures and guidelines (see References).

## 2. Project Description

The Project includes the development of approximately 84 acres located in the East Tennessee Technology Park in the city of Oak Ridge, Roane County, Tennessee. The East Tennessee Technology Park is currently owned by the U.S. Department of Energy (USDOE) and sits upon the historic uranium enrichment facility that began operation as part of the Manhattan Project during World War II and continued until the USDOE terminated the program in 1987. The Project site and surrounding region are shown on Figure 1. The Project site is located on the former K-27 and K-29 building sites. The historic enrichment processing buildings were remediated from 2016 through 2020. The Project site is bounded by Poplar Creek to north, west and southwest. The former K-25 building site and other remediated portions of the East Tennessee Technology Park bound the Project site to the east and south. Access to the Project site is from the Oak Ridge Turnpike and Heritage Center Boulevard from the south to Enrichment Street, which terminates at the Project site from the east.

The Radiant Project team will fuel, test, store, and eventually assemble and refuel self-contained and trailer mounted mobile Kaleidos reactors capable of generating 1 MW electric and 1.9 MW heat load when installed and energized at customer's sites.

The Project site will be developed to include the following features:

- a refueling building of approximately 30,000 square feet and not expected to exceed 45 feet in height;
- a small security building at the entrance not to exceed a height of 20 feet;
- a stack for the heater unit not to exceed a height of 45 feet;
- fresh fuel storage area, the Project plans to utilize TRISO fuel; and
- space for operational testing and final staging once fueled and ready for deployment.

The proposed action will also require development of the following:

- entrance roadway to access the Project site;
- connecting paved or concrete areas between buildings and Project site roadways;
- security station at the Project site entrance;
- secure and monitored fence line surrounding the active portions of the Project;
- employee office space and parking areas;
- emission monitoring stations; and
- connections and onsite conveyance for utilities (potable water, sanitary sewer, stormwater management, electrical, natural gas, fiber cable) from local services.

Conceptual layouts for the proposed Project are shown on Figure 2. The Project is anticipated to have an operating life of 40 years after which time the facility will be decommissioned.

The Project site is located within the former “K-25 Gaseous Diffusion Plant” portion of the Oak Ridge Reservation and was largely undeveloped until construction of uranium enrichment operations infrastructure in 1943. The original uranium enrichment operations supported the development of nuclear weapons as part of the U.S. Army’s Manhattan Project and later expanded to include production of enriched uranium for fabrication into fuel elements for nuclear reactors. Uranium enrichment continued from 1943 until the USDOE terminated the program in 1987, and subsequently initiated site environmental cleanup and restoration activities. In 1997 the K-25 Gaseous Diffusion Plant site was renamed the “East Tennessee Technology Park,” to support reindustrialization and reuse of former USDOE assets by private industry. The Project site was historically occupied by the former K-25 Gaseous Diffusion Plant Buildings K-27 and K-29. Between 1987 and 2024, more than 500 buildings (including those within the Project site) were demolished and soil cleanup/remediation activities were completed.

United States Geological Survey (USGS) topographic mapping indicates the Project site is situated in generally flat topography adjacent to the east bank of Poplar Creek. Valley and ridge topography prevails in the surrounding area. Elevation within the Project site ranges from approximately 750 feet above mean sea level along Poplar Creek to approximately 795 feet above mean sea level in the central portion of the Project site.

# 3. Existing Visual Character

## 3.1 VISUAL SETTING

Based on established visual assessment methodology and site-specific topographic and land use conditions that limit Project visibility, the visual study area for this Project (Study Area) was defined as the area within 1.0 mile of the center of the proposed Project (Figure 3). This Study Area encompasses approximately 4.83 square miles within the city of Oak Ridge. Landscape character within the Study Area is defined by the existing topography, vegetation, land use, and water features, and was evaluated during a field visit by Haley & Aldrich staff during October 2025.

The Study Area is located in the Valley and Ridge physiographic province of East Tennessee, which is characterized by a series of narrow, parallel valleys and ridges. Elevation within the Study Area ranges from approximately 750 feet above mean sea level in the northwestern portion of the Study Area along Poplar Creek to approximately 795 feet above mean sea level in the central portion of the Study Area.

Land use within the Study Area is characterized by a mix of undeveloped forest land, active agricultural land, successional old field and shrubland, waterbodies and areas characterized by low density residential and light commercial development. State Routes 58 and 327 (Blair Road) are the major transportation corridors that intersect the visual Study Area. Mature forest vegetation is the dominant cover type within the Study Area. This forested community generally provides a substantial amount of screening around most roads and residential areas. The Clinch River and Poplar Creek are the dominant water features within the Study Area.

The scenic quality of the Project site was rated according to the Bureau of Land Management (BLM) Visual Resource Inventory Manual (U.S. Department of Interior - BLM, 1986). In the BLM system the relative worth of a landscape from a visual perception point of view is rated based on seven key factors (i.e., landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications). Scenic quality is rated A (highest visual rating), B, or C (lowest visual rating) (U.S. Department of Interior – BLM, 1986). Based on the October 2025 site visit, the Study Area was rated with a C classification because of the extensive cultural modifications within the Study Area and surrounding areas. The scenic quality rating is improved by Poplar Creek and the Clinch River as well as the forested hillsides that surround the East Tennessee Technology Park. The BLM system also provides a rating system for sensitivity level, which is defined as the measure of public concern for the maintenance of scenic quality based on user types, amount of use, public interest, adjacent land uses, special areas. The sensitivity level for the Study Area was rated as low-to-moderate based on the presence of the Black Oak Ridge Conservation Easement (a public use area) located north of the Project site as well as public viewing areas located adjacent to the Project site at the K-25 History Center and south of the Project site at the K-25 Overlook and Visitor Center.

## 3.2 VISUALLY SENSITIVE RESOURCES

With the exception of the K-25 History Center of the Manhattan Project National Historical Park, scenic resources of national significance are not present within the Study Area. The Study Area includes no national scenic byways or national recreational/scenic trails (e.g., Appalachian Trail). None of the waterbodies in the Study Area are on the national list of wild, scenic or recreational rivers, and there are no National Wildlife Refuges, National Parks, National Seashores, National Forests, or National Natural

Landmarks located within or adjacent to the visual Study Area. However, as shown on Figure 4, the Study Area includes several resources/sites that could be considered visually sensitive from a statewide, regional, or local perspective. Aesthetic resources considered to be of statewide significance include structures or districts listed in the State/National Register of Historic Places, State Parks, State Wildlife Management Areas, State Forests, State-designated Wild, Scenic or Recreational Rivers, State Scenic Byways, State Reservations, State Recreational/Scenic Trails, State Nature and Historic Preserve Areas, and State-designated Scenic Areas. Resources of regional or local significance generally include town/county parks and recreational facilities (including trails, bike paths, golf courses and athletic fields), designated open space (e.g., land trust properties, conservation lands), schools/colleges, cemeteries, waterbodies, and areas of intensive land use (e.g., village centers, apartment complexes, and major transportation corridors). Resources of statewide and local significance that occur within the visual Study Area are listed in Appendix A and summarized below.

### 3.2.1 Historic Places

According to the National Register of Historic Places (NRHP) database (NPS, 2025), there is one NRHP-listed historic site, George Jones Memorial Baptist Church, located just outside of the visual Study Area to the northeast. In addition, the Oak Ridge portion of the Manhattan Project National Historic Park is located immediately east of the Project site within the Study Area. The park also includes sites in Hanford, Washington and Los Alamos, New Mexico. The Oak Ridge site includes the William J. Wilcox K-25 Interpretive Center, which provides a museum and viewing platform for observation of the former K-25 building footprint.

### 3.2.2 Parks and Recreational Areas

According to the Tennessee Statewide Public Recreation Areas database and the Tennessee Wildlife Management Area mapping, there is one Wildlife Management Area (WMA), Oak Ridge Reservation WMA, which generally surrounds the East Tennessee Technology Park. Within the Study Area, Public access is provided via the Dyllis Orchard Road Hiking Trail in the Black Oak Ridge Conservation Easement (BORCE) located in the northern portion of the Study Area.

In addition to numerous smaller streams, the Clinch River and Poplar Creek flow through the visual Study Area and are popular areas for fishing, boating/canoeing, and other recreational activities. The Clinch River is a designated Tennessee Scenic River.

None of the following are located within the visual Study Area: Urban Cultural Parks/Heritage Areas; National Natural Landmarks; Recreation Areas, Seashores, and/or Forests; National Designated Wild, Scenic, or Recreational Rivers; Scenic Areas of Statewide Significance; State or Federally Designated Trails; or State Nature and Historic Preserve Areas.

### 3.2.3 Areas of Intensive Land Use and Transportation Corridors

City, towns and heavily traveled roads within the visual Study Area may be considered visually sensitive because of the number of potential viewers present at these sites. The city of Oak Ridge comprises the entirety of the visual Study Area. According to the Tennessee Department of Transportation (TDOT) Tennessee Traffic Information Management and Evaluation System (TN-TIMES) (2025), heavily traveled roadways within the visual Study Area, with annual average daily traffic (AADT) (i.e., the estimated average daily traffic volume on a route segment), include:

- State Route 58 (AADT) = 15,271 and
- State Route 327 (AADT) = 2,639.

## 3.3 LANDSCAPE SIMILARITY ZONES

Within the visual Study Area, Haley & Aldrich defined five distinct landscape similarity zones (LSZ's). LSZ's are areas of similar landscape/aesthetic character based on patterns of landform, vegetation, water resources, land use, and user activity. These areas were identified within the visual Study Area in general accordance with established visual assessment methodologies (Smardon et al., 1988; USDA National Forest Service, 1974 and 1995; U.S. Department of Transportation (USDOT) Federal Highway Administration, 1981; U.S. Department of Interior Bureau of Land Management, 1980). Preliminary land cover classifications were established through Geographic Information System (GIS) analysis of land cover data (vegetation, structures and water) for the visual Study Area. They were created using the 2011 USGS National Land Cover Dataset (NLCD). The original NLCD classes were reclassified into four general land cover types: 1) Open Water, 2) Developed, 3) Open/Agriculture, and 4) Forest. The location of these land cover types within the visual Study Area is shown in Figure 5. These preliminary groupings were then verified and refined based on aerial photo interpretation and field review. This effort resulted in the definition of eight final LSZs within the visual Study Area, including the following: 1) Forested, 2) Open Water/River, and 3) Highway. Representative photos of these LSZ's are included in Figure 6 and narrative descriptions are presented below:

### 3.3.1 Forested

The Forested LSZ is characterized by relatively large tracts of mature forest, typically including both deciduous and evergreen species. Little to no residential development occurs within this zone and is a minor component of the dominant forested landscape. Significant areas of undeveloped forest land are located throughout the Study Area. Forest vegetation is generally the default cover type, and typically adjoins and surrounds formerly developed areas associated with the Manhattan Project as well as waterbodies and wetlands. Most of the forested land within the Study Area is under federal government ownership. Long-distance views within this zone are generally either fully or partially screened by woody vegetation. Open foreground views of the Project in this LSZ are available where the cleared ROW crosses public roads, rivers and developed areas from the former Manhattan Project site.

### 3.3.2 Developed/Highways

Development within the viewshed corresponds primarily with the existing developed areas and ongoing construction with the East Tennessee Technology Park. The businesses within this LSZ represent a range of architectural styles, scale, and set-backs, and some variety in their surrounding land use context. However, buildings are typically large one and two-story structures. Automobiles, delivery vehicles, and parking lots are all significant components of the Developed LSZ. Views within the zone are primarily directed along the roadways, and generally limited due to obstruction by adjacent commercial buildings, industrial buildings, topography, and vegetation. Baseline scenic quality in this LSZ is generally not as high as in other zones. Therefore, the Developed LSZ tends to absorb new infrastructure and visual changes more readily than other LSZs within the visual Study Area.

The Highways portion of this LSZ includes the major transportation routes of TN State Routes 58 and 327. Views along these road corridors are generally dominated by automobiles, pavement, guard rails,

signs, and adjacent vegetation. Viewer attention is generally focused on the roadway and associated traffic. Travel is at relatively high speed, and outward peripheral views are fleeting. The surrounding scenery is variable, but within the Study Area is dominated by forests, light commercial structures and fleeting views of the rivers.

### 3.3.3 Open Water/River

This zone includes the open water of the Clinch River and Poplar Creek and associated wetlands. Man-made features in the water are limited, but include occasional bridges, boats, and waterfront development. Views across the open water often terminate at a distant shoreline characterized by a mix of natural vegetation and man-made features, including electric transmission lines and commercial structures with open adjacent areas. Human activity on the water includes recreational activities (e.g., boating, fishing, and water sports).

### 3.3.4 Open/Undeveloped

This LSZ is characterized by gently sloping open fields and undeveloped parcels primarily associated with maintained rights of way under electric transmission lines. This zone occurs in small areas throughout the visual Study Area. Although these open areas provide for long distance views in this zone, adjacent forest and hills typically frame/enclose these views and/or provide significant screening.

# 4. Visual Impact Analysis

## 4.1 PROJECT VISIBILITY

An analysis of potential Project visibility was undertaken to identify those locations within the visual Study Area where it may be possible to view the proposed Project from ground-level vantage points. The analysis includes identifying potentially visible areas on viewshed maps and verifying unobstructed line of sight conditions in the field.

### 4.1.1 Viewshed Analysis

Viewshed analyses of the existing and proposed Project site were performed to evaluate potential Project visibility. Currently there are no structures on the Project site. Data on the height and location of the proposed Project structures were provided by Radiant. These proposed structures are expected to include one 30,000 square foot fueling building and a stack for the heater unit that are not expected to exceed 45 feet in height.

Topographic viewshed maps for the Project were prepared using USGS digital elevation model (DEM) data (7.5-minute series), the location and height of the proposed structures, and ESRI ArcGIS® software with the Spatial Analyst extension. One, 1.0-mile radius topographic viewshed was mapped to illustrate potential visibility of the proposed Project (See Figure 7). The ArcGIS program defines the viewshed (using topography only) by determining the visibility of the proposed structures from each 10-meter by 10-meter cell of the DEM. The resulting viewshed maps define the maximum area from which the structures could potentially be seen from ground-level vantage points (existing grade plus 1.7 meters to account for viewer height). Because the topographic viewshed analysis is based on the maximum height of the Project structures and does not consider the screening effect of vegetation or built structures, it provides a very conservative (i.e., “worst case”) assessment of potential visibility. The resulting topographic viewshed map for the proposed Project structures were compared to show changes in visibility resulting from construction of the proposed Project. It should be noted that viewshed analysis accuracy is directly related to the accuracy of USGS DEM data used in the analysis.

The analysis revealed that the proposed structures have potential visibility from approximately 53.8 percent of the visual Study Area based on the screening provided by topography alone (see Table 1). However, because the screening provided by vegetation and structures was not considered in this analysis, the topographic viewshed represents a “worst case” assessment of potential visibility. Topographic viewshed maps assume that no trees exist and are therefore very accurate in predicting where visibility will not occur due to topographic interference. However, they are less accurate in identifying areas from which the Project will be visible.

As indicated by the topographic viewshed analysis, increased potential visibility could occur from areas currently screened from view of the existing Project site (Figure 7). The majority of these areas occur on hillsides northwest and southeast of the Project site, where intervening vegetation and the effects of distance are likely to mitigate any increase in actual Project visibility or visual impact. Field review of the Study Area revealed the topographic viewshed analysis overstates the visibility of the proposed Project. Forest vegetation provides a significant amount of screening in most areas.

A vegetation viewshed analysis was also prepared for the proposed structures to more accurately define areas of likely visibility, and better illustrate the potential screening effect of forest vegetation (See Figure 8). The vegetation viewshed utilized a forest vegetation layer, which was created by identifying areas mapped as forest by the USGS NLCD and assigning these areas an assumed height of 50 feet. This layer was added to the digital elevation model to produce a base layer for the viewshed analysis, as described above. Once the viewshed analysis was completed, the areas covered by the forest vegetation layer were set to zero visibility using a Spatial Analyst conditional statement to reflect the fact that views from within forested areas will be screened.

The screening effect of mapped forest vegetation reduces potential visibility of the proposed Project from 53.8 percent (topographic visibility) to 25.3 percent of the 1.0-mile radius visual Study Area (see Table 1). This reduction reflects the abundance of mapped forest vegetation throughout the visual Study Area. Areas expected to allow visibility based on the vegetation viewshed analysis are limited primarily to open areas such as open areas overlooking the former Manhattan Project site, cleared road corridors, river crossings, and existing cleared electric transmission line corridors. Field observations generally confirmed the accuracy of the vegetation viewshed analysis. The viewshed analysis did not consider the distance from the viewer or physical characteristics of the proposed structures (e.g. color, profile, etc.) that may limit or eliminate visibility in areas indicated as having potential Project visibility. Consequently, being within the vegetation viewshed does not necessarily equate to actual Project visibility.

**Table 1. Radiant R-50 Production Facility Viewshed Analysis Summary**

| Viewshed Analysis Type | Visual Study Area | | |
|---|---|---|---|
| | Total Acres | Visible Acres | % Visibility |
| Proposed Structures – Topography Only | 3,092 | 1,664 | 53.8 |
| Proposed Structures – Topography & Vegetation | 3,092 | 782 | 25.3 |

### 4.1.2 Field Verification

As mentioned previously, the vegetation viewshed analysis only considers large blocks of mapped vegetation and assume a 50-foot tree height. To more accurately evaluate the potential visibility of the proposed Project, the area within a 1.0-mile radius of the Project site was reviewed in the field October 20 and 21, 2025. During the field review, views toward the Project site were documented from 19 representative/sensitive viewpoints with photos and field notes (see Appendix B). All photos were obtained using a Nikon D90 digital SLR camera with the focal length set at approximately 35 mm (equivalent to between 50 and 55 mm on a standard 35 mm film camera). This focal length is the standard used in visual impact assessment because it most closely approximates human perception of spatial relationships and scale in the landscape. Viewpoint locations were documented using a hand-held Trimble TDC6 global positioning system (GPS) unit with reported sub-meter accuracy, and the time of each photo was documented on all electronic equipment (cameras, GPS units, etc.) and data sheets (see Appendix B). A compass was used to reference the direction towards the Project site during field review. Documented viewpoints typically offered the most open, unobstructed views toward the Project site, and/or included areas identified as visually sensitive, or having a high level of public use/visitation. Viewpoint locations within the visual Study Area are shown in Figure 4. The photos obtained during this field evaluation were used to determine where the proposed Project structures might realistically be visible.

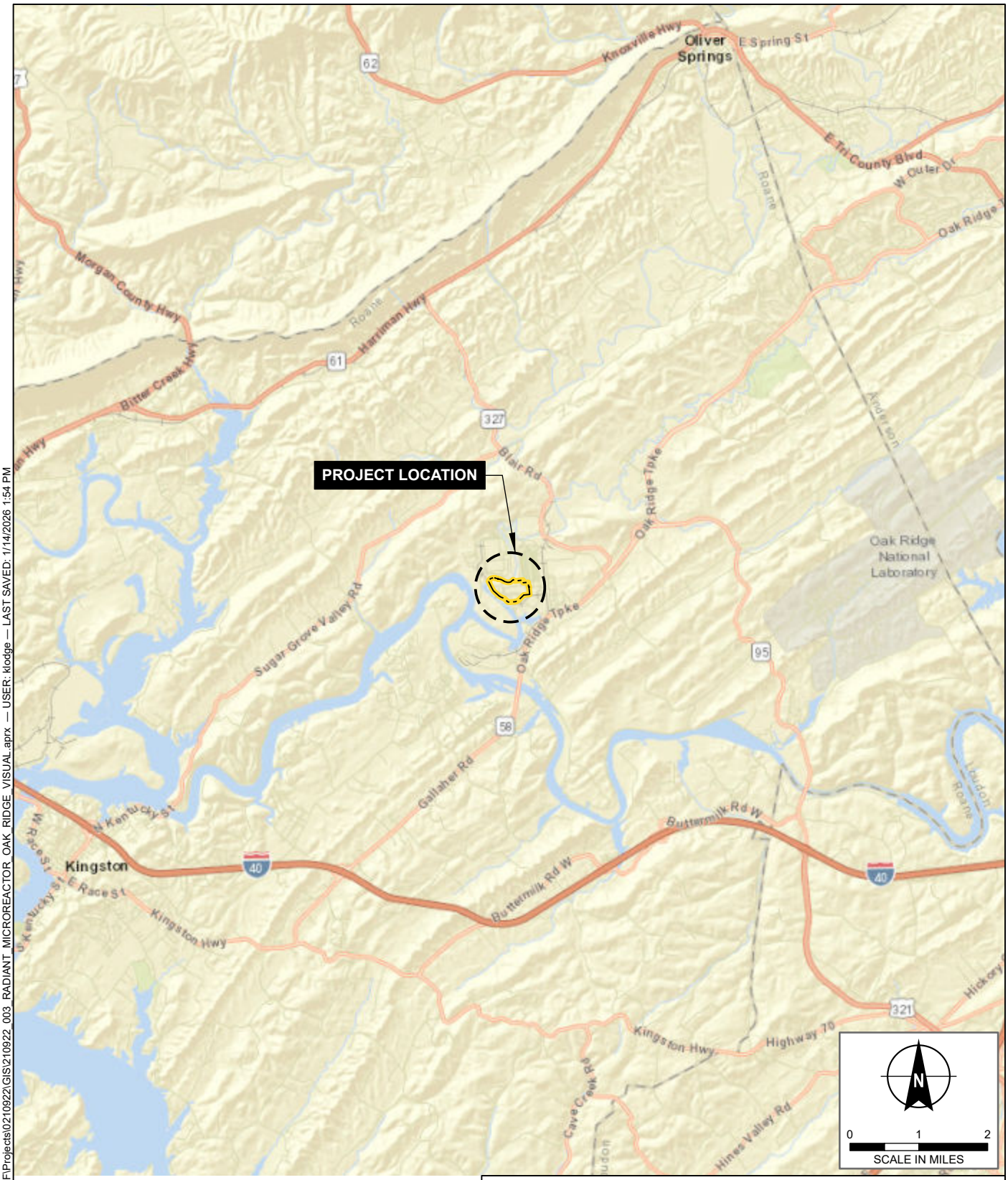
Field verification confirmed that the visibility of the existing Project site is generally limited to areas along SR 58 and Perimeter Road. This limited visibility is due to the topographic variation and dense forest vegetation that characterize the majority of the visual Study Area. There are no longer distance views. Where visible, the existing structures at the East Tennessee Technology Park are typically seen at foreground distances (under 0.5 mile) by drivers, local residents, and in some cases, business employees and recreational users. The existing building structures are relatively close to the viewer, unscreened or partially screened. However, these views from local roads are fleeting, and generally completely obscured by existing vegetation once the viewer is outside the limits of the East Tennessee Technology Park.

Field verification found the Project will be screened from a large majority of sensitive sites that were visited. A detailed assessment of sensitive resource visibility is provided in Appendix A. The forest vegetation that occurs at many sensitive sites (e.g., parks, cemeteries, and schools,) generally impedes the viewer's perception of the line and/or cleared ROW from these areas. As noted above, the screening effect of vegetation will be somewhat diminished during the winter in areas where deciduous vegetation was prevalent. At sensitive sites where such screening is lacking (e.g., K-25 Overlook and K-25 History Center) open views of the existing buildings at the East Tennessee Technology Park are already present, and therefore additional visual change (either negative or positive) will be limited. Other than public roads, Project visibility from visually sensitive sites was generally limited by vegetation, built structures, and/or distance. Potential Project visibility from sensitive resources inventoried within the visual Study Area, based on viewshed analysis and field verification, is summarized in Appendix A.

## References

1. U.S. Department of Interior – BLM. 1986. “Visual Resource Inventory Manual H-8410-1.” Available at https://www.blm.gov/sites/blm.gov/files/uploads/Media_Library_BLM_Policy_H-8410.pdf.

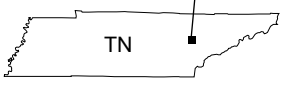
# FIGURES




LEGEND

PROJECT LOCATION

VISUAL STUDY AREA




BASEMAP SOURCE: ESRI WORLD STREET MAP

HALEY ALDRICH

RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# PROJECT LOCATION

APPROXIMATE SCALE: 1 IN = 2 MILES
JANUARY 2026

FIGURE 1

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_VISUAL.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:54 PM

# RADIANT INDUSTRIES - OAK RIDGE SITE

5455-002-00

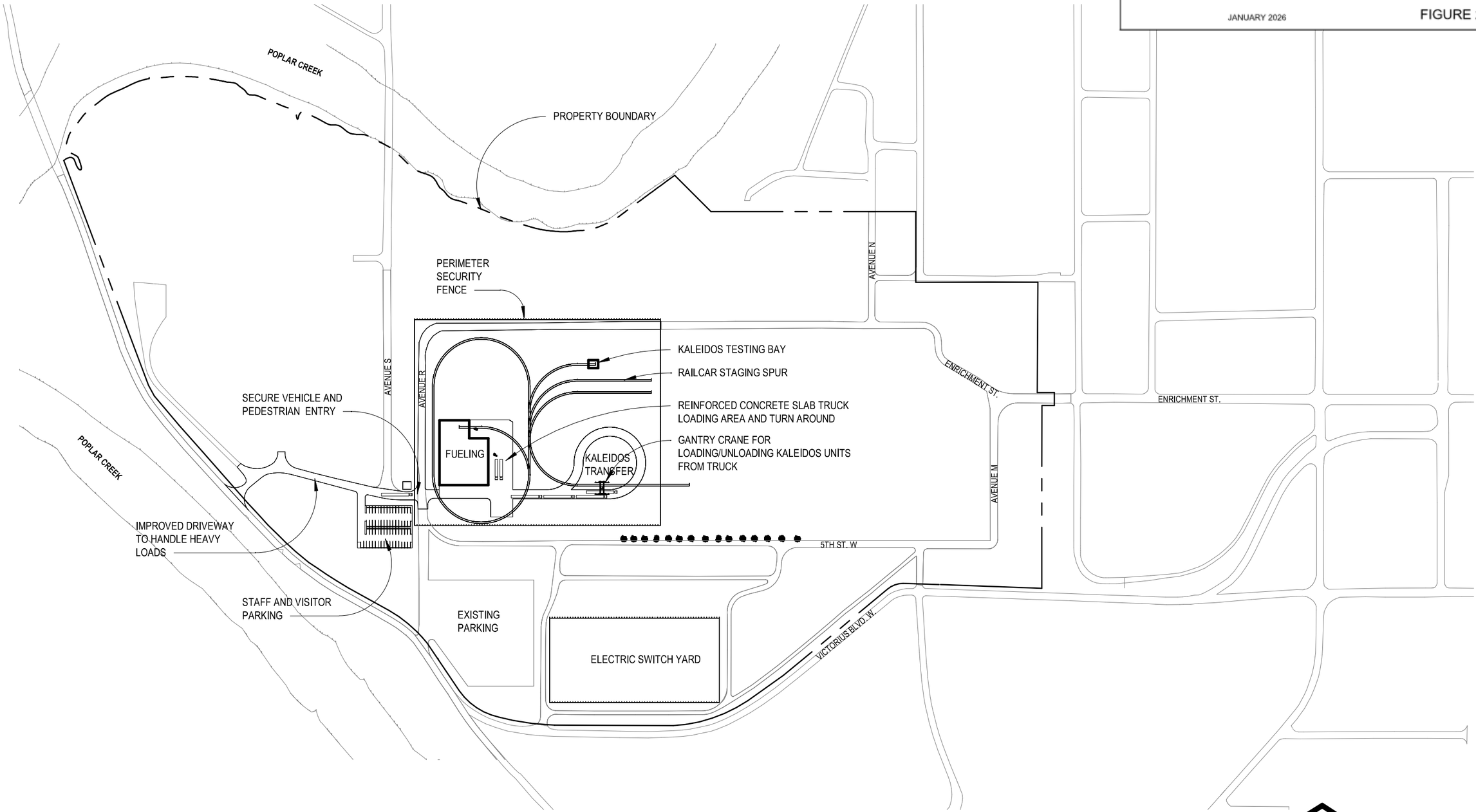
HALEY ALDRICH

RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

## PHASE I SITE PLAN

JANUARY 2026

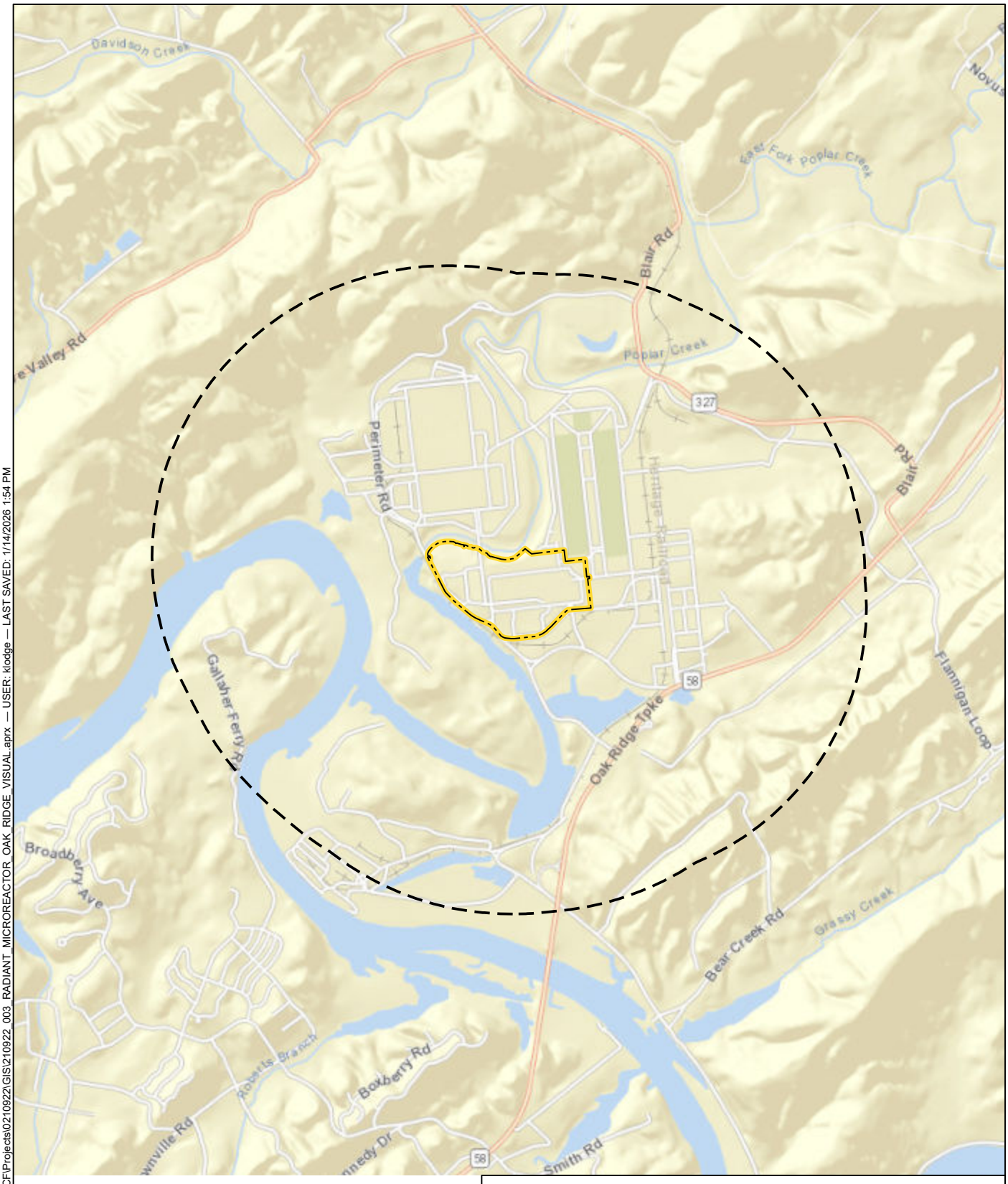
FIGURE 2




HGA

12.15.25

1" = 300'-0"




**LEGEND**

VISUAL STUDY AREA

1-MILE VISUAL STUDY AREA

N

0 0.25 0.5

SCALE IN MILES

BASEMAP SOURCE: ESRI WORLD STREET MAP

HALEY ALDRICH

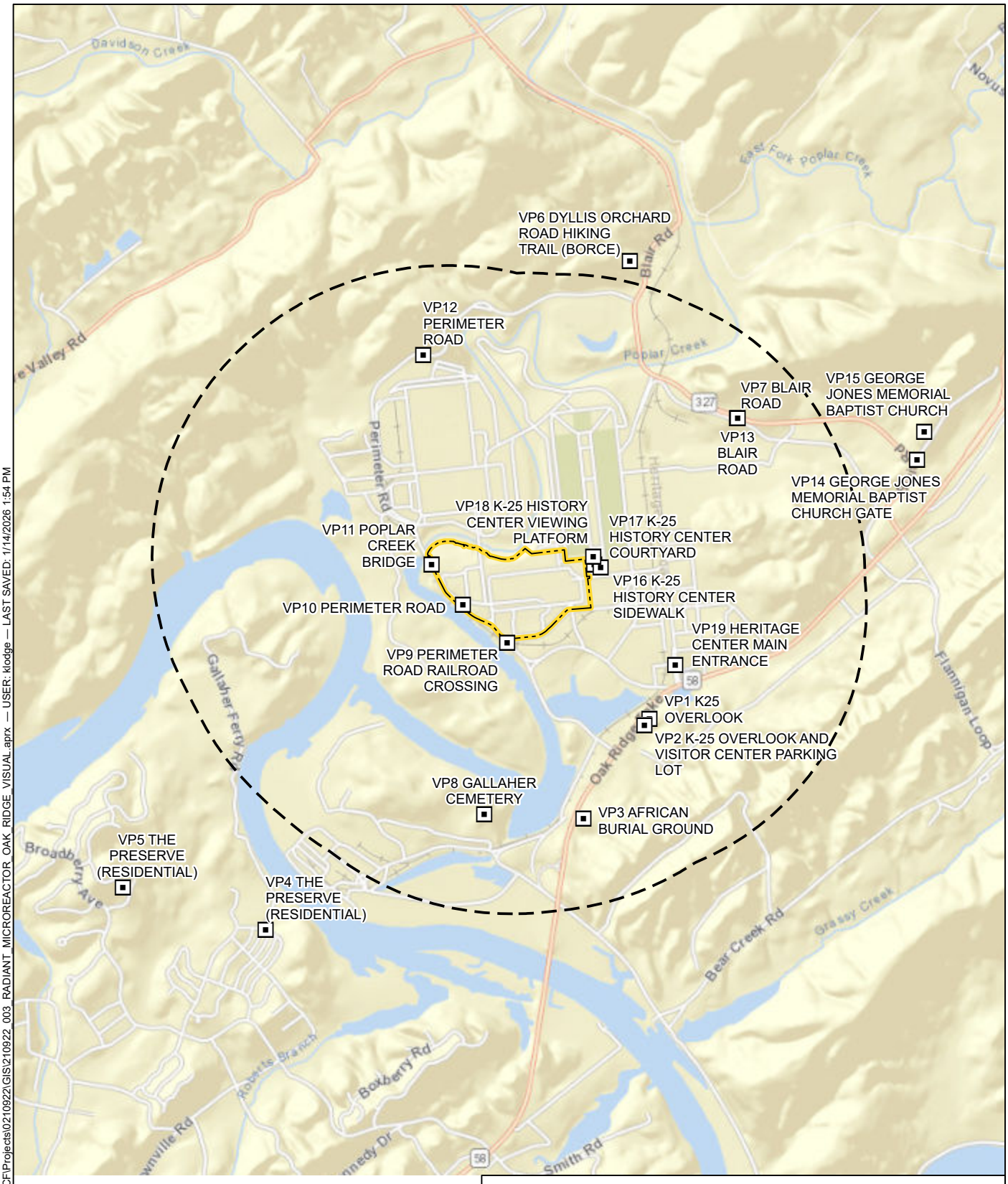
RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# VISUAL STUDY AREA OVERVIEW

SCALE: AS SHOWN
JANUARY 2026

FIGURE 3

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_VISUAL.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:54 PM




**LEGEND**

- VISUAL STUDY AREA
- 1-MILE VISUAL STUDY AREA
- VIEWPOINT LOCATION

N

0 0.25 0.5

SCALE IN MILES

BASEMAP SOURCE: ESRI WORLD STREET MAP

HALEY ALDRICH

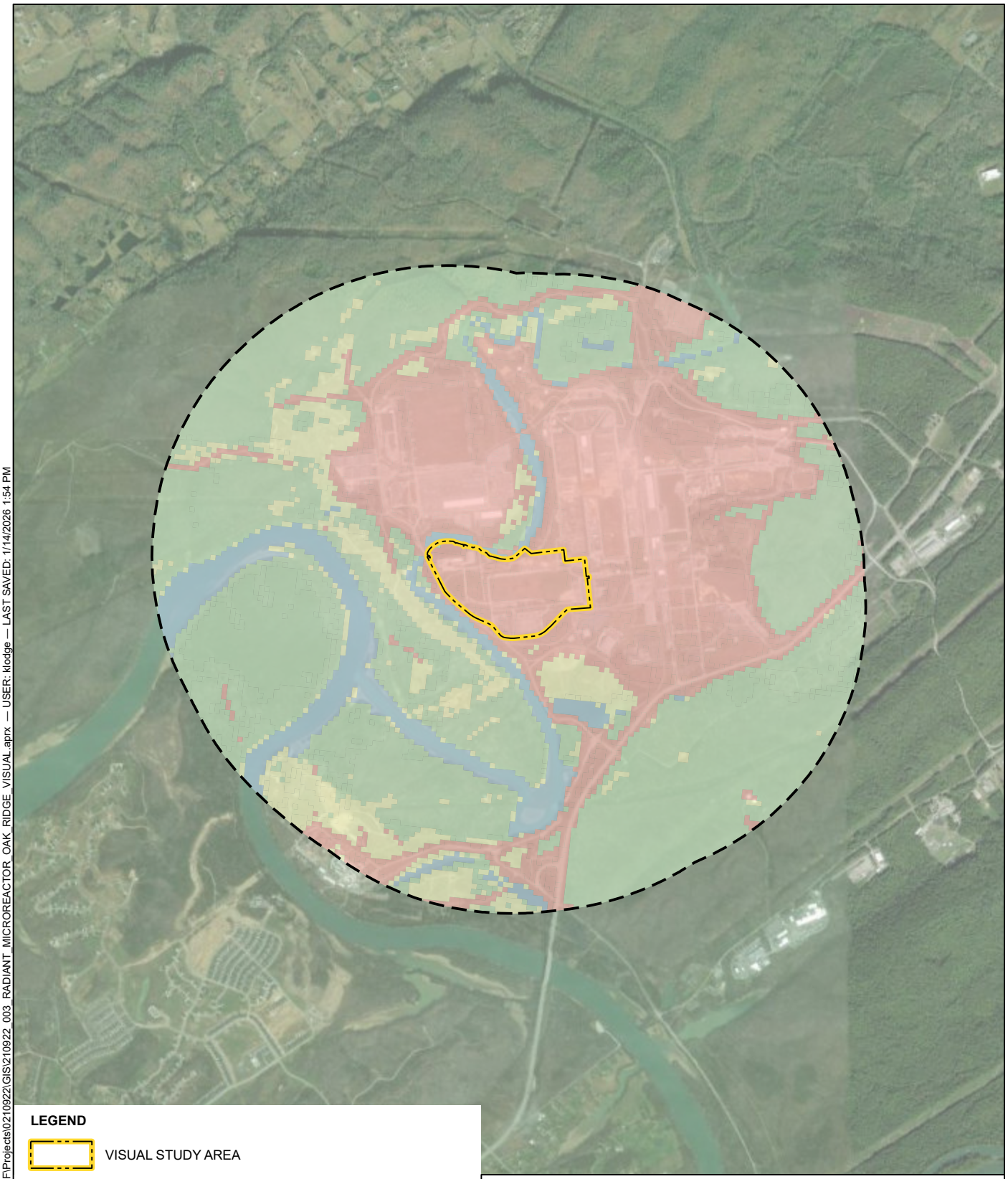
RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# VISUALLY SENSITIVE RESOURCES

SCALE: AS SHOWN
JANUARY 2026

FIGURE 4

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_VISUAL.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:54 PM




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OAK RIDGE, TENNESSEE

# LANDSCAPE SIMILARITY ZONES

SCALE: AS SHOWN
JANUARY 2026

FIGURE 5

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_VISUAL.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:54 PM

# FIGURE 6: LANDSCAPE SIMILARITY ZONES

RADIANT INDUCTIRES, INC. – R-50 PRODUCTION FACILITY PROJECT
OAK RIDGE, ROANE COUNTY, TENNESSEE



***Forested LSZ***



***Developed/Highways LSZ***



HALEY ALDRICH



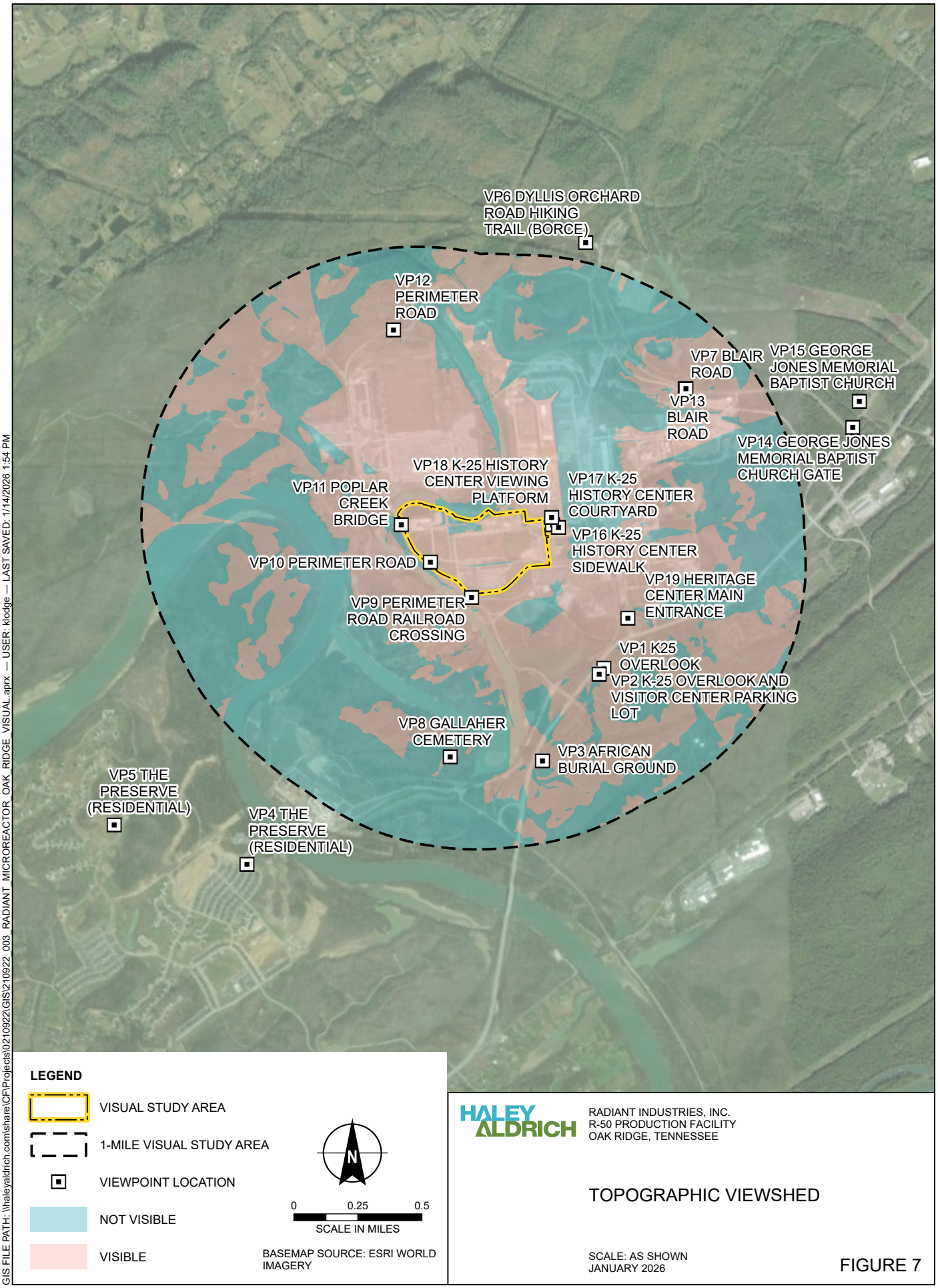
***Developed/Highways LSZ***



***Open Water/River LSZ***



***Open/Undeveloped LSZ***




GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_VISUAL.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:54 PM

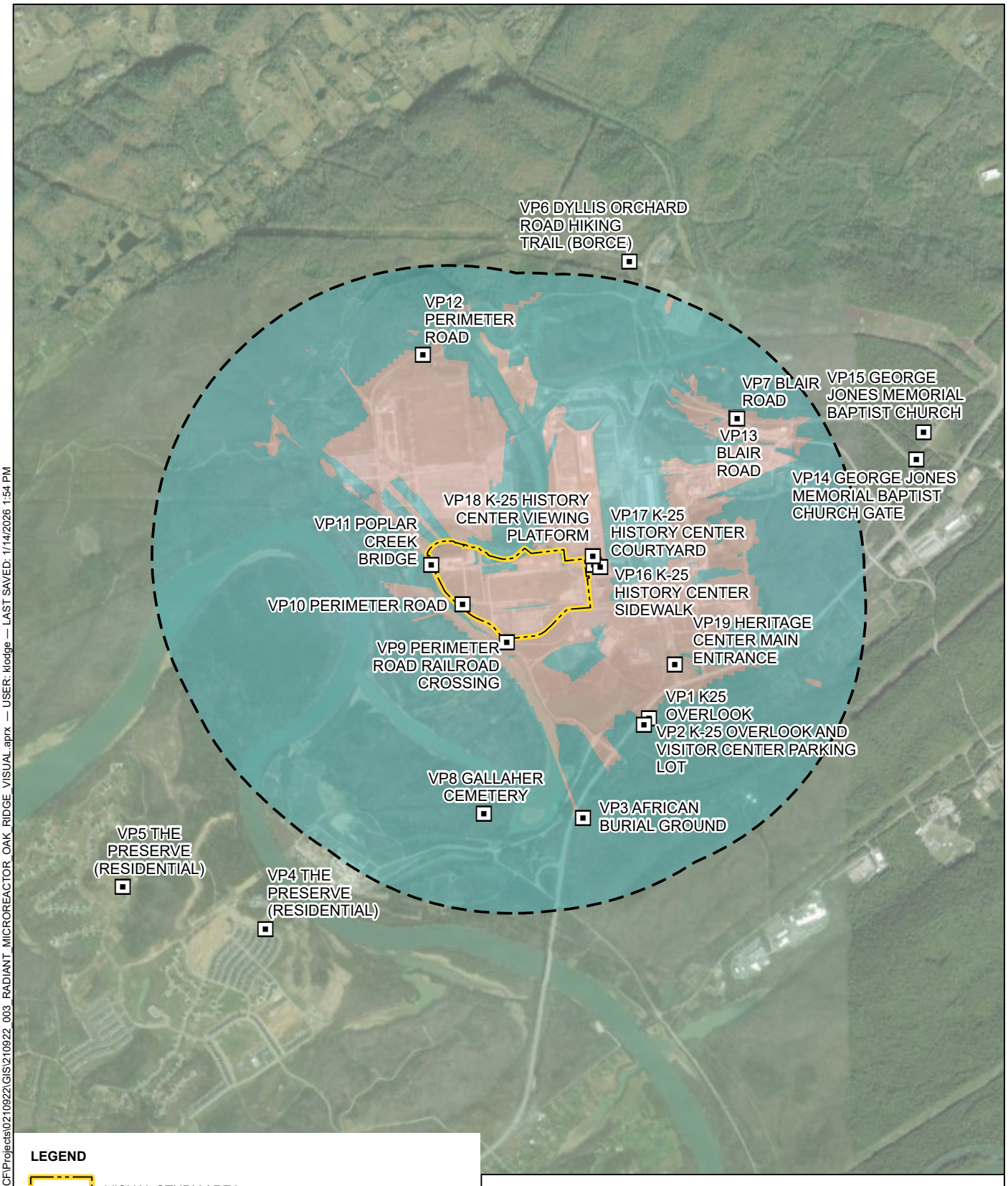
HALEY ALDRICH

RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# TOPOGRAPHIC VIEWSHED

SCALE: AS SHOWN
JANUARY 2026

FIGURE 7




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RADIANT INDUSTRIES, INC.
R-50 PRODUCTION FACILITY
OAK RIDGE, TENNESSEE

# VEGETATION VIEWSHED

SCALE: AS SHOWN
JANUARY 2026

FIGURE 8

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210922\GIS\210922_003_RADIANT_MICROREACTOR_OAK_RIDGE_VISUAL.aprx — USER: klodge — LAST SAVED: 1/14/2026 1:54 PM

# APPENDIX A
# Resources of Statewide and Local Significance

## Appendix A - Visually Sensitive Resources

| Viewpoint Number | Visually Sensitive Resource | Location | Distance from Project Site | Project Visibility | | |
|---|---|---|---|---|---|---|
| | | | | Visible (+), Not Visisble (-), Partially Visible (+/-) | | |
| | | | | Topographic Viewshed | Topographic and Vegetation Viewshed | Field Visit |
| 1 | K-25 Overlook | Oak Ridge Turnpike, Oak Ridge, TN | 0.49 mile | + | + | + |
| 2 | K-25 Overlook and Visitor Center Parking | Oak Ridge Turnpike, Oak Ridge, TN | 0.49 mile | + | - | + |
| 3 | African Burial Ground | Oak Ridge Turnpike, Oak Ridge, TN | 0.68 mile | + | - | +/- |
| 4 | The Preserve (Residential Development) | Hatleyberry Street, Oak Ridge, TN | 1.36 mile | + | - | - |
| 5 | The Preserve (Residential Development) | Cedarberry Street, Oak Ridge, TN | 1.59 mile | + | - | - |
| 6 | Dyllis Orchard Road Hiking Trail (BORCE) | Blair Road, Oak Ridge, TN | 1.07 mile | + | - | - |
| 7 | Blair Road | Blair Road, Oak Ridge, TN | 0.75 mile | + | + | +/- |
| 8 | Gallaher Cemetary | Oak Ridge, TN | 0.65 mile | + | - | - |
| 9 | Perimeter Road Railroad Crossing | Perimeter Road, Oak Ridge, TN | adjacent | + | + | + |
| 10 | Perimeter Road | Perimeter Road, Oak Ridge, TN | adjacent | + | + | + |
| 11 | Poplar Creek Bridge | Perimeter Road, Oak Ridge, TN | adjacent | + | + | + |
| 12 | Perimeter Road | Perimeter Road, Oak Ridge, TN | 0.68 mile | + | + | + |
| 13 | Blair Road | Oak Ridge, TN | 0.75 mile | + | + | +/- |
| 14 | George Jones Memorial Baptist Church Gate | Blair Road, Oak Ridge, TN | 1.26 mile | + | - | - |
| 15 | George Jones Memorial Baptist Church | Oak Ridge, TN | 1.32 mile | + | - | - |
| 16 | K-25 History Center Sidewalk | 652 Enrichment Street, Oak Ridge, TN | adjacent | + | + | + |
| 17 | K-25 History Center Courtyard | 652 Enrichment Street, Oak Ridge, TN | adjacent | + | + | + |
| 18 | K-25 History Center Viewing Platform | 652 Enrichment Street, Oak Ridge, TN | adjacent | + | + | + |
| 19 | Heritage Center Main Entrance | Heritage Center Boulevard, Oak Ridge, TN | 0.37 mile | + | + | +/- |

# APPENDIX B
# Sensitive Viewpoint Photos and Field Notes



***Photo 1. Viewpoint 1***




***Photo 2. Viewpoint 2***



***Photo 3. Viewpoint 3***



***Photo 4. Viewpoint 4***



***Photo 5. Viewpoint 5***



***Photo 6. Viewpoint 6***



***Photo 7. Viewpoint 7***




***Photo 8. Viewpoint 8***




***Photo 9. Viewpoint 9***



***Photo 10. Viewpoint 10***



***Photo 11. Viewpoint 11***



***Photo 12. Viewpoint 12***



***Photo 13. Viewpoint 13***



***Photo 14. Viewpoint 14***



***Photo 15. Viewpoint 15***



***Photo 16. Viewpoint 16***



***Photo 17. Viewpoint 17***



***Photo 18. Viewpoint 18***



***Photo 19. Viewpoint 19***

**Project Name:**

Date: 10/20/25 Weather: Sunny 64° Winds: Calm Sheet 1 of 2

| VP# | GPS# | Photo Reference | Time | Location/Similarity Zone/Sensitive Resource/Comments |
|---|---|---|---|---|
| VP1 | VP1 | 5447 - 5462 | 1:20 | K-25 Overlook Visitor Center. Taken at Bench |
| VP2 | VP2 | 5464 - 5471 | 1:35 | K-25 overlook at Visitor center. Views towards site with limited visibility. Historic panels present |
| VP3 | VP3 | 5472 - 5479 | 1:40 | African Burial Cemetery. Views towards site of limited visibility. Views of cemetery & memorial. |
| VP4 | VP4 | 5480 - 5494 | 2:05 | View towards site from residential track "Preserve" OH TL visible. Site & buildings not visible. |
| VP5 | VP5 | 5495 - 5508 | 2:20 | view from 101 Condensory St. in Preserve. Site is barely visible but screened by trees. |
| VP6 | VP6 | 5509 - 5520 | 2:40 | View from Dyllis Orchard Road Hiking Trail Parking area. Site is south & screened by veg. |
| VP7 | VP7 | 5521 - 5537 | 2:50 | View south towards site with open views. Taken from Blair Road. May be screened by existing bldg. |
| VP8 | VP8 | 5538 - 5551 | 12:15 | View towards project site from Gallaher Cemetery. views obstructed by vegetation. |
| VP9 | VP9 | 5552 - 5561 | 12:30 | View towards site - (Open view) from Perimeter Road & RR track crossing. |
| VP10 | VP10 | 5562 - 5573 | 12:35 | View from SW corner of project site. Open views. |
| VP11 | VP11 | 5574 - 5584 | 12:40 | View from Perimeter Road at Bridge over Poplar Branch. Open views. |
| VP12 | VP12 | 5585 - 5600 | 12:45 | View from Perimeter Road - from the north. Obstructed by some buildings & vegetation. |

11/21/25 Hy lowly slm

| Project Name: | | | | |
|---|---|---|---|---|
| Date: 10/21/2025 Weather: Pt Cloudy | | | Winds: Calm | Sheet 2 of 2 |
| VP# | GPS# | Photo Reference | Time | Location/Similarity Zone/Sensitive Resource/Comments |
| VP13 | VP13 | 5601 - 5612 | 12:55 | View from Perimeter Rd. NE of Site. Partial visibility. |
| VP14 | VP14 | 5613 - 5621 | 1:00 | View from Gate at access road to George Jones Memorial Baptist Church. View obstructed. |
| VP15 | VP15 | 5622 - 5641 | 1:10 | View from George Jones Memorial Baptist Church view obstructed. |
| VP16 | VP16 | 5642 - 5655 | 1:25 | View from K-25 History Center - Ope view Concrete sidewalk to entrance. |
| VP17 | VP17 | 5656 - 5668 | 1:30 | View from K-25 History Center Courtyard next to the building. |
| VP18 | VP18 | 5669 - 5677 | 1:40 | view from inside the History center on 2nd floor platform viewing area. |
| VP19 | VP19 | 5678 - 5690 | 2:00 | View from main entrance Zoo Heritage Park Partial view of taller structures once built. |
| | | | | |
| | | | | |
| | | | | |
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