DOE/EA-1640
DRAFT

Environmental Assessment

Transfer of Land and Facilities within the East Tennessee Technology Park and Surrounding Area, Oak Ridge, Tennessee

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SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

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FIGURES

TABLES

ACRONYMS

AMSL	above mean sea level
ASER	Annual Site Environmental Report
BORCE	Black Oak Ridge Conservation Easement
C&D	construction and demolition
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	*Code of Federal Regulations*
CNF	Central Neutralization Facility
CRMP	Cultural Resource Management Plan
CRO	community reuse organization
CROET	Community Reuse Organization of East Tennessee
D&D	decontamination and decommissioning
dBA	A-weighted decibels
DCG	derived concentration guideline
DOE	U. S. Department of Energy
EA	Environmental Assessment
EDE	effective dose equivalent
EIS	Environmental Impact Statement
EM	Environmental Management
EPA	U. S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-To-Know Act
ES&H	environmental safety and health
ETTP	East Tennessee Technology Park
FFA	Federal Facility Agreement
FONSI	Finding of No Significant Impact
FY	fiscal year
GPD	gallons per day
HI	hazard index
HQ	hazard quotient
IFDP	Integrated Facility Disposition Project
LLW	Low-level (radioactive) waste
MEI	maximally exposed individual
MGD	million gallons per day
mrem	millirem
MVA	megavolt-ampere
NA	natural area
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act of 1969
NERP	National Environmental Research Park
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NRC	U. S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
OMB	Office of Management and Budget
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Office
ORR	Oak Ridge Reservation

ORSTP	Oak Ridge Science and Technology Project
ORWMA	Oak Ridge Wildlife Management Area
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PIF	Partners in Flight
PILT	payment in lieu of taxes
POTW	Publicly Owned Treatment Works
R&D	research and development
RCRA	Resource Conservation and Recovery Act of 1976
ROD	Record of Decision
ROI	region of influence
ROW	right-of-way
S&M	surveillance and maintenance
SHPO	State Historic Preservation Office
SR	state route
STP	Sewage Treatment Plant
TDEC	Tennessee Department of Environment and Conservation
TSCA	Toxic Substances Control Act of 1976
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
USACE	U. S. Army Corps of Engineers
VOC	volatile organic compound

1. INTRODUCTION

1.1 PURPOSE AND NEED FOR ACTION

The proposed action evaluated in this Environmental Assessment (EA) is the conveyance (lease, easement, and/or title transfer) of U. S. Department of Energy (DOE) property located at the East Tennessee Technology Park (ETTP) and surrounding area for mixed use economic development. Leases, easements, and/or title transfers could be entered into with the Community Reuse Organization of East Tennessee (CROET), city of Oak Ridge, other agencies, or private entities. Leasing and title transfers for economic development are allowed under 10 *Code of Federal Regulations* (*CFR*) 770, *Transfer of Real Property at Defense Nuclear Facilities for Economic Development.*

DOE's action is needed to reduce the eventual cost for building demolition and reduce or eliminate landlord costs. This also helps to free money for reinvestment in cleanup projects to further reduce risks at the site. The conveyance of unneeded property can also help offset economic losses resulting from continued DOE downsizing, facility closures, and workforce restructuring.

1.2 BACKGROUND

The study area for the EA includes approximately 5,000 acres located in the northwestern portion of the Oak Ridge Reservation (ORR) and includes the developed portion of the ETTP (Fig. 1.1). In 1996, DOE began a Reindustrialization Program to make land, facilities, and equipment at ETTP available for use by private-sector businesses and industries. As part of the reindustrialization effort, DOE and CROET are transitioning the former gaseous diffusion plant to a private industrial/business park known as the Heritage Center.

CROET is the DOE-recognized community reuse organization (CRO) engaged in furtherance of economic development for Oak Ridge, including the ORR. DOE has made some of its underutilized facilities and land parcels at ETTP available for lease or title transfer and, in turn, they have been subleased or sold to private-sector firms. DOE has also been transferring facilities and utility infrastructure to the city of Oak Ridge. More information about DOE's Reindustrialization Program at ETTP is available on the web at: http://www.ettpreuse.com.

Commercial use of the area does not constitute a change of the primary use of the property, which has been industrial for over 60 years. The remainder of the study area, which is not being considered for transfer consists of large, open tracts of undeveloped land [e.g., Black Oak Ridge Conservation Easement (BORCE) area] and various other uses [i.e., some DOE facilities, utility rights-of-way (ROWs) and infrastructure, roads, etc.].

The study area has been the subject of previous National Environmental Policy Act of 1969 (NEPA) decisions and land use planning efforts. NEPA decisions include the *Final Environmental Assessment for the Lease of Land and Facilities Within the East Tennessee Technology Park*, DOE/EA-1175 (DOE 1997) and the *Final Environmental Assessment Addendum for the Title Transfer of ETTP Land and Facilities*, DOE/EA-1175-A (DOE 2003). Land use planning efforts include the *Oak Ridge Reservation Ten-Year Site Plan* (DOE 2007) and the land use planning process conducted in 2001 documented in the *Final Report of the Oak Ridge Land Use Planning Focus Group* (2002) and *Land Use Technical Report* (ORNL 2002).

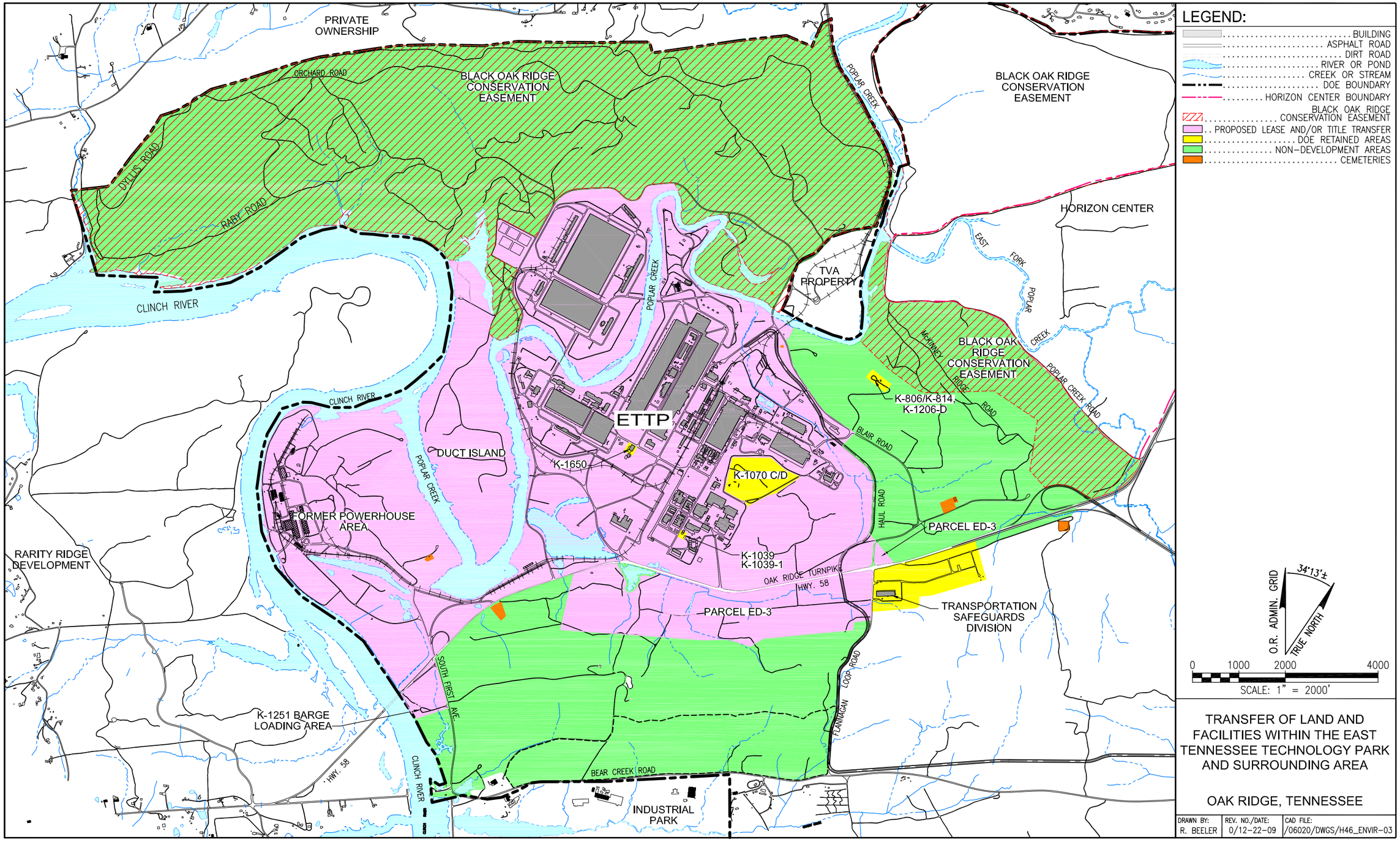

Fig. 1.1. EA study area.

The 2001 land use planning effort took place to develop suggestions for the utilization of land in the northwest portion of the ORR. As part of the process, four land use scenarios were developed and analyzed in the technical report prepared for the process (ORNL 2002). Land uses that were considered for the four scenarios included greenspace, conservation, and research; industrial/commercial; office; residential; and open space. Additional information on the land use planning process is also available on the web at: http://landuseplanning.ornl.gov.

For the four land use scenarios considered, there was general agreement on the use of approximately 87% of the land under consideration. The Focus Group[1] did not reach a consensus on the preferred use for the remaining land, which included the area designated as Parcel ED-3 and former "city of Oak Ridge self-sufficiency Land Parcel 8" located along the west end of Bear Creek Road (Fig. 1.1). Based on the results of the land use planning process, DOE reconfigured Parcel ED-3. Due to the physical attributes not being suited for development, the property along Bear Creek Road is no longer being considered for transfer.

DOE is using its Reindustrialization Program experience, information from CROET, and results of the previous land use planning efforts to perform this EA, which primarily covers additional mixed uses within ETTP and the surrounding area that were not considered in previous NEPA decisions. The areas proposed for conveyance are not needed for mission purposes and, therefore, are consistent with the 2001 land use planning process.

1.3 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

DOE has prepared this EA to assess the potential consequences of the proposed action on the human environment in accordance with the Council on Environmental Quality (CEQ) regulations (40 *CFR* Parts 1500–1508) implementing NEPA and the DOE NEPA Implementing Procedures (10 *CFR* 1021). If the impacts associated with the proposed action are not identified as significant as a result of this EA, DOE shall issue a Finding of No Significant Impact (FONSI) and will proceed with the action. If impacts are identified as potentially significant, an Environmental Impact Statement (EIS) will be prepared.

This EA (1) describes the existing environment within the EA study area relevant to potential impacts of the proposed action and alternatives; (2) analyzes potential environmental impacts that could result from the proposed action and alternatives; and (3) identifies and characterizes cumulative impacts that could result from the conveyance of DOE property in relation to other ongoing or proposed activities within the surrounding area.

Certain aspects of the proposed action have a greater potential for creating adverse environmental impacts than others. For this reason, CEQ regulations (40 *CFR* 1502.1 and 1502.2) recommend a "sliding-scale" approach so that those actions with greater potential effect can be discussed in greater detail in NEPA documents than those that have little potential for impact.

Because the actual future uses of the property are not currently known, a "bounding" analysis was used to estimate potential impacts. A bounding analysis is prepared when no specific activity has been identified for analysis. Because of the lack of detail of a future use or uses, especially in the case of a land transfer for development purposes, the bounding analysis typically uses conservative assumptions and analytical methods to estimate (i.e., bound) the maximum value of a potential environmental impact. In

[1] The Focus Group was comprised of a broad cross-section of the community, as well as representatives from agencies and organizations having an interest in the future of Oak Ridge Reservation land.

this EA, reasonably foreseeable land uses and their associated environmental effects are addressed. The bounding analysis is based on the various types of industrial, commercial, and recreational uses that would be compatible for the property. This assumption is based on the types of businesses that are currently operating at ETTP, in nearby industrial parks (e.g., Bethel Valley Industrial Park), and those proposed for the Horizon Center, which is an industrial/business park located adjacent to the EA study area. The proposed uses would complement the industrial base being developed at the ETTP and the Horizon Center by providing related business-support needs. Based on information about these uses, assumptions were developed regarding potential emissions, effluents, waste streams, services, and infrastructure. Finally, technical experts analyzed the potential for adverse impacts and defined commonly used measures that could be used to reduce or mitigate potential impacts.

2. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

Under the proposed action, DOE could convey up to approximately 1,800 acres of property located within the EA study area (Fig. 1.1). This property includes the majority of the main ETTP plant area, Duct Island, a portion of the former K-25 Powerhouse Area, the K-1251 Barge Loading Area and the land adjacent to it, and land identified as Parcel ED-3.

Areas that would not be conveyed include non-development areas and DOE-retained property (retained for a variety of uses or purposes). These areas are also shown on Fig. 1.1. A large portion of the non-development area is already part of the BORCE. The remaining non-development areas have limited development potential because of various constraints such as steep slopes, wetland and floodplain issues, existing infrastructure, and sensitive ecological resources. The DOE-retained property includes the K-1650 Central Control Facility, K-1039 and K-1039-1 Telecommunications Buildings, K-1070-C/D Burial Ground, K-806 and K-814 McKinney Ridge Radio Repeater Stations, K-1206-D Fire Water Tank, and the Transportation Safeguards Division Facility (a National Nuclear Security Administration facility). DOE would also retain custody, control, and maintenance of the cemeteries that are located within the area.

Conveyance of the property would be phased with the option of fee title transfer, easements, or leasing. Upon the completion of the conveyance, the developable portions of the property would be marketed, sold, leased, or utilized by CROET or other owners. The proposed action assumes that the conveyed property would be developed for a mixed use, including but not limited to, industrial, commercial, recreation, tourism (including historic preservation), and open space. In addition to the construction of new facilities or reuse of existing facilities, development activities would also include placement and compaction of earth backfill to establish required building elevations, excavation for the installation of concrete foundations/footings, and infrastructure development including, but not limited to, utility connections. Construction activities would also include vehicle access roads, parking lots, pedestrian walkways, and fire protection facilities and equipment.

2.1.1 Land Use Scenarios and Assumptions

Because specific uses may not be known prior to the fee title conveyance or until proposals for leases are developed and reviewed by DOE, reasonably foreseeable uses have been developed to bound the analysis in this EA. Industrial uses considered are the permitted principal uses and uses requiring a Board of Zoning Appeals permit in the City of Oak Ridge Zoning Ordinance for IND-1, IND-2, and IND-3, Industrial Districts. Additional commercial and recreational uses are those included in the Zoning Ordinance for UB-2, Unified General Business Districts. These uses could include, but are not limited to, the following:

- Light to heavy processing, manufacturing, assembly, and fabrication plants.
- Storage; wholesaling; distribution; warehousing, including shipping and freight terminals; and related facilities.
- Research and testing facilities, including renewable and advanced energy, industrial, and scientific research laboratories that include incidental pilot plant processing operations.
- Administrative, technical, and professional offices.

- Storage facilities for materials such as, but not limited to, salt, switchgrass, other alternative fuel feedstocks, coal, coke, building material, sand, gravel, stone, lumber, and enclosed or open storage of construction contractors' equipment and supplies.

- Waste treatment facilities, including hazardous and mixed waste treatment for shipment to off-site storage and disposal facilities.

- Recycling operations, including those for radioactively contaminated materials and those associated with metal and other material treatment and processing.

- Broadcasting, publishing, recording, and telecommunications.

- Food processing such as dairy products, bakery products, and beverage products (all activities are conducted in an enclosed building).

- Airports.

- Commercial uses, including restaurants and service establishments such as: gas station/convenience store, bank, post office/mailing/shipping center, copying/printing, bulk cleaning and laundry, cold storage lockers, furniture and carpet warehouses, car washes, equipment and appliance repair, vehicle service centers etc.

- Public recreation uses such as parks, playgrounds, golf courses, athletic fields, and stadiums.

The bounding analysis used in this EA assumes that the potential uses would be compatible with other non-DOE uses in the surrounding area. The uses would also be compatible with other ongoing DOE missions and activities. If portions of the parcel are leased prior to being conveyed, DOE would review each proposal to ensure that proposed activities fall within the bounding analysis in this EA. If the proposed uses and their potential impacts were not consistent with the uses and bounding analysis evaluated in the EA, DOE would determine the appropriate level of additional review that would be required prior to implementation.

DOE has also based the bounding analysis in this EA on the following assumptions:

- The city of Oak Ridge would review development plans to ensure compliance with all applicable zoning ordinance requirements and other engineering-related ordinances and standards.

- Construction activities involving ground disturbance would be conducted incrementally to limit the potential for soil erosion.

- Sensitive resources, including cultural resources, would be protected as necessary through the use of deed restrictions and compliance with all applicable local, state, and federal regulations.

- State and federal storm water regulations to minimize erosion and sedimentation would be met. As applicable, notification of any disturbance would be made to the appropriate authorities prior to construction activities.

- Future owners and/or occupants would be responsible for seeking and obtaining any applicable federal, state, and/or local permits and licenses for activities and operations at their facilities. Examples include building permits, permits for air emissions, industrial wastewater discharge permits, Resource Conservation and Recovery Act of 1976 (RCRA) permits, etc.

- Future occupants of the property proposed for transfer may include companies engaged in the handling or use of radioactive materials and other radiological operations. The company or companies would be required to obtain all necessary permits and licenses, including radiological licenses from the U. S. Nuclear Regulatory Commission (NRC). This would entail the required analyses to ensure that members of the public are protected, including DOE and contractor employees.

- Certain uses, especially those that would require additional permits or licenses for construction and/or operation (e.g., airport, power plant), could require a more detailed environmental review that would be performed by the applicable permitting agency.

2.1.2 CERCLA 120(h) Compliance

In accordance with the Federal Facility Agreement (FFA) between the DOE-Oak Ridge Office (ORO), the U. S. Environmental Protection Agency (EPA), and the Tennessee Department of Environment and Conservation (TDEC), conveyances would have to comply with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Sect. 120(h). To comply with the CERCLA requirements, a report is prepared that details the baseline environmental condition of the property and requires the identification of hazardous materials that are present, stored, or have been released on the property proposed for transfer. The report also includes information on prior property ownership, past and present property use, as well as past and present activities on adjacent properties. Depending upon the review of historic records, environmental sampling may be conducted, including radiological surveys, if needed. The resultant data may be used in a risk analysis, if appropriate. The information collected provides the environmental risk management basis for DOE's lease or title transfer decision, notwithstanding the policy-level decision-making that is achieved via the NEPA process.

2.2 ALTERNATIVE 1 – HEAVY INDUSTRIAL

Under Alternative 1, DOE would convey the same property that is included in the proposed action. However, instead of the property being developed for mixed uses, it would be developed to support heavy industrial operations only. Permitted principal uses and uses requiring a Board of Zoning Appeals permit are included in the City of Oak Ridge Zoning Ordinance for IND-3, Industrial Districts. These uses could include, but are not limited to, the following:

- heavy manufacturing, excluding slaughtering plants and paper or pulp mills;
- warehousing and wholesaling facilities, including truck and rail service terminals;
- public utility facilities with or without storage yards;
- research and development (R&D) with or without outside storage or operations;
- nonhazardous waste recycling centers;
- hazardous and nuclear material collection, recycling, treatment, or disposal and storage areas;
- bulk oil and gasoline storage or bulk storage of natural gas;
- airports; and
- power plants.

Like the proposed action, conveyance of the property would be phased with the option of fee title transfer, easement, or leasing. The balance of the area includes the land and facilities covered by previous NEPA decisions, non-development areas, and DOE-retained property (see Sect. 2.1). The

bounding analysis assumptions presented in Sect. 2.1.1 would also apply to this alternative as well as the CERCLA 120(h) compliance requirements.

2.3 ALTERNATIVE 2 – UB-2 UNIFIED GENERAL BUSINESS DISTRICTS

Under Alternative 2, DOE would convey the same property that is included in the proposed action. Like the proposed action, the property would be developed for mixed uses except for industrial. Permitted principal uses and uses requiring a Board of Zoning Appeals permit are included in the City of Oak Ridge Zoning Ordinance for UB-2, Unified General Business Districts. These uses could include, but are not limited to, the following:

- Any retail business, whose principal activity is the sale of merchandise in an enclosed building.
- Administrative, technical, and professional offices.
- Commercial uses, including restaurants and service establishments such as: gas station/convenience store, bank, post office/mailing/shipping center, copying/printing, bulk cleaning and laundry, cold storage lockers, furniture and carpet warehouses, car washes, equipment and appliance repair, vehicle service centers etc.
- Theaters, radio and television studio, assembly hall, concert hall, dance hall, bowling alley, skating rink, or similar recreation use or place of assembly.
- Church, school, or public library.
- Public utility facilities without storage yards.
- Research laboratory, including incidental pilot plant processing operations.
- Commercial greenhouse or nursery.
- Family day care home, childcare center, and private education institution.
- Hospital or clinic, excluding animal hospital, penal or correctional institution.
- Mortuary establishment or cemetery.
- Public recreation uses such as parks, playgrounds, golf courses, athletic fields, and stadiums.

Like the proposed action, conveyance of the property would be phased with the option of fee title transfer or leasing. The balance of the EA study area includes the land and facilities covered by previous NEPA decisions (see Sect. 1.2), non-development areas, and DOE-retained property (see Sect. 2.1). The bounding analysis assumptions presented in Sect. 2.1.1 would also apply to this alternative as well as the CERCLA 120(h) compliance requirements.

2.4 NO ACTION ALTERNATIVE

The no action alternative provides an environmental baseline with which impacts of the proposed action and alternatives can be compared, and is required by the DOE NEPA regulations.

Under the no action alternative, no additional property within the EA study area would be leased or sold for development unless it has already been reviewed under a previous NEPA evaluation. Title transfer activities presently underway at ETTP for all facilities and land areas included in previous NEPA decision documents would continue. The remainder of the property within the study area would continue to be retained by DOE. Ongoing environmental restoration and waste management activities at ETTP would also continue.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED

2.5.1 Conveyance by Lease Only

Transfer of land via lease only would not meet the stated purpose and need for the proposed action because DOE has a programmatic need to reduce its footprint to help foster economic development. A lease-only program would introduce marginally higher costs to DOE because personnel would need to be kept in place to manage the leases. Furthermore, CROET or other entities need to own the property in order to market it effectively. It is difficult for a CRO, or any organization, to market property they do not own, and especially for an interested tenant or purchaser to obtain financing for land they cannot own. A lease-only program would also not meet the need for DOE to reduce or eliminate landlord costs at ETTP. Thus, this alternative was eliminated from further analysis.

2.5.2 Transfer of Additional Land Near the ETTP

The land use planning process conducted in 2001 (see Sect. 2.1) also evaluated land use scenarios that included development of DOE property located along Bear Creek Road and additional land located east of Parcel ED-3 and along Blair Road. The property along Bear Creek Road was eliminated from further consideration for development due to the power line ROW, sensitive ecological areas, and topography. The additional land along Blair Road and east of Parcel ED-3 was eliminated primarily because of the adverse impact that it would have on the remnants of the historic Wheat Community. Thus, this alternative was eliminated from further analysis.

2.5.3 Transfer of Other Oak Ridge Reservation Land

At the present time, DOE has not identified any other large consolidated areas of the ORR as underutilized, surplus, or excess that would qualify as being eligible for transfer for economic development. Thus, this alternative was dismissed from detailed consideration and further analysis.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter provides the existing conditions and background information for evaluating the potential environmental impacts of the proposed action and alternatives. This chapter also includes the impact analysis and discussion of project attributes that could have the potential for significant impacts.

3.1 LAND USE

3.1.1 Existing Conditions

The EA study area consists of approximately 5,000 acres. Areas that have been impacted by DOE activities in the past account for roughly 2,200 of the 5,000 acres. As part of the cleanup of ETTP, DOE's Environmental Management (EM) Program has divided the potentially impacted area of ETTP into two areas: outside the main fence (Zone 1 – 1,400 acres) and inside the main fence (Zone 2 – 800 acres). Historically, Zone 1 was used for light industrial purposes and has some open areas and some areas of waste disposal. Zone 2 is the main plant area and has historically had a heavy industrial use (Fig. 3.1).

Major changes to the land use within ETTP have not occurred since the completion of the *Final Environmental Assessment for the Lease of Land and Facilities Within the East Tennessee Technology Park*, DOE/EA-1175 (DOE 1997). The ETTP mission has been to remediate the site, as well as reindustrialize and reuse site assets through leasing and title transfer of underutilized facilities and land parcels. EM Program projects at ETTP have included both remedial action and decontamination and decommissioning (D&D) activities. Remedial action projects typically address contaminant releases to the environment by addressing contaminated soil, water, sediment, or biota. D&D projects address contamination in facilities and structures and can also include demolition. Additional information on the ongoing environmental restoration and waste management activities at ETTP can be found in the 2007 ORR Annual Site Environmental Report (ASER) [DOE 2008] and the fiscal year (FY) 2008 Cleanup Progress Report (DOE 2009).

Areas outside of Zone 1 within the EA study area include a large portion of McKinney Ridge east of Blair Road, Pine Ridge between state route (SR) 58 and Bear Creek Road, and Parcel ED-3. Except for a few roads, utility easements, and water tanks, much of the McKinney Ridge and Pine Ridge area is relatively undeveloped and is primarily used for a facility buffer, wildlife management, forestry, and environmental monitoring and research. The majority of Parcel ED-3 has been previously disturbed (see Sect. 3.6.1). Parcel ED-3 is currently being used for roads and utility easements, facility buffer, and wildlife management. The temporary "Haul Road," currently used for truck transport of waste materials from ETTP, transects the eastern portion of the parcel from north to south. Currently, the only activities conducted at Parcel ED-3 occur at the trailers and sheds located in the northeastern corner of the parcel. These facilities are used for office space and equipment storage by Restoration Services, Inc., in support of ongoing EM activities.

3.1.2 Environmental Consequences

3.1.2.1 Proposed action

Within the area proposed for lease and/or title transfer, the present land use of the parcel would change over time as development occurs. This would be most evident in the areas that have had limited

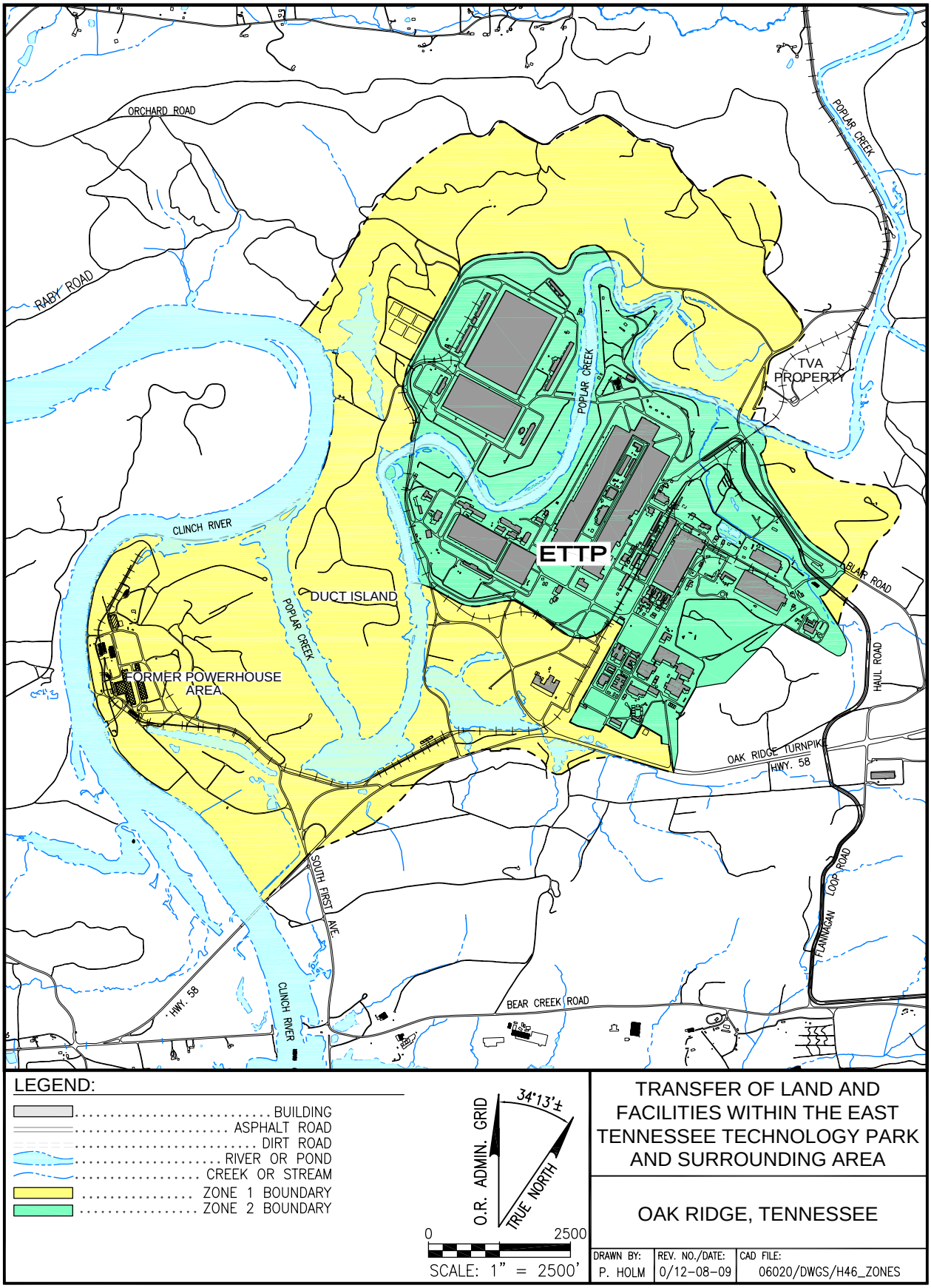

Fig. 3.1. Zone 1 and Zone 2 at ETTP.

development or presently are primarily undeveloped (e.g., Duct Island, Parcel ED-3). In these areas, the visual character of the property could change from a more natural to a more man-made-looking environment. This change would only occur for those uses that would require extensive industrial or commercial development. In the highly disturbed main portion of ETTP, development would not change the existing land use, which has been and is currently industrial in nature. Under the proposed action, recreation, tourism (including historic preservation), and open space uses would add to the future land use mix. Land use and visual impacts would be minimized if heavier industrial uses are sited on previously disturbed areas that have historically been used for industrial operations. Similarly, while lighter industrial, commercial, and recreational uses would be located in the other areas proposed for transfer. Additionally, not all of the area proposed for conveyance is equally developable because of various constraints including existing power lines and utility ROWs, floodplains, groundwater wells (unless they are removed prior to the transfer), cemeteries, and facilities. Acceptable land uses will also be based on CERCLA 120(h) compliance requirements, applicable city of Oak Ridge zoning requirements, and the ability to obtain construction and operating permits and licenses.

3.1.2.2 Alternative 1

Potential land use impacts under Alternative 1 are expected to be similar to those described for the proposed action. However, since this alternative assumes greater industrial development, it is assumed that a larger portion of the area proposed for conveyance could be developed. This could result in greater adverse visual impacts for those areas that are presently undeveloped or only contain limited development. However, the overall impact would depend on the density of the industrial development determined through the applicable regulatory process (i.e., licensing, permitting) and any specific requirements of the Oak Ridge Zoning Ordinance.

3.1.2.3 Alternative 2

Land use impacts under Alternative 2 are expected to be similar to those described for the proposed action. However, since industrial uses would not be permitted under the City of Oak Ridge Zoning Ordinance for UB-2, Unified General Business Districts, potential adverse visual impacts typically associated with heavy industrial development would not occur. Development plans that incorporate appropriate buffers and landscaping, as well as modern building architecture that is designed to blend in with the surrounding environment, would also help to minimize adverse impacts.

3.1.2.4 No action

Under the no action alternative, the existing land use would continue, and the land would remain as DOE property until any future disposition could be decided. Ongoing and planned remedial actions and reindustrialization activities would continue.

3.2 AIR QUALITY AND NOISE

3.2.1 Existing Conditions

3.2.1.1 Air quality

Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The levels of pollutants are generally expressed in terms of concentration, either in units of parts per million or micrograms per cubic meter.

The baseline standards for pollutant concentrations are the National Ambient Air Quality Standards (NAAQS) and state air quality standards. These standards represent the maximum allowable atmospheric concentration that may occur and still protect public health and welfare. The state of Tennessee has adopted NAAQS (TDEC 1200-3-3).

Based on measured ambient air pollutant concentrations, the EPA designates whether areas of the United States meet NAAQS. Those areas demonstrating compliance with NAAQS are considered "attainment" areas, while those that are not are known as "non-attainment" areas. Those areas that cannot be classified on the basis of available information for a particular pollutant are "unclassifiable" and are treated as attainment areas until proven otherwise.

The proposed action would occur in Roane County, which is used as the region of influence (ROI) for this analysis. For comparison purposes, Table 3.1 presents EPA's 2002 National Emissions Inventory (NEI) data for Roane County (EPA 2002). The county data include emissions data from point sources, area sources, and mobile sources. Point sources are stationary sources that can be identified by name and location. Area sources are point sources whose emissions are too small to track individually, such as a home or small office building, or a diffuse stationary source, such as wildfires or agricultural tilling. Mobile sources are any kind of vehicle or equipment with gasoline or diesel engine, an airplane, or a ship. Two types of mobile sources are considered: on-road and non-road. On-road mobile sources consist of vehicles such as cars, light trucks, heavy trucks, buses, and motorcycles. Non-road sources are aircraft, locomotives, diesel and gasoline boats and ships, personal watercraft, lawn and garden equipment, agricultural and construction equipment, and recreational vehicles (EPA 2005).

Table 3.1. Roane County emissions for 2002

	Emissions (tons/year)					
Source Type	**CO**	**NO_x**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**VOC**
Area source	648	116	3,516	845	149	1,209
Non-road mobile	3,703	1,167	2,092	624	124	827
On-road mobile	21,386	4,381	2,175	620	106	1,548
Point source	1,150	26,280	4,394	3,583	77,882	240
Total	*26,887*	*31,943*	*12,177*	*5,672*	*78,262*	*3,824*

Source: EPA 2002.

CO = carbon monoxide; NOx = nitrogen oxide; PM_{10} and $PM_{2.5}$ = particulate matter with an aerodynamic diameter less than 10 microns and 2.5 microns, respectively; SOx = sulfur oxide; and VOC = volatile organic compound.

TDEC operates air quality monitors in various counties throughout the state (TDEC 2008). There is a particulate matter with an aerodynamic diameter less than 2.5 microns ($PM_{2.5}$) monitor in Roane County and an ozone monitor in the neighboring Anderson County; Oak Ridge area air quality is relatively good compared to nearby Knox County. Part of Roane County [census block that includes the Tennessee Valley Authority (TVA) Kingston Steam Plant] is designated partial non-attainment for the new, stricter federal $PM_{2.5}$. The neighboring county, Anderson County, is non-attainment for the 8-hr ozone and $PM_{2.5}$ standard.

3.2.1.2 Noise

Noise sources within the ETTP can be categorized into two major groups: transportation and stationary. Transportation noise sources are associated with moving vehicles that generally result in fluctuating noise levels above ambient noise levels for a short period of time. Stationary noise sources are

those that do not move or that move relatively short distances. Stationary noise sources include ventilation systems, air compressors, generators, power transformers, and construction equipment. These stationary sources are primarily associated with the ongoing activities within the industrialized central portion of ETTP. During peak hours, traffic along SR 58 is a major contributor to traffic noise levels in the area. Background noise levels at the ETTP are mostly from local traffic and are comparable to noise levels in an urban residential area. Noise levels 200 ft from main thoroughfares serving the ETTP have been estimated from traffic counts during rush hour to be between 58 and 66 "A-weighted decibels" (dBA). Noise levels at relatively isolated sites or farther from the highway may be lower than 55 dBA. No sensitive receptor sites such as picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, or hotels are presently located in the immediate ETTP vicinity.

3.2.2 Environmental Consequences

3.2.2.1 Proposed action

Air Quality

During site preparation and construction, the use of heavy equipment would generate engine exhaust containing air pollutants associated with diesel combustion. Similar air emissions would be generated from delivery vehicles bringing supplies and equipment to the construction site and from construction workers commuting in their personal vehicles. These emissions would be short-term, sporadic, and localized (except for emissions associated with the personal vehicles of construction workers and vehicles transporting construction materials and equipment). Dispersion would decrease concentrations of pollutants in the ambient air as distance from the construction site increased. The quantities of air pollutants produced by vehicles and equipment associated with construction would not be a substantial contribution to the total emissions from mobile sources already operating in the area and would not be expected to adversely affect local air quality.

In addition, construction activities could generate an increase in fugitive dust (i.e., airborne particulate matter that escapes from a construction site) from earthmoving and other construction vehicle operation. Not all of the area available for construction would be under construction at any one time. Rather, earthwork would likely be undertaken in increments. Increases in fugitive dust concentrations would probably be noticeable on the site and in the immediate vicinity, and ambient concentrations of particulate matter could rise in the short-term. However, control measures for lowering fugitive dust emissions (i.e., covers and water or chemical dust suppressants) would minimize these emissions.

Specific details about atmospheric pollutants that may be emitted by companies locating within the proposed development are not available. However, the types of commercial businesses and industries that are anticipated to be recruited could produce air emissions [e.g., volatile organic compounds (VOCs), particulates, etc.] typical of standard industrial and research operations. Minor emissions are typically controlled within the facility using conventional treatment technologies like scrubber systems and particulate filters, and external effects are negligible. New facility operations that have minor air contaminant sources would be required to obtain air quality construction and operating permits (non-Title V) from TDEC. The terms and conditions of the permits would include emission limits and outline specific monitoring, operating conditions, and recordkeeping requirements for the source.

Major sources of air emissions typical of heavy industries could be subject to a Title V operating permit. A Title V permit is required for any facility operations with the potential to emit more than 100 tons per year of any regulated air pollutant, 10 tons per year of any hazardous air pollutant, and/or 25 tons per year of any combination of hazardous air pollutants. If required, the appropriate permits

would be obtained. This regulatory process would prevent violations of air quality standards and mitigate the potential for adverse air quality impacts.

Noise

Construction noise associated with any future development would cause a temporary and short-term increase to the ambient sound environment. Workers associated with the construction activities would be expected to wear appropriate hearing protection as required by the Occupational Safety and Health Administration (OSHA). Construction activities would occur in active industrialized areas and in areas where no sensitive receptors are located. As a result, noise from construction would have no adverse effects.

Noise generated from new industrial or commercial businesses after construction would depend on the actual uses within the developed areas. Industrial uses involving heavy processing, manufacturing, assembly, and fabrication plants would be expected to generate more noise than commercial uses such as offices, service establishments, and storage/warehousing facilities. Uses that require outside material storage facilities or shipping and freight terminals would generate noise from the operation of heavy equipment and trucks. Public recreation uses such as parks, playgrounds, athletic fields, etc., generate even less noise. Noise compatibility should be a consideration when putting together development plans and may be a factor in obtaining the appropriate building/construction permits, licenses, etc., as part of applicable zoning regulations or ordinances that the private owners/developers would be subject to.

3.2.2.2 Alternative 1

Under Alternative 1, the types of potential air quality and noise impacts are expected to be similar to those for the proposed action. However, since the conveyed property would be primary for heavy industrial development, the potential for adverse impacts could be greater. The potential for major adverse impacts would be somewhat mitigated by the City of Oak Ridge Zoning requirements and the regulatory permitting process. It is unlikely that the state of Tennessee would issue several Title V air quality permits for new sources in the ETTP area because of the likelihood that the higher density of heavy industries would adversely impact both local and regional air quality.

3.2.2.3 Alternative 2

Under Alternative 2, the types of potential air quality and noise impacts are expected to be similar to those for the proposed action. Since industrial uses are not permitted under the City of Oak Ridge Zoning Ordinance for UB-2, Unified General Business Districts, potential adverse air quality impacts typically associated with heavy industrial development would not occur. However, it is possible that some commercial uses would still be required to obtain air quality construction and operating permits for their minor sources. Adverse noise impacts are not expected.

3.2.2.4 No action

Under the no action alternative, air quality in the area would continue to be influenced primarily by DOE activities at ETTP and emissions from mobile sources associated with vehicles travelling on existing roads and highways. Emissions currently meet permitting regulations and DOE and EPA standards. Ambient noise levels are also expected to remain close to existing conditions.

3.3 GEOLOGY AND SOILS

3.3.1 Existing Conditions

A detailed description of the geology of the ETTP area is presented in the *Final Environmental Assessment for the Lease of Land and Facilities Within the East Tennessee Technology Park*, DOE/EA-1175 (DOE 1997) and is summarized here.

In general, the ETTP area is underlain by bedrock that can be broadly characterized as carbonate (Chickamauga Group and Knox Group) or clastic (Rome Formation). Figure 3.2 provides a geologic map of the ETTP area.

The geology is complex as a result of extensive faults, fractures, and folds and the presence of karst features in the bedrock underlying the site (Lemiszki 1994). The principal faults include the Whiteoak Mountain Fault, a major regional thrust fault that closely parallels the Oak Ridge Turnpike at the base of Pine Ridge, and the K-25 Fault that trends north-northwest through the eastern portion of the ETTP. Both of these faults have placed rocks of the Rome Formation over rocks of the Chickamauga Group and have also juxtaposed rocks of the Knox Group in the northeastern portion of the ETTP.

Clastic rocks of the Rome Formation underlie the easternmost portion of the main ETTP plant area, the K-1251 Barge Loading Area, and land tract identified as Parcel ED-3. The Rome Formation generally consists of thin-bedded shale and siltstone with interbedded sandstones. A limestone unit is present in the lower Rome in some areas of East Tennessee. The Rome bedrock is extremely contorted, with complex fracturing and folding in the vicinity of the K-25 Fault. Available exposures of the weathered Rome in the eastern portion of the ETTP reveal numerous tight, highly fractured folds with widely ranging bedding orientations.

The Knox Group is predominantly made up of dolostone that is highly siliceous, which makes it a ridge-former in this region (Blackoak Ridge and McKinney Ridge locally), and is found only in the northernmost portion of the proposed action. Dolostones in the Knox Group commonly consist of stacks of thick-to-massive beds. Within some of these beds, there are highly siliceous zones containing pods and lenses of chert, which are commonly intensely fractured.

The Chickamauga Group, which underlies the majority of the main ETTP plant area, Duct Island, and the former K-25 Powerhouse Area, is primarily composed of limestones, but there are also distinct calcareous shale beds, mud-rich limestones, and thin mud seams and stringers. Structurally, these formations have been significantly folded within the main plant area of the ETTP producing a diverse range of bedding orientations. The carbonates of the Chickamauga commonly weather in situ and turn completely to clay and silty clay. The transition from weathered material to competent bedrock is generally distinct and occurs over a short interval.

There is abundant evidence of karst within the Knox Group and Chickamauga Group formations, but the degree and style of karstification varies between these two groups, largely due to the different lithologic and mechanical characteristics of each unit. Karst development is of much greater extent in the Knox Group; however, it is also commonly present in the Chickamauga Group, which underlies the majority of the property included in the proposed action.

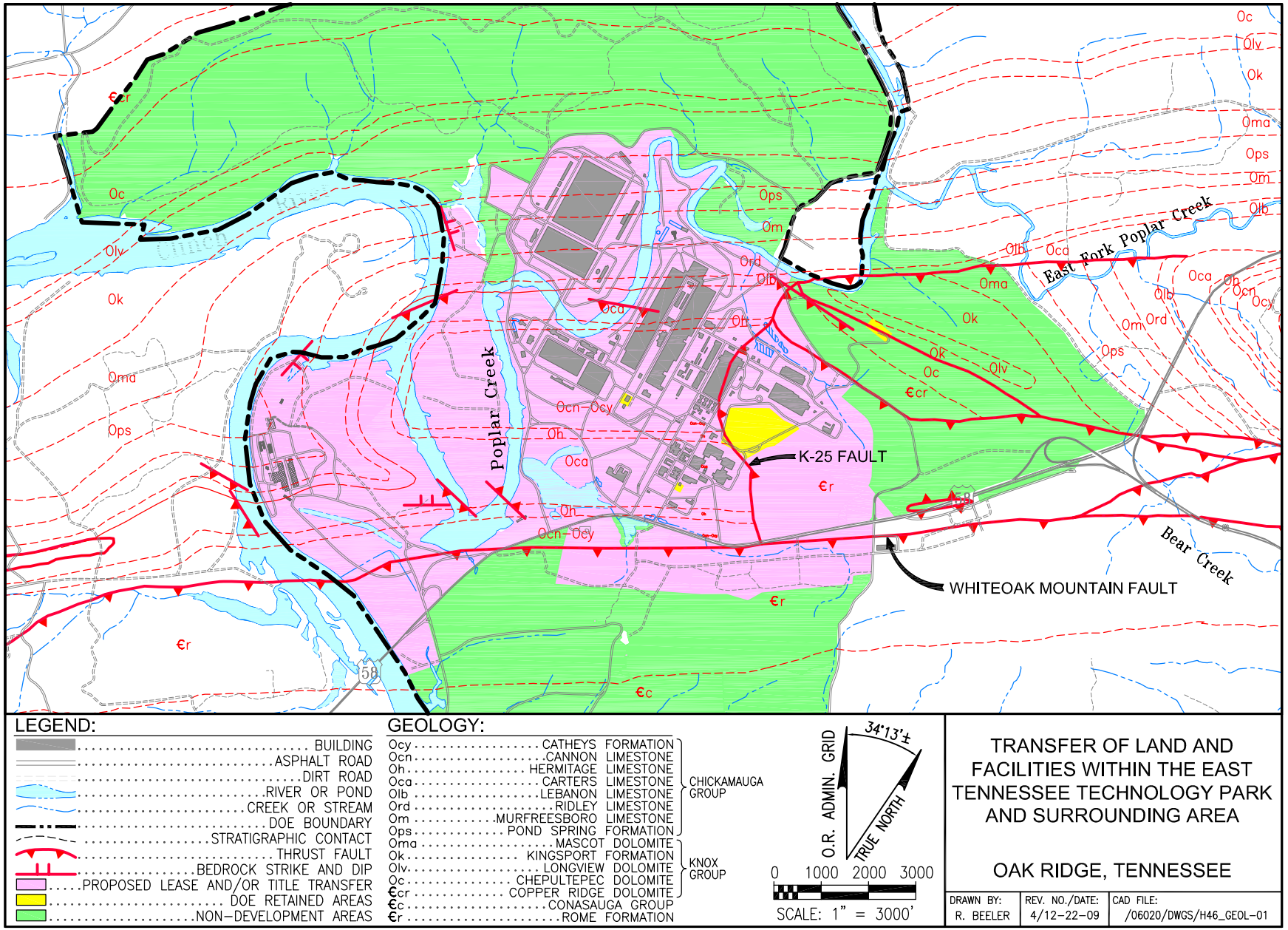

Fig. 3.2. Geologic Map of ETTP.

Despite the presence of numerous faults in the ETTP area, these faults are no longer active. The most recent significant movement of these faults likely occurred over 200 million years ago (Stearns and Miller 1977).

With few exceptions, bedrock at ETTP is mantled by unconsolidated overburden materials that range in thickness up to 70 ft. The heterogeneous soils overlying bedrock at the ETTP include a mixture of fill, reworked soils, native residual soils, and alluvium. These materials are products of either progressive in situ weathering of the underlying parent bedrock, depositional processes, or anthropogenic activities. During construction of the ETTP, soils were extensively modified by excavation and refilling of areas throughout the site, and few areas of undisturbed soils remain. Although the soils have largely been reworked, for the most part, soils at the ETTP are fine-grained and generally consist of silty clay materials. Coarser-grained soils are present in the Powerhouse area and in some fill areas.

3.3.2 Environmental Consequences

3.3.2.1 Proposed action

Site clearing, grading, and contouring would alter the topography of the property in the areas that would be developed, but the geologic formations underlying those sites should not be adversely affected. The potentially affected bedrock is generally stable and adequate to support structures using standard construction techniques. However, geotechnical studies would most likely be conducted prior to construction. If necessary, low geological impact foundations (e.g., shallow footings, micro piles, etc.) could be used to minimize excavation. Seismic hazards are relatively low in the ETTP area, and structures should be designed to conform to appropriate seismic standards.

Construction would disturb soils, and some topsoil might be removed in the process. However, construction activities involving ground disturbance would be conducted incrementally to limit the potential for soil erosion. Construction projects that disturb one acre or more of land require a storm water permit under the National Pollutant Discharge Elimination System (NPDES) program from TDEC. The permit process also requires a storm water pollution prevention plan for the site. This plan includes erosion, sediment, and storm water management controls to minimize the potential for adverse impacts. Examples include silt fences, sediment basins, erosion control mattings and blankets, etc. It is also expected that topsoil would be replaced as construction activities are completed, and disturbed areas would be revegetated.

3.3.2.2 Alternative 1

Potential geology and soils impacts under this alternative would be similar to those described for the proposed action. However, a greater density of heavy industrial development could increase the potential for adverse impacts.

3.3.2.3 Alternative 2

Potential geology and soils impacts under this alternative would be similar to those described for the proposed action.

3.3.2.4 No action

Under the no action alternative, the property would not be conveyed and would remain under DOE control. Ongoing environmental restoration, waste management, and reindustrialization activities at ETTP

would continue. Potential geology and soil impacts are addressed by approved NEPA studies or other applicable regulatory documents.

3.4 WATER RESOURCES

3.4.1 Existing Conditions

3.4.1.1 Groundwater

Groundwater occurs in both the unconsolidated overburden and bedrock at the ETTP, primarily as a single, unconfined, water table aquifer. Over most of the site, the water table occurs within the unconsolidated zone above bedrock. However, in several areas of the site, typically in areas of thin overburden where bedrock relief is high and/or the depth to water is greater, the water table occurs below the top of bedrock (DOE 1996). Depth to groundwater ranges from 1 to 65 ft below ground surface, largely depending on topographic position, with groundwater occurring at greater depths in the higher elevation portions of the ETTP. The water table is generally a subdued replica of topography implying radial flow from elevated areas within the plant to the adjacent surface water features, including Mitchell Branch, the K-1007-B Ponds, K-901-A Pond, Poplar Creek, and the Clinch River. Fluctuations in Clinch River and Poplar Creek stage directly impact groundwater hydraulic gradients in areas adjacent to these features (DOE 1996).

Over most of the ETTP, the water table occurs in the overburden, and groundwater flow in the overburden would be expected to follow hydraulic gradients with radial flow from higher topographic position within the site to adjacent surface water features, as described above. Depending on the specific overburden material (residual soil, fill materials, reworked soils, or alluvium), discrete flow zones may alter the flow directions slightly on a local scale, though overall flow would still be expected to follow the general hydraulic gradients. The ORR conceptual model (Solomon et al. 1992) suggests that the most active interval for groundwater flow on the ORR is the interface between bedrock and the unconsolidated zone and the uppermost surface of the bedrock. This is likely to be the case at the ETTP, as well.

In areas of the site where the water table occurs below the top of bedrock, groundwater flow would be controlled by both hydraulic gradient and bedrock structural features (including cavities). These flowpaths would be generally oriented parallel to bedrock strike in the carbonates, but highly unpredictable in areas of the site underlain by the Rome Formation. Groundwater at ETTP typically follows short flowpaths to discharge to local surface water features, including existing Clinch River, Poplar Creek, K-1007-P Ponds, K-901-A Pond, and various seeps and springs.

Routine monitoring of groundwater quality at ETTP is conducted to evaluate effectiveness of DOE's remediation activities at the ETTP. The results of this monitoring are reported in the annual DOE Remediation Effectiveness Report.

3.4.1.2 Surface water

The ETTP is directly adjacent to the Clinch River along the northwest boundary of the ORR. The Clinch River is considered a run-of-the-river impoundment, forming a portion of Watts Bar Reservoir. The Clinch River enters East Fork Valley through a water gap in Pine Ridge just upstream of the ETTP and flows across the valley before turning southwest to flow along the axis of the valley toward Watts Bar Dam. The Clinch River is up to 490 ft wide adjacent to the ETTP and, based on bathymetric surveys, typical water depths have been observed to range from 25 to 35 ft along the channel [i.e., the river bottom

elevation is typically 705 to 710 ft above mean sea level (AMSL)]. However, extreme water depths in excess of 50 ft have been observed within the river channel adjacent to the K-901-A Pond outfall.

Poplar Creek enters the north side of the ETTP and flows approximately 5.5 miles through the site, from the upstream confluence of the east and west forks of Poplar Creek to the confluence with the Clinch River at River Mile 12. At high pool stage, Poplar Creek is up to 290 ft wide, with water depths ranging up to 23 ft (bottom elevation = 718 ft AMSL). Backflow conditions persist upstream to above the confluence with East Fork Poplar Creek.

Clinch River flow rates are regulated by the TVA through operations at downstream Watts Bar and upstream Melton Hill Dams. Consequently, stage elevations fluctuate daily, weekly, and seasonally in response to TVA operations. Fluctuations of up to 5 ft may occur in both the Clinch River and Poplar Creek. Additionally, as a result of power generation schedules at the two dams, there are periods during the day when river flow can reverse upstream.

Tributary streams to Poplar Creek at the ETTP include Mitchell Branch, which originates on McKinney Ridge above ETTP and flows through the northeastern portion of the ETTP to discharge to Poplar Creek. The primary surface water feature within Parcel ED-3 is the unnamed stream along the south side of SR 58. This stream originates on Pine Ridge east of Parcel ED-3, flows west adjacent to SR 58, and passes under SR 58 through a culvert before it enters the K-1007-P5 Pond. Much of the stream was channelized during the widening of SR 58. An unnamed drainage west of Flannagan's Loop Road and small springs and seeps on the flanks of Pine Ridge also contribute to the flow in the stream. A small portion of surface water flow directly adjacent to the western boundary of Parcel ED-3 flows directly to the K-1007-P3 Pond. The K-1007-P3 Pond also receives runoff from a seep area and wet-weather drainage that flows down Pine Ridge further west of Parcel ED-3. Discharges from these ponds enter Poplar Creek, which is part of the Clinch River watershed.

Routine surface water monitoring is conducted at ETTP at nine locations (DOE 2008). These locations monitor surface water runoff or ambient stream conditions, and in some cases groundwater contributions to surface water. Depending on the location, samples may be collected and analyzed for radionuclides and nonradiological parameters. Results of radiological monitoring are compared to DOE derived concentration guidelines (DCGs) and nonradiological results are compared to appropriate water quality standards. In general, monitoring results for radionuclides and nonradiological parameters are within the allowable limits or below applicable standards (DOE 2008).

3.4.1.3 Floodplains

Some areas of the proposed action lie within the existing 100-year and 500-year floodplains adjacent to the Clinch River and Poplar Creek (Fig. 3.3). In addition, the floodplain for Poplar Creek extends up the Mitchell Branch drainage area within the northeastern portion of the site.

3.4.1.4 Wetlands

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

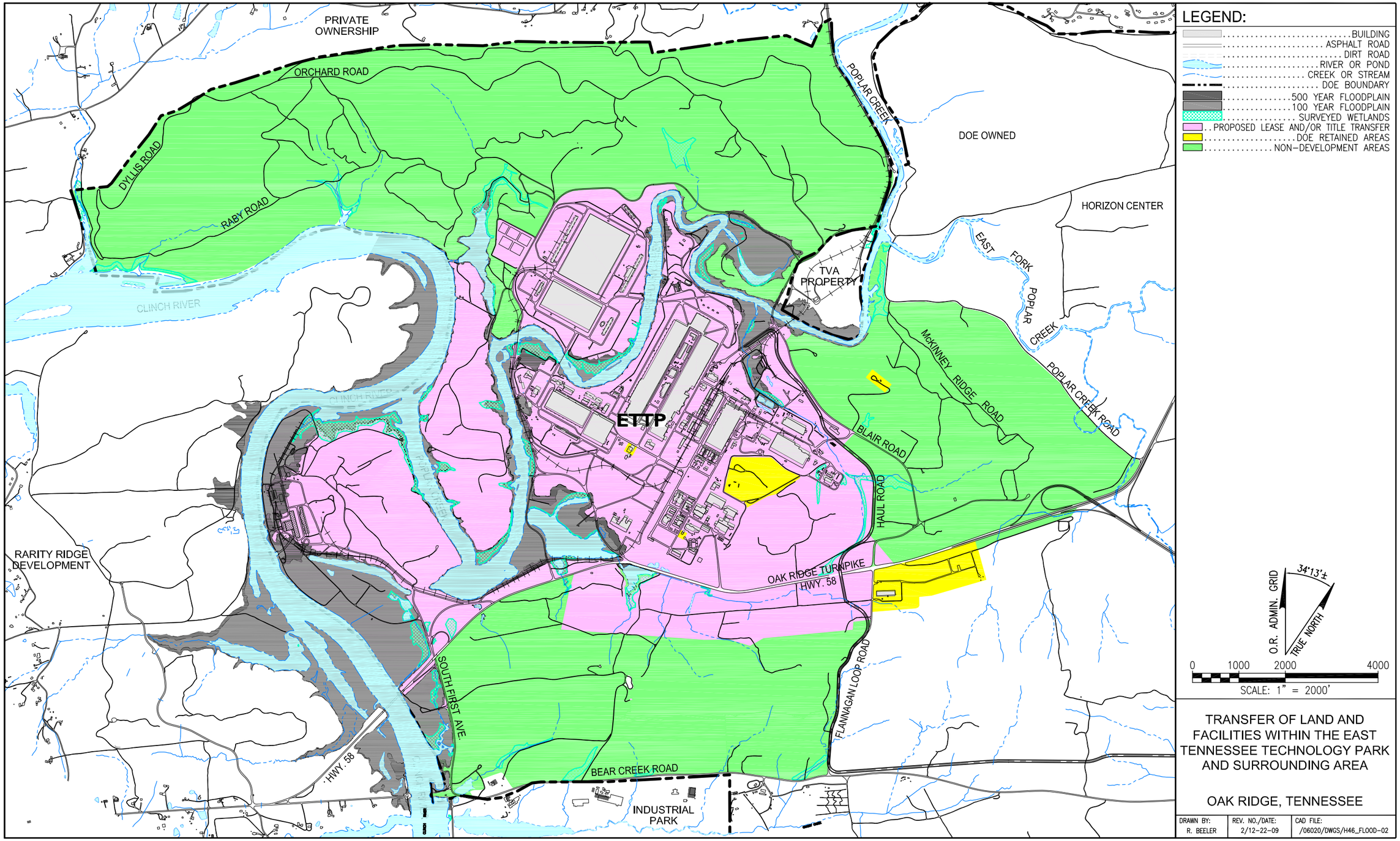

Fig. 3.3. The 100-year and 500-year floodplain and surveyed wetlands in the ETTP area.

soil conditions. Third, site hydrology, meaning the area is inundated or saturated to the surface at some time during the growing season of the prevalent vegetation, must be present (Environmental Laboratory 1987).

Surveys to identify wetlands were conducted in the summer of 1994 in selected areas of the ETTP area (Fig. 3.3). A total of 47 wetland areas that range in size from 0.3 to 10.7 acres were identified in the surveys (Rosensteel and Awl 1995). These wetlands occur in association with springs and seeps along stream bottomlands, in areas of seasonally high groundwater tables and surface water levels on the alluvial islands and floodplains of Poplar Creek and the Clinch River, in association with a beaver dam, and in and adjacent to areas of human impact (including utility line ROWs and channelized streams).

The recent habitat assessment of Parcel ED-3 conducted by MRW Environmental LLC (2009) recorded 10 jurisdictional wetlands totaling approximately 1.6 acres. All of the wetlands identified were classified as slope wetlands with the exception of two. One was considered an isolated depression and the other a lacustrine fringe wetland. The overall size of the wetlands was small, with the average wetland size being 0.16 acre.

3.4.2 Environmental Consequences

3.4.2.1 Proposed action

No impacts to groundwater are anticipated from any construction activities or normal facility operations. Use of groundwater would be prohibited via a lease restriction or condition of the deed for title transfer. The restriction is to ensure the protection of human health by preventing exposure to contaminants that could potentially be present in the groundwater. Impacts to groundwater quality could occur as a result of a fuel or hazardous material spill and subsequent migration of contaminants through the soil profile to the groundwater table. However, it is expected that the quantities of materials with the potential to affect groundwater would be transported or stored on-site in the proper containers and according to all applicable regulations. The use of local, state, or federal permits, safety procedures, spill prevention plans, and spill response plans in accordance with applicable laws would minimize the severity of potential impacts from accidents.

Potential adverse impacts to surface water resources are expected to be minimal. Construction activities would be required to follow the appropriate regulatory process, including obtaining a construction storm water NPDES permit from TDEC. The use of best management practices, including appropriate erosion prevention and sediment control measures, would minimize indirect impacts to adjacent surface waters. The potential for adverse impacts to occur would exist until disturbed areas were stabilized. Work within or near surface waters could also require that an Aquatic Resources Alteration Permit be obtained from TDEC. Spills of fuel and/or hazardous material could also have an adverse impact on surface waters if not controlled or contained.

The addition of new impervious surfaces would increase the rate and volume of storm water runoff within the affected area. Increases in surface water runoff as a result of new construction would be attenuated through the use of temporary or permanent storm water controls, such as detention or retention basins and other structures, and stabilization of disturbed areas through landscaping and vegetation. The use of these measures would also increase groundwater recharge through direct percolation, offsetting the loss of pervious surface due to construction and minimizing downstream effects. Storm water runoff after construction activities are completed and any discharge from facility operations to surface water would be in accordance with limitations established under the applicable TDEC NPDES permit.

New construction within the existing Clinch River and Poplar Creek floodplains is not anticipated. However, any and all construction, which may occur within any floodplain or floodway or that might

affect a floodplain, must comply with applicable federal and state laws with respect to such construction. The potential for, and degree of, potential wetland impacts would depend upon how the future owners and/or occupants develop and use the property. Activities associated with development could have beneficial effects or adverse effects on wetlands. Beneficial impacts would include any actions that would improve the quality of wetlands or actions that would enhance the ability of wetlands to perform wetland functions. Adverse impacts would include any activity that would adversely affect the survival, quality, and natural and beneficial values of wetlands. Effects on wetlands might result from activities occurring directly in wetlands or might result indirectly from activities that occur in areas adjacent to wetlands. The consequences of wetland alteration might last for decades (long-term effects) or be minor enough that wetlands could recover in a few years (short-term effects).

TDEC and the USACE jointly regulate wetlands-related activities. If any portion of transferred property is deemed to be jurisdictional wetlands as determined by the Nashville District USACE, development activities would need to comply with the USACE wetlands construction restrictions contained in 33 *CFR*, Sections 320 through 330, as amended, and any other applicable federal, state, or local wetlands regulations. Work within or near wetlands could also require that an Aquatic Resources Alteration Permit be obtained from TDEC. It would be the responsibility of the new owners and/or occupants to secure these permits prior to initiating work in any wetlands. Permit conditions would stipulate which activities could occur in or around the affected wetlands. Regulatory permits would also specify all required mitigative measures, including potential compensation.

3.4.2.2 Alternative 1

Under Alternative 1, water resource impacts are expected to be similar to those for the proposed action. However, a greater density of heavy industrial development could increase the potential for adverse impacts.

3.4.2.3 Alternative 2

Under Alternative 2, water resource impacts are expected to be similar to those for the proposed action.

3.4.2.4 No action

Under the no action alternative, ongoing and planned reindustrialization and cleanup activities would continue. Potential impacts to groundwater, surface waters, or wetlands are addressed by approved NEPA studies or other applicable regulatory documents.

3.5 ECOLOGICAL RESOURCES

3.5.1 Existing Conditions

3.5.1.1 Vegetation

Vegetation within the fenced industrialized area of ETTP includes a mixture of mowed grasses with a few shrubs and trees (especially around buildings), small areas of mixed tree/shrub/grass associations, or mixed evergreen-deciduous vegetation. Many of the shrubs and trees have been planted as landscaping, although some native species are found in unmowed areas around ponds and along waterways. The Duct Island area and the former K-25 Powerhouse area include planted pine trees, second-growth mixed coniferous-deciduous vegetation, and open areas, particularly with transmission line ROWs (DOE 1997).

A habitat assessment recently conducted for the area identified as Parcel ED-3 identified a total of 15 different plant communities (MRW Environmental LLC 2009). These 15 plant communities can be grouped within the following cover types:

Mixed forestland	Hardwood forest types dominated by oaks and hickories.
Transitional	Secondary early successional sites, often grassland to grassland/shrub mix; generally mowed within utility ROWs.
Pine plantation	Areas of row-planted pine trees of a uniform age.
Urban land	Buildings, parking lots, lawns, and ornamental plantings.

Some of the areas on Parcel ED-3 are in an intermediate stage of succession, whereas others are composed of trees in older age classes that have not been subject to severe disturbance for many years. The steeper portions of the site in the western portion of the parcel have the largest diameter hardwood trees and a composition that reflects little recent disturbance. The lowest portion of the site adjacent to the stream/floodplain/wetland complex supports a mixed hardwood community characteristic of riparian areas. Areas that were affected by the Southern pine beetle, and formerly open areas that have been planted with pines, have undergone normal successional processes. These areas are generally characterized by a dense growth of small-diameter trees or shrubs. The remainder of the site includes areas along roads dominated by planted vegetation (e.g., tall fescue, *Lespedeza* spp.) and the small portion of the parcel that is developed and currently contains offices and parking lots (MRW Environmental LLC 2009).

The remainder of the EA study area consists of relatively undeveloped areas along and adjacent to Blackoak Ridge, Pine Ridge, and McKinney Ridge. These areas are dominated by deciduous forestland, mixed forestland, and to a lesser extent evergreen forestland and transitional areas. The least fragmented of these areas also contains interior forest habitat. Interior forest habitat is defined as a forested area that possesses more than 70% canopy cover with a minimum acreage of 50 contiguous acres (ORNL 2002). Interior forest habitat is important for many forest species, especially neo-tropical migratory songbirds whose populations have been declining.

The occurrence of invasive plants on the ORR has been recognized for many years. About 168 of the 1,100 vascular plants on the ORR are not native. Of these, 54 have been identified as aggressive. Drake et al (2002) identified 18 of these non-native plants that pose the greatest threat for natural areas (NAs) [i.e., ORR habitats with rare plants or wildlife]. Invasive plants on the ORR have spread from old home site plantings, past erosion control efforts, forage enhancement projects, and adjacent farm or residential property. Common exotic species include privet (*Ligustrum* spp.), Nepalese stiltgrass (*Microstegium vimineum*), Japanese honeysuckle (*Lonicera japonica*), kudzu (*Pueraria lobata*), Johnsongrass (*Sorgham halepense*), bushclover (*Lespedeza* spp.), tree of heaven (*Ailanthus altissima*), tall fescue (*Festuca arundinacea*), and periwinkle (*Vinca* spp.).

3.5.1.2 Wildlife

The large, relatively unfragmented area of mature eastern deciduous hardwood forest on the ORR provides a variety of other habitats for numerous wildlife species (Parr and Hughes 2006). The resulting diversity of wildlife species ranges from common species found in urban and suburban areas of eastern Tennessee to species with more restrictive requirements, such as interior forest bird species. The ORR hosts more than 70 species of fish; about 45 species of reptiles and amphibians; more than 200 species of migratory, transient, and resident birds; and more than 30 species of mammals, as well

as innumerable invertebrate species. Current lists of the fish; reptiles, amphibians, and mammals; and birds can be found on the ORR National Environmental Research Park (NERP) website at http://www.esd.ornl.gov/facilities/nerp/data.html.

Limited habitat is available for native animals within the industrialized main ETTP area. These areas host urbanized species that adapt well to disturbance and the presence of humans. These include small rodents, groundhogs (*Marmota monax*), birds such as starlings (*Sturnus vulgaris*), pigeons (*Columba livia*), Canada geese (*Branta canadensis*), and small reptiles. Large wildlife such as white-tailed deer (*Odocoileus virginianus*) are frequently seen in the vicinity. Other common mammals that are present within the lesser-developed areas of the study area include the Virginia opossum (*Didelphis virginiana*), gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), eastern cottontail rabbit (*Sylvilagus floridanus*), and raccoon (*Procyon lotor*).

The recent habitat assessment of Parcel ED-3 conducted by MRW Environmental LLC (2009) observed 40 bird species within the parcel, including year-round residents, short-distance migrants, and neo-tropical migrants. Although the bird species observed on Parcel ED-3 are probably representative of the EA study area, it is likely that numerous species not identified during the assessment are present at varying times of the year (e.g., during migration). Many of the species noted and potential species not documented during the assessment are listed by Partners in Flight (PIF) as being of high priority (scores of 20 or greater) for protection in Tennessee. Examples include the cerulean warbler (*Dendroica cerulean*), wood thrush (*Hylocichla mustelina*), Kentucky warbler (*Oporornis formosus*), and indigo bunting (*Passerina cyanea*).

3.5.1.3 Aquatic resources

Aquatic habitats in and directly adjacent to the EA study area include the Clinch River, Poplar Creek, small streams, and ponds. Section 3.4.1.2 provides a description of these surface waters. Five major biotic communities occur in waters adjacent to the ETTP: phytoplankton, periphyton, zooplankton, benthic macroinvertebrates, and fish.

3.5.1.4 Threatened and endangered species

A list of the animal species of concern that have been reported from the ORR is presented, along with their federal and state status, in Table 3.2.

The state endangered peregrine falcon and the state threatened northern saw-whet owl are only very rare transients. Similarly, several state-listed bird species, such as the anhinga, olive-sided flycatcher, and little blue heron, are currently uncommon migrants or visitors to the ORR; however, the little blue heron is probably increasing in numbers. The cerulean warbler, listed by the state as in need of management, has been recorded during the breeding season; however, this species is not actually known to breed on the ORR. The bald eagle, also listed by the state as in need of management, is increasingly seen in winter and may well begin nesting here within a few years. Others, such as the northern harrier, great egret, and yellow-bellied sapsucker, are migrants or winter residents that do not nest on the ORR. The golden-winged warbler, listed by the state as in need of management, has been sighted once. Barn owls have been known to nest on the ORR in the past. One federal and state threatened species, the spotfin chub (*Cyprinella monacha*), has been sighted and collected in the city of Oak Ridge and is possibly present on the ORR. The Tennessee dace (*Phoxinus tennesseensis*) has been found in some sections of Grassy Creek and other streams on the ORR (DOE 2008).

Table 3.2. Animal species of concern reported from the ORR[a]

Species	Legal status[b]	
	Federal	State
Fish		
Tennessee dace *(Phoxinus tennesseensis)*		NM
Amphibians and reptiles		
Four-toed salamander *(Hemidactylium scutatum)*		NM
Northern pine snake *(Pituophis melanoleucus melanoleucus)*		T
Birds		
Sharp-shinned hawk *(Accipiter striatus)*		NM
Northern saw-whet owl (*Aegolius acadicus*)	MC	T
Anhinga *(Anhinga anhinga)*		NM
Great egret *(Casmerodius alba)*		NM
Northern harrier *(Circus cyaneus)*		NM
Olive-sided flycatcher *(Contopus borealis)*		NM
Cerulean warbler *(Dendroica cerulea)*		NM
Little blue heron (*Egretta caerulea*)		NM
Snowy egret *(Egretta thula)*		NM
Peregrine falcon *(Falco peregrinus[c])*		E
Bald eagle *(Haliaeetus leucocephalus[d])*		NM
Loggerhead shrike *(Lanius ludovicianus)*	MC	NM
Vesper sparrow (*Pooecetes gramineus*)		NM
Yellow-bellied sapsucker *(Sphyrapicus varius)*	MC	NM
Barn owl (*Tyto alba*)		NM
Golden-winged warbler (*Vermivora chrysoptera*)	MC	NM
Mammals		
Gray bat *(Myotis grisescens)*	E	E
Southeastern shrew *(Sorex longirostris)*		NM

[a]Land and surface waters of the Oak Ridge Reservation (ORR) exclusive of the Clinch River, which borders the ORR.
[b]E = endangered, T = threatened, MC = management concern, NM = in need of management.
[c]The Peregrine falcon was federally delisted on August 25, 1999.
[d]The Bald eagle was federally delisted on August 8, 2007.

The northern pine snake (*Pituophis melanoleucus melanoleucus*) and the gray bat (*Myotis grisescens*) are the only federal- and/or state-listed threatened or endangered animals to have been documented as occurring in the vicinity of the EA study area. Tennessee Natural Heritage Inventory Program records document that the northern pine snake has been found within a one-mile radius of Parcel ED-3. A survey was conducted for the northern pine snake, during the recently conducted Parcel ED-3 habitat assessment (MRW Environmental LLC 2009), but none were observed even though potential habitat for the species is present within portions of the parcel. Echolocation calls of the gray bat were identified at Freel's Bend on Melton Hill Lake in 2003, and in 2004 at the K-1007-P1 Pond at ETTP (Harvey and Britzke 2004). In 2006, during a bat survey of four caves on the ORR, an adult male gray bat and two juvenile males were captured (ORNL 2006). In 2007, BHE Environmental Inc. conducted a mist net survey for the Indiana bat and the gray bat within Parcel ED-3. The survey resulted in no captures of either bat species. In 2008, BHE Environmental Inc. conducted an additional survey at four sites within the western portion of the ETTP area that included mist netting and acoustic sampling using Anabat® technology. One potential Indiana bat recording occurred at one location; however, there were no mist net captures or additional recordings for that species during the 2008 survey season. No gray bats were captured or recorded. It should also be noted that no caves are known to exist within the area proposed for lease and/or title transfer.

Listed vascular plant species that currently occur on the ORR are given, along with their status, in Table 3.3. At least five of these sensitive plant species have been identified, or were evaluated as having the potential to exist, in the ETTP vicinity (Fig. 3.4). Spreading false-foxglove (*Aureolaria patula*) has been observed in the K-25 Filtration Plant Wetland (NA 33) and northeast of Parcel ED-3 in the McKinney Ridge Hemlocks (NA 45). Goldenseal (*Hydrastis canadensis*) and ginseng (*Panax quinquifolius*) probably occur on Pine Ridge, south of Parcel ED-3, in Potential Habitat 2 (Water Tank Road Forest). Pink lady-slipper (*Cypripedium acaule*) also has the potential to occur on Pine Ridge in Potential Habitat 2. Shining ladies' tresses (*Spiranthes lucida*) has been positively identified in NA 33 (DOE 1997a). In addition to these species, the assessment of Parcel ED-3 conducted by MRW Environmental LLC (2009) listed the tubercled rein-orchid (*Platanthera flava* var. *herbiola*) as having been documented within a mile radius of the parcel.

Table 3.3. Currently known or previously reported vascular plant species reported from the ORR listed by state or federal agencies

Species	Habitat on ORR	Status code[a]
Spreading false-foxglove *(Aureolaria patula)*	River bluff	FSC, S
Heavy sedge *(Carex gravida)*	Varied	S
Hairy sharp-scaled sedge *(Carex oxylepis var. pubescens[b])*	Shaded wetlands	S
Appalachian bugbane *(Cimicifuga rubifolia)*	River slope	FSC, T
Pink land's-slipper *(Cypripedium acaule)*	Dry to rich woods	E, CE
Tall larkspur *(Delphinium exaltatum)*	Barrens and woods	FSC, E
Northern bush-honeysuckle *(Diervilla lonicera)*	River bluff	T
Branching whitlow-grass *(Draba ramosissima)*	Limestone cliff	S
Nuttall waterweed *(Elodea nuttallii)*	Pond, embayment	S
Mountain witch-alder *(Fothergilla major)*	Woods	T
Golden seal *(Hydrastis canadensis)*	Rich woods	S, CE
Butternut *(Juglans cinerea)*	Slope near stream	FSC, T
Small-head rush *(Juncus brachycephalus)*	Open wetland	S
Canada lily *(Lilium canadense)*	Moist woods	T
Michigan lily *(Lilium michiganense[c])*	Moist woods	T
Fen orchid *(Liparis loeselii)*	Forested wetland	E
Ginseng *(Panax quinquifolius)*	Rich woods	S, CE
Tubercled rein-orchid *(Platanthera flava var. herbiola)*	Forested wetland	T
Push's wild-petunia *(Ruellia purshiana)*	Dry, open woods	S
River bulrush *(Scirpus fluviatilis)*	Wetland	S
Shinning ladies-tresses *(Spiranthes lucida)*	Boggy wetland	T
Northern white cedar *(Thuja occidentalis)*	Rocky river bluffs	S
Three-parted violet *(Viola tripartita var. tripartita)*	Rocky woods	S

[a]FSC = Federal Special Concern; formerly designated as C2. More information needed to determine status, E = endangered in Tennessee, T = threatened in Tennessee, S = special concern in Tennessee, CE = status due to commercial exploitation.
[b]*Carex oxylepis var. pubescens* has not been observed during recent surveys.
[c]*Lilium michiganense* is no longer found on the Oak Ridge Reservation (ORR).

3.5.1.5 Special uses and designations

The Tennessee Wildlife Resources Agency (TWRA) has been granted a license by DOE for the purpose of operating and maintaining TWRA's designated Oak Ridge Wildlife Management Area (ORWMA). The ORWMA provides wildlife management, research, and species protection opportunities on the ORR. A major goal in the management of the deer herd on the ORR is public highway safety in the form of reduced automobile-deer collisions. The ORWMA covers much of the ORR, including much of

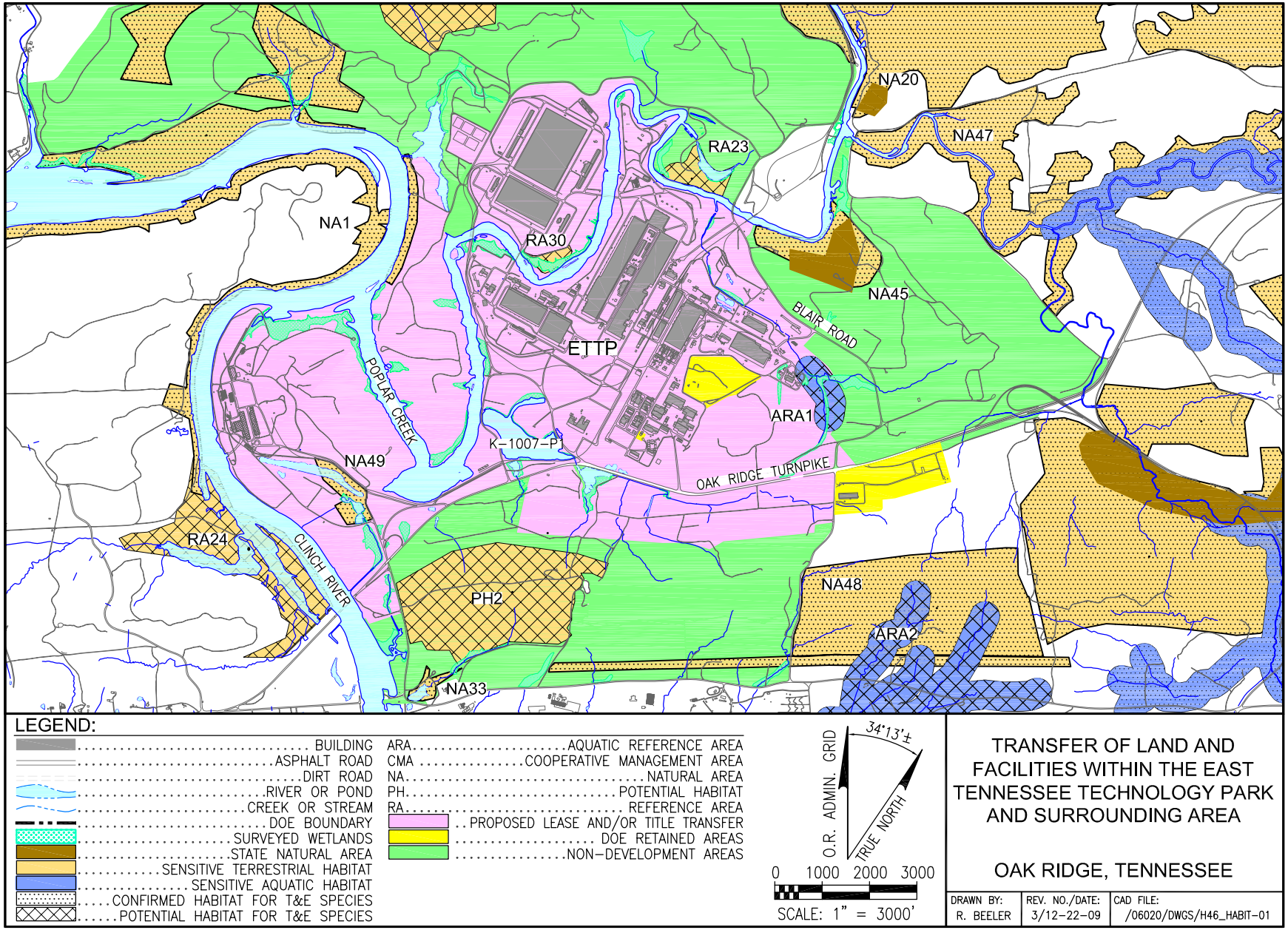

Fig. 3.4. Natural areas and sensitive terrestrial and aquatic habitats in the ETTP area.

the EA study area. Information on the deer and turkey hunts that take place within the ORWMA can be found at http://www.ornl.gov/rmal/huntinfo.htm.

3.5.2 Environmental Consequences

3.5.2.1 Proposed action

Development of conveyed property would have direct or indirect impacts on plants and animals. Construction impacts would include direct mortality or injury to biota and the elimination or further fragmentation of the existing habitat. Potentially affected wildlife and plants are common to the area and some animal species would be able to relocate to other nearby areas that offer the same type of habitat mix. Impacts would be greater in those areas that are relatively undeveloped and have a greater diversity of undisturbed habitat (e.g., portions of the former K-25 Powerhouse Area, Duct Island, and Parcel ED-3). Impacts within the main industrialized portion of ETTP would be negligible because of the heavily disturbed nature of the area and lack of suitable habitat. Direct adverse impacts to aquatic resources would be unlikely.

Adverse impacts, especially to sensitive migratory birds, would be mitigated because DOE has designated large areas containing higher quality habitat including relatively unfragmented native forest as non-development areas. These areas include the Blackoak Ridge and McKinney Ridge areas that are within the BORCE, much of Pine Ridge within the EA study area, and a large piece of land adjacent to the Clinch River near SR 58. Additionally, no designated aquatic or terrestrial sensitive areas, state NAs, or Nature Conservancy biodiversity ranked areas are within the areas identified for potential conveyance (Fig. 3.3).

Minimizing the amount of disturbance and blending development with the natural setting of the area would reduce the impacts to biological resources. Natural habitat around areas of development should be left as a buffer zone between the developed areas and other undeveloped portions of the site. Areas disturbed during development, but not used for new facilities, should be revegetated after construction is completed. The use of native species for revegetation would have a positive impact. Normal facility operations should not have any adverse impacts to wildlife or pose any unacceptable ecological risk.

Potential, marginal habitat exists for Indiana and gray bats within the EA study area. However, mist netting and acoustic sampling conducted in 2007 and 2008 resulted in no captures or positive recordings of either species. Additionally, no caves are known to exist on the property proposed for conveyance. No adverse impacts to either species are expected from the proposed action.

The northern pine snake has been documented as occurring in the vicinity of the EA study area and potential habitat for the species is present within portions of Parcel ED-3. No recent observations of the snake in the area have been reported and no individuals were captured or observed during the 2009 Parcel ED-3 habitat assessment. It is unlikely that the northern pine snake is still present, and no adverse impacts are expected.

The DOE license to TWRA for operating and maintaining the ORWMA would need to be amended to exclude those areas that are conveyed. Also, additional safety zones would need to be posted around the perimeter of any new development areas. This could reduce the number of deer harvested from the ORR by a very small percentage; however, the loss of hunting area could possibly be offset by changes in other management parameters, such as permitting an additional hunt or increasing the harvest quota.

3.5.2.2 Alternative 1

Under Alternative 1, impacts to ecological resources are expected to be similar to those for the proposed action. However, a greater density of heavy industrial development could increase the potential for adverse impacts.

3.5.2.3 Alternative 2

Under Alternative 2, impacts to ecological resource are expected to be similar to those for the proposed action.

3.5.2.4 No action

Although the potential exists for a spill or leak from normal ongoing operations and traffic, which could adversely affect ecological resources within the area, no additional impacts would result from no action.

3.6 CULTURAL RESOURCES

3.6.1 Existing Conditions

Cultural resources are defined as any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. When these resources meet any one of the National Register Criteria for Evaluation (36 *CFR* Part 60.4), they may be termed historic properties and thereby are potentially eligible for inclusion on the National Register of Historic Places (NRHP).

Members of the Jacobs Environmental Restoration (EM) Team conducted a cultural resource survey for the Oak Ridge K-25 Site in 1994. The survey included an architectural survey in the plant area proper and an archaeological survey of the adjacent areas outside the plant boundaries (Morris 1998). The purpose of the architectural survey was to inventory and evaluate the properties in the project area to determine those that might be eligible for inclusion in the NRHP. The archaeological survey evaluated the condition of previously reviewed sites and made recommendations for those sites that may require further investigation. Recommendations were provided to DOE for use in the DOE Cultural Resource Management Plan (CRMP) for the ORR (DOE 2001).

No known prehistoric archaeological resources are known to exist within the area proposed for conveyance. Because of the massive cut and fill operations causing extensive disturbance during the construction of the former K-25 Site, there are likely no intact archaeological sites to be found within the ETTP security fences (Morris 1998). Six prehistoric archaeological sites are located within the EA study area. The sites are located along Poplar Creek and the Clinch River. Four of the sites have been determined to be eligible for inclusion in the NRHP (DOE 2001).

Based on the architectural survey conducted in 1994, the Jacobs EM Team, in conjunction with the DOE-ORO and ETTP staff and in consultation with the Site Historical Preservation Office (SHPO), concluded that the following properties at the ETTP are eligible for inclusion in the NRHP: (1) the ETTP Main Plant Historic District, which includes facilities within the main plant area and contains 120 contributing structures and 37 noncontributing structures, and (2) 11 structures that are not contiguous with the historic district (DOE 2001). Since the CRMP was issued, several of these structures

have been demolished or are in the process of being demolished as part of the ongoing environmental restoration activities at ETTP.

Six cemeteries are located within the study area. These include the Gallaher and Welcker Cemeteries near the former K-25 Powerhouse Area; Wheat Community African Burial Ground (formerly #2 Slave Cemetery) near SR 58, south of the visitor's overlook; George Jones Memorial Cemetery located within the Wheat Community Historic District; and the Ellis and Shelton Cemeteries located near the Blair Road crossing of Poplar Creek.

The Wheat Community Historic District, located adjacent to Blair Road on the north side of SR 58, is also located within the EA study area. Named for its first postmaster, Frank Wheat, the 19th-century community was a thriving center of local and regional trade. A 1942 inventory recorded a Masonic lodge, Robinson's School, Wheat High School (formerly Roane College and Poplar Creek Seminary), Adam's Store, a post office, and several frame residences. The community also included a Methodist church, Mt. Zion Baptist Church, Cumberland Presbyterian Church, and George Jones Memorial Baptist Church (the only standing building from the Wheat Community). The Wheat Community properties were purchased by the federal government in late 1942 as part of the Manhattan Project.

The Parcel ED-3 area was recently surveyed (2008 and 2009) for archaeological resources (New South Associates 2009). The objectives of the surveys were to identify any archaeological remains associated with the Happy Valley Worker Camp (Happy Valley) and any additional sites on the property, and to assess these sites for National Register eligibility. Happy Valley was a temporary worker housing area occupied from 1943 to 1947 during the construction of the K-25 Oak Ridge Gaseous Diffusion Plant. Happy Valley accommodated a population of approximately 15,000. The temporary town included hutments, central washing facilities, a mess hall, barracks, trailers, a school, commercial center, theater, three recreation halls, and other buildings (Gosling 1990, Hewlett and Anderson 1962). Demolition of the site began in 1947, and by the mid-1950s all buildings within the area had been torn down. Demolition of the buildings consisted of salvaging usable material and bulldozing or burning the remainder of the material in place. During the two surveys a total of 13 artifact concentrations, 14 isolated finds, and 75 structural features were located. Due to the Happy Valley's strong association with the Manhattan Project, the site is recommended eligible for the NRHP.

3.6.2 Environmental Consequences

3.6.2.1 Proposed action

Other than the Happy Valley area within Parcel ED-3, no other prehistoric or historic archaeological resources would be affected by the proposed action. Known prehistoric sites located along Poplar Creek and the Clinch River are located in DOE-designated non-development areas or they would be protected from development through lease and/or deed restrictions based on consultation with the Tennessee SHPO. Likewise, the six cemeteries located within the EA study area would also be protected from any future development activities. A portion of the Parcel ED-3 area is directly adjacent to the Wheat Historic District, but development would not have any direct adverse impacts on the area, and the view of the George Jones Memorial Baptist Church would not be obscured.

DOE has determined, in accordance with Sect. 800.3 of the Advisory Council on Historic Preservation (Council) regulations for the protection of historic properties, that the proposed action (1) is an undertaking, as defined in 36 *CFR* 800.1(y); and (2) is the type of activity that has the potential to cause effects on historic properties. In accordance with Sect. 800.8(c) of the Council's regulations, DOE has notified the State and the Council of the proposed undertaking. The Tennessee SHPO responded to DOE's notification letter and is completing its review of the recently completed archaeological survey

report (New South Associates 2009). A copy of the DOE notification letter and the response from the State is included in Appendix A.

3.6.2.2 Alternative 1

Potential cultural resource impacts, under Alternative 1, would be similar to those described for the proposed action.

3.6.2.3 Alternative 2

Potential cultural resource impacts, under Alternative 2, would be similar to those described for the proposed action.

3.6.2.4 No action

Under the no action alternative, there would be no changes or additional impacts to cultural resources within the EA study area beyond those being addressed for current activities.

3.7 SOCIOECONOMICS

3.7.1 Existing Conditions

The ROI for this analysis includes Anderson, Knox, Loudon, and Roane counties. The region includes the cities of Clinton, Oak Ridge, Knoxville, Loudon, Lenoir City, Harriman, and Kingston.

3.7.1.1 Demographic and economic characteristics

Table 3.4 summarizes population, per capita income, and wage and salary employment from 2002 to 2007. Population has increased slightly over the 6-year period, with Roane County accounting for most of the growth. Employment for the region increased from 363,519 in 2002 to 403,993 in 2007. Per capita income grew from $28,418 to $34,333 over the same period, generating a total regional income of $20.4 billion in 2007 (Bureau of Economic Analysis 2009a).

Table 3.5 shows the distribution of minority populations in the city of Oak Ridge. For the purposes of this analysis, a minority population consists of any census tract in which minority representation is greater than the national average of 30.7%. Minorities include individuals classified by the U.S. Bureau of the Census as Black or African-American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, and Hispanic or Latino, and those classified under “Two or more races.” This provides a conservative estimate consistent with the Office of Management and Budget (OMB) and Census guidance (Census 2003). Hispanics may be of any race and are excluded from the totals for individual races to avoid double counting.

As of the 2000 Census, minorities represented 14.0% of the total Oak Ridge population, compared to the national average of 30.7%. Of the Census tracts surrounding the ORR, only the Scarboro Community in tract 201 included a minority population greater than the national average. African-Americans comprised 29.6% of the population in tract 201, and other minorities (including two or more races) comprised 10.5%. For all other tracts in the area, minorities comprised 20% or less of the population. For comparison, minorities represented 21.0% of the population in Tennessee (Bureau of the Census 2000).

Table 3.4. Demographic and economic characteristics: Oak Ridge Region of Influence

County	2002	2003	2004	2005	2006	2007	Annual growth 2002–2007 (%)
Anderson							
Population	71,340	71,365	71,319	71,725	72,735	73,246	0.53%
Per capita income ($)	26,919	27,755	28,135	29,010	30,165	31,077	2.91%
Total employment	50,601	51,904	52,021	52,707	52,987	52,906	0.89%
Knox							
Population	392,723	398,571	402,830	408,809	416,014	423,603	1.53%
Per capita income ($)	29,488	29,908	31,314	32,430	33,996	35,491	3.78%
Total employment	275,868	277,453	289,337	294,496	301,529	309,116	2.30%
Loudon							
Population	40,732	41,389	42,115	43,194	44,281	45,363	1.85%
Per capita income ($)	26,396	27,647	29,746	30,697	32,037	33,543	3.94%
Total employment	16,075	17,253	17,857	18,567	19,092	19,726	2.72%
Roane							
Population	52,099	52,410	52,633	52,569	53,040	53,306	0.46%
Per capita income ($)	23,994	24,876	26,353	27,852	29,144	30,278	4.76%
Total employment	20,975	21,023	21,141	21,741	22,126	22,245	1.18%
Region Totals							
Population	556,894	563,735	568,897	576,297	586,070	595,518	1.35%
Per capita income ($)	28,418	29,001	30,341	31,458	32,935	34,333	3.85%
Total employment	363,519	367,633	380,356	387,511	395,734	403,993	2.13%

***Source*:** Bureau of Economic Analysis 2009a.

Table 3.5. Race or ethnic distribution for Oak Ridge City population: 2000

Race or ethnic group	Number	Percent
Not Hispanic or Latino		
White	23,517	85.9
Black or African American	2,229	8.1
American Indian or Alaska Native	81	0.3
Asian	568	2.1
Native Hawaiian and Other Pacific Islander	6	0.0
Some other race	30	0.1
Two or more races	427	1.6
Hispanic or Latino[a]	529	1.9
Total	27,387	100.0

[a]May be of any race. Those classified as Hispanic or Latino are excluded from other categories to avoid double counting.

Source: Bureau of the Census 2000.

The Census also provides annual estimates of population by race and ethnic group in the years between decennial censuses. According to these estimates for 2007, the demographic characteristics have changed only slightly in the Oak Ridge ROI. Minorities represent 8.5% of the population in Anderson County, 14.2% in Knox County, 7.3% in Loudon County, and 5.7% in Roane County (Census 2009a). Figures for 2007 are the most recent estimates available. No federally recognized Native American groups live within 80 km (50 miles) of the proposed site.

According to the 2000 Census, 12.4% of the U. S. population and 13.5% of the Tennessee population had incomes below the poverty level in 1999 (Census 2000). In this analysis, a low-income population consists of any census tract in which the proportion of individuals below the poverty level exceeds the national average. Within the ROI, 13.1% of the population in Anderson County had incomes below the poverty level in 1999, while the proportion was 13.9% in Roane County, 12.6% in Knox County, and 10.0% in Loudon County. At the tract level, there were only two low-income populations located near the ORR, in census tracts 201 (15.8% below poverty level) and 205 (27.9%). Tract 201 roughly corresponds to the Scarboro community, and tract 205 includes the area between Oak Ridge Turnpike and West Outer Drive, bounded on the west by Louisiana Avenue and on the east by Highland Avenue and Robertsville Road. In other nearby census tracts, the percentages ranged from 12.1% in tract 204 to 1.9% in tract 301 (Census 2000). Based on American Community Survey results for 2005–2007, the Census estimates that 11.6% of the residents of the city of Oak Ridge had incomes below the poverty level during that period (Census 2009b).

3.7.1.2 Fiscal characteristics

Oak Ridge City general fund revenues and expenditures for FY 2008 and anticipated revenues and expenditures for FY 2009 are presented in Table 3.6. The general fund supports the ongoing operations of local governments as well as community services, such as police protection and parks and recreation. The largest revenue sources have traditionally been local taxes (which include taxes on property, real estate, hotel/motel receipts, and sales) and intergovernmental transfers from the federal or state government. Roughly 95% of the 2008 general fund revenue came from these combined sources (City of Oak Ridge 2009). For FY 2009 and FY 2010, the property tax rate is $2.77 per $100 of assessed value. The assessment rate is 40% for industrial and commercial property and 25% for residential property (City of Oak Ridge 2008, 2009). The city also receives a payment-in-lieu-of-tax (PILT) for ORR acreage that falls within the city limits. The payment is based on its value as farmland, and assessed at the farmland rate of 25% (City of Oak Ridge 2008). In 2008, the city expected to receive a payment of approximately $1,415,000 (City of Oak Ridge 2008).

Table 3.6. City of Oak Ridge revenues and expenditures, FY 2008 and budgeted FY 2009 ($)

	2008 Actual	2009 Budgeted
Revenues		
Taxes	32,169,500	32,957,157
Licenses and permits	271,002	223,000
Intergovernmental revenues	3,483,369	3,423,300
Charges for services	367,508	318,000
Fines and forfeitures	347,436	338,000
Other revenues	881,694	664,000
Total revenues	*37,520,509*	*37,923,457*
Expenditures and other financing		
Expenditures	(17,341,556)	(18,064,507)
Other financing uses[a]	(18,554,441)	(19,192,371)
Total expenditures and other financing	*(35,895,997)*	*(37,256,878)*

[a]Includes items such as capital projects fund, solid waste fund, economic diversification fund, debt service, and schools.

Source: City of Oak Ridge 2009.

FY = Fiscal year.

3.7.2 Environmental Consequences

This section addresses the potential socioeconomic impacts of the proposed action and its alternatives. Socioeconomic impacts are not only important in themselves, but also for the secondary environmental or distributional effects they may have. For example, economic growth can sometimes attract enough new people to an area that it places pressure on housing, schools, water supply, and other infrastructure. Environmental effects of any new construction, facility improvements required, or infrastructure overloads that result from such a population increase should also be evaluated as induced effects of the development. For this reason, the analysis below uses bounding assumptions to identify the range of potential impacts. The purpose here is not to forecast economic activity but to make sure that reasonably foreseeable indirect effects are appropriately identified and considered.

3.7.2.1 Proposed action

Environmental Justice

Executive Order 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low Income Populations*, requires agencies to identify and address disproportionately high and adverse human health or environmental effects its activities may have on minority and low-income populations. Although current assumptions suggest that there would be no high and adverse human health or environmental impacts, the actual circumstances would depend on specific choices made at the time of development. As discussed above in Sect. 3.7.1, of the census tracts near the proposed site, only tract 201 includes a higher proportion of minorities in the population than the national average. Other tracts are also located closer to the proposed site, and in the event that adverse impacts occur, they are likely to have at least as much effect on these closer populations as on the residents of tract 201.

Similarly, some low-income populations are located near the proposed site. However, these populations are scattered among higher income populations. Any adverse impacts that affect the low-income tracts are also likely to affect the higher income populations. Therefore, any adverse health or environmental impacts that may occur are not expected to have a disproportionate effect on low-income or minority populations.

Employment and Income

In the 1997 EA, it was estimated that developing the proposed acreage could generate up to 2,500 new, direct jobs over the 13-year period from 1997 to 2010 (DOE 1997). Since the current proposed action incorporates only small changes in acreage and in the parcels considered, it was determined that this estimate was still valid as a bounding assumption (Biloski 2009). The 1997 EA also estimated that the new, direct employment could generate up to 3,300 indirect jobs to provide the goods and services demanded by the new workers and the enterprises that employ them. Under these assumptions, as an upper bound the proposed action could create a total of 5,800 new jobs, or an increase of 1.4% in employment for the ROI compared to 2007. Over 13 years, this represents an annual growth rate of roughly 0.1%, well within the historic growth rate for the region. Based on experience to date, actual development may be spread over a longer period of time, resulting in a smaller impact in any one year.

The impact on regional income is expected to be similar to the employment impact. Assuming that the new employees earned the 2007 average wage for Tennessee of $38,467, then regional income would increase by $223 million (5,800 × 38,467), a 1.1% increase compared to 2007. The actual impact on income will depend on the final mix of industries and their individual wage levels. For example, the state

average manufacturing wage in 2007 was higher than the state average at $46,310, while the average wage for accommodation and food services is much lower at $16,732.

Population

Based on the limited employment impact, no change in population is anticipated as a result of the proposed action.

Fiscal Impacts

There are two potential changes in local revenue as a result of development: (1) additional tax revenue as property or improvements on property become taxable, and (2) loss of DOE PILT on any acreage transferred. While DOE owns the land and buildings, they are not taxable, but leasehold improvements made by tenants are taxable (Young 2002). With title transfer, facilities could be sold and both the property and improvements by the new owners would be subject to property and sales taxes. However, the value of improvements is usually much greater than the land itself, and therefore tax revenues are likely to be similar whether the land is leased or transferred (ORNL 2002). Moreover, only land eventually sold to private corporations is likely to become taxable; transfer to Heritage Center LLC or other nonprofit entity may not change the property's tax status (Young 2002). As a result, the net change in revenue to the city and Roane County would be the tax collected on land and improvements sold to for-profit organizations, minus any lost revenues from discontinued PILT.

The total amount of land that could be sold is unknown at this time. Nationwide experience with Brownfields suggests that even after remediation, these sites are more difficult to market and develop than comparable sites with no history of contamination (United States Conference of Mayors 2000). The Conference of Mayors defines a Brownfield site as one in which redevelopment is complicated by either real or perceived environmental contamination. The amount of land sold would depend on the final size of the parcels transferred, the proportion of the land considered developable after remediation, and on other market factors.

For the purposes of this analysis, the assumptions developed for the ETTP EA Addendum in 2003 are used, which assumed that approximately 1,600 acres would be transferred. The analysis also assumed that the entire 1,600 acres would be transferred at one time. However, the actual transfers would likely be phased over a yet to be determined time period. If Heritage Center LLC or a similar non-profit entity retains ownership of all of the land and existing buildings, then there would be no change in the tax status, and the net result of the transfer is the annual loss of the PILT. For 1,600 acres, this would amount to roughly $71,500 in 2009 (1,600 acres valued at $6,450/acre × 25% assessment rate × $2.77 per $100 assessed value) [Finn 2009]. The amount for Roane County would be approximately $58,600 at the current tax rate of $2.27 per $100 assessed value (City of Oak Ridge 2009). It should be noted that tax revenue would be generated on improvements made to the property regardless of whether it is leased or the title is transferred.

The analysis also assumed that about 500 out of the 1,600 acres potentially transferred would eventually be suitable for development. The city and county would collect maximum tax revenue if all of the 500 acres is eventually sold to tax-paying corporations. Unimproved Oak Ridge industrial land has been valued from $17,000 to $35,000 per acre (FLUOR 2001). The total land value for 500 acres would then fall between $8.5 million and $17.5 million, and the assessed value between $3.4 million and $7.0 million. At $2.77 per $100 assessed value that would result in roughly $94,000 to $194,000 in annual tax revenue for the city of Oak Ridge. Subtracting the $71,500 in lost revenue from discontinued DOE PILT suggests that net new annual city revenue could range from $22,500 to $112,500 ($94,000 minus $71,500 to $194,000 minus $71,500).

Using the same assumptions, Roane County could receive $77,200 to $158,900 in annual tax revenue. Subtracting $58,600 in lost PILT revenues suggests that net new annual revenue for Roane County could range from $18,600 to $100,300. Any improvements made to the land would further increase the net gain to both the city and the county. The Oak Ridge National Laboratory (ORNL) land use planning document estimated that the value of improved industrial land can range from 8 to 15 times its unimproved value, and commercial land values are likely to be much higher (ORNL 2002).

In addition, commercial development can also increase local government revenues through sales taxes, although the size of those revenues depends on too many factors to predict in advance. Actual revenues would depend on the acreage transferred, the amount of property sold, the types of improvements made, and on future land valuations, assessments, and tax rates.

3.7.2.2 Alternative 1

Under Alternative 1, employment impacts are expected to be similar to those for the proposed action. Since manufacturing wages are higher than the Tennessee average wage, income impacts may be slightly higher than for the proposed alternative, but the total change in income would still be within the historic growth rate for the region. Property tax impacts would be similar to those discussed for the proposed action. Because purchases of raw materials for manufacturing are usually not taxable, sales tax revenues would be limited.

3.7.2.3 Alternative 2

Under Alternative 2, employment impacts are expected to be similar to those for the proposed action. Income impacts will depend on the actual mix of businesses that locate in the site, since wages for the potential businesses vary widely. For example, the average annual wage for Professional, scientific, and technical services in Tennessee is $58,153, compared to $28,703 for Administrative and waste services, and $16,732 for Accommodation and food services.

Assuming all development efforts succeed, fiscal impacts may be somewhat greater for unified business development than for the proposed action because both property tax and sales tax revenues are likely to be greater. Historically, property values in Oak Ridge have been higher for commercial property, ranging from $50,000 to over $100,000 per acre. The total land value for 500 acres would then fall between $25 million and $50 million, and the assessed value between $6.25 million and $12.5 million. At $2.77 per $100 assessed value that would result in roughly $173,000 to $346,000 in annual tax revenue for the city of Oak Ridge. Subtracting the $71,500 in lost revenue from discontinued DOE PILT suggests that net new annual city revenue could range from $101,500 to $274,500 ($173,000 minus $71,500 to $346,000 minus $71,500).

Using the same assumptions, Roane County could receive approximately $141,900 to $283,800 in annual tax revenue. Subtracting $58,600 in lost PILT revenues suggests that net new annual revenue for Roane County could range from $83,300 to $225,200. Any improvements made to the land would further increase the net gain to both the city and the county. The ORNL land use planning document estimated that the value of improved industrial land can range from 8 to 15 times its unimproved value, and commercial land values are likely to be much higher (ORNL 2002).

Unified business development may also include a higher proportion of retail establishments, with some associated increase in sales tax revenue. Actual revenues would depend on the acreage developed, the amount of property sold, the types of improvements made, actual mix of businesses, and on future land valuations, assessments, and tax rates.

3.7.2.4 No action

Under the no action alternative, no change in employment, income, population or local government revenues is anticipated beyond that which is generated through the current and planned reindustrialization activities.

3.8 INFRASTRUCTURE

3.8.1 Existing Conditions

3.8.1.1 Utilities

Most of the developed area of the ETTP has available utilities or existing utility infrastructure is located in the nearby vicinity.

Electricity and Natural Gas

TVA generates electric power for the region. TVA presently transmits power directly to the ETTP, but most residences and businesses receive their power through distribution companies that purchase wholesale power from TVA. The city of Oak Ridge operates its own electric utility, providing electricity to about 15,000 metered customers. The electrical lines that run through Parcel ED-3 are owned by the city of Oak Ridge. Peak system demand in the city is approximately 120 megavolt-amperes (MVA), while the system's base capacity is just over 200 MVA.

Natural gas is distributed to houses and other buildings in the region by a number of different companies, including Empiregas, Inc., of Clinton; Harriman Utility Board; Oak Ridge Utility District; and the Powell–Clinch Utility District. East Tennessee Natural Gas Company is the major pipeline transmission system for the area. The Oak Ridge Utility District has a right-of-easement with DOE for a 6-in. natural gas pipeline from the K-720-A Gas Metering Station on the East Tennessee Natural Gas Company's transmission line (east of Flannagan's Loop Road) that parallels the south side of SR 58, within Parcel ED-3, and then runs underneath the Clinch River.

Potable Water

Water supply for the Oak Ridge area is obtained from the Clinch River. DOE transferred ownership of its water treatment plant to the city of Oak Ridge effective May 1, 2000. This plant is located on Pine Ridge near the Y-12 Complex. The plant produces about 12 million gallons per day (MGD) and has the capacity to produce up to 28 MGD.

The ETTP has a pumping station (K-1513) on the Clinch River located at the west end of Bear Creek Road. The sanitary water system also includes a filtration and treatment plant (K-1515), water storage tanks (K-1529 and K-1530), and about 19 miles of water distribution pipe (MMES 1994). The ETTP water treatment plant is currently producing 800,000 gallons per day (GPD) to 1.4 MGD of potable water, with an average production of about 1.2 MGD. Its capacity is estimated at 4.1 MGD (Bowman 1999). The water distribution system is made up of 10-in. and 12-in. cast-iron mains. The water distribution system is in fair condition although it is more than 45 years old. DOE transferred these facilities to the city of Oak Ridge in May 2008. The city also owns the water main running through Parcel ED-3.

Wastewater Treatment

Facilities for the treatment of domestic and industrial wastewater are available at the city of Oak Ridge Publicly Owned Treatment Works (POTW) and the package wastewater treatment plant located at the Rarity Ridge development. The sewage treatment plant that was located at ETTP has been shut down and is no longer in operation. Design capacity at the city of Oak Ridge POTW is about 5.9 MGD. The plant currently processes between 5.1 and 5.3 MGD (Currier 1999). The city recently completed upgrading the POTW to increase the capacity to about 30 MGD. CROET, in May 2008, installed a new lift station and force main at ETTP to accommodate other nearby areas (i.e., the ETTP and Parcel ED-3) and send wastewater from ETTP to the Rarity Ridge plant.

3.8.1.2 Transportation

Major transportation routes to the ORR are via two interstate highways, I-40 and I-75, and U. S. highways 11, 25W, and 70. I-40 is located almost directly west of the ETTP site.

Motorists utilize four roadway segments within and near the EA study area:

- SR 95 (Oak Ridge Turnpike) from the SR 95/58 interchange to Wisconsin Avenue,
- SR 95 (White Wing Road) from the SR 95/58 interchange to Bear Creek Road,
- SR 327 (Blair Road) from Poplar Creek Road to SR 58, and
- SR 58 from Gallaher Road to the SR 95/58 interchange.

Annual average daily traffic for roadways near the study site ranges from 3,280 to 12,050 vehicles a day, which is considered light compared to other roadways in Oak Ridge (which range from 17,040 to 30,360 vehicles a day). The majority of the ETTP commuting traffic (88%) comes from the east on SR 58, and the remaining 12% comes from the west. Of the east side traffic, 62% comes from the Oak Ridge Turnpike, 8% comes from Blair Road, and 18% comes from SR 95 (White Wing Road) (DOE 1997). SR 95 is presently being widened from the intersection with SR 62 (Illinois Avenue) to near Westover Drive. Widening of SR 95 from near Wisconsin Avenue west to the SR95/58 interchange is also proposed to occur.

3.8.2 Environmental Consequences

3.8.2.1 Proposed action

Utilities

Under the proposed action, utility impacts would be expected to be minimal. Commercial or industrial facilities could connect to the existing utility systems that serve the ETTP and the surrounding area. Excess service capacity exists at the city of Oak Ridge facilities and is large enough to accommodate additional development within the EA study area. Construction of new utility infrastructure would be limited. Electricity would be purchased from the city of Oak Ridge, and natural gas would be purchased from the Oak Ridge Utility District. Telecommunication services could be provided from the fiber-optic system that serves the ETTP. Existing water and sewer lines currently exist along SR 58. In the long-term, the city of Oak Ridge, along with other public and private organizations, is working on extending utility service to the western portion of the city corporate limits to serve proposed future developments.

Transportation

The transport of materials and equipment associated with any construction activities to accomplish the development of any property that is conveyed would be over regional and local roadways to the site. Additionally, the development would be phased over time, and no adverse impacts are expected. The additional amount of vehicle and truck traffic from operations associated with the new development would have a negligible effect on existing traffic since the affected roadways presently have sufficient design capacity. It should be noted that although commercial and industrial development for the ETTP area could slightly increase traffic, the volume of traffic is not expected to exceed historic traffic volumes that occurred between 1993–1996 during large employment periods at the ETTP. A minor increase in the amount of traffic should also not substantially increase the chance of accidents occurring. Installing turn lanes, additional traffic signals, and frontage roads could mitigate these types of potential impacts, if necessary.

3.8.2.2 Alternative 1

Potential utility and transportation impacts under Alternative 1 are expected to be similar to those described for the proposed action. However, since this alternative assumes greater industrial development, it is assumed that utility demand and use would be greater and the percentage of additional truck traffic would likely be greater.

3.8.2.3 Alternative 2

Utility impacts under Alternative 2 are expected to be similar to those described for the proposed action. However, since industrial uses would not be permitted under the City of Oak Ridge Zoning Ordinance for UB-2, Unified General Business Districts, potential utility demand and use are assumed to be less. Transportation impacts under Alternative 2 are expected to be similar to those described for the proposed action.

3.8.2.4 No action

There would be no changes to utilities under the no action alternative beyond the utility easements and improvements that are taking place as part of ongoing and planned reindustrialization activities. There would be little change from the baseline level of vehicle trips or the potential for accidents involving vehicles. At the baseline level of activity, traffic volume is considered to be within the existing transportation infrastructure's capacity.

3.9 WASTE MANAGEMENT

3.9.1 Existing Conditions

Waste management from ongoing environmental restoration activities at ETTP is managed by the DOE-ORO EM Program and Bechtel Jacobs Company LLC. Waste management facilities at ETTP include the Toxic Substances Control Act of 1976 (TSCA) Incinerator and the Central Neutralization Facility (CNF). Additional information on the TSCA Incinerator, CNF, and the ongoing environmental restoration and waste management activities at ETTP can be found in the 2007 ORR ASER (DOE 2008) and the FY 2008 Cleanup Progress Report (DOE 2009). Tenants operating at the Heritage Center, within the ETTP, contract with private waste haulers for solid and hazardous waste disposal (e.g., Waste Management).

The major waste types that would be generated from the proposed action and alternatives are described below.

Sanitary/industrial solid wastes consist of paper, garbage, wood, metal, glass, plastic, construction and demolition (C&D) debris, food wastes, sludge from water and air treatment, and other special wastes. The Solid Waste Management Program in Tennessee was implemented in 1971 with the promulgation of the Regulations Governing Solid Waste Processing and Disposal. Within the state of Tennessee, there are four distinct classes of solid waste landfills that are permitted by TDEC for disposal of various types of solid waste generated within the state. The four classes of landfills and wastes that may be disposed of within the various classes of landfills include:

- Class I landfills – municipal solid waste, household waste, shredded/waste tires, etc.;
- Class II landfills – industrial waste;
- Class III landfills – farming wastes, landscaping and land clearing wastes, etc.; and
- Class IV landfills – C&D waste.

Solid waste landfills are governed by federal and state environmental regulations that are found at 40 *CFR* Part 258 (governs only municipal solid waste landfills) and Rules of the TDEC Chap. 1200-1-7. These provisions specify the operational and permit requirements for disposal of solid waste within the state of Tennessee. The nearest commercial Class I landfill to the ORR is the Chestnut Ridge Landfill and Recycling Center in Anderson County operated by Waste Management, Inc., of Tennessee.

Hazardous waste is a waste or surplus material with negligible value that may cause or contribute to an increase in mortality or to an increase in serious irreversible illness, or pose a substantial present or potential hazard to human health or the environment when improperly stored, treated, disposed of, or transported. These wastes are regulated pursuant to RCRA. Hazardous wastes are defined and regulated by RCRA regulations by specific source lists, non-specific source lists, characteristic hazards, and discarded commercial chemical product lists. The regulations generally divide hazardous wastes into two categories: characteristic hazardous wastes and listed hazardous wastes. Characteristic hazardous wastes are those that exhibit the characteristics of ignitability, corrosivity, reactivity, or toxicity, as defined in 40 *CFR* 261, Subpart C. Listed hazardous wastes are those found within the specific waste listings provided at 40 *CFR* Part 261, Subpart D. Tennessee's Hazardous Waste Program is managed by TDEC's Division of Solid and Hazardous Waste Management.

Low-level radioactive waste (LLW) is waste that contains radioactivity but is not classified as high-level waste, TRU waste, spent nuclear fuel, or byproduct material, as defined by DOE Order 435.1, "Radioactive Waste Management." LLW does not contain hazardous waste as regulated by RCRA and as defined in 40 *CFR* 260–268 (or state of Tennessee equivalent standards). Some polychlorinated biphenyl (PCB)-contaminated or PCB-detectable waste as regulated by TSCA, and as defined in 40 *CFR* 761, may be accepted and handled as LLW. DOE Order 435.1 and the Atomic Energy Act, as amended, provide the primary regulatory guidance and requirements for the management of LLW.

3.9.2 Environmental Consequences

3.9.2.1 Proposed action

Specific details about the wastes that may be generated by companies locating on property that is conveyed and developed are not available; however, the types of uses that are anticipated would produce wastes typical of other industrial, research, and office park operations in the region. These wastes would be handled by the individual companies or by contracted waste management services providers and would

not enter into existing ETTP waste management systems, except for possibly wastewater. It is also expected that the companies would practice waste minimization, source reduction, recycling, etc.

Quantities of solid, non-hazardous waste generated would most likely be recycled or transported to the Chestnut Ridge Landfill for disposal. This solid waste could also include C&D debris such as construction materials for buildings, concrete and asphalt rubble, and land-clearing debris. It is anticipated that only minor quantities of hazardous waste and hazardous materials would be handled or generated. In the event that individual companies generate sufficient quantities to require reporting status, they would likely qualify as conditionally exempt, small-quantity generators. These wastes would be handled and stored according to applicable state and federal regulations and transported to an approved, licensed, off-site facility for further treatment and/or disposal. It is also possible that some companies may stabilize, test, and treat these wastes on-site as part of their operations. Petroleum, oils, lubricants, and chemicals would be managed in accordance with permits or licenses issued by the state of Tennessee, and in a way that would minimize the potential for contamination and adverse environmental impacts.

For NRC-licensed facilities, radioactive materials and wastes would be handled according to the conditions of the license. This might include returning the materials and waste to the manufacturer, when required, or stabilizing, testing, and transporting them to a licensed off-site facility for disposal. Persons who transport radioactive waste or have radioactive waste transported into or within the state of Tennessee to a disposal/processing facility are required to obtain a License-for-Delivery from the TDEC Division of Radiological Health. Persons whose activities result in the generation of radioactive waste have the primary responsibility to ensure that a License-for-Delivery is obtained.

Impacts from accidental spills would be addressed by individual operating entities through the use of safety procedures and spill prevention plans. If required by state/federal law, companies locating within the development would have a spill prevention, control, and countermeasures plan and/or an emergency response plan, should a release of hazardous materials (to any environmental medium—air, surface water, groundwater, or soils) occur.

3.9.2.2 Alternative 1

Potential waste management impacts under Alternative 1 are expected to be similar to those described for the proposed action. However, since this alternative assumes greater industrial development, the amount of waste generated would likely be greater.

3.9.2.3 Alternative 2

Potential waste management impacts under Alternative 2 are expected to be similar to those described for the proposed action. However, since industrial uses are not permitted under the City of Oak Ridge Zoning Ordinance for UB-2, Unified General Business Districts, the amount of waste generated would likely be less, especially the generation of hazardous and LLW.

3.9.2.4 No action

Under the no action alternative, there would be no waste management impacts beyond those associated with ongoing DOE and contractor activities.

3.10 HUMAN HEALTH AND SAFETY

3.10.1 Existing Conditions

Past activities at ETTP have resulted in releases of radionuclides and chemicals to the environment. Such releases combine with natural sources and can augment the exposure to humans both on- and off-site. Natural background sources include cosmic radiation and uranium and thorium in native soil. Inorganic elements, such as arsenic, beryllium, and manganese, are also found in native soil on the ORR. These naturally existing sources of radiological and chemical exposures become the background exposure to which the effects of the man-made releases would be added. The ORR ASER for 2007 (DOE 2008) summarizes releases of environmental contamination levels of chemicals and radiation and resulting exposures for calendar year 2007. In general, human exposure pathways include direct contact, inhalation, and ingestion. Radiation exposure is commonly categorized as either external (exposure to penetrating radiation) or internal (ingestion and inhalation). Ingestion of radionuclides can be through the intake of water or foodstuffs (e.g., vegetation and fish).

DOE Order 5400.5, "Radiation Protection of the Public and the Environment," limits the effective dose equivalent (EDE) that an off-site individual may receive from all exposure pathways and all radionuclides released from the ORR during 1 year to no more than 100 millirem (mrem). DOE regulations (10 *CFR* 835, "Occupational Radiation Protection") establish radiation protection standards and program requirements for DOE and DOE contractor operations with respect to the protection of workers from ionizing radiation. DOE's limiting control value for a worker's radiation dose is 5,000 mrem/year total EDE from combined internal and external sources.

3.10.1.1 Radiation Exposure to the Public

The average annual background radiological EDE from natural and man-made sources to an individual residing in the United States is approximately 360 mrem. Approximately 300 mrem of the 360 mrem are from natural sources (e.g., radon and cosmic radiation) and about 55 mrem of which are from natural external radiation sources (i.e., cosmic and terrestrial radiation) [National Council on Radiation Protection and Measurements 1987]. External radiation exposure rates from background sources have been measured in Tennessee. The measured rates are equivalent to an average annual EDE of 42 mrem, ranging between 19 and 72 mrem (Myrick et al. 1981). This average is less than the United States annual average of 55 mrem.

DOE (2008) provides estimates of radiological doses from the ETTP; information from this report is summarized here. The calculated radiation dose to the maximally exposed off-site individual resulting from airborne releases from the ETTP was about 0.02 mrem during 2007, which is less than 1% of the natural external radiation background EDE to an average Tennessee resident. The maximally exposed individual (MEI) is assumed to be located 0.6 miles southwest of the TSCA 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 2007; 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 EDE to the entire population within 50 miles of the ORR (about 1,040,041 persons) was 19.5 person-rem, which is approximately 0.006% of the 312,012 person-rem that this population received from natural sources of radiation (DOE 2008).

3.10.1.2 Public chemical exposures

Health effects attributed to chemical exposures can be categorized as carcinogenic or non-carcinogenic. Chemical carcinogenic risks are reported here as a lifetime probability of developing an excess cancer. EPA defines a target cancer risk range of 10^{-4} (1 in 10,000) to 10^{-6} (1 in 1,000,000), which defines when cleanup actions are to be considered under CERCLA. Non-carcinogenic hazards are reported as hazard quotients (HQs) where unity (1) or greater represents a potential for adverse health effects. An HQ less than unity indicates an unlikely potential for adverse health effects. The sum of more than one HQ for multiple toxicants and/or multiple exposure pathways is called a hazard index (HI). Pathways of concern for non-carcinogens are defined as those with an HI greater than 1.

DOE (2008) estimates the human health risks from chemicals found in the environs of the ORR. The primary exposure pathways considered are ingestion of drinking water and fish. For ingestion of drinking water, HQs were estimated upstream and downstream of ORR discharge points. HQs were less than 1 for detected chemical analytes for which there are reference doses or maximum contaminant levels (i.e., barium, manganese, zinc, etc.). Acceptable risk levels for carcinogens typically range from 10^{-4} to 10^{-6}. Risk values greater than 10^{-5} were calculated for the intake of arsenic in water at both upstream and downstream locations.

For consumption of sunfish and catfish, HQ values of less than 1 were calculated for all detected analytes except for Aroclor-1254 and Aroclor-1260. At three sample locations, an HQ greater than 1 for Aroclor-1260 was estimated in catfish. For sunfish, the HQ was either near to or exceeded 1 at three locations. An HQ greater than 1 for Aroclor-1254 was estimated in catfish at all three sample locations. TDEC has issued a fish advisory that states that catfish should not be consumed from Melton Hill Reservoir (in its entirety) because of PCB contamination and has issued a precautionary fish consumption advisory for catfish in the Clinch River arm of Watts Bar Reservoir (DOE 2008).

3.10.2 Environmental Consequences

3.10.2.1 Proposed action

Construction workers would be subject to typical hazards and occupational exposures faced at other industrial construction sites. Falls, spills, vehicle accidents, confined-space incidents, and injuries from tool and machinery operation could occur. Similar accidents could occur at facilities during operation. Accidents could result from operator error, equipment malfunction, or from natural phenomena (e.g., earthquakes, tornadoes, flooding, fire, etc.). Potential hazards from the operation of facilities could include electrical energy, flammable materials, toxic/corrosive/reactive materials, and radiation sources. Other hazards include kinetic energy and stored energy. Examples of kinetic energy hazards include moving ventilation system components, forklifts, and other drum- or box-handling equipment. Stored energy hazards include elevated structures and equipment, stacked drums, and boxes. Workers would receive applicable training, be protected through appropriate controls and oversight, and be afforded the same level of safety and health protection found at similar developments. The property developers and the individual companies that would operate would also be required to follow applicable OSHA requirements.

The potential for fires and any resulting adverse impacts would likely be mitigated by the following: (1) most new building construction would consist of steel frames, concrete floors, noncombustible exterior walls, and metal roofs; (2) building design and materials would comply with all applicable National Fire Protection Association codes and standards; (3) buildings would be equipped with fire detection systems and fire-suppression equipment as applicable (e.g., fire alarms, portable fire extinguishers, and sprinkler

systems); and (4) appropriate fire safety and emergency policies and procedures, including proper training, would be implemented.

No unique occupational health and safety hazards are expected, and it would be the responsibility of each company to operate in a safe and protective manner. Issues related to public and worker exposures to effluents and emissions from industrial operations would be addressed by permits and regulations under the state of Tennessee. If required by state and federal law, companies would be required to have an emergency response plan for the accidental release of hazardous materials. The Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986, also referred to as the Superfund Amendments and Reauthorization Act Title III, requires reporting of emergency planning information, hazardous chemical inventories, and releases to the environment. EPCRA reports (if required) would be submitted to federal, state, and local authorities. Section 304 of the EPCRA requires reporting of off-site reportable quantity releases to state and local authorities. It is expected that resources would be available for response to an event such as a release or spill through agreements with ETTP emergency response units and surrounding communities. It is anticipated that most of the facility operations would not result in radiological exposures. However, if a company did handle radioactive material or wastes, they would be regulated by the NRC or the state of Tennessee. These facilities would be required to comply with the terms and conditions of their radioactive materials license, if applicable.

3.10.2.2 Alternative 1

Potential human health and safety impacts under Alternative 1 are expected to be similar to those described for the proposed action. However, since this alternative assumes heavy industrial development, the potential for accidents and occupational exposures to physical, chemical, and radiological hazards would likely be greater.

3.10.2.3 Alternative 2

Potential human health and safety impacts under Alternative 2 are expected to be similar to those described for the proposed action. However, since industrial uses are not permitted under the City of Oak Ridge Zoning Ordinance for UB-2, Unified General Business Districts, the likelihood for accidents and hazardous occupational exposures would be less.

3.10.2.4 No action

Under the no action alternative, there would be no human health and safety impacts beyond those associated with ongoing DOE and contractor activities.

3.11 INTENTIONAL DESTRUCTIVE ACTS

DOE is required to consider intentional destructive acts, such as sabotage and terrorism, in each EIS or EA that it prepares. After review, it was determined that the likelihood of such acts for the proposed action is extremely low. It is possible that random acts of vandalism could happen as in any other location. It is also anticipated that security measures typical of small industrial parks and other commercial developments would be implemented.

3.12 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Table 3.7 provides a comparative summary of the potential environmental consequences that could result from implementing the proposed action or alternatives.

Table 3.7. Summary of impacts by resource

Environmental impact	Proposed action	Alternative 1	Alternative 2	No action alternative
Land use	Land use would change over time as development occurs. In less developed areas, the visual character would change from a more natural to a more man-made looking environment.	Land use impacts would be similar to the proposed action. Heavier industrial development could have a greater visual impact.	Land use impacts would be similar to the proposed action. Adverse visual impacts associated with heavy industrial development would not occur.	No changes to the existing land use or visual resources would occur. Ongoing and planned remedial actions and reindustrialization activities would continue.
Air quality and noise	Construction would be phased and air emissions would be short-term, sporadic, and localized. Fugitive dust would be controlled to minimize emissions. Minor air emissions from operations could require air quality construction and operating permits (non-Title V). Other than temporary noise from construction activities, noise levels should remain close to existing levels, and no adverse noise impacts are anticipated.	Impacts would be similar to the proposed action. Heavy industries could be required to obtain a Title V air quality permit. Noise impacts would be similar to the proposed action.	Impacts would be similar to the proposed action. Industrial uses would not be permitted and air quality impacts would be less. Adverse noise impacts are not expected.	Air pollutants would continue to be emitted at current rates in the vicinity of ETTP, and no adverse effects to air quality are predicted. No changes in existing noise levels are expected. Noise levels within the area are associated with ongoing uses and adjacent traffic.
Geology and soils	Adverse impacts on site geology are not expected. Geotechnical studies would be conducted if required. Affected soils are generally stable and acceptable for standard construction requirements. Karst areas should be avoided if practicable. Erosion prevention and sedimentation control measures would be implemented to minimize the potential for soil erosion.	Impacts would be similar to the proposed action.	Impacts would be similar to the proposed action.	No impacts on geology and soils would occur, and existing site conditions would continue.

Table 3.7. Summary of impacts by resource (continued)

Environmental impact	Proposed action	Alternative 1	Alternative 2	No action alternative
Water resources	Erosion and sedimentation controls would limit potential impacts on surface water. No impacts on surface water or groundwater are anticipated from construction and normal facility operations. Groundwater use would be prohibited. Applicable federal, state, and local laws and regulations would apply to any activities that could potentially affect a floodplain or wetlands.	A greater density of heavy industrial development could increase the potential for adverse impacts.	Impacts would be similar to the proposed action.	No additional impacts to any water resources are expected. Ongoing surface and groundwater monitoring and, where appropriate, remediation would continue at the ETTP.
Ecological resources	Vegetation and habitats in affected areas would be permanently changed to an urban/industrial cover type. Some wildlife would be destroyed and displaced during development. No state or federally listed threatened and endangered species have been identified, and no adverse impacts would occur.	Impacts would be similar to the proposed action.	Impacts would be similar to the proposed action.	Existing biological resources would be unaffected because no new development would occur in the area. Absent active management, natural succession of vegetation would continue to occur within existing habitats.
Cultural resources	Other than the Happy Valley area, no other prehistoric or historic resources would be affected. Happy Valley is potentially eligible for the NRHP and would be subject to consultation with the Tennessee State Historic Preservation Office prior to any transfer.	Impacts would be similar to the proposed action.	Impacts would be similar to the proposed action.	There would be no changes or additional impacts.

Table 3.7. Summary of impacts by resource (continued)

Environmental impact	Proposed action	Alternative 1	Alternative 2	No action alternative
Socioeconomics	Positive employment and income impacts. No impact on population. Positive fiscal impacts include increased revenue from real estate or sales taxes. DOE would not continue the in-lieu-of-tax payments on the property that is conveyed. No disproportionate adverse health or environmental impacts would occur to any low-income or minority population.	Impacts would be similar to the proposed action.	Impacts would be similar to the proposed action.	No change in employment, income, population, or local government revenues is anticipated beyond that which is generated through current and planned reindustrialization activities.
Infrastructure	Existing utilities have adequate capacity to support additional development, but minor upgrades and modifications would be needed. Transport of construction materials would be over regional and local roadways and would have a negligible effect on existing traffic. Employee traffic could increase over current levels but would not exceed historic levels.	Utility impacts would be similar to the proposed action. Demand could be higher from increased heavy industrial development. Transportation impacts would be similar to the proposed action, but there could be a greater volume of truck traffic.	Utility impacts would be similar to the proposed action. Transportation impacts would be similar to the proposed action.	There would be no impacts on existing utilities. Traffic would likely continue to remain close to current levels, and no impacts are anticipated.
Waste management	Solid non-hazardous waste would be recycled or transported to an appropriate licensed landfill for disposal. Minor quantities of hazardous or radioactive waste may be generated. Companies would use existing licensed and/or permitted treatment, storage, and disposal facilities.	Impacts would be similar to the proposed action. Heavy industrial development could increase the amount of waste generated.	Impacts would be similar to the proposed action.	Ongoing waste management activities would continue unchanged.

Table 3.7. Summary of impacts by resource (continued)

Environmental impact	Proposed action	Alternative 1	Alternative 2	No action alternative
Human health and safety	Construction workers would be subject to typical hazards and occupational exposures. No unique occupational health and safety hazards would be posed by development.	Heavy industrial development could increase the potential for accidents and occupational exposures to physical, chemical, and radiological hazards.	Impacts would be similar to the proposed action.	No additional impacts on the environment within or adjacent to the proposed locations beyond the scope of normal conditions and influences in the area.
Intentional Destructive Acts	The likelihood of sabotage and terrorism is extremely low. However, it is possible but highly unlikely that random acts of vandalism could occur. A variety of measures to control access and maintain security would be used.	Same as the proposed action.	Same as the proposed action.	Ongoing security measures and property access controls in the area would continue.
Cumulative impacts	The cumulative contribution of impacts that the proposed action would make on the various environmental resources is expected to be minor.	Similar to the proposed action.	Similar to the proposed action.	No additional cumulative impacts would occur.

DOE = U. S. Department of Energy.
ETTP = East Tennessee Technology Park
NRHP = National Register of Historic Places.

4. CUMULATIVE IMPACTS

Cumulative impacts are those that may result from the incremental impacts of an action considered additively with the impacts of other past, present, and reasonably foreseeable future actions. Cumulative impacts are considered regardless of the agency or person undertaking the other actions (40 *CFR* 1508.7, CEQ 1997) and can result from the combined or synergistic effects of individually minor actions over a period of time. The actions are as follows and the location of the actions is shown on Fig. 4.1.

4.1 POTENTIALLY CUMULATIVE ACTIONS

This section describes present actions as well as reasonably foreseeable future actions that are considered pertinent to the analysis of cumulative impacts for the proposed action**.**

ORNL Revitalization Program and Modernization Initiative. DOE is implementing a revitalization project at ORNL to consolidate staff on the main ORNL campus; vacate old, expensive to maintain space; and build new, and refurbish key facilities. The first phase included construction of up to 24 new facilities totaling approximately 1.2 million ft^2 in Bethel Valley near the main ORNL entrance, near the West Portal in Bethel Valley, and within the footprint for the Spallation Neutron Source. Some of the new construction is being funded by the state of Tennessee and the private sector. About 20 acres of Brownfields property in Bethel Valley have been transferred from DOE to the private sector in support of this proposed action. The environmental consequences of this project were reviewed in an EA (DOE/EA-1362).

The ORNL Modernization Initiative includes additional upgrades and construction of new facilities at ORNL including, but not limited to, offices, laboratories, and maintenance and support facilities. In addition to the new facilities, the proposed action would include replacement of the existing wastewater treatment plant, upgrading the ORNL Steam Plant with a biomass gasification system, decentralizing a portion of the steam distribution system that serves several remote buildings, and the construction of a new small package steam plant. DOE completed an EA for the project (DOE/EA-1618).

Oak Ridge Science and Technology Project. DOE recently completed an EA (DOE/EA-1575) for the creation of the Oak Ridge Science and Technology Project (ORSTP) at ORNL. The proposed action would advance technology transfer and other missions at ORNL by supporting technology commercialization, creating new companies, and stimulating technology-based recruitment.

To establish the ORSTP, DOE will lease approximately 40 acres of underutilized facilities and land parcels at ORNL within the Central Campus area, which is located in the western portion of the Laboratory. ORSTP is intended primarily for R&D facilities, high-technology and science-based companies, engineering support services, technology commercialization incubation space, and prototype manufacturing facilities. Initially, ORSTP would be within the northwest quadrant of the Central Campus and includes approximately 12 acres of currently leased property along Bethel Valley Road where the new Pro2Serve National Security Engineering Center is being constructed. New buildings would be constructed, but existing facilities could also be modified or renovated to accommodate new users. An example is the recently opened Halcyon Commercialization Center, formerly known as Bldg. 2033.

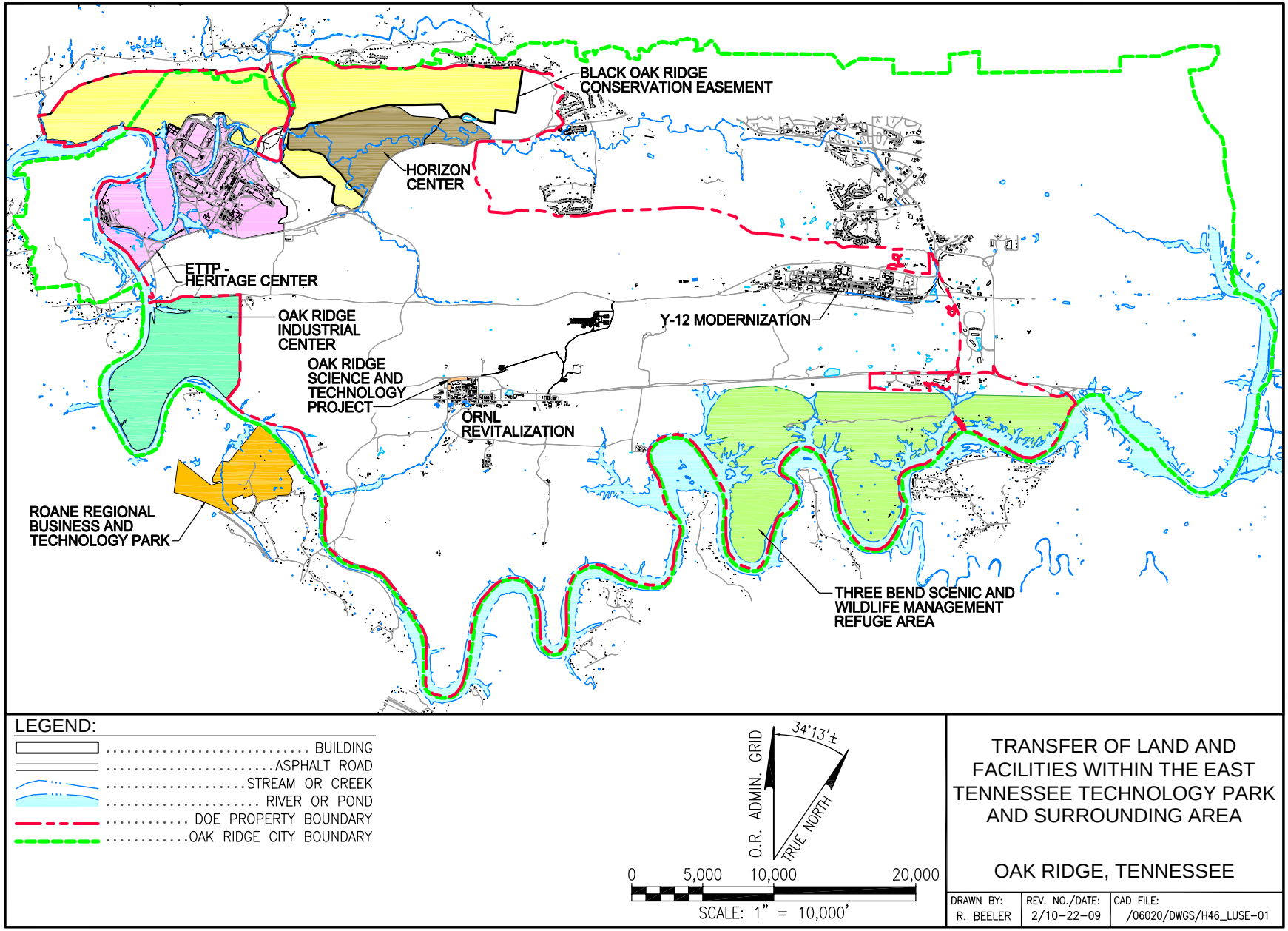

Fig. 4.1. Location of actions contributing to cumulative impacts.

Integrated Facility Disposition Project (IFDP). IFDP integrates the cleanup scope resulting from modernization of ORNL and the Y-12 Complex with the existing Oak Ridge EM baseline. The scope for IFDP, among other activities, is to demolish excess facilities, dispose of legacy materials/waste, and address environmental cleanup, resulting in risk reduction, surveillance and maintenance (S&M) cost reduction, and release of strategic real estate for modernization initiatives. The IFDP estimated cost ranges from $4 to $8 billion and the duration ranges from 15 to 20 years. The IFDP scope includes:

- D&D of over 400 facilities;
- remedial actions;
- facility reconfiguration, adaptive re-use, and utility modifications;
- waste treatment and storage facilities operations;
- ORR Landfill operation;
- CERCLA Cell (Environmental Management Waste Management Facility) operation, expansion, and closure;
- S&M;
- legacy material/waste and remedial action and D&D waste disposition;
- associated regulatory and planning documentation, including final CERCLA Records of Decision (RODs); and
- project management, administration, and support.

Horizon Center. DOE has transferred title of the developable portion (approximately 491 acres) of what was previously referred to as Parcel ED-1 to Horizon Center LLC, a subsidiary of CROET, for the continued development as an industrial/business park for R&D, as well as manufacturing, distribution, and corporate headquarters office facilities. DOE maintains ownership of the remainder of the parcel, which includes the NA.

Y-12 Complex Modernization Program. DOE has issued a Final Site-Wide EIS and ROD on the operation of the Y-12 Complex and modernization of facilities (DOE 2001b). Major actions include construction of the Highly Enriched Uranium Materials Facility, which will replace multiple aging facilities within a single state-of-the-art storage facility; a Purification Facility, which was completed in 2004; a Uranium Processing Facility, which will replace current enriched uranium and other processing operations; an Enriched Uranium Manufacturing Facility to replace current enriched uranium and other processing operations; and the Beryllium Capability project, which will upgrade an existing facility, installing modern equipment that will protect workers from exposure to beryllium and improve efficiency and reliability. Many existing facilities have been demolished to prepare for the new construction that began in 2003. By 2013, when the Uranium Processing Facility becomes operational, the Y-12 Complex will have reduced its defense manufacturing footprint by almost one-half.

Roane Regional Business and Technology Park. This industrial park is located north of Interstate 40 in Roane County approximately 3 miles southwest of the ORSTP site. The 655-acre site includes areas for industrial development and greenbelt uses. The park is anchored by the H.T. Hackney Company distribution and service center. Other industries located at the site include instrumentation, light metalwork, ceramics, and materials handling. Additional types of industries expected to locate at the park include information technology, automotive transportation, and corporate administrative offices.

Oak Ridge Industrial Center. The Oak Ridge Industrial Center is located at the site partially developed by TVA for the Clinch River Breeder Reactor prior to 1983. The 1,245-acre property has been considered for development by several manufacturing industries. TVA has graded a 150-acre tract on the property to <2% slope. The remaining land is rolling to rough terrain, having an 8 to 20% slope. The developable land contains tracts with hardwood forests and pine plantations impacted by the Southern pine beetle. The site also contains cultural resources. TVA has also designated a 103-acre tract bordering Grassy Creek as the Grassy Creek Habitat Protection Area to be reserved for protection of bugbane (*Cimicifuga rubifolia*) habitat (TVA 1988).

4.2 CUMULATIVE IMPACTS BY RESOURCE AREA

Land Use. Of the original 58,582 acres of land acquired in 1942 by the federal government, 24,943 acres have been conveyed for residential, commercial, and community development; transportation easements; preservation and recreation; industrial development; and mission-related purposes, and approximately 33,639 acres remain within the ORR.

Current land outgrants (lease/license/permit areas) include:

- 2,966 acres for the BORCE,
- 2,920 acres for the Three Bend Scenic and Wildlife Management Refuge Area, and
- 466 acres for the Horizon Center NA.

Conveyance of additional land and facilities at ETTP under the proposed action could potentially remove additional land. However, the majority of the ETTP area being considered for conveyance has already been developed for industrial purposes or has been impacted in some other way. Further development would not result in substantial changes from this industrial land use. Additionally, DOE has designated large portions as non-development areas, and land use in these areas would remain as it presently is.

Soil. The most frequent effect of surface disturbance with regard to soil in this region is accelerated erosion. Implementation of past, current, and reasonably foreseeable future projects would add to the total acreage of soil disturbed and would permanently alter the soil within the footprint of the projects, adding to the overall loss of soil productivity. However, the majority of actions described within this document are within the areas where similar construction of roads and buildings has occurred or has been planned. As long as all construction projects comply with state and federal laws and regulations, mitigations would be implemented to minimize erosion from construction activities and sediment delivery to nearby surface water. Additionally, landscaping after construction completion would serve to stabilize soil once the projects have been completed. These actions would minimize the cumulative impacts of construction projects in the region that may otherwise result in accelerated erosion.

Surface Water Resources. The most frequent effect of surface disturbance in this region associated with surface water is increased surface water runoff, all of which may affect downstream water bodies by contributing sediment or increasing flooding. The primary cumulative impacts on surface water would result from an increase in the acreage of earthmoving activities and increased impervious areas that have the potential to increase sediment delivery and surface water runoff downstream.

As long as all construction projects comply with state and federal laws and regulations, mitigations would be implemented to minimize erosion from construction activities and sediment delivery to nearby surface water. This would minimize the cumulative impacts of construction projects in the region that may otherwise result in increased sediment delivery.

The addition of new impervious surfaces would likely result in a cumulative increase in the rate and volume of storm water runoff. The use of temporary or permanent storm water controls such as detention or retention basins and other structures, and stabilization of disturbed areas through landscaping and vegetation, would attenuate increases in surface water runoff and increase groundwater recharge through direct percolation, thus offsetting the loss of pervious surface due to construction in the region and minimizing downstream cumulative effects.

Air Quality. Additional C&D activities involved in the projects already in progress or expected in the foreseeable future would cause temporary increases in air pollutant emissions. The primary pollutant from construction activities would be particulate matter in the form of fugitive dust. This source of emissions is short-term and the impacts are localized to the immediate area. To minimize these emissions, application of wetting agents during dry periods may be used as mitigation. The increase in heavy industry, traffic, and population growth in the county could adversely impact air quality. Emissions from industrial development would be controlled by the required permitting process.

Biological Resources. The greatest threat to reduced biodiversity of an area or region is conversion of cover types from natural systems to completely different and maintained systems. Growth and development in the region surrounding the ORR is putting increased pressure on the biodiversity of the Ridge and Valley Ecoregion. Development within the ORR has also removed additional land from the Reservation. However, much of the core area of the ORR and most sensitive areas have been avoided or potential impacts have been mitigated. Approximately 491 acres of the Horizon Center are not available for development and contain NA corridors and buffers for native vegetation and wildlife species. Also, much of the development and reindustrialization on the ORR is taking place within previously disturbed and/or developed areas within and surrounding the major plant areas. Actions such as the BORCE and the Three Bend Scenic and Wildlife Management Refuge have the potential to provide long-term protection for some of the most ecologically sensitive areas on the Reservation, and the ORR continues to be a biologically rich resource that provides protection for large land areas and the biodiversity found within those protected areas.

Socioeconomics. Major initiatives include reindustrialization of the ETTP-Heritage Center, development of the Horizon Center, ORNL revitalization, Roane Regional Business and Technology Park, and the potential development of the Oak Ridge Industrial Center. The cumulative impact of new development is likely to result in increased population, employment, and income. The proposed action is expected to represent a small part of the total acreage proposed for development, and its effect on the cumulative impacts is expected to be correspondingly small.

Actual employment and income impacts from cumulative development would depend on the success of each of these developments and the overall rate at which development proceeds, both of which are uncertain. Developers have recently scaled back plans for some of these projects based on current market conditions (Huotari 2006). Property tax revenue would depend on the value of the properties, future tax rates, and any tax abatements that may be negotiated.

Utilities. Addition of the identified reasonably foreseeable future projects would result in incremental increases in utility usage. However, there is currently sufficient excess capacity to meet the demand, and continued upgrades and improvements in the local and regional utility systems would serve to offset/accommodate any potential utility use increases. Additionally, the individual projects described above would likely be implemented in phases over the course of several years, thus enabling the utilization of new, more energy-efficient technologies to minimize energy consumption and to provide utility systems sufficient opportunity to meet demand through upgrades and improvements. As a result, the cumulative impact on local and regional infrastructure is expected to be minimal.

Transportation. Cumulative transportation impacts in Roane and Anderson Counties could occur from increased development and growth. These potential impacts could be combined with ongoing environmental restoration and D&D activities on the ORR and with the planned expansion of the state highways by the Tennessee Department of Transportation. The main transportation impact of commercial and industrial development would be an increase in average daily traffic volumes.

Associated with increases in traffic is the potential for an increased number of accidents, additional noise and air pollution, and road deterioration and damage. The increase in average daily traffic volumes could result in inconveniences for other vehicles (personal and commercial) on affected routes and connecting roads. Commercial operations could suffer temporarily reduced business while customers avoid affected areas because of traffic delays. Increased pavement deterioration and damage could increase costs associated with maintaining or resurfacing roads and highways. Although noise associated with increases in traffic is normally not harmful to hearing, increased traffic noise is considered by the public to be a nuisance. Increased accidents put an additional strain on local emergency response personnel. Increased vehicular traffic also has the greatest potential to increase air pollution in the local area because emissions from motor vehicles are poorly regulated.

Solid Waste. Major projects and activities within the ROI are, or will, generate solid waste requiring disposal. Although additional construction, demolition, and/or renovation will occur under many of the projects in Sect. 4.1, specific quantities of C&D wastes cannot be estimated. Because the specific timing of each project is unknown, it is unclear the extent of project overlap that would occur between the potential cumulative actions and the proposed action in this EA. If the projects occur within the same timeframe, there could be a potential adverse cumulative impact on landfills in the ROI. However, it is anticipated that the projects would be phased over a 10-year period and landfill capacity is assumed to be adequate to handle the anticipated amounts of solid waste requiring disposal.

Human Health. Operations included under the proposed action could potentially increase worker or public exposure to physical, chemical, or radiological hazards. New or expanded facilities from development under the proposed action would be of modern design with engineered controls for improved environmental safety and health (ES&H) operation, thus resulting in improvements to the ES&H environment. It is likely that any new facilities developed, as described, under the reasonably foreseeable actions would follow the same principle of improvements in operational ES&H environments. Consequently, there would be no cumulative human health effects to workers or off-site populations.

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APPENDIX A – CORRESPONDENCE

Department of Energy

Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831—

July 17, 2009

Dr. Joseph Y. Garrison
Tennessee Historical Commission
Department of Environment and Conservation
2941 Lebanon Road
Nashville, Tennessee 37243-0442

Dear Dr. Garrison:

NOTIFICATION OF PROPOSED UNDERTAKING FOR THE CONVEYANCE OF U.S. DEPARTMENT OF ENERGY PROPERTY WITHIN THE EAST TENNESSEE TECHNOLOGY PARK AREA OF RESPONSIBILITY

The U.S. Department of Energy (DOE) is preparing an Environmental Assessment (EA) for a proposed *Conveyance of U.S. Department of Energy Property Within the East Tennessee Technology Park Area of Responsibility in Oak Ridge, Tennessee*. The purpose of the proposed action being evaluated is to convey DOE property located within the East Tennessee Technology Park (ETTP) Area of Responsibility (AOR) to the Community Reuse Organization of East Tennessee (CROET), City of Oak Ridge, other agencies, or private entities for economic development. Leasing and title transfers for economic development are allowed under 10 Code of Federal Regulations (CFR) 770, *Transfer of Real Property at Defense Nuclear Facilities for Economic Development*. DOE's action is needed to help reduce the eventual cost for building demolition and reduce or eliminate ETTP AOR landlord costs. This would also help to free money for reinvestment in cleanup projects to further reduce risks at the site. In addition, DOE recognizes that transferring unneeded property can help offset economic losses resulting from continued DOE downsizing, facility closures, and workforce restructuring.

Much of the ETTP AOR has been the subject of previous land use planning efforts and National Environmental Policy Act of 1969 (NEPA) decisions. These include the *Final Environmental Assessment for the Lease of Land and Facilities Within the East Tennessee Technology Park*, DOE/EA-1175 (1997); the land use planning process conducted in 2001 documented in the *Final Report of the Oak Ridge Land Use Planning Focus Group* (2002) and *Land Use Technical Report* (2002); and the *Final Environmental Assessment Addendum for the Title Transfer of ETTP Land and Facilities,* DOE/EA-1175-A (2003).

Under the proposed action, DOE could convey up to approximately 1,600 acres of property located within the ETTP AOR. The property that could potentially be conveyed includes the majority of the main ETTP plant area, Duct Island, a portion of the former K-25 Powerhouse Area, the K-1251 Barge Loading Area, and the land adjacent to it identified as Parcel ED-3.

DOE has existing Memorandums of Agreement (MOA), under Section 106 of the National Historic Preservation Act, for all of these areas with the exception of Parcel ED-3, which is approximately 170 acres.

Conveyance of the property would be phased with the option of fee title transfer or interim leasing. Once transferred, developable portions of the property would be marketed, sold, or leased by CROET or other owners. The proposed action assumes that the property would be developed for a mix of uses, including but not limited to, industrial, commercial, recreation, tourism (including historic preservation), and open space. The enclosed map shows the location of the proposed initiative.

On June 25, 2001, a MOA, *Memorandum of Agreement Between the U.S. Department of Energy Oak Ridge Operations Office and the Tennessee State Historic Preservation Office Submitted to the Advisory Council on Historic Preservation Pursuant to 36 CFR 800.6(b)(1) Regarding Lease of Land Parcel ED-3 of the Oak Ridge Reservation to the Community Reuse Organization of East Tennessee Oak Ridge Reservation, Anderson County, Tennessee,* was fully ratified. In this MOA, DOE agreed to ensure that the following stipulations were implemented:

1. the perimeter of the Wheat Community African Burial Ground (40RE219) will be surveyed and clearly marked on all plat maps generated in support of the lease agreement, including an additional 100-ft protective perimeter around the cemetery;
2. disturbance of the Wheat Community African Burial Ground and associated protective perimeter will be avoided;
3. the portion of site 40RE224 within the lease area (including sites 711B, 722A, 725A, 726A, and 728A) and 711A adjacent to 40RE224 will be surveyed by an archeologist, undergo appropriate testing (which may include photographs, shovel testing, material inventory and recordation, and a survey report), and obtain acceptance by the State Historic Preservation Officer (SHPO) prior to commencing development in these areas; and
4. a walkover survey report by an archaeologist will be provided to the SHPO for concurrence prior to commencing development in the Fercleve Housing, Happy Valley West Housing, Happy Valley Housing, and Ford, Bacon, and Davis Housing areas.

This MOA was prepared in conjunction with a proposed action identified in a 2000 EA for leasing Parcel ED-3; however, the EA was placed on hold and then subsequently cancelled. The new proposed action is for conveying (rather than leasing) a portion of the original property identified in the ED-3 EA; however, the acreage is much less (450 acres versus the 170 acres being proposed for conveyance). The portion of site 40RE224 identified in Stipulation 3 was removed from the ED-3 footprint, and this area will not be conveyed as part of this proposed undertaking. DOE has fulfilled its obligations for the stipulations contained within the framework of the agreement document except for completing the survey report and acceptance

by the SHPO prior to commencing development in these areas. A *Phase I Archaeological Survey of Parcel ED-3 and Historic Assessment of the Happy Valley Worker Camp* was completed in May 2008 for a project area measuring approximately 110 acres; however, a small portion remains to be surveyed by the archaeologist. Once this area has been surveyed, the survey report will be provided to the SHPO for acceptance, and the results of the survey will be incorporated into the EA.

We have determined, in accordance with §800.3 of the Advisory Council on Historic Preservation's (Council) regulations for the protection of historic properties, that DOE's proposed action in this EA (1) is an undertaking, as defined in 36 CFR 800.16(y), and (2) is the type of activity that has the potential to cause effects on historic properties. In accordance with §800.8(c) of the Council's regulations, we are notifying you and the Council, by copy of this letter, that we intend to use the process and documentation required to comply with the National Environmental Policy Act to comply with Section 106 of the National Historic Preservation Act for this undertaking. In using the NEPA process in lieu of the procedures set forth in §800.3 through §800.6 of the Council's regulations (i.e., the Section 106 process), we will ensure the standards set forth in §800.8(c)(l) through §800.8(c)(5) are met.

If you have any questions or need additional information on this matter, please contact me at (865) 576-0835.

Sincerely,

Katatra C. Vasquez
Cultural Resources
Management Coordinator

Enclosure

cc w/enclosure:
Jennifer Barnett, TDEC Division of Archaeology
Tom McCulloch, Advisory Council on Historic Preservation
George Malosh, SC-3, HQ/FORS
Anna Lising, SC-3, HQ/FORS
Skip Gosling, HR-76, HQ/FORS
Gerald Boyd, M-1, ORO
Robert Brown, M-2, ORO
Walter Perry, M-4, ORO
Larry Kelly, SE-30, ORO
Teresa Perry, SE-30, ORO
David Allen, SE-32, ORO
Gary Hartman, SE-32, ORO
Larry Clark, NS-50, ORO
Patricia Hart, NS-53, ORO
Susan Cange, NS-50, ORO
Nancy Carnes, CC-10, ORO
Stephen McCracken, EM-90, ORO
Cindy Finn, AD-42, ORO

TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

July 30, 2009

Ms. Kakatra Vasquez
Department of Energy
Oak Ridge Operations Office
Post Office Box 2001
Oak Ridge, Tennessee 37831

RE: DOE, E. TN TECHNOLOGY PARK CONVEYANCE, OAK RIDGE, ROANE COUNTY

Dear Ms. Vasquez:

The above-referenced undertaking has been reviewed with regard to National Historic Preservation Act compliance by the participating federal agency or its designated representative. Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

Thank-you for the progress report relating to your agency's fulfillment of the stipulations contained in the signed memorandum of agreement for this undertaking. Per your correspondence we understand that a small portion of the area of potential effect has yet to be subjected to archaeological survey.

Upon receipt of the archaeological survey report for the remaining portion of the area of potential effect, we will complete our review of this undertaking as expeditiously as possible. Please inform this office if this project is canceled or not funded by the federal agency. Questions and comments may be directed to Jennifer M. Barnett (615) 741-1588, ext. 105.

Your cooperation is appreciated.

Sincerely,

E. Patrick McIntyre, Jr.

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jmb