DOE/EA-1514

ENVIRONMENTAL ASSESSMENT U. S. DEPARTMENT OF ENERGY CONVEYANCE OF PARCEL ED-6 TO THE CITY OF OAK RIDGE, TENNESSEE

May 2007

U. S. Department of Energy
Oak Ridge Office
Oak Ridge, Tennessee

05-007(E)/050807

DOE/EA-1514

Environmental Assessment
U. S. Department of Energy
Conveyance of Parcel ED-6
to the City of
Oak Ridge, Tennessee

Date Issued—May 2007

Prepared for
U. S. Department of Energy
Oak Ridge Office
Oak Ridge, Tennessee

05-007(E)/050807

CONTENTS

FIGURES vii
TABLES vii
ACRONYMS ix

1.0 INTRODUCTION 1-1
1.1 PURPOSE AND NEED FOR U. S. DEPARTMENT OF ENERGY ACTION 1-1
1.2 BACKGROUND 1-1
1.3 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT 1-3

2.0 DESCRIPTION OF ALTERNATIVES 2-1
2.1 PROPOSED ACTION 2-1
2.2 NO ACTION ALTERNATIVE 2-1
2.3 MIXED DEVELOPMENT ALTERNATIVE 2-1
2.4 CONSERVATION EASEMENT ALTERNATIVE 2-1

3.0 AFFECTED ENVIRONMENT 3-1
3.1 LAND USE 3-1
3.2 AIR QUALITY 3-1
3.3 GEOLOGY AND SOILS 3-2
3.3.1 Site Geology 3-2
3.3.2 Soils 3-4
3.4 WATER RESOURCES 3-4
3.4.1 Groundwater 3-4
3.4.2 Surface Water 3-5
3.5 FLOODPLAINS AND WETLANDS 3-5
3.6 ECOLOGICAL RESOURCES 3-5
3.6.1 Terrestrial Habitat 3-5
3.6.2 Interior Forest 3-7
3.6.3 Terrestrial Animals 3-8
3.6.4 Threatened and Endangered Species 3-9
3.7 CULTURAL RESOURCES 3-10
3.8 SOCIOECONOMICS 3-11
3.8.1 Demographic and Economic Characteristics 3-11
3.8.2 Distribution of Minority and Economically Disadvantaged Populations 3-11
3.8.3 Housing 3-12
3.8.4 Schools 3-12
3.8.5 Police and Fire Protection 3-13
3.8.6 Fiscal Characteristics 3-13
3.9 INFRASTRUCTURE 3-13
3.9.1 Transportation 3-13
3.9.2 Utilities 3-14
3.10 Noise 3-14

4.0 ENVIRONMENTAL CONSEQUENCES 4-1
4.1 LAND USE 4-1
4.1.1 Proposed Action 4-1
4.1.2 No Action 4-1

4.1.3 Mixed Development Alternative 4-1
4.1.4 Conservation Easement Alternative 4-1
4.2 AIR QUALITY 4-2
4.2.1 Proposed Action 4-2
4.2.2 No Action 4-2
4.2.3 Mixed Development Alternative 4-2
4.2.4 Conservation Easement Alternative 4-3
4.3 GEOLOGY AND SOILS 4-3
4.3.1 Proposed Action 4-3
4.3.2 No Action 4-3
4.3.3 Mixed Development Alternative 4-3
4.3.4 Conservation Easement Alternative 4-3
4.4 WATER RESOURCES 4-3
4.4.1 Proposed Action 4-3
4.4.2 No Action 4-4
4.4.3 Mixed Development Alternative 4-4
4.4.4 Conservation Easement Alternative 4-4
4.5 FLOODPLAINS AND WETLANDS 4-4
4.5.1 Proposed Action 4-4
4.5.2 No Action 4-4
4.5.3 Mixed Development Alternative 4-5
4.5.4 Conservation Easement Alternative 4-5
4.6 ECOLOGICAL RESOURCES 4-5
4.6.1 Proposed Action 4-5
4.6.2 No Action 4-6
4.6.3 Mixed Development Alternative 4-6
4.6.4 Conservation Easement Alternative 4-6
4.7 CULTURAL RESOURCES 4-6
4.7.1 Proposed Action 4-6
4.7.2 No Action 4-7
4.7.3 Mixed Development Alternative 4-7
4.7.4 Conservation Easement Alternative 4-7
4.8 SOCIOECONOMICS 4-7
4.8.1 Proposed Action 4-7
4.8.2 No Action 4-9
4.8.3 Mixed Development Alternative 4-9
4.8.4 Conservation Easement Alternative 4-10
4.9 INFRASTRUCTURE 4-11
4.9.1 Transportation 4-11
4.9.2 Utilities 4-12
4.10 NOISE 4-12
4.10.1 Proposed Action 4-12
4.10.2 No Action 4-13
4.10.3 Mixed Development Alternative 4-13
4.10.4 Conservation Easement Alternative 4-13

5.0 CUMULATIVE IMPACTS 5-1
5.1 POTENTIALLY CUMULATIVE ACTIONS 5-1
5.2 CUMULATIVE IMPACTS BY RESOURCE AREA 5-3
5.2.1 Land Use 5-3
5.2.2 Air Quality 5-4

5.2.3 Socioeconomics 5-4
5.2.4 Biodiversity 5-5

6.0 LIST OF AGENCIES AND PERSONS CONTACTED 6-1

7.0 REFERENCES 7-1

APPENDIX A COMMENT RESPONSE A-1

APPENDIX B CORRESPONDENCE LETTERS B-1

APPENDIX C BIOLOGICAL ASSESSMENT C-1

FIGURES

1.1 Parcel ED-6 vicinity map 1-2
3.1 Geologic map of Parcel ED-6 3-3
3.2 Parcel ED-6 vegetation 3-6

TABLES

3.1 Vascular plant species reported from the ORR listed by state or federal agencies 3-10
3.2 Demographic and economic characteristics: Anderson and Roane counties 3-12
3.3 City of Oak Ridge revenues and expenditures, FY 2005 and budgeted FY 2007 ($) 3-14
4.1 Potential property tax impacts for Oak Ridge from Parcel ED-6 residential development 4-9
4.2 Potential property tax impacts for Roane County of Parcel ED-6 residential development 4-9
4.3 Potential city of Oak Ridge property tax revenue from Parcel ED-6 commercial development 4-11
4.4 Potential city of Oak Ridge net property tax revenue from Parcel ED-6 with limited commercial development 4-11
4.5 Potential Roane County net property tax revenue from Parcel ED-6 with limited commercial development 4-11

ACRONYMS

BORCE	Black Oak Ridge Conservation Easement
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CO_2	carbon dioxide
CROET	Community Reuse Organization of East Tennessee
DOE	U. S. Department of Energy
EA	environmental assessment
EPA	U. S. Environmental Protection Agency
ETTP	East Tennessee Technology Park
FIR	Federal Industry and Research
FRP	Facilities Revitalization Program
FY	fiscal year
GSA	General Services Administration
LESA	Land Evaluation and Site Assessment
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Policy Act of 1969
NERP	National Environmental Research Park
NO_2	nitrogen dioxide
NRHP	National Register of Historic Places
O_3	ozone
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PIF	Partners in Flight
PILT	payment-in-lieu-of-tax
PM_{10}	particulate matter less than 10 microns in size
$PM_{2.5}$	particulate matter less than 2.5 microns in size
PSD	prevention of significant deterioration
ROI	region of influence
ROW	right-of-way
SNS	Spallation Neutron Source
SO_2	sulfur dioxide
SR	State Route
T&E	threatened and endangered
TDOT	Tennessee Department of Transportation
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
USFWS	U. S. Fish and Wildlife Service
WMA	Wildlife Management Area
Y-12	Y-12 National Security Complex

1.0 INTRODUCTION

1.1 PURPOSE AND NEED FOR U. S. DEPARTMENT OF ENERGY ACTION

The proposed action evaluated in this environmental assessment (EA) is the U. S. Department of Energy (DOE) conveyance of approximately 336 acres of excess property (i.e., property not needed to fulfill DOE current or foreseeable future requirements) known as Parcel ED-6 to the city of Oak Ridge, Tennessee. The purpose of the proposed action is to transfer DOE-Oak Ridge Office real property for economic development.

The need for DOE action is the result of a request from the city of Oak Ridge to convey Parcel ED-6 under 10 *Code of Federal Regulations* (*CFR*) 770. This regulation, entitled *Transfer of Real Property at Defense Nuclear Facilities for Economic Development*, allows DOE to transfer real property to local communities for economic development purposes. The proposed action would also help the city to meet the goals stated in the Oak Ridge City Council's Strategic Plan, *The Path Forward: 2003-2007*, which identifies the development of new housing as a major initiative. DOE also recognizes that transferring land for local economic development purposes can benefit the federal government by reducing financial costs associated with ownership and management of underutilized and excess real property.

1.2 BACKGROUND

Parcel ED-6 is located within the city limits of Oak Ridge (Fig. 1.1). The general location of the property is west of Wisconsin Avenue, south of Whippoorwill Drive, north of the Oak Ridge Turnpike [State Route (SR) 95], and east of the Horizon Center Industrial Park.

Parcel ED-6 is part of the area included in the Oak Ridge Reservation (ORR) Land Use Planning Process. This land use planning effort took place in 2001 and 2002 to develop suggestions for the utilization of land in the northwest portion of ORR. As part of the process, four land use scenarios were developed and analyzed in the technical report prepared for the process (ORNL 2002). The four scenarios included a greenspace emphasis (Scenario 1), development emphasis (Scenario 2), modified Parcel ED-3 (Scenario 3), and less development (Scenario 4). Land uses within each scenario included greenspace, conservation, and research (all four scenarios); light industrial/commercial (all four scenarios); office (Scenario 2); residential (Scenarios 2, 3, and 4); and open space (all four scenarios). Environmental impact analyses were performed for the four scenarios. Direct, indirect, and cumulative impacts were determined whenever possible. Certain resource areas (such as economics and biological resources) received proportionately more analytical emphasis, because these areas were deemed to be the most important to members of the Focus Group[1].

The Parcel ED-6 area in the land use planning process included about 328 acres. However, it did not include the area between the North Boundary Greenway and the DOE boundary east of Wisconsin Avenue and the Tennessee Department of Transportation (TDOT) right-of-way (ROW) located along SR 95. It also included approximately 36 acres that are not included within the current Parcel ED-6 boundary because that area was added to the Black Oak Ridge Conservation Easement (BORCE).

[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.

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 had mixed feelings about uses for the remaining land, as reflected in discussions of and conclusion for the four land use scenarios. While there were some preferences, no one scenario could be judged as representing a consensus of the Focus Group. In the September 2002 *Final Report of the Oak Ridge Land Use Planning Focus Group,* the members of the Focus Group agreed to present these mixed results, leaving their interpretation to DOE (Focus Group 2002).

As part of the public involvement process for this EA, DOE held an informal information meeting on November 18, 2004, at the DOE Information Center in Oak Ridge. Approximately 50 people attended the meeting. Comments received during and after the meeting dealt primarily with the North Boundary Greenway, impacts of the potential development on Wisconsin Avenue and the homes along Whippoorwill Drive, and the relationship of Parcel ED-6 to the ORR Land Use Planning Process and the BORCE. After the release of the Draft EA, DOE held another informal public information meeting on August 23, 2005. This meeting was attended by approximately 35 people. Comments received during the meeting were similar to those received during and after the November 2004 meeting. The comments and DOE's responses are located in Appendix A.

Based on the comments received from the public during the information meetings and the public comment period, DOE made two decisions that impacted the proposed action. The first decision eliminated the new fire protection/boundary patrol road that was part of the original proposed action in the Draft EA. The other decision was to revise the western boundary of the parcel to more closely follow the topography of the property. As a result of the redrawn boundary, the total area of Parcel ED-6 was reduced from approximately 362 acres to 336 acres. The area between the old western boundary of the parcel and the revised boundary would remain as DOE property and would serve as a buffer between the anticipated residential development and the BORCE.

1.3 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

This EA presents information on the potential impacts associated with the proposed conveyance of Parcel ED-6 to the city of Oak Ridge. DOE has prepared this EA to assess the potential consequences of its activities on the human environment in accordance with the Council on Environmental Quality (CEQ) regulations (40 *CFR* Parts 1500–1508) implementing National Environmental Policy Act of 1969 (NEPA) and 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 and will proceed with the action. If impacts are identified as potentially significant, an Environmental Impact Statement will be prepared.

This EA (1) describes the existing environment for Parcel ED-6 relevant to potential impacts of the proposed action and alternatives; (2) analyzes potential environmental impacts that could result from the proposed action; (3) identifies and characterizes cumulative impacts that could result from the proposed action in relation to other ongoing or proposed activities within the surrounding area; and (4) provides DOE with environmental information for use in prescribing restrictions to protect, preserve, and enhance the human environment and natural ecosystems.

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.

Implementation of the proposed action also requires compliance with Sect. 120 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Section 120(h) requires the identification of uncontaminated property transferred by federal agencies. This identification is based on an investigation of the property to determine the presence or likely presence of a release or threatened release of any hazardous substance or any petroleum product or its derivatives on the property.

DOE prepared a CERCLA Sect. 120(h) report (DOE 2006) to satisfy this requirement. The report documents the review of Parcel ED-6 and pertinent records to identify any areas on the parcel where hazardous substances or petroleum products were known to have been released or disposed of. Based on its investigation and the information set forth in the document, DOE has identified Parcel ED-6 as "uncontaminated property" in accordance with CERCLA Sect. 120(h)(4)(A). The U. S. Environmental Protection Agency (EPA) concurred with DOE's classification that Parcel ED-6 is "uncontaminated" per CERCLA Sect. 120(h)(4). A copy of the letter from the EPA is located in Appendix B.

2.0 DESCRIPTION OF ALTERNATIVES

2.1 PROPOSED ACTION

DOE has determined that Parcel ED-6 is excess property and under 10 *CFR* Part 770 proposes to convey this property to the city of Oak Ridge for the development of new residential housing.

For the purposes of analysis, this EA assumes that after Parcel ED-6 is conveyed, the city of Oak Ridge would sell the property to a private developer. City staff would review the residential development plans to ensure compliance with all applicable zoning ordinance requirements and other engineering-related ordinances and standards. Constraints on developing portions of the parcel include the Tennessee Valley Authority (TVA) power line and ROW, steep topography (i.e., slopes >10%), and the North Boundary Greenway Trail. Thus, all 336 acres are not equally developable and other complimentary uses (e.g., open space, recreational elements, etc.) may be incorporated into any future development.

2.2 NO ACTION ALTERNATIVE

Under the no action alternative, which provides an environmental baseline with which impacts of the proposed action and alternatives can be compared, Parcel ED-6 would not be conveyed for development. The parcel would be retained as DOE property and would continue in its current use (e.g., utility easement, limited security and facility buffer, wildlife management, forestry, and environmental monitoring).

2.3 MIXED DEVELOPMENT ALTERNATIVE

This alternative is similar to the proposed action because the same amount of acreage would be conveyed to the city of Oak Ridge. However, in addition to residential development, a portion of Parcel ED-6 could be used for commercial development (e.g., retail businesses or offices). The most likely location for any commercial development would be the portion of the parcel located between the Oak Ridge Turnpike (SR 95) and East Quarry Road.

2.4 CONSERVATION EASEMENT ALTERNATIVE

Under this alternative, DOE could add all or a portion of Parcel ED-6 located west of Wisconsin Avenue into the BORCE area. For bounding purposes, the analysis assumes that the entire portion would be added into the BORCE. The state of Tennessee, DOE, U. S. Fish and Wildlife Service (USFWS), and TVA, in response to natural resource damages at the Lower Watts Bar Reservoir, developed this conservation easement through a joint effort. The approximately 3000 acres of DOE ORR land will be managed in accordance with state laws addressing natural areas and wildlife management areas (WMAs). Additional information on the conservation easement can be found in the BORCE Draft Management Plan (TDEC 2004). The remaining portion of Parcel ED-6 would be transferred to the city of Oak Ridge.

3.0 AFFECTED ENVIRONMENT

3.1 LAND USE

Parcel ED-6 consists of approximately 336 acres located on the eastern end of ORR. The parcel is also located within the city limits of Oak Ridge and is currently zoned as Federal Industry and Research (FIR). The majority of the parcel is undeveloped and serves multiple uses that include utility easement, limited security and facility buffer, wildlife management, forestry, and environmental monitoring.

The property is also part of the National Environmental Research Park (NERP). NERP serves as an outdoor laboratory for studying the nature of present and future environmental consequences from energy-related issues such as global and regional change, environmental stresses, and resource use. Active research within the boundary of Parcel ED-6 includes a soil sampling site for ecosystem and landscape scale studies. The parcel is also located within the Poplar Creek Road Unit of the Oak Ridge WMA, which is managed by the Tennessee Wildlife Resources Agency (TWRA). Deer and turkey hunts are conducted in the area at various times during the year. However, archery hunters may not hunt within 100 yards of residential areas, and gun hunters may not hunt within 400 yards of residential areas.

Development on the property includes a TVA power line and ROW, three roads (Wisconsin Avenue, North Boundary Patrol Road, and East Quarry Road), a water pump station, and a water tank. The North Boundary Patrol Road also serves as the North Boundary Greenway Trail through a license DOE granted to the city of Oak Ridge in 1999. Wisconsin Avenue is maintained by the city and provides access to the residential development located along Whippoorwill Drive.

Land uses immediately adjacent to Parcel ED-6 are varied. Residential developments are located to the north and east of the parcel. The area to the west of the parcel is part of the ORR land included in the BORCE. Although not immediately adjacent to Parcel ED-6, the Horizon Center Industrial Park is also located west of the parcel. The Oak Ridge Turnpike (SR 95) runs along the southern portion of the parcel. Land use further south of the highway is primarily agricultural land and some limited residential development.

3.2 AIR QUALITY

The state of Tennessee has adopted the National Ambient Air Quality Standards (NAAQS) set by EPA for six principal pollutants considered harmful to public health and the environment. These pollutants include particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$) in diameter, sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), lead (Pb), and ozone (O_3). Based on the ambient (outdoor) levels of the criteria pollutants, EPA evaluates individual Air Quality Control Regions to establish whether or not they meet NAAQS. Areas that meet NAAQS are classified as attainment areas; areas that exceed NAAQS for a particular pollutant(s) are classified as non-attainment areas for the pollutant(s).

Air quality surrounding the Oak Ridge area is relatively good. However, Anderson County has been designated as a non-attainment area for the 8-hour O_3 standard, as part of the larger Knoxville non-attainment area. Also, Anderson County and a portion of Roane County have been designated as non-attainment for the new, stricter federal fine particulate matter ($PM_{2.5}$) air quality standard. For all other criteria pollutants for which EPA has made attainment designations, existing air quality in the greater Knoxville and Oak Ridge areas is in attainment with NAAQS.

Oak Ridge is located in a Class II prevention-of-significant-deterioration (PSD) area. One set of allowable increments exists for Class II PSD areas, and more stringent increments apply to Class I PSD areas, which include national parks that exceed 6000 acres and some other national parks, monuments, wilderness areas, and other areas specified in 40 *CFR* 51.166. The nearest such area is the Great Smoky Mountains National Park, located about 35 miles southeast of Oak Ridge. PSD standards exist for SO_2, NO_2, and PM-10.

3.3 GEOLOGY AND SOILS

3.3.1 Site Geology

Oak Ridge lies within the Valley and Ridge Physiographic Province of the Southern Appalachian Mountains. The Valley and Ridge Province in Tennessee consists of Cambrian- to Ordovician-age sedimentary rocks that occur as northeast-southwest-trending thrust sheets formed during the Late Paleozoic Appalachian mountain-building episode, which has created the pattern of parallel valleys and ridges characteristic of the region. Erosion-resistant sandstones, siltstones, dolomites, and cherty formation help form the higher ridges while less-resistant limestones and shales underlie the valleys. Karst processes that form sinkholes and cavern systems have created extensive underground drainage networks in the more soluble carbonate-rich rocks.

Discussions of the regional geology and structural and stratigraphic relationships on ORR can be found in the *Status Report on the Geology of the Oak Ridge Reservation* (Hatcher et al. 1992), and detailed discussions of the geology and geologic structure of the area immediately west of Parcel ED-6 can be found in Lemiszki (1994 and 1995). The geologic formations underlying Parcel ED-6 are indicated on Fig. 3.1 and include those of the Knox Group and the lower portion of the Chickamauga Supergroup.

The Knox Group, which underlies the northern two-thirds of Parcel ED-6, consists of carbonates that have been divided into five formations based primarily on the characteristics of chert and sandstone blocks preserved in the residuum. The Knox Group includes, from oldest to youngest, the Copper Ridge Dolomite, the Chepultepec Dolomite, the Longview Dolomite, the Kingsport Formation, and the Mascot Dolomite. For the most part, these rocks range from massive- to medium-bedded, fine- to coarse-grained dolomite with some interbedded limestones, primarily in the Kingsport Formation, and sandstone lenses, all containing chert. These formations weather chiefly by solutional attack with irregular thicknesses of soil developed above them.

The Chickamauga Supergroup includes the Stones River Group of formations, which occupy the southern one-third of Parcel ED-6. The Stones River Group includes the Pond Spring Formation, the Murfreesboro Limestone, the Ridley Limestone, and the Lebanon Limestone. These formations range from massive-bedded limestones to thin, irregular-bedded calcareous shales colored from dark gray to maroon, green, and yellowish-red with some beds containing abundant fossils.

Monoclinal dipping beds with northeast strike and southeast dips characterize the bedrock underlying Parcel ED-6. The mean strike and dip for these formations along strike in the vicinity of the East Tennessee Technology Park (ETTP) west of the parcel, as determined by Lemiszki (1995), is N49°E/35°SE. Lemiszki (1995) notes that faults are rare to nonexistent and fractures are generally consistent, with two primary bedding plane normal sets, and as many as three additional fracture sets present locally in these same rocks in the vicinity of ETTP. The secondary fracture sets have orientations at 30 to 45° east and west of the primary sets, resulting in east-west and north-south fracture orientations. The primary structural feature in the vicinity of Parcel ED-6 is the East Fork syncline (bowl-shaped fold), which lies to the south. This feature was developed on the footwall of the Whiteoak Mountain fault and

preserves younger rocks in the center of this feature. The leading edge of the Whiteoak Mountain fault lies approximately 5500 ft south of the parcel. A part of the Whiteoak Mountain fault, known as the K-25 fault, has been mapped to within approximately 4500 ft of the southwestern corner of Parcel ED-6 where it appears to terminate within the rocks of the north limb of the East Fork syncline. Karst development is common in the carbonate rocks of the Knox Group throughout ORR. Lithologic and bedding variations in the Chickamauga Supergroup result in less dramatic karst development in these rocks, but it still occurs. Sinkholes and related surface depressions in the vicinity of Parcel ED-6 indicate that karst development is present. A cave exists at the base of the north slope of Blackoak Ridge approximately 3000 ft northwest of the parcel. A relatively large sinkhole located approximately 1200 ft southwest is indicated on the U. S. Geological Survey topographic map. This sinkhole has developed within rocks of the Chickamauga Supergroup.

3.3.2 Soils

Soils underlying Parcel ED-6 can be generally characterized as well-drained residuum and colluvium derived from Knox Group dolostones and Chickamauga Supergroup limestones and shales. Depth to bedrock is typically 50 ft or more over the Knox Group with bedrock generally being shallower over the Chickamauga Supergroup rocks. The soils in the area have been mapped as primarily consisting of Fullerton cherty silt loam and Clarksville cherty silt loam with smaller areas of Dewey silty clay loam, Talbott silty clay loam, Colbert silty clay loam, and Roane gravelly loam (USDA 1942). Soils of the Fullerton and Clarksville series occupy the majority of the site and are found on the steep, hilly, and rolling portions of the parcel, while soils of the other series primarily occupy the low areas near streams and East Fork Poplar Creek.

Soils of the Fullerton series are described as being well-drained, strongly acid, moderately cherty, and moderately productive soils originating from the weathering of moderately cherty dolomitic limestone. In uneroded areas, Fullerton cherty silt loam has a brownish-gray loose silt loam surface soil about 10 to 15 in. thick. This layer normally contains a moderate quantity of chert fragments. Underlying the surface soil is the yellowish-red or pale-red silty clay or silty clay loam subsoil, about 25 to 35 in. thick. This subsoil also contains a moderate quantity of chert fragments. Underlying the subsoil is the substratum consisting of reddish-yellow silty clay splotched with yellow, red, brown, and gray. This material is generally tight, sticky, and plastic and contains a moderate quantity of chert fragments. The substratum continues to bedrock, which lies from 20 to 30 ft below the surface in most places (USDA 1942). The eroded phase of the Fullerton, which has also been mapped in the Parcel ED-6 area, is similar to the above with the exception that most or all of the surface soil is missing from this phase. Like the Fullerton soils, the Clarksville soils are developed from the residuum of cherty dolomitic limestone. These soils have similar characteristics; however, the Clarksville soils contain more chert and have lighter colored surface soils and yellow rather than yellowish-red subsoils.

3.4 WATER RESOURCES

3.4.1 Groundwater

The principal aquifers in the Oak Ridge area include two general hydrologic units, the Knox Aquifer and the ORR Aquitards. The Knox Aquifer includes the Knox Group, which underlies the northern two-thirds of Parcel ED-6, and the Maynardville Limestone of the Conasauga Group. Flow in the Knox Aquifer is primarily through solution cavities and enlarged fractures. The ORR Aquitards are associated with the remaining geologic units in the area, including the Chickamauga Supergroup that underlies the southern third of Parcel ED-6. Hydraulic conductivity and potential yield in the ORR Aquitards are generally low and highly variable, depending on the density, width, and

interconnectedness of local bedrock fractures and solution cavities. Shallow groundwater is expected to follow topography and discharge to the south into East Fork Poplar Creek. Groundwater flow in bedrock likely follows solution-enlarged features, such as bedding planes and fractures, with movement both along geologic strike and dip of the bedrock formations.

Groundwater is not used for agricultural, drinking, or industrial purposes in Oak Ridge. All water users in the area obtain water directly from the Oak Ridge municipal water system. There are no groundwater wells that extract water for drinking water purposes within a 2-mile radius of Parcel ED-6.

3.4.2 Surface Water

Surface water features on Parcel ED-6 are limited. Storm water runoff from the parcel either infiltrates in the ground or drains to one of four intermittent streams, which eventually discharge into East Fork Poplar Creek. These intermittent streams are dry for much of the year and typically have only ephemeral flow after precipitation events.

3.5 FLOODPLAINS AND WETLANDS

Parcel ED-6 is located outside of the East Fork Poplar Creek floodplain and the published Oak Ridge flood hazard zone boundaries. A walkover survey of Parcel ED-6, conducted by wetland scientists in October 2004, did not identify the presence of any wetlands on the property.

3.6 ECOLOGICAL RESOURCES

3.6.1 Terrestrial Habitat

The Oak Ridge area provides a variety of habitat types that support a large number of plant and animal species. Vegetation on Parcel ED-6 includes mixed hardwood, mixed hardwood/pine, mixed hardwood/cedar, pine, kudzu, prairie, and maintained lawn habitats (Fig. 3.2).

Mixed hardwoods occur on the steeply sloping eastern and western portions of the parcel. This community is characterized by dominant mature trees consisting of white oak (*Quercus alba)*, black oak (*Quercus velutina)*, southern red oak (*Quercus falcate)*, mockernut hickory (*Carya tormentosa*), yellow-poplar (*Liriodendron tulipifera)*, sugar maple (*Acer saccharum)*, and red maple (*Acer rubrum)*, along with a variety of other trees and shrubs.

The mixed hardwood/pine habitat type also occurs on the steeper slopes within the center and eastern portions of the site. Dominant species of this plant community include a variety of mature oaks, hickories, and miscellaneous other hardwood species in association with shortleaf pine (*Pinus echinata*), Virginia pine (*Pinus virginiana*), and eastern white pine (*Pinus strobe*). This habitat type also includes areas of mixed-aged (mature and immature) scrub hardwood stands that have developed where the mature pines were impacted by the Southern pine beetle.

Mixed hardwood/cedar habitat occupies most of the south side of the parcel on gently sloping to nearly level land of lower elevations. Dominant species of this plant community include mature chinquapin oak (*Quercus muehlenbergii*), black walnut *(Juglans nigra*), American elm (*Ulmus Americana*), slippery elm *(Ulmus rubra*), boxelder *(Acer negundo*), green ash (*Fraxinus pennsylvatica*), and eastern redcedar (*Juniperus virginiana*).

The loblolly pine (*Pinus taeda*) habitat type is found in scattered areas throughout the site. In most cases, this type includes relatively homogenous stands of loblolly pine of varying age. This habitat type occurs in former mature pine plantations that were impacted by the Southern pine beetle infestation in the 1990s, which have since regenerated back to pine via natural recruitment. In most cases, these are immature stands (10 to 15 years), but there are pockets of older trees that were not affected by the pine beetle.

A fairly large (approximately 3 acres) patch of kudzu vine (*Pueraria montana)* has developed in the southeast corner of the parcel in the TVA ROW and along the North Boundary Road Greenway. Additionally, there are a number of other exotic, invasive plants on the property. These plants occur throughout the parcel in all habitat types. Some of the primary species observed include autumn-olive (*Elaeagnus umbellate*), Chinese privet (*Lingustrum sinense*), English privet (*Ligustrum vulgare*), Japanese honeysuckle (*Lonicera japonica*), bush honeysuckle (*Lonicera maacaii*), and Nepal grass. In addition, several mimosa trees (*Albizia julibrissin*) are present along the gravel access road on the south side of the property.

The prairie community type is present within and adjacent to the TVA power line ROW that crosses the southern portion of the site. This habitat is typically maintained by prescribed burning, but has developed in the TVA ROW because of periodical clearing to eliminate woody vegetation. Dominant species include big bluestem grass (*Andropogon gerardii*), broomsedge grass (*Andropogin virginicus*), and various other native warm-season grasses, along with scrubby immature hardwoods and shrubs (blackberries and sumac).

Maintained lawn occurs in areas that are frequently mowed. Dominant plants include Kentucky-31 fescue and various other lawn grasses, as well as herbaceous plants. This manmade landscape feature is present near the water tower on the ridge top, the utility building on the east side, and along the roadside ROWs.

3.6.2 Interior Forest

As part of the ORR Land Use Planning process, an analysis was performed to determine the impacts of the land use scenarios that would result in the creation of an additional edge in forested areas and the loss of interior forest habitat. Interior forest habitat was defined as a forested area that possesses more than 70% canopy cover. For analysis purposes, the minimum acreage required by interior forest wildlife was defined as 50 contiguous acres (ORNL 2002). Interior forest habitat is important for many forest species, especially neo-tropical migratory songbirds whose populations have been declining. Interior forest habitat on Parcel ED-6 was estimated to be about 141 acres, which are part of a larger contiguous area (approximately 878 acres) of interior forest habitat located along Blackoak Ridge and which is part of the BORCE.

Interior forest habitat was calculated by applying a 200-m edge around forested areas within the ORR Land Use Planning process study area. The edge was measured from any feature that broke the tree cover, such as roads, rivers, ROWs, etc. Small streams and roads that exist under the tree canopy were deemed to not need a 200-m edge. After defining the 200-m edge on all sides of the forested areas, the remaining forest habitat inside of the edge area was considered interior forest habitat. The 200-m edge effect is considered to be a very conservative measurement and many studies that have been conducted on the subject of how edge effects interior forest habitat use 100-m as a guide.

3.6.3 Terrestrial Animals

A terrestrial animal survey has not been conducted for Parcel ED-6. However, the available habitat on the parcel surely supports a moderately diverse group of animals. Wildlife species that would be expected to occur include those species typically found in urban settings (due to the close proximity of residential developments) and species that typically occur on ORR in less developed areas.

Species typically found in urban settings include mammals such as the gray squirrel (*Sciurus caroliniensis*), chipmunk (*Tamias striatus*), cottontail rabbit (*Sylvilagus floridanus*), striped skunk (*Mephitis mephitis*), groundhog (*Marmota monax*), and gray fox (*Urocyon cinereoargenteus*). Animals that may inhabit other portions of Parcel ED-6 include small mammals such as the white-footed mouse (*Peromyscus leucopus*), golden mouse (*Ochrotomys nuttalli*), and short-tail shrew (*Blarina brevicauda*), as well as the red fox (*Vulpes vulpes*), coyote (*Canis latrans*), white-tailed deer (*Odocoileus virginianus*), cotton rat (*Sigmodon hispidus*), and eastern harvest mouse (*Reithrodontomys humulis*).

Nearly 200 species of birds have been documented on ORR, and the area plays an important role in nesting and migration of songbirds. Surveys of songbird populations on the Oak Ridge WMA began in 1993 and are conducted as part of the Partners in Flight (PIF) program. The PIF program was established in 1990 to establish an international framework to conserve and manage bird populations, particularly Neo-tropical migrants—birds that nest in North America and spend their winter months in the New World tropics, south of the United States.

PIF monitoring indicates that 23 of the top 27 priority species for conservation in this region are present on ORR during the breeding season and many of these species are common or abundant. The wood thrush (*Hylocichla mustelina*), a species very high on the list of concern, is the second most abundant forest-breeding bird found on the Reservation. Other forest birds with conservation priority that nest on ORR include the worm-eating warbler (*Helmitheros vermivorus*), Kentucky warbler (*Oporornis formosus*), chuck-will's-widow (*Caprimulgus carolinensis*), eastern wood-pewee (*Contopus virens*), yellow-throated warbler (*Dendroica dominica*), prothonotary warbler (*Protonotoria citrea*), brown-headed nuthatch (*Sitta pusilla*), yellow-throated vireo (*Vireo flavifrons*), yellow-billed cuckoo (*Coccyzus americanus*), and summer tanager (*Piranga olivacea*). It is likely that some of these species occur within the interior forest habitat located on Parcel ED-6.

Birds commonly found in urban areas of Oak Ridge, including Parcel ED-6, are the northern cardinal (*Cardinalis cardinalis*), robin (*Turdus migratorius*), eastern bluebird (*Sialia sialis*), tufted titmouse (*Baeolophus bicolor*), black-capped-chickadee (*Poecile carolinensis*), song sparrow (*Melospiza melodia*), northern mockingbird (*Mimus polyglottos*), common grackle (*Quiscalus quiscala*), starling (*Sturnus vulgaris*), American crow (*Corvus brachyrhynchos*), house finch (*Carpodacus mexicanus*), house sparrow (*Passer domesticus*), rock dove (*Columba livia*), mourning dove (*Zenaida macroura*), northern flicker (*Colaptes auratus*), red-bellied woodpecker (*Melanerpes carolinus*), downy woodpecker (*Picoides pubescens*), blue jay (*Cyanocitta cristata*), and eastern towhee (*Pipilo erythrophthalmus*).

Other species of birds that would likely be found at Parcel ED-6 are the Kentucky warbler, ovenbird (*Seiurus aurocapillus*), brown thrasher (*Toxostoma rufum*), wood thrush, rufous-sided towhee (*Pipilo erythrophthalmus*), Carolina wren (*Thryothorus ludovicianus*), eastern meadowlark (*Sturnella magna*), indigo bunting (*Passerina cyanea*), turkey (*Meleagris gallopavo*), and quail (*Colinus virginianus*). Birds of prey that may nest or hunt on or near the parcel are the red-tailed hawk (*Buteo jamaicensis*), broad-winged hawk (*Buteo platypterus*), great horned owl (*Bubo virginianus*), screech owl (*Otus asio*), barred owl (*Strix varia*), and Cooper's hawk (A*ccipiter cooperii*).

Reptiles and amphibians that may inhabit Parcel ED-6 include the upland chorus frog (*Pseudacris triseriata*), tree frog (*Hyla versicolor*), spring peeper (*Hyla crucifer*), green frog (*Rana clamitans*), toad (*Bufo* spp.), various salamanders (*Eurycea* spp. and *Desmognathus* spp.), eastern box turtle (*Terrapene carolina*), northern copperhead (*Agkistrodon contortix*), black rat snake (*Elaphe obsolete*), and fence lizard (*Sceloporus undulates*).

3.6.4 Threatened and Endangered Species

DOE contacted the USFWS to inform them about the proposed action and to obtain the latest information on federally listed threatened and endangered (T&E) species in the area of Parcel ED-6. Information received from the USFWS is summarized below and included in Appendix B.

According to the information provided by the USFWS, the gray bat (*Myotis grisescens*) and Indiana bat (*Myotis sodalis*), both federally listed endangered species, may occur on or near Parcel ED-6. The USFWS also recommended that a biological assessment be conducted to assess potential impacts and determine if the proposed action may affect the two bat species.

DOE completed a biological assessment for Parcel ED-6 (Appendix C) that included two mist net surveys and a habitat assessment to determine the presence or probable absence of the gray bat and Indiana bat (DOE 2006).

No Indiana or gray bats were captured during the initial mist net survey conducted during August 2005. Sixty-seven bats of three species were captured in the proposed project area: the big brown bat (*Eptesicus fuscus*), red bat (*Lasiurus borealis*), and eastern pipistrelle (*Pipistrellus subflavus*). None of the three species captured is federally or state listed as endangered or threatened, and they are afforded no legal protection beyond measures that protect common species of wildlife.

Results of the habitat assessment indicated none of Parcel ED-6 provides high-quality summer habitat for Indiana bats. The majority of the parcel only provides low-quality habitat, but approximately 61 acres adjacent to Wisconsin Avenue provides moderate-quality summer habitat. The portion of the parcel located within the TVA power line ROW does not provide any suitable summer habitat for Indiana bats.

Based on the review of the 2005 mist net survey and habitat assessment, DOE and USFWS agreed to conduct another mist net survey at three additional sites within Parcel ED-6. This additional mist net survey was conducted during July 2006. Mist net locations were selected following an on-site meeting with representatives from USFWS and DOE in April 2006, and subsequent guidance from USFWS. Eight bats were captured during the survey. All of the captures were at one site and no bats were captured at the other two sites. Two species were identified during the survey: big brown bats and red bats.

There are currently 24 plant species listed by the state of Tennessee as threatened or endangered on the ORR; among them are the pink lady's slipper and Canada lily (Table 3.1). Two species occurring on the ORR, Carey's saxifrage and the purple fringeless orchid, have been removed from the state list as of November 1999 (DOE 2004).

Literature searches of previous rare plant surveys conducted on the ORR did not indicate any records of rare plants occurring on or in the immediate vicinity of Parcel ED-6. No federal- or state-listed plant species were encountered during the October 2004 walkover of the property and the parcel does not contain, or only provides limited suitable habitat for, the species listed in Table 3.1.

Table 3.1. Vascular plant species reported from the ORR listed by state or federal agencies

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

[a]Status codes:
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 located during recent surveys.
[c]*Lilium michiganense* is believed to have been extirpated from the ORR by the impoundment at Melton Hill.
[d]*Populus grandidentata* was reported in two ORR locations. One of the reports was confirmed, but the tree died during the year.
ORR = Oak Ridge Reservation.

3.7 CULTURAL RESOURCES

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).

Based on previous surveys (DuVall and Souza 1996), it was thought that Parcel ED-6 did not contain any intact cultural resources. However, because the area contains previously recorded and inventoried pre-World War II structures, DOE conducted an additional archaeological survey of the area (DuVall 2005). The survey consisted of background historical, archaeological research, and intensive pedestrian inspection of the parcel, including systematic shovel testing in areas of high resource probability.

Prehistoric activity was limited to two previously identified sites (40RE134 and 40RE228) located within or near the southern portion of Parcel ED-6. These sites could not be relocated during the survey, and

no additional prehistoric sites were identified. Both sites were reported to have prehistoric and historic artifact scatters of a very disturbed nature.

Historic resources identified within Parcel ED-6 include the remains of five previously identified pre-World War II structures. The remains of these structures were located in the vicinity of the old Gallaher Ferry Road (i.e., East Quarry Road). Surface remains include chimney falls, foundation remains, and other historic debris. The sites date no earlier than the late 19th century and were probably razed around 1942 when the government was acquiring the land as part of the Manhattan Project. All of the sites were in very poor condition and evidence of disturbance was well documented. Shovel testing in the site areas produced few artifacts associated with the 20th century occupation of the structures. The sites have limited potential for archaeological interpretation and would not be considered eligible for NRHP listing.

Based on the survey findings and research at the Tennessee Division of Archaeology and the Tennessee Historical Commission, DOE has determined that the proposed action would have no impact on any site or property eligible for or included in the NRHP pursuant to 36 *CFR* 60.4 and no further archaeological investigations are recommended. The Tennessee Historical Commission concurred with DOE's determination that the area of potential effect for this undertaking contains no cultural resources eligible for listing in the NRHP (Appendix B).

3.8 SOCIOECONOMICS

The region of influence (ROI) for the purpose of this analysis includes Anderson and Roane counties in Tennessee. Parcel ED-6 is located within the Roane County portion of Oak Ridge, and the impact of residential development will primarily affect the city and Roane County. Although business and industrial development affects a four-county or wider area, the impacts of residential development are likely to be limited to the immediate Oak Ridge area.

3.8.1 Demographic and Economic Characteristics

Table 3.2 summarizes population, per capita income, and wage and salary employment from 1999 to 2004. Population has increased slightly over the 5-year period, with Roane County accounting for most of the growth. Employment for the region declined from 74,997 in 1999 to 72,573 in 2004. Per capita income grew from $22,778 to $27,518 over the same period (Bureau of Economic Analysis 2006).

3.8.2 Distribution of Minority and Economically Disadvantaged Populations

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, Hispanic or Latino, and Some Other Race. This provides a conservative estimate consistent with recent Office of Management and Budget guidance (OMB 2000). Hispanics may be of any race and are excluded from the totals for individual races to avoid double counting.

The distribution of minority and economically disadvantaged populations changed little between 1990 and 2000. Only one of the census tracts that immediately surrounds ORR currently includes a minority population. As of the 2000 census, minorities represented 40.1% of the population in tract 201.

Table 3.2. Demographic and economic characteristics: Anderson and Roane counties

County	1999	2000	2001	2002	2003	2004	Annual growth 1999–2004 (%)
			Anderson				
Population	71,454	71,293	71,444	71,664	71,909	72,045	0.16
Per capita income ($)	24,001	25,035	25,988	26,978	27,664	28588	3.56
Total employment	50,387	50,961	50,975	50,601	51,907	51,967	0.62
			Roane				
Population	51,736	51,954	51,976	52,225	52,487	52,781	0.40
Per capita income ($)	21,091	22,339	22,638	23936	24949	26,051	4.31
Total employment	24,610	23798	20,953	20,975	20,847	20,606	-3.49
			Region Totals				
Population	123,190	123,247	123,420	123,889	124,396	124,826	0.26
Per capita income ($)	22,778	23903	24,583	25,587	26,512	27,518	3.85
Total employment	74,997	74,759	71,928	71,576	72,754	75,265	-0.65

Source: Bureau of Economic Analysis 2006.

As in 1990, Black or African-American residents comprised the largest group (29.6%) of these minorities. The proportion of minority residents in all other Oak Ridge census tracts was below the national average, ranging from 17.4% in tract 205 to 8.8% in tract 206 (Census 2000). No federally recognized Native American groups live within 50 miles of the project area.

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. The proportion in Roane County was 13.9%. Within Oak Ridge, low-income populations were located 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 Oak Ridge census tracts, the percentages ranged from 12.1% in tract 204 to 1.9% in tract 301 (Census 2000).

3.8.3 Housing

In Oak Ridge, there were 13,417 housing units in 2000, of which 12,062 (89.9%) were occupied and 1,355 (10.1%) were vacant. Of the occupied units, 68.4% were owner-occupied and 31.6% were renter-occupied (Census 2000). The total number of housing units represents a slow increase (0.6 per year) over the 12,694 housing units reported in the 1990 Census. City-wide, the median asking price for Oak Ridge housing units in 2000 was $98,200 for owner-occupied units and $80,700 for vacant units (Census 2000). Among renter-occupied units, the median rent was $487/month for occupied units and $389/month for vacant units (Census 2000).

3.8.4 Schools

The Oak Ridge school system includes eight schools, which served a total of 4286 students in 2005. The city budget for 2007 includes $12.6 million allocated for school operations. Linden Elementary School and Robertsville Middle School serve the area that includes Parcel ED-6. In 2005, there were 405 students enrolled in Linden, and 688 enrolled in Robertsville (Tennessee Department of Education 2006, City of Oak Ridge 2006). Oak Ridge has one high school. The city has recently begun a major renovation and upgrade to the high school buildings and infrastructure.

3.8.5 Police and Fire Protection

The Police Department in Oak Ridge includes 58 uniformed officers and 12 non-uniform support personnel, with a 2007 budget allocation of $5.0 million. The Oak Ridge Fire Department maintains three fire stations, staffed by over 40 uniform personnel supplemented by fire specialists. The 2007 budget allocation for the fire department is $4.0 million. The city has mutual-aid agreements with DOE and with most surrounding agencies (City of Oak Ridge 2006).

3.8.6 Fiscal Characteristics

Oak Ridge City general fund revenues and expenditures for fiscal year (FY) 2005 and budgeted revenues and expenditures for 2006 are presented in Table 3.3. 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. Local property taxes account for nearly half (48.7%) of the current general fund revenues (City of Oak Ridge 2006). For FY 2006, the property tax rate is $2.55 per $100 of assessed value. The assessment rate is 40% for industrial and commercial property and 25% for residential property (City of Oak Ridge 2005). 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 2005). In 2006, the payment was based on a value of $6,450 per acre (Hunter 2006).

Local sales taxes were the second largest source of revenue for the city of Oak Ridge, accounting for 23% of general fund revenues. In the Roane County portion of Oak Ridge, the sales tax rate is at the state maximum of 2.75%. The rate includes a 2.50% tax collected by the county and shared with Oak Ridge City, and a 0.25% city of Oak Ridge rate (City of Oak Ridge 2005).

Roane County's budget for 2006 estimates $80,842,538 in expenditures and $77,687,382 in total revenues. Property tax revenues were estimated as $20,587,201, or about 25% of total revenues. Sales taxes were expected to be $11,435,000, or 14% of revenues (Moore 2006). As of 2005, the county property tax rate for the Roane County portion of Oak Ridge was $2.02 per $100 assessed value, (Tennessee Comptroller of the Treasury 2006). Roane County also receives PILT on ORR property within the county (Huotari 2006d).

3.9 INFRASTRUCTURE

3.9.1 Transportation

Parcel ED-6 is well serviced by existing roads within the city of Oak Ridge. The main access to the parcel is from the Oak Ridge Turnpike (SR 95) on Wisconsin Avenue. The parcel can also be accessed adjacent to Wisconsin Avenue via the North Boundary Patrol Road, which is also the North Boundary Greenway. East Quarry Road, which is a gravel DOE-controlled access road, is located on the southern part of the property. The entrance to this road is off of the Oak Ridge Turnpike just west of Wisconsin Avenue.

Table 3.3. City of Oak Ridge revenues and expenditures, FY 2005 and budgeted FY 2007 ($)

	2005 Actual	2007 Budgeted
Revenues		
Taxes	19,915,688	20,933,810
Licenses and permits	340,802	220,000
Intergovernmental revenues[a]	10,574,555	11,771,300
Charges for services	388,577	346,000
Fines and forfeitures	238,503	289,000
Other revenues	527,689	558,500
Total revenues	31,985,814	34,118,610
Expenditures and other financing		
Expenditures	(14,737,841)	(16,326,766)
Other financing uses[b]	(17,503,411)	(18,997,273)
Total expenditures and other financing	(32,241,252)	(35,324,039)

Source: City of Oak Ridge 2006.
[a]Includes payment-in-lieu-of-tax (PILT).
[b]Includes items such as capital projects fund, solid waste fund, economic diversification fund, debt service, and schools.
FY = Fiscal year.

3.9.2 Utilities

Major utilities from the city of Oak Ridge (e.g., electricity, water, and sewer) that currently serve the residential developments along Whippoorwill Drive and east of Wisconsin Avenue would also be available for Parcel ED-6. Natural gas is also available from the Oak Ridge Utility District.

3.10 NOISE

The primary source of background noise on Parcel ED-6 is associated with moving vehicles traveling on the Oak Ridge Turnpike and Wisconsin Avenue. The traffic generally results in fluctuating noise levels above ambient noise levels for a short period of time. A source of stationary noise is the residential development along the north boundary of the parcel. Sensitive noise sources near or on Parcel ED-6 include the North Boundary Greenway and the homes along Whippoorwill Drive.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 LAND USE

4.1.1 Proposed Action

Under the proposed action, the present land use of Parcel ED-6 would change over time as the residential development occurs. The visual character of the majority of the parcel would change from a more natural to a more man-made-looking environment as development progressed. Conveyance of the property and the subsequent residential development would also remove the area from the NERP and the Oak Ridge WMA.

Development would be compatible with local zoning requirements and would be subject to all local, state, and federal environmental laws and regulations. Currently, Parcel ED-6 is zoned by the city of Oak Ridge as FIR. This classification was established for ORR and operations within its boundaries. Whenever ORR land is transferred from DOE to the city or a private owner for purposes not directly related to the mission of DOE, the City of Oak Ridge Municipal Planning Commission will study and make recommendations to City Council concerning the appropriate zoning district designation. Upon receipt of such recommendation, the City Council will, after public hearings as required by law, adopt an ordinance establishing the zoning district classification as other than FIR. Under the proposed action, it is assumed that, after the conveyance, the appropriate zoning district designation for the parcel would be one of the single-family residential districts in the City of Oak Ridge Zoning Ordinance.

Constraints on developing portions of the parcel include the TVA power line and ROW, steep topography (i.e., slopes >10%), and the North Boundary Greenway Trail. Thus, all 336 acres are not equally developable and other complimentary uses (e.g., open space, recreational elements, etc.) may be incorporated into the future residential development.

4.1.2 No Action

Under the no action alternative, the existing land use at Parcel ED-6 would continue and the land would remain as DOE property until any future disposition could be decided (see Sect. 2.2).

4.1.3 Mixed Development Alternative

Land use impacts under this alternative would be similar to those described for the proposed action. Any commercial use of the parcel in addition to residential development would require the appropriate zoning designation by the city of Oak Ridge. The most likely location for any commercial development would be the portion of the parcel located between the Oak Ridge Turnpike (SR 95) and East Quarry Road.

4.1.4 Conservation Easement Alternative

If the portion of Parcel ED-6 located west of Wisconsin Avenue were included in the BORCE, land use would continue to be similar to existing conditions. Management of the area would be by TWRA in consultation with the Tennessee Department of Environment and Conservation, Division of Natural Heritage and would be consistent with the terms of an agreement between TWRA and DOE. The BORCE is subdivided into two units. The East Blackoak Ridge unit, which would include Parcel ED-6, would be managed both as a WMA and a proposed state natural area. The draft management plan for the area (TDEC 2004) states that permitted uses will include hiking and nature enjoyment. Conditional uses

include hunting (in accordance with the Oak Ridge WMA agreement), pets (leashed pets may be permitted), motorized vehicles (in accordance with the Oak Ridge WMA agreement), and prescribed fires (allowed as per the agreement with DOE). Prohibited uses include horseback riding, camping, motorized and non-motorized off-road vehicle riding, rappelling, fires, collection, and consumption or possession of alcoholic beverages and controlled substances.

Under this alternative, the portion of Parcel ED-6 not added to the BORCE (located east of Wisconsin Avenue) would be conveyed to the city of Oak Ridge. Land use for this area would also likely continue to be similar to existing conditions. The area currently contains part of the North Boundary Greenway Trail and is also used as a utility ROW. A city of Oak Ridge water pumping station is also located in the area. These uses, as well as topography and drainage constraints, would probably prohibit further development for other uses.

4.2 AIR QUALITY

4.2.1 Proposed Action

During preparation and construction, the use of heavy equipment would generate combustion engine exhaust containing air pollutants associated with diesel combustion (NO_2, CO_2, SO_2, PM_{10}, and volatile organic compounds). 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. Emissions from site preparation and construction 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. There would be a relatively limited amount of construction equipment and a small number of construction workers. 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 movement. Not all of the area available for construction would be under construction at any one time. Rather, earthwork would likely be undertaken in increments, with the first phase being excavated for utility installation, road construction and upgrading, and grading/contouring. Increases in fugitive dust would probably be noticeable at each 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.

4.2.2 No Action

Under the no action alternative, air pollutants would continue to be emitted at current rates in the vicinity of each parcel, with the largest source being vehicle traffic. Vehicle emissions at the baseline level would continue to be a source of O_3 in the surrounding area.

4.2.3 Mixed Development Alternative

Construction-related air emissions under this alternative would essentially be identical to those described for the proposed action and the addition of limited commercial facilities to the development of Parcel ED-6 would still not be expected to adversely affect local air quality.

4.2.4 Conservation Easement Alternative

Because no additional development would take place under this alternative, there would be no affect on local air quality.

4.3 GEOLOGY AND SOILS

4.3.1 Proposed Action

Site clearing, grading, and contouring would alter the topography of Parcel ED-6 in the areas that would be developed under the proposed action, but the geologic formations underlying those sites should not be affected by proposed residential development. Construction would disturb soils, and some topsoil might be removed in the process. Soil erosion and runoff would be minimized with the use of appropriate sedimentation and erosion control measures. The potential for impacts to occur would exist until the disturbed areas were stabilized.

Normally, a Farmland Conversion Impact Rating would be completed to rate the relative impact of the proposed action. The rating form is based on a Land Evaluation and Site Assessment (LESA) system, which measures the quality of farmland based on soil quality and other factors that would affect a farm's viability. No LESA was completed for the proposed action because the definition of prime farmland specifically excludes from consideration lands committed to urban development. Because Parcel ED-6 is within the city of Oak Ridge and has been zoned to include nonagricultural uses (i.e., industrial and research), the parcel is exempt from consideration as prime farmland.

4.3.2 No Action

No impact to the local geology and soils of Parcel ED-6 would occur under the no action alternative because no development would take place.

4.3.3 Mixed Development Alternative

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

4.3.4 Conservation Easement Alternative

Because no additional development would occur if Parcel ED-6 were added to the proposed BORCE, there would be no impact to the local geology and soils.

4.4 WATER RESOURCES

4.4.1 Proposed Action

The greatest potential impact to surface waters would originate during development from soil erosion, runoff, and sedimentation. Changes in surface topography during construction could alter the local hydrology, and covering large areas for roads and houses would reduce water infiltration, which could potentially affect off-site surface water features. Impacts could also occur from a fuel or hazardous material spill. Surface water runoff from the parcel eventually enters East Fork Poplar Creek through one of the intermittent streams on the property. Construction activities that could indirectly impact East Fork Poplar Creek may require that the appropriate permits be obtained prior to any disturbance. Uncontrolled

soil erosion would increase sedimentation and turbidity in the receiving surface waters. Soil erosion impacts would be mitigated through the use of best management practices and appropriate sedimentation and erosion control measures. The potential for adverse impacts to occur would exist until the disturbed areas were stabilized.

Spills of fuel and/or hazardous material would have adverse impacts on surface waters if not controlled or contained. Impacts would primarily be a change to the water quality (e.g., pH, dissolved oxygen, and conductivity) that could affect vegetation and aquatic biota. The potential for spills could be mitigated through the adherence to proper safety procedures and spill prevention plans. In the event of a spill from an accident, spill response measures (e.g., sorbents, neutralizers, secondary containment, and mechanical removal equipment) would minimize potential adverse impacts.

Storm detention basins used to capture and treat storm water runoff should be designed and constructed to handle the additional runoff associated with any new development to minimize impacts to the drainage system and, potentially, East Fork Poplar Creek. Storm water runoff would be discharged to surface water in accordance with limitations established under state or other regulatory permits.

Impacts to groundwater quality could also 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 surface or groundwater (e.g., fuel) would be transported or stored at the construction sites 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 state and federal laws would minimize the severity of potential impacts from accidents.

4.4.2 No Action

Under the no action alternative there would be no impacts to surface water or groundwater resources.

4.4.3 Mixed Development Alternative

Impacts would be similar to those described under the proposed action.

4.4.4 Conservation Easement Alternative

This alternative would have a positive impact on surface water and groundwater resources in the vicinity of Parcel ED-6 because no development would occur.

4.5 FLOODPLAINS AND WETLANDS

4.5.1 Proposed Action

Parcel ED-6 is not located within any floodplain and no wetlands have been identified on the property.

4.5.2 No Action

No impacts to floodplains or wetlands would occur.

4.5.3 Mixed Development Alternative

No impacts would occur.

4.5.4 Conservation Easement Alternative

This alternative would not impact any floodplain or wetland because none are present at Parcel ED-6.

4.6 ECOLOGICAL RESOURCES

4.6.1 Proposed Action

Development on Parcel ED-6 would have direct impacts on terrestrial plants and animals. Construction impacts would include direct mortality or injury to biota and the elimination or further fragmentation of the majority of the existing habitat present on the parcel. Wildlife impacts would be minimal because many of the species that likely occur on the parcel are common in the Oak Ridge area and some species could relocate to similar habitats located immediately adjacent to the parcel.

Development of Parcel ED-6 would result in the elimination of interior forest habitat (see Sect. 3.6.2). If the entire parcel was cleared and developed, the maximum loss of interior forest habitat would be approximately 231 acres. This includes the potential direct loss of about 141 acres of interior forest habitat within Parcel ED-6 and an additional loss of approximately 90 acres adjacent to the western boundary of the parcel. The forested area adjacent to Parcel ED-6 would not be directly impacted but indirect impacts could result from any new edge habitat that would be created. It should be noted that is a very conservative estimate of the total loss of interior forest habitat that could potentially occur. It is also very likely that development plans for the parcel would include some additional buffer areas between the new residential development and the western boundary of the parcel, which would reduce the potential net loss of interior forest habitat.

Elimination of this habitat and the resulting increase in forest fragmentation would have an adverse impact on neo-tropical migratory birds that use the area for both breeding and migration. Not only does forest clearing remove usable wildlife habitat, the removal of trees results in additional breaks in the forest canopy and increases the amount of edge habitat. Increased edge means that predators such as domestic cats, snakes, and raccoons that would not usually find bird nests within the interior forest can now gain access to nests and either eat the eggs or young birds. Parasitism of nests also increases with the increase of edge for the same reason. For example, the brown-headed cowbird is notorious as a brood parasite. This means that it never builds a nest but, instead, lays its eggs in the nests of other species of birds.

Surface water features on the parcel are limited to intermittent streams. These intermittent streams are dry for much of the year and typically have only ephemeral flow after precipitation events. Direct adverse impacts to aquatic resources would be unlikely.

Minimizing the amount of earthmoving activities would reduce the impacts to ecological 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 housing, should be revegetated after construction is completed. The use of native species for revegetation would have a positive impact.

Conveyance of Parcel ED-6 would remove the area from the Oak Ridge WMA, and hunting would no longer occur on and in the immediate vicinity of the property. However, the removal of this property from the WMA would not adversely affect the management and control of the ORR deer population. In 2004, no deer were killed within Parcel ED-6, and only three deer were taken from the area located immediately to the west. Since 1985, only 138 deer out of a total of 8865, or approximately 1.6%, have been killed in the general vicinity of Parcel ED-6.

No federal- or state-listed T&E plants or animals are known to exist at Parcel ED-6. DOE concluded, based on the results of the mist net surveys and the information presented in the biological assessment prepared for the USFWS, that the proposed conveyance of Parcel ED-6 is not likely to adversely affect either the gray bat or Indiana bat. Neither species appears likely to be present on Parcel ED-6, and proposed or designated critical habitats for the species are not present on or near the parcel. No caves, other suitable hibernacula, or roosting habitat for gray bats are present at Parcel ED-6. However, caves that could provide potential roosting habitat for the gray bat are present within 5 miles of the property. Although the ultimate use of Parcel ED-6 would eventually require removal of trees, the majority of the potential summer roosting habitat on the parcel is considered low to moderate quality for Indiana bats. Also, there is better quality summer habitat and adequate numbers of suitable and potentially suitable roost trees available immediately adjacent to Parcel ED-6 in the BORCE area. Surface water resources on the parcel are limited to intermittent streams, but East Fork Poplar Creek provides a permanent source of water within 100 ft of Parcel ED-6. The USFWS, in a letter dated April 10, 2007, stated that the requirements of Sect. 7 of the Endangered Species Act have been fulfilled for the transfer of Parcel ED-6 and that no further consultation is needed (Appendix B).

4.6.2 No Action

No additional impacts to terrestrial or aquatic habitats, plants, and animals would occur under the no action alternative. Parcel ED-6 would remain DOE property and the current land use would remain unchanged until any future disposition could be decided (see Sect. 2.2).

4.6.3 Mixed Development Alternative

Under the mixed development alternative, potential impacts to ecological resources on and adjacent to Parcel ED-6 would be similar to those described for the proposed action.

4.6.4 Conservation Easement Alternative

The conservation easement alternative would have a positive impact on the ecological resources of Parcel ED-6 because the property would be protected from development. The greatest beneficial impact of this alternative would be the protection of the interior forest habitat of the parcel and its associated species.

4.7 CULTURAL RESOURCES

4.7.1 Proposed Action

Based on the results of a Phase I archaeological survey performed on Parcel ED-6, DOE determined that no archaeological resources would be affected by the proposed action. It was also determined that none of the historical resources present on the parcel would be eligible for listing in the NRHP pursuant to 36 *CFR* 60.4. The Tennessee Historical Commission reviewed the archaeological survey report and

concurred with DOE that no archaeological resources eligible for listing in the NRHP are located within the project area (Appendix B).

4.7.2 No Action

There would be no impacts on cultural resources under the no action alternative.

4.7.3 Mixed Development Alternative

Impacts under this alternative would be the same as those described under the proposed action.

4.7.4 Conservation Easement Alternative

Although Parcel ED-6 does not contain any sites or properties on or eligible for listing in the NRHP, this alternative would serve to protect the remains of existing sites from any additional disturbance due to development activities.

4.8 SOCIOECONOMICS

4.8.1 Proposed Action

This section assesses the potential socioeconomic impacts of the Parcel ED-6 conveyance and residential development. Residential development is expected primarily to affect local tax revenues through increases in property values and the shift from government to private ownership. This analysis assumes that there would be no commercial or retail development on Parcel ED-6 and that residential development would have no direct impact on employment other than temporary construction employment.

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.

Because development plans have not been finalized or approved at this time, the number of new houses that could be constructed on Parcel ED-6 is not known. The analysis in this EA assumes that the number of new units would range from a minimum of 315 to a maximum of 385 new units. This is based on informal conversations with developers and input received at the DOE public information sessions that were held on the EA.

4.8.1.1 Demographics

Population. Parcel ED-6 is located in Census Tract 301 within Oak Ridge, and new housing is expected to be similar to existing housing in this area. The average household in this census tract consisted of 2.51 persons in 2000 (Census 2000). Assuming all units are occupied by a similar mix of residents suggests that the local population would increase by a maximum of 966 residents, which represents less than a 1% increase in population for the ROI compared to the 2003 population. The same

figure would represent a 3.5% increase in population for the city of Oak Ridge compared to 2000 Census figures. However, any increase in the Oak Ridge population may also represent a shift in relative population share from other parts of the region into Oak Ridge, rather than a net gain for the region.

Environmental Justice. Executive Order 12898, "Federal Actions 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. Current assumptions suggest there would be no high and adverse human health or environmental impacts, and residential development does not normally result in such adverse impacts. Therefore, the proposed action is not expected to have a disproportionate adverse effect on low-income and minority populations.

4.8.1.2 Employment and income

As discussed earlier, this analysis assumes that developing Parcel ED-6 would create no direct, full-time-equivalent jobs. Therefore, no direct impacts on ROI employment or income are anticipated.

4.8.1.3 Housing

As discussed in Sect. 4.8.1, the analysis of socioeconomic impacts in this EA is based on an estimated 315 to 385 new houses to be constructed on Parcel ED-6. This would result in a 2.3 to 2.9% increase in housing stock for the city of Oak Ridge.

4.8.1.4 Schools

The proposed action is likely to have limited impact on the local schools, but the actual impact would depend on the housing density of the final development and the age distribution of the new residents. Based on the relatively small increase in Oak Ridge population, the expected number of additional students would also be small and there would be little or no impact on local schools.

4.8.1.5 Police and fire protection

The existing levels of police and fire protection are adequate for any future residential development on Parcel ED-6, and the proposed action is expected to have minimal impact on police and fire protection resources.

4.8.1.6 Fiscal impacts

The main impact of the proposed conveyance is likely to be its effect on city of Oak Ridge and Roane County finances. Potential positive impacts include additional tax revenues generated by private ownership and development of Parcel ED-6, increased land values in the developed parcel, and potential increases in sales tax revenue if new residents make enough purchases within the city. Potential negative fiscal impacts include loss of the DOE PILT revenues for approximately 336 acres once they are transferred into private hands, and any additional costs to provide services to a new residential area.

Based on the information in Sect. 4.8.1.1, recent home sales in the adjacent area of Oak Ridge and current tax rates upper and lower bounds for potential impacts on property tax revenues in Oak Ridge were calculated, as shown in Table 4.1.

At the lower bound, city of Oak Ridge revenues would increase by roughly 1.5% over actual revenues in 2005, while at the upper bound revenues would increase 3.2% over 2005 levels. Based on the

same assumptions and a tax rate of $2.02 per $100 assessed value, Roane County would receive a similar increase in revenues, as shown in Table 4.2. For the county, potential revenues would represent a 0.5% to 1.0% increase over revenues estimated in the 2006 budget. The costs of any additional services required for the new residential development are unknown at this time. Both the city of Oak Ridge and Roane County would receive additional revenue from sales tax on purchases made by the new residents. However, the actual amount would depend on the specific spending patterns of the new residents.

Table 4.1. Potential property tax impacts for Oak Ridge from Parcel ED-6 residential development

Housing density	Total housing units	Value/unit[a]	Total value	Assessed value (× 0.25)	Property tax revenue	PILT reduction	Net tax revenue
Lower bound	315	$245,000	$77,175,000	$19,293,750	$491,991	($13,816)	$478,175
Upper bound	385	$417,000	$160,545,000	$40,136,250	$1,023,474	($13,816)	$1,009,658

[a]Maximum and minimum values of homes sold in the Westwood area in 2005 and early 2006 (Crouch 2006 and Hanrahan 2006).

Tax rate = $2.55/$100 assessed value (City of Oak Ridge 2006).

Payment-in-lieu-of-tax (PILT) reduction = 336 acres × $6,450/acre × 0.25 × $2.55/$100 = $13,816.

Table 4.2. Potential property tax impacts for Roane County of Parcel ED-6 residential development

Housing density	Assessed value	Property tax revenue	PILT reduction	Net tax revenue
Lower bound	$19,293,750	$389,734	$10,944	$378,789
Upper bound	$40,136,250	$810,752	$10,944	$799,808

Tax rate = $2.02/$100 assessed value (Tennessee Comptroller of the Treasury 2006).

Assessment rate = 0.25 x total value.

Payment-in-lieu-of-tax (PILT) reduction = 336 acres × $6,450/acre x 0.25 x 2.02/$100=$10,944.

4.8.2 No Action

Under the no action alternative, there would be no change in anticipated population, employment, income, or fiscal characteristics, and no disproportionate effect on minority or low-income populations. The no action alternative would also not have any impacts on schools or police and fire protection.

4.8.3 Mixed Development Alternative

Under the mixed development alternative, potential socioeconomic impacts would be similar to those described for the proposed action, but with additional positive impacts on employment, income, and city finances. The analysis below uses the same assumptions as for the proposed alternative, with the following changes:

1. Ten percent of the acreage (34 acres) is used for commercial development (office or retail).

2. Property tax revenue from residential development would be reduced by 10% from the value shown for the proposed alternative.

3. Value of commercially developed land will range from $400,000 to $1,600,000 per acre, as estimated in the Land Use Technical Report (ORNL 2002).

4. Commercial land is assessed at 40% of value.

5. Commercial development will generate seven jobs per acre, as estimated in the Land Use Technical Report (ORNL 2002).

4.8.3.1 Population

Impacts under this alternative would be 90% of those described under the proposed action for an increase of 869 residents. This represents a less than 1% increase over ROI population in 2003 or a 3.1% increase over Oak Ridge population in 2000.

4.8.3.2 Employment and income

Based on the assumptions above, successful commercial development would create an estimated 238 jobs (7 jobs/acre × 34 acres), for a net change of 0.3% in ROI employment compared to the 2003 baseline. The expected change in income would be similar to the change in employment.

4.8.3.3 Schools

Impacts to Oak Ridge City schools would be the same as those described for the proposed action.

4.8.3.4 Police and fire protection

The addition of commercial development would not impact police and fire protection resources provided by the city of Oak Ridge.

4.8.3.5 Fiscal impacts

Under the mixed development alternative, potential fiscal impacts would include the property tax revenue from both residential and commercial development and sales tax revenue from any retail establishments in the development. Based on the assumptions above, estimated property tax for the city of Oak Ridge from commercial development could range from $138,720 to $554,880, as shown in Table 4.3. Table 4.4 shows the range of the potential impact on net revenues, using the assumptions identified above. The lower bound on net tax revenue would then be an annual increase of $570,101 or 1.8% of city of Oak Ridge revenues in 2004. At the upper bound, $1,464,596 would represent an increase of about 4.5% in city revenues. Table 4.5 shows a similar increase in Roane County revenues, for a change of 0.6% to 1.5% in annual county revenues compared to 2006 estimates. Sales taxes from commercial sales would also increase tax revenues, but the amount would depend on the specific types of commercial development and local residents' actual buying patterns.

4.8.4 Conservation Easement Alternative

Under the Conservation Easement Alternative, there would be no change in anticipated population, employment, income, or fiscal characteristics, and no disproportionate effect on minority or low-income populations. This alternative would also not have any impacts on schools or police and fire protection. DOE would retain ownership of the land, and there would be no change in the PILT.

Table 4.3. Potential city of Oak Ridge property tax revenue from Parcel ED-6 commercial development

	Acres	Value/acre	Total value	Assessed value (× 0.40)	Property tax revenue: Commercial
Lower bound	34	$400,000	$13,600,000	$5,440,000	$138,720
Upper bound	34	$1,600,000	$54,400,000	$21,760,000	$554,880

Table 4.4. Potential city of Oak Ridge net property tax revenue from Parcel ED-6 with limited commercial development

	Residential property tax revenue[a]	Commercial property tax revenue	PILT reduction	Net tax revenue
Lower bound	$442,792	$138,720	($11,410)	$570,101
Upper bound	$921,127	$554,880	($11,410)	$1,464,596

[a] 90% of residential tax revenues from Sect. 4.8.1.5.
PILT = payment-in-lieu-of-tax.

Table 4.5. Potential Roane County net property tax revenue from Parcel ED-6 with limited commercial development

	Residential property tax revenue[a]	Commercial property tax revenue	PILT reduction	Net tax revenue
Lower bound	$350,760	$109,888	($9,039)	$451,610
Upper bound	$729,677	$439,552	($9,039)	$1,160,190

[a]90% of residential tax revenues from Sect. 4.8.1.5.
PILT = payment-in-lieu-of-tax.

4.9 INFRASTRUCTURE

4.9.1 Transportation

4.9.1.1 Proposed action

New development at Parcel ED-6 would not be large enough to have more than a minor increase in the amount of traffic entering and exiting Wisconsin Avenue and the Oak Ridge Turnpike. A minor increase in the amount of traffic should also not substantially increase the chance of accidents occurring.

4.9.1.2 No action

Under the no action alternative, there would be little to no change from the baseline level of vehicle trips or the potential for accidents involving vehicles in the vicinity of Parcel ED-6. At the baseline level of activity, traffic volume is considered to be within the existing transportation infrastructure's capacity.

4.9.1.3 Mixed development alternative

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

4.9.1.4 Conservation easement alternative

Under this alternative, traffic on the Oak Ridge Turnpike and Wisconsin Avenue would remain close to the baseline level.

4.9.2 Utilities

4.9.2.1 Proposed action

Under the proposed action, utility impacts would be expected to be minimal. New development at Parcel ED-6 could connect to the existing city of Oak Ridge utility systems that already exist in the area. Construction of new utility infrastructure would be limited to the new housing development. The additional utility demand for the new residential development should not exceed the capacities of the existing Oak Ridge utility systems.

4.9.2.2 No action

No additional utility impacts would occur under the no action alternative.

4.9.2.3 Mixed development alternative

Potential utility impacts under this alternative would be similar to those described for the proposed action. Utility demand could be slightly greater with the addition of some commercial development along with the new residential development, but still would be within the existing utility capacity.

4.9.2.4 Conservation easement alternative

This alternative is similar to the no action alternative, and there would not be any additional utility impacts.

4.10 NOISE

4.10.1 Proposed Action

Site preparation, road and utility installation, and construction of new homes would generate intermittent noise above the current background level. Potential noise sources include heavy construction equipment, trucks, and power tools. Equipment, such as front-end loaders and backhoes, would produce noise levels around 73 to 94 “A-weighted decibels” (dBA) at 50 ft from the work site under normal working conditions (Magrab 1975, Cantor 1996). Noise from heavy equipment operation would primarily occur during the site preparation phase of construction. House building would create noise levels slightly above normal background. Sound levels would be expected to dissipate to background levels within a relatively short distance and would be intermittent and temporary. Construction activities normally would be limited to daytime hours, and thus would not impact existing background noise levels at night. Sensitive noise sources near or on Parcel ED-6 include the North Boundary Greenway and the homes along Whippoorwill Drive. Although Parcel ED-6 is relatively isolated and not within an area of

extensive urban development, it is also impacted somewhat by nearby traffic noise generated from vehicles traveling on the Oak Ridge Turnpike.

4.10.2 No Action

Under the no action alternative, there would be no additional noise impacts above baseline conditions.

4.10.3 Mixed Development Alternative

Under this alternative noise impacts would be expected to be similar to those described for the proposed action.

4.10.4 Conservation Easement Alternative

There would be no additional noise impacts above baseline conditions because no development of Parcel ED-6 would occur.

5.0 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), and can result from the combined or synergistic effects of individually minor actions over a period of time.

Identification of other actions that could result in cumulative impacts when combined with the proposed action is based on actions likely to have similar potential impacts within the same geographic area and over the same timeframe. Ongoing actions near Parcel ED-6 that are considered pertinent to the analysis of cumulative impacts include the BORCE, continued reindustrialization of ETTP (Heritage Center), further development of the Horizon Center, Rarity Ridge, and other residential development within the city of Oak Ridge.

5.1 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 conveyance of Parcel ED-6. The actions are as follows.

Horizon Center Industrial Park (also referred to as Parcel ED-1). DOE has transferred title to the developable portion of Parcel ED-1 (approximately 426 acres) to Horizon Center LLC, a subsidiary of the Community Reuse Organization of East Tennessee (CROET), for the continued development as an industrial/business park for research and development, medical technology, manufacturing, distribution, and corporate headquarters office facilities. DOE maintains ownership of the remainder of the parcel, which includes the Natural Area (approximately 491 acres). Horizon Center LLC, under a lease agreement with DOE, leases the Natural Area.

ETTP (Heritage Center) Reindustrialization. DOE has made some of its underutilized facilities at ETTP available for lease to CROET, who in turn is subleasing these facilities to private sector firms (DOE 1997). With the onset of the accelerated cleanup plan for ETTP, DOE has begun to transfer title to some buildings and land parcels to CROET. To date, six buildings, totaling over 300,000 ft^2, have been transferred and work is progressing on the transfer of additional facilities (CROET 2006). As cleanup is progressing, DOE and CROET are transitioning the former gaseous diffusion plant to a private industrial park known as the Heritage Center. Commercial use of these facilities does not constitute a change of the primary use of the property, which has been industrial for about 60 years.

Spallation Neutron Source Project. The Spallation Neutron Source (SNS) is a state-of-the-art, high-flux, short-pulsed neutron source facility occupying about 110 acres near the Oak Ridge National Laboratory (ORNL). The SNS is located within the ORR on Chestnut Ridge. About 15 permanent buildings covering about 6 acres have been constructed for the project. The SNS facility, which generates subatomic particles called neutrons for materials testing and other research, began operation in April 2006. At full operation, the facility is expected to employ about 500 people and generate over 2000 user visits per year (Munger 2006).

Y-12 Modernization Program. DOE has issued a Final Site-Wide EIS and Record of Decision (DOE/EIS-0309) for the operation of the Y-12 National Security Complex (Y-12) and modernization of facilities. Major actions include construction of a 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; and the Beryllium Capability Project, which will upgrade an existing facility. 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, Y-12 will have reduced its defense manufacturing footprint by almost half.

ORNL Revitalization Program. DOE is implementing a Facilities Revitalization Program (FRP) at ORNL to modernize some ORNL facilities, maintain ORNL's competitive research and development capabilities, enhance worker health and safety, and reduce operating costs. The FRP includes constructing new facilities on brownfield land and remodeling numerous existing facilities to relocate ORNL staff currently housed at Y-12, other ORR facilities, and in commercial office space. New facilities have been constructed in Bethel Valley near the main ORNL entrance, near the West Portal in Bethel Valley, and within the footprint for the SNS. Some of the new construction is being funded by the state of Tennessee and the private sector. About 20 acres of brownfield 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, and a FONSI was signed on June 1, 2001 (DOE 2001).

Oak Ridge Science and Technology Park. DOE has leased approximately 12 acres of underutilized property to Halcyon LLC, a subsidiary of CROET. The leased property is located along Bethel Valley Road. The leased property is part of the FRP at ORNL for which DOE completed an EA (DOE/EA-1362) and issued a FONSI in 2001. It is expected that development of the area will include approximately 150,000 ft^2 of new research/office space.

Roane Regional Business and Technology Park. This industrial park is located north of Interstate 40 in Roane County approximately 3 miles southwest of the western portion of ORNL. The 655-acre site includes areas for industrial development and greenbelt uses. The park will be developed in three phases. Phase I development of 200 acres was completed in late 2001 and is expected to house industries that will provide about 500 jobs. Industries located at the site include instrumentation, light metalwork, and materials handling. Additional types of industries expected to locate at the park include information technology, automotive transportation, and corporate administrative offices (Human 2000, TECD 2006).

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 1245-acre property is for sale by TVA and 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 (ORCC 1999). 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). A feeder road may be constructed by TDOT to improve access from SR 58, pending the sale and further industrial development of the property (ORCC 1999).

Pine Ridge Development. In 1969, the city of Oak Ridge acquired 230 acres of property, identified as Site X, from the then Atomic Energy Commission. The property included the current Valley Industrial Park and a portion of Pine Ridge. In 1999, the city transferred approximately 71 acres of Pine Ridge between South Illinois Avenue, Union Valley Road, and Scarboro Road to the Industrial Development Board, which in turn sold the property to a private developer. The area is now being developed for office space, light manufacturing, and storage facilities.

Rarity Ridge Development. A private development company is constructing a mixed, residential/commercial development project for the former Boeing property in western Oak Ridge (Roane County). The developer purchased about 1200 acres from the previous property owner and an additional 182 acres of adjoining floodplain from DOE. DOE completed an EA for the transfer of the floodplain (DOE/EA-1361) and issued a FONSI on January 31, 2001. In February 2000, the Oak Ridge City Council voted to rezone the property from industrial to mixed use. The most recent Rarity Ridge plan calls for 3,000 to 4,000 new housing units and 500,000 to 1,250,000 ft^2 of commercial space. More than 100 acres are planned for parks, 17 acres for active recreation, and more than 30 acres will be retained as a preserve with limited access. In addition, approximately 440 acres will be transferred to a third party for open space and recreational purposes. Up to 200 homes may be completed by the end of 2006.

5.2 CUMULATIVE IMPACTS BY RESOURCE AREA

5.2.1 Land Use

Of the original 58,582 acres of land acquired in 1942 by the federal government, 24,860 acres have been conveyed and approximately 34,000 acres remain within ORR. The purposes for which ORR land has been conveyed include:

- 16,855 acres for residential, commercial, and community development;
- 1,031 acres to federal agencies and for transportation easements;
- 3,208 acres for preservation and recreation;
- 3,755 acres for industrial development; and
- 11 acres for mission-related purposes.

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

- 2,966 acres for the BORCE,
- 2,929 acres for the Three Bend Scenic and Wildlife Management Refuge Area, and
- 491 acres for the Parcel ED-1 Natural Area.

Title transfer of land and facilities at ETTP could potentially remove an additional 1600 acres of land. However, the majority of the ETTP area being considered for title transfer has already been developed for industrial purposes or been impacted in some other way.

A few changes in the acreage of NERP have occurred over the past 23 years. When designated in 1980, the size of NERP was about 13,590 acres. Some research land was lost with the sale of the former Boeing property (Rarity Ridge) and some other land areas. In 1998, the NERP designation was removed from the ETTP Area of Responsibility and the Horizon Center. Since then, NERP has been expanded to include most of the undeveloped area of ORR and is currently about 20,000 acres. The BORCE resulted in approximately 3000 acres of ORR land being set aside for conservation and recreation purposes. It is assumed that the NERP designation for this area would remain.

Conveyance of Parcel ED-6 would remove approximately 336 additional acres of land from ORR. Because the total area is small compared to the remaining ORR land (1%), the change in land use would result in a minor cumulative impact to land use.

5.2.2 Air Quality

Although the proposed action evaluated in this EA does not have the potential to bring about major impacts to air quality, new industrial development, increased traffic, and general population growth in Roane and Anderson counties continues to adversely impact air quality in the region. Construction activities can be a major source of emissions, particularly particulates in the form of fugitive dust. Such sources tend to be of short duration (during the construction period) and largely result in impacts of a localized nature that can be mitigated with appropriate controls.

5.2.3 Socioeconomics

Nearby residential and industrial developments are expected to increase population, employment, and income in the ROI, independent of any development on Parcel ED-6. Developers have begun or announced plans to build about 6000 new housing units in Oak Ridge during the next decade (Oak Ridger 2006). If all units are completed as planned, the change would represent a 44.7% increase over the number of housing units in Oak Ridge in 2000. The proposed action would add an estimated 315 to 380 units, or about 6% of that total. The new and proposed residential developments in the city of Oak Ridge are listed below (Huotari 2006a, b, c, e).

- Rarity Ridge – mixed residential/commercial development. Plans include an estimated 3,000 to 4,000 new housing units to be constructed over several years and 500,000 to 1,250,000 ft^2 of commercial space. Up to 200 homes may be completed by the end of 2006.
- Willow Place – 75 homes, nearing completion.
- Rarity Oaks – 550 homes west of the Country Club Estates.
- Jackson Crossing – off the Oak Ridge Turnpike in West Oak Ridge.
- Park Meade Place – 12 acres of townhouses and executive homes.
- Centennial Village – residential development off Edgemoor Road.
- East Oak Ridge development – 34 single-level homes.
- Bristol Place Apartments – intersection of Emory Valley Road and Lafayette Drive.

Major industrial initiatives include development of the nearby Horizon Center, reindustrialization activities at the Heritage Center, the SNS project at ORNL, ORNL revitalization, and the Roane Regional Business and Technology Park.

If all of the proposed housing units are built, over the next 10 years, and all units are occupied in that time, a corresponding increase in population would be expected. While the actual impact will depend on the characteristics of the new residents, an increase in the need for schools, police and fire protection, and city services could be expected. The cost of these additional services would be at least partially offset by additional tax revenue from the developed properties. Actual tax revenue will depend on the value of the properties and future tax rates. Additional sales tax revenue from proposed commercial development is also likely for both the city of Oak Ridge and Roane County; the exact amount will depend on the amount and type of new commercial development and residents' actual buying patterns. The final size of new developments will also depend on market conditions and may be somewhat smaller or take a longer period of time to complete (Huotari 2006e).

There is not sufficient information available to project employment associated with the Rarity Ridge development and the Oak Ridge Industrial Center. A recent analysis developed for land use planning estimated that if ETTP redevelopment and other initiatives succeed during the next 20 years, the cumulative impact could result in up to 25,000 direct and indirect new jobs or an increase of 33.9% over 2003 ROI employment (ORNL 2002). This rate is about 1.7% per year. Impacts would be the same for the proposed action and the no action alternative. The additional 238 jobs estimated for the mixed development alternative would change the estimated cumulative impact by less than 1%. Given the uncertainties surrounding future success of any of these initiatives, this represents an upper bound on the cumulative employment impacts. This increase falls well within the historical growth rates for the region and is not expected to create an undue strain on local socioeconomic resources.

5.2.4 Biodiversity

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 ORR is putting increased pressure on the biodiversity of the Ridge and Valley Ecoregion. Development within the ORR (e.g., SNS and the transfer of the Horizon Center) has removed some 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. Also, much of the development and reindustrialization on ORR is taking place within previously disturbed and/or developed areas within and surrounding the major plant areas. Actions such as the BORCE have the potential to provide long-term protection for some of the most ecologically sensitive areas on the Reservation, and ORR continues to be a biologically rich resource that provides protection for large land areas and the biodiversity found within those protected areas.

6.0 LIST OF AGENCIES AND PERSONS CONTACTED

The following agencies and persons were contacted for information and data used in the preparation of this EA.

Name	Affiliation	Location	Topic
Lee Barclay	U. S. Fish and Wildlife Service	Cookeville, TN	Endangered Species Act, Sect. 7 – Informal Consultation
Joyce Crouch	Linda Brown Realty	Oak Ridge, TN	Socioeconomics
Amy Fitzgerald	City of Oak Ridge	Oak Ridge, TN	Socioeconomics
Joseph Garrison	Tennessee Historical Commission	Nashville, TN	National Historic Preservation Act, Sect. 106 – Compliance
Peggy Hanrahan	Realty Center	Oak Ridge, TN	Socioeconomics
Alva Moore	Roane County	Kingston, TN	Socioeconomics

7.0 REFERENCES

BEA (Bureau of Economic Analysis) 2004. Regional Accounts Data, Table CA30 (May 2003), available at http://www.bea.doc.gov/bea/regional/reis/, accessed October 19, 2004.

BEA 2005. Regional Accounts Data, Table CA30 (May 2003), available at http://www.bea.doc.gov/bea/regional/reis/, accessed July 13, 2005.

Cantor, L. 1996. *Environmental Impact Assessment*, 2d ed., McGraw-Hill, Inc., New York.

Census (Bureau of the Census) 2000. American FactFinder. Available at http://factfinder.census.gov/, accessed November 2, 2004 – February 3, 2005.

City of Oak Ridge 2005. "City of Oak Ridge, Tennessee, Fiscal Year 2006 Annual Budget."

City of Oak Ridge 2006. "City of Oak Ridge, Tennessee, Fiscal Year 2007 Proposed Budget."

CROET (Community Reuse Organization of East Tennessee) 2006. Personal communication from Jeff Deardorff, CROET, to Sharon Bell, SAIC, October 12.

Crouch, J. 2006. Joyce Crouch, Linda Brown Realty. Private communication with Sharon Bell, Science Applications International Corporation, March 20.

DOE 1997. *Final Environmental Assessment for Lease of Land and Facilities within the East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/EA-1175, November.

DOE 2001. *Finding of No Significant Impact (FONSI) and Environmental Assessment for the Oak Ridge National Laboratory Facilities Revitalization Project*, DOE/EA-1362, U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN, June.

DuVall, G. D., and P.A. Souza. 1996. *An Evaluation of Previously Recorded and Inventoried Archeological Sites on the Oak Ridge Reservation, Anderson and Roane Counties, Tennessee*, ORNL/M-4946, prepared for the Oak Ridge National Laboratory, Oak Ridge, TN, January.

DuVall, G. D. 2005. *A Cultural Resources Survey of the Two Development Parcels (ED-6 and ED-7) on the Oak Ridge Reservation, Roane County, Tennessee*, prepared for Science Applications International Corporation, under contract to the U. S. Department of Energy, Oak Ridge, TN, February.

Focus Group 2002. *Final Report of the Oak Ridge Land Use Planning Focus Group*, September.

Hanrahan, P. 2006. Realty Center. Private communication with Sharon Bell, Science Applications International Corporation, March 20.

Hatcher, R. D., et al. 1992. *Status Report on the Geology of the Oak Ridge Reservation*, ORNL/TM-12074, Oak Ridge National Laboratory, Oak Ridge, TN.

Human, G. 2000. Personal communication from Gary Human, Roane County Industrial Development Board (RCIDB), to Julia Gartseff, SAIC, July.

Hunter, C. 2006. Personal communication from Cindy Hunter, DOE Real Estate Office, to Sharon Bell, 36 SAIC, September 5.

Huotari, John 2006a. "Thousands of homes in 'pipeline,'" The Oak Ridger, February 14, available at http://oakridger.com/stories/021406/com_20060214014.shtml, accessed April 4, 2006.

Huotari, John 2006b. "Commisioners looking at two development projects," *The Oak Ridger,* February 23, available at http://oakridger.com/stories/022306/new_20060223040.shtml, accessed March 15, 2006.

Huotari, John 2006c. "New Oak Ridge neighborhood proposed," *The Oak Ridger,* March 2, http://oakridger.com/stories/030206/com_20060302023.shtml, accessed March 12, 2006.

Huotari, John 2006d. "Anderson officials request change in DOE payments," *The Oak Ridger,* March 14, available at http://oakridger.com/stories/031406/new_20060314019.shtml, accessed March 15, 2006.

Huotari, John 2006e. "Rarity Ridge plans revised, scaled back," *The Oak Ridger,* March 22, http://oakridger.com/stories/032206/com_20060322009.shtml, accessed March 22, 2006.

Lemiszki, P. J. 1994. *Geological Mapping of the Oak Ridge K-25 Site, Oak Ridge, Tennessee,* K/ER-111, Martin Marietta Energy Systems, Oak Ridge, TN.

Lemiszki, P. J. 1995. *Mesoscopic Structural Analysis of Bedrock Exposures at the Oak Ridge K-25 Site, Oak Ridge, Tennessee,* K/ER-259, Lockheed Martin Energy Systems, Oak Ridge, TN.

Magrab, E. B. 1975. *Environmental Noise Control,* Wiley-Interscience Publication, John Wiley & Sons, New York.

Moore, A. 2006. Alva Moore, Director of Accounts and Budgets, Roane County. Private communication with Sharon Bell, Science Applications International Corporation, April 4.

Munger, Frank 2006. "Munger: $1.4B SNS key to 'economic synergy," Knoxville News Sentinel, August 21, available at http://www.knoxnews.com/kns/business_journal/article/0,2682,KNS_24796_4917064,00.html, accessed October 10, 2006.

OMB (Office of Management and Budget) 2000. "Guidance on Aggregation and Allocation of Data on Race for Use in Civil Rights Monitoring and Enforcement," March 9, available at http://www.whitehouse.gov/omb/bulletins/b00-02.html, accessed November 8, 2001.

ORCC (Oak Ridge Chamber of Commerce) 1999. Personal communication from Kim Denton, ORCC, to Julia Gartseff, SAIC, November 4.

ORNL (Oak Ridge National Laboratory) 2002. *Land Use Technical Report*, ORNL/TM-2002/132, September.

TDEC (Tennessee Department of Environment and Conservation) 2004. *Black Oak Ridge Conservation Easement, Draft Management Plan*, December.

TECD (Tennessee Department of Economic and Community Development) 2006. "Tennessee Prospector: Available Buildings and Sites," available at http://www.tennesseeprospector.com, accessed October 10.

Tennessee Comptroller of the Treasury 2006. *2005 Tennessee Property Tax Rates*, available at http://170.142.183.29/Panew/, accessed March 30.

Tennessee Department of Education 2006. *Report Card 2005*, available at http://www.k-12.state.tn.us/rptcrd05/, accessed October 23.

TVA (Tennessee Valley Authority) 1988. *Watts Bar Reservoir Land Management*, August (reprinted September 1992).

USDA (U. S. Department of Agriculture) 1942. Soil Survey, Roane County, Tennessee, Bureau of Plant Industry, Tennessee Agriculture Experiment Station.

APPENDIX A

COMMENT RESPONSE

Comment No.	Comment	Response
Advocates for the Oak Ridge Reservation (AFORR) (Jo Ann Thompson) – Email dated September 15, 2005		
1.	AFORR continues to contend (as indicated in a January 2001 letter to DOE written on AFORR's behalf by the Southern Environmental Law Center) that DOE should not continue to consider land-transfer proposals such as this one on a piecemeal basis because the National Environmental Policy Act (NEPA) obligates DOE to prepare an environmental impact statement (EIS) that considers the combined, long-range impacts of land-use decisions on the Oak Ridge Reservation as a whole. However, the organization does not object in principle to this particular proposal because (1) it is an outgrowth of the Land-Use Planning Focus Group process that AFORR supported as the first stage of an EIS-like assessment process and (2) earlier we agreed to acquiesce to the city's plans for a residential development in this area in exchange for the city's agreement to accept the establishment of the adjacent Black Oak Ridge Conservation Easement (BORCE).	Comment noted. An EIS was not prepared because the proposed action is not among the classes of actions listed in Appendix D to Subpart D of the DOE NEPA Implementing Procedures (10 CFR Part 1021) that typically require preparation of an EIS. In accordance with CEQ and DOE regulations, if DOE is unsure of the potential impacts of a proposed action, an EA is prepared to determine if an EIS is required. DOE has historically prepared EAs to review the environmental impacts of previous land transfers to the City of Oak Ridge.
2.	AFORR is, however, disappointed that the proposed transfer and development will reduce the conservation value of the BORCE, and our organization would like the proposal to be modified to reduce its adverse impacts.	Changes to the proposed action, including the removal of new boundary road and modification of the western boundary of Parcel ED-6, were made to reduce potential adverse impacts to the conservation value of the BORCE.
3.	We have identified two major objections to the specifics of the land-transfer proposal as presented in the draft EA: (1) The land area proposed for transfer is much larger than had been discussed previously. (2) The draft EA states that after the transfer DOE would build a new gravel road on the eastern edge of the BORCE, near the new federal boundary. In addition, we believe that the draft EA is deficient in its assessment of impacts to deep forest-interior habitat.	The proposed size of Parcel ED-6 was reduced from approximately 362 acres to about 336 and the new boundary road was removed from the proposed action. Additional information has been provided on the potential impacts to interior forest habitat.
4.	The two aspects of the proposal to which we object increase the ED-6 transfer's adverse impact on the large stand of deep forest-interior habitat that is the most significant ecological value of this portion of Black Oak Ridge. This forest provides rare forest interior habitat, a type of habitat that some songbirds require for breeding and that is rapidly disappearing from our landscape. According to the draft EA, ED-6 contains 174 acres of this habitat type, part of an 863-acre contiguous tract that is mostly in the BORCE. The actual loss of forest interior	DOE has removed the new boundary road from consideration and reduced the size of the area proposed to be conveyed. The discussion of interior forest impacts has also been revised.

Comment No.	Comment	Response
	habitat would be much larger than 174 acres because the clearing of forest eliminates the "interior" attribute from remaining forest within a substantial distance of the new forest edge. To reduce the impacts of this proposal, DOE should withdraw plans for the road and reduce the size of the transfer area in keeping with the spirit of earlier discussions and agreements.	
5.	During the DOE Land-Use Focus Group process in 2001 and 2002, city officials indicated an interest in a total of about 220 acres for residential development, not the 362 acres that DOE now proposes to transfer. When DOE reserved this large area from the BORCE for consideration of a possible transfer to the city, AFORR understood that a larger area had been reserved in order to allow more detailed study and the crafting of a transfer proposal (for the acreage desired by the city) that was sensitive to the special features of the land. (AFORR also understands that some of the 362 acres consists of state highway right of way that is not suitable for either conservation or development.)	The proposed size of Parcel ED-6 was reduced from approximately 362 acres to about 336 and the new boundary road was removed from the proposed action.
6.	During informal scoping for this EA, our members asked DOE to survey the ED-6 area for sensitive plants and other sensitive features, then present an additional alternative in which the western boundary of ED-6 was redrawn to follow natural topographic boundaries, excluding steep areas with little development potential and areas with sensitive vegetation, thus reducing the acreage of the transferred parcel and allowing some of the land to be added to the adjacent BORCE. We were disappointed to see that this option is not considered in the draft EA and, indeed, that the EA does not even mention that this issue was raised. City officials have told us informally that if DOE transfers the entire parcel, they would consider reserving western portions of the parcel and giving them to the State of Tennessee to be added to the Conservation Area. However, AFORR would prefer that DOE (as steward of this land on behalf of the people of the United States) assume the responsibility of identifying some land for conservation, thus respecting the basis for AFORR's and other groups' agreement not to object to a proposed transfer.	DOE has revised the proposed western boundary of the parcel to exclude areas with steep slopes. The excluded area will remain as DOE property. At some time in the future this land may be considered for addition to the BORCE but that action is beyond the scope of this EA and would occur separately from this NEPA action. The analysis in this EA takes the conservative approach that the majority of the parcel would be cleared for future residential development. However, it is likely that not all areas of the parcel are equally developable and the City along with the developer may propose some of the western portions of the parcel to be a buffer between the development and the BORCE.

Comment No.	Comment	Response
7.	DOE's planned perimeter road does not appear to have any useful purpose. The draft EA states that DOE "would need" to build a road "to provide continued security and fire suppression for that portion of the ORR" and to "separate the proposed residential development from the BORCE area." The need for "continued security access" is not apparent, since the area to be secured has no DOE programmatic function other than conservation. Public roads nearby and intersecting the existing boundary patrol road (including Wisconsin Avenue and the new roads that would be built in the proposed residential development) should be more than ample to provide fire suppression access to the BORCE. Finally, it is difficult to conceive of why a residential development and a conservation area would need to be separated by a 20-foot-wide gravel road with 5 feet of cleared space on either side. The road would substantially extend the adverse ecological impacts of the proposed ED-6 land transfer (by eliminating some habitat, extending the loss of forest interior habitat farther into the BORCE), would be considered an eyesore by adjacent residents, would increase DOE's management costs, and could increase trespasser access to both the conservation area and the residential area. This road should be deleted from DOE's proposal.	The proposed action has been revised and the new boundary road has been removed from consideration.
8.	A serious flaw in the EA (one that must be corrected in the final EA) is its poor handling of impacts to "deep forest" (forest interior) habitat. In the final EA, please (1) explain the methodology used to identify forest interior habitat (how far must an area be from a forest edge in order to qualify as interior), (2) acknowledge that the actual loss of forest interior habitat would be much larger than 174 acres because of the introduction of new "edge," (3) provide a quantitative estimate of the amount of forest interior habitat that would be lost because of the new "edge" created by the residential development and perimeter road (if the boundary distance from "edge" to "interior" is 100 meters, the total interior habitat loss would increase by at least 40 acres, to about 214 acres), and (4) present the results in the context of the total amount of interior habitat in the adjacent BORCE and on the ORR as a whole. A 25% reduction in the 863-acre interior forest tract of which this area is a part may be a significant environmental impact, particularly considering the small total area of this habitat type on the ORR and the ongoing global decline in the songbird species that require this habitat type for nesting.	Information on the interior forest habitat present on Parcel ED-6 and in the adjacent area has been revised.

Comment No.	Comment	Response
	Virginia H. Dale – Letter dated September 13, 2005	
9.	ED-6 is mostly forested, may contain some wetlands, and certainly provides habitat for species of special interest in the region. As part of the larger Oak Ridge Reservation (ORR), it has special value because of the rarity of contiguous large forest tracts in the region.	Comment noted.
10.	It has never been explained why the ED-6 boundary to the west is a straight line when a contoured line following the slopes would make much more sense. It looks like the lazy way of making land decisions (drawing a line in an office rather than surveying the area).	The western boundary of the parcel has been revised to better follow the topography of the area and to eliminate areas of steeper slopes (>10%).
11.	I have specific comments on the EA: P. 1.1 – second paragraph in section 1.2 "encompasses" is the wrong word here. – saying ED-6 "is part of" the area included in the ORR Land use planning process is correct.	Change made.
12.	P.2-1 – 1st sentence – I realize that the document uses "underutilized" here in the strange way that DOE has chosen to use this word. Since that is the case, I think the document should italicize the word and provide DOE's definition. In the everyday sense of the word, ED-6 is highly used and valued for recreation and conservation value.	Parcel ED-6 has been determined by DOE to be "excess" property. This change has been made in the EA and a definition is provided.
13.	P. 4-4 Last paragraph – The sentence about "direct adverse impacts to aquatic sources should be last. The sentence about terrestrial impacts is more important and should be earlier in the paragraph.	This section has been revised.
14.	P. 4-5 first paragraph – Change the second sentence to read "The impact would be the elimination of one or more terrestrial areas or narrowing…" This is not a "most likely impact" – it is a given. These areas are not now fragmented.	This section has been revised.

Comment No.	Comment	Response
15.	P. 4-5 second paragraph – Please define how the number 174 was derived. "Deep woods" is not a common ecological phrase. If this is meant to refer to edge effects – then the document should say so. Also, all of the interior forest on this parcel could be lost. The developed area will comprise (174-x) acres that will be developed (the rest of the parcel). In second sentence replace "could" with "would" – since this <u>will</u> happen.	The discussion regarding interior forest habitat and edge effects has been revised.
16.	P. 4-5 third paragraph – if the second paragraph is about fragmentation effects, then the third paragraph is not valid, for large areas are required for some of he (sic) species subject to fragmentation effects. The argument falls apart here. Both sides of the arguments can be used.	This section has been revised.
17.	P. 5-1 – last sentence – the argument that ED-6 removes 1% of the ORR result in a "minor cumulative impact to land use" is invalid and ignores years of advances in landscape ecology, which document the position in the landscape as well as adjacent land parcels and land use practices are critical to consider. Also if DOE removes 1% of land from the ORR every few years – then soon little is left.	The discussion on land use relative to cumulative impacts has been revised.
18.	It has never been explained that when the City of Oak Ridge asked for 245 acres in August 2004, why DOE returned with a plan to transfer 362 acres. This is more land that (sic) the Land-Use Planning Focus Group discussed.	The City of Oak Ridge's original proposal (July 1, 2004) requested Parcel ED-6 with no specific acreage amount listed. Once the property was surveyed, the total acreage was calculated at 362 acres. See response to comment No. 3.
19.	DOE should be aware that a meeting was held on December 18, 2004 with members of the community and the Oak Ridge Mayor and other city officials in which city officials gave assurances that the North Boundary Greenway would not be altered by the development and some land would be set aside for conservation. I am concerned that city officials never told DOE about this meeting. At that meeting, city officials said that they would sign a binding agreement with the state to give reserved western portions of the ED-6 parcel to the state to be added to the Conservation Area.	For purposes of analysis, DOE assumed that the North Boundary Greenway would not be altered or impacted from the conveyance of Parcel ED-6 to the City. The analysis in this EA also takes the conservative approach that the majority of the parcel would be cleared for future residential development. However, it is likely that not all areas of the parcel are equally developable and the City along with the developer may propose some of the western portions of the parcel to be a buffer between the development and the BORCE. It is also possible that other agreements between the City and the state may occur but these are outside of the scope of this EA.

Comment No.	Comment	Response
20.	Finally, I want to express my concern about piecemeal decision-making and illegal "segmentation" since it is a violation of NEPA to break a major federal action into small pieces in order to avoid doing an EIS on that action. I raise this issue because I know that DOE and the City of Oak Ridge are discussing several different proposed transfers at the same time. In this case, it is quite apparent that the proposals cannot be treated as separate and independent actions.	Comment noted. An EIS was not prepared because the proposed action is not among the classes of actions listed in Appendix D to Subpart D of the DOE NEPA Implementing Procedures (10 CFR Part 1021) that typically require preparation of an EIS. In accordance with CEQ and DOE regulations, if DOE is unsure of the potential impacts of a proposed action, an EA is prepared to determine if an EIS is required. DOE has historically prepared EAs to review the environmental impacts of previous land transfers to the City of Oak Ridge.
Amy Fitzgerald, City of Oak Ridge – Email dated September 21, 2005		
21.	The City of Oak Ridge strongly supports the proposed action/preferred alternative evaluated in the draft environmental assessment (EA). The City appreciates the Department of Energy's (DOE) initiative to sponsor two meetings in order to solicit public input relative to the proposed conveyance.	Comment noted.
22.	City officials have received several inquiries from Oak Ridge residents regarding the possible conveyance of a modest number of additional acres in a strip between the northern edge of the existing North Boundary Greenway and the private properties to the south of Whippoorwill Drive. The City is willing to support such a request, but would like to discuss the matter with DOE as a separate action, so as to avoid a delay in conveyance of the property evaluated in the draft EA.	DOE has adjusted the boundary line to include this property in the transfer to the City of Oak Ridge.
23.	The draft EA correctly states that the City intends to utilize the property for the development of new housing. As stated in the City's proposal to DOE, however, while the City anticipates that the majority of the property is suited for residential development, the City reserves the right to maximize the use of the parcel to incorporate complementary uses, e.g. open space, recreational elements, etc. should these uses prove to be economical and compatible with residential use.	DOE understands that the after the conveyance the City will have the right to develop the parcel as it deems appropriate. For the analysis in this EA, DOE has taken the conservative approach that the majority of the parcel would be cleared for future residential development. However, it is likely that not all areas of the parcel are equally developable and other complementary uses may be incorporated into development plans.

Comment No.	Comment	Response
24.	Section 1.3 describes the scope of the EA and states that Section 120(h) compliance is being addressed in a separate report. The final EA should update this section, and note that the City has formally requested indemnification for the real property pursuant to 10 CFR Part 770, et. seq., and 42 U.S.C. 7274 et. seq. Indemnification is deemed essential for the purposes of facilitating reuse of the property and meeting the objectives of both DOE and the City.	This section has been revised. The City of Oak Ridge's original proposal requested indemnification, and DOE ORO is proposing indemnification to DOE Headquarters.
25.	Section 3.8 correctly states that Parcel ED-6 is located within the Roane County portion of Oak Ridge. This section should acknowledge that positive socioeconomic benefits would accrue to Roane County in addition to the City of Oak Ridge. Similarly, Roane County should be included in Section 4.8.1.5 entitled "Fiscal Impacts".	The socioeconomic analysis has been revised and now reflects fiscal impacts to Roane County as well as the City.
26.	The final EA should include current information in order to update and clarify Table 3.2 depicting City of Oak Ridge revenues and expenditures.	This information in the EA has been updated.
27.	In section 4.1.1 replace "City of Oak Ridge Regional Planning Commission" with "City of Oak Ridge Municipal Planning Commission".	Change made.
Frank Hensley – Email dated September 14, 2005		
28.	I have reviewed the subject EA on the conveyance of Parcel ED-6. Several deficiencies have been identified in the document which relate to the planned actions of DOE and the City. As it stands, the draft EA does not provide an adequate assessment of the environmental impacts of the Proposed Action, including impacts on the adjoining Black Oak Ridge Conservation Easement (BORCE). We request that Proposed Actions be changed and the EA be revised to reflect these changes as listed below.	The proposed action has been revised and several other revisions and changes have been made to address specific comments.
29.	1) A thorough assessment of the area must be made to locate endangered or threatened plants.	Coordination with the USFWS, TN Division of Natural Heritage, reviews of existing literature, and a site walkover were conducted for Parcel ED-6. It was determined that the presence of any listed threatened and endangered plants on the property was unlikely and a survey was not conducted.

Comment No.	Comment	Response
30.	2) The straight line boundary between Parcel ED-6 and the BORCE should be modified so that it follows the topography. The boundary was drawn arbitrarily on a map used by the Land-Use Planning Focus Group and it was never intended to be used as a property line. This boundary line should be better defined to represent a reasonable boundary based on topography and development needs of the City of Oak Ridge and which also protects the most ecologically valuable land.	The western boundary of the parcel has been revised to better follow the topography of the area and to eliminate areas of steeper slopes (>10%).
31.	3) The environmental impact of constructing a new boundary road should be discussed. The report notes that construction of a 30-ft wide boundary-patrol and fire-suppression road would be a direct result of the Proposed Action. However, the draft EA does not show the likely route of the patrol road and does not evaluate its environmental impact. Cutting a wide road through deep forest will also affect wildlife habitat on the BORCE as well as destroy the forested buffer zone between residential development and the BORCE.	The revised proposed action eliminates the new boundary road that was originally considered.
32.	Since the City has agreed to not allow development on the western portion of ED6 and has agreed to transfer 50 to 100 acres of this land to TDEC to be added to the BORCE, it is very important that this boundary- patrol road not be constructed. Construction of this road would separate these 50 to 100 acres from the BORCE and negate their importance to wildlife since they would not be contiguous with the BORCE. It is not clear why a boundary road is being proposed since the BORCE is not critical to any active DOE mission, especially since this 30-ft wide boundary road will have substantial negative impacts on the east end of the conservation easement (BORCE). The EA notes that fire protection of Parcel ED-6 will be adequately covered by existing city resources. TDEC and TWRA should be responsible for making the decision on the need for this road since they manage the BORCE.	Changes to the western boundary and the elimination of the new boundary road resulted in a reduction of the size of the parcel from approximately 362 acres to around 336. The excluded area will remain as DOE property. At some time in the future this land may be considered for addition to the BORCE but that action is beyond the scope of this EA and would occur separately from this NEPA action.

Comment No.	Comment	Response
	Bill Johnston – Email dated September 14, 2005	
33.	The Cumulative Impacts analysis is incomplete and addresses only the fractional, incremental impact of the ED-6 land transfer. The draft EA defines cumulative impact as "...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7)".	The cumulative impacts analysis has been revised.
34.	The draft EA mentions two recent land transfers, the Boeing property and the Horizon Center. The draft EA fails to mention other recent land transfers, including Parcel A and the Bethel Valley Industrial Park. No acreage totals are provided for those transfers. The draft EA fails to provide the acreage of recent non-government residential development along the north boundary of ED-6, along Whipoorwill Drive, or to the south, across Oak Ridge Turnpike. The draft EA fails to include the acreage or impact of DOE projects that use previously undeveloped land (eg., SNS and the K-25 demolition haul road). The draft EA fails to mention continued efforts by the City of Oak Ridge and its economic development associates to obtain additional DOE property for residential and industrial development. The draft EA should quantify the acreage of previous land transfers in order to present the cumulative impact of the present and past land transfers.	Additional information about present and reasonably foreseeable actions has been added to Section 5.1.
35.	The draft EA should quantify the anticipated acreage of "reasonably foreseeable" future land transfer actions and future DOE project actions. The anticipated acreage may be estimated by calculating the annual average rate of land transfers over some reasonable time period. The average annual rate of land use change from DOE projects can be estimated in similar fashion. Using the past average annual rate of land transfer and the past average annual rate of development for DOE projects allows the estimation of reasonably foreseeable future land use impacts in future decades. Only after those estimates of future impacts are summed with past and present impacts can the cumulative impact be estimated.	Disagree that the anticipated acreage of “reasonably foreseeable” future land transfers and DOE projects can be calculated by using an annual average rate of land transfers over some undefined time period. This is beyond the scope of the cumulative impact analysis for this proposed action since this action, while having an incremental impact, would not have a significant cumulative impact on the ORR.

Comment No.	Comment	Response
36.	The final paragraph in Section 5.1.1 summarizes the incremental impact of the ED-6 land transfer. It does NOT summarize the cumulative impact.	There would be no significant cumulative impact because the action would have a negligible incremental impact on the amount of land removed from the ORR when compared with the remaining acreage.
James S. Johnson, Jr. – Letter dated September 5, 2005		
37.	The main impact of the preferred alternative is clearly on the decreased acreage in the Black Oak Ridge Conservation Easement characterized as deep forest habitat. Deep forest habitat is vital to rare migrating songbird species, which thrive only in forests with substantial buffers to the perturbations of humans and their pets. It is disappearing at alarming rates across the nation, and any chipping away of the remainder must cause concern.	DOE has removed the new boundary road from consideration and reduced the size of the area proposed to be conveyed. The discussion of interior forest impacts has also been revised.
38.	The history of the Oak Ridge Reservation and its National Environmental Research Park has been just such chipping away of its area and resources, without any comprehensive environmental impact study. My memory may be incorrect, but I think classing the analyses of scenarios generated in the Land Use Planning Process as EISs is overstatement. The degradation of the corpus is likely to continue. City and business officials rattle on about some vague self-sufficiency obligations (conflicting with other commitments, even if they exist) of the Federal government to the city. They seem unable to comprehend value of open space, in spite of the nearby gross example of west Knox County. Environmentalists must be tempted to dig in their heels and vote for no action, or in this case the conservation easement option.	Comment noted.
39.	However, Wisconsin Avenue is already there, and development around it may do little further damage. Such would not require 360 acres. I suggest the matter be shelved, until the city or its development customer come back with a detailed map of what they need for consideration.	Comment noted.
40.	Acknowledgment of possible personal interest: I am a coowner of an 80-acre tract in western Oak Ridge zoned residential. Public entities making available land may impact the salability of this property, as I suspect Parcel A, Rarity Ridge, and the redeveloped city services area already have.	Comment noted.

Comment No.	Comment	Response
Oak Ridge Reservation Local Oversight Committee (LOC) (Norman Mulvenon) – Letter dated September 9, 2005		
41.	The Citizens' Advisory Panel (CAP) of the Oak Ridge Reservation Local Oversight Committee (LOC) has reviewed the subject EA on the conveyance of Parcel ED-6. The CAP has identified several deficiencies in the document which relate to the planned actions of DOE and the City. As it stands, the draft EA does not provide an adequate assessment of the environmental impacts of the Proposed Action, including impacts on the adjoining Black Oak Ridge Conservation Easement (BORCE). We request that the draft EA be strengthened as noted below:	The proposed action has been revised and several other revisions and changes have been made to address specific comments.
42.	A map showing the location of biologically sensitive areas on Parcel ED-6 should be included in the EA to guide the involved parties in determining non-developable land.	This information has been incorporated into the EA.
43.	The straight line boundary between Parcel ED-6 and the BORCE should be modified so that it follows the topography. The boundary should conserve as much developable land on Parcel ED-6 as reasonable (generally ridgetops and gently sloping areas) while removing sensitive lands, tributary streams, and steep slopes from the west side of the parcel. It is our understanding that the boundary was based on a map discussed during the Land-Use Planning Focus Group with an example boundary drawn by hand. The proposed boundary should be better refined to represent a reasonable boundary based on topography and development needs of the City of Oak Ridge and which also protects the most ecologically valuable land.	The western boundary of the parcel has been revised to better follow the topography of the area and to eliminate areas of steeper slopes (>10%).

Comment No.	Comment	Response
44.	The environmental impact of constructing a new boundary road should be analyzed and discussed. The report notes that construction of a 30-ft wide boundary-patrol and fire-suppression road would be a direct result of the Proposed Action as well as the Mixed Development and Conservation Easement Alternatives. However, the draft EA does not show the likely route(s) of the boundary road nor does it evaluate its environmental impact. If the boundary road crossed step ridges and stream tributaries, it will have a large impact on the watershed due to erosion of the steep terrain. Cutting a wide road through a deep forest will also affect wildlife habitat on the BORCE as well as destroy the forested buffer zone between residential development and the conservation easement. It is not clear to the CAP why a boundary road is at all necessary as the BORCE is not related to any active DOE mission and considering that a 30-ft wide boundary road will have a substantial negative impact on the east end of the conservation easement. The EA notes that fire protection of Parcel ED-6 will be adequately covered by existing city resources. Because fires tend to spread uphill and downwind, the remainder of the BORCE is unlikely to be at risk from a fire originating in the residential area. The decision to build a road primarily for fire-suppression should be ratified by the State, which has the responsibility for management of the BORCE.	The revised proposed action eliminates the new boundary road that was originally considered.
David M. McGinty – Letter dated September 13, 2005		
45.	1. Limited notice on this proposed land transfer. A one day notice in local newspapers was not an adequate method of notification for this proposed action. If the city had made a local zoning request that would impact this area; then as a minimum, signs would have been posted on the land involved. DOE should have provided this type of notification so the majority of stakeholders for this proposed (sic) would have received timely notice of this proposed action. The limited notification appeared to be an effort to limit input for this proposed action.	Comment noted.

Comment No.	Comment	Response
46.	2. The land transfer will destroy an established greenbelt zone. Very frequently deer and other native animals are observed in this area. This proposed transfer to the city will allow for a developer to destroy this habitat. It is difficult to understand how a land transfer that is based on compensation for damage to the environment can be justified based on more damage to the environment due to economical development of this area. This greenbelt has been established for over 15 years. It was one of the drawing cards to attract home owners into this area. While the city now does not recognize this "greenbelt" status; they have relied on this aspect to attract new home owners into this area. To break faith with existing home owners in order to increase the tax base is wrong and should not be supported by the federal government. I would recommend that the existing greenbelt that surrounds Wisconsin Avenue be maintained and any proposed development or land transfer be shifted further west. This would minimize the environmental impact and support the corrective actions for remediation of past environmental insult actions by DOE.	It is anticipated the existing North Boundary Greenway would not be disturbed as a result of the property conveyance.
47.	3. The proposed land transfer negatively impacts the majority of homeowners on Whippoorwill Drive. To allow only a limited number of home owners to acquire land during this proposed land transfer to the city as a buffer to the proposed development is unfair. All home owners that have property adjacent to the DOE land (security patrol road) should have the same opportunity. My property at 133 touches the immediate area that will be turned over to a developer and I will not be allowed the opportunity to acquire land that has served as part of my backyard since this neighborhood was established. Everyone on Whippoorwill should be allowed this same opportunity. A proposed land transfer should provide the maximum benefit to all stakeholders and not to just a limited few. This "no man's land" adjacent to the DOE security fence has been maintained by almost everyone whose property is next to DOE property line. Therefore, I recommend that everyone on Whippoorwill be allowed this opportunity; that is, to acquire the land adjacent to their property that borders the DOE security fence as part of this land transfer agreement.	Comment noted.

Comment No.	Comment	Response
48.	4. The draft EA contains language that suggests a decision has already been made regarding the proper disposition of the land. For example, to characterize this land as "underutilized property" versus "scenic natural forest that has supported a greenbelt environment" in the introduction of this report implies a decision has already been made regarding the proper disposition of this government land. This document should present facts and not conclusions based on their desired results.	DOE has determined that Parcel ED-6 is excess property (i.e., property not needed to fulfill DOE current or foreseeable future requirements).
	Lorene Sigal – Handwritten comments received on September 12, 2005	
49.	As I remember, the acreage discussed in the FOCUS group was about 220 acres. Even if the areas between the North Boundary Greenway and the DOE boundary east of Wisconsin Avenue, and the TDOT right-of-way along State Route 95 [about 34 acres (362-328)] were added to the FOCUS group estimate, it is about 254 acres. Thus, DOE is giving away about 30 percent more land (108 acres) than discussions in the FOCUS group. Furthermore, this 108 acres is west of Wisconsin Ave. and is part of the deep forest-interior habitat of the BORCE. When I raised this issue at the ED-6 EA public meeting, the response was that the ED-6 area had not been surveyed at the time of the FOCUS group. Be that as it may, the land area proposed for transfer is larger than previously discussed. Furthermore, DOE intends to build a new boundary patrol road between the western boundary of ED-6 and the remaining DOE property (i.e., the BORCE) which will further adversely impact the rare forest-interior habitat.	Changes to the proposed action, including the removal of new boundary road and modification of the western boundary of Parcel ED-6, were made to reduce potential adverse impacts to the conservation value of the BORCE. The proposed size of Parcel ED-6 was reduced from approximately 362 acres to about 336. Additional information has been provided on the potential impacts to interior forest habitat.
50.	1. Thus, I believe that the ED-6 EA is inadequate because it does not provide a map that describes the Proposed Action. The map must locate and include acreages for the: - proposed residential development plans, including roads - undevelopable land (i.e., slopes greater than 10 percent) - the new DOE boundary patrol road	DOE has provided information in the EA on the existing condition of Parcel ED-6. If the parcel is conveyed, DOE would have no control over the development of the property. Proposed residential development plans were not available during the preparation of the EA.

Comment No.	Comment	Response
51.	2. Furthermore, there must be an evaluation of the amount (acres) of forest interior habitat that will be lost. The evaluation must include the area that results from clearing for residential development and the DOE boundary patrol road and include the edge effects of such activities (i.e., about 300 feet from the development and the road). This area must also be shown on the map.	Additional information has been provided in Section 3.6.2 and 4.6.1 on the potential impacts to interior forest habitat.
52.	3. Include the separate CERCLA report mentioned on page 1-3.	The conclusion of the CERCLA investigation and report has been added to Sect. 1.3. The complete report is available from DOE upon request.
53.	4. Explain why the Conservation Easement Alternative would require construction of a new boundary patrol road (page 2-2) and where it would be. Such a road is unnecessary since Wisconsin Avenue bounds the property east of Wisconsin Avenue.	The revised proposed action eliminates the new boundary road that was originally considered. The road has also been eliminated in the other alternatives considered in the EA.
54.	5. Show the location of sink holes on the Geologic Map of Parcel ED-6. (see page 3-4.)	The sinkhole described as being located approximately 1200 ft southwest of the parcel is depicted on the geologic map. No major sinkholes are present on ED-6 but some shallow depressions are evident.
55.	6. How about calling “wet-weather conveyances” ephemeral streams? (Page 3-5)	The “wet-weather conveyances” have been changed to “intermittent streams” and are further described as having ephemeral flow.
56.	7. Page 4-1. Delete “Regional” from Oak Ridge Planning Commission.	The City stated that the correct name is “Oak Ridge Municipal Planning Commission” and the change has been made.
57.	8. Page 4-5. It is not true that “…many of the animal species could relocate to similar habitats located immediately adjacent to the parcel.” Adjacent habitat accommodates existing species and no more. Please revise.	This statement has been revised to state that “some” species could relocate.
58.	9. Table 4.1. Revise; this table doesn’t make sense! I don’t know any developer who would build 16 units for $90,000 each on that land. Nor would it be possible to build 156 units at $300,000 each on that hilly land. However, if there were a map of residential development to support the table, it might be more convincing. The upper bound of 156 units would probably be a mix of units. Not all would be valued at $300,000.	Table 4.1 has been revised.

Comment No.	Comment	Response
59.	10. Page 4-9. Sections 4.8.3 and 4.8.3.2 are unrealistic given the status of the Horizon Center. Even with the economic growth that appears to be happening in Oak Ridge, much of it is still unrealized (e.g., Rarity Ridge).	Information presented in Section 4.8 has been revised.
60.	11. Page 5-1. Delete "proposed" from BORCE.	Deleted.
61.	12. Page 5-1. Why only 3208 acres for preservation and recreation when the BORCE and 3 Bends total about 6000 acres. Please clarify.	The 3208 acres is land that has been conveyed and DOE no longer owns. The property within the BORCE and the Three Bends area is still DOE property.
62.	13. Page 5-1. What are "land outgrants" and what which such lands are included in the "3498 acres for preservation/recreation"? Please clarify.	Revised.
63.	14. Page 5-1. While the loss of 360 acres of land (about one percent) is small compared to the size of the ORR, it is not small when compared to the available deep forest habitat on the ORR. Such a comparison is more realistic and must be included in Section 5.1.1. In addition, the cumulative impacts analysis must include estimates and location of the surrounding deep-forest habitat so that one can know the real impacts to species that depend on contiguous deep-forest habitat.	Additional information has been provided in Section 3.6.2 and 4.6.1 on the potential impacts to interior forest habitat.
64.	15. Page 5-2. What and where is the "Oak Ridge Industrial Center"? Please identify.	The Oak Ridge Industrial Center is located in Roane County on the approximately 1300 acre peninsula that was the former location proposed for the Clinch River Breeder Reactor. The site is currently owned by TVA
Tennessee Citizens for Wilderness Planning (Frank Hensley and Jo Ann Thompson) – Letter to Gerald Boyd dated September 28, 2005		
65.	The Tennessee Citizens for Wilderness Planning (TCWP) and the Advocates for the Oak Ridge Reservation (AFORR) are writing you today about a number of the unassessed environmental impacts of the proposed land transfer and patrol road addressed in the Department of Energy's recent ED-6 Draft Environmental Assessment. Of particular interest are effects on the Black Oak Ridge Conservation Easement (BORCE) State Natural Area.	Comment noted.

Comment No.	Comment	Response
66.	The DOE is proposing to transfer 362 acres of land, identified as ED-6, to the City of Oak Ridge. The impacts of this transfer are supposed to be identified and assessed in the Environmental Assessment (DOE/EA-1514 Draft). In the belief that the environmental assessment (EA) would be thorough and that negative impacts on the adjacent BORCE State Natural Area would be mitigated, the local conservation community, represented by TCWP and AFORR, agreed to endorse the ED-6 proposal, although it encompassed more land than the Land-Use Focus Group discussed for residential development (220 acres) and was larger than the acreage initially requested by the City (Resolution 5-73-04, 245 acres). We also had been informed, by the Mayor and other City of Oak Ridge officials on two occasions (DOE ED-6 information meeting in November 2004 and a December 18, 2004, meeting with city officials), that the excess land (between 50 and 100 acres) would be transferred to the State to become a part of and contiguous with the BORCE State Natural Area.	Comment noted.
67.	The EA is not complete without having assessed the impacts of the ED-6 development and construction of the patrol road on the deep forest habitat which they would destroy. The additional loss of deep forest habitat as a result of creating the new edge around the 174 acres of destroyed deep forest has not been assessed in the EA.	The revised proposed action eliminates the new boundary road that was originally considered. The road has also been eliminated in the other alternatives considered in the EA.
68.	The destruction of the deep forest habitat could be reduced by relocating the western boundary line farther east and allowing it to follow the natural land contours. This could save an estimated 50 to 60 acres of deep forest habitat.	Changes to the western boundary and the elimination of the new boundary road resulted in a reduction of the size of the parcel from approximately 362 acres to around 336. The excluded area will remain as DOE property. At some time in the future this land may be considered for addition to the BORCE but that action is beyond the scope of this EA and would occur separately from this NEPA action.
69.	The construction of the proposed patrol road within the BORCE State Natural Area is a part of the ED-6 proposed action, but it has not been analyzed for any environmental impacts. This patrol road is not required for any DOE mission since this is supposed to be a State Natural Area. Fire protection should not be a problem since this area is accessible from roads in the proposed ED-6 development.	The revised proposed action eliminates the new boundary road that was originally considered.

Comment No.	Comment	Response
70.	The unnamed stream affected by this patrol road drains approximately 100 acres of the BORCE State Natural Area. Approximately 50% of this unnamed stream traverses parcel ED-6, with the balance located within the BORCE State Natural Area. This unnamed stream has been treated as a "wet weather conveyance" in the ED-6 EA and this is an inaccurate description of this stream.	The term "wet-weather conveyance" has been replaced with "intermittent streams" to describe the surface water features located on Parcel ED-6. These intermittent streams are dry for much of the year and typically have only ephemeral flow after precipitation events and during the "wet" season.
71.	The irreparable negative impacts of the proposed new patrol road are summarized: 1) It would severely degrade the ecological value of the unused ED-6 land (50 to 100) acres the City would transfer to the BORCE State Natural Area because the acreage would not be contiguous with the primary State Natural Area acreage. The proposed patrol road cannot follow the arbitrarily drawn straight ED-6 boundary line because of steep terrain. It must meander through the BORCE, hence cutting off and isolating a portion of the BORCE State Natural Area. The excess City land would only be contiguous with this small cut-off portion. 2) It would have a negative environmental effect on the unnamed stream draining the valley within the BORCE State Natural Area because its undefined route must meander off the hill and down through the valley. 3) It would substantially increase the estimated loss of deep forest habitat by as much as 100 acres (in addition to the 174 acres of deep forest habitat loss within the proposed ED-6 boundary). Part of this 100-acre loss would be due to the eastern end of the BORCE State Natural Area being isolated by the road, and hence separated and not contiguous with the deep forest section of the BORCE State Natural Area (see #1 above). 4) It would reduce the monetary value of the BORCE State Natural Area as compensation from DOE for pollution of Watts Bar Lake under the Natural Resource Damage Assessment (NRDA). 5) New residential lots that back up on an unpaved gravel road would have less value than lots that back up on a natural area.	The new boundary road is no longer part of the proposed action or included in any of the alternatives.

Comment No.	Comment	Response
72.	TCWP and AFORR request the following changes to the ED-6 EA: 1) The additional loss of deep forest habitat, due to the new edge created around the proposed ED-6, should be assessed. 2) The proposed new patrol road should be deleted from the project. 3) The straight-line western boundary of ED-6 should be redrawn to follow the natural land contours, hence reducing the total acreage and allowing 50 to 60 acres of the deep forest to be left in the BORCE State Natural Area. 4) A complete plant survey should be done to determine if and where there are rare and endangered plants on the property. 5) The DOE should provide a comprehensive analysis of cumulative impacts of past, present and reasonably foreseeable DOE proposed land use changes on the Oak Ridge Reservation. 6) The overall effect of ED-6 on the BORCE State Natural Area should be assessed.	1) The proposed boundary road has been eliminated from consideration and is no longer part of the proposed action. 2) Done. 3) Changes to the western boundary and the elimination of the new boundary road resulted in a reduction of the size of the parcel from approximately 362 acres to around 336. The excluded area will remain as DOE property. At some time in the future this land may be considered for addition to the BORCE but that action is beyond the scope of this EA and would occur separately from this NEPA action. 4) It was determined that a complete plant survey was not needed since it is unlikely that any listed threatened and endangered plants are present on the parcel. 5) DOE has determined that the analysis of cumulative impacts is adequate for this EA. 6) The removal of new boundary road, the reduction in the amount of acres, and the change to the western boundary would minimize any potential effect on the BORCE.
73.	Although we have provided official comments on the ED-6 EA, it is our obligation to alert you to serious deficiencies that could bring about legal challenges to this process and thus delay the ED-6 land transfer to the City of Oak Ridge. Our purpose is to see that DOE fulfills its responsibilities for the environment; we do not want to delay the proposal.	Comment noted.
74.	We appreciate your continuing interest in protecting this unique and irreplaceable Oak Ridge Reservation.	Comment noted.

Comment No.	Comment	Response
	Tennessee Citizens for Wilderness Planning (Sandra Goss) – Email dated September 15, 2005	
75.	The Tennessee Citizens for Wilderness Planning (TCWP) has reviewed the subject EA on the conveyance of Parcel ED-6. TCWP has identified several deficiencies in the document which relate to the planned actions of DOE and the City. As it stands, the draft EA does not provide an adequate assessment of the environmental impacts of the Proposed Action, including impacts on the adjoining Black Oak Ridge Conservation Easement (BORCE). We request that Proposed Actions be changed and the EA be revised to reflect these changes as listed below.	The proposed action has been revised and several other revisions and changes have been made to address specific comments.
76.	1) A map showing the location of biologically sensitive areas on Parcel ED-6 should be included in the EA to guide the involved parties in determining land not suitable for development.	This information has been incorporated into the EA.
77.	2) A thorough assessment of the area should be made to locate endangered or threatened plants.	Coordination with the USFWS, TN Division of Natural Heritage, reviews of existing literature, and a site walkover were conducted for Parcel ED-6. It was determined that the presence of any listed threatened and endangered plants on the property was unlikely and a survey was not conducted.
78.	3) The straight line boundary between Parcel ED-6 and the BORCE should be modified so that it follows the topography. The boundary should conserve as much developable land on Parcel ED-6 as reasonable (generally ridge tops and gently sloping areas) while removing sensitive lands, tributary streams, and steep slopes from the west side of the parcel. The boundary was drawn arbitrarily on a map used by the Land-Use Planning Focus Group and it was never intended to be used as a property line. This boundary line should be better defined to represent a reasonable boundary based on topography and development needs of the City of Oak Ridge and which also protects the most ecologically valuable land.	The western boundary of the parcel has been revised to better follow the topography of the area and to eliminate areas of steeper slopes (>10%).

Comment No.	Comment	Response
79.	4) The environmental impact of constructing a new boundary road should be discussed. The report notes that construction of a 30-ft wide boundary-patrol and fire-suppression road would be a direct result of the Proposed Action. However, the draft EA does not show the likely route of the patrol road nor does it evaluate its environmental impact. If the patrol road crosses steep ridges and stream tributaries, it will have a large impact on the watershed due to erosion of the steep terrain. Cutting a wide road through deep forest will also affect wildlife habitat on the BORCE as well as destroy the forested buffer zone between residential development and the conservation easement.	The revised proposed action eliminates the new boundary road that was originally considered.
80.	Since the City has agreed to not allow development on the western portion of ED6 and has agreed to transfer 50 to 100 acres of this land to TDEC to be added to the BORCE, it is very important that this boundary- patrol road not be constructed. Construction of this road would separate these 50 to 100 acres from the BORCE and negate their importance to wildlife since they would not be contiguous with the BORCE. It is not clear why a boundary road is at all necessary as the BORCE is not related to any active DOE mission especially since this 30-ft wide boundary road will have substantial negative impacts on the east end of the conservation easement. The EA notes that fire protection of Parcel ED-6 will be adequately covered by existing city resources. The decision to build a road primarily for fire-suppression should be ratified by TDEC since they are responsible for management of the BORCE.	The new boundary road is no longer part of the proposed action or included in any of the alternatives.
U.S. Fish and Wildlife Service (Lee A. Barclay) – Letter dated September 13, 2005		
81.	The draft EA does not adequately describe potential Indiana bat maternity roost habitats present on Parcel ED-6. Although the results of mist-net and habitat surveys are briefly mentioned in Section 3.6.3, no data regarding the mist net survey protocols and methods or results of the bat habitat assessments are provided. As presented in the draft EA, the Biological Assessment would not support a “not likely to adversely affect” finding. The Service is unable to provide our concurrence at this time and we suggest that a more detailed report of the mist net surveys and habitat assessments be provided.	The completed Biological Assessment including the Mist Net Survey and Habitat Assessment was transmitted to the FWS. Information from the Biological Assessment has been summarized and included in the EA.

Comment No.	Comment	Response
82.	The draft EA adequately documents deep forest habitats present on Parcel ED-6 and generally describes potential adverse effects associated with the envisioned residential development under the proposed action. More detailed information is needed, however, to adequately assess the potential negative effects of DOE's proposed action on migratory birds that utilize Parcel ED-6 and the contiguous Black Oak Ridge Conservation Easement. The cumulative effects of the continued loss of interior forest breeding bird habitat on the Oak Ridge Reservation and in the Ridge and Valley Physiographic Province are not adequately assessed in the EA. Based on our evaluation of the information presented in the draft EA, the Service can only support the conservation easement or no action alternatives.	Additional information on the potential impact to interior forest habitat and migratory birds has been added to the EA.
83.	If DOE desires to proceed with the proposed transfer of Parcel ED-6 to the City of Oak Ridge, we believe that the development of an Environmental Impact Statement (EIS) is warranted. Reliance on the existing zoning regulations of the City of Oak Ridge to adequately protect threatened and endangered species and migratory birds that utilize this area is not feasible. Pursuant to the Migratory Bird Treaty Act and Executive Order 13186, DOE has a responsibility to protect and enhance the conservation of migratory bird resources on the ORR.	Comment noted.

Comment No.	Comment	Response
	J. Warren Webb – Email dated August 24, 2005	
84.	Section 1.1, Purpose and Need, should be revised and expanded to point the way to the alternatives (see below). The first sentence of this section signals to this reader (and probably to the decision maker) that the decision to be made is simply whether to transfer 362 acres to the City of Oak Ridge. In fact, the purpose of the EA should be to consider whether to transfer ED-6 or some portion thereof to the City, and, if so, how much and with what restrictions. The need arises directly from a request by the City to transfer 245 acres, not 362 acres, for residential development; indirectly, it arises from consideration by the Focus Group to make some acreage (about 220 acres in the majority report) available to the City for residential development. The City, apparently, made no mention of commercial development, and only a minority of the Focus Group supported commercial development. These circumstances should be made clear briefly in the need statement and fully explicated in the background section (no acreages for Focus Group alternatives are given; a table would be appropriate). *Not raising and explaining these pertinent circumstances in the EA does a disservice to the decision maker and the public, and raises a possibility of legal action.*	The proposed conveyance supports the purpose and need of the action which is to transfer property to the City of Oak Ridge for economic development. As stated in the response to comment No. 18, the City of Oak Ridge's original proposal (July 1, 2004) requested Parcel ED-6 with no specific acreage amount listed. Once the property was surveyed, the total acreage was calculated at 362 acres. The proposed size of Parcel ED-6 was reduced from approximately 362 acres to about 336 acres, and the new boundary road was removed from the proposed action. The City has requested conveyance of the property for residential development purposes.
85.	Section 2, Description of Alternatives should be revised/expanded to include reasonable alternatives and explain why the proposed action is reasonable. The City's original request for 245 acres is a reasonable alternative. The Focus Group recommendations could be considered reasonable. Thus, these alternatives should be included in the EA. The Proposed Action, Section 2.1, to transfer 362 acres, seems to come out of nowhere, or at least left field. If it is a reasonable alternative, the reasons why it is reasonable should be explained. The City's subsequent position, that it would like all 362 acres but would sign a binding agreement, needs to be explained. Also, in Paragraph 2 of Section 2.1, DOE makes a number of assumptions; these are meaningless unless there is some assurance (e.g., deed restrictions) that they would be fulfilled. All of the subsequent analysis is predicated on these unsubstantiated assumptions. Again, a disservice to the decision maker and the public is perpetrated.	The alternatives do not reflect specific acreage because the environmental concerns for minor acreage fluctuations would not result in a significant change to the impacts being evaluated.

Comment No.	Comment	Response
86.	Section 2.3, the Mixed Development Alternative, includes some (unspecified as to amount, and only the "most likely" location specified generally) commercial development. Again, this seems to come out of nowhere, unless from a minority of the Focus Group. For this alternative to be considered reasonable, more information is needed.	Mixed development was considered by the Focus Group and DOE decided that including this alternative in the EA was reasonable.
87.	Section 2.4, the Conservation Easement Alternative, presents an all-or-nothing alternative, when, in fact, some portion of ED-6 could be incorporated in the BORCE.	This alternative was modified so the entire Parcel ED-6 or a portion could be added to the BORCE. For analysis purposes the entire parcel was considered for bounding purposes.
88.	Description of the Terrestrial Environment, Section 3.6.1 should explain the value of the habitat. The key point is that 174 acres of the parcel are deep forest habitat, and are part of a much larger block in the BORCE (863 acres). The FWS noted this as a significant issue in its letter to DOE, included in the EA. Specifically, the FWS, quoting a University of Tennessee study, stated: "large forested tracts are much less common on the ORR and more accurately meet habitat requirements for rare species." This large block (almost half of ED-6) should be brought forward at the beginning of the section and its characteristics thoroughly described. Much of the rest of the description can be shortened and incorporated by reference, thus focusing the attention of the reader on the key issue.	Section 3.6.1 has been revised and the discussion of interior forest habitat has been revised based on changes in the Parcel ED-6 boundary. The discussion of interior forest habitat is now included in a separate subsection 3.6.2.
89.	Similarly, Section 3.6.2 should focus on the animals using this deep forest block, rather than reciting "typical" or "common" species expected to be found in the parcel. Such information can be presented in tables or incorporated by reference. Incidentally, the EA presents mist netting for bats (without numerical results or citation) in the context of endangered species. In fact, findings on bats are indicative of general ecosystem health, and should be presented as such with locations and discussion in the context of deep forest and other habitats.	The text describing terrestrial animals that likely inhabit Parcel ED-6 includes common or typical species and sensitive species like neo-tropical migratory birds that can be found within the interior forest habitat. The results of the bats captured during the Parcel ED-6 mist netting have been added to Section 3.6.4.

Comment No.	Comment	Response
90.	Discussion of Impacts in Section 4.6.1 to 174 acres of deep forest should be highlighted. The language of paragraph 2 of this section is far too weak: the proposed action, in fact, would eliminate up to 174 acres (no potential about it) of deep forest that is a significant resource and part of a much larger block. Elimination of this habitat would adversely impact neotropical migrant birds and other wildlife. Because the reasonable option of combining all or part of this with the BORCE is not considered, it must be discussed in this section. In view of the significance of this habitat and its wildlife, the positive impacts of no action and the conservation easement alternative should be further explained.	This section has been revised to better describe the impacts associated with the removal of interior forest habitat.
91.	Section 5.1.4 should be revised and expanded. For starters, this section contains two astounding, unsubstantiated statements: "As an example, the conversion of an upland hardwood forest to pasture or hayfield use can result in nearly the same loss of biodiversity as if the woodland were converted to industrial use." " . . . but the impact on biodiversity has probably been minimal since much of the core area of the Reservation and most sensitive areas have been avoided or potential impacts have been mitigated. Also, much of the development and reindustrialization on ORR is taking place within previously disturbed and/or developed areas within and surrounding the major plant areas."	The first statement has been deleted. The second statement was not changed.
92.	In any case, the section is totally inadequate in view of the 174 acres of deep forest (not mentioned) as part of a much larger block (863 acres); the unanalyzed impacts thereof (Section 4.6.1); the statement by the FWS regarding significance of the area; the actual impacts of past actions such as ED-1 (as opposed to those asserted); and the, alas, possibility that DOE will continue to fragment the ORR by segmented actions, as here. Moreover, using the positive aspects of the BORCE as a substitute for explicating the negative impacts of the proposal is unconscionable and of no use to the public or the decision maker.	Comment noted.

Comment No.	Comment	Response
93.	The preparers seem unaware of an important point about cumulative impacts: most of the changes we observe – to natural resources (e.g., deep forest), social conditions, and land use – are the result of small, incremental changes that can be presented as inconsequential when viewed in a narrow context. Thus, the loss of 174 acres of deep forest, for example, may be inconsequential, or it may be yet another contribution to a substantial trend. The decision maker must confront this conundrum, and the EA should assist him/her. This EA does not.	Comment noted.
94.	An important omission is discussion of deed restrictions. DOE has a history of turning over land without sufficient restrictions based on environmental findings (e.g., the Boeing property). In view of this sad history, and the unsupported assumptions made in the description of alternatives, the EA should indicate strong deed restrictions that would be incorporated in order to conform to the assumptions in Section 2.1 and to prevent later actions that would increase adverse impacts. These restrictions would include, but not be limited to, the City's willingness to enter into binding agreements concerning portions of the property.	The total acreage to be conveyed was reduced by adjusting the alignment of the property boundary to reflect topography and protect interior forest habitat. No deed restrictions are necessary.

APPENDIX B

CORRESPONDENCE LETTERS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

January 19, 2005

Mr. James L. Elmore, Ph.D.
U.S. Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831

AMESH
OFFICIAL FILE COPY
DOCS NO. 201878
DATE RECEIVED JAN 25 2005
FILE CODE

Re: FWS#05-0436

Dear Dr. Elmore:

Thank you for your letter and enclosures received December 20, 2004, regarding the preparation of an Environmental Assessment (EA) by the Department of Energy (DOE) for the proposed transfer of Parcel ED-6 of the Oak Ridge Reservation (ORR), formerly known as Self Sufficiency Parcel D, to the City of Oak Ridge in Anderson County, Tennessee. U.S. Fish and Wildlife Service personnel have reviewed the information submitted and offer the following comments for consideration.

According to our records, the following federally listed endangered species may occur on or near the Parcel ED-6 property:

gray bat (*Myotis grisescens*)
Indiana bat (*Myotis sodalis*)

Qualified biologists should assess potential impacts and determine if the proposed land transfer may affect the species. We recommend that you submit a copy of your assessment and the draft EA to this office for review and concurrence. A finding of "may affect" could require the initiation of formal consultation procedures.

The EA should discuss the conclusions, recommendations, and resolutions that emanated from the Oak Ridge Land Use Planning Process which was conducted in 2001 and 2002. This strategic planning process sanctioned by DOE, which included the participation of a wide variety of stakeholders for the ORR, evaluated a variety of scenarios for potential uses of DOE lands in the western part of the ORR. Although the City of Oak Ridge has determined that the most likely use of this property would be residential development, this statement diverges from consensus opinions expressed by the Oak Ridge Land Use Planning Focus Group.

During the development of the final report of the Oak Ridge Land Use Planning Focus Group, University of Tennessee personnel performed a sensitive habitat analysis of five key areas located in the western portion of the ORR. One of those areas, Area 7, included a significant portion of Parcel ED-6. Approximately 863 acres of deep forest habitat were identified in Area 7. Area 7 was deemed a valuable source of deep forest habitat and the conclusion of the UT researchers was that "large forested tracts are much less common on the ORR and more accurately meet habitat requirements for rare species." A substantial portion of Parcel ED-6 would be considered core interior forest breeding bird habitat. We believe that Parcel ED-6 provides significant nesting habitats for a variety of neo-tropical migratory birds, of which many species are currently in decline.

The EA should evaluate a variety of alternatives which closely resemble the four scenarios that were documented in the final report (i.e., greenspace emphasis, development emphasis, modified ED-3, and less development). The most current biological data, including surveys for endangered species and migratory birds, should be discussed in detail. The EA should also evaluate the cumulative effects of the continuing disposition of DOE ORR properties to the City of Oak Ridge for economic development purposes on legally protected species, including migratory birds. This analysis should not only focus on DOE-managed lands on the ORR, but also include a larger geographic analysis which takes the ecological condition of the entire Ridge and Valley Physiographic Province into consideration. This may necessitate the development of an Environmental Impact Statement.

These constitute the comments of the U.S. Department of the Interior, provided in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.), the Migratory Bird Treaty Act (16 U.S.C. 703-711), the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), and the National Environmental Policy Act (42 U.S.C. 4321-4347; 83 Stat. 852). We appreciate the opportunity to comment. Should you have any questions or need further assistance, please contact Steve Alexander of my staff at 931/528-6481, ext. 210, or via e-mail at *steven_alexander@fws.gov*.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

xc: Pat Parr, ORNL, Oak Ridge
Dave McKinney, TWRA, Nashville
David Harbin, TDEC, Nashville
John Owsley, TDEC, Oak Ridge

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

April 10, 2007

Mr. Larry C. Kelly
Department of Energy
Oak Ridge Office
P.O. Box 2001
Oak Ridge, Tennessee 37831

Dear Mr. Kelly:

On March 12, 2007, a meeting was held at the U.S. Fish and Wildlife Service's Regional Office in Atlanta, Georgia. In attendance were representative from the U.S. Department of Energy at Oak Ridge, Tennessee, the Fish and Wildlife Service from Cookeville, Tennessee, and the Fish and Wildlife Service's Regional Office. The purpose of the meeting was to discuss and resolve issues concerning section 7 Endangered Species Act consultation for the transfer of Parcel ED-6 at the Oak Ridge Reservation in Roane County, Tennessee, to the City of Oak Ridge.

After discussions at the meeting, and upon review of additional information concerning mist net surveys provided to us at the meeting, we believe that the requirements of section 7 of the Endangered Species Act have been fulfilled for the transfer of Parcel ED-6, and that no further consultation is needed. Obligations under section 7 must be reconsidered, however, if: (1) new information reveals that the proposed action may affect listed species in a manner or to an extent not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Discussions at the meeting revealed that, although there are a number of caves and areas of upland and riparian forest suitable for use as roosting and foraging habitat, there have not been any comprehensive bat surveys done on the Oak Ridge Reservation. Such surveys would provide valuable data concerning the use of suitable habitat on and the distribution of bats, including the gray bat and Indiana bat, on the Reservation; they would contribute toward fulfilling the Department of Energy's obligations under section 7(a)(1) of the Endangered Species Act; and they would provide baseline data that would be useful during review of future actions. It is our understanding that you have agreed to consider conducting Reservation-wide bat surveys. Biologists from my staff are available to partner with you and your staff in this effort. Also, we are available to partner with you to develop and implement surveys for other rare or federally listed plants and animals that might exist on Reservation lands.

Thank you for your cooperation in resolving the issues associated with the transfer of Parcel ED-6. If you have any questions, or if we can be of further assistance, please contact me at 931/528-6481, ext. 212.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

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

April 6, 2005

Mr. Gary Hartman
Department of Energy
Oak Ridge Office
Post Office Box 2001
Oak Ridge, Tennessee 37831

RE: DOE, ARCHAEOLOGICAL ASSESSMENT, PARCELS ED-6 AND 7 TRANSFER, OAK RIDGE, ROANE COUNTY, TN

Dear Mr. Hartman:

At your request, our office has reviewed the above-referenced archaeological survey report in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). Based on the information provided, we find that the project area contains no archaeological resources eligible for listing in the National Register of Historic Places.

If project plans are changed or archaeological remains are discovered during construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act.

Your cooperation is appreciated.

Sincerely,

Herbert L. Harper
Executive Director and
Deputy State Historic
Preservation Officer

HLH/jmb

AMESH
OFFICIAL FILE COPY
DOCS NO. 214584
DATE RECEIVED APR 14 2005
FILE CODE 451.9.17

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

August 31, 2005

Mr. Gary S. Hartman
Oak Ridge Operations Office
Post Office Box 2001
Oak Ridge, Tennessee, 37831

RE: DOE, CULTURAL RESOURCES SURVEY REPORT, TRANSFER/PARCELS ED-6, OAK RIDGE, ANDERSON COUNTY

Mr. Hartman:

Pursuant to your request, received on Thursday, August 18, 2005, this office has reviewed documentation concerning the above-referenced undertaking. This review is a requirement of Section 106 of the National Historic Preservation Act for compliance by the participating federal agency or applicant for federal assistance. Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739)

Considering the information provided, we find that the area of potential effects for this undertaking contains no cultural resources eligible for listing in the National Register of Historic Places. You should notify interested persons and make the documentation associated with this finding available to the public.

If your agency proposes any modifications in current project plans or discovers any archaeological remains during the ground disturbance or construction phase, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act.

This office appreciates your cooperation.

Sincerely,

Herbert L. Harper
Executive Director and
Deputy State Historic
Preservation Officer

HLH/jyg

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

April 3, 2006

4WD-FFB

David G. Page
Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, TN 37831

SUBJ: Concurrence with Identification of Uncontaminated Property (Parcel ED-6) for Transfer Purposes under CERCLA § 120(h)(4)(B)

Dear Mr. Boyd:

In response to your letter of February 27, 2006, the Environmental Protection Agency (EPA) hereby concurs with the Department of Energy's (DOE) identification of Parcel ED-6 as uncontaminated property, in accordance with § 120(h)(4)(B) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

Based on the information provided in the "Comprehensive Environmental Response, Compensation, and Liability Act Section 120 (h) Report for the Title Transfer of Parcel ED-6 at the Oak Ridge Reservation, Oak Ridge, Tennessee" (February 2006), and data collected during the Remedial Investigation for the East Fork Poplar Creek Sewer Line Beltway, EPA believes Parcel ED-6 is properly classified as "uncontaminated" as that term is used in CERCLA § 120(h)(4).

If you have questions regarding this uncontaminated property determination, please do not hesitate to contact me at 404-562-8513.

Sincerely,

Jennifer Tufts, Project Manager
KY/TN Federal Oversight Section
Federal Facilities Branch
Waste Management Division

Internet Address (URL) • http://www.epa.gov
Recycled/Recyclable • Printed with Vegetable Oil Based Inks on Recycled Paper (Minimum 30% Postconsumer)

cc
Doug McCoy, TDEC
Dave Adler, DOE
Oak Ridge SSAB

APPENDIX C

BIOLOGICAL ASSESSMENT

Biological Assessment for Threatened and Endangered Species Under Section 7 of the Endangered Species Act for the U. S. Department of Energy Conveyance of Parcel ED-6 to the City of Oak Ridge, Tennessee

May 2007

U.S. Department of Energy
Oak Ridge Office
Oak Ridge, Tennessee

Biological Assessment for Threatened and Endangered Species Under Section 7 of the Endangered Species Act for the U. S. Department of Energy Conveyance of Parcel ED-6 to the City of Oak Ridge, Tennessee

Date Issued: May 2007

Prepared by
Science Applications International Corporation
and
BHE Environmental, Inc.

U.S. Department of Energy
Oak Ridge Office
Oak Ridge, Tennessee 37831

05-007(E)/050807

CONTENTS

FIGURES ..... C-iv
TABLES ..... C-iv
ACRONYMS ..... C-iv

1. SUMMARY C-1

2. DESCRIPTION OF THE PROPOSED ACTION C-3

3. STATUS AND BIOLOGY OF THE LISTED SPECIES C-3
   3.1 GRAY BAT C-3
      3.1.1 Status C-3
      3.1.2 Biology C-4
   3.2 INDIANA BAT C-5
      3.2.1 Status C-5
      3.2.2 Biology C-5

4. ECOLOGICAL DESCRIPTION OF THE SITE C-6

5. MIST NET SURVEYS AND HABITAT ASSESSMENT C-8
   5.1 MIST NET SURVEYS C-8
   5.2 HABITAT ASSESSMENT C-10

6. POTENTIAL IMPACTS OF THE PROJECT ON LISTED SPECIES C-11

7. REFERENCES C-12

FIGURES

1 Parcel ED-6 vicinity map. C-2
2 Location of six mist net sites and vegetation cover in Parcel ED-6 on the Oak Ridge Reservation in Roane County, Tennessee. C-9

TABLES

1 2005 Mist netting results from Parcel ED-6 ..... C-10
2 2006 Mist netting results from Parcel ED-6 ..... C-10

ACRONYMS

BA	biological assessment
BHE	BHE Environmental, Inc.
dbh	diameter at breast height
DOE	U. S. Department of Energy
EA	Environmental Assessment
EFPC	East Fork Poplar Creek
HSI	Habitat Suitability Index
KBWG	Kentucky Bat Working Group
ORR	Oak Ridge Reservation
ROW	right-of-way
TVA	Tennessee Valley Authority
USFWS	U. S. Fish and Wildlife Service

BIOLOGICAL ASSESSMENT FOR THREATENED AND ENDANGERED SPECIES UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE U. S. DEPARTMENT OF ENERGY CONVEYANCE OF PARCEL ED-6 TO THE CITY OF OAK RIDGE, TENNESSEE

1. SUMMARY

This biological assessment (BA) assesses the potential for adverse effects on two federally listed animal species that could result from the conveyance of Parcel ED-6 by the U. S. Department of Energy (DOE) to the city of Oak Ridge. Parcel ED-6 consists of approximately 336 acres located on the eastern end of the Oak Ridge Reservation (ORR) (Fig. 1) within the city limits of Oak Ridge. The species discussed in this BA are those mentioned in a letter from the U. S. Fish and Wildlife Service (USFWS) to DOE, dated January 19, 2001, regarding the preparation of an Environmental Assessment (EA) for the proposed conveyance (USFWS 2005). USFWS determined that the gray bat (*Myotis grisescens*) and the Indiana bat (*Myotis sodalis*) might occur on or near the Parcel ED-6 property. Both species are federally listed as endangered.

Between July 29 and August 1, 2005, BHE Environmental, Inc. (BHE), completed a mist net survey to investigate the presence of the Indiana bat and/or gray bat in Parcel ED-6 (BHE 2005). BHE surveyed three sites with mist nets and qualitatively assessed habitat suitability for summering Indiana bats. Methods of the mist net survey followed recommendations of the Indiana Bat Recovery Team (USFWS 1999a) and guidance from the USFWS Tennessee Field Office. The timing of the survey, level of effort, and survey conditions were appropriate for investigating presence of the Indiana bat during the maternity season. The qualitative habitat assessment was conducted using principles of the Habitat Suitability Index (HSI) Model for Indiana Bat Summer Habitat (Rommé et al. 1995).

No Indiana bats or gray bats were captured during the survey. Sixty-seven bats of three species were captured in the proposed project area: the big brown bat (*Eptesicus fuscus*), red bat (*Lasiurus borealis*), and eastern pipistrelle (*Pipistrellus subflavus*). None of the three species captured is federally or state listed as endangered or threatened, and they are afforded no legal protection beyond measures that protect common species of wildlife.

Results of the habitat assessment indicated none of Parcel ED-6 provides high-quality summer habitat for Indiana bats. Approximately 61 acres provide moderate-quality summer habitat, and 278 acres provide low-quality summer habitat for Indiana bats. Approximately 16 acres do not provide suitable summer habitat for Indiana bats. Note: At the time BHE conducted the habitat assessment, the acreage of Parcel ED-6 was about 360 acres. Subsequent to their initial work, the proposed western boundary of the parcel was changed, which resulted in the parcel now being about 336 acres.

Based on the review of the 2005 mist net survey and habitat assessment, DOE and USFWS agreed to conduct another mist net survey at three additional sites within Parcel ED-6. This additional mist net survey was conducted by BHE during July 11–16, 2006 (BHE 2006). Mist net locations were selected following an on-site meeting with representatives from USFWS and DOE in April 2006, and subsequent guidance from USFWS. Eight bats were captured during the survey. All of the captures were at one site and no bats were captured at the other two sites. Two species were identified during the survey: big brown bats and red bats.

DOE concludes, based on the results of the mist net surveys and the information presented in this BA, that the proposed transfer of Parcel ED-6 to the city of Oak Ridge is not likely to adversely affect either of the listed species. Neither species appears likely to be present on Parcel ED-6, and proposed or designated critical habitats for the species are not present on or near the parcel. No caves, other suitable hibernacula, or roosting habitat for gray bats is present at Parcel ED-6. However, caves that could provide potential roosting habitat for the gray bat are present within 5 miles of the property. Although the ultimate use of Parcel ED-6 would eventually require removal of trees, the majority of the potential summer habitat on the parcel is considered low to moderate quality for Indiana bats. Also, there is better quality summer habitat and adequate numbers of suitable and potentially suitable roost trees available immediately adjacent to Parcel ED-6 in the Blackoak Ridge Conservation Easement area. Surface water resources on the parcel are limited to intermittent streams, but East Fork Poplar Creek (EFPC) provides a permanent source of water within 100 ft of Parcel ED-6.

2. DESCRIPTION OF THE PROPOSED ACTION

DOE proposes to convey Parcel ED-6 to the city of Oak Ridge for the development of new housing. Parcel ED-6 is being transferred because DOE has determined that the property is excess (i.e., property is not needed to fulfill DOE current or foreseeable future requirements). The need for DOE action is the result of a request from the city of Oak Ridge to transfer Parcel ED-6 under 10 *Code of Federal Regulations* Part 770. This regulation, entitled *Transfer of Real Property at Defense Nuclear Facilities for Economic Development*, allows DOE to transfer real property to local communities for economic development purposes.

For the purposes of analysis, it is assumed that after the transfer, the city of Oak Ridge would sell the property to a private developer. City staff would review the residential development plans to ensure compliance with all applicable zoning ordinance requirements and other engineering-related ordinances and standards. For bounding purposes, it is also assumed that the new residential development would be primarily concentrated on the portion of the parcel that is located west of Wisconsin Avenue and north of East Quarry Road. Constraints on developing the other portions of the parcel include the Tennessee Valley Authority (TVA) power line and right-of-way (ROW), steep topography (i.e., slopes >10%), and the North Boundary Greenway trail. Thus, some areas of the parcel are more conducive to development than others.

3. STATUS AND BIOLOGY OF THE LISTED SPECIES

The general ecology of the gray bat and Indiana bat is summarized below. Unless otherwise noted, general biological information on the species is derived from the published literature, reports, and Internet resources listed under each species heading.

3.1 GRAY BAT

3.1.1 Status

Gray bats were listed by the federal government as endangered on April 28, 1976. The total gray bat population across the species range has declined drastically since the early 1960s. Because gray bat colonies roost only in caves and cave-like habitats, the decline of the species is attributed chiefly to

human disturbance and vandalism. Suspected contributing factors include contamination by pesticides, chemical pollution or siltation of waterways over which gray bats forage, and loss of foraging habitat.

A recovery plan for gray bats was developed in 1982 (USFWS 1982). The primary objective of the recovery plan is to move the gray bat from endangered to threatened status. In summary, objectives of the Gray Bat Recovery Plan include: (1) prevent disturbance to important roost habitat; (2) maintain, protect, and restore foraging habitat; and (3) monitor population trends.

3.1.2 Biology

Unless otherwise noted or referenced, the following general biological information on the gray bat is derived from USFWS (1991), Harvey (1992), and Kentucky Bat Working Group (KBWG) (2000). The core range of the endangered gray bat encompasses the cave regions of Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee, but a few occur in northwestern Florida, western Georgia, southwestern Kansas, southern Indiana, southern and southwestern Illinois, northeastern Oklahoma, northeastern Mississippi, western Virginia, and possibly western North Carolina. Gray bats are restricted to caves or cave-like habitats, and few caves meet their specific roost requirements. These restrictions result in about 95% of the population's hibernating in only eight or nine caves. For hibernation, the roost site must have an average temperature of 5.6°C to 11.1°C (42°F to 52°F). Most of the caves used by gray bats for hibernation have deep vertical passages with large rooms that function as cold air traps. Summer caves must be warm, between 13.9°C and 25.0°C (57°F and 77°F), or have small rooms or domes that can trap the body heat of roosting bats. Summer caves are normally located close to rivers or lakes where the bats feed. Gray bats have been known to fly 12 miles or more from their colony to feed.

Gray bats roost, breed, rear young, and hibernate in caves year round. They migrate between summer and winter caves and will use transient or stopover caves along the way. One-way migrating distance between winter and summer caves may vary from as little as 16.09 km (10 miles) to well over 321.8 km (200 miles). Mating occurs as bats return to winter caves in September and October. By November, most gray bats are hibernating. Adult females begin to emerge in late March, followed by juveniles and adult males. Females store sperm over the winter and become pregnant the following spring. A few hundred to many thousands of pregnant females congregate to form maternity colonies. Males and nonreproductive females gather in smaller groups to form what are known as bachelor colonies. A single pup is born in late May or early June. The young begin to fly 20 to 25 days after birth. Gray bats feed primarily on flying insects over lakes, rivers, and streams. Aquatic insects, particularly mayflies, make up most of their diet.

Information about the occurrence of gray bats on the ORR is limited. In November 1994, a single dead gray bat was found in a display cabinet in Building 9204-3 at the Y-12 National Security Complex. The bat was probably an isolated individual juvenile that became lost, disoriented, and trapped. Mist netting for bats was conducted on the lower EFPC and its tributaries in May 1992 and again in May through June 1997 (DOE 1997). The 1997 survey included portions of lower Bear Creek near its confluence with lower EFPC. The creeks in this area provided good gray bat foraging habitat at the time of the surveys. No gray bats were recorded among the six species captured. More recent acoustic surveys between 2002 and 2004 have found gray bats at Melton Hill Lake and the K-1007-P1 Holding Pond near East Tennessee Technology Park (Harvey 2005). More than 20 caves have been identified on the ORR. Mitchell et al. (1996) surveyed seven of the caves (Copper Ridge, Flashlight Heaven, Walker Branch, Big Turtle, Little Turtle, Pinnacle, and Bull Bluff) but found no gray bats. There was an unverified report of ten gray bats roosting in Little Turtle Cave in September 1996. These bats were observed roosting and were not further disturbed; therefore, a definite, in-the-hand identification was not made (Webb 1996). Examination of photographs taken of the roosting bats indicate that they appeared to be *Myotis* and more than likely were gray bats, but the species could not be positively determined (Major 2000 and Henry 2000).

None of the caves on the ORR has been completely and systematically surveyed for bats, except for the limited surveys reported in Mitchell et al. (1996) and the 1996 report of *Myotis* roosting in Little Turtle Cave. The caves within the vicinity of the project area may not provide adequate hibernacula for gray bats, but they could provide transient or stopover roosting habitat for migrating gray bats. Suitable foraging habitat for gray bats within the vicinity of Parcel ED-6 includes EFPC.

Because no caves are present within Parcel ED-6, none would be disturbed as a result of the transfer. Development of the parcel would also not directly impact any potential foraging habitat that exists in the vicinity or indirectly affect aquatic insect fauna on which the gray bats would prey. Thus, the proposed transfer is unlikely to adversely affect the gray bat or its habitat.

3.2 INDIANA BAT

3.2.1 Status

Indiana bats were listed by the federal government as endangered on March 11, 1967. Populations across the species range (as recorded from counts in hibernacula) have declined since the late 1950s. A principal cause of decline is destruction of hibernacula from collapse, flooding, or vandalism by humans. Suspected contributing factors include loss of suitable summer habitat and contamination by pesticides (USFWS 1999a).

A recovery plan for Indiana bats was developed in 1983 (USFWS 1983). An Agency Draft Revised Recovery Plan was distributed by USFWS in 1999. In summary, objectives of the Indiana Bat Recovery Plan include: (1) protect hibernacula; (2) maintain, protect, and restore summer maternity habitat; (3) monitor population trends through winter censusing; (4) educate the public; and (5) continue research.

3.2.2 Biology

Unless otherwise noted or referenced, the following general biological information on the Indiana bat is derived from USFWS (1991, 1999a, 1999b, 2000), Harvey (1992), and KBWG (1997, 2000). The Indiana bat is a migratory species found throughout much of the eastern half of the United States from Oklahoma, Iowa, and Wisconsin east to Vermont and south to northwestern Florida. For hibernation, Indiana bats prefer limestone caves with stable temperatures of 3.3 to 6.1°C (38 to 43°F) and high relative humidity. As with the gray bat, few caves meet the specific roost requirements of the species. Subsequently, more than 85% of the population hibernates in only nine sites. However, Indiana bats have been found hibernating in a few abandoned mines, a tunnel, and a hydroelectric dam. The bats hibernate from October to April, depending on climatic conditions. Density in tightly packed clusters is usually estimated at 3228 bats per square meter (300 bats per square foot), although as many as 5165 bats per square meter (480 per square foot) have been reported.

Female Indiana bats depart hibernation caves before males and arrive at summer maternity roosts in mid-May. A single offspring is born between late June and early July. The young bats can fly within a month of birth. Early researchers considered floodplain and riparian forest to be the primary roosting and foraging habitats used during the summer by the Indiana bat, and these forest types unquestionably are important. More recently, upland forest has been shown to be used by Indiana bats for roosting. Within the range of the species, the existence of Indiana bats in a particular area may be governed by the availability of natural roost structures, primarily standing dead trees with loose bark. The suitability of any tree as a roost site is determined by (1) its condition (dead or alive), (2) the quantity of loose bark, (3) the tree's solar exposure and location in relation to other trees, and (4) the tree's spatial relationship to water sources and foraging areas. The most important characteristic of roost trees is probably not species but

structure (i.e., exfoliating bark with space for bats to roost between the bark and the bole of the tree). To a limited extent, tree cavities and crevices are also used for roosting. Maternity colonies use multiple primary roost trees, which are used by a majority of the bats most of the summer, and a number of "secondary" roosts, which are used intermittently and by fewer bats, especially during periods of precipitation or extreme temperatures. The summer roost of adult males is often near maternity roosts, but where most spend the day is unknown. Others remain near the hibernaculum, and a few males are found in other caves during summer. Researchers have found that primary roosts are generally in openings or at the edge of forest stands, while alternate roosts can be either in the open or in the interior of the forest stands. Indiana bats use roosts in the spring and fall similar to those selected during the summer. During the fall, when Indiana bats swarm and mate at their hibernacula, male bats roost in trees nearby during the day and fly to the cave during the night.

Indiana bats forage in and around the tree canopy of floodplain, riparian, and upland forest. In riparian areas, Indiana bats forage primarily around and near riparian and floodplain trees (e.g., sycamore, cottonwood, black walnut, black willow, and oaks) and solitary trees and forest edge on the floodplain. Streams, associated floodplain forests, and impounded bodies of water (e.g., ponds, wetlands, and reservoirs) are preferred foraging habitat for pregnant and lactating Indiana bats, some of which may fly up to 1.5 miles from upland roosts. Indiana bats also forage within the canopy of upland forests, over clearings with early successional vegetation (e.g., old fields), along the borders of croplands, along wooded fencerows, and over farm ponds in pastures. Indiana bats return nightly to their foraging areas. Indiana bats feed strictly on flying insects, and their selection of prey items reflects the environment in which they forage. Both aquatic and terrestrial insects are consumed. Moths, caddisflies, flies, mosquitoes, and midges are major prey items. Other prey includes bees, wasps, flying ants, beetles, leafhoppers, and treehoppers. During September, the bats depart for hibernation caves.

Information about the occurrence of Indiana bats on the ORR is limited. Mist netting for bats was conducted on lower EFPC and its tributaries in May 1992 and again in May through June 1997 (DOE 1997). The 1997 survey included portions of lower Bear Creek near its confluence with lower EFPC. The creeks in this area provided Indiana bat summer roosting and foraging habitat at the time of the surveys. No Indiana bats were recorded among the six species captured. More recent acoustic surveys between 2002 and 2004 did not find Indiana bats in the area (Melton Hill Lake or the K-1007-P1 Holding Pond near the East Tennessee Technology Park) (Harvey 2005).

In Tennessee, the nearest hibernating population of Indiana bats exists in White Oak Blowhole Cave, located in Blount County in the western end of the Great Smoky Mountains National Park. This cave has been designated as critical habitat for this species. A few Indiana bats also hibernate in Bull Cave, also located in Blount County. No maternity roosts have been located on the ORR or as yet in Tennessee. However, in July 1999, a small colony of Indiana bats was discovered roosting in a dead hemlock tree on the Cheoah Ranger District of the Nantahala National Forest in Graham County, North Carolina. This discovery represents the first record of a reproductive female Indiana bat being found south of Kentucky. Recent collections of individual Indiana bats have also been recorded from the Cherokee National Forest near Tellico Lake in Monroe County, Tennessee. These reports indicate that summer colonies of the species may be present in east Tennessee. The habitat from which these individuals were collected is similar to suitable habitat found on the ORR.

4. ECOLOGICAL DESCRIPTION OF THE SITE

The majority of the parcel is undeveloped and serves multiple uses that include utility easement, limited security and facility buffer, wildlife management, forestry, and environmental monitoring. The

parcel is currently zoned as Federal Industry and Research. Development on the property includes a TVA power line and ROW, three roads (Wisconsin Avenue, North Boundary Patrol Road, and East Quarry Road), a water pump station, and water tank. The North Boundary Patrol Road also serves as the North Boundary Greenway Trail through a license DOE granted to the city in 1999. Wisconsin Avenue is maintained by the city and provides access to the residential development located along Whippoorwill Drive. Land uses immediately adjacent to Parcel ED-6 are varied. Residential developments are located to the north and east of the parcel. The area to the west of the parcel is part of the Blackoak Ridge Conservation Easement. Although not immediately adjacent to Parcel ED-6, the Horizon Center Industrial Park is located west of the parcel. Oak Ridge Turnpike (State Route 95) runs along the southern portion of the parcel. Land use further south of the highway is primarily agricultural, with some limited residential development.

Vegetation on Parcel ED-6 includes mixed hardwood, mixed hardwood/pine, mixed hardwood/cedar, pine, kudzu, prairie, and maintained lawn habitats.

Mixed hardwoods occur on the steeply sloping eastern and western portions of the parcel. This community is characterized by dominant mature trees consisting of white oak (*Quercus alba)*, black oak (*Quercus velutina)*, southern red oak (*Quercus falcate)*, mockernut hickory (*Carya tormentosa*), yellow-poplar (*Liriodendron tulipifera)*, sugar maple (*Acer saccharum)*, and red maple (*Acer rubrum)*, along with a variety of other trees and shrubs.

The mixed hardwood/pine habitat type also occurs on the steeper slopes within the center and eastern portions of the site. Dominant species of this plant community include a variety of mature oaks, hickories, and miscellaneous other hardwood species in association with shortleaf pine (*Pinus echinata*), Virginia pine (*Pinus virginiana*), and eastern white pine (*Pinus strobe*). This habitat type also includes areas of mixed-aged (mature and immature) scrub hardwood stands that have developed where the mature pines were impacted by the southern pine beetle.

Mixed hardwood/cedar habitat occupies most of the south side of the parcel on gently sloping to nearly level land of lower elevations. Dominant species of this plant community include mature chinquapin oak (*Quercus muehlenbergii*), black walnut *(Juglans nigra*), American elm (*Ulmus americana*), slippery elm *(Ulmus rubra*), boxelder *(Acer negundo*), green ash (*Fraxinus pennsylvatica*), and eastern red cedar (*Juniperus virginiana*).

The loblolly pine (*Pinus taeda*) habitat type is found in scattered areas throughout the site. In most cases, this type includes relatively homogenous stands of loblolly pine of varying age. This habitat type occurs in former mature pine plantations that were impacted by the southern pine beetle infestation in the 1990s and that have since regenerated back to pine via natural recruitment. In most cases, these are immature stands (10 to 15 years), but there are pockets of older trees that were not affected by the pine beetle.

A fairly large (approximately 3 acres) patch of kudzu vine (*Pueraria montana)* has developed in the southeast corner of the parcel in the TVA ROW and along the North Boundary Road Greenway. Additionally, there are a number of other exotic, invasive plants on the property. These plants occur throughout the parcel in all habitat types. Some of the primary species observed include autumn-olive (*Elaeagnus umbellate*), Chinese privet (*Lingustrum sinense*), English privet (*Ligustrum vulgare*), Japanese honeysuckle (*Lonicera japonica*), bush honeysuckle (*Lonicera maacaii*), and Nepal grass. In addition, several mimosa trees (*Albizia julibrissin*) are present along the gravel access road on the south side of the property.

The prairie community type is present within and adjacent to the TVA power line ROW that crosses the southern portion of the site. This habitat is typically maintained by prescribed burning, but it has developed in the TVA ROW because of periodical clearing to eliminate woody vegetation. Dominant species include big bluestem grass (*Andropogon gerardii*), broomsedge grass (*Andropogin virginicus*), and various other native warm-season grasses, along with scrubby immature hardwoods and shrubs (blackberries and sumac).

Maintained lawn occurs in areas that are frequently mowed. Dominant plants include Kentucky-31 fescue and various other lawn grasses, as well as herbaceous plants. This manmade landscape feature is present near the water tower on the ridge top and the utility building on the east side, as well as along the roadside ROWs.

Surface water features on Parcel ED-6 are limited. Storm water runoff from the parcel either infiltrates into the ground or drains to one of four intermittent streams, which eventually discharge into EFPC. These intermittent streams are dry for much of the year and typically have only ephemeral flow after precipitation events. Parcel ED-6 is located outside of the EFPC floodplain and the published Oak Ridge flood hazard zone boundaries. A walkover survey of Parcel ED-6, conducted by wetland scientists in October 2004, did not identify the presence of any wetlands on the property.

5. MIST NET SURVEYS AND HABITAT ASSESSMENT

5.1 MIST NET SURVEYS

BHE was retained to conduct two mist net surveys to identify the presence of summering Indiana bats and/or gray bats and to assess habitat suitability for the species within Parcel ED-6 (BHE 2005, 2006). The results of the mist net surveys and habitat suitability assessment are summarized below.

The level of survey effort for this project was established using survey guidelines developed by the Indiana Bat Recovery Team (USFWS 1999a). Potential areas for mist net placement were identified by BHE using a topographic map of the proposed project area and through coordination with the USFWS Tennessee Field Office. Actual locations of the sites were selected during field reconnaissance. To the extent practicable, mist net sites were distributed so as to sample forested habitat throughout the parcel (Fig. 2).

The initial mist net survey was conducted between July 29 and August 1, 2005. Mist net site selection was based upon extent of canopy cover and presence of an open flyway. Two net sets were erected at each site and spaced at least 100 ft apart. At each site, 2 net sets were each operated for 2 nights, resulting in a total of 12 net nights for the entire survey [2 nets × 2 nights × 3 sites = 12 net nights). A "net night" is defined as the operation of one set for one night. To the extent possible, nets were placed so as to be bordered on top and sides by vegetation to create a funneling effect to facilitate capture of bats. Mist nets were deployed at dusk and monitored every 15 to 20 min for at least 5 hr.

Sixty-seven bats of three species were captured during the survey (Table 1). No Indiana bats or gray bats were captured. The big brown bat (*Eptesicus fuscus*) was the species most commonly encountered, making up 75% of the total capture. The other two species were the red bat (*Lasiurus borealis*) and the eastern pipistrelle (*Pipistrellus subflavus*). Post-lactating adult females and juveniles of all three species were captured.

Table 1. 2005 Mist netting results from Parcel ED-6

Site No.	Date Surveyed (2005)	Big Brown Bat *Eptesicus fuscus*					Red Bat *Lasiurus borealis*			Eastern Pipistrelle *Pipistrellus subflavus*			Total
		PLF	NRF	M	J	E	PLF	NRF	J	PLF	J	E	
1	7/29, 7/30	3	1	2	4	1	1	1	3				16
2	7/29, 7/30	22		4	5	4			3		1	1	40
3	7/31, 8/1	1		1		2	2		2	1	2		11
Totals		50					12				5		67

E = escape before age or gender determined.
J = juvenile (either gender).
M = adult male.
NRF = non-reproductive adult female.
PLF= post lactating adult female.

BHE conducted a second mist nest survey for Parcel ED-6 during July 11–16, 2006. This survey consisted of sampling three additional locations on the parcel. The three additional locations were selected based on USFWS recommendations and field reconnaissance. The level of effort was identical to the initial mist net survey.

Eight bats were captured during the 2006 survey (Table 2). No Indiana bats or gray bats were captured. All of the captured bats were from Site 4. Only big brown bats and red bats were captured and identified during the survey.

Table 2. 2006 Mist netting results from Parcel ED-6

Site No.	Date Surveyed (2005)	Big Brown Bat *Eptesicus fuscus*			Red Bat *Lasiurus borealis*		Total
		PLF	LF	J	LF	J	
4	7/11, 7/12	1	2	2	2	1	8
5	7/13, 7/14						
6	7/15, 7/16						
Totals			5		3		8

J = juvenile (either gender).
LF = lactating adult female.
PLF= post lactating adult female.

At the request of USFWS, BHE biologists also noted bat activity in the general vicinity of the net sites, as a qualitative indicator of potential bat activity on the parcel. Small numbers of bats were observed flying over the gravel road at Site 4. No bats were observed flying at or near Sites 5 or 6.

5.2 HABITAT ASSESSMENT

On July 29 through August 1, 2005, BHE conducted a pedestrian survey of Parcel ED-6. Experienced biologists qualitatively assessed suitability of habitat for summering Indiana bats. Habitat suitability was evaluated based upon estimates for the following components of summer habitat:

- percent overstory canopy cover,
- average diameter at breast height (dbh) of overstory canopy trees,
- average height to bottom of canopy,
- density of subcanopy vegetation,

- presence of potential roost trees,
- distance between the project site and a permanent water source, and
- percentage of forested land in the 74 acres surrounding the project area.

These parameters are some of the factors used in the summer HSI model, which was developed to quantify suitability of an area to support Indiana bats. In general, high-quality habitat occurs in relatively mature forest where overstory canopy cover is between 60 and 80%, subcanopy vegetation is relatively open, and potential roost trees are present. Estimates of the average diameter of canopy trees and height to the bottom of the canopy reflect the maturity of the trees. Dense vegetation in the subcanopy may impede the flight of foraging bats or obstruct access to roost sites. Habitat suitability is moderate or low when one or more parameters are suboptimal.

Potential Indiana bat roost trees include trees greater than 6 inches dbh. As defined by the HSI model, high-quality potential roost trees have greater than 25% exfoliating bark. Low- and moderate-quality potential roost trees have 0 to 10 and 11 to 25% exfoliating bark, respectively. Suitable summer habitat also includes availability of a permanent water source within 2.5 miles and forest covering at least 5% of the 74 acres surrounding the project area.

Landscape-scale characteristics of the parcel are suitable for summering Indiana bats. EFPC provides a permanent source of water within 100 ft of Parcel ED-6, and Watts Bar Lake is approximately 5 miles southwest of the parcel. Topographic maps indicate approximately 80% (60 acres) of the 74 acres surrounding the project area is forested.

None of Parcel ED-6 provides high-quality summer habitat for Indiana bats. BHE found moderate-quality summer habitat for Indiana bats in approximately 61 acres of Parcel ED-6 (Polygons 2 and 6). Moderate-quality habitat contains moderate- or high-quality potential roost trees and forest characteristics suitable for summering Indiana bats. Two areas provide relatively large oak and yellow poplar trees in the overstory, including several potential roost trees. Canopy cover is 85 to 90%, and density of understory vegetation varies from moderately dense to open.

Low-quality summer habitat occurs within 278 acres (78%) of the parcel. Areas that provide low-quality habitat are less likely to be used by roosting Indiana bats. Low-quality habitat contains no potential roost trees or contains several low-quality roost trees. Forest characteristics in low-quality habitat, including density of understory vegetation and average diameter of canopy trees, are generally suboptimal. Low-quality roost trees have less than 10% exfoliating bark. A single high-quality potential roost tree was identified in one area; however, that area provides low-quality roost habitat because the forest is primarily eastern red cedar and pines growing in dense stands. Understory vegetation in that area generally is dense, providing little space through which bats could fly.

6. POTENTIAL IMPACTS OF THE PROJECT ON LISTED SPECIES

Based on the information presented in this BA, DOE concludes that the proposed transfer of Parcel ED-6 to the city of Oak Ridge is not likely to adversely affect either of the listed species. Results of the mist net surveys did not confirm presence of the Indiana bat or gray bat in Parcel ED-6. Parcel ED-6 does not provide high-quality summer habitat for Indiana bats. Approximately 61 acres provide moderate-quality summer habitat, and 278 acres provide low-quality summer habitat for Indiana bats. No caves or other suitable hibernacula or roosting habitat for gray bats is present in Parcel ED-6.

7. REFERENCES

BHE (BHE Environmental, Inc.) 2005. *Mist Net Survey and Habitat Suitability Assessment for the Indiana Bat in Parcel ED-6, Oak Ridge Reservation Roane County, Tennessee*, September.

BHE 2006. *2006 Mist Net Survey for the Indiana Bat and the Gray Bat in Parcel ED-6, Oak Ridge Reservation Roane County, Tennessee*, August.

DOE (U.S. Department of Energy) 1997. *Annual Report, Implementation of Mitigation Action Plan for DOE/EA-1113: Lease of Parcel ED-1 of the Oak Ridge Reservation, Oak Ridge, Tennessee, Pre-Development Ecological Surveys*, DOE/EA-1113/MAP-97, Oak Ridge Operations, Oak Ridge, TN.

Harvey, Michael J. 1992. *Bats of the Eastern United States*, Arkansas Game and Fish Commission and U.S. Fish and Wildlife Service, February, 46 pp.

Harvey, Michael J. 2005. Personal communication from Michael Harvey, Tennessee Technology University, to Eric Romaniszyn, Science Applications International Corporation, March 22, 2005.

Henry, Hill 2000. Personal communication from Hill Henry, Tennessee Valley Authority, to Mike Deacon, Science Applications International Corporation, May 4.

KBWG (Kentucky Bat Working Group) 1997. *Protection and Enhancement Plan for the Indiana Bat*, available at <http://www.biology.eku.edu/bats/indbat-recmanageplan.htm>, June.

KBWG 2000. *The Bats of Kentucky*, available at <http://www.biology.eku.edu/bats>.

Major, Smoot 2000. Personal communication from Smoot Major, Tennessee Department of Environment and Conservation, Division of Natural Heritage, to Mike Deacon, Science Applications International Corporation, May 4.

Mitchell, J. M., E. R. Vail, J. W. Webb, J. W. Evans, A. L. King, and P. A. Hamlett 1996. *Survey of Protected Terrestrial Vertebrates on the Oak Ridge Reservation*, ES/ER/TM-188/R1, Final Report, Oak Ridge National Laboratory, Oak Ridge, TN.

Rommé, R.C., K. Tyrell, and V. Brack, Jr. 1995. *Literature Summary and Habitat Suitability Index Model: Components of Summer Habitat for the Indiana Bat, Myotis sodalis*, Final Report to U.S. Fish and Wildlife Service and Indiana Department of Natural Resources, Division of Fish and Wildlife.

USFWS (U.S. Fish and Wildlife Service) 1982. *Gray Bat Recovery Plan*, Prepared by the U.S. Fish and Wildlife Service in cooperation with the Gray Bat Recovery Team, Atlanta, Georgia, 80 pp.

USFWS 1983. *Recovery Plan for the Indiana Bat*, U.S. Department of the Interior, Fish and Wildlife Service, 80 pp.

USFWS 1991. *Endangered and Threatened Species of the Southeastern United States (The Red Book)*, Region 4, February.

USFWS 1999a. *Agency Draft: Indiana Bat (Myotis sodalis) Revised Recovery Plan*, Prepared by the Indiana Bat Recovery Team, Region 3, U.S. Fish and Wildlife Service, Fort Snelling, Minnesota, 53 pp.

USFWS 1999b. *Indiana Bat*, Asheville Field Office, August.

USFWS 2000. *The Indiana Bat in Western North Carolina, A Status Summary Update*, Asheville Field Office, April.

USFWS 2005. Letter from Dr. Lee A. Barclay, U.S. Fish and Wildlife Service, Cookeville, Tennessee, to Dr. James L. Elmore, U.S. Department of Energy, Oak Ridge, Tennessee, December 19.

Webb, Warren 1996. Personal communication with Deborah Awl, JAYCOR, September 18.

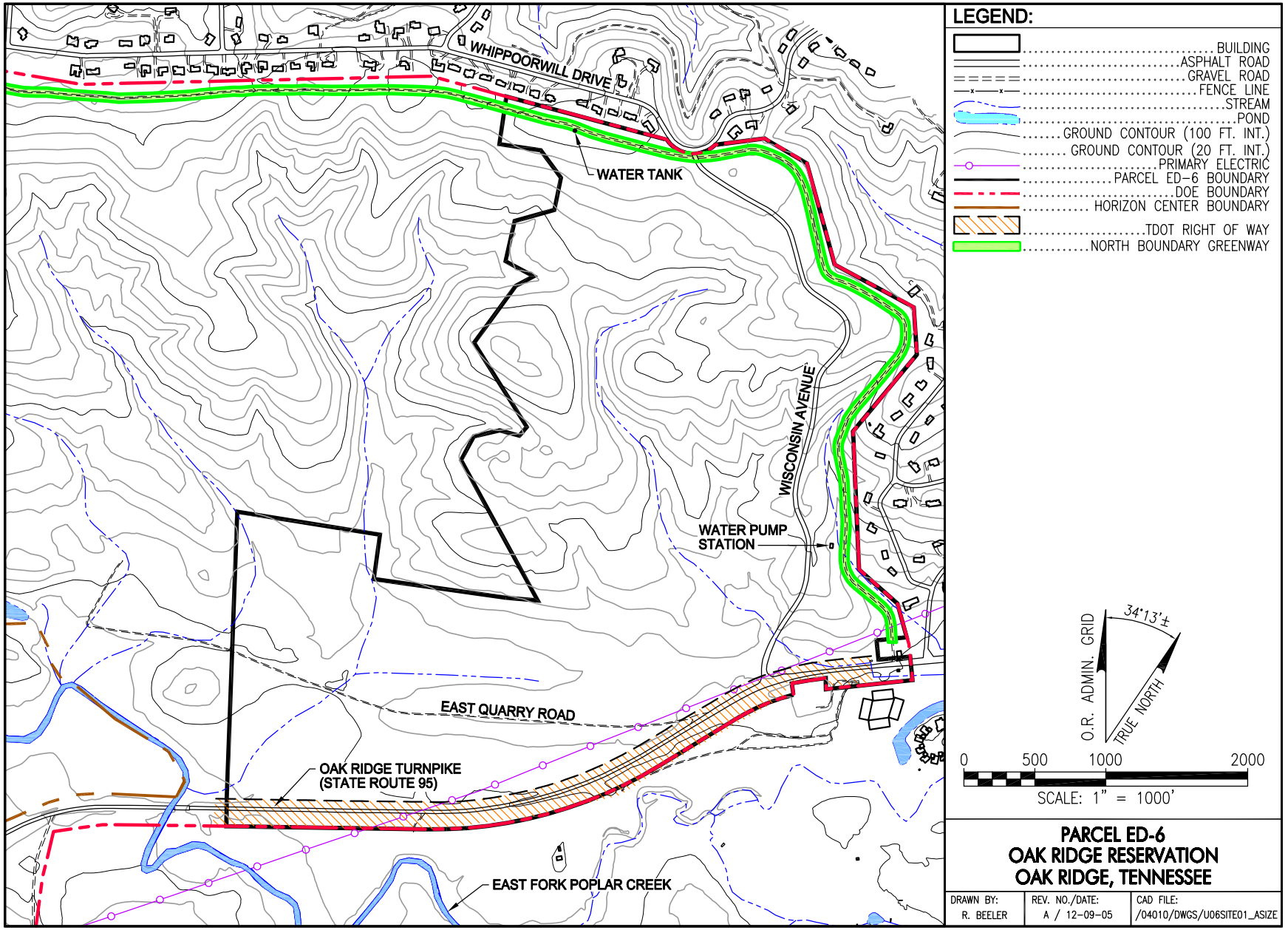
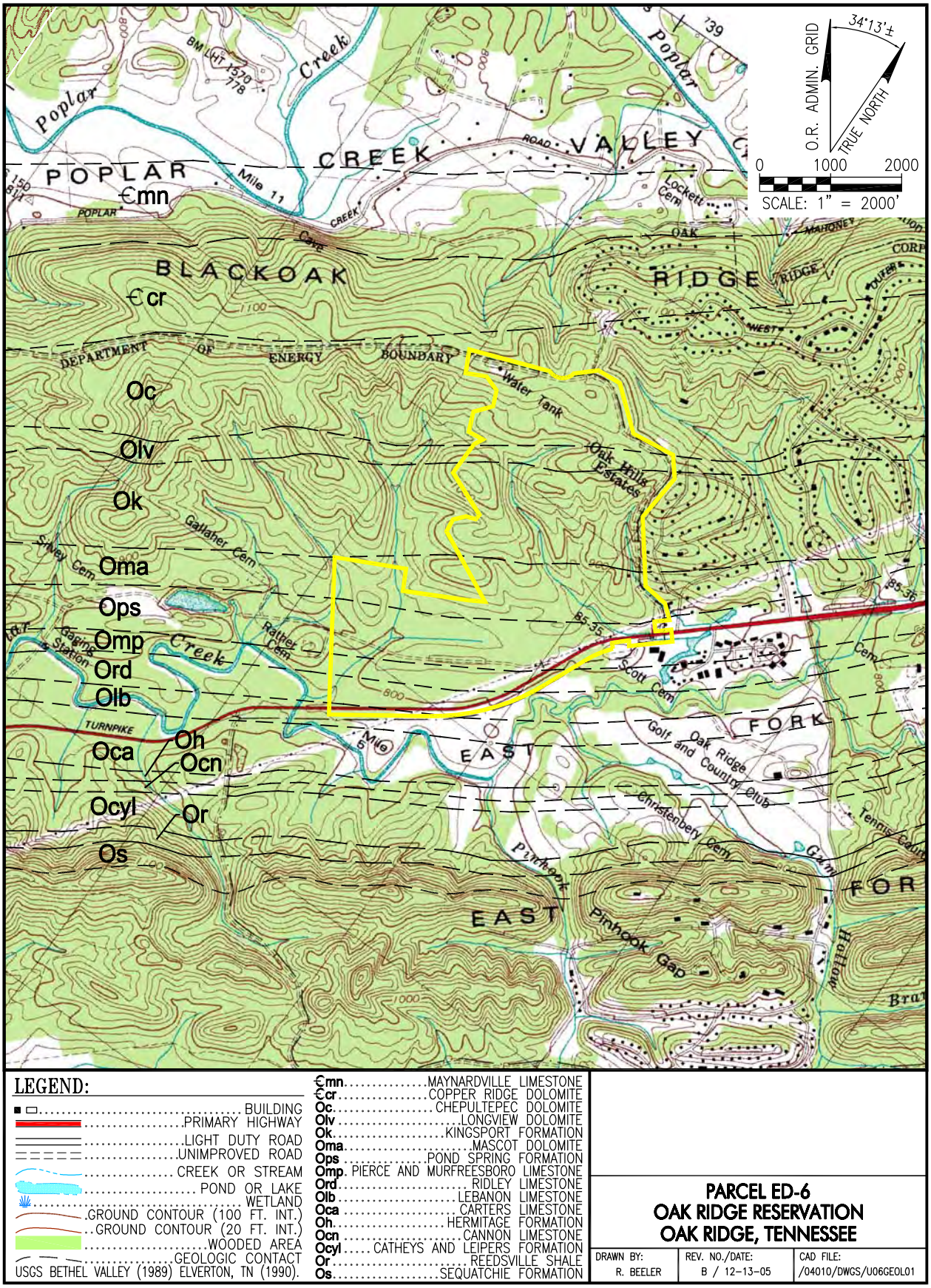


Fig. 1.1. Parcel ED-6 vicinity map.



LEGEND:

- BUILDING
- PRIMARY HIGHWAY
- LIGHT DUTY ROAD
- UNIMPROVED ROAD
- CREEK OR STREAM
- POND OR LAKE
- WETLAND
- GROUND CONTOUR (100 FT. INT.)
- GROUND CONTOUR (20 FT. INT.)
- WOODED AREA
- GEOLOGIC CONTACT

USGS BETHEL VALLEY (1989) ELVERTON, TN (1990).

Cmn	MAYNARDVILLE LIMESTONE
Ccr	COPPER RIDGE DOLOMITE
Oc	CHEPULTEPEC DOLOMITE
Olv	LONGVIEW DOLOMITE
Ok	KINGSPORT FORMATION
Oma	MASCOT DOLOMITE
Ops	POND SPRING FORMATION
Omp	PIERCE AND MURFREESBORO LIMESTONE
Ord	RIDLEY LIMESTONE
Olb	LEBANON LIMESTONE
Oca	CARTERS LIMESTONE
Oh	HERMITAGE FORMATION
Ocn	CANNON LIMESTONE
Ocyl	CATHEYS AND LEIPERS FORMATION
Or	REEDSVILLE SHALE
Os	SEQUATCHIE FORMATION

PARCEL ED-6
OAK RIDGE RESERVATION
OAK RIDGE, TENNESSEE

DRAWN BY:	REV. NO./DATE:	CAD FILE:
R. BEELER	B / 12-13-05	/04010/DWGS/U06GEOL01

Fig. 3.1. Geologic map of Parcel ED-6.

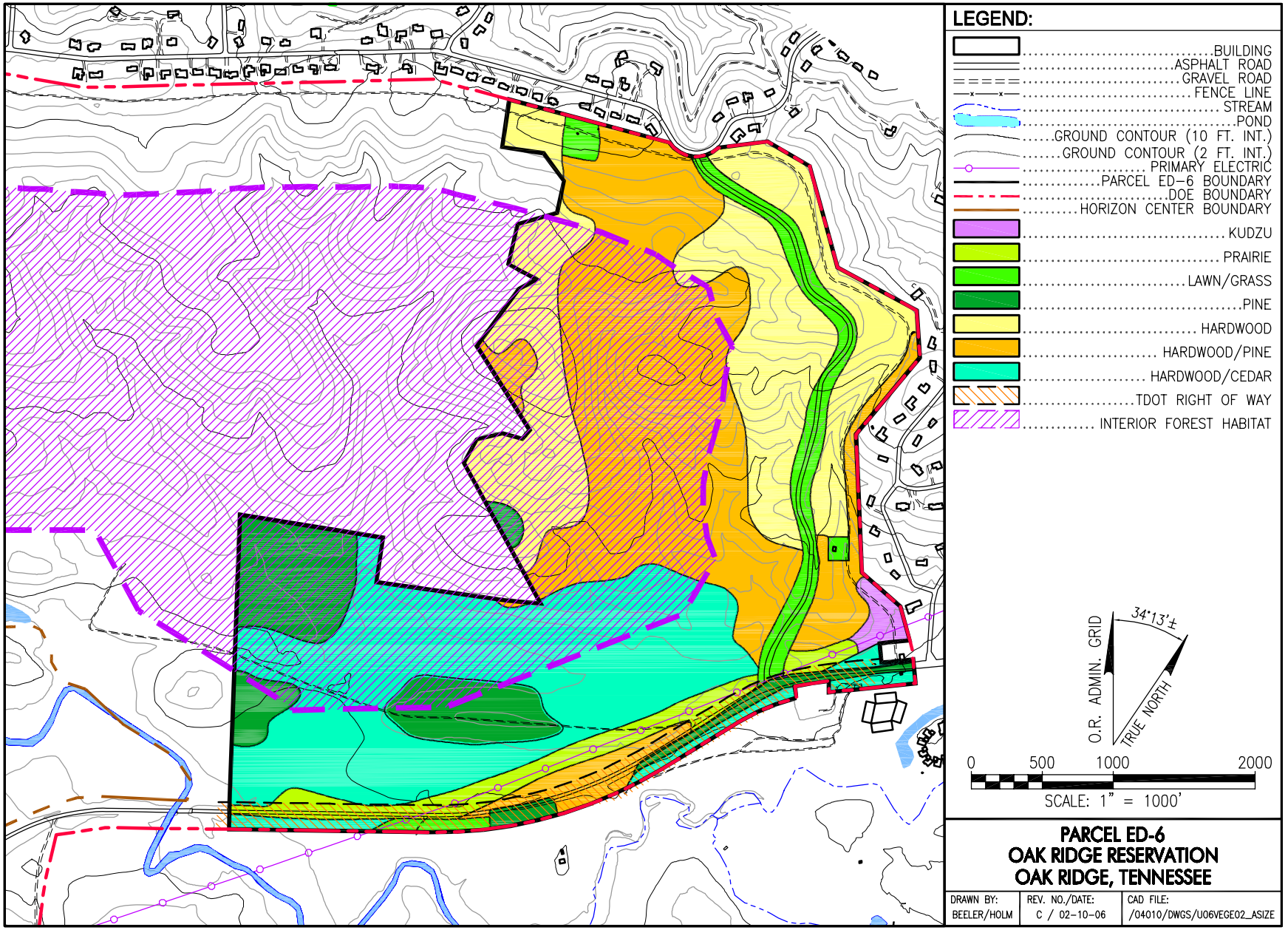


Fig. 3.2. Parcel ED-6 vegetation.

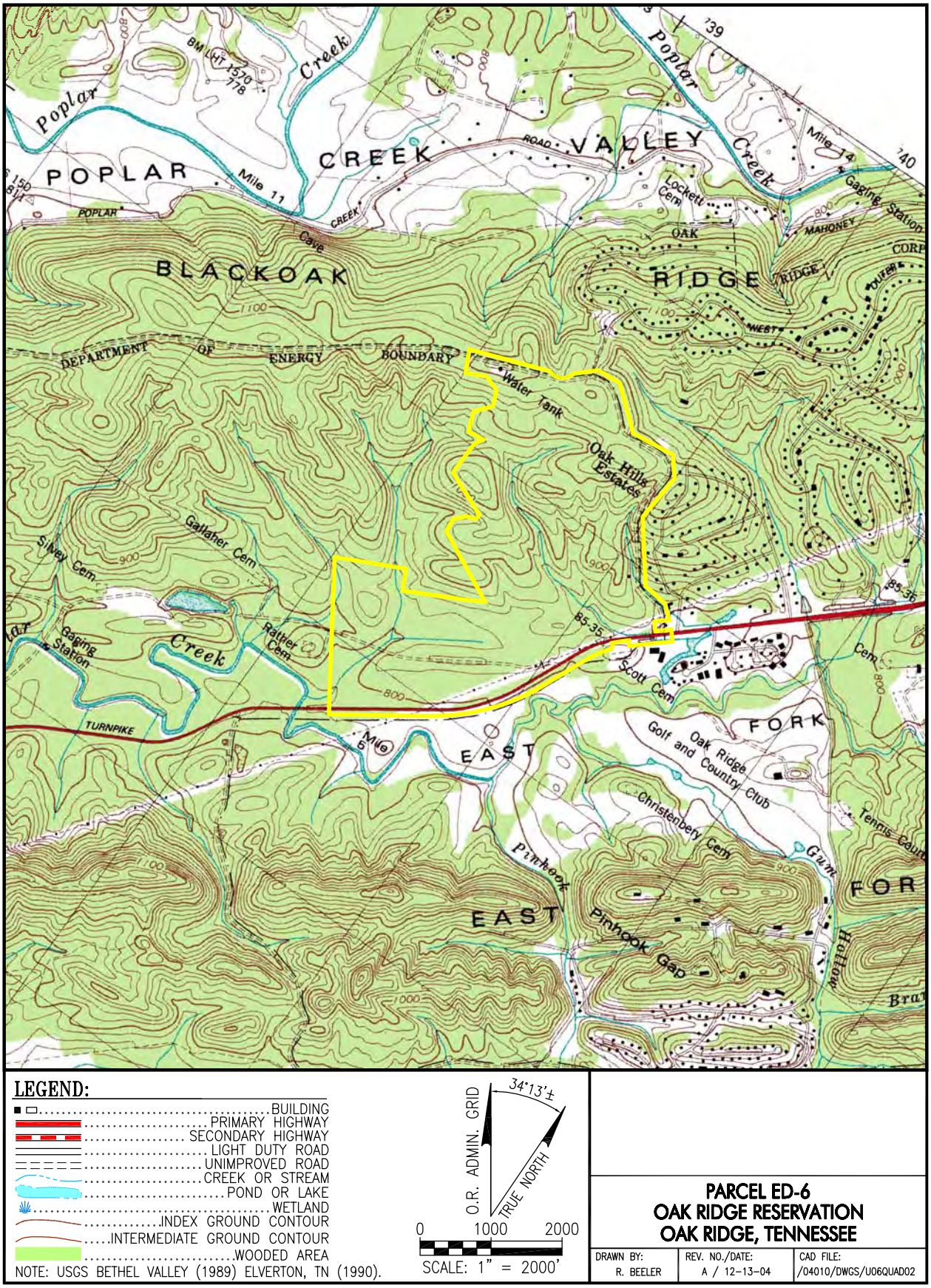


Fig. 1. Parcel ED-6 vicinity map.

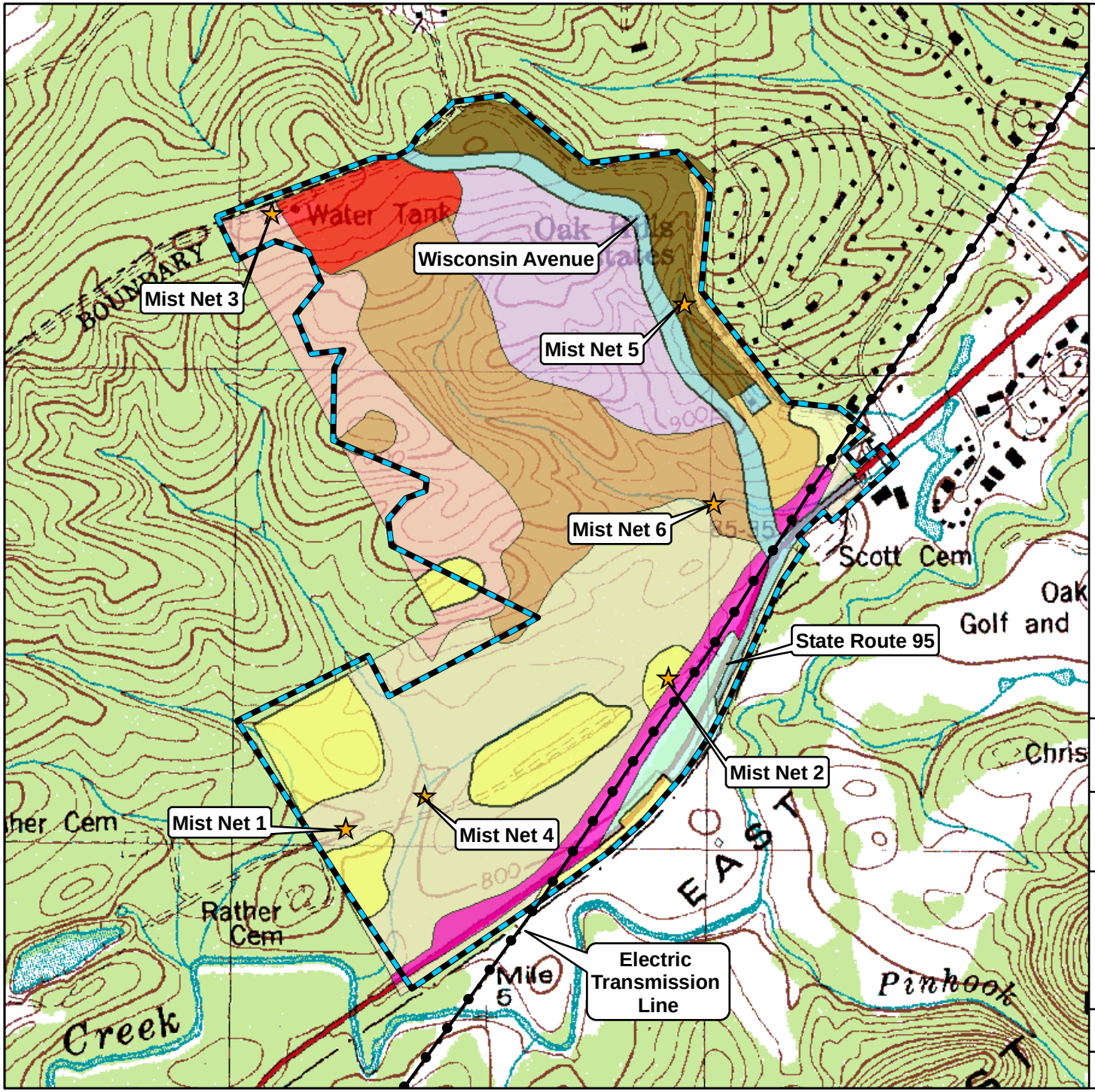


Fig. 2. Location of six mist net sites and vegetation cover in Parcel ED-6 on the Oak Ridge Reservation in Roane County, Tennessee.

Mist Net Site

Polygon No.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- project_bndry

Feet

500 0 500 1,000

Base Map - USGS 7.5 Minute Topographic Map: Bethel Valley, TN 1972

N W E S

BHE ENVIRONMENTAL

July 2006

Project No. 0005.010