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DOE/EA-1113

ENVIRONMENTAL ASSESSMENT

LEASE OF PARCEL ED-1 OF THE OAK RIDGE RESERVATION BY THE EAST TENNESSEE ECONOMIC COUNCIL

APRIL 1996

U.S. DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS
OAK RIDGE, TENNESSEE

FINDING OF NO SIGNIFICANT IMPACT

LEASE OF PARCEL ED-1 OF THE OAK RIDGE RESERVATION TO THE EAST TENNESSEE ECONOMIC COUNCIL

AGENCY: U.S. DEPARTMENT OF ENERGY

ACTION: FINDING OF NO SIGNIFICANT IMPACT

SUMMARY: The U.S. Department of Energy (DOE) has completed an environmental assessment (DOE/EA-1113) for the proposed lease of 957.16 acres of the Oak Ridge Reservation (ORR) to the East Tennessee Economic Council (ETEC)*, a non-profit community organization, for a period of 10 years, with an option for renewal. ETEC proposes to develop an industrial park on the leased site to provide employment opportunities for DOE and contractor employees affected by decreased federal funding. Based on the results of the analysis reported in the EA and implementation of mitigation measures defined in this Finding of No Significant Impact (FONSI), DOE has determined that the proposed action is not a major Federal action that would significantly affect the quality of the human environment within the context of the National Environmental Policy Act of 1969 (NEPA). Therefore, preparation of an environmental impact statement (EIS) is not necessary, and DOE is issuing this mitigated FONSI. DOE will implement a Mitigation Action Plan for this project and provide annual reports on mitigation and monitoring.

PUBLIC AVAILABILITY OF EA AND FONSI: The EA, mitigated FONSI, and Mitigation Action Plan may be reviewed at and copies of the documents obtained from

U.S. Department of Energy
Public Reading Room
55 Jefferson Circle, Rm 112
Oak Ridge, Tennessee 37830
Phone: (423) 241-4780.

FURTHER INFORMATION ON THE NEPA PROCESS: For further information on the NEPA process, contact

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* ETEC is now known as Community Reuse Organization of East Tennessee.

BACKGROUND: The proposed action is the lease of 957.16 acres of U.S. Department of Energy (DOE) land on the Oak Ridge (Tennessee) Reservation (ORR) to the East Tennessee Economic Council (ETEC). The Secretary of Energy proposed the action pursuant to Section 3154 of the Defense Authorization Act of 1994 (the Act) (Public Law 103-160), which grants authority for the lease of real property at a DOE facility that is (1) to be closed or reconfigured, (2) not currently needed by DOE, and (3) under DOE control. Per the terms of the proposed lease, the sole purpose for which the lessee (ETEC) would use the parcel of land (designated Parcel ED-1) would be to further and support economic development in the region. The need for DOE action is driven by a decreased budget that will impact jobs and the economy in Oak Ridge and surrounding communities. The proposed action is wholly intended to help offset potential economic losses resulting from DOE and contractor downsizing in the near term and to diversify the economic base of the region in the long term.

Parcel ED-1 is proposed by ETEC to be developed as an industrial park. The parcel was selected for lease after DOE reviewed present and future programmatic needs for various land areas of the ORR that met the size requirements of ETEC. Specific industries to be located at Parcel ED-1 will not be known until infrastructure is developed and ETEC negotiates subleases. Industrial use shall be required to conform to the city of Oak Ridge Zoning Ordinance (Chapter 7, Sect. 6-713 IND-2, Industrial Districts). Environmental and socioeconomic factors will be considered in development plans, and buffer zones will be designated to protect sensitive ecological resources, such as floodplains, wetlands, streams, and unique plant and animal communities.

ALTERNATIVES: Three alternatives to the proposed action were considered: no action, lease of other ORR land to ETEC, and disposal of Parcel ED-1. If no action is taken, Parcel ED-1 would be retained as DOE property and would continue in its current use (wildlife management, silviculture, ecosystem research, and environmental monitoring). If DOE does not take action, jobs lost by downsizing and strategic realignment may not be replaceable in the near term.

Leasing other ORR land and disposal of Parcel ED-1 were dismissed from further consideration. Other ORR lands are now being utilized or are planned for future programmatic uses. In addition, there are no other parcels of sufficient size and contiguity on the perimeter of the ORR to meet the land requirements for an industrial park. Further, DOE has determined at this time that it should retain fee-title in order to encourage the kind of investment necessary for long-term commercial development, and to continue environmental research programs and maintain measures to preserve environmentally sensitive areas.

ENVIRONMENTAL IMPACTS:

Land Use

Current land use of Parcel ED-1 for wildlife management, silviculture, and environmental research would be affected by development of industrial facilities and infrastructure. However, industrial use would be compatible with similar use of the nearby DOE Oak Ridge K-25 Site. All of Parcel ED-1 is within the DOE Oak Ridge National Environmental Research Park, which is part of a system of Research Parks that provide protected land areas for research and education in the environment sciences to demonstrate that energy technology development can be compatible with a quality environment. With the implementation of specific mitigation and monitoring of the parcel during infrastructure and industrial development, and facilities operation, Research Park objectives could be met. National Environmental Research Park and Oak Ridge National Laboratory (ORNL) Environmental Sciences Division staff will be available to provide assistance to DOE and ETEC during the planning, development, and operation of facilities.

Geology and Soils

Site clearing, grading, contouring, and excavation would change topography of some areas of the site but would not affect the underlying geology. Some soils on the parcel are "prime farmland", which is protected under the Farmland Protection Policy Act. DOE has been advised by the U.S. Natural Resources Conservation Service (NCRS) (formerly Soil Conservation Service) that because Parcel ED-1 lies wholly within the city of Oak Ridge, the prime farmland designation is waived, and other uses of the land, such as industrial development, are permitted.

Air Quality

Construction. Fugitive particulates and gaseous exhaust would be produced by earthwork and vehicle and machinery operation. Concentrations of nitrogen oxides, sulfur dioxide, carbon monoxide, unburned hydrocarbons, and particulates would increase near the disturbed areas. Emissions would be localized, short-term, and sporadic. Because of dispersal of emissions in the atmosphere, changes in off-site ambient concentrations of these pollutants would be negligible. Ambient concentrations of particulates at and near the parcel are well-below National Ambient Air Quality Standards (NAAQS). Results of modeling indicate that the NAAQS for particulates would not be exceeded because of the increment added by Parcel ED-1 construction.

Operations. Operation of industrial facilities may produce atmospheric pollutant emissions, including radionuclides, lead, nitrogen oxides, sulfur dioxide, carbon dioxide, and particulates. Modeling results indicate that the increment of pollutant emissions from hypothetical facilities, typical of those that may locate on Parcel ED-1, would not result in exceedances of NAAQS. Incremental emissions from facilities planning to locate at Parcel

ED-1 would be evaluated on a case-by-case basis by state and federal regulatory agencies prior to issuance of air permits. The regulatory air permit review process is designed to protect human health and the environment.

Water Resources

Erosion. Earthmoving activities may increase sediment transport and deposition in surface waters. Impacts to water quality and aquatic biota, can be minimized by the use of Best Management Practices, which include, but are not limited to, (1) avoiding construction within the East Fork Poplar Creek (EFPC) and Bear Creek (BC) floodplains, (2) using siltation fences, (3) providing at least 30 m (100 ft) of natural vegetation riparian zone buffers with a wider buffer in steep areas, and (4) revegetating bare soil with native plants.

Stormwater and effluent discharge. Stormwater runoff and effluent discharge from industrial facilities would be managed to minimize impacts to local hydrology and water quality. Paved and unpaved areas would be contoured so that runoff drains to a sump or basin. Collected stormwater, domestic wastewater, and liquid industrial waste streams would be pretreated, if required, and directed to either the DOE K-25 Site or City of Oak Ridge wastewater treatment facility, both of which have adequate capacity to accommodate additional effluents. Treated waters from either of these facilities would continue to be discharged to surface water in accordance with limitations established in a revised or new National Pollutant Discharge Elimination System (NPDES) permit issued by the State of Tennessee. If permit limits are consistently met, degradation of aquatic habitat would be minimal. To minimize impacts to aquatic species, cooling water from industrial facilities would not be discharged to streams until cooled to the ambient temperature of the receiving water.

Consumptive use. City-supplied water is available to the site, and wells would not be drilled for groundwater use or wastewater disposal.

Floodplains/Wetlands

The lease will require that no development occur in 100-year floodplains or in wetlands. If ETEC or its sublessees undertake actions other than routine maintenance (e.g., repairs to bridge abutments or existing roads) in floodplains or wetlands, DOE must be notified and appropriate environmental reviews conducted at the lessee's or sublessee's expense.

Terrestrial Ecology

The forest on Parcel ED-1 is an important segment of all ORR forested area and may include unique and rare species. Protected and natural corridor areas are located along EFPC and its major tributaries. Development of non-protected areas would disturb or remove approximately 50% of vegetation on Parcel ED-1. Removal of native vegetation would reduce the value of the natural areas to wildlife. Eventual development of the parcel would eliminate

all wildlife habitat in developed areas. Vegetation removal would increase forest fragmentation and loss of connectivity at the scale of structural species (e.g., overstory, understory, subcanopy forest structure), keystone species, and rare species.

In developed areas, construction and maintenance of industrial facilities would result in permanent loss of vegetation and reduced structural diversity of remaining plant communities (e.g., grass instead of trees, shrubs, and herbs). These losses would greatly simplify wildlife habitat, which in turn would limit wildlife species diversity. Species that adapt most readily to human presence would predominate (e.g., deer, skunk, raccoon, rabbit, woodchuck, beaver, opossum, starling, resident Canada goose). Species that require large forested areas (e.g., neotropical migratory songbirds) would be adversely affected by loss of habitat, increased predation and parasitism from species that benefit from openings and edges in the surrounding forest.

Fugitive particulates released during construction and operation would be dispersed and deposited in nearby terrestrial and aquatic habitats. Airborne and waterborne toxics have the potential to adversely impact the food chain by injuring or killing plants, amphibians, and invertebrates. Deer populations would probably increase because of the creation and/or maintenance of edges and openings near bottomland hardwood forest. Total or near-total removal of habitat could displace deer into other areas, including the city of Oak Ridge. Further, restriction of deer hunting on the parcel would add to the 8,000 acres of the ORR already restricted (increase from 25% restricted to 31% restricted), thereby further limiting the ability to control the deer herd.

Threatened and Endangered (T&E) Species

In compliance with Section 7 of the Endangered Species Act, DOE consulted informally with the FWS for information on T&E species. Bottomland forest on EFPC provides an abundance of suitable habitat for maternity colonies of the endangered (federal and state) Indiana bat (*Myotis sodalis)*, but no colonies have been observed. EFPC may also provide foraging habitat for the federal- and state-listed endangered gray bat (*Myotis grisescens*), which has been documented on the ORR. The FWS has agreed that exclusion of bottomland hardwood habitat and the EFPC floodplain from development would protect these species.

New populations of state-threatened *Hydrastis canadensis* (golden seal), state-endangered *Cypripedium acaule* (pink lady slipper), and state-threatened *Panax quinquefolia* (ginseng) have been located on Parcel ED-1 near EFPC. All populations are located within National Environmental Research Park Natural Area (NA) 47, which would be excluded from development. In addition, all are found elsewhere on the ORR.

Parcel ED-1 also supports state-listed in-need-of-management animal species (sharp-shinned hawk, southeastern shrew, and Tennessee dace). State law requires that neither these species nor their habitats be knowingly destroyed without a permit from the state [Tennessee

Code Annotated Title 70, Chap. 8, and regulations of the Tennessee Wildlife Resource Agency (TWRA)]. Exclusion of development in NA-47 would protect species and habitat at that location; however the hawk and shrew occur elsewhere on the parcel.

Socioeconomics

Oak Ridge and surrounding communities would benefit from the development of Parcel ED-1. DOE's strategic realignment and Congressional budget allocations will in the near term necessitate involuntary separation of DOE and DOE contractor employees nationwide. In Oak Ridge, some of these losses would be offset by new employment opportunities at industries that locate at Parcel ED-1.

Minority and/or low-income populations in Oak Ridge, which are concentrated in an area more than 2 miles away, would not be disproportionately affected by the proposed action.

Historic and Archaeological Resources

Archaeological and historic resources on all but 80 acres of the parcel have been surveyed and catalogued in consultation with the Tennessee State Archaeologist. In accordance with DOE's commitment to protect properties included on and eligible for listing on the National Register of Historic Places and at the request of the State Historic Preservation Officer (SHPO), three historic sites on Parcel ED-1 would be excluded from development/use, and each would be surrounded by buffer zones. DOE will require that the 80-acre area at the west end of the parcel be excluded from development until a full archaeological survey is completed and approval to proceed with development is granted by the SHPO.

Health and Safety

Workers at Parcel ED-1 construction sites would be subject to safety hazards common to any industrial site. For the most part, adherence to policies and procedures based on Occupational Safety and Health Act regulations would minimize impacts to worker health and safety. In this EA, it was assumed that facilities that would be developed at Parcel ED-1 would be similar to facilities in other Oak Ridge area industrial parks. To date, these operating facilities have reported no unique occupational or public health and safety hazards or issues.

Waste Management

Based on historical operations of Oak Ridge private sector industrial facilities, it is assumed that wastes from similar facilities at Parcel ED-1 could be safely managed. Recycling and waste minimization would be practiced. Nonrecyclables would be packaged and shipped to off-site treatment and disposal facilities, based on their waste classification.

Spills

Accidental spills of hazardous materials would be mitigated by the use of appropriate equipment and cleanup procedures [i.e., Environmental Protection Agency (EPA)-approved spill prevention control and countermeasure plan]. Accidental releases of high concentrations and/or large quantities of pollutants could cause standards to be exceeded. Under the Superfund Amendments and Reauthorization Act of 1986, Title III, industrial facilities are required to report releases of "reportable quantities" of hazardous substances (listed in the Comprehensive Environmental Response, Compensation, and Liability Act and Emergency Planning and Community Right-to-Know Act of 1986) to state and local emergency response personnel. DOE, Lockheed Martin Energy Systems, and the city of Oak Ridge would mobilize emergency response actions in accordance with mutual aid agreements should a release of hazardous materials (to any environmental medium--air, surface water, groundwater, soils) occur on Parcel ED-1. If necessary, emergency personnel from neighboring communities would be recruited for assistance.

MITIGATION:

The following measures shall be implemented to prevent significant adverse impacts to ecological resources, floodplains, wetlands, water resources, and historic and archaeological resources. Measures are comprised of (1) excluding areas on Parcel ED-1 from disturbance and development and (2) conducting surveys and monitoring of industrial development areas prior to disturbance and during facilities operations. DOE shall have the right to terminate the lease with ETEC should the lessee and/or sublessees fail to implement the mitigation defined in this FONSI.

Mitigation of impacts to ecological resources focuses on the preservation of corridors and buffers for aquatic biota, terrestrial wildlife and plant communities by their exclusion from development. Connections with surrounding natural habitats shall be maintained to reduce the effects of fragmentation. In general, such areas shall be larger for wildlife than those recommended for protection of water quality or rare plants, because many wildlife species need large blocks of continuous habitat while others are subject to the effects of predatory and parasitic species associated with forest openings and habitat edges created by development. Mitigation by exclusion would reduce the land area available for industrial development while maintaining the existing use and function of the ecosystem.

Exclusion areas. Fig. S-1 delineates areas available for development. Exclusion areas include the 100-year floodplain of onsite streams; designated natural areas (including bottomland hardwood forests, upland hardwood habitat, walnut plantations, canebrake, limestone cliffs, and limestone bluffs); aquatic natural areas (e.g., Tennessee dace habitat); archaeological and historic sites; special features (caves, springs, wetlands); wildlife corridors; and stream buffers. Total acreage that shall be excluded from development is 491 acres. Estimated land area available for development is 444 acres, which includes acreage at the west end of the parcel for which an archaeological survey shall be required prior to development,

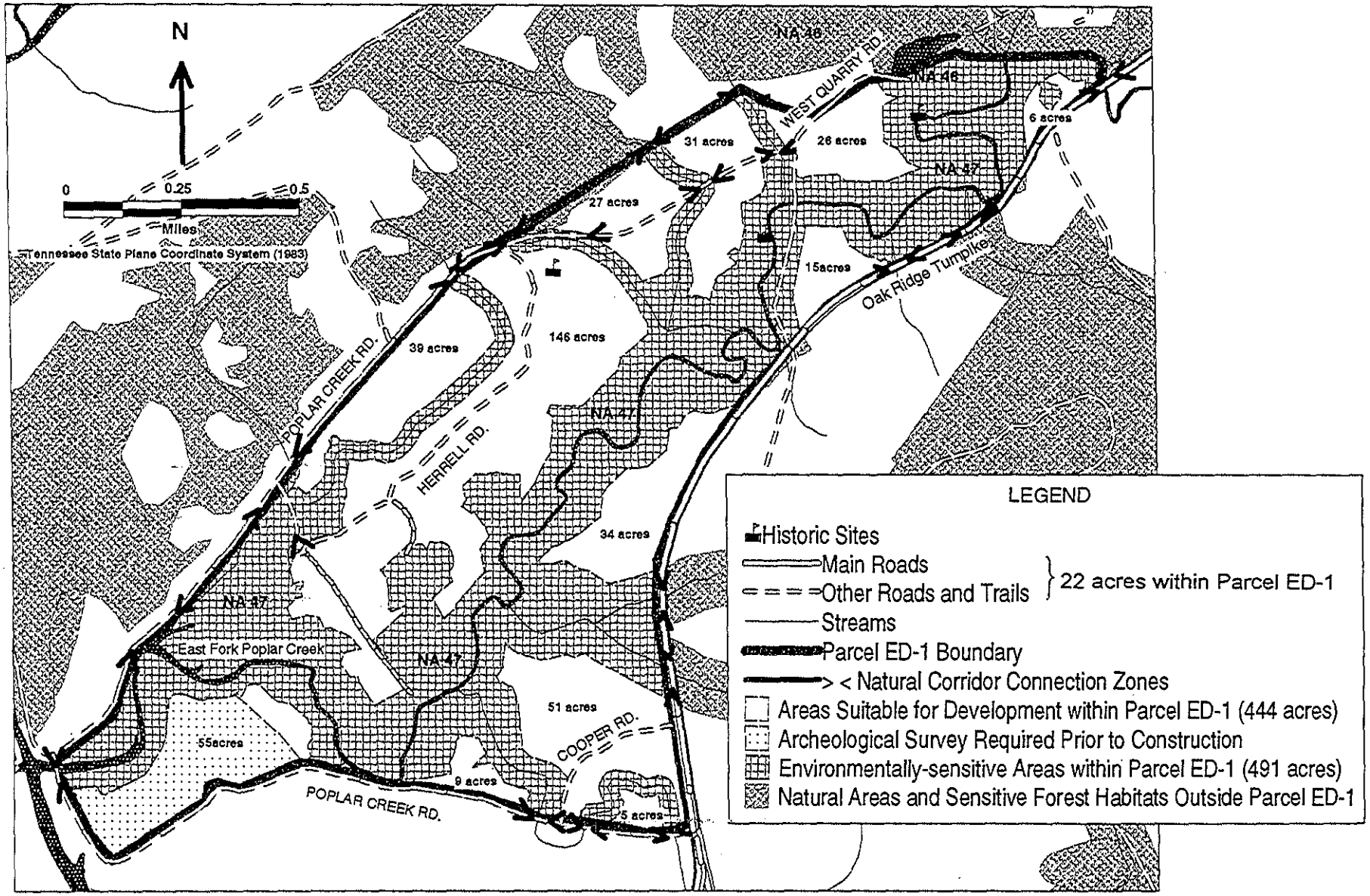

Fig. S-1. Areas available for development on Parcel ED-1 of the Oak Ridge Reservation. Environmentally sensitive areas include the 100-year floodplain, 100-foot stream buffers, Natural Areas (NAs), and sensitive forest habitats.

and acreage required for access and infrastructure. The remaining 22 acreas are accounted for by existing roads. The following mitigation shall apply.

1. Bottomland hardwood habitat associated with EFPC and its tributaries, both in and out of the 100-year floodplain, shall not be disturbed. Buffer zones shall extend at least 30 m (100 ft) on each side of streams to protect unique plant communities and to provide adequate habitat to protect interior wildlife species from incursions by species such as the brown cowbird, starling, and European sparrow.

2. Wetland boundaries shall be delineated prior to development. If road, bridge, or other construction is proposed in floodplains or wetlands, all appropriate environmental documentation shall be prepared and areas surveyed prior to disturbance. Surveys would identify areas that would be least impacted by development. Following any development, stream banks, stream sides, and riparian zones shall either be restored to or allowed to regenerate naturally to habitat representative of natural communities in the area. Native plant species consistent with local community types shall be used in restoration and revegetation.

3. Upland hardwood habitat and features of special value for wildlife (e.g., beech-maple forests, karst hardwood communities, walnut plantations, caves, springs) shall be preserved and protected. Clearing of other upland hardwoods shall only be allowed from October to April because of the potential presence of maternity colonies of the endangered Indiana bat during breeding season.

4. National Environmental Research Park NA 47 shall be excluded from development, since all currently identified rare species populations occurring within Parcel ED-1 and representatives of all critically rare and subcritically rare community types identified within Parcel ED-1 are contained within it. The continuity of natural areas (NA-46, NA-47) shall be maintained. The easternmost area of the site shall remain undeveloped to provide continuity of wildlife habitat with adjacent areas. Also, a natural corridor system, a minimum of 61 m (200 ft) wide, shall be retained to connect bottomland habitat to upland hardwood habitat north of the parcel; this would maintain continuity of habitat and mitigate the adverse effects of forest fragmentation. This corridor system shall be configured to include the isolated hardwood stands retained on the north side of the parcel (see Item 3). A method to maintain a corridor across the north-boundary roadway (e.g., an underpass) shall be developed.

5. Roads and utility extensions shall not cross natural areas NA-46 and NA-47.

6. Land temporarily disturbed by construction shall be restored to its original contour and soil content and planted with native vegetation, as advised by the NRCS, TWRA, and FWS.

7. Prior to facilities and infrastructure construction, developers shall consult with DOE and with appropriate state and federal agencies to plan landscaping and vegetation management to minimize impacts on songbirds, other nongame and native wildlife, and native plant communities.

8. Developers, DOE, and state and federal agencies shall maintain a continuing dialogue during development to ensure that exclusion areas and sensitive resources are protected as prescribed in this FONSI.

Ecological surveys and monitoring. Both the FWS and the State of Tennessee have requested that areas proposed for development be surveyed for protected species of vegetation and wildlife prior to disturbance and that survey results be shared with these agencies. In addition, follow-up surveys shall be periodically conducted to determine any impacts from development on plant and wildlife populations and the success of mitigation measures. The following ecological surveys and monitoring shall be conducted in consultation with TWRA and FWS.

1. Surveys and monitoring shall focus on, but shall not be limited to, the following: vegetation and wildlife species and habitat protected by state and federal legislation, deer, turkey, wood duck and other waterfowl, breeding birds and their predators, unique or rare plants and plant communities, and wetlands. Surveys of lower EFPC and BC shall be conducted to verify the presence or absence of protected aquatic species.

2. A long-term monitoring program for designated NAs, rare plant species, and rare vegetation communities shall be designed to detect direct and indirect impacts, as well as to monitor continued avoidance of protected areas. Monitoring shall begin prior to any construction activity to provide a baseline with which to compare future data.

3. A long-term monitoring program of aquatic communities shall be designed to study the effects of development. Monitoring shall begin prior to any construction activity to provide a baseline with which to compare future data, to determine if any impacts have resulted from development and operations, and to determine the success of mitigation.

4. To monitor and control the ORR deer population, ETEC shall consult with DOE and TWRA about the possibility of continuing deer hunting north of the site and, if feasible, on the site itself.

DETERMINATION: Based on the findings of this EA and the implementation of mitigation defined in the EA and FONSI, DOE has determined that the proposed lease of Parcel ED-1 to ETEC does not constitute a major Federal action that would significantly affect the quality of the human environment within the context of the National Environmental Policy Act. Therefore, preparation of an environmental impact statement is not required.

Issued at Oak Ridge, Tennessee, this 23 day of June 1996.

James C. Hall
Manager
U.S. Department of Energy
Oak Ridge Operations Office
Oak Ridge, Tennessee

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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

AADT	annual average daily traffic
AECA	Atomic Energy Community Act
AHR	archaeological and historic review
ANA	aquatic natural area
BC	Bear Creek
BMAP	Biological Monitoring and Abatement Program
BMP	best management practice
C	Celsius
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cm	centimeter
CO	carbon monoxide
COE	Corps of Engineers (U.S. Army)
dB	decibel
dBA	decibel (A-weighted)
dbh	diameter at breast height
dm	decimeter
DOE	U.S. Department of Energy
EA	environmental assessment
EERC	Energy, Environment, and Resources Center
EFPC	East Fork Poplar Creek
EIS	environmental impact statement
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act of 1986
EPT	Epemeroptera, Plecoptera, and Trichoptera
ESA	Endangered Species Act
ESCP	Erosion and Sedimentation Control Plans
ETEC	East Tennessee Economic Council
F	Fahrenheit
FACW	facultative wetlands
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
ft	feet (foot)
FWS	U.S. Fish and Wildlife Service
FY	Fiscal Year
GIS	geographic information system
gpd	gallons per day
GPS	Global Positioning System
GSMNP	Great Smoky Mountains National Park

ha	hectare(s)
HAP	hazardous air pollutant
HSWA	Hazardous Solid Waste Amendments
IM	in need of management
in.	inch(es)
IT	International Technology
K-25	DOE Oak Ridge K-25 Site
km	kilometer
km/hr	kilometers per hour
L_{10}	90th percentile of the sound pressure level (the noise level that is exceeded 10 per cent of the time)
L_{eq}	equivalent noise level (the average noise level expressed in decibels)
LMES	Lockheed Martin Energy Systems
LOS	level of service
m	meter
m^2	square meters
m^3/s	cubic meters per second
MAB	Man and the Biosphere
mgd	millions gallons per day
m/L	milligrams per liter
MMES	Martin Marietta Energy Systems, Inc.
mph	miles per hour
mSv	millisievert
$\mu g/m^3$	micrograms per cubic meter
$\mu g/m^3/yr$	micrograms per cubic meter per year
NA	natural area
NAAQS	National Ambient Air Quality Standards
NCRS	U.S. Natural Resources Conservation Service
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NT	northern tributary
OBL	obligate wetland
ORNL	Oak Ridge National Laboratory (X-10)
ORO	Oak Ridge Operations
ORR	Oak Ridge Reservation
PCB	polychlorinated biphenyl
PM	particulate matter
POTW	Publicly Owned Treatment Works
PSD	prevention of significant deterioration
ROI	region of influence

SAMAB	South Appalachian Man and Biosphere
SARA	Superfund Amendments and Reauthorization Act of 1986
SEG	Scientific Ecology Group
SH	sinkhole creek
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
SPCC	spill prevention control and countermeasures (plan)
SPCCC	spill prevention control, countermeasures, and contingency (plan)
ST	southern tributary
STP	sewage treatment plant
SR	state route
T&E	threatened and/or endangered
TDEC	Tennessee Department of Environment and Conservation
TSS	total suspended solids
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resource Agency
UNESCO	United Nations Educational, Scientific and Cultural Organizations
USC	United States Code
USD	U.S. Department of Agriculture
UT	The University of Tennessee
WAC	Waste Acceptance Criteria
yd^3	cubic yard(s)
<	less than
>	greater than

SUMMARY

S.1 PROPOSED ACTION

The proposed action evaluated in this environmental assessment (EA) is the lease of 957.16 acres of U.S. Department of Energy (DOE) land on the Oak Ridge (Tennessee) Reservation (ORR) to the East Tennessee Economic Council (ETEC)* under the authority of Sect. 3154 of the Defense Authorization Act of 1994 (Public Law 103-160). The sole purpose for which ETEC would use the parcel of land (designated Parcel ED-1) would be to further and support economic development in the region. The need for DOE action is driven by a decreased budget that will impact jobs and the economy in Oak Ridge and surrounding communities. The proposed action is wholly intended to help offset potential economic losses resulting from DOE and contractor downsizing in the near term and to diversify the economic base of the region in the long term.

Parcel ED-1 is proposed by ETEC to be developed as an industrial park. The parcel was selected for lease after a review of present and future programmatic needs for various land areas of the ORR. In addition, its physical features and proximity to the Oak Ridge K-25 Site, public services, and utility infrastructure are extremely favorable for industrial development.

Specific industries to be located at Parcel ED-1 will not be known until infrastructure is developed and ETEC negotiates subleases. Industrial use will be required to conform to the city of Oak Ridge Zoning Ordinance (Chapter 7, Sect. 6-713 IND-2, Industrial Districts). Typical industries that ETEC will market for inclusion in the Parcel ED-1 industrial park include, but are not limited to, ceramics and auto parts manufacturers, computer and electronic components manufacturers, copying services, and commercial offices.

A partnership between DOE and the private sector is intended to demonstrate that development is compatible with DOE's Land Management Policy—to manage its land and facilities as natural resources with stewardship based on principles of ecosystem management and sustainable development. Environmental and socioeconomic factors will be considered in development plans, and buffer zones will be designated to protect sensitive ecological resources, such as floodplains, wetlands, streams, and unique plant and animal communities.

* ETEC is now known as Community Reuse Organization of East Tennessee.

S.2 ALTERNATIVES

Three alternatives to the proposed action were considered: no action, lease of other ORR land to ETEC, and disposal of Parcel ED-1. If no action is taken, Parcel ED-1 would be retained as DOE property and would continue in its current use (wildlife management, silviculture, ecosystem research, and environmental monitoring). If DOE does not take action, jobs lost by downsizing and strategic realignment may not be replaceable in the near term.

Leasing other ORR land and disposal of Parcel ED-1 were dismissed from further consideration. Other ORR lands are now being utilized or are planned for future programmatic uses. In addition, there are no other parcels of sufficient size and contiguity on the perimeter of the ORR to meet the land requirements for an industrial park. Further, DOE has determined at this time that it should retain fee-title in order to encourage the kind of investment necessary for long-term commercial development, and to continue environmental research programs and maintain measures to preserve environmentally sensitive areas.

S.3 FINDINGS

Considering the environmental protection requirements of the lease, the findings of the impacts analyses of this proposed action are as follows:

Land Use

Current land use of Parcel ED-1 for wildlife management, silviculture, and environmental research would be affected by development of industrial facilities and infrastructure. However, industrial use would be compatible with similar use of the nearby DOE Oak Ridge K-25 Site. All of Parcel ED-1 is within the DOE Oak Ridge National Environmental Research Park, which is part of a system of Research Parks that provide protected land areas for research and education in the environmental sciences in an effort to demonstrate that energy technology development can be compatible with a quality environment. With implementation of specific mitigation and monitoring of the parcel during infrastructure and industrial development and facilities operation, Research Park objectives could be met. National Environmental Research Park and Oak Ridge National Laboratory (ORNL) Environmental Sciences Division staff will be available to provide assistance to DOE and ETEC during the planning, development, and operation of facilities.

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Site clearing, grading, contouring, and excavation would change topography of some areas of the site but would not affect the underlying geology. Some soils on the parcel are "prime farmland," which is protected under the Farmland Protection Policy Act. DOE has been advised by the U.S. Natural Resources Conservation Service (NCRS) (formerly Soil Conservation Service) that because Parcel ED-1 lies wholly within the city of Oak Ridge, the prime farmland designation is waived, and other uses of the land, such as industrial development, are permitted.

Air Quality

Construction. Fugitive particulates and gaseous exhaust would be produced by earthwork and vehicle and machinery operation. Concentrations of nitrogen oxides, sulfur dioxide, carbon monoxide, unburned hydrocarbons, and particulates would increase near the disturbed areas. Emissions would be localized, short term, and sporadic. Because of dispersal and dilution of emissions in the atmosphere, changes in off-site ambient concentrations of these pollutants would be negligible. Ambient concentrations of particulates at and near the parcel are well below National Ambient Air Quality Standards (NAAQS). Results of modelling indicate that the NAAQS for particulates would not be exceeded.

Operation. Operation of industrial facilities may produce atmospheric pollutant emissions, including radionuclides, lead, nitrogen oxides, sulfur dioxide, carbon dioxide, and particulates. Emissions from hypothetical industries located on Parcel ED-1 would not result in exceedances of NAAQS. The modeled upper-bound effects of emissions from industries that might potentially be located on Parcel ED-1 are very small, and actual effects are expected to be negligible. Incremental emissions from facilities planning to locate at Parcel ED-1 would be evaluated on a case by case basis by state and federal regulatory agencies prior to issuance of air permits. The regulatory air permit review process is designed to protect human health and the environment.

Water Resources

Erosion. Earthmoving activities may increase sediment transport and deposition in surface waters. Impacts to water quality and aquatic biota can be minimized by the use of Best Management Practices, which include, but are not limited to, (1) avoiding construction within the East Fork Poplar Creek (EFPC) and Bear Creek (BC) floodplains, (2) using siltation fences, (3) providing at least 30 m (100 ft) of natural vegetation riparian zone buffers with a wider buffer in steep areas, and (4) revegetating bare soil with native plants.

Stormwater and effluent discharge. Stormwater runoff and effluent discharge from industrial facilities would be managed to minimize impacts to local hydrology and water quality. Paved and unpaved areas would be contoured so that runoff drains to a sump or basin. Collected stormwater, domestic wastewater, and liquid industrial waste streams would be pretreated, if required, and directed to either the K-25 Site or city of Oak Ridge wastewater treatment facility, both of which have adequate capacity to accommodate additional effluents. Treated waters from either of these facilities would continue to be discharged to surface water in accordance with limitations established in a revised or new National Pollutant Discharge Elimination System (NPDES) permit issued by the State of Tennessee. If permit limits are consistently met, degradation of aquatic habitat would be minimal. To minimize impacts to aquatic species, waste cooling water from industrial facilities would not be discharged into streams until cooled to ambient temperatures of the receiving waters.

Consumptive use. City-supplied water and sewers are available to the site, and wells would not be drilled for groundwater use or wastewater disposal.

Floodplains/Wetlands

The lease will require that no development occur in 100-year floodplains or in wetlands. If ETEC or its sublessees undertake actions other than routine maintenance (e.g., repairs to bridge abutments or existing roads) in floodplains or wetlands, DOE must be notified and appropriate environmental reviews conducted at the lessee's or sublessee's expense.

Terrestrial Ecology

Construction would disturb or remove approximately 50% of vegetation on Parcel ED-1. The forest on this parcel is an important segment of the overall ORR forested area and may include unique and rare species. Removal of native vegetation would reduce the value of the natural areas to wildlife. Eventual development of the parcel would eliminate all wildlife habitat in developed areas. Protected and natural corridor areas would be located primarily along EFPC and its major tributaries. Vegetation removal would increase forest fragmentation and loss of connectivity at the scale of structural species (e.g., overstory, understory, subcanopy forest structure), keystone species, and rare species.

In developed areas, construction and maintenance of industrial facilities would result in permanent loss of vegetation and reduced structural diversity of remaining plant communities (e.g., grass instead of trees, shrubs, and herbs). These losses would greatly simplify wildlife habitat, which in turn would limit wildlife species diversity. Species that adapt most readily to human presence would predominate (e.g., deer, skunk, raccoon, rabbit, woodchuck, beaver, opossum, starling, and resident Canada goose). Species that require large forested areas (e.g., neotropical migratory songbirds) would be adversely affected by loss of habitat, increased predation, and parasitism from species that would benefit from openings and edges in the surrounding forest.

Fugitive particulates released during construction and operation would be dispersed and deposited in nearby terrestrial and aquatic habitats. Airborne and waterborne toxics might affect the food chain by injuring or killing plants, amphibians, and invertebrates. Deer populations would probably increase because of the creation and/or maintenance of edges and openings near bottomland hardwood forest. Total or near-total removal of habitat could displace deer into other areas, including the city of Oak Ridge. Further, restriction of deer hunting on the parcel would add to the 8000 acres of the ORR already restricted (increase from 25% restricted to 31% restricted), thereby further limiting the ability to control the deer herd.

Threatened and/or Endangered (T&E) Species

In compliance with Section 7 of the Endangered Species Act, DOE consulted informally with the FWS for information on T&E species. Bottomland forest on EFPC

provides an abundance of suitable habitat for maternity colonies of the endangered (federal and state) Indiana bat (*Myotis sodalis)*, but no colonies have been observed. EFPC may also provide foraging habitat for the federal- and state-listed endangered gray bat (*Myotis grisescens*), which has been documented on the ORR. The FWS concurs that exclusion of bottomland hardwood habitat and the EFPC floodplain from development would protect these species.

New populations of state-threatened *Hydrastis canadensis* (golden seal), state-endangered *Cypripedium acaule* (pink lady slipper), and state-threatened *Panax quinquefolia* (ginseng) have been located on Parcel ED-1 near EFPC. All populations are located within National Environmental Research Park Natural Area (NA) 47, which would be excluded from development. In addition, all are found elsewhere on the ORR.

Parcel ED-1 also supports state-listed in-need-of-management animal species (sharp-shinned hawk, southeastern shrew, and Tennessee dace). State law requires that neither these species nor their habitats be knowingly destroyed without a permit from the state [Tennessee Code Annotated Title 70, Chap. 8, and regulations of the Tennessee Wildlife Resource Agency (TWRA)]. Exclusion of development in NA-47 would protect species and habitat at that location; however, the hawk and shrew occur elsewhere on the parcel.

Socioeconomics

Oak Ridge and surrounding communities would benefit from the development of Parcel ED-1. DOE's strategic realignment and Congressional budget allocations will in the near term necessitate involuntary separation of DOE and DOE contractor employees nationwide. In Oak Ridge, some of these losses would be offset by new employment opportunities at industries that locate at Parcel ED-1.

Minority and/or low-income populations in Oak Ridge, which are concentrated in an area more than 2 miles away, would not be disproportionately affected by the proposed action.

Historic and Archaeological Resources

Archaeological and historic resources on all but 80 acres of the parcel have been surveyed and catalogued in consultation with the Tennessee State Archaeologist. In accordance with DOE's commitment to protect properties included on or eligible for inclusion on the National Register of Historic Places, and at the request of the State Historic Preservation Officer (SHPO), three historic sites on Parcel ED-1 would be excluded from development/use, and each would be surrounded by buffer zones. DOE will require that the 80-acre area at the west end of the parcel be excluded from development until a full archaeological survey is completed and approval to proceed with development is granted by the SHPO.

Health and Safety

Workers at Parcel ED-1 construction sites would be subject to safety hazards common to any industrial site. For the most part, adherence to policies and procedures based on Occupational Safety and Health Act regulations would minimize impacts to worker health and safety. In this EA, it was assumed that facilities that would be developed at Parcel ED-1 would be similar to facilities in other Oak Ridge area industrial parks. To date, these operating facilities have reported no unique occupational or public health and safety hazards or issues.

Waste Management

Based on historical operations of Oak Ridge private sector industrial facilities, it is assumed that wastes from similar facilities at Parcel ED-1 could be safely managed. Recycling and waste minimization would be practiced. Nonrecyclables would be packaged and shipped to off-site treatment and disposal facilities, based on their waste classification.

Spills

Accidental spills of hazardous materials would be mitigated by the use of appropriate equipment and cleanup procedures [i.e., Environmental Protection Agency (EPA)-approved spill prevention control and countermeasure plan]. Accidental releases of high concentrations and/or large quantities of pollutants could cause standards to be exceeded. Under the Superfund Amendments and Reauthorization Act of 1986, Title III, industrial facilities are required to report releases of "reportable quantities" of hazardous substances (listed in the Comprehensive Environmental Response, Compensation, and Liability Act and Emergency Planning and Community Right-to-Know Act of 1986) to state and local emergency response personnel. DOE, Lockheed Martin Energy Systems, and the city of Oak Ridge would mobilize emergency response actions in accordance with mutual aid agreements should a release of hazardous materials (to any environmental medium—air, surface water, groundwater, or soils) occur on Parcel ED-1. If necessary, emergency personnel from neighboring communities would be recruited for assistance.

S.4 MITIGATION

The following measures will be implemented to prevent significant adverse impacts to ecological resources, floodplains, wetlands, water resources, and historic and archaeological resources. Measures are comprised of (1) excluding areas on Parcel ED-1 from disturbance and development and (2) conducting surveys and monitoring of industrial development areas prior to disturbance and during facilities operations. DOE will have the right to terminate the lease with ETEC should the lessee and/or sublessees fail to implement the required mitigation.

Mitigation of impacts to ecological resources is based on the preservation of corridors and buffers for aquatic biota, terrestrial wildlife and plant communities by their

exclusion from development. Connections with surrounding natural habitats will be maintained to reduce the effects of fragmentation. In general, such areas will be larger for wildlife than those recommended for protection of water quality or rare plants, because many wildlife species need large blocks of continuous habitat while others are subject to the effects of predatory and parasitic species associated with forest openings and habitat edges created by development. Mitigation by exclusion would reduce the land area available for industrial development while maintaining the existing use and function of the ecosystem.

Exclusion areas. Fig. S-1 delineates areas available for development. Exclusion areas include the 100-year floodplain of on-site streams; designated natural areas (including bottomland hardwood forests, upland hardwood habitat, walnut plantations, canebrake, limestone cliffs, and limestone bluffs); aquatic natural areas (e.g., Tennessee dace habitat); archaeological and historic sites; special features (caves, springs, wetlands); wildlife corridors; and stream buffers. Estimated land area available for development is 444 acres, which includes acreage at the west end of the parcel (for which an archaeological survey would be required prior to development) and acreage required for access and infrastructure. The total area excluded from development is 491 acres. The remaining 22 acres are accounted for by existing roads. Excluded areas and criteria for their management include the following:

1. Bottomland hardwood habitat associated with EFPC and its tributaries, both in and out of the 100-year floodplain, shall not be disturbed. Buffer zones shall extend at least 30 m (100 ft) on each side of streams to protect unique plant communities and to provide adequate habitat to protect interior wildlife species from incursions by species such as the brown cowbird, starling, and European sparrow.

2. Surveys shall be conducted to delineate wetland boundaries prior to construction. If a bridge or other construction is proposed in floodplains or wetlands, all appropriate environmental documentation shall be prepared and areas surveyed prior to disturbance. Surveys will identify areas that would be least impacted by development. Following any development, stream banks, stream sides, and riparian zones shall either be restored to or allowed to regenerate naturally to habitat representative of natural communities in the area. Native plant species consistent with local community types shall be used in restoration and revegetation.

3. Upland hardwood habitat and features of special value for wildlife (e.g., beech-maple forests, karst hardwood communities, walnut plantations, caves, and springs) shall be preserved and protected. Clearing of other upland hardwoods shall only be allowed from October to April because of the potential presence of maternity colonies of the endangered Indiana bat during breeding season.

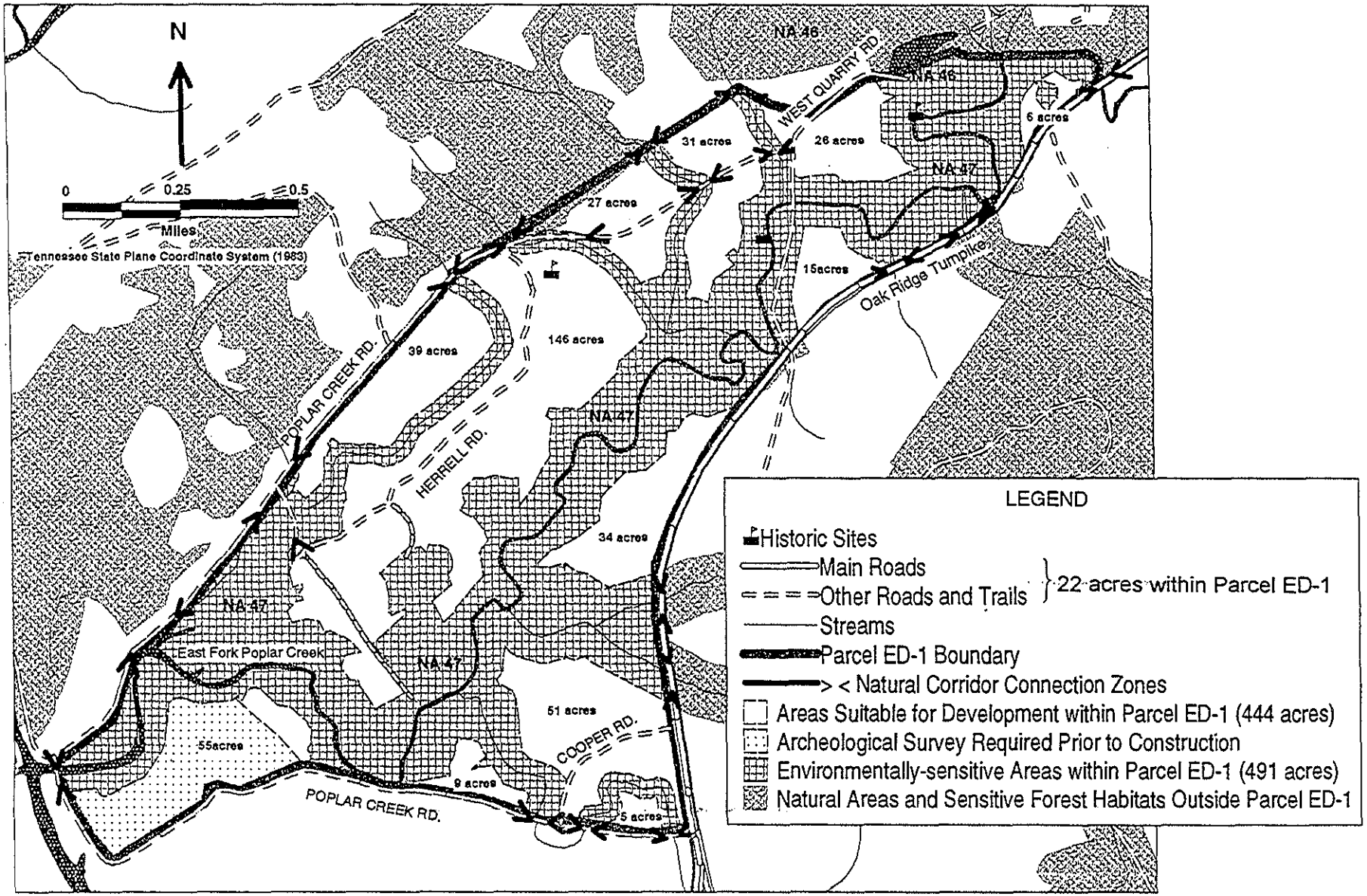


Fig. S-1. Areas available for development on Parcel ED-1 of the Oak Ridge Reservation. Environmentally sensitive areas include the 100-year floodplain, 100-foot stream buffers, Natural Areas (NAs), and sensitive forest habitats.

4. National Environmental Research Park NA-47 would be excluded from development, since all currently identified rare species populations occurring within Parcel ED-1 and representatives of all critically rare and subcritically rare community types identified within Parcel ED-1 are contained within it. The continuity of natural areas (NA-46 and NA-47) shall be maintained. The easternmost area of the site shall remain undeveloped to provide continuity of wildlife habitat with adjacent areas. Also, a natural corridor system, a minimum of 61 m (200 ft) wide, shall be retained to connect bottomland habitat to upland hardwood habitat north of the parcel; this would maintain continuity of habitat and mitigate the adverse effects of forest fragmentation. This corridor system shall be configured to include the isolated hardwood stands retained on the north side of the parcel (see Item 3). A method to maintain a corridor across the north-boundary roadway (e.g., an underpass) shall be developed.

5. Roads and utility extensions shall not cross natural areas NA-46 and NA-47.

6. Land temporarily disturbed by construction shall be restored to its original contour and soil content and planted with native vegetation, as advised by the NRCS, TWRA, and FWS.

7. Prior to facilities and infrastructure construction, developers shall consult with DOE and appropriate state and federal to plan landscaping and vegetation management to minimize impacts on songbirds, other nongame and native wildlife, and native plant communities.

8. Developers, DOE, and state and federal agencies shall maintain a continuing dialogue during development to ensure that exclusion areas and sensitive resources are protected.

Ecological surveys and monitoring. Both the FWS and the State of Tennessee have requested that areas proposed for development be surveyed for protected species of vegetation and wildlife prior to disturbance and that survey results be shared with these agencies. In addition, follow-up surveys shall be periodically conducted to determine any development impacts on plant and wildlife populations and the success of mitigation measures. The following ecological surveys and monitoring shall be conducted in consultation with TWRA and FWS:

1. Surveys and monitoring shall focus on, but will not be limited to, the following: vegetation and wildlife species and habitat protected by state and federal legislation, deer, turkey, wood duck and other waterfowl, breeding birds and their predators, unique or rare plants and plant communities, and wetlands. Surveys of lower EFPC and BC shall be conducted to verify the presence or absence of protected aquatic species.

2. A long-term monitoring program for designated NAs, rare plant species, and rare vegetation communities shall be designed to detect direct and indirect impacts, as

well as to monitor continued avoidance of protected areas. Monitoring shall begin prior to any construction activity to provide a baseline with which to compare future data.

3. A long-term monitoring program of aquatic communities shall be designed to study the effects of development. Monitoring shall begin prior to any construction activity to provide a baseline with which to compare future data, to determine if any impacts have resulted from development and operations, and to determine the success of mitigation.

4. To monitor and control the ORR deer population, ETEC shall consult with DOE and TWRA about continuing deer hunts north of the site and, if possible, on the site itself.

1.0 INTRODUCTION

1.1 PURPOSE OF AND NEED FOR DOE ACTION

The proposed action evaluated in this environmental assessment (EA) is the lease of 957.16 acres of U.S. Department of Energy (DOE) land on the Oak Ridge (Tennessee) Reservation (ORR) (Fig. 1-1) to the East Tennessee Economic Council (ETEC), a nonprofit community organization (now known as Community Reuse Organization of East Tennessee). Under the authority granted in Sect. 3154 of the Defense Authorization Act of 1994 (Public Law 103-160) (see Appendix A), the Secretary of Energy may lease real property at a DOE facility that is (1) to be closed or reconfigured, (2) not now needed by DOE, and (3) under DOE control. In accordance with the terms of the lease, the sole purpose for which the lessee (ETEC) would use the parcel of land (designated Parcel ED-1) would be to further and support economic development in the region. The need for DOE action is driven by a decreased budget that will impact jobs and the economy in Oak Ridge and surrounding communities. The proposed action is wholly intended to help offset potential economic losses resulting from DOE and contractor downsizing in the near term and to diversify the economic base of the region in the long term by making ORR land available to the private sector for industrial development. Retention of title to the land through lease (rather than disposal) of the land enables DOE to take measures to encourage long-term commercial development of the land.

1.2 HISTORICAL PERSPECTIVE

Small farming and coal mining communities dominated the Oak Ridge area until 1942, when Oak Ridge experienced a dramatic change. At that time, the Clinch River Valley was chosen by the federal government as the location of a large-scale production facility for the development of the world's first nuclear weapon (Manhattan Project). For over 50 years, federal activities conducted at the ORR have strongly influenced the social and economic characteristics of the community.

In recent years, the mission of DOE's three Oak Ridge facilities [Y-12 Plant, Oak Ridge K-25 Site, and Oak Ridge National Laboratory (ORNL)] (Fig. 1-2) has changed. Gaseous diffusion operations at the K-25 site were shut down in 1987 due to the decreasing demand for large amounts of enriched uranium. Activities at the site now focus on environmental restoration and waste management. Because of the end of the Cold War, weapons production at the Y-12 Plant is being replaced by weapons disassembly. ORNL, which at one time focused on nuclear research, continues to conduct research and development but on a more diverse range of energy technologies. In general, the focus at all three facilities is to transfer technologies and skills originally developed for defense purposes to the private sector.

In December 1993, DOE directed agency officials at each of its major sites to "implement a site-specific process to identify future use options based on the unique

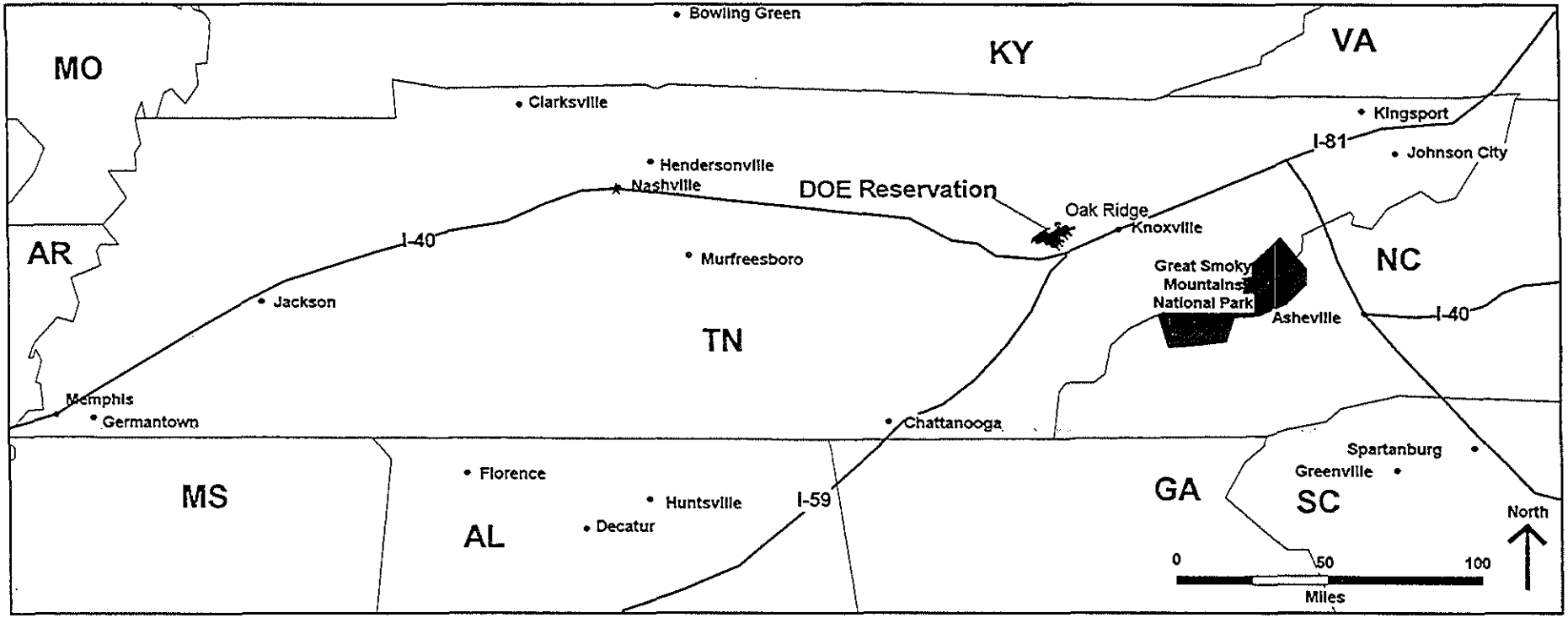


Fig. 1-1. Geographic location of the Oak Ridge Reservation in Tennessee.

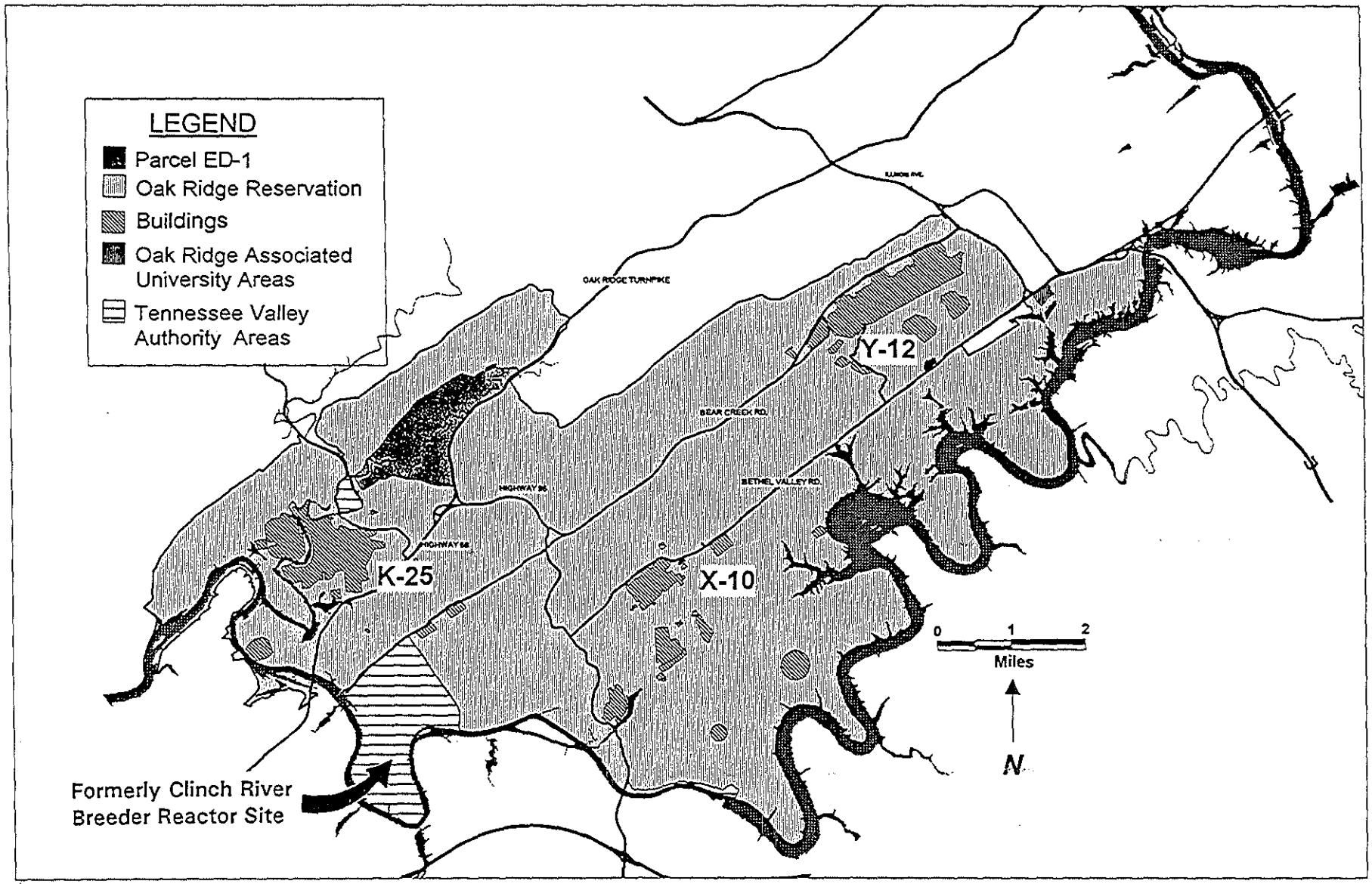


Fig. 1-2. Location of DOE facilities on the Oak Ridge Reservation.

characteristics of the site and stakeholder needs" (Pearman and Grumbly 1993). In December 1994, Secretary O'Leary issued a Land and Facility Use Policy for returning lands to public use, stimulating local economies, ensuring public participation, and protecting natural resources. The policy states,

> "It is Department of Energy policy to manage all of its land facilities as valuable national resources. Our stewardship will be based on the principles of ecosystem management and sustainable development. We will integrate mission, economic, ecologic, social, and cultural factors in a comprehensive plan for each site that will guide land and facility use decisions. Each comprehensive plan will consider the site's larger regional development context and be developed with stakeholder participation. This policy will result in land and facility uses which support the Department's critical missions, stimulate the economy, and protect the environment" [Memorandum from Hazel O'Leary to Secretarial Officers and Operations Office Managers, Land and Facility Use Policy, December 21, 1994].

This policy is intended to be basic general guidance for DOE to follow in strengthening its stewardship of its land and facilities, which are recognized as valuable national resources. The policy states that DOE will base this stewardship on the principles of ecosystem management and sustainable development. While the policy sets a general framework within which to manage these lands and facilities, it does not detail how the policy will be implemented in specific instances. A DOE decision on a specific proposed action will be made after careful consideration of DOE's mission and local economic, ecological, social, and cultural factors. The NEPA process is used to implement the general policy at a specific site. When an EA is being prepared to determine the potential environmental impacts of a proposed DOE action, principles of ecosystem management and sustainable development are among the factors used in determining whether a finding of no significant impact (FONSI) is the appropriate conclusion of the EA. In some cases, mitigation and monitoring measures are required to support the conclusion of no significant impacts. These *mitigated FONSIs* incorporate DOE oversight and monitoring to ensure that the mitigation measures delineated in the *mitigated FONSI* are enforced.

DOE's 1994 Secretarial Land and Facility Use policy statement reiterated a commitment to integration of agency and community interests that has been active in Oak Ridge for at least 40 years. Since the 1950s, DOE and its predecessor agencies (the Atomic Energy Commission and the Energy Research and Development Administration) have sold or transferred approximately 24,000 acres of land from the ORR to the local community. More than half of these transfers were to private parties for housing, churches, businesses, and other community needs. These land transactions involved about 41% of the 58,600 acres of Oak Ridge lands obtained by the federal government for the Manhattan Project.

In 1979, the Secretary of Energy approved a program to permit DOE to make financial assistance payments to the city of Oak Ridge for a 5-year period under the authority of the Atomic Energy Community Act of 1955 (AECA). To encourage self-sufficiency on the part of the city, a portion of the payments was earmarked for development of self-sufficiency plans (DOE 1993). In 1980, the city of Oak Ridge submitted a self-sufficiency plan (City of Oak Ridge 1979 and 1980) that proposed that DOE sell land to the city for industrial and commercial development (Fig. 1-3). Under Sect. 161(g) of the AECA, DOE determined that land could be directly transferred to the

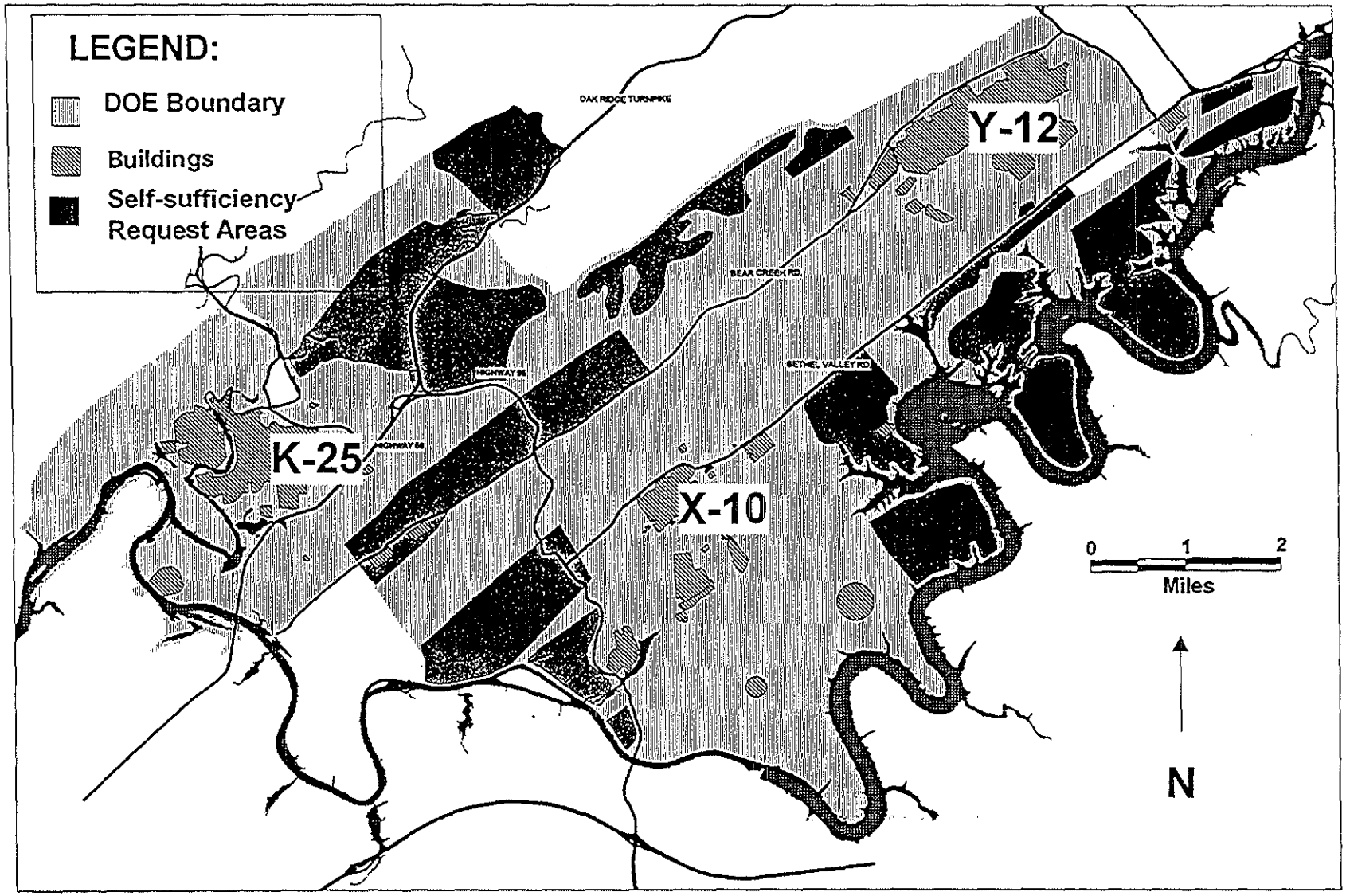


Fig. 1-3. City of Oak Ridge self-sufficiency request areas on the Oak Ridge Reservation.

city in this manner, and 2371.03 acres were conveyed over a 10-year period. Table 1-1 provides details of the land transfers; Fig. 1-4 shows their relative locations on the ORR.

Table 1-1. Department of Energy Oak Ridge Reservation land transfers to the city of Oak Ridge (1983-1993)

Parcel	Date of Transfer	Acreage	Proposed Use
B and C	9-30-83	279.3	Industrial
F	9-27-85	118.87	Industrial
E	2-5-87	1216.71	Industrial
A1	6-21-88	52.7	Residential or
A2	9-23-92	532.59	Industrial
A3	8-23-93	170.86	

Source: K. Kates, U.S. Department of Energy, Oak Ridge, Tennessee, Real Estate Office.

Periodically, a site utilization survey is performed, normally in conjunction with General Services Administration, to determine if land and/or facilities on the ORR are properly utilized for their intended purposes. This survey also identifies underutilized or excess land and facilities if such exist. In the event land or facilities are found to be underutilized or excess, current and future programmatic uses are analyzed prior to any decisions being made for outgranting or disposal.

Because of the rapidly changing programs and missions of DOE, it has been the practice of DOE to informally review such land and facility usage between utilization survey periods. These reviews are based on current needs and future probability of programmatic utilization. After consideration of the imminent downsizing of DOE and contractor work force and in conjunction with ETEC's proposals for economic development within the Oak Ridge region, DOE agreed to consider outgranting (leasing) an area to provide for industrial development as an economic base for the region. Enactment of Public Law 103-160 (Hall Amendment, Sec. 3154) (Appendix A) provided an avenue for long-term leasing of DOE property at certain DOE facilities. In January 1995, DOE began a process to identify a contiguous parcel of land comprised of approximately 1000 acres to meet ETEC's size requirements for an industrial park. The only parcel meeting the current underutilized status and the contiguous-acreage requirements was identified as a self-sufficiency parcel (Fig. 1-3) which, if and when determined to be excess to DOE needs, could be conveyed to the city of Oak Ridge under the terms of the Self-Sufficiency Plan.

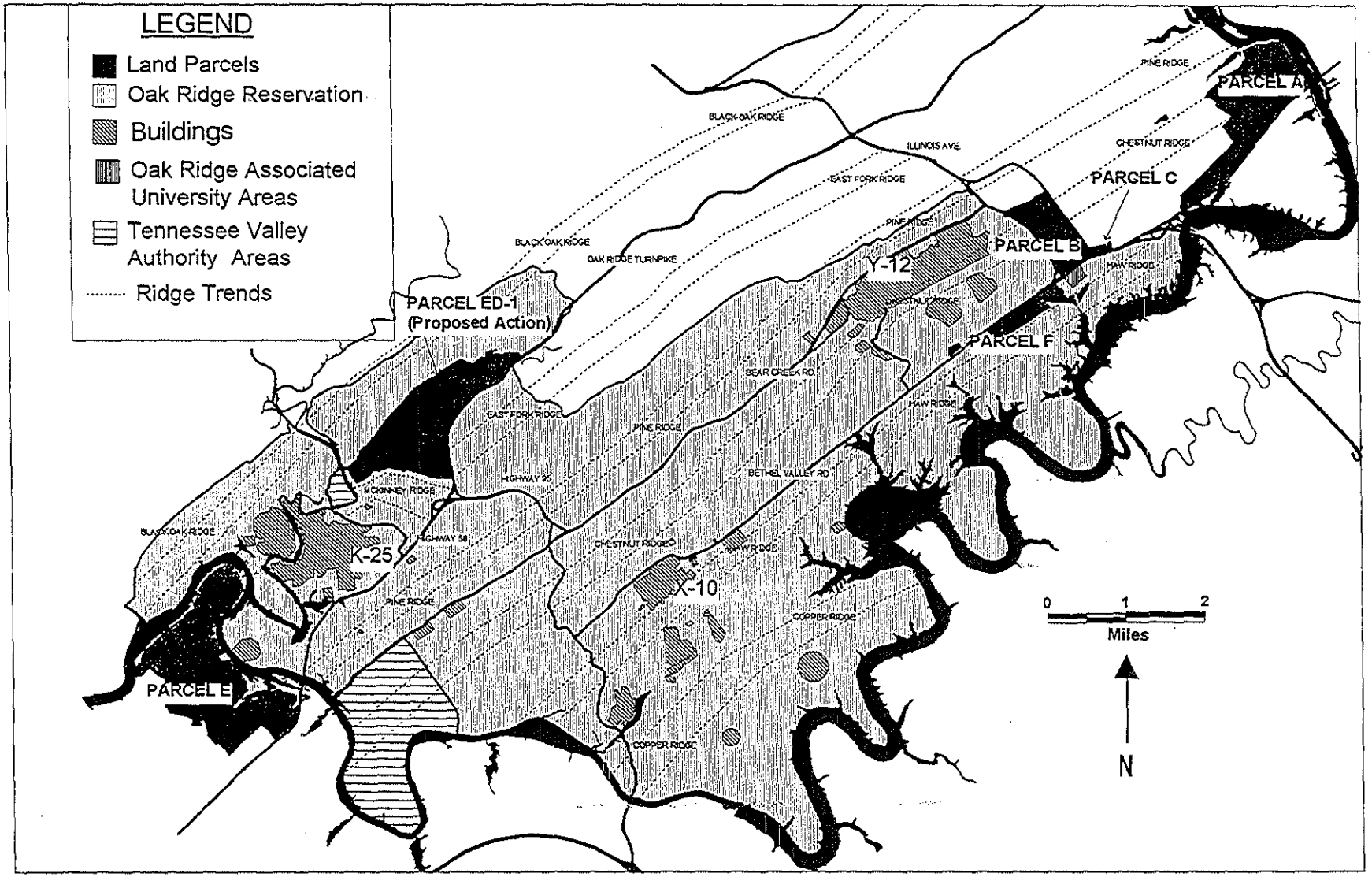


Fig. 1-4. Parcels of Oak Ridge Reservation land transferred to the city of Oak Ridge (1983-1993).

In an independent study for the Oak Ridge Chamber of Commerce, Lockwood Greene reviewed all existing industrial and green field sites within a 25-mile radius of the existing Clinch Bend site (commonly known as the Clinch River Breeder Reactor Site) (see Fig. 1-2). Lockwood Greene concluded that the Clinch Bend site configuration and topography strongly suggest that the site is unlikely to be fully occupied by a single user representative of a major manufacturing facility. They found further that the relatively high investment cost to develop site infrastructure and improvements to maximize utilization for late users would be a major liability for this site. Of all existing regional industrial parks and sites (31 within the study area), none, as currently configured, meet the criteria for a major industrial project. Throughout the 25-mile radius, only two potential green field sites, not currently designated as industrial sites, were identified, one of which is Parcel ED-1. In comparing the Clinch Bend site and these two potential green field sites, Lockwood Greene rated Parcel ED-1 the highest by far in those factors considered important by corporations conducting site searches for major industrial facilities.

1.3 SCOPE OF EA ANALYSIS

This EA conforms to the requirements of the Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508) implementing the National Environmental Policy Act of 1969 (NEPA) and DOE NEPA Implementing Procedures (10 CFR 1021).

A "sliding-scale" approach is the basis for analysis of impacts of the proposed action. That is, certain aspects of the action have a greater potential for causing adverse environmental impacts; therefore, they are discussed in greater detail in this EA than those aspects with little potential for impact. Because the lease of Parcel ED-1 and subsequent industrial development have the potential to adversely affect natural ecosystems on the ORR, the EA provides a detailed description of terrestrial and aquatic resources. Few, if any, impacts are expected to geological, archaeological, historic, and socioeconomic resources; therefore, these areas are discussed in lesser detail, although the original treatment was augmented in response to comments received during and subsequent to the public workshop held on August 24, 1995.

ETEC has no firm plans for subleases to specific businesses, manufacturers, or industries. Thus, details concerning the exact acreage and location of land disturbance during construction; the precise location of utilities, roads, and bridges; and the nature and quantities of atmospheric emissions, effluent discharges, and wastes from industrial facilities are unknown. For this reason, the impacts analysis in this EA relies on the following assumptions:

- earthwork would occur incrementally and would not disturb the entire parcel at one time;
- floodplain (100-year) and wetlands would be delineated prior to construction and avoided (including the largest sycamore tree on the ORR near EFPC);

- should bridge construction be necessary, ETEC would be financially responsible for environmental documentation, approved by DOE, in accordance with 10 CFR 1022 floodplain/wetland regulations;

- habitat of federal and state-listed T&E species would be avoided;

- known historic sites would be avoided in accordance with recommendations of the State Historic Preservation Officer (SHPO);

- a survey would be undertaken by DOE, at the expense of ETEC, should a disturbance to a suspected archaeological site at the west end of the parcel be proposed;

- stormwater runoff would be collected and discharged directly to a sewer or treated and discharged to land or surface waters in compliance with a National Pollutant Discharge Elimination System (NPDES) permit;

- industrial and domestic wastewater effluents would be discharged to a permitted treatment facility;

- an electric power substation might be constructed on the parcel; and

- certain types of industrial facilities would be targeted as sublessees: ceramics and auto parts manufacturers, computer and electronic component manufacturers, and commercial services businesses.

1.4 PUBLIC INVOLVEMENT

Public participation during preparation of an EA is neither a CEQ nor DOE NEPA requirement. Nevertheless, DOE held a public workshop on the proposed action and the NEPA process on August 24, 1995. Appendix B provides DOE's responses to public comments on the Draft EA.

1.5 COMMON GROUND PROCESS

In December 1993, DOE directed agency officials at each of its major sites to ". . . implement a site-specific process to identify future use options based on the unique characteristics of the site and stakeholder needs." In response, DOE-ORO developed a program called the "Common Ground Process." A primary objective of the Common Ground Process is to recommend future land-use options for the ORR that represent widely held stakeholder preferences and to utilize the information for planning cleanup options. An additional objective is to incorporate into the recommendations the DOE goal of ". . . maintaining the natural sustainability and biological diversity of the ecosystem while supporting sustainable economic development and communities" [DOE Response to

Congressional Research Service Questions, March 23-24, 1994, Symposium on Ecosystem Management].

Workshops were held in November and December 1994 in five communities surrounding the ORR to familiarize interested citizens with the Common Ground Process, provide information about the ORR and the region, and gather opinions and ideas for future uses of the ORR. Questionnaires were distributed; small working groups were formed; and data was collected for analysis, distribution, and use in developing recommendations.

In June 1995, five public forums were held to allow stakeholders to review preliminary recommendations. Preferences expressed during the five workshops and in questionnaires (including mail-in questionnaires from nonattendees) were analyzed to develop a preliminary recommendations report (EERC 1995). Discussions at the two most heavily attended forums in Oak Ridge (approximately 60 people each) included the lease of Parcel ED-1. Questionnaires were again distributed and analyzed to revise the preliminary recommendations. The revised recommendations were made available as a report for public review and stakeholder comment in September 1995 (LMES 1995a).

Two final public meetings were held on September 26, 1995, at which the decision-making role of the Common Ground process was clarified. Land use options for the ORR are addressed under Common Ground in terms of overall uses and large units or elements. However, the NEPA process is relied upon for the detailed review of any land use proposal. Both processes (Common Ground and NEPA) interface, both include public and stakeholder input, and both share information regarding stakeholder views. However, neither process is dependent upon the other for land use decision-making or closure.

2.0 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1 PROPOSED ACTION

2.1.1 Project Location

Parcel ED-1, depicted in Fig. 2-1, is proposed by ETEC to be developed as an industrial park. It would complement other industrial parks in the Oak Ridge area, which include Commerce Park, Bethel Valley Park, Eagle Bend Park, and Clinch River Park. The parcel was selected for lease after a review of present and future programmatic needs for various land areas of the ORR (see Sect. 1.2). In addition, its physical features and proximity to public services and utility infrastructure are extremely favorable for industrial development.

2.1.2 Lease

The lease was signed on January 16, 1996 for an initial 10-year period. Renewal of the lease is being considered for additional periods that will be negotiated by DOE and ETEC. The lease is not effective until all NEPA and other statutory and regulatory requirements have been completed or met. Development of the parcel would begin with installation of utilities and construction/upgrade of roads and bridges, if necessary. A rail spur at the nearby K-25 Site may be needed in the long term should heavy industry so require.

2.1.3 Industrial Development

Specific industries to be located at Parcel ED-1 will not be known until the infrastructure is developed and ETEC negotiates subleases. Nevertheless, ETEC has indicated that its goal is to make the new industrial park a showcase facility for East Tennessee (J. Campbell, ETEC, personal communication with A. Campbell, DOE-ORO, Environmental Protection Division, July 18, 1995). Development is intended to demonstrate that a partnership between DOE and the private sector can be compatible with long-term DOE reservation-management goals. Environmental and socioeconomic factors will be considered in development plans, and buffer zones will be designated to protect sensitive ecological resources, such as wildlife, floodplain, wetlands, streams, and unique plant and animal communities.

Industrial use will be required to conform to the city of Oak Ridge Zoning Ordinance (Chapter 7, Sect. 6-713 IND-2. Industrial Districts) (Appendix C). ETEC has indicated that certain uses permitted by the ordinance would definitely not be allowed on Parcel ED-1: an airport, wholesaling facilities, bulk oil and similar storage facilities, and utility uses. Typical industries that ETEC would market for inclusion in the Parcel ED-1 industrial park include, but are not limited to, ceramics and auto parts manufacturers, computer and electronic components manufacturers, copying services, and commercial offices. Although ETEC currently has no plans for locating waste management facilities on Parcel ED-1, facilities of that type were considered in this EA to provide analytical

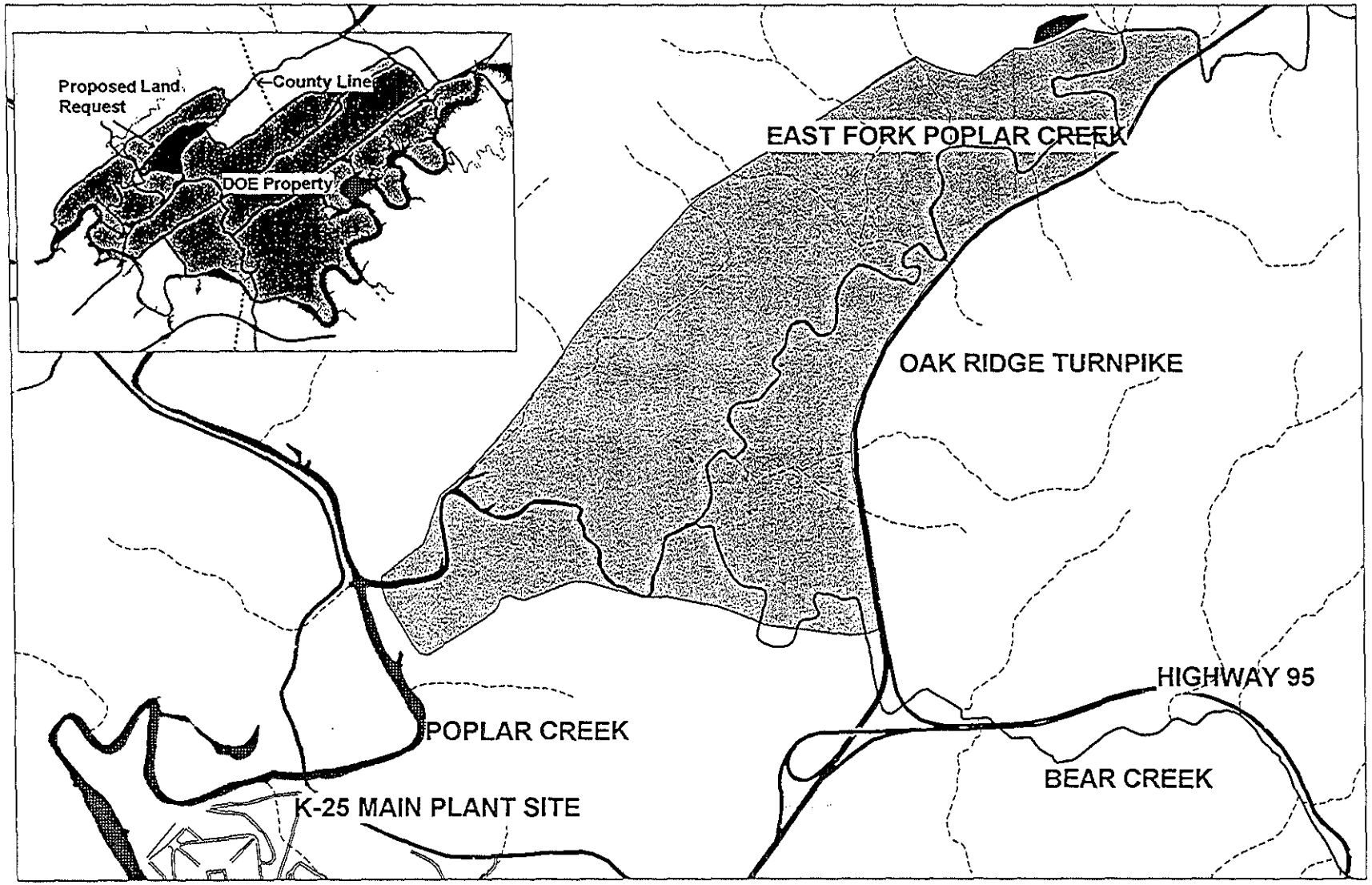


Fig. 2-1. Parcel ED-1 of the Oak Ridge Reservation.

boundaries. If ETEC decides to sublease to a waste management company, DOE will require that an additional environmental review be conducted at the expense of ETEC or the sublessee. In the absence of detailed information about site development, certain assumptions were made to enable DOE to qualitatively assess the potential impacts of the lease. These assumptions are itemized in Sect. 1.3.

Various facilities in the Oak Ridge area were visited during preparation of this EA to obtain information on emissions, effluents, and wastes that candidate facilities generate; their required permits and licenses; and environmental concerns or issues that have arisen. Table 2-1 summarizes the findings from these visits.

2.2 NO ACTION

If no action is taken, Parcel ED-1 would be retained as DOE-ORR property and would continue in its current use (wildlife management, silviculture, ecosystem research, and environmental monitoring) until a decision is made on another use. If DOE does not take action, jobs lost by downsizing and strategic realignment would not be replaceable in the near term. The goal of providing opportunities for economic development of communities adversely affected by the reconfiguration of DOE would not be met.

2.3 LEASE OF OTHER ORR LAND

The DOE Real Estate Office has reviewed ORR lands for feasibility of leasing other parcels in lieu of the proposed parcel. Interior tracts were not considered in order to preserve the interior of the ORR for future programmatic use. The only other tract of land of sufficient size on the perimeter of the reservation is not suitable for development due to its steep topography. Scattered parcels of land across the reservation were not considered because none would be large enough to support development of an industrial park. In effect, no other available parcels met the requirements for an industrial park. Thus, the alternative of leasing a different parcel to ETEC is not a reasonably foreseeable alternative that would meet the present need for and purpose of DOE action.

2.4 DISPOSAL OF PARCEL ED-1

DOE has reviewed the option of disposing of the land to be leased. This land comprises a portion of the self-sufficiency parcels approved for direct conveyance to the city of Oak Ridge (see Sect. 1.2 and Fig. 1-3); however, disposal by sale or transfer would merely generate a one-time payment to the Treasury and would not fulfill the legislative intent of Public Law 103-160 (Hall Amendment, Sect. 3124), which is to provide additional authority to the Secretary of Energy to utilize property under the control of DOE and not needed in order to further the goal of economic development. A long-term lease is the most effective mechanism to promote the kind of investment necessary to fulfill this legislative purpose and the Secretary of Energy's commitment to stimulate economic development and provide employment for displaced workers over the long term.

Table 2-1. Characteristics of typical industries that may locate in Parcel ED-1 Industrial Park

Industry	Emissions	Effluents	Wastes	Other
Ceramic parts	NO_x, SO_2, CO, volatile organics from natural gas combustion/state permit.	Wastewater to city sewer in accordance with state NPDES permit (city's).	Waste oil is burned. Industrial oil is collected for disposal. Non-recyclables landfilled.	Stormwater runoff directed to sump per state permit. No PCBs generated. Degreasers are inorganics; no hazardous organics.
Vacuum equipment	None.	None.	Sanitary only to sewer.	Stormwater runoff to sump. Meet park requirements.
Computer components	None.	None.	Recycle 85 tons of cardboard and styrofoam annually. Small quantity (state permit) hazardous wastes to off-site disposal.	None.
Waste and metal treating and recycling facility[a]	Radionuclides/state permit.	Sanitary waste to city plant, then to Grassy Creek under NPDES permit. Liquid wastes recycled.	Sanitary sludge to city municipal plant to landfarming application. Treated radioactive waste to commercial disposal. No RCRA-hazardous or mixed waste.	Stormwater to basin, then to Grassy Creek under NPDES permit. Comprehensive monitoring program for air, water, and soil.

Source: Personal communication from Chris Nelson (Coors Technical Ceramic Co.), George Solomon (Vacuum Technologies), Bob Cooney (ELO Touch Systems), and Les Cole (Scientific Ecology Group) to Helen Braunstein, ORNL, August 1995.

[a]ETEC currently has no plans for locating a waste management facility on Parcel ED-1. If plans should change, no action would be taken prior to conducting an environmental review and preparing environmental documentation.

3.0 AFFECTED ENVIRONMENT

3.1 LAND USE

Oak Ridge lies in the East Tennessee Valley between the Cumberland Mountains and the southern Appalachians. Covering 233 km² (90 square miles), the city spans the border of Anderson and Roane counties. The cities of Atlanta, Nashville, Chattanooga, Louisville, Lexington, and Asheville are within 321 km (200 miles) by Interstate highways 40, 75, and 81 (see Fig. 1-1). Knoxville, Tennessee's third largest city, is 27 km (17 miles) to the southeast.

The ORR lies within the physiographical region known as the Valley and Ridge province, sometimes referred to as the Valley of East Tennessee for the portion lying in Tennessee. This province is characterized by numerous elongated ridges and intervening valleys. The configuration of the area's terrain was a primary factor in the selection of Oak Ridge as the site for the top-secret Manhattan Project because it enhanced security geographically. Located 113 km (70 miles) southeast of Oak Ridge is the Great Smoky Mountains National Park.

Knox County has the highest percentage of urban developed land, while Morgan County has the least. Within the incorporated areas of Knoxville, Clinton, Norris, Lenoir City, and Lake City, the predominant land use is residential; however, residential land use comprises less than 10% of the land in Oak Ridge and is located primarily in the northeast section of the city (Fig. 3-1).

The total incorporated area of Oak Ridge is 23,296 ha (57,541 acres) (personal communication from Karen Gentry, City of Oak Ridge Planning Office, to H. M. Braunstein, ORNL, February 6, 1996). Over 60% of the land area in Oak Ridge is designated for forestry, agriculture, industry, and research. This percentage is due primarily to the large amount of land [13,970 ha (34,516 acres)] within the incorporated city area that is owned by the DOE (Fig. 3-1). In addition, The University of Tennessee (UT) and the Tennessee Valley Authority (TVA) own 1890 ha (4645 acres) within the incorporated area of Oak Ridge. The University owns 911 ha (2250 acres) in Oak Ridge; 101 ha (250 acres) are used as an arboretum and the other 810 ha (2000 acres) for a forestry experiment station. TVA owns 969 ha (2395 acres) in Oak Ridge; 544 ha (1344 acres) are designated as industrial, whereas 425 ha (1051) are used for recreational purposes (DOE 1994a).

Land use on the ORR is varied. The three most developed areas are industrial facilities at the Y-12 Plant site, research and waste management facilities at the K-25 Site, and research facilities at the ORNL (see Fig. 1-2). Several areas on the ORR are presently used for environmental research projects; others are protected as conservation sites. Waste storage and disposal facilities are present throughout the ORR. The ORR is also operated as a Wildlife Management Area through a DOE/TWRA Cooperative Agreement (Fig. 3-2).

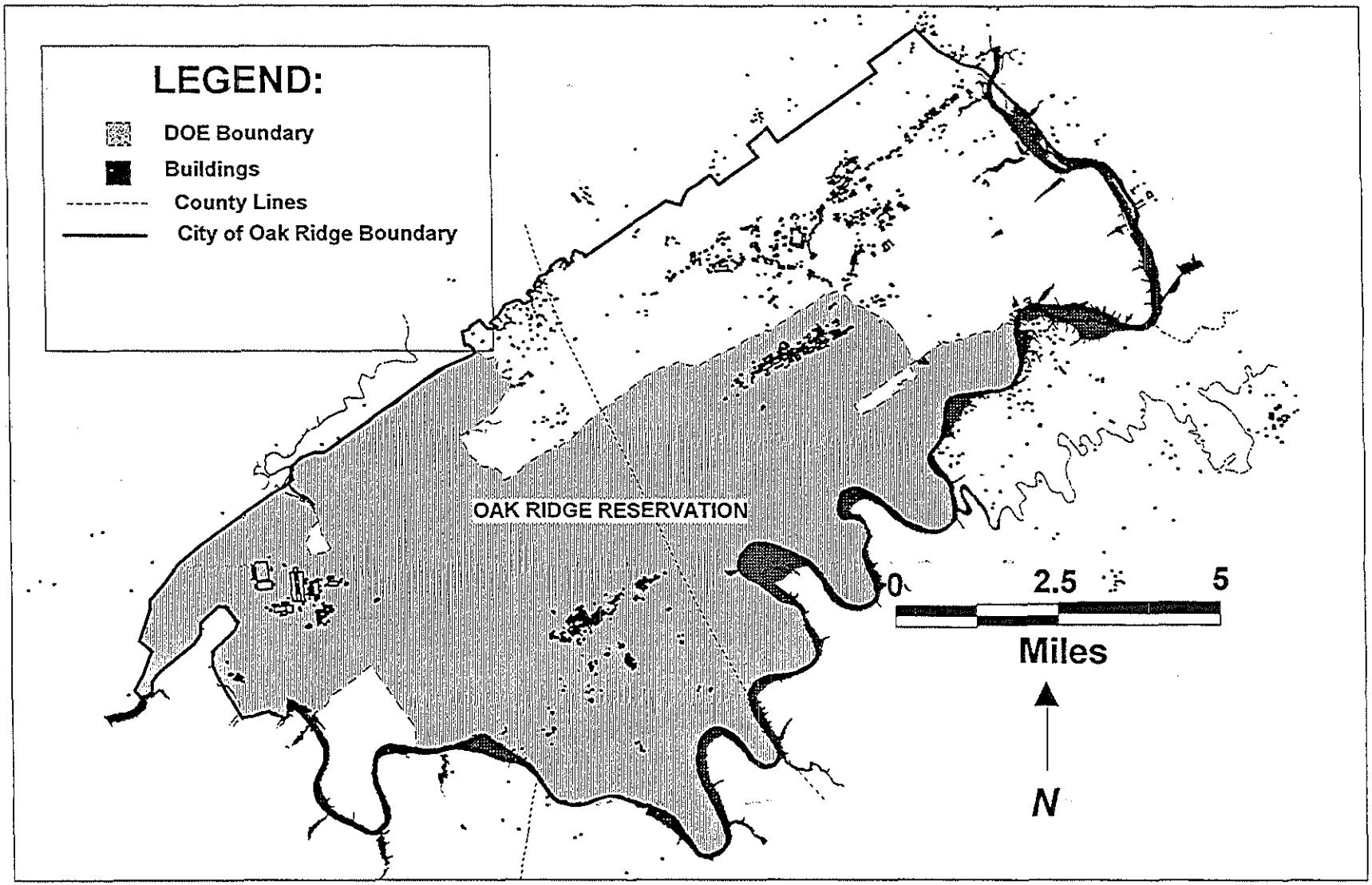


Fig. 3-1. City of Oak Ridge, which includes the Oak Ridge Reservation.

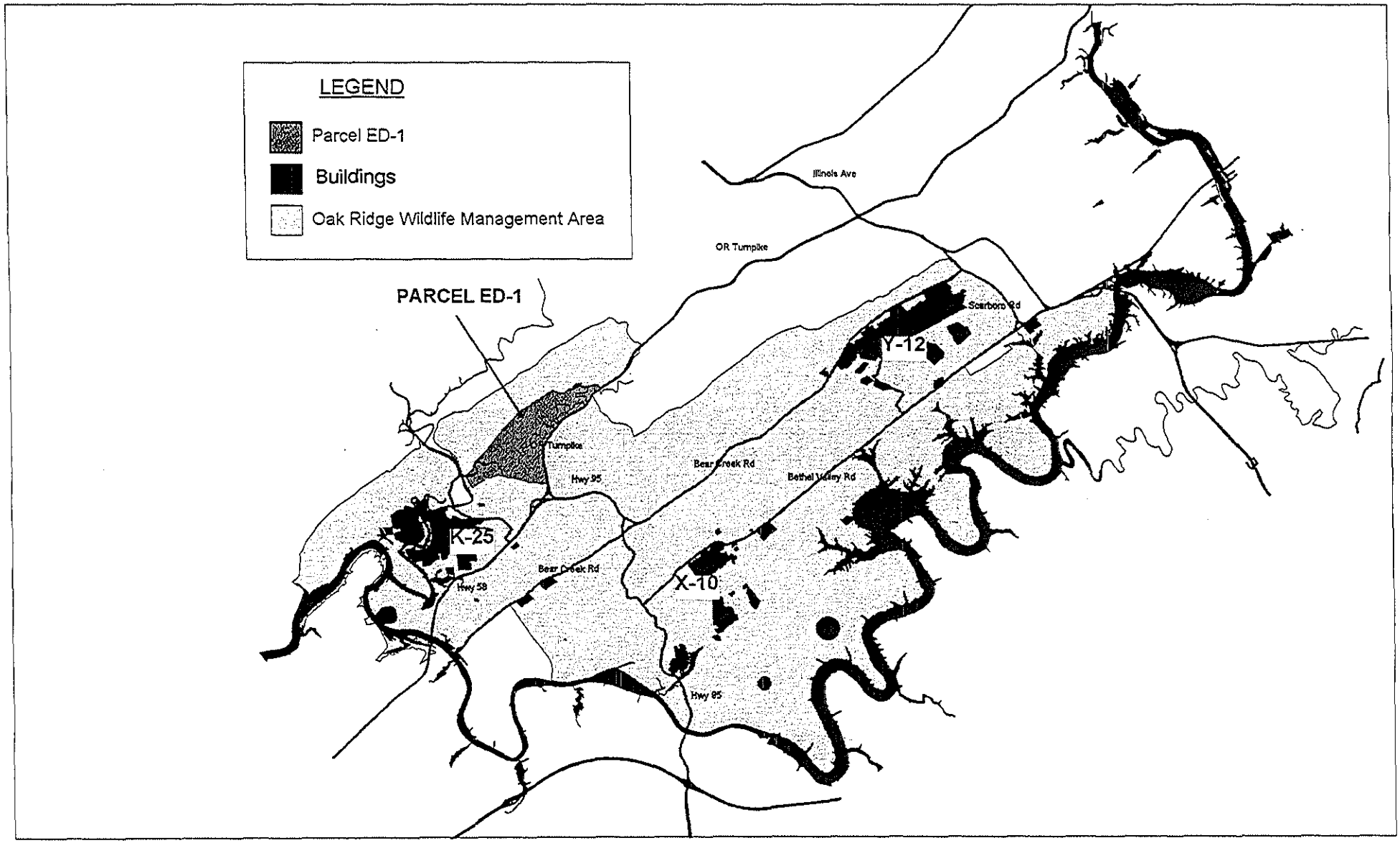


Fig. 3-2. Oak Ridge Wildlife Management Area including Parcel ED-1 of the Oak Ridge Reservation.

Nearly all of Parcel ED-1 was used for agriculture prior to abandonment in the early 1940s. Other small areas that were too steep, too rocky, or with too many surface stones present were probably in pasture or pastured woodlots and not plowed. Parcel ED-1 also contains one undocumented cemetery and several soil pits from which soil samples were collected and analyzed for the ORR Background Soils Characterization Project. There is also one small area that contains gun emplacement pits and foxholes.

Some land areas of Parcel ED-1 are suitable for waste disposal by a septic tank system; but large areas are not usable or are only marginally usable due to wetness, slow permeability, depth to rock, the presence of karst features, or flood/water ponding hazards. To achieve maximum development, connections to public or K-25 Site sewer and water systems would be necessary.

3.2 GEOLOGY

Parcel ED-1 is located in the western part of the southern Appalachian Ridge and Valley Physiographic Province within East Fork Valley, which is bounded to the northwest by Black Oak Ridge and to the southwest by McKinney Ridge (see Fig. 1-4). The ridges are formed by dolomites of the Upper Cambrian to Lower Ordovician Knox Group, whereas limestones of the Middle Ordovician Chickamauga Supergroup underlie East Fork Valley. The sedimentary rock sequence was folded and faulted during the late Paleozoic (270 million years ago) mountain-building event known as the Alleghenian orogeny (Hatcher 1987). The following sections provide a brief description of the geology of the site, which includes stratigraphy, structure, seismicity, soils, and groundwater hydrology.

3.2.1 Stratigraphy

Bedrock is exposed at the surface in many areas of Parcel ED-1 (Fig. 3-3). It consists of the entire Middle and Upper Ordovician carbonate sequence known as the Chickamauga Supergroup (Fig. 3-4). The sequence is approximately 575 m thick. Middle Tennessee stratigraphic characteristics and marker beds were used to divide the sequence into formations of the Stones River and Nashville Groups. Lithofacies analysis indicates that the carbonate sequence represents a tidal flat and subtidal-lagoonal environment on a gently sloping platform (Ghazizideh 1987). The contact between the Chickamauga Group and the Knox Group occurs along the northern boundary of the site. Though not exposed within the limits of the site, the Lowermost Knox Group formation, the Mascot Dolomite, dips beneath the site. This unit is important in that it is commonly cavernous (i.e., has large solution cavities). The Lower Ordovician Mascot Dolomite consists mostly of the same kinds of dolomite that occur in the other formations within the Knox Supergroup, with greater amounts of mottled pale-pink to grayish-pink and greenish-gray dolomite in the upper part. The Mascot has the greatest variability in thickness of any in the Knox because of the erosion on the Middle Ordovician unconformity. Thickness of the Mascot ranges from approximately 80 to 165 m (250 to 500 ft) on the ORR, indicating that the relief on the unconformity surface is a minimum of 70 m. Further description of stratigraphic units is given in Appendix D.

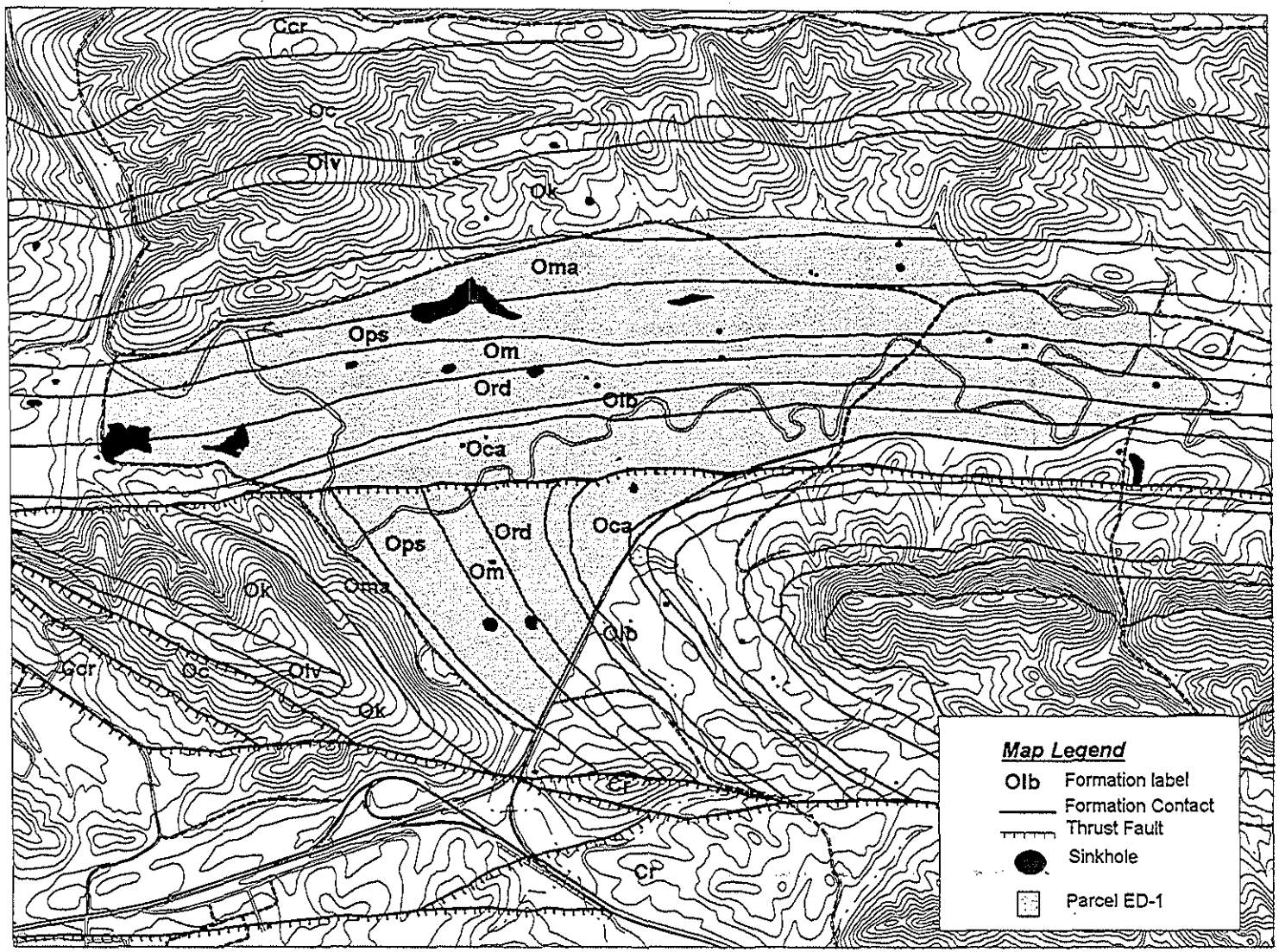


Fig. 3-3. Surface stratigraphy of Parcel ED-1 of the Oak Ridge Reservation. (Stratigraphic symbols are identified in Fig. 3-4.)

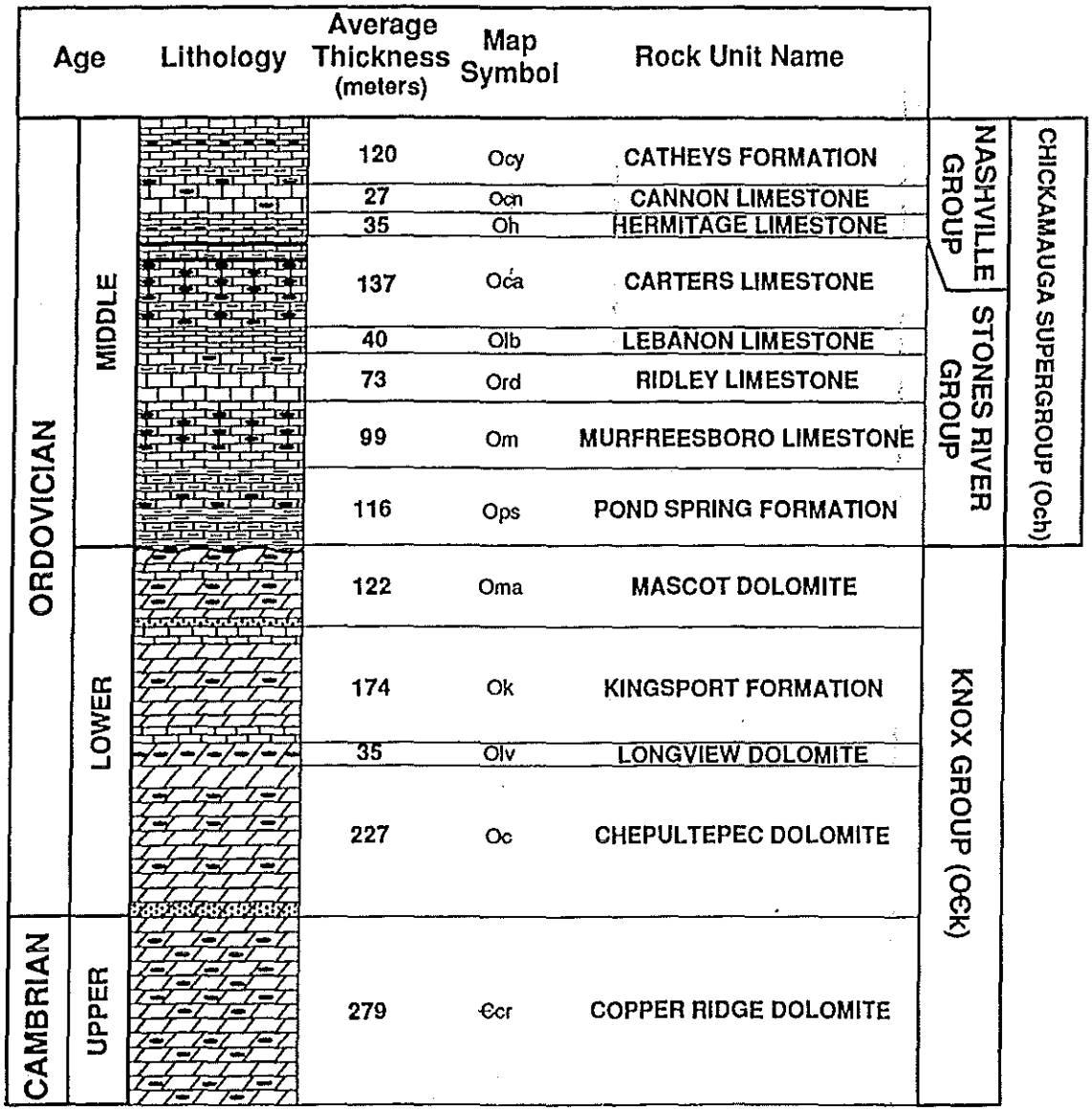


Fig. 3-4. Regional stratigraphy in the Oak Ridge, Tennessee, area.

3.2.2 Structure

Faults

Parcel ED-1 lies within the trailing edge of the Kingston thrust sheet. A single fault transects the site, which has been called the K-25 Fault. Although unexposed, the fault is a thrust fault that strikes northeast and dips to the southeast. The main evidence for the existence of the fault is that rocks on the northwest side of the fault strike and dip N50E/35SE parallel to the fault, and rocks on the southeast side of the fault are rotated to the northwest as part of the hinge zone of the East Fork Ridge syncline and are truncated against the fault. The extension of the fault to the southwest is supported by the truncated location of the Knox Group on the northwest side of McKinney Ridge. The extension of the fault to the northeast is less certain; however, it is interpreted to lose displacement and terminate within the site. By analogy to better exposed areas, other smaller-scale faults that are related to the larger-scale fault and fold probably occur across the site.

Fractures

The fracture system on the ORR consists of regional fracture sets and local fracture sets related to folding and faulting. Fracture strikes parallel and perpendicular to bedrock strike represent two major fracture sets in the area. In the Kingston thrust sheet and East Fork Valley syncline, the two dominant fracture sets have a mean strike and dip of N65E/53NW and N30W/89NE (Hatcher et al. 1992). The regional fracture sets consist primarily of extension fractures. The fractures are commonly oriented perpendicular to bedding and, although they may continue through a number of carbonate beds, they terminate at bed contacts where there is a distinct change in sedimentologic characteristics (e.g., lithology and bed thickness). The fractures are commonly widely spaced individual breaks, but zones of closely spaced fractures also occur. Many of the fractures are now open, but the presence of numerous calcite-filled fractures suggests that all were previously sealed and may be commonly sealed at depth. Calcite-filled fractures have apertures ranging from hairline to as much as 2 cm. Weathering of the calcite filling and surrounding rock has greatly enlarged the aperture in open fractures.

Overprinting the regional fracture sets are arrays of shear fractures. Shear fractures differ from the regional extension fracture sets because displacement is primarily parallel to the walls of the fracture. Shear zones range from single, discrete fractures to wide zones consisting of conjugate arrays of echelon tension gashes. The zones are commonly perpendicular to bedding. Shear zones indicative of both left-lateral and right-lateral strike slip displacement have been observed based on mineral filling geometries and offset chert markers.

3.2.3 Seismicity

Mapped faults in and around Parcel ED-1 are thrust faults that formed during the late Paleozoic (270 million years ago) mountain-building event known as the Alleghenian orogeny (Hatcher 1987). These faults are known to be inactive today because of the

absence of (1) seismicity, (2) offset landforms, and (3) topographic fault scarps. Furthermore, the present-day stress field in the area is improperly oriented to reactivate movement along these pre-existing faults. In East Tennessee, however, nearly half of the seismic events originate within 25 km of Knoxville (Bollinger et al 1991). For example, the largest known earthquake of the region occurred in 1973 with a magnitude of 4.6 in Alcoa-Maryville. From various investigations, a reasonably constrained seismotectonic model for eastern Tennessee and North Carolina has emerged (Bollinger et al. 1991). Active faulting is occurring on steeply dipping fault planes, the majority of which are located beneath the master Appalachian decollement. Focal mechanisms of the region's larger events are similar, indicating right-lateral strike slip faulting on north-south nodal planes or left-lateral slip on east-west planes. Johnston et al. (1985) have argued that a spatial control of eastern Tennessee seismicity is exerted by major structural features in the basement crust at depths ranging from 7 to 25 km beneath the Appalachian decollement. For example, between 80 and 90% of the seismicity in Tennessee and North Carolina lies between deep-seated linear structures identified by their magnetic field signature.

3.2.4 Soils

The following discussion describes soils on a section of the ORR bounded on the west by McKinney Ridge, on the north by Black Oak Ridge, and on the south by East Fork Ridge and the Oak Ridge Turnpike interchange with Route 95 (see Fig. 1-4). This area is mostly underlain by the Chickamauga Group (Fig. 3-5), composed mainly of limestone and thin shale beds plus some low chert ridges. On the north side of the tract, the lower slopes of Black Oak Ridge are underlain by the Mascot and Kingsport Formations of the Knox Group (Figs. 3-4 and 3-5). These lower side slopes have considerable karst features including dolines (sinkholes). Fig. 3-6 shows the extent of soils that are shallow to rock (less than 20 inches) on Parcel ED-1. In addition, these shallow to rock soils commonly have few to many outcrops of limestone. The EFPC floodplain and terraces plus tributaries, including BC, transect this tract of land as shown in Fig. 3-7, while Fig. 3-8 shows the extent of wet soils, some of which qualify as wetlands soils. Most of these wet soils occur in the floodplain where there is a frequent flood hazard, but some are in the bottoms of large flat-bottomed dolines and are subject to periods of extended ponding.

3.2.4.1 Residual Soils

The following is a general discussion of soils on Parcel ED-1. Not all of these soils have established soil series names, but more detailed information can be found in Hatcher et al. (1992). Soil series are designated by the first three digits of a five-digit number, the first of which codes for the underlying geologic formation, the second for residuum, colluvium, or alluvium, and the third for each individual soil. The soil survey of the ORR endeavored to associate the residual soils with the underlying geologic formation where it was possible to do so. The only area where this was not possible was in the section of the Chickamauga Group that underlies Parcel ED-1.

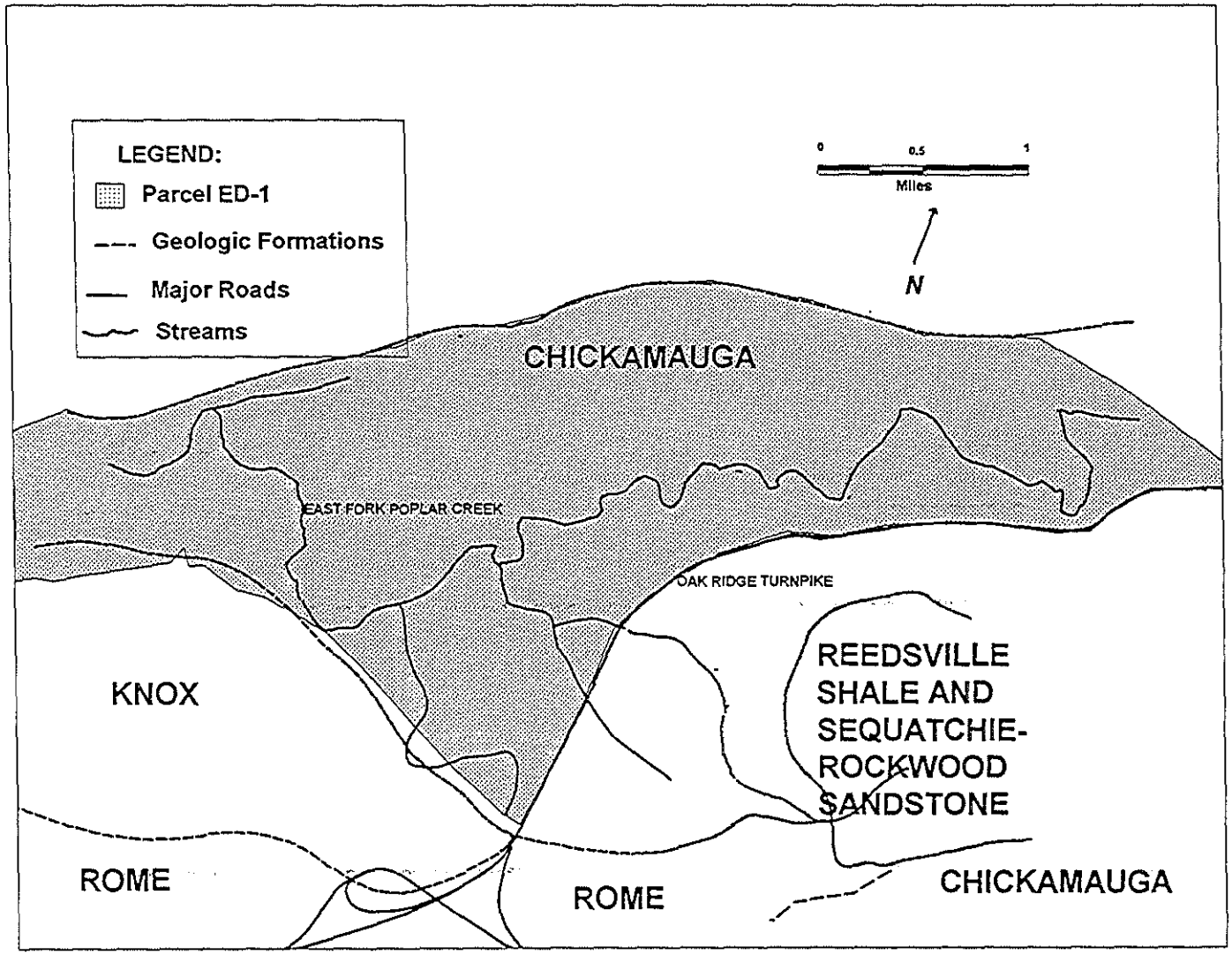


Fig. 3-5. Geologic formations underlying the Parcel ED-1 area.

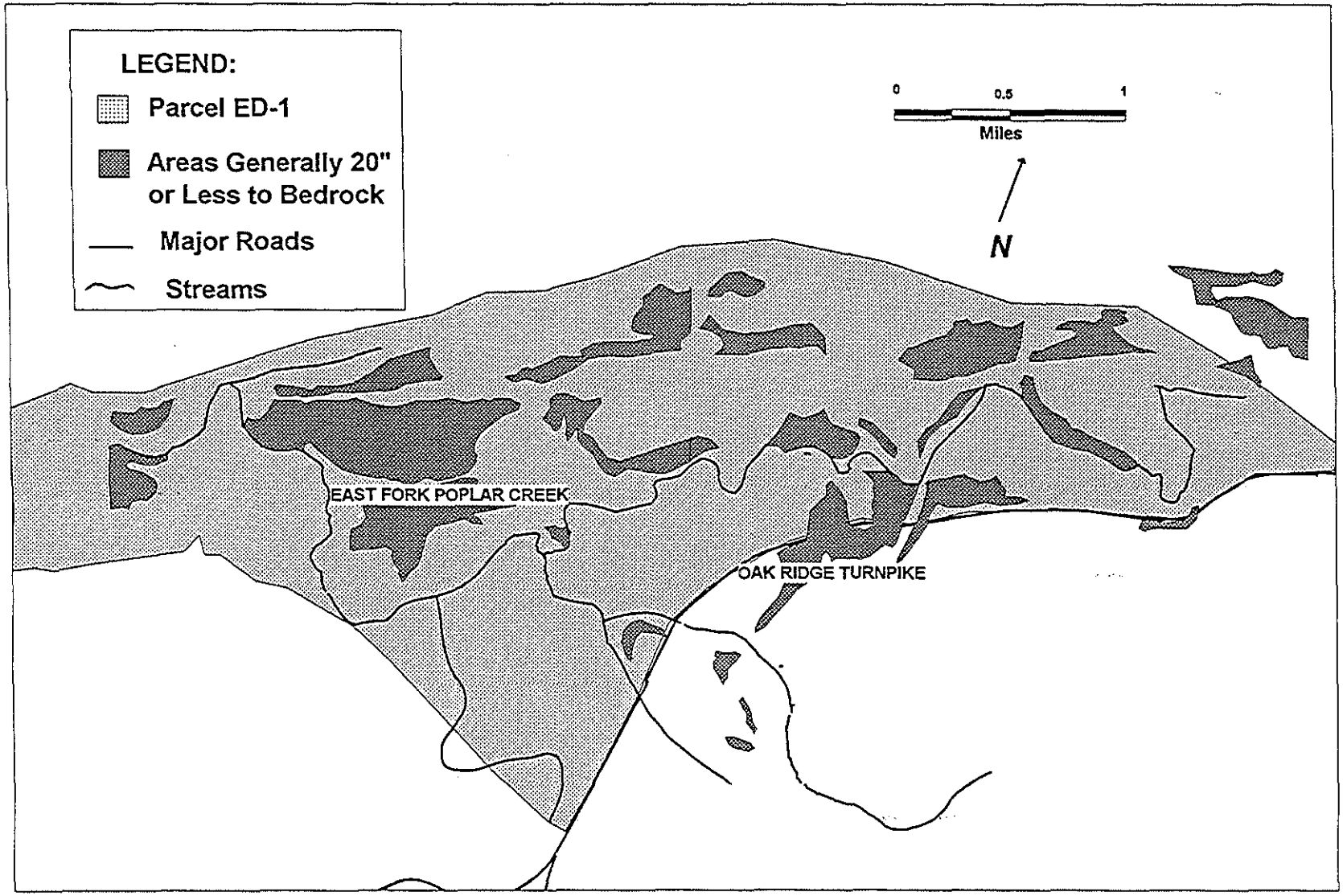


Fig. 3-6. Soil areas generally 20 inches or less to bedrock on Parcel ED-1 of the Oak Ridge Reservation.

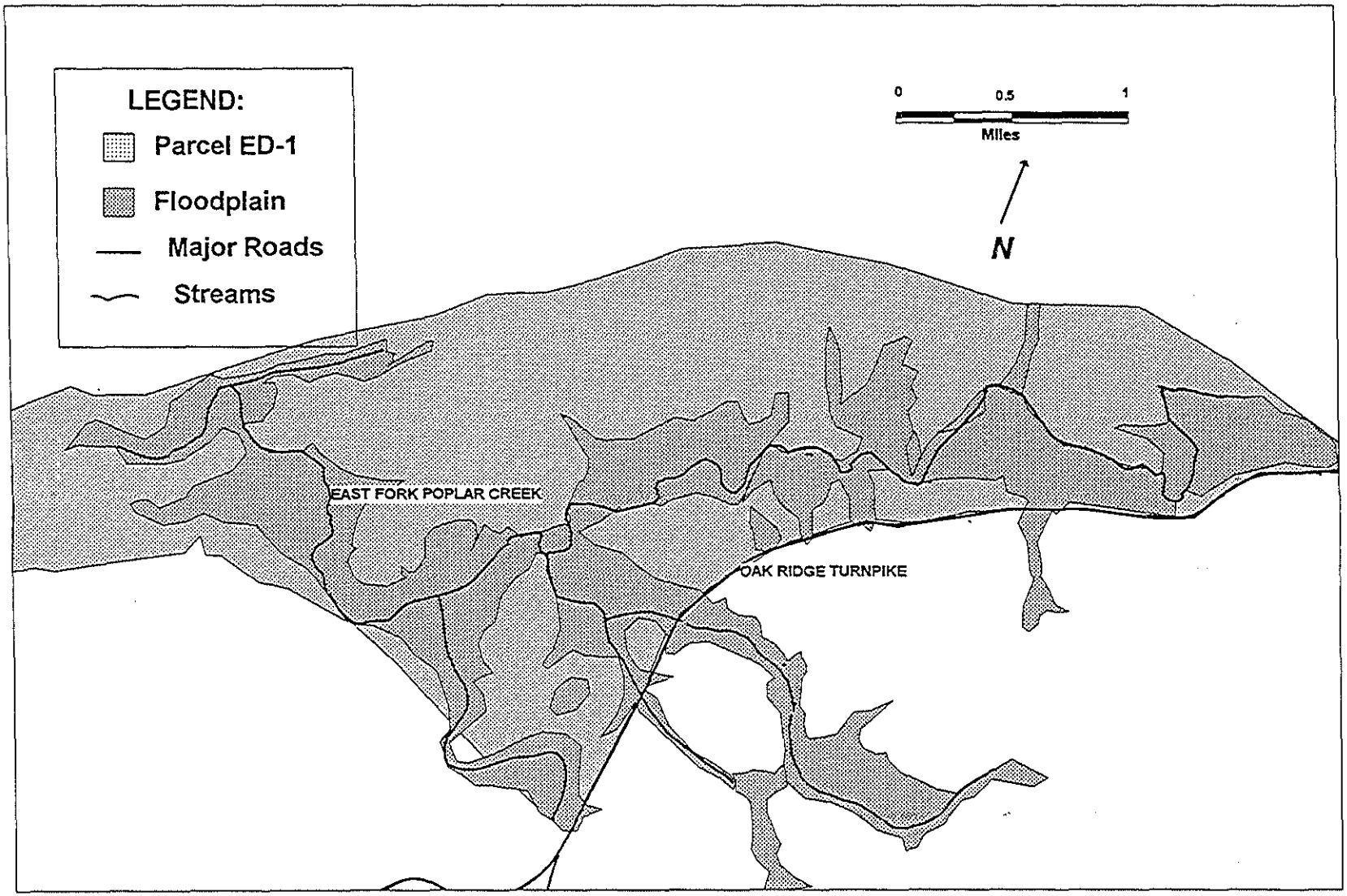


Fig. 3-7. Floodplains and terraces on Parcel ED-1 of the Oak Ridge Reservation.

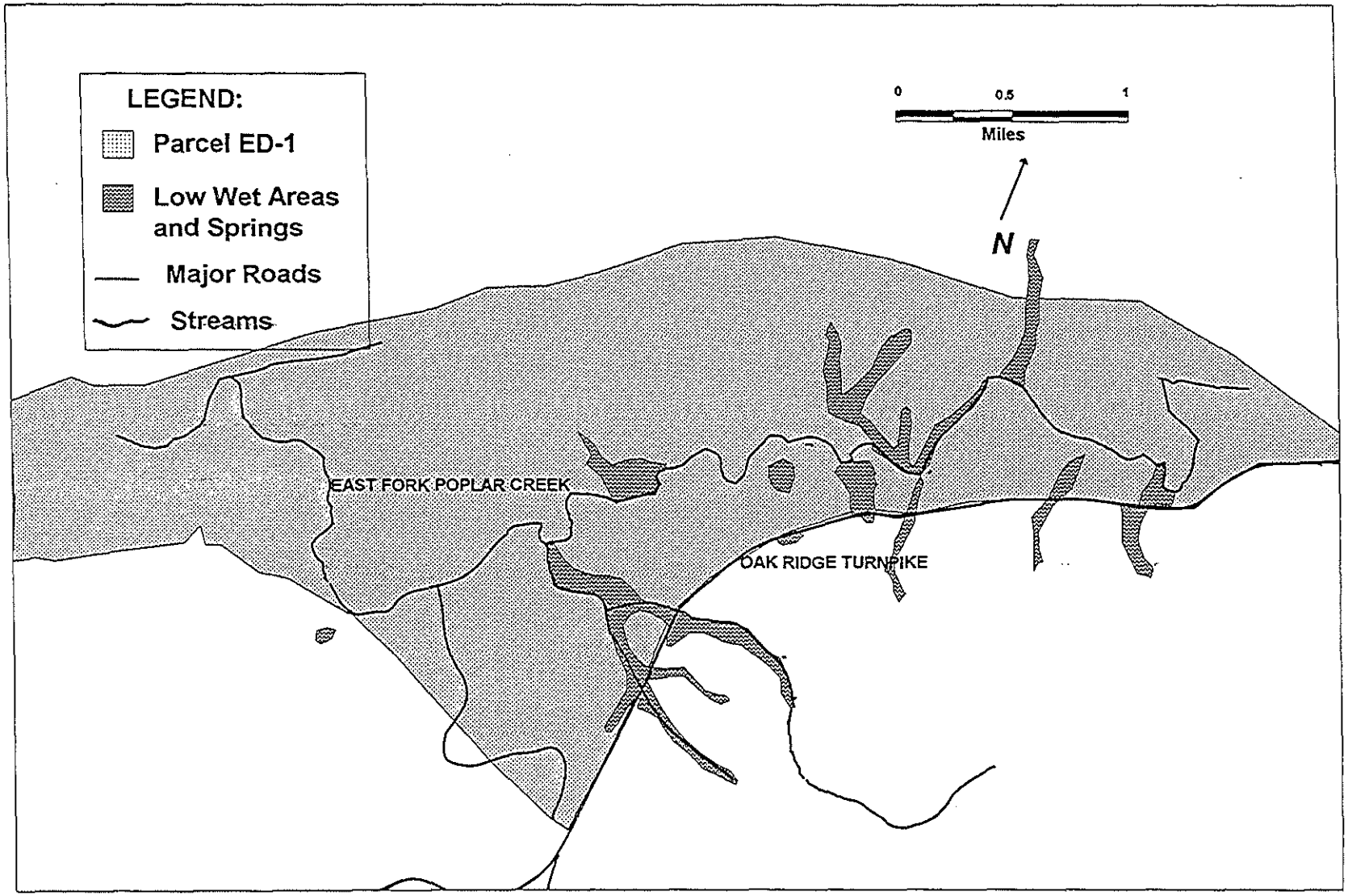


Fig. 3-8. Low wet areas and springs on Parcel ED-1 of the Oak Ridge Reservation.

Knox Group

Kingsport Soil Series 406 contains karst (an irregular limestone region with caverns and sinks under streams) features. These soils tend to be deeply weathered, but soil depth is highly variable and cannot be predicted. **Kingsport Soil Series 407** contains karst features and rock outcrops. **Mascot Soil Series 404** contains karst features. Rock ledges and pinnacles come close to the surface, but there are very few outcrops. **Mascot Soil Series 405** contains karst features and rock outcrops.

These soils have cherty surface layers and red-to-yellowish red clay subsoils with variable chert content. Most of these soil areas were not in planted pines but instead in old-field successional forest of mixed pines and hardwoods. The presence of red cedar that extends into the canopy is a good indicator of places that are shallow to rock.

Chickamauga Group

Soil Series 502 and 508 are not directly related to any particular geologic formations but represent shallow, generally less than 20 inches, to rock soils. The soils have sticky, plastic subsoils that range in color from yellowish brown to yellowish red.

Soil Series 603, 604, and 608 represent soils that are deeper to rock, usually more than 40 inches. Soils identified as **603** are deep to rock and mostly well drained. These soils have a red or reddish-yellow plastic clay subsoil. Soils identified as **604** are above chert beds. These soils have a very high chert content. Soils identified as **608** are less well drained and have mottled yellowish brown to yellowish-red clay subsoils that are very sticky and plastic. These **608** soils have only minor extent.

3.2.4.2 Alluvial Soils

Four terrace levels, including the present floodplain of EFPC, exist on Parcel ED-1. The highest terrace is identified by the **993** soil series. These soils are well drained and have a reddish-yellow to yellowish-red or strong brown clay loam or silty clay loam, clay-enriched subsoil. These soils were all extensively farmed and highly eroded before abandonment. Most areas were subsequently planted to pines. The **999** soil series represents soils on the next lower terrace. These soils have a strong brown to yellowish-brown loam to clay loam, clay-enriched subsoil. The next lower terrace is identified by the **986** soil series. These soils are still subject to occasional flooding but are otherwise well drained. Streams that flow through areas of these soils are entrenched. The lowest floodplain soil is identified by the **984** soil series. These soils are poorly drained. Soil **998**, of minor extent on this tract, is correlated with the **993** soils but is a Clinch River terrace soil.

Higher terrace soils occur on Black Oak Ridge, including large areas along the crest of this ridge. These soils are identified by the **990** and **994** soil series.

Tributaries to EFPC may have the same soils described above as well as additional soils, depending on the source of the alluvial sediments. These tributary drainageway soils are identified as **983** and **980** soil series.

3.2.4.3 Colluvial Soils

Colluvial soils also occur, but they are of minor extent on this tract. Knox colluvial soils are identified by the **430, 431, 432** and **436** soil series whereas Chickamauga colluvial soils are identified by the **540** soil series.

3.2.4.4 Prime Farmland

Prime farmland is land with the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops and available for these uses. Most of the land on Parcel ED-1 has been in forest, but current land use does not affect the designation except that water, urban land, or other built-up land areas are excluded. However, because the pines have been removed from much of the area, the land could be made available for agricultural crop production again. Prime farmland is protected by the Farmland Protection Policy Act (FPPA) which seeks ". . . to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmlands to nonagricultural uses . . . ." [7 USC 4201(b)]. Some of the soils on Parcel ED-1 (Fig. 3-9) are prime farmland, including the Greendale silt loam, Pope very fine sandy loam, Apison very fine sandy loam, and Leadvale very fine sandy loam soils. However, because these soils are present on land that is within the city of Oak Ridge, this designation is waived and other uses are permitted (Alan Neal, NRCS, Anderson County, personal communication with Tom Zondlo, ORNL, Aug. 9, 1995).

3.3 CLIMATE AND AIR QUALITY

3.3.1 Climate

The Oak Ridge area has a temperate continental climate. The Cumberland Mountains to the northwest shield the region from cold air masses that frequently penetrate south during winter months. During the summer, tropical air masses from the south provide warm, humid conditions that often produce thunderstorms; however, anticyclonic circulation around high-pressure systems centered in the western Gulf of Mexico can bring dry air from the southwestern United States into the region, leading to occasional periods of drought.

The mean annual temperature for the Oak Ridge area is 14.4°C (58°F) (DOE 1994a). The coldest month is usually January, with temperatures averaging about 3.3°C (38°F) but occasionally dropping as low as -31°C (-24°F) (DOE 1994a). July is typically the hottest month of the year, with temperatures averaging 25°C (77°F) but occasionally peaking at over 37.8°C (100°F). In the course of a year, the difference between maximum and minimum daily temperatures averages 12°C (22°F).

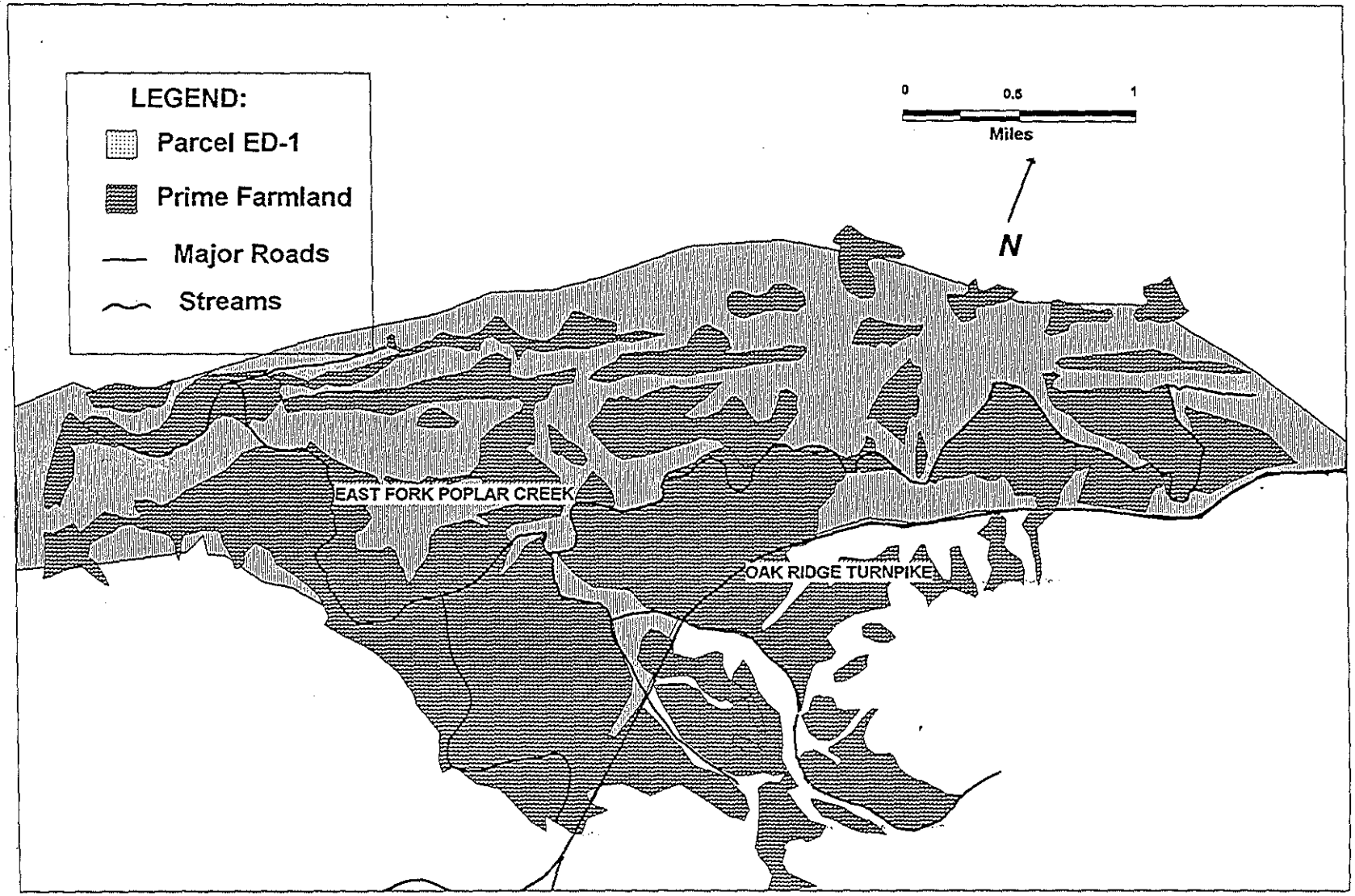


Fig. 3-9. Areas considered to be prime farmland on Parcel ED-1 of the Oak Ridge Reservation.

Winds in the Oak Ridge area are affected by valley-and-ridge topography. Prevailing winds are either southwesterly during the day or northeasterly nighttime winds. Wind speeds average less than 11.9 km/hour (7.4 mph) 75% of the time; tornadoes and winds exceeding 30 km/hour (18.5 mph) are rare (DOE 1994a).

Air stagnation is relatively common in eastern Tennessee. An average of about two multiday air stagnation episodes occur annually in eastern Tennessee, covering an average of 8 days per year. August, September, and October are the most likely months for air stagnation episodes.

3.3.2 Air Quality

The State of Tennessee has adopted the National Ambient Air Quality Standards (NAAQS). In addition to the standards for criteria pollutants, the Tennessee Department of Environment and Conservation (TDEC) has adopted regulations to provide guidance for evaluating hazardous air pollutants (HAPs) and air toxics that specify permissible short- and long-term concentrations of various contaminants. The TDEC list is the same as the 189 HAPs listed in Sect. 112(b) of the Clean Air Act Amendments (42 USC 7401-7626 [B]). Emission standards for these HAPs are established in the National Emission Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR 63). Oak Ridge is located in an Air Quality Control Region classified "attainment" status for the six NAAQS criteria pollutants (LMES 1995b).

The ORR is located in a Class II prevention-of-significant-deterioration (PSD) area, and any new sources of emissions must adhere to the increment standards for a Class II area. The nearest Class I PSD area is the Great Smoky Mountains National Park, approximately 56 km (35 mi) southeast of the ORR.

Oak Ridge and surrounding communities are monitored or sampled continuously by DOE's air monitoring network. Measurements of air concentrations of gross alpha, gross beta, fluorides, sulfur dioxides, total suspended particulates, and mercury indicate that ORR operations do not measurably impact regional air quality (LMES 1995b). In 1994, total suspended particulates at the K-25 Site, immediately adjacent to Parcel ED-1, did not exceed 46% of the annual allowable standard (75 $\mu g/m^3/yr$). More importantly, ambient inhalable particulates (PM-10) were less than 50% of the annual standard of 50 $\mu g/m^3/yr$ (LMES 1995b).

3.4 WATER RESOURCES

3.4.1 Surface Water

East Fork Poplar Creek (EFPC). EFPC is a moderately wide (approximately 10 to 20 m) (33 to 66 ft), fourth-order stream that bisects Parcel ED-1 (Fig. 3-10). EFPC is

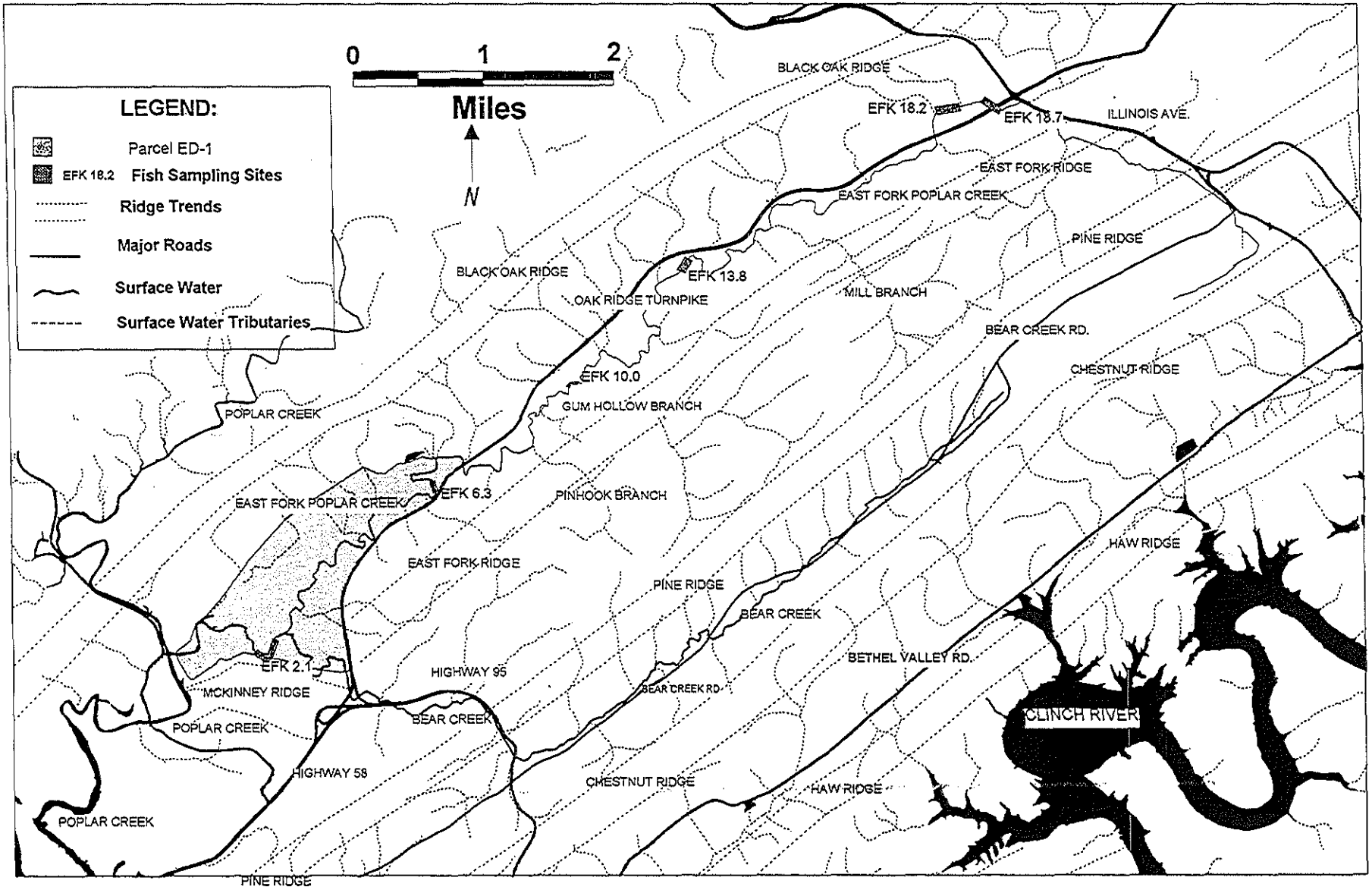


Fig. 3-10. Surface water features in the Oak Ridge area.

bordered by a riparian zone of mixed hardwoods and plantations of various tree species, dating from 1949 to 1977. In the last 50 years, the area has experienced no other development or agricultural land use. Approximately 7 km (4 miles) of EFPC are included on the parcel out of a total EFPC stream length of 26 km (16 miles).

EFPC originates within the Y-12 Plant, and upstream reaches have sustained considerable impacts and received substantial amounts of contamination in the more-than-50 years that the plant has operated. Primary contaminants include mercury and polychlorinated biphenyls (PCBs). Remedial actions planned for EFPC upstream of the parcel will focus on removal of contaminated floodplain sediments, and efforts at the Y-12 Plant to reduce contaminant emissions will continue as well. An additional remedial action planned for late 1995 to early 1996 will be flow augmentation of EFPC at the Y-12 Plant. The flow augmentation will double the base flow of EFPC from 1.5 to 3.0 m^3/s (3.5 mgd to 7.0 mgd). Previous remedial actions have reduced the contaminant loading to EFPC and led to some downstream recovery of aquatic communities (Hinzman 1993).

Bear Creek (BC). BC is a tributary to EFPC of 3 to 10 m (10 to 33 feet) width, which at its confluence to EFPC is a third-order stream. Within the parcel, BC is bordered by hardwoods, cleared pine plantations, and an access road. Of a total BC stream length of 12.5 km (7.75 miles), approximately 1.8 stream km (1 mile) of BC flow across the parcel. BC originates just west of the Y-12 Plant and has received a variety of contaminants, including nitrates, heavy metals, PCBs, radionuclides (predominantly uranium, technetium, and tritium), and organic compounds. Remedial actions at the headwaters of BC have so far focused on capping of waste disposal ponds or springs, although groundwater contamination in Bear Creek Valley and surface water contamination throughout Bear Creek remains an ongoing problem.

East Fork Tributaries and Smaller Creeks. There are seven tributaries to EFPC and a sinkhole stream within the parcel that are small, first- or second-order shallow and narrow streams [generally $<$ 1 m (3 ft) wide and 0.5 m (1.5 ft) deep] (see Fig. G-2). All seven streams enter EFPC within the parcel, and some lie almost totally within the area (see Fig. G-2). The three northern tributaries and the sinkhole tributary are typically seasonal, with subsurface flow and surface drying during periods of limited rainfall. The southern tributaries are spring fed and cease flowing only during the very driest conditions. As with EFPC, these streams are bordered by road surfaces, mixed hardwoods, and/or pine plantations. These streams are at most minimally contaminated or impacted by Y-12 Plant operations and other activities on the ORR (e.g. pine cutting), although several flow through sewage sludge application areas.

Stream Designations. Several streams in the parcel have been recognized as ecologically significant by ORNL and conservancy organizations. This recognition is based on the presence of rare or unusual species, the importance of activities conducted within the stream, or the uniqueness of community assemblages (see Tables G-1 and G-2). The Tennessee Water Quality Control Board has designated BC and EFPC in the area of Parcel ED-1 as suitable for growth and propagation of fish and aquatic life, for recreation

including fishing and swimming, for irrigation and livestock watering and for wildlife (TDEC 1994).

Local Hydrology. Parcel ED-1 is located in a flat, low-lying area and hence is prone to flooding from EFPC. The stage of the creek and its hydrograph (the stage measured over time) are functions of upstream flow and local inflows as runoff from the parcel. Although the upstream inflow is beyond the control of any activities in Parcel ED-1, the local runoff is very much a function of the amount and style of development of the site. The existing surface runoff and seepage flow (flow of water just under the ground surface) to the creek is moderated by the soils and vegetation on the site, which impose a time delay between a rainfall event and its appearance in the creek and promote infiltration to groundwater and transpiration by the vegetation. This rainfall-runoff relationship is highly dependent on the condition of the surface on which the rain falls. The volume of rainfall on a land area will be divided between surface water runoff, evaporation, infiltration, and transpiration. A forested or otherwise intensely vegetated surface will mitigate flooding by the following methods: (1) delaying the overland flow of runoff to surface water since flow over a vegetated surface is slow, (2) promoting infiltration since the delay provides a longer opportunity to infiltrate, and (3) removing water to the atmosphere by means of transpiration through the plants themselves. All of these processes contribute to suppressing the hydrograph of the creek, i.e., there is less water getting to the creek than fell on the land, and it is spread out over a longer period of time than the rainfall event. A suppressed hydrograph corresponds to the least amount of flooding.

Hydrologic behavior such as the relationship between rainfall events and the response of the stream hydrograph can be modeled, and can be useful in predicting flood events and environmental impacts of development. Relevant parameters are rainfall amounts and duration, creek and tributary stages and hydrographs, soil type and antecedent moisture conditions, an inventory of the type, condition, and distribution of vegetation and their rates of transpiration, and an assessment of groundwater infiltration processes, including permeability of soils and location of karst phenomena such as sinkholes and caves. Quantification of these natural hydrologic processes requires extensive field study, including measurements of a number of parameters over a variety of conditions, and is beyond the scope of this EA.

3.4.2 Groundwater

Parcel ED-1 is situated predominantly in a groundwater discharge regime along the axis of the East Fork Valley. Although no known wells are on the Parcel ED-1 site, the abundance of springs and seeps (Fig. 3-11) indicate points of intersection of the water table and suggests that groundwater occurs at shallow depths below much of the site. Depth to groundwater is expected to range from 4 to 6 m (15 to 20 ft) along the crests of the low-lying hills within the site area along EFPC.

Based on analogy to the K-25 Site, the water table is expected to fluctuate approximately 1.5 to 3 m (5 to 10 ft) along the hilltops but remain fairly constant along the major surface water drainages. The water-table elevation is expected to be greatest during

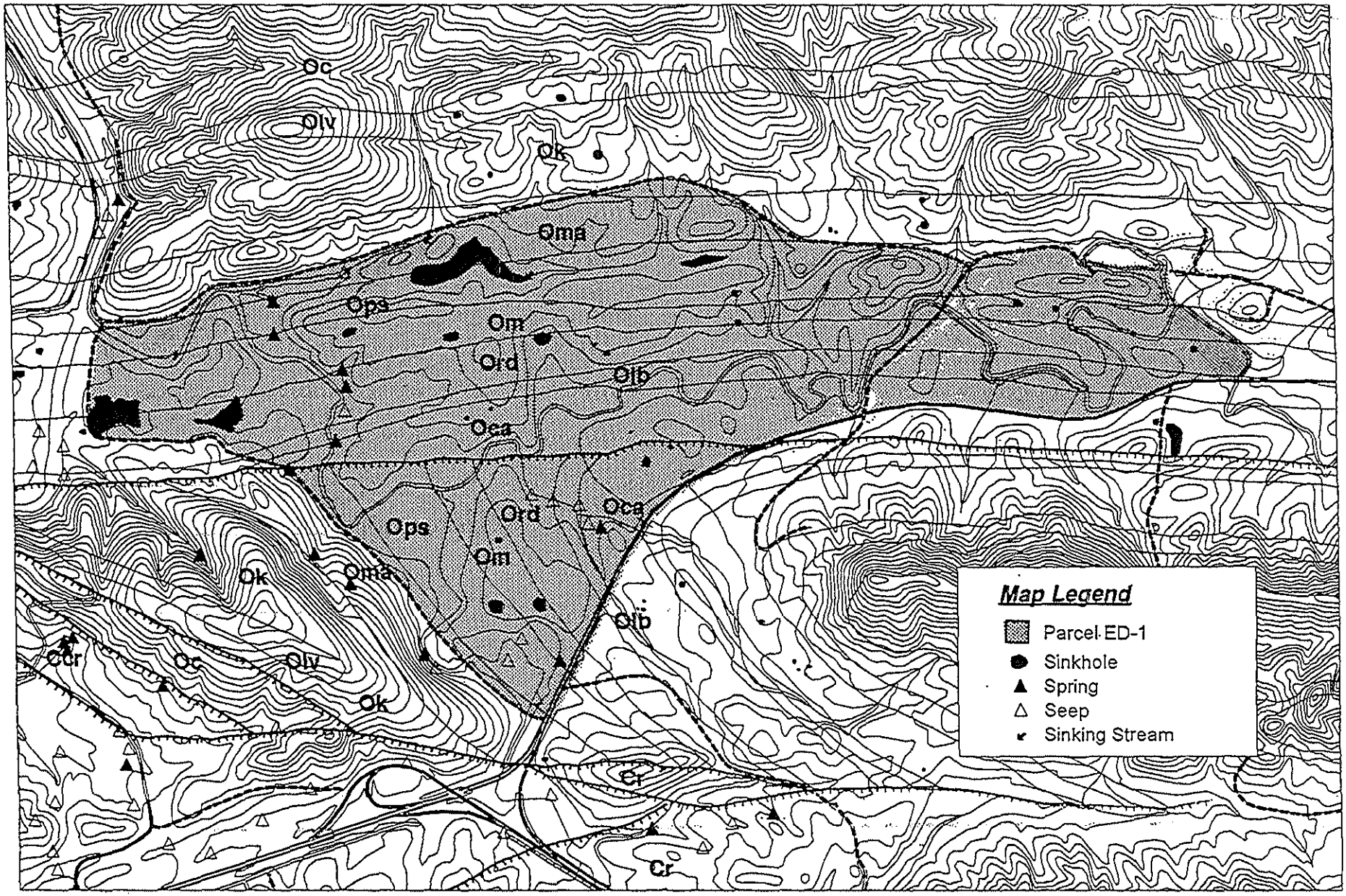


Fig. 3-11. Seeps, springs, and sinkholes on Parcel ED-1 of the Oak Ridge Reservation. [Stratigraphic symbols (Om, Ord, etc.) identified in Fig. 3-4].

the seasonal wet months, November through March, when recharge is greatest and evapotranspiration is at a minimum. Additionally, the stages in nearby Poplar Creek and the Clinch River, which are regulated by power-generation schedules at downstream Watts Bar and upstream Melton Hill dams, often result in significant backflow up Poplar Creek and up the EFPC itself into Parcel ED-1. Consequently, stream stages impact groundwater discharge to these features and the depth to the water table in the overall area.

Detailed field reconnaissance mapping has identified a number of sinkholes and sinking streams within the site area that reflect the karstic nature of the flow system (Fig. 3-12). These features are active, as evidenced by at least one new sinkhole forming in the fall of 1995 (Tauxe 1995). The many sinkholes in this area would be expected to rapidly transmit recharge to the water table. There are two distinct sinking streams (flowing streams that disappear underground): one along the northern boundary of the site and the other at the eastern edge of the large sinkhole in the northern portion of the parcel. Additional field evidence exists of overflow sinks, which are activated during high-recharge events when the principal swallow holes can no longer accommodate the volume of water being supplied. Recent hydrologic work at the nearby K-25 Site suggests a large karst conduit may exist, following the base of Black Oak Ridge in the Mascot Dolomite and extending from the city of Oak Ridge westward at least to the Clinch River (and possibly beyond). A number of large sinkholes occur in line with the formation either in the Mascot or in the overlying Pond Springs Formations along the length of this conduit. A microgravity traverse was recently completed in a dip-parallel orientation through the largest low sinkhole on Parcel ED-1 (see Fig. 3-12). A large gravity low, indicative of a significant bedrock solution cavity at depth (the conduit), was detected; the extent of this anomaly is shown in Fig. 3-12. A seismic survey of the site was conducted in December 1995. The results were not available at the time of this writing, but should be considered in future site characterization work.

The nearest residential wells are located on the west side of the Clinch River, and several groundwater monitoring wells within the K-25 Site are used in association with CERCLA remediation activities. These are all located down gradient of Parcel ED-1.

Considering the shallow depth to bedrock, shallow depth to the water table, karstic nature of the carbonate bedrock underlying the site, and evidence of karst flow conditions, this site is considered a sensitive hydrologic setting.

3.4.3 Wastewater Treatment Facilities

3.4.3.1 Domestic Wastewater

Facilities for the treatment of domestic wastewater are available at the city of Oak Ridge Publicly Owned Treatment Works (POTW) and the K-25 Sewage Treatment Plant (STP). Both of these facilities are well within their NPDES Permit discharge limits, and have extra capacity available for processing domestic waste waters from industries situated on Parcel ED-1. Representatives of both plants indicated that they could readily

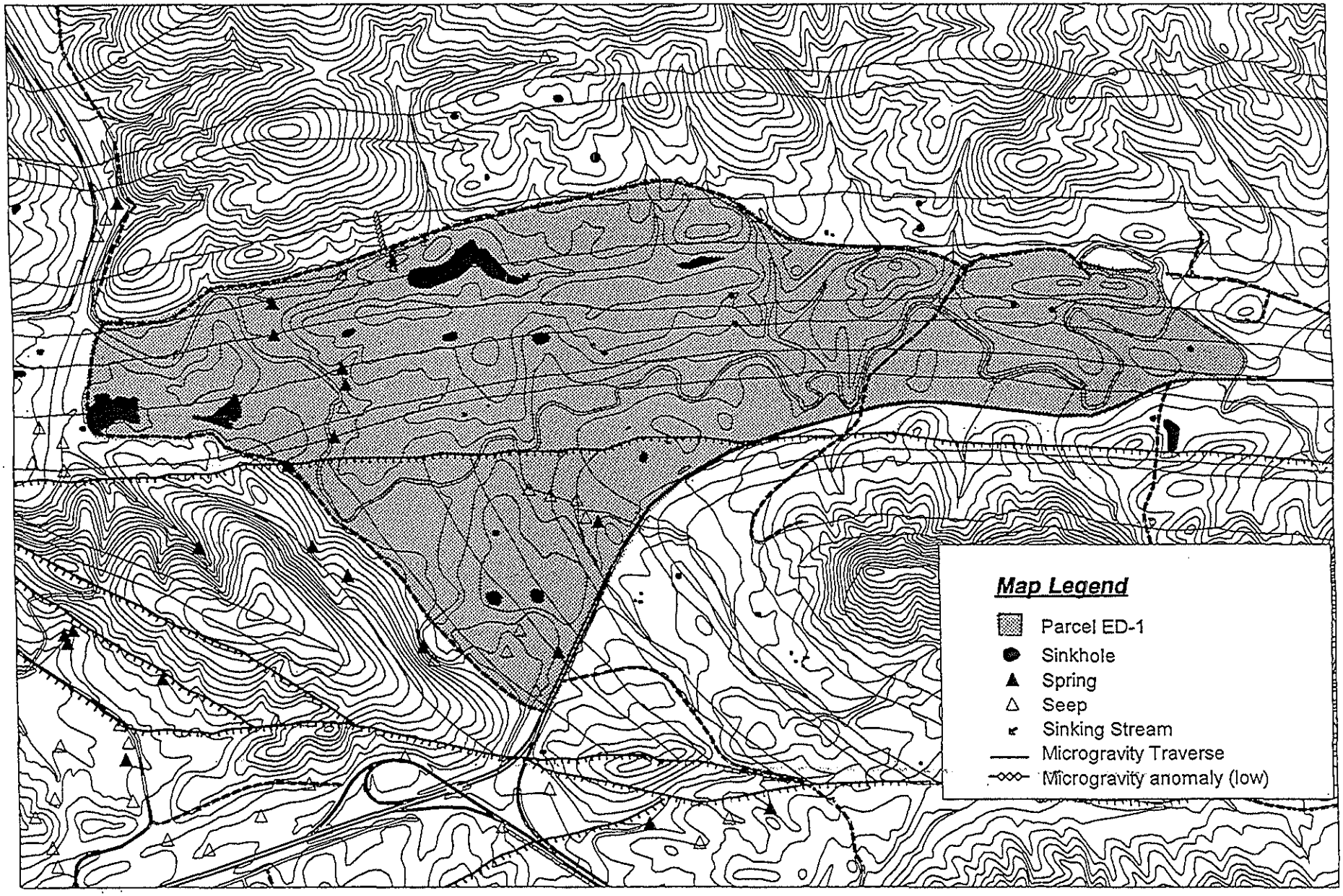


Fig. 3-12. Microgravity traverse and microgravity anomaly on Parcel ED-1 of the Oak Ridge Reservation.

accommodate additional loads (personal communications from Bruce Giles, city of Oak Ridge, and Bill Woods, Oak Ridge K-25 Site, to J. Tauxe, ORNL, January 2, 1996).

Operating capacity at the K-25 STP is about 2300 m^3/d (600,000 gpd), with a current load of only 1150 m^3/d (300,000 gpd), leaving 1150 m^3/d (300,000 gpd) available (personal communication from Bill Woods, K-25, to John Tauxe, ORNL, January 2, 1996). This plant discharges directly to Poplar Creek, located approximately 10 km (6 miles) downstream of Parcel ED-1.

Operating capacity at the city of Oak Ridge POTW is about 32,000 m^3/d (8.5 mgd) and is planning for an expansion to better accommodate infiltration flows. The plant currently processes 19,000 m^3/d (5 mgd), leaving at least 8000 m^3/d (2 mgd) available (personal communication from Bruce Giles, city of Oak Ridge POTW, to John Tauxe, ORNL, January 2, 1996). This plant discharges directly to East Fork Poplar Creek, located approximately 10 km (6 miles) upstream of Parcel ED-1.

3.4.3.2 Industrial Wastewater

Facilities for the treatment of industrial wastewater are also available at the City of Oak Ridge POTW and the K-25 Waste Treatment Operations Department. Both of these facilities are also well within their NPDES Permit discharge limits, and have extra capacity available for processing industrial waste waters from industries situated on the Parcel ED-1.

Operating capacity at the K-25 Waste Treatment Operations Department is about 570 m^3/d (150,000 gpd), with a present average load of only 310 m^3/d (82,000 gpd), leaving about 200 m^3/d (53,000 gpd) available (personal communication from Tommy Bowers, K-25 Site, to John Tauxe, ORNL, January 3, 1996). This plant discharges to the Clinch River via a pipeline in Poplar Creek, located approximately 10 km downstream of Parcel ED-1. Acceptance of waste from private industries would require a renegotiation of the K-25 NPDES permit, which currently stipulates that all accepted wastes are from government sources.

Operating capacity at the city of Oak Ridge plant is about 32,000 m^3/d (8.5 mgd), and an expansion is planned to better accommodate infiltration flows. The plant currently processes 19,000 m^3/d (5 mgd), leaving at least 8000 m^3/d available (personal communication from Bruce Giles, city of Oak Ridge POTW, to John Tauxe, ORNL, January 2, 1996). This plant discharges directly to East Fork Poplar Creek, located approximately 10 km upstream of Parcel ED-1. The Wastewater Discharge Permit issued by the city of Oak Ridge to local industries specifies several standard discharge prohibitions and limitations in the Sewer Use Ordinance (City of Oak Ridge, 1991). These are listed in Appendix C.

3.5 ECOLOGICAL RESOURCES

3.5.1 Terrestrial

3.5.1.1 Landscape Elements

Landscape elements are land types and formations that provide the underlying structure for the development of biological habitats and communities. Most biological habitats and communities are associated with or restricted to certain land types/formations. Parcel ED-1 consists of the following landscape elements: lower slope/terraced lands, floodplains, sinkholes, caves, and springs. These elements are quite limited in the Ridge and Valley Physiographic Province.

Lower slope/terraced lands in valleys are relatively flatter than the adjacent ridge slopes, but they are too elevated to receive direct overflow from rivers and streams. In contrast, floodplains are "the valley floors adjacent to and formed by alluviating rivers which are subject to overflow" (Lapedes 1974). In the Ridge and Valley Province, lower slope/terraced lands and floodplains "represent a small percentage of landscape relative to the uplands" (Martin 1989), mainly due to the geology of the region. They were, however, "substantially more widespread prior to impoundments on the Tennessee River and its tributaries" (Martin 1989). Their existence is necessary for the development of certain wetland, bottomland, and lower slope communities. Left in natural vegetation, they provide critical biological resources that are not provided in the adjacent steeper-sloped ridge areas. Sometime in their life history (e.g., during periods of severe weather), animal species typically found in upland areas require resources found only in lower slope/terraced lands and floodplains. Some birds and larger mammals may travel daily between uplands and lowlands to meet their needs. Because of the difficulties of farming and building on the more common steep slopes, flatter areas have historically been prime targets for agriculture and development. Most of the lower slope/terraced lands and floodplains in the Ridge and Valley Province have been "completely cleared and developed" or "inundated by TVA lakes" (Martin 1989).

Parcel ED-1 encompasses the largest undeveloped lower slope/terraced land and floodplain area remaining on the ORR and perhaps one of the largest remaining in the entire Ridge and Valley Province. The parcel contains one sizable sinkhole, one cave entrance, and two high-quality springs (Fig. 3-13). Sinkholes, caves, and springs are karst features which, while not infrequent occurrences in a karst landscape, are generally very limited in areal extent. Thus, the habitat range of species and communities that require them may be severely restricted. Sinkholes and caves provide a combination of physical shelter and humidity not found in the surrounding landscape. Sinkholes are necessary for the development of certain rare plant communities present on the ORR (TNC 1995) and provide habitat for certain rare animal species. For example, a sinkhole in the Parcel ED-1 area provides habitat for the southeastern shrew, which is a Tennessee state-listed mammal. Caves in the Ridge and Valley Province provide habitat for certain rare species such as the Tennessee cave salamander and American hart's tongue fern. Unknown species of cave salamanders have been collected on the ORR in the past (King et al. 1994). Also, there is

a nineteenth century record of American hart's tongue fern having been found in a cave entrance in Roane County (Cunningham et al. 1993).

Springs are groundwater upwellings that provide a source of relatively pure water. Plant species associated with springs and seeps in the Ridge and Valley Province must generally be adapted to nutrient-poor conditions relative to the surrounding vegetation and may be more sensitive to water pollution/contamination than the surrounding vegetation, thus restricting their distribution in the landscape.

3.5.1.2 Vegetation

Table 3-1 lists the types and sizes of plant communities (natural and planted) found on Parcel ED-1, and Fig. 3-13 shows locations. Some of the natural vegetation types are common in the region, while others are rare. (More information on rare plants can found in Appendix E.)

The most widespread vegetation type on Parcel ED-1 is bottomland hardwood associated with EFPC and its tributaries. This habitat is rare on the ORR and in the region (Mann et al. in press). The second most common vegetation type is planted pine (plantations) and areas with pines as the dominant species. The main vegetation types on the upland portions of the proposed site, except for pine plantations, are oak-hickory forest and mixed pine-hardwood forest, which are common regionally. The parcel also includes a few small hardwood plantations. In addition to bottomland hardwoods, several other rare communities are found on Parcel ED-1.

Bottomland (Floodplain) Hardwood Forest

EFPC bisects Parcel ED-1 (See Sect. 3.4). The terrestrial community associated with the creek is sycamore-green ash-willow bottomland hardwood forest, which has suffered a 70 to 84% decline nationally and in Tennessee (Noss et al. 1995). In Martin (1989), this forest type was described as a restricted/relic community in the Ridge and Valley Province:

> "Most floodplain, lower terrace, and riparian habitats along major streams are (or have been) cultivated or have been inundated by TVA lakes. Although these habitats represent a small percentage of landscape relative to the uplands, they were substantially more widespread prior to impoundments on the Tennessee River and its tributaries."

This formerly typical eastern U.S. floodplain forest (Martin 1989) is now uncommon on the ORR, because of widespread use and planting of floodplain areas (Pounds et al. 1993), and throughout the United States, because of agricultural use.

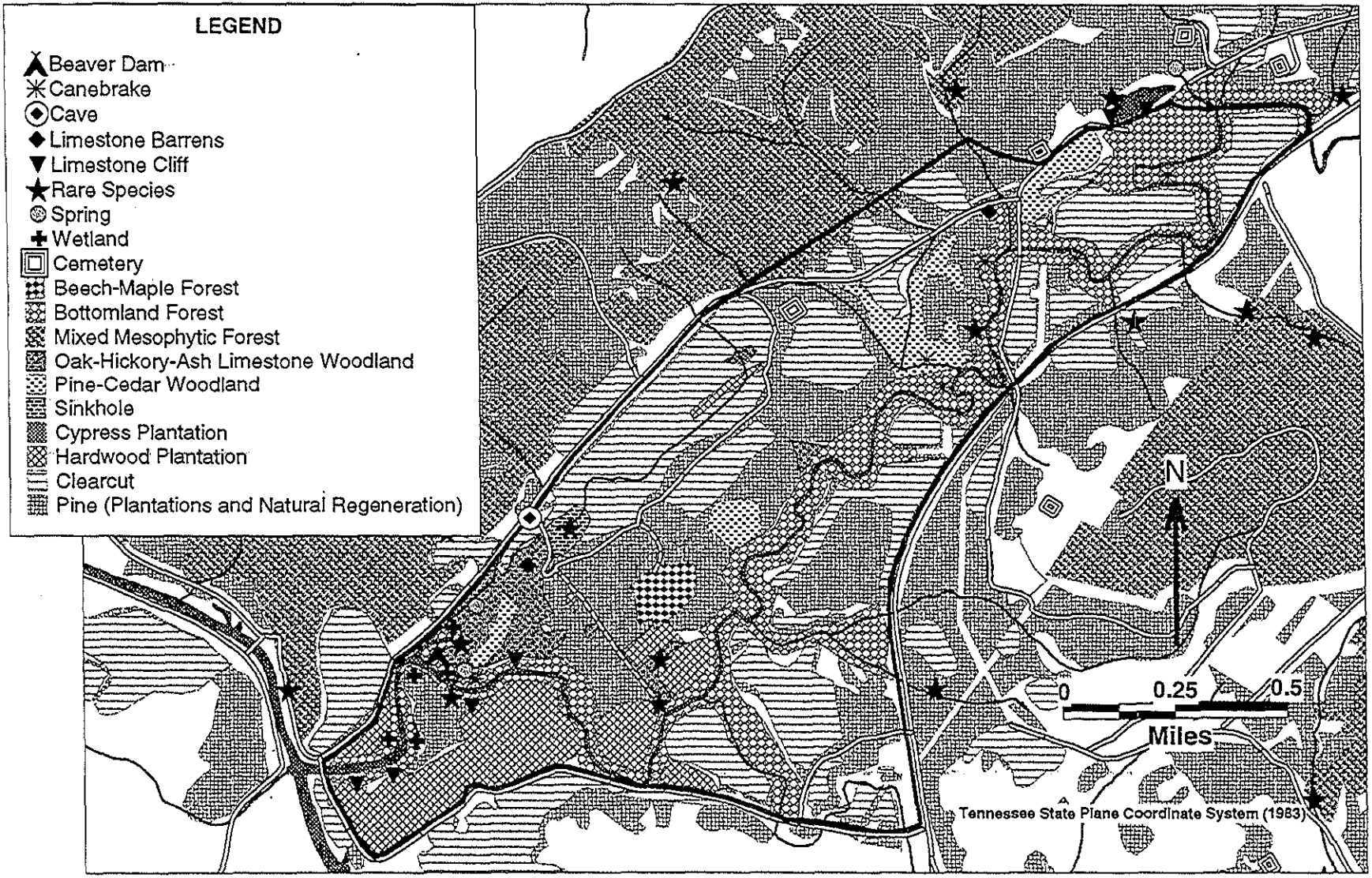


Fig. 3-13. Natural features of Parcel ED-1 of the Oak Ridge Reservation.

Table 3-1. Plant communities found on Parcel ED-1[a]

Community Type	Hectares (Acres)
HARDWOOD PLANTATIONS	
Yellow poplar-sycamore-ash	5 (12)
Green ash	1.5 (3)
Yellow poplar	16 (39)
Sweetgum	2 (5)
Green ash-birch-cottonwood-sycamore-yellow poplar-sweetgum	2 (5)
Sycamore	1.6 (4)
Walnut	3 (8)
River birch-cottonwood-sycamore-alder	4 (9)
Cottonwood	1.6 (4)
Total Hardwood Plantations	36 (89)
PINE PLANTATIONS	
Loblolly pine	80 (198)
White pine	2 (5)
White pine-loblolly	2 (5)
Yellow poplar-loblolly	1.6 (4)
Bald cypress	0.4 (1)
Total Pine Plantations	86 (213)
NATURAL COMMUNITIES[a]	
Pine-cedar woodlands	28 (70)
White pine	1.6 (4) [limited to 0.5-1 ha (1-2 acre) stands]

Table 3-1. Plant communities found on Parcel ED-1[a] (cont.)

Community Type	Hectares (Acres)
NATURAL COMMUNITIES (cont.)	
Arundinaria gigantea Canebrake (forested canebrake)	approx. 4 (10) (based on field estimate)
Floodplain pool	[approx. 1.5 (3)] (based on COE delineations)
Limestone barren (perennial grass dominated)	[approx. 1 (2)] (based on field estimate)
Limestone cliff	[unknown area along EFPC]
Limestone sinkhole	[1 (2)]
Oak-hickory-ash limestone woodland	17 (42)
Sycamore-green ash-willow bottomland forest	52 (129)
Mature beech-sugar maple forest	3(7)
Ridge and valley calcareous mixed mesophytic forest	8 (19)
Streams	26 (65)
Total Natural Communities	134 (332) [minus inclusions]
OTHER AREAS	
1993-1994 Clear-cut areas	105 (260)
Roads	17 (42)
Power lines	approx. 5 (12)
Nonforested areas	approx. 15 (38)
Older Cutover areas	approx. 15 (38)
Total other areas	144 (357)
GRAND TOTAL	401 (991)

[a] Brackets indicate an area which is an inclusion in a larger community type.

The designated 100-year floodplain of EFPC encompasses much but not all of this habitat. Reconnaissance surveys in 1991 (J. W. Webb, LMES, personal communication with M. S. Salk, LMES, July 31, 1995) and 1995 (J. M. Mitchell, LMES, personal communication with J. W. Webb, LMES, July 25, 1995) indicate that the floodplain provides the valuable structural diversity generally expected of riparian hardwood forests. Typical overstory bottomland hardwood species that are abundant in the EFPC floodplain include willow, sycamore, box-elder, green ash, slippery elm, sweet gum, red and sugar maple, and hackberry. Parts of this forest existed prior to the acquisition of the ORR (based on TVA aerial photography from 1942; D. J. Awl, JAYCOR, Oak Ridge, Tenn., personal communication to P. D. Parr, ORNL, Aug. 3, 1995). Sycamore-green ash-willow bottomland forest of this high quality and extent is not known to exist elsewhere on the ORR.

Sycamore-green ash-willow bottomland forest is associated with the *Arundinaria gigantea* forested canebrake community (listed as critically rare by the National Biological Survey and globally rare by the Nature Conservancy), an association noted by Martin (1989). It is difficult to separate the canebrake community from the greater bottomland forest community in which it occurs (Grossman et al. 1994). The sycamore-green ash-willow bottomland forest community may be in need of protection in the future because of its association with the canebrake community.

Pine

Much of Parcel ED-1 was planted in pine at various times between 1949 and 1977. The pine communities are primarily loblolly and white pine, with some Virginia and shortleaf pine. In 1992 and 1993, these areas were destroyed by the Southern pine beetle, and most were subsequently salvage-logged. Some standing dead and live pine trees remain along the periphery of the area (D. M. Bradburn, LMES, memorandum to J. R. Newman, LMES, July 24, 1995).

One or two natural pine stands on Parcel ED-1 contain shortleaf, white, and Virginia pine. The shortleaf pine-Virginia pine-cedar woodland communities are associated with critically rare limestone barrens. These existed prior to the acquisition of the ORR (based on TVA aerial photography from 1942; D. J. Awl, LMES, personal communication with P. D. Parr, Aug. 3, 1995). About 4 acres of natural white pine on the parcel are limited to 1- to 2-acre stands.

Old-field

Areas recently cleared of pines have succeeded to old-field habitat and sometimes have an ingrowth of hardwoods. If these are left undisturbed, natural succession would create an upland-forest habitat contiguous with bottomland forest during the initial 10-year lease period. Such a habitat combination is extremely limited in the region. In general, seed sources in the adjacent floodplain and ingrown hardwoods would result in rapid development of such habitat in areas south of EFPC. Succession would be somewhat less rapid north of the creek.

Upland Hardwood

Nonriparian habitats on the parcel include scattered small hardwood plantings and a few isolated natural stands. Hardwoods in plantations include yellow poplar, sycamore, ash, sweet gum, black walnut, river birch, and cottonwood. Cleared areas, formerly in pine south of the creek, have an ingrowth of hardwoods. Much of the area north of Parcel ED-1 is mixed hardwood, including several areas designated as "important natural areas" by the Nature Conservancy (TNC 1995).

Unique or Rare Communities

With the exception of bottomland forest, discussed above, and wetlands, discussed in Sect. 3.5.3, other rare community types on Parcel ED-1 are described below. According to the Tennessee Natural Areas Program (TNDOC 1988),

> "A natural community is considered to be critically rare if the 1) type is uncommon within its physiographic province; 2) land type on which the community occurs is uncommon; 3) community type is remnant or its dominants are peripheral or disjunct; and 4) community type is easily destroyed and its potential for recovery is slight."

In general, "critically" rare communities meet at least three of these criteria, while "subcritically" rare communities meet one or two of these criteria. The Nature Conservancy also ranks communities on a global rarity scale (G ranks) based on "estimated global acreage and total number of occurrences worldwide" (Grossman et al. 1994). The scale is G1 (very rare) to G4 (common) (Table 3-2). The following communities are ranked as "critically rare" according to the system developed by the Tennessee Natural Areas Program.

Table 3-2. The Nature Conservancy's Global Conservation Status Ranking System[a]

Ranks[b]	Description
G1	Critically imperiled globally because of extreme rarity (typically 5 or fewer occurrences or very few remaining acres) or because of some factor(s) making it particularly vulnerable to extinction.
G2	Imperiled globally because of extreme rarity (6 to 20 occurrences or few remaining acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3	Rare or uncommon globally (21 to 100 occurrences). Either very rare and local throughout its range or found locally, even abundantly, in a restricted range or vulnerable to extinction throughout its range due to specific factors.
G4	Apparently secure, widespread, and abundant globally (usually more than 100 occurrences), but with cause for long-term concern.

Ranks[b]	Description
G5	Demonstrably secure, widespread, and abundant globally.
G?	Unranked
Qualifiers	**Description**
?	Inexact numeric rank.
Q	Questionable taxonomy; questions exist concerning classification of this type.

[a]Modified from Appendix D in Grossman et al. 1994 and Table 3 in TNC 1995.
[b]Ranks may be combined to indicate a range (e.g., G2G3); combined ranks indicate a larger margin of error than ranks assigned a "?" qualifier.

1. **Canebrake**(also known as forested canebrake)(*Arundinaria gigantea*). The Nature Conservancy ranks forested canebrake as G1Q, indicating that it is very rare, but more information is needed to confirm this rank (Grossman et al. 1994). The National Biological Service identifies *Arundinaria gigantea* canebrake as a critically endangered ecosystem in the Southeast (Noss et al. 1995). Since European settlement, more than 98% of the ecosystem type has been destroyed, converted to other land uses, or significantly degraded of its ecological structure, function, or composition.

   The canebrake community along EFPC lies within the sycamore-green ash-willow bottomland forest community (Martin 1989). Martin reports that "It [cane] was widespread along all major rivers and streams, most minor tributaries, and extended onto some mesic uplands and ridges. As a result of forest clearing, draining of the wetlands, and repeated grazing, these extensive monospecific understory communities exist as tiny scattered remnants. Few of the 'cane brakes' of any size exist today and fewer have received any form of protection." The *Arundinaria gigantea* canebrake community along EFPC is the most extensive and highest quality example of this community existing on the ORR. This community is also known to exist at five other sites on the ORR, all smaller and more disturbed. "This community occurs as discrete patches in a bottomland mosaic . . . It is characterized by dense stands of *Arundinaria gigantea* occasionally reaching 9 to 10 meters in height under a bottomland canopy that is variable in species composition and coverage. It is estimated that 95% of this community is gone, largely due to free-range livestock, drainage, conversion to agriculture, and fire suppression" (Grossman et al. 1994).

2. **Floodplain pool**. Floodplain pool on the ORR is ranked as G2? by the Nature Conservancy (TNC 1995) because more information is needed. "These communities

are semi-permanently flooded wetlands in floodplains of rivers and large streams in the Ridge and Valley Physiographic Province . . . Probably restricted to low elevations in the Southern Appalachians . . . Few examples have survived the extensive impoundments and pasturing in the area . . . Examples on the ORR are among the best known . . . Floodplain pools serve as important amphibian breeding areas." Floodplain pools occur at other sites on the ORR.

3. Limestone barren (perennial-grass-dominated; formerly cedar barren). Limestone barren (perennial-grass-dominated) is ranked as G2-G3 by the Nature Conservancy (TNC 1995). Data are still being collected to confirm the ranking. Limestone barrens are upland areas over limestone, dominated by little bluestem grass. "This type of limestone barren is believed to be restricted to the Ridge and Valley Province of southwestern Virginia, Tennessee, northwestern Georgia, and northern Alabama . . . ORR contains important occurrences of this globally rare community" (TNC 1995). On Parcel ED-1, small oak/cedar stands are found in the Herrell Road area (Fig. 3-14) and on the eastern portion of the plot. Limestone barrens also occur at other better quality sites on the ORR.

4. Limestone cliff. Limestone cliff on the ORR is ranked by the Nature Conservancy as globally threatened (G3?) (TNC 1995). This rank indicates that it is a globally rare type but that additional investigation is needed to more accurately characterize its significance. Southern Appalachian calcareous cliff, a similar habitat, is listed by the Nature Conservancy as G1, which is very rare globally (Grossman et al. 1994). The species composition of the limestone cliff community on EFPC is very similar to that of Southern Appalachian calcareous cliff, the main difference between the two being the elevation at which they are found. Thus, more investigation may determine that the limestone cliff on EFPC should also be ranked as G1. "This sparsely vegetated community occurs on very steep to vertical slopes, on lower, sheltered slopes or river bluffs of calcareous rock such as limestone . . . These rocky habitats are typically dry, but may contain seepage zones . . . This community is characterized by significant areas of bare rock with open vegetation. Soil pockets may develop to an extent that allows scattered trees and shrubs to establish, although never to the extent that a closed canopy forms. Ferns and calciphilic herbs grow in cracks and on small soil accumulations" (Grossman et al. 1994). "ORR contains some of the higher quality occurrences of these communities known" (TNC 1995). Limestone cliff occurs at other more significant sites on the ORR.

5. Limestone sinkhole. Limestone sinkhole communities are described by the Nature Conservancy as G? because insufficient data exist to determine a rank (TNC 1995). "These communities are humid limestone sinkholes. They are restricted to Tennessee, Alabama, and perhaps Virginia and Kentucky . . . ORR apparently contains important occurrences of this globally rare community; further assessment of this community on the ORR is needed." (TNC 1995). Limestone sinkhole occurs

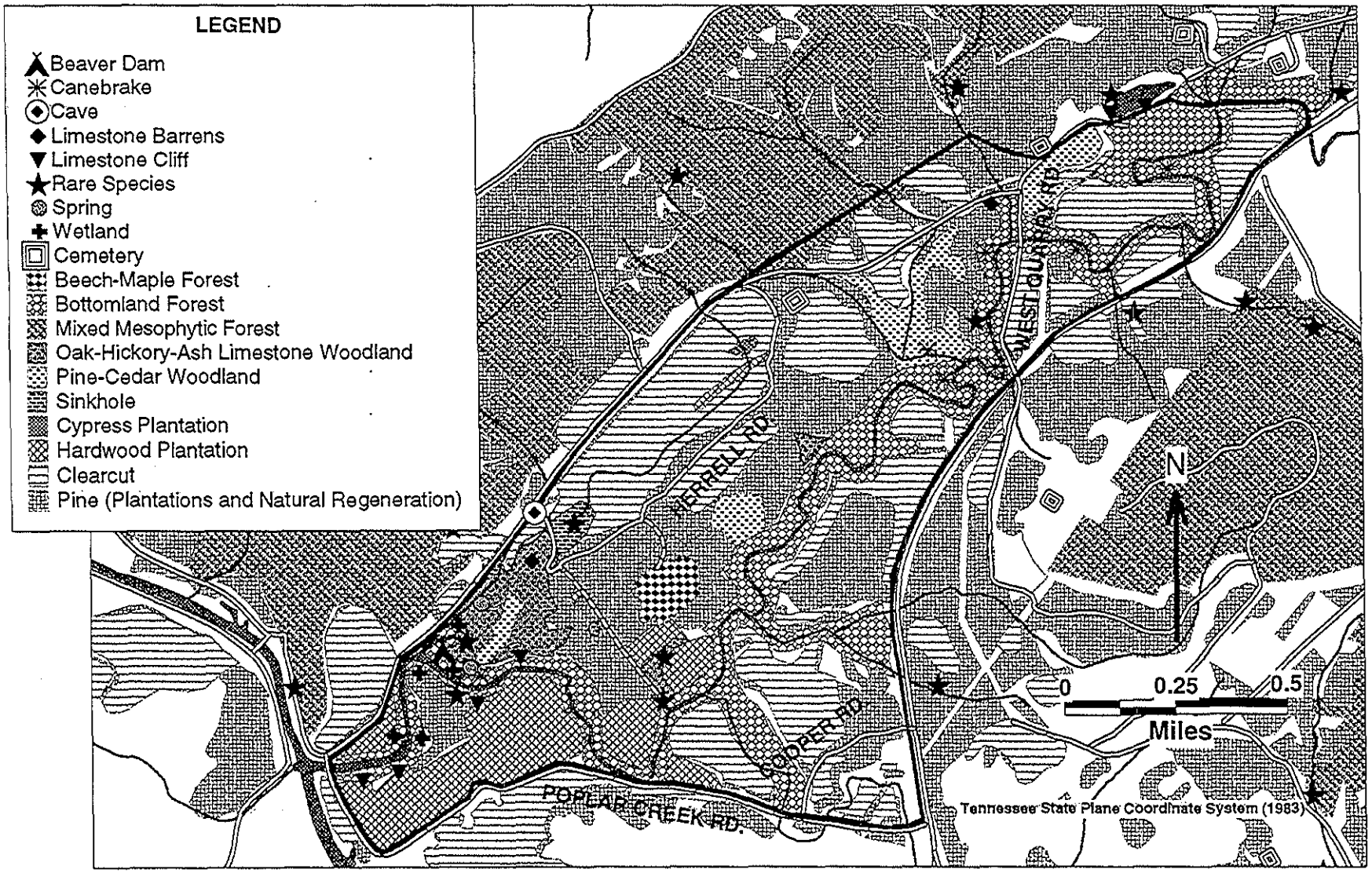


Fig. 3-14. Herrell Road area of Parcel ED-1 of the Oak Ridge Reservation.

at other sites on the ORR. One of the limestone sinkhole communities on Parcel ED-1 is optimal habitat for the southeastern shrew, which is state-listed as being "in need of management." The southeastern shrew is found at other locations on the ORR.

6. Oak-hickory-ash limestone woodland. This community is listed by the Nature Conservancy as G3? because more information is needed to determine its ranking (TNC 1995). Oak-hickory-ash limestone woodland was originally described by Martin (1989) and was previously designated by the Tennessee Natural Areas Program as "Southern red oak (Shumard oak)-mixed oaks-cedar." These communities are xeric open woodlands. Characteristic species include chinquapin oak, Shumard oak, white oak, white ash, pignut hickory, eastern red-cedar, fragrant sumac, rusty black-haw, coralberry, shrubby St. John's-wort, and little bluestem. They are "limited to calcareous and mafic situations in the southeastern United States . . . ORR contains some of the higher quality occurrences of this type known" (TNC 1995). Most of this woodland area existed prior to the acquisition of the ORR (based on TVA aerial photography from 1942). Oak-hickory-ash limestone woodland also occurs at other sites on the ORR.

The following communities are ranked as "subcritically rare," according to the system developed by the Tennessee Natural Areas Program (TNDOC 1988):

1. Sycamore-green ash-willow bottomland forest. The Nature Conservancy ranks this type of forest as G? because insufficient data exist to determine a G rank (TNC 1995). Sycamore-green ash-willow bottomland forest of the high quality and extent that is found on Parcel ED-1 is not known to exist at any other site on the ORR.

2. Mature beech-sugar maple forest. The mature beech-sugar maple forest, an unusual forest type for the Ridge and Valley Physiographic Province, is a representative of the *Fagus grandifolia-Acer saccharum-Liriodendron tulipifera* forest alliance. In the Midwest, forests of this type have been ranked G1 by The Nature Conservancy (Grossman et al. 1994), because they are extremely rare. The mature beech-sugar maple forest has an open understory typical of mature forest types, relatively large-diameter trees, and a closed canopy. Because of their rarity, insufficient data exists concerning these communities in the Ridge and Valley Province. This community is significant because it existed prior to the acquisition of the ORR (based on TVA aerial photography from 1942) and has experienced minimal direct impact since government acquisition. A mature beech-sugar maple forest has not to date been identified anywhere else on the ORR.

3. Ridge and Valley calcareous mixed mesophytic forest. This community is listed by The Nature Conservancy as G3? because more information is needed to determine its ranking (TNC 1995). The Nature Conservancy describes this forest type as "mesic, diverse mixed hardwood forests over limestone" found in lower slopes and coves. It is "restricted to the sedimentary rock physiographic provinces of the Southern Appalachians, in Tennessee, Kentucky, Southwestern Virginia, and possibly other states . . . ORR likely includes some of the best remaining examples of this community type" (TNC 1995). The Ridge and Valley calcareous mixed

mesophytic forest is known to occur at other sites on the ORR. These significant hardwood forest tracts are distinguished by their age, lack of disturbance, continuity, and large size. Mature hardwood forests of this size range have become exceedingly rare in the Ridge and Valley Province due to forest fragmentation resulting from agriculture, urban sprawl, industrial development, roads, and utility corridors.

3.5.1.3 Wildlife

The vegetation communities of Parcel ED-1 provide a variety of wildlife habitat. The designated 100-year floodplain of EFPC (Fig. 3-15) encompasses much, but not all, of bottomland hardwood habitat on the parcel. Bottomland hardwood habitat provides abundant special features and structural diversity important to many game and nongame wildlife species. These features and their value are as follows:

- Fallen logs provide cover, food, and den sites.
- Standing dead trees (snags) provide perches and nesting/denning cavities for many species and potential roosting sites for maternity colonies of the endangered Indiana bat.
- Large-diameter [e.g., > 51 cm (20 in.) diameter at breast high (dbh)] living trees provide mast and other food, perches, and a variety of nesting/denning sites.
- Undercut stream banks provide habitat for waterfowl (e.g., wood duck).
- Beaver ponds provide habitat for waterfowl and aquatic mammals (e.g., muskrat).
- Ditches and sloughs provide water, cover, transportation corridors, and denning sites.
- A diverse understory and herbaceous layer provide a seasonal variety of food and cover.

Overall, the mosaic of wildlife habitat on Parcel ED-1 provides one of the best continuous blocks of natural habitat functionally connected to the rest of the ORR.

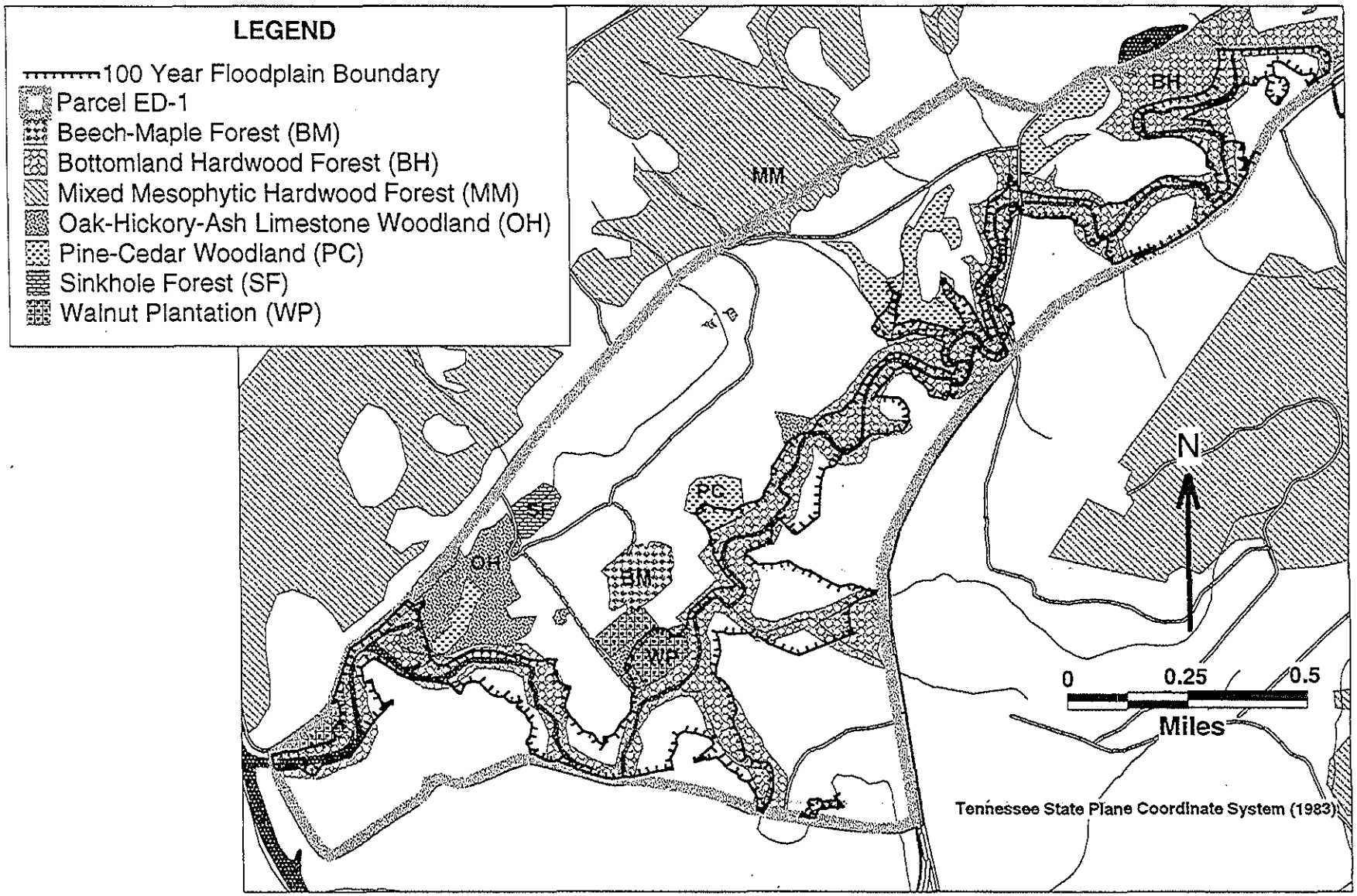


Fig. 3-15. East Fork Poplar Creek floodplain and forest communities on Parcel ED-1 of the Oak Ridge Reservation.

Special Features

In addition to bottomland hardwoods, several other natural features of Parcel ED-1 are of special value to wildlife. Two small walnut plantations [0.4 and 2.8 ha (1 and 7 acres)] provide mast and shade. A 2.8-ha (7-acre) beech/sugar maple forest (see above description) north of EFPC features high-mast-value trees (e.g., beech, hickory, oak), shade, cover, and water for wildlife. A beaver pond is present on a slough near the juncture of EFPC and Poplar Creek (see Figs. 3-13 and J-3). The pond provides habitat for wood ducks, wading birds (which may include state-listed species such as little blue heron, snowy egret, and great egret), amphibians, and other mammals. Several sinkholes and possibly a cave are present near the Herrell Road area (see Fig. 3-14) in the northwest part of the parcel. Springs and seeps throughout the area have not been characterized.

Breeding Birds

The EFPC area provides unique habitat for breeding birds in East Tennessee and is used as a reference site for the national breeding bird survey sponsored by a national joint venture called "Partners in Flight." Birds identified during a 1995 survey along the proposed northern boundary (which would include birds within Parcel ED-1) are listed in Table 3-3.

Throughout the year, the EFPC floodplain is home to about 260 species of birds (DOE 1994b). Approximately 80 of these are considered migratory species, 14 are winter residents, 32 are transients during migration, and the remaining are year-round residents. The riparian/pine/hardwood/old-field habitat complex of Parcel ED-1 serves as a refuge for many breeding neotropical migrant songbirds, some of which are declining nationally or regionally because of loss, disruption, and fragmentation of habitat (Robbins et al. 1993).

The area also provides valuable stopover habitat (i.e., resting and staging areas) for neotropical species during their spring and fall migrations. Examples of nationally declining species (Robbins et al. 1993) that have been documented on the site are yellow-billed cuckoo, wood thrush, white-eyed vireo, and Kentucky warbler. Many of these species require special habitat conditions and do not nest in nonwooded areas. Also, many of them are area-sensitive and require large blocks of habitat, at least 100 ha (247 acres), to reproduce. The EFPC tract, as an integral part of the ORR, is one of the few remaining areas of contiguous undeveloped habitat in the Ridge and Valley Province (Mann et al. in press). Thus, it has great value for providing habitat for many neotropical bird species.

Table 3-3. Birds identified during breeding bird survey in the East Fork Poplar Creek area in June 1995[a]

Canada goose	Common crow	Northern cardinal
Wood duck	Tufted titmouse	Indigo bunting
Sharp-shinned hawk	Carolina chickadee	Rufous-sided towhee
Red-tailed hawk	Carolina wren	Field sparrow
Northern bobwhite	Blue-gray gnatcatcher	Brown-headed cowbird
Wild turkey	Wood thrush	Scarlet tanager
Yellow-billed cuckoo	White-eyed vireo	American goldfinch
Mourning dove	Red-eyed vireo	
Ruby-throated hummingbird	Northern parula	
Red-bellied woodpecker	Yellow-throated warbler	
Pileated woodpecker	Pine warbler	
Eastern phoebe	Kentucky warbler	
Acadian flycatcher	Common yellowthroat	
Blue jay	Yellow-breasted chat	

[a]Excerpted from data supplied to Partners in Flight, a national joint venture to monitor neotropical migrant songbirds in cooperation with the USFWS, TWRA, ORNL, and other states.

Bird species that are often found in bottomland or wet areas include belted kingfisher, wood thrush, pileated woodpecker, Acadian flycatcher, and Kentucky warbler. Diversity in upland areas would be less than in the floodplain but would include many of the same avian species. Examples of species which might also be found in uplands include woodpeckers (downy and hairy), eastern phoebe, Carolina wren, northern cardinal, and rose-breasted grosbeak.

Other Nongame Species

Parcel ED-1 provides habitat for many small nongame mammals as well as reptiles, amphibians, and terrestrial invertebrates. Small mammals present or likely to occur include some sensitive species (see Sect. 3.5.2.2). Carnivores such as bobcat, fox, and coyote are also likely to be present. Amphibians and reptiles found in the area include leopard frog,

green frog, red salamander, two-lined salamander, mountain dusky, box turtle, race runner, northern water snake, and eastern ring-necked snake.

The area also provides outstanding habitat for arthropods, including terrestrial insects. Arthropod diversity is enhanced by the clearings within the forested tracts and the occurrence of sinkholes, springs, and streamside habitat. Sampling for arthropods in the EFPC yielded representatives of 135 families in 19 orders (DOE 1994b); 109 of these were terrestrial insect families. Butterflies, for example, are abundant due to the diversity and abundance of wildflowers and water resources.

Game Species

The most important game animal in the area is the white-tailed deer. Others known or likely to be present include squirrel, rabbit, raccoon, beaver, mink, muskrat, wild turkey (censused for the last 9 years on the ORR, including EFPC), wood duck (censused for the last 5 years on the ORR, including EFPC), woodcock, quail, and common snipe.

Deer harvest records indicate that Parcel ED-1 provides high-quality deer habitat on the ORR. The hunt compartments that include the parcel yielded higher average weights [42.6 kg (94 lb)] for 3.5-year-old does than the overall ORR average [41.7 kg (92 lb)]. Also, counts taken per compartment per hunt-year averaged 25 for these compartments compared to 12 for the entire ORR (gun-hunted compartments only). Thus, more deer in good condition are harvested from Parcel ED-1. Although hunting for nondeer species is not allowed, some or all of the other species mentioned above could also be harvested. Parcel ED-1 also serves as a source of wild turkey, which are trapped and relocated to other sites in the state.

3.5.1.4 Threatened and/or Endangered Species

Appendix F describes the compliance process for federal and state regulations that protect plant and animal species. Informal consultation with the FWS has been completed (see Appendix F). Table F-1 also reports the current status of protected species known to occur on the ORR. The following text discusses the results of recent T&E species surveys.

Plants

New populations of *Hydrastis canadensis* (golden seal) (state threatened), *Cypripedium acaule* (pink lady slipper) (state endangered), and *Panax quinquefolus* (ginseng) (federal 3C-candidate species and state-threatened species) have been located on Parcel ED-1 near EFPC. All populations are located within the boundaries of National Environmental Research Park Natural Area 47 (NA 47), and all are found elsewhere on the ORR.

A new state record plant species, *Rhynchospora colorata* (syn. *Dichromena colorata*) (white-topped sedge), was located on the boundary of the parcel and not within the interior. *Rhynchospora colorata* is an attractive sedge with showy white and green

bracts. White-topped sedge is not known to occur elsewhere on the ORR. This is also now the only verified population existing in Tennessee. TDEC plans to have the species added to the state list as soon as possible, probably as of "Special Concern." The population is located in National Environmental Research Park Natural Area 46 (NA-46) (see Fig. S-1).

Wildlife

Bottomland forest on EFPC provides abundant habitat for maternity colonies of the federally endangered Indiana bat (*Myotis sodalis*). Meteorologic conditions during a 1992 mist-netting survey for bats, which was unsuccessful, were sub-optimal; thus its occurrence cannot be disclaimed (J. W. Webb, ORNL, personal communication with M. S. Salk, ORNL, July 31, 1995). The EFPC may also provide foraging habitat for the endangered gray bat (*Myotis grisescens*), which has been documented as occurring on the ORR. Consultation with the FWS to comply with Sect. 7 of the ESA has been completed (Appendix F).

Two animal species listed by the state as in need of management (IM) (Table F-1) have been reported on the parcel in 1995. The sharp-shinned hawk has been sighted several times during nesting season near Herrell Road in the northern sector of the plot (see Fig. 3-14). The southeastern shrew has been trapped in a sinkhole within a natural hardwood stand, also in the Herrell Road area. Based on available habitat, several other species listed by the state as IM may also occur, including least shrew, masked shrew, meadow jumping mouse, and yellow-nosed vole. State-listed wildlife species (all deemed in need of management) which are documented by the TDEC as occurring historically on the ORR (TDEC 1995) and which could likely be found on Parcel ED-1 include mole salamander, green salamander, hellbender, northern pine snake, Cooper's hawk, and woodland jumping mouse.

3.5.1.5 Special Uses and Designations

Parcel ED-1 is part of the DOE-Oak Ridge National Environmental Research Park, the Southern Appalachian Biosphere Reserve (Fig. 3-16), and the Oak Ridge Wildlife Management Area (see Fig. 3-2). The DOE Oak Ridge National Environmental Research Park is one in a network of seven DOE parks. The Oak Ridge Park, about 8,700 ha (21,500 acres), was designated in 1980. The research parks provide protected land areas for research and education in environmental sciences and demonstrate that energy technology development can be compatible with a quality environment.

The Oak Ridge Research Park was designated as a Biosphere Reserve in 1988. Biosphere reserves are multipurpose areas that are nominated by the national committee of

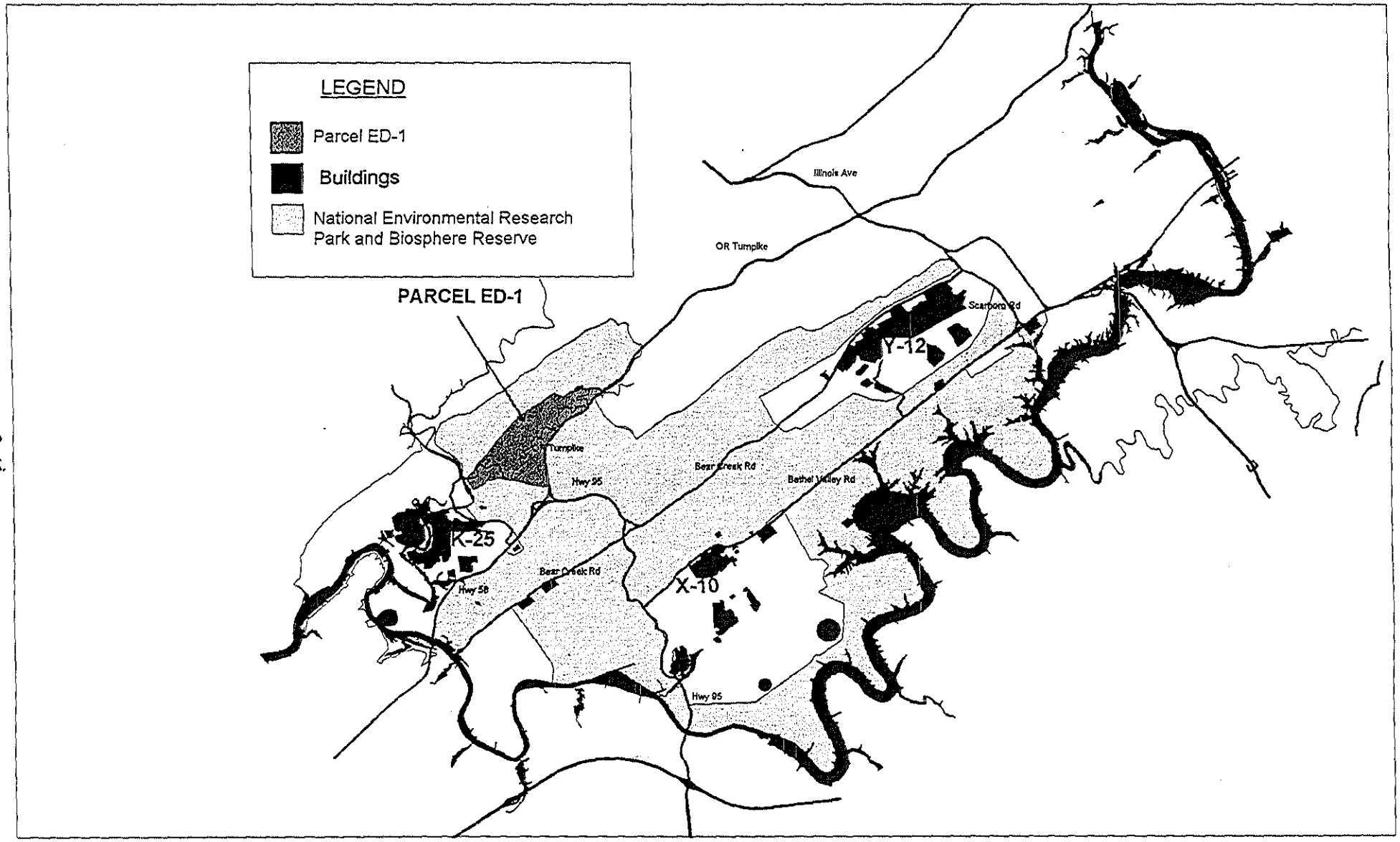


Fig. 3-16. National Environmental Research Park and Biosphere Reserve including Parcel ED-1 of the Oak Ridge Reservation.

the Man and the Biosphere (MAB) Program and designated by the United Nations Educational, Scientific and Cultural Organizations (UNESCO). Their purpose is to serve as demonstration areas for cooperation in building harmonious relationships between human activities and the conservation of ecosystems and biological diversity. The U.S. MAB Program utilizes biosphere reserves as sites for promoting ecosystem management by incorporating a program of ecosystem protection with sustainable human use and development; documenting global change and biological diversity through monitoring, inventorying, and scientific research; and organizing regional cooperative institutions for resolving complex issues of multi-purpose land use (U.S. MAB Program 1995).

In addition, DOE is one of the signatories to an Interagency Agreement for the Establishment and Operation of the Southern Appalachian MAB (SAMAB) Cooperative. Objectives of the SAMAB Cooperative are to promote wise use of the region's renewable resources, increase environmental awareness, encourage environmentally safe economic development, and enable the sharing of scientific research. A cluster of three biosphere reserves (Oak Ridge, Great Smoky Mountains National Park, and Coweeta Hydrological Laboratory) formed the original core of the Southern Appalachian Biosphere Reserve. The Southern Appalachian Biosphere Reserve has been designated as the primary zone of cooperation under the auspices of the SAMAB program.

In November 1984, DOE-Oak Ridge and the Tennessee Wildlife Resources Agency (TWRA) entered into a cooperative agreement for the establishment of a Wildlife Management Area at the ORR for a 5-year period (Parr and Evans 1992). This agreement was extended for an additional 5 years on December 1, 1989 (Parr and Evans 1992) and for an additional 2 years on December 1, 1994 (personal communication, memo from K. Kates, DOE-ORO, to B. Teer, LMES, January 20, 1995). Natural Area 46 (formerly called Reference Area 3b), shown in Fig. S-1, is a limestone quarry and spring of 9 ha (22 acres) located on the boundary of the proposed lease area. This sensitive area includes a limestone cliff, which is a globally rare plant community as determined by the Nature Conservancy (Grossman et al. 1994) (see Sect. 3.5.1). It also has the only now verified population in Tennessee of a sedge, *Rhynchospora colorata* (syn. *Dichromena colorata*), which is soon to be state-listed. Natural Area 47, the EFPC floodplain (also shown in Fig. S-1), is about 172 ha (425 acres) in size. The boundaries of the Natural Area have been delineated from 1993 TVA orthoimagery, field data, locations of rare species, topography, the U.S. Army Corps of Engineers (COE) 100-year floodplain, and standard buffer sizes. This sensitive area primarily includes the floodplain forest but also contains some critical adjacent upland areas and a sink area. The area includes nine rare community types (which were described previously): *Arundinaria gigantea* canebrake, floodplain pool, limestone barren (perennial grass dominated) (formerly called cedar barrens), limestone cliff, limestone sinkhole, sycamore-green ash-willow bottomland, mature beech-sugar maple forest, ridge and valley mixed mesophytic forest, and oak-hickory-ash limestone woodland. The area includes populations of five state-listed species: one fish (Tennessee dace); one mammal (southeastern shrew); and three plants (golden seal, pink lady slipper, and ginseng).

3.5.2 Aquatic

3.5.2.1 Biota

Aquatic biota in EFPC and BC have been the subject of past and ongoing studies (Ryon and Loar 1988; Hinzman in preparation; Smith and Dickinson 1994). Fifty species of fish are now documented in EFPC, and 25 are known to occur in BC (See Appendix G and Table G-3.). Species in these streams are those common to headwater streams as well as those common to reservoir or lake systems. The species in streams on and near Parcel ED-1 are a major component of the fish of the ORR. Several species on the ORR are found only in lower EFPC.

The proximity of lower EFPC and BC to Poplar Creek and the Clinch River offers a range of habitats and watersheds from which species can migrate into these streams as water quality improves (Appendix G, Loar et al. 1992a; Ryon 1993). Species that are sensitive to stress or have more restricted habitat and food requirements have increased in number. In lower BC, the taxonomic richness and the richness of pollution-sensitive invertebrate species are high (Hinzman in preparation; Southworth et al. 1992) and may possibly be greater than in reference streams off the ORR (Smith and Dickinson 1994) where less protection from land development and agricultural use is provided (Appendix G). In EFPC, species richness and abundance of fish and invertebrates have increased steadily in recent years, but pollution-intolerant macroinvertebrate communities are still only one-half to two-thirds of those found in reference streams. Also, the recovery of sensitive fish species is below levels seen in comparable reference streams. Fewer sensitive species are likely associated with the presence of the city of Oak Ridge in the watershed of EFPC. Factors common to urbanization, such as discharges associated with wastewater treatment, stormwater runoff, and sedimentation from construction activities, are known to adversely affect habitat quality.

Recovery of stream biota to levels observed in reference streams has not yet occurred. Reduced *Ceriodaphnia* reproduction continues to indicate sources of toxicity at upstream sites. The number of fish and benthic macroinvertebrate species at several sites is low. Mercury and PCBs in fish remain elevated at the downstream sites, and BC may be a source of these contaminants to waters off the ORR. Recovery of the fish communities has occurred in EFPC since the closure of New Hope Pond and the construction of additional waste treatment facilities (Ryon 1993). More species and greater numbers of individuals are now found in EFPC than during initial surveys in the mid-1980s. However, recovery of the fish communities in EFPC have not reached levels seen in comparable reference streams.

With regard to aquatic herpetological species on Parcel ED-1, the hellbender (*Cryptobranchus alleganiensis*) (a candidate for federal listing) has not been observed in EFPC or BC. Specimens were collected in the Clinch River and Hinds Creek (in Knox County within the same valley as EFPC) during the last 10 years (M. G. Ryon, ORNL, personal communication with H. Braunstein, ORNL, August 3, 1995); thus, populations would be expected on the ORR. The lower reaches of BC and EFPC contain the

appropriate habitat for the hellbender; therefore, it is possible that this species occurs in these streams.

3.5.2.2 Threatened and/or Endangered Species

Appendix F describes the process that DOE must conduct to comply with Sect. 7 of the ESA. Also provided is a summary of species listed as threatened, endangered, or candidate species by the FWS and the state of Tennessee. The following discussion focuses on protected aquatic species in streams on or near Parcel ED-1.

No listed T&E macroinvertebrates or any taxa proposed for listing (see Appendix F) have been found in collections made in EFPC or BC since 1985 (Southworth et al. 1992; Hinzman in press; Smith and Tolbert 1993; Smith and Dickinson 1994). In addition to quantitative samples, these collections have included more spatially comprehensive qualitative surveys, although still limited to < 50 m reaches. However, no collections were made in these or any other streams on the ORR specifically for T&E species during this time period. In 1961, a survey of mollusks was conducted (H. V. Van der Schalie and J. Burch, University of Michigan, unpublished data, 1961), and no state- or federally listed or federal candidate species were found.

Although all streams on Parcel ED-1 have not been extensively surveyed, one state-protected fish species, the Tennessee dace (*Phoxinus tennesseensis*), is known to occur on the parcel, and the potential exists for other protected species to be present (see Appendix G). The Tennessee dace, "deemed in need of management" by the State of Tennessee, occurs in headwater creeks of the upper Tennessee River drainage, where it is rare to uncommon (Starnes and Jenkins 1991). Locally, the Tennessee dace occurs throughout the BC and EFPC watersheds, with most of the populations in the tributary streams. Because these populations have been recognized as among the largest in Tennessee, the ORR represents a stronghold for the species (Etnier and Starnes 1993). EFPC and lower BC provide important corridors for fish migration and for the exchange of gene flow between the smaller tributaries in which the Tennessee dace occurs in higher population numbers. Threats to the Tennessee dace include habitat degradation from stream channelization, impoundment, flow alterations, and siltation. Although not now federally listed or a candidate for listing, this species, which is endangered in Virginia and declining throughout its ranges, is being considered for formal review (Appendix G).

Historically, the "in-need-of-management" flame chub (*Hemitremia flammea*) was found near the Y-12 facility (Etnier 1978). This species is normally associated with springs and spring runs and may still be present in the proposed site. The federal candidate blue sucker (*Cycleptus elongatus*) and the "in-need-of-management" highfin carpsucker (*Carpiodes vellifer*) were found in earlier surveys of the Clinch River prior to its impoundment creating the Melton Hill Reservoir (Fitz 1968). These species are usually associated with river habitats, and it is unlikely that they would occur in streams on the site because they are too small. However, the highfin carpsucker could move into EFPC from the reservoir seeking gravel areas over which to spawn.

Other protected species, including the federally listed threatened yellowfin madtom (*Noturus flavipinnis*), the candidate hellbender (*Cryptobranchus alleganiensis*), and the state "in need of management" ashy darter (*Etheostoma cinereum*), could occur in or near the proposed site based on habitat requirements and regional distribution (Appendix G). The hellbender is an amphibian known to occur in the vicinity, and the lower reaches of BC and EFPC contain appropriate habitat. Although appropriate habitat for the yellowfin madtom and ashy darter may be present, these two fish species have not been documented in the vicinity.

3.5.2.3 Research and Monitoring

An Oak Ridge Research Park aquatic natural area, recognized as ecologically significant by ORNL, is located within Parcel ED-1. The significance of this natural area is based on the presence of rare or unusual species, the importance of activities conducted within the stream, and the uniqueness of the community assemblages. This natural area has also been recognized by the Nature Conservancy as being of very high ecological significance as a conservation site based on ecosystem quality and rarity (TNC 1995).

An aquatic Biological Monitoring and Abatement Program (BMAP), begun on BC in 1984, consists of four major tasks: (1) ambient toxicity testing, (2) bioaccumulation, (3) benthic macroinvertebrate community studies, and (4) fish community studies. A BMAP begun on EFPC in 1985 includes, in addition to the tasks for the BC BMAP, tasks to research (1) periphyton communities, (2) bioindicators and reproductive success in fish, and (3) terrestrial bioaccumulation from aquatic sources. Ecological damage attributable to past waste disposal activities has been characterized and documented (Loar et al. 1992b; Hinzman et al. 1993; Southworth et al. 1992). As abatement activities and remedial actions have progressed on the ORR, the BMAP has documented recovery in the BC and EFPC systems, the most substantial of which have occurred after the closure of the S-3 Ponds and the replacement of New Hope Pond with Lake Reality at the Y-12 Plant. Toxicity to laboratory test organisms (*Ceriodaphnia* and fathead minnows) in water collected from the uppermost sites was reduced, and fish and benthic macroinvertebrate communities began colonizing upper BC.

Within the boundaries of Parcel ED-1 are three sites located on EFPC used as part of the EFPC BMAP and one site used for the BC BMAP. BMAP sites are located at stream km EFK 2.1, EFK 5.0, EFK 6.3, and BCK 0.7 (see Fig. G-1). Some of these sites have been sampled since 1985.

The BMAPs for EFPC and BC provide an ecological measure of performance of remedial actions that have been implemented. Routinely collected data and special studies conducted as part of the Bear Creek BMAP have been used on several environmental restoration projects. The Bear Creek BMAP also provides essential data for the reservation-wide ecological risk assessment.

3.5.3 Wetlands

As discussed in Sect. 3.4, EFPC flows through the center of Parcel ED-1, and BC joins EFPC in the southwestern portion of the parcel. These streams and their associated floodplains and watersheds are known to contain wetland areas near the confluence of EFPC with Watts Bar Reservoir/Poplar Creek and probably in other areas. The total acreage in five wetlands identified during a COE survey of the floodplain in 1991-1992 (DOE 1994b) was about 1.4 ha (3.5 acres) (Fig. 3-17). All five are within the 100-year floodplain of EFPC (Fig. 3-17).

Hydrology in these wetlands is associated with the backwater of Watts Bar Reservoir; however, some upstream input comes from springs and surface runoff. Vegetation ranges from open water to herbaceous, shrub, and forest and includes sedges, jewelweed, smartweed, button bush, silky dogwood, box elder, green ash, and sycamore.

One wetland contains an active beaver colony with two beaver dams and a beaver lodge at the confluence of a major northern tributary, NT1 (see Fig. G-2), with EFPC (see Figs. 3-13 and J-3). Beaver activity has apparently increased the size of this wetland from that which was delineated in the 1991-1992 surveys (Appendix H).

Three other areas within Parcel ED-1 are believed to contain wetlands, but to date they have not been closely monitored. One of these areas is a floodplain forest near the confluence of EFPC and BC within the 100-year floodplain (see Fig. 3-17). The other two areas are located in recent logging sites; one is near a stream, and the other may contain seeps. See Appendix H for additional information on wetlands.

3.5.4 Biodiversity

Biological diversity (biodiversity) is simply described as "the variety and variability of life" or "the diversity of genes, species, and ecosystems" (CEQ 1993). The latter definition reflects the concept that biodiversity must be considered on different scales, ranging from the genetic composition of individual organisms to the structure and function of local ecosystems within a landscape. CEQ (1993) considers biodiversity to encompass four components:

1. *Genetic diversity*: the variation among individuals within a species that enables species to survive and evolve in a variety of environments.

2. *Species diversity*: the variety of individual species, including animals, plants, fungi, and micro-organisms.

3. *Local ecosystem diversity*: the diversity of all living and nonliving components within a given geographic area and their interrelationships. Ecosystems are the critical biological/ecological operating units in nature.

4. *Regional ecosystem diversity*: the pattern of local ecosystems across the landscape, sometimes referred to as "landscape diversity".

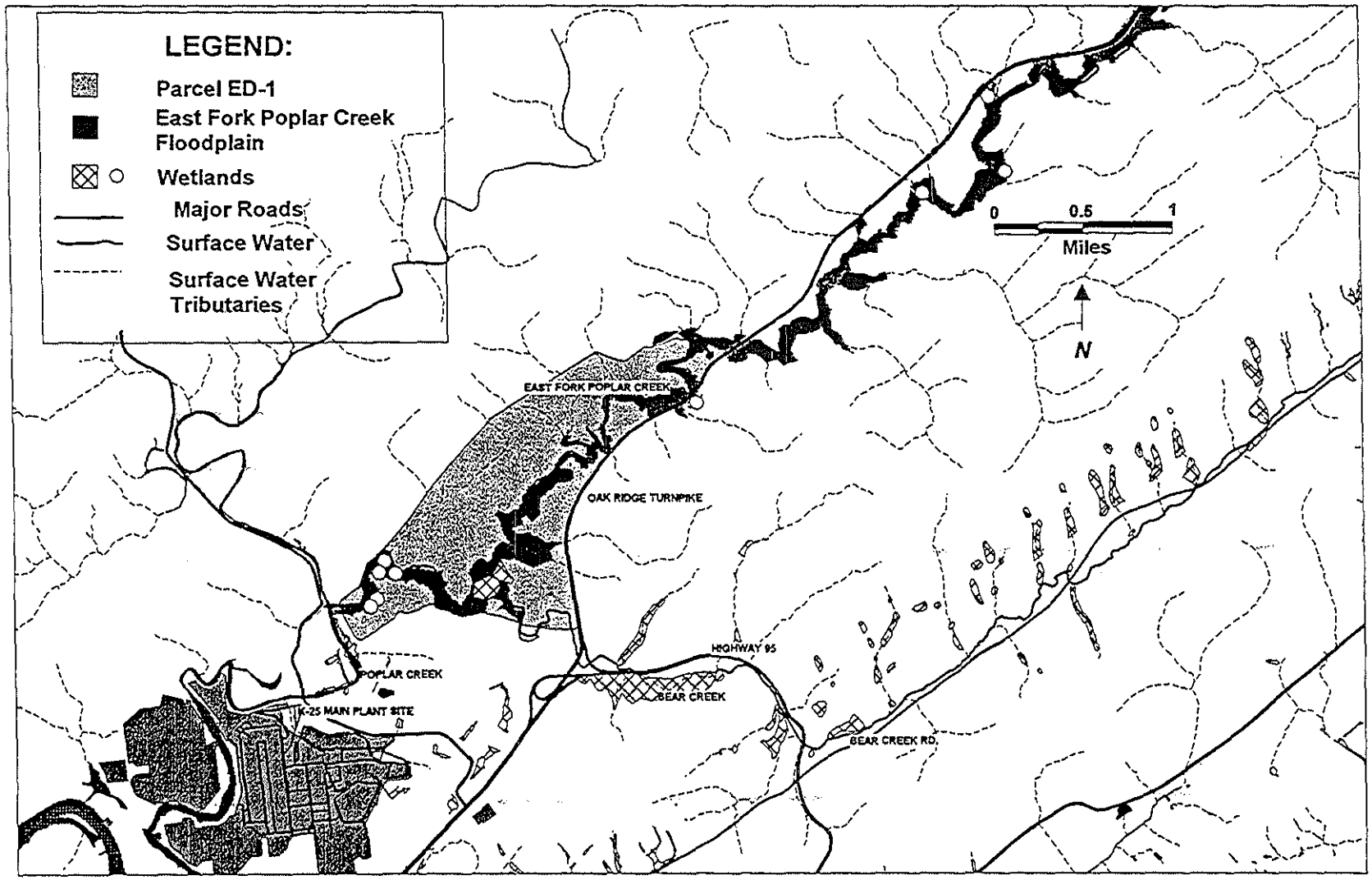


Fig. 3-17. East Fork Poplar Creek floodplain and wetlands on Parcel ED-1 of the Oak Ridge Reservation.

For the ecosystem of Parcel ED-1 and surrounding areas, biodiversity can be considered on all four scales:

- Individual animals of the same species inhabiting the area exhibit genetic diversity.
- The fish and other biological communities are comprised of numerous and varied species (species diversity).
- The local ecosystem is comprised of diverse plant and animal communities (bottomland hardwood forest, wetlands, pine plantations, old-field successional areas).
- These habitat types contribute to the diversity of the local/regional landscape.

Preservation of biodiversity is often perceived in a narrow sense, for example, protection of rare, threatened, or endangered species. Although this is one critical aspect of biodiversity management, the preservation of genetic diversity among abundant species may be equally important to the long-term survival of that species in the face of changing environmental conditions.

Genetic diversity within individual species at the proposed lease site is not known. Species and local ecosystem diversity at Parcel ED-1 are evident in the descriptions provided in Sect. 3.5. Biodiversity in species and the local ecosystem has no doubt been decreased by activities on the ORR. Terrestrial systems have been altered by agriculture and silviculture (e.g., pine plantations) because these land use practices emphasize monocultures of single or a few plant species of economic value over the natural diversity of plant communities. Similarly, species diversity and aquatic ecosystem diversity in BC and EFPC have been severely decreased by habitat loss, effects of effluents from the Y-12 Plant, and effects of urban point-source and nonpoint-source discharges.

Changes in species and ecosystem diversity in response to pollution control and remedial actions are detailed in various BMAP reports (Loar 1994; Loar et al. 1989, 1992b). In general, species and ecosystem diversity have recently increased on Parcel ED-1 because of ongoing ORR remedial actions and the early succession of pine plantations to old-field habitats.

With regard to the diversity of the local and regional landscape, those large, contiguous blocks of bottomland hardwood forest and mixed pine/hardwood forest that comprise a portion of Parcel ED-1 (see Sect. 3.5.1.2) are rapidly being lost to agriculture and urbanization. Mann et al. (in press) noted that these types of forest habitats support many rare plant and wildlife species and have themselves become rare in the Ridge and Valley Province of East Tennessee. In 1995, the Nature Conservancy reported on a preliminary study of the biodiversity of the ORR. Eighty-eight distinct conservation sites and three large landscape complexes were identified as important to biodiversity on the ORR because of the presence of rare species, rare communities, and large blocks of high-quality vegetation. Based on the occurrences of rare/endangered species, significant

communities, and other important landscape features, 27 of the 88 conservation sites were ranked as very highly significant. One conservation site on Parcel ED-1 (#BSR2-12) (Fig. 3-18) is comprised of mesic (Ridge and Valley floodplain) forest, chestnut oak-white oak-red oak forest, and streamhead seepage swamp habitats (TNC 1995). The BSR2-12 site supports two state-threatened plant species (Canada lily and goldenseal) and one fish species considered to be IM (Tennessee dace). Parcel ED-1 occurs within the Nature Conservancy's Landscape Complex 1 (TNC 1995). Landscape Complex 1 includes numerous small sites, including eight BSR 2 sites, and it encompasses the largest population of Tennessee dace known range-wide. It also contains 17 of the 44 blocks of hardwood forest over 100 acres in size. Long-term viability of many of these features will be facilitated by conservation management within this Landscape Complex (TNC 1995).

3.6 SOCIOECONOMICS

For the socioeconomic impact analysis in this EA, the Tennessee counties of Anderson, Knox, Loudon, Morgan, and Roane were chosen as the region of influence (ROI) (Fig. 3-19). These counties were selected because a high percentage (92%) of ORR employees reside in the five counties, they are geographically close to Parcel ED-1, and resources/utilities to be used in the development of the parcel would likely come from these five counties. In particular, the socioeconomic analysis focuses on the city of Oak Ridge because Parcel ED-1 is located within the city's jurisdiction, and the city lies within both Anderson and Roane counties. Thus, Oak Ridge would derive much of the benefit associated with developing Parcel ED-1 in terms of employment, income, and local government revenues. Conversely, Oak Ridge would be responsible for providing most of the additional public services (e.g., water, sewer, police and fire protection) associated with developing Parcel ED-1.

3.6.1 Population

3.6.1.1 General Information

The total population of the ROI in 1992 was 517,158 (70,525 in Anderson County, 347,583 in Knox County, 33,242 in Loudon County, 17,714 in Morgan County, and 48,094 in Roane County). Population in the ROI increased by 7.6% between 1980 (480,622) and 1992 (517,158), with growth occurring in Loudon (16.4%), Knox (8.7%), Morgan (6.7%), and Anderson (4.7%) counties. Roane County experienced a population decrease of 0.6% between 1980 and 1992 (UT 1994).

In 1992, 32.3% (167,287) of the total population (517,158) within the ROI resided within the corporate limits of Knoxville in Knox County, while 5.4% (27,976) resided within the corporate limits of Oak Ridge (U.S. Department of Commerce 1994). In its latest comprehensive plan, the city of Oak Ridge projected that its population will increase at an annual rate of 1.1% through 2000 (DOE 1992).

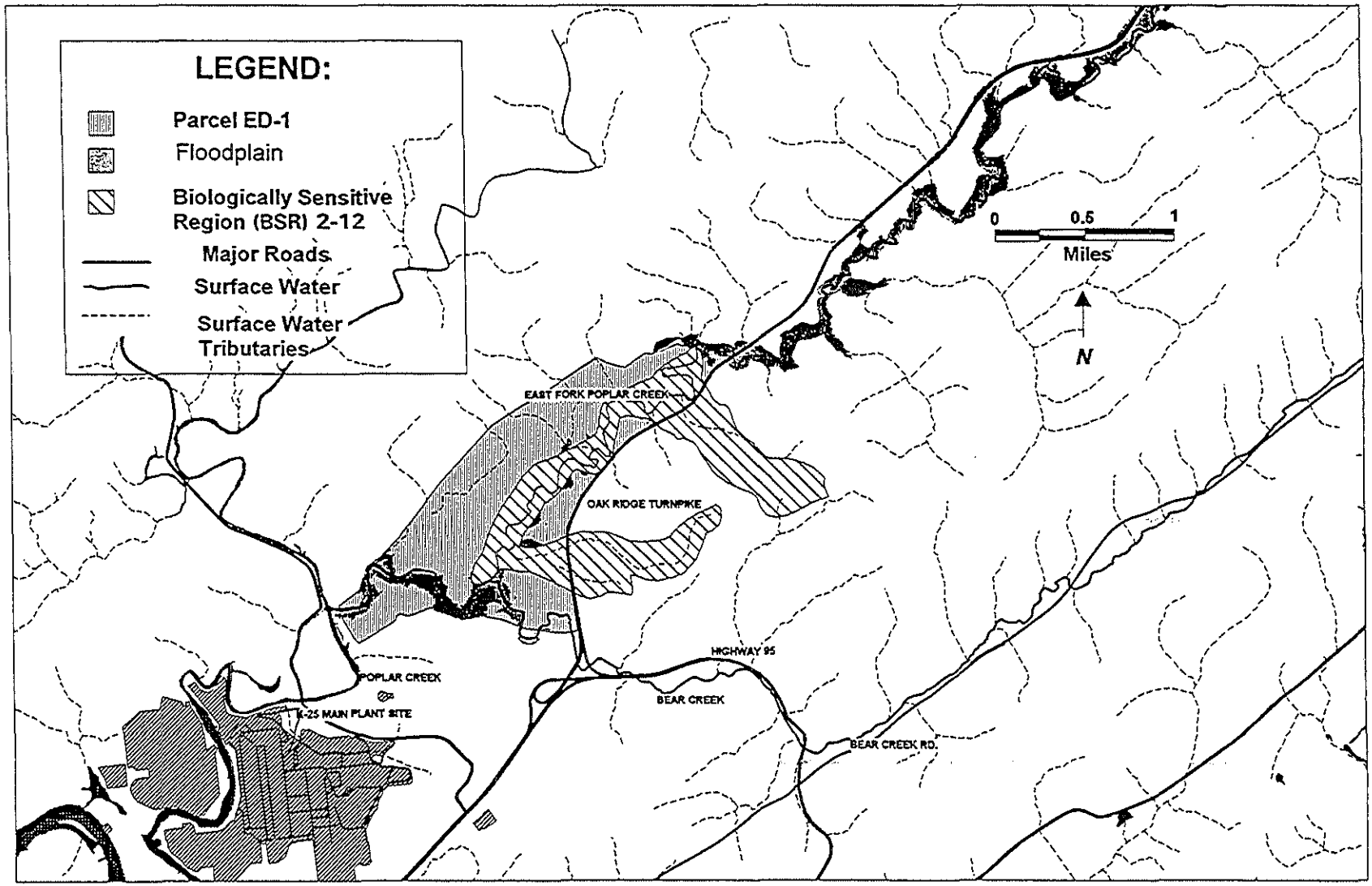


Fig. 3-18. Location of biologically sensitive region 2-12 on Parcel ED-1 of the Oak Ridge Reservation

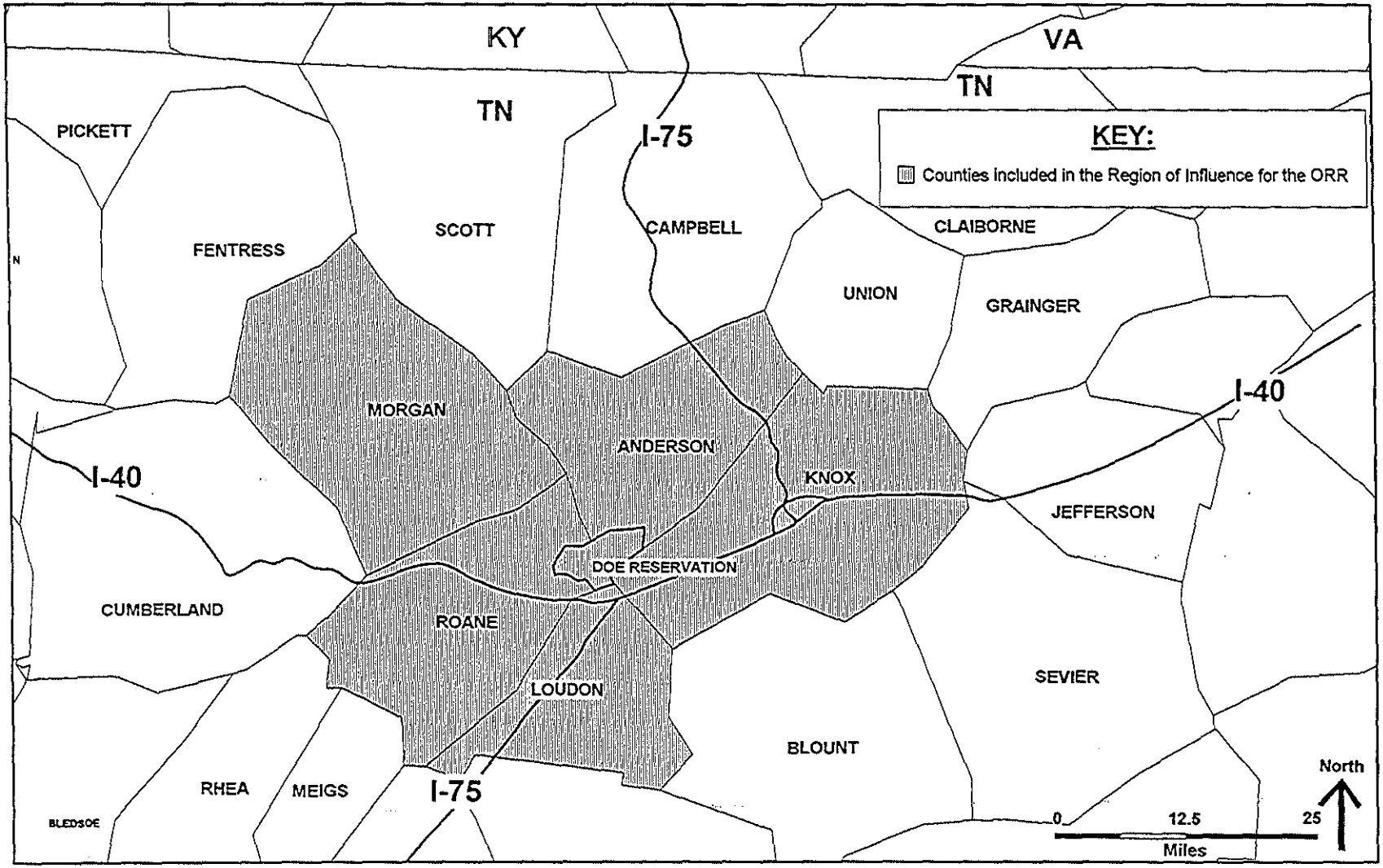


Fig. 3-19. Counties included in the region of influence of the Oak Ridge Reservation.

3.6.1.2 Distribution of Minority and Economically Disadvantaged Populations

Executive Order 12898 requires federal agencies to achieve environmental justice "to the greatest extent practicable" by identifying and addressing "disproportionately high and adverse human health or environmental effect of its . . . activities on minority populations and low- income populations . . . ." To determine whether disproportionate impacts would affect economically disadvantaged or minority populations, nearby population and income data were reviewed. Table 3-4 presents the 1990 population by race in census tracts (Fig. 3-20) near Parcel ED-1, and Table 3-5 gives the 1989 household income by census tract. In census tract 201, 36.8% of the population is black; in the other census tracts, the black population ranges from 1.4% to 6.5% of the total. Other nonwhite and Hispanic populations were less than 6% in each census tract, and no tract showed a substantially larger percentage of these populations. Tract 201 had the highest percentage of minority households.

The 1994 Federal Poverty Guideline on income levels by size of family unit for all states (except Alaska, Hawaii, and the District of Columbia) is shown in Table 3-6 (59 *Federal Register* 6277). Although guidance defines a *low-income household*, a *low-income* (the percentage of the households in the community with poverty-level incomes) is not defined. For the census tracts near Parcel ED-1, data are not available on household income by household size. Table 3-5 data are from a city of Oak Ridge study (City of Oak Ridge 1994), which lists households by income level and census tract but not household size.

In tract 201, 55% of the households have incomes less than $25,000, and 34% have incomes less than $15,000. In tract 205, 58% of the households have incomes less than $25,000, and 40% have incomes less than $15,000. In other tracts, more than 50% of the households have incomes greater than the Tennessee median income. Also, less than 30% of the households in the other tracts have incomes of less than $15,000. Based on these data, tracts 201 and 205 are identified as having the highest percentage of low-income or minority households in areas near Parcel ED-1.

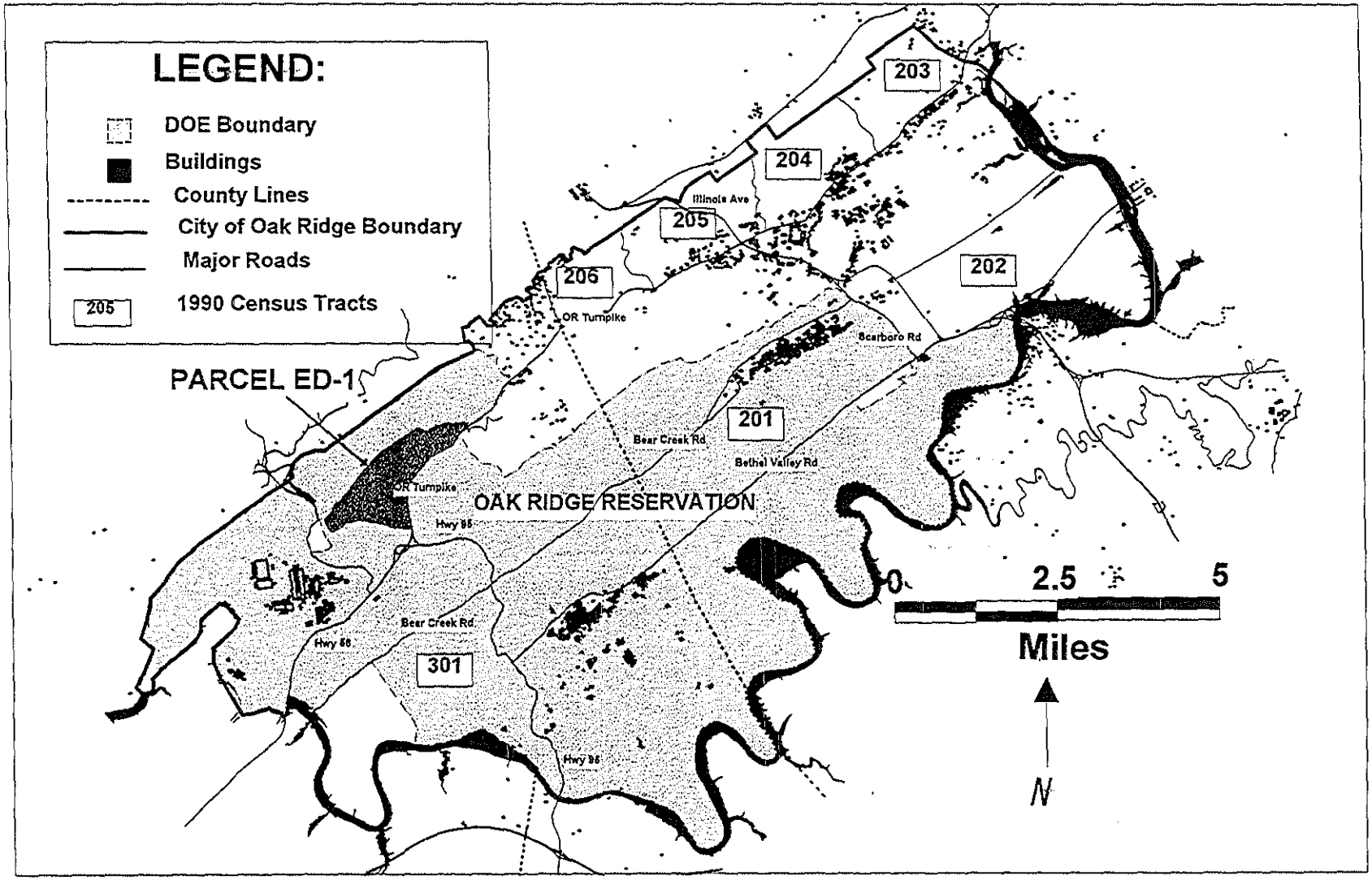


Fig. 3-20. City of Oak Ridge, 1990 census tracts.

Table 3-4. 1990 population distribution by race in census tracts near the Oak Ridge K-25 Site and the Y-12 Plant[a]

Tract	Total population	White		Black		Other non-white		Hispanic[b]	
		Total	%	Total	%	Total	%	Total	%
201	2,767	1,520	58.5	1,019	36.8	128	4.6	24	0.9
202	6,260	5,814	92.9	230	3.7	21	3.5	68	1.1
203	4,533	4,232	93.4	232	5.1	69	1.5	26	0.6
204	4,544	4,228	93.0	249	5.5	67	1.5	44	1.0
205	3,932	3,625	92.2	255	6.5	52	1.3	28	0.7
206	2,707	2,463	91.0	158	5.8	86	3.2	33	1.2
301	2,563	2,423	94.3	37	1.4	143	5.6	13	1.4
Total	27,306	24,405	89.4	1,936	7.0	761	2.8	236	0.9

[a] *Source:* "An Analysis of Impediments to Fair Housing," prepared by the city of Oak Ridge for the U.S. Department of Housing and Urban Development, June 1994.

[b] Hispanic origin may be any race and is included in other totals.

Table 3-5. 1989 household income by census tract[a]

Income range	Census tract						
	201	202	203	204	205	206	301
Less than $5,000	135	145	40	146	218	7	11
$5,000 - 9,999	191	268	114	271	200	14	23
$10,000 - 14,999	133	138	198	177	246	33	0
$15,000 - 24,999	281	346	359	344	299	129	57
$25,000 - 34,999	217	332	397	335	275	154	39
$35,000 - 49,999	173	411	445	401	209	221	137
$50,000 - 74,999	170	638	258	342	140	254	367
$75,000 - 99,000	20	198	88	86	43	161	213
$100,000 or more	29	161	35	32	23	81	117
Total	1,349	2,637	1,934	2,134	1,653	1,054	964

[a] *Source*: "An Analysis of Impediments to Fair Housing," prepared by the city of Oak Ridge for the U.S. Department of Housing and Urban Development, June 1994.

Table 3-6. 1994 Federal Poverty Guideline on income levels by size of family unit for all states[a]

Size of family unit	Poverty guidance
1	$7,360
2	9,840
3	12,320
4	14,800
5	17,280
6	19,760
7	22,240
8	24,720

[a]Excludes Alaska, Hawaii, and the District of Columbia.

3.6.2 Employment and Income

The total labor force in the ROI in 1993 was 266,440, with an unemployment rate of 4.4%. This unemployment rate was lower than that of Tennessee (5.7%) and the United States (6.8%) for the same year (UT 1994). The total labor force in Oak Ridge in 1991 was 15,854, with an unemployment rate of 4.0% (DOE 1992).

The availability of high-quality professional and technical positions in the Knoxville-Oak Ridge area has helped create a diversified work force in the ROI. Of the 246,999 persons employed in the ROI in 1990, the majority were employed in the professional/specialist (15.2%), administrative support/clerical (14.4%), sales (13.2%), precision production/craft and repair (11.7%), and service (11.5%) trades (UT 1994). Approximately 6% of the 1990 ROI work force was employed on the ORR; consequently, the three DOE facilities on the ORR represent the largest single source of regional employment (DOE 1994a).

In 1992, the average per capita income for the five counties in the ROI was $16,290, while the Tennessee average was $17,674. Per capita income in the ROI ranged from $19,601 in Knox County to $11,675 in Morgan County. Per capita income is typically higher in Oak Ridge than in the surrounding counties, reflecting the higher level of education in Oak Ridge and the concentration of residents employed by DOE and its contractors (DOE 1992). For example, the 1989 per capita income for Oak Ridge ($17,661) was considerably higher than the 1992 average per capita income for the ROI ($16,290) (UT 1994).

3.6.3 Housing

There were 212,612 housing units in the ROI in 1990, of which 197,472 (92.9%) were occupied and 15,140 (7.1%) were vacant. Of the 197,472 occupied units, 67.4%

were owner-occupied and 32.6% were renter-occupied. Of the 15,140 vacant units, the vast majority were in Knox County (9,943 or 65.7%), Anderson County (1,939 or 12.8%), and Roane County (1,881 or 12.4%) (UT 1994).

In 1990, there were 12,694 housing units in Oak Ridge, of which 11,763 (92.7%) were occupied and 931 (7.3%) were vacant. Of the 11,763 occupied units, 66.5% were owner-occupied and 33.5% were renter-occupied (UT 1994). The 1990 homeowner vacancy rate for Oak Ridge was 1.3%, while the rental vacancy rate was 13.2% (DOE 1992).

Housing prices vary widely among the five ROI counties. In 1992, the average mean price of a single-family unit in the ROI was $65,953, with a range in mean prices from $88,295 in Knox County to $39,445 in Morgan County. In 1990, the average median rent for renter-occupied units in the ROI was $217 per month, with a range in median rents from $272 in Knox County to $165 in Morgan County. The median value of a single-family unit in Oak Ridge in 1990 was $64,100, while the median rent for renter-occupied units was $307 (UT 1994).

3.6.4 Public Services and Local Government Expenditures

Because the city of Oak Ridge would be responsible for providing most of the additional public services associated with developing Parcel ED-1, the following subsections focus on public services and local government expenditures for Oak Ridge rather than for the entire ROI.

3.6.4.1 Education

The Oak Ridge school system has a preschool, four elementary schools, two middle schools, one high school, and one special education facility. Total enrollment at the start of the 1995-1996 school year was projected to be approximately 5,300 (Pat Farrell, Oak Ridge City Schools Superintendent's Office, personal communication to J. W. Saulsbury, ORNL, September 5, 1995). At $32.4 million, the education budget represents the largest single item (34.4% of the total) in the city of Oak Ridge fiscal year (FY) 1996 budget (City of Oak Ridge 1995).

3.6.4.2 Water and Sewer Services

Oak Ridge has sufficient water and sewer services to accommodate projected increases in population and business activities. The city owns and operates the water distribution system but purchases treated water from DOE (City of Oak Ridge 1995). The DOE water treatment and filtration system has a capacity of 1.2 to 1.3 m^3/s (28 to 30 mgd) but typically processes only about half that rate (DOE 1992).

The city also owns and operates the sewage collection system, the wastewater treatment plant (in the west end of Oak Ridge), and a package plant located in the Clinch River Industrial Park (City of Oak Ridge 1995). The sewer system typically operates at about half its 0.35 m^3/s (8 mgd) peak capacity (DOE 1992).

3.6.4.3 Police and Fire Protection

In 1992 the Oak Ridge Police Department had 46 full-time police officers and 9 civilian officers, for a citizen/officer ratio of about 509:1 (UT 1994). At $3 million, the police department budget represents the fourth largest item in the city of Oak Ridge FY 1996 budget (City of Oak Ridge 1995).

The Oak Ridge Fire Department has three stations, which are located in the east, west, and central areas of the city. Over the past several years, the Fire Department's fleet of vehicles has been significantly improved, including replacement and restoration of older vehicles. Due in part to these improvements, the city of Oak Ridge has maintained a Class 3 fire rating (an independent rating used by insurance companies to set fire insurance rates) since 1989. The Class 3 rating results in relatively low fire insurance rates for Oak Ridge homeowners (DOE 1992).

3.6.4.4 Local Government Expenditures

The city of Oak Ridge FY 1996 budget projects total expenditures of approximately $94.1 million. Of this amount, over two-thirds is budgeted for education ($32.4 million or 34.4%) and utility operation ($30.9 million or 32.8%). Other major budget items include capital outlay ($13.4 million), police ($3.0 million), debt service ($3.0 million), other activities ($2.5 million), fire ($2.4 million), public works ($1.8 million), and recreation and parks ($1.6 million). For FY 1996, the city projects that it will exceed total revenues and other financing sources ($85.0 million) with total expenditures ($94.1 million), for a deficit of $9.1 million. However, because the city had an estimated fund balance of approximately $36.8 million on September 1, 1995, the total projected fund balance for June 30, 1996, is $27.7 million (City of Oak Ridge 1995).

3.6.5 Local Government Revenues

Because the city of Oak Ridge would derive much of the benefit associated with developing Parcel ED-1 in terms of local government revenues, this subsection focuses on revenues for Oak Ridge rather than for the entire ROI.

The city of Oak Ridge FY 1996 budget projects total revenues and other financing sources of approximately $85.0 million. Of this amount, over two-thirds comes from charges for services ($33.8 million or 39.8%) and intergovernmental transfers ($26.9 million or 31.6%). Other major revenue sources include taxes ($18.1 million) and other transfers ($11.9 million). As discussed in Sect. 3.6.4.4, the city projects to exceed total revenues and other financing sources ($85.0 million) with total expenditures ($94.1 million), for a deficit of $9.1 million in FY 1996 (City of Oak Ridge 1995).

Because Oak Ridge is divided between Anderson and Roane counties, different parts of the city are subject to different property tax rates. The Roane County portion of Oak Ridge, in which Parcel ED-1 is located, has a property tax rate of 4.78% (a city tax rate of 1.73% plus a county tax rate of 3.04%) and an appraisal ratio of 40% on commercial and industrial real property (UT 1994).

The presence of three large DOE facilities within the city affects Oak Ridge in terms of tax revenues. The DOE facilities are exempt from local property taxes; instead, the federal government traditionally made annual in-lieu-of-tax payments. In FY 1986, the city of Oak Ridge accepted a one-time payment of $22.4 million from DOE, ending the annual payments (DOE 1992).

3.6.6 Transportation

3.6.6.1 Existing Traffic Conditions

The traffic induced by the proposed industrial park would have an immediate influence on the following four roadway segments:

(1) SR 95 from the junction with SR 58 to Wisconsin Avenue (Oak Ridge Turnpike),
(2) SR 95 from the junction with SR 58 to Bear Creek Road (White Wing Road),
(3) Blair Road, and
(4) SR 58 from Gallaher Bridge to the junction with SR 95.

Annual average daily traffic (AADT) for these roadways is shown in Fig. 3-21 (TDOT 1994). The traffic within the study area, ranging from 3,500 to 15,670 vehicles a day, is considered light compared to traffic on other roadways in Oak Ridge (ranging from 17,040 to 30,360 vehicles a day).

Roadway operational conditions such as the delay, congestion, and conflicting movements experienced by the roadway users are often described in terms of level of service (LOS). A LOS definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, convenience, and safety. Six levels of service, A through F, are used to represent a continuum of operating conditions, level A being the most desirable and level F the most undesirable (Table 3-7). During the 1960s, most highways were designed for LOS C. However, due to higher highway construction costs and rapid increases in traffic volumes, many state and city traffic agencies now consider LOS D acceptable.

LOS analysis was performed for the existing traffic conditions in the vicinity of Parcel ED-1 using available traffic volume information and the procedure suggested by the publication *Highway Capacity Manual* (Transportation Research Board 1985). The existing levels of service for the four roadway segments listed in Table 3-8 range from A to D and are, therefore, considered acceptable.

Table 3-7. General level-of-service (LOS) criteria for roadway segments

Level	Criteria
A	Traffic flows freely with low volumes and high speeds.
B	Traffic flow is stable, but operating speeds and maneuverability are somewhat restricted because of increased volume.
C	Traffic flow is still stable, but most drivers are restricted in their freedom to select their own speed, change lanes, or pass.
D	Traffic flow approaches instability; tolerable operating speeds are maintained but may drop because of fluctuations in volume and temporary restrictions to flow. Maneuverability is limited.
E	Volumes are at or near the capacity of the roadway. Flow is unstable, speeds are low, and momentary stoppages may occur.
F	Volumes exceed roadway capacity, speeds are very low, and stoppages occur for long or short periods.

Source: Transportation Research Board 1985.

Table 3-8. Existing levels of service and traffic during the peak traffic hour (7:30–8:30 a.m.) on the Oak Ridge Reservation near Parcel ED-1

Roadway segment	Peak traffic volume (vehicles per hour)	Level of service
Blair Road	435	C
SR 95 from junction with SR 58 to Wisconsin Avenue	883	D
SR 95 from junction with SR 58 to Bear Creek Road	858	D
SR 58 from Gallaher Bridge to junction with SR 95	1068	A

3.6.6.2 Traffic Safety

Accident information for the past three years for the two established industrial parks in the area (Commerce Park and Bethel Valley Industrial Park) was obtained from the city of Oak Ridge Police Department (Lt. Gary Ogle, personal communication with S. M. Chin, Oak Ridge National Laboratory, October 1995) (Table 3-9). The number of accidents at the entrances/exits of these two industrial parks is unsatisfactory. However, without a detailed traffic safety study, it is difficult to pin-point the traffic safety problem associated with these accidents.

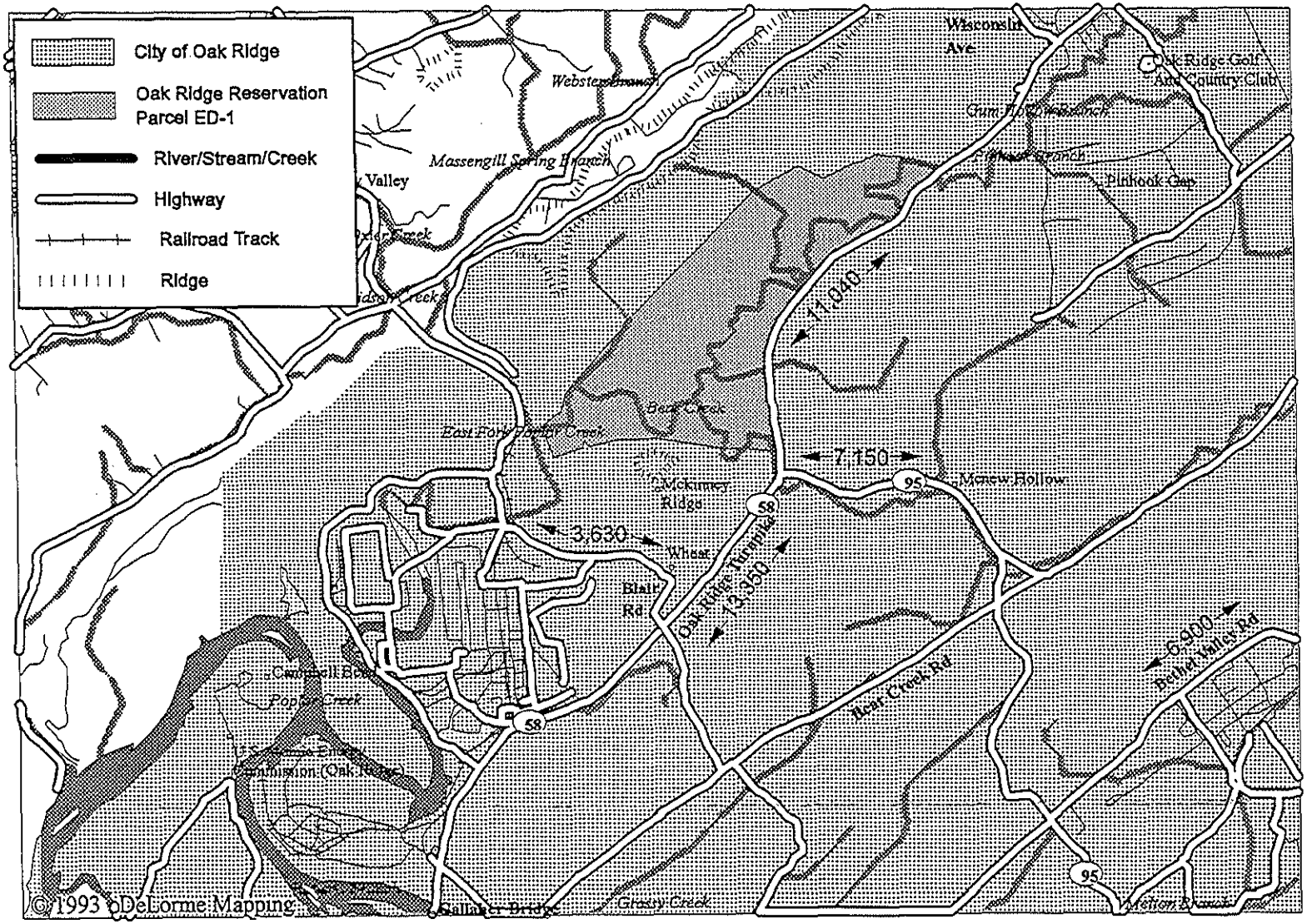


Fig. 3-21. Annual average daily traffic for Oak Ridge, 1994.

Table 3-9. Vehicular accident information for Oak Ridge industrial parks for the past 3 years

Industrial Park	Intersection	Number of Accidents
Commerce Park	Entrance with Illinois Avenue	17
	Chesapeake Drive with Scarboro Road	6
Bethel Valley Industrial Park	Alvin Weinberg Drive with Bethel Valley Road	17

Source: Lt. Gary Ogle, Oak Ridge Police Department, October 1995.

In addition to vehicular accidents, deer-related accidents constitute a major traffic safety problem within the Oak Ridge area. Over the past three years, 260 deer-related traffic accidents within the Oak Ridge area were reported (J. Evans, Tennessee Wildlife Resources Agency, personal communication with S. M. Chin, October 1995). In 1994, there were 7 deer-related traffic accidents on SR 58 from Gallaher Bridge to the junction with SR 95, 8 on SR 95 from the junction with SR 58 to Wisconsin Avenue, and 14 on SR 95 from Wisconsin Avenue to Illinois Avenue, for a total of 29 deer-vehicle collisions on three of the road segments that would be carrying traffic to and from Parcel ED-1.

3.6.6.3 Existing Commuting Traffic Pattern

Without the benefit of a detailed origin and destination study, certain assumptions must be made regarding the flow pattern of commuter traffic within the study area. Because of the proximity to K-25, it is assumed that the commuter traffic pattern in the study area would be similar to that of K-25 (Tennessee Transportation Assistance Program 1993). The existing pattern for K-25 is presented in Fig. 3-22. Most (88%) of the K-25 commuting traffic comes from the east side of SR 58, and the remaining 12% comes from the west side. Of the east side traffic, 62% comes from the Oak Ridge Turnpike, 8% comes from Blair Road, and 18% comes from White Wing Road (W. E. Issel, Community Development Director, city of Oak Ridge, personal communication with S. M. Chin, October 1995).

3.6.6.4 Existing Traffic Noise

Two noise level measures are commonly used in traffic-related noise studies: L_{10} and L_{eq} (Institute of Transportation Engineers 1992). L_{10} is the 10^{th} percentage point or the 90^{th} percentile of the sound pressure level probability distribution function. In other words, L_{10} is the noise level that is exceeded 10 per cent of the time at a specific location. The equivalent noise level, L_{eq}, is the average noise level expressed in decibels. In field data collection, L_{eq} may be approximated as the logarithmic sum of a series of discrete noise

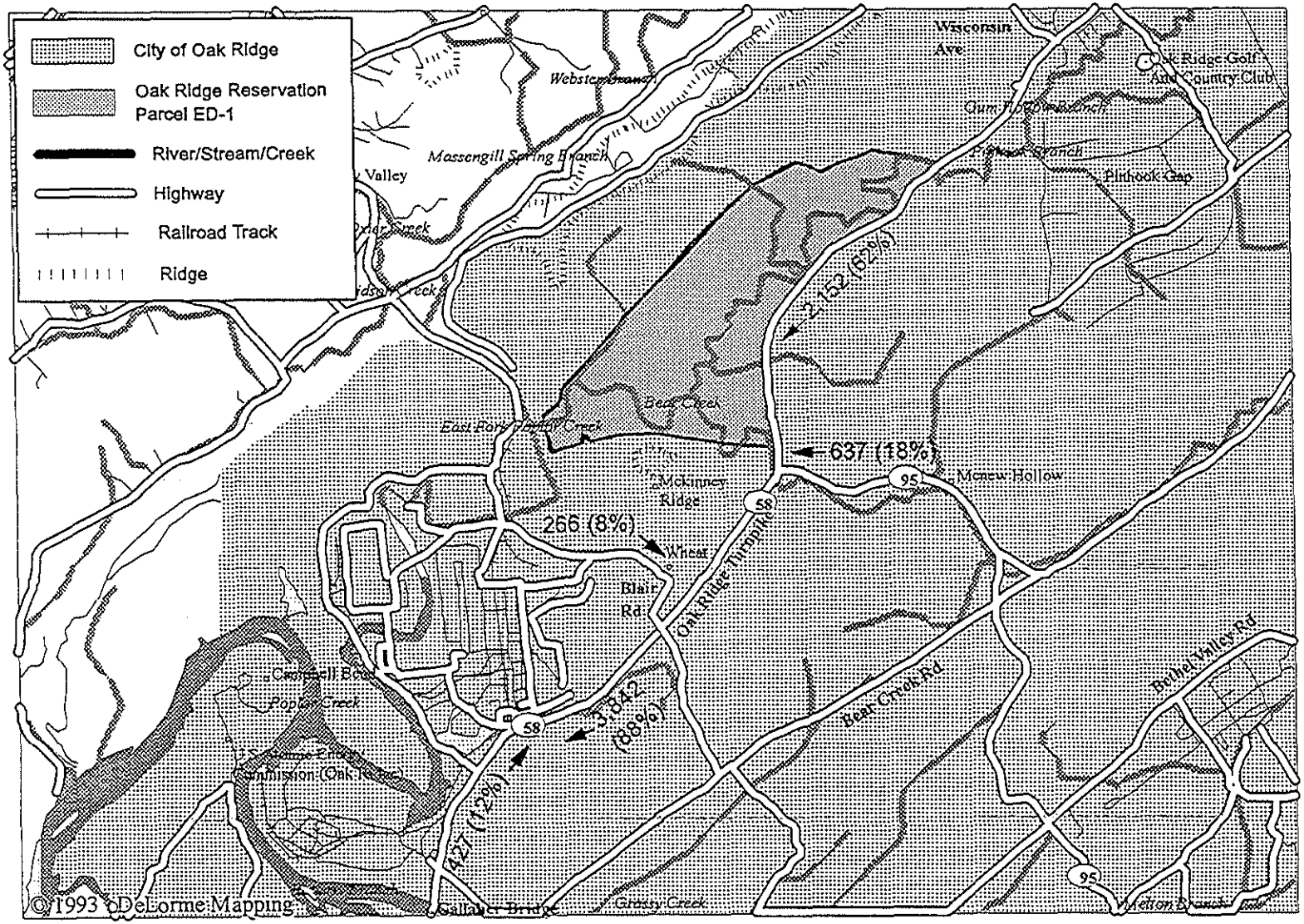


Fig. 3-22. K-25 commuter traffic pattern.

level samples. In general, the L_{eq} noise level reading is about 3 dBA lower than the L_{10} reading for the same sound source over a period of time. The L_{eq} noise level is additive, but it is not linearly proportional to the traffic volume. In general, doubling the traffic volume will only add 3 dBA to the original L_{eq} noise level. No sensitive receptor sites (such as picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, or hotels) exist within the study area. However, a newly developed subdivision, Southwood Estates, is situated on the south side of SR 95 (Oak Ridge Turnpike). Some lots within the subdivision are close to SR 95, and future houses might be situated near high traffic noise.

Due to the lack of sensitive receptors in the study area, no field ambient noise level data was collected. Instead, traffic noise levels for the four roadway segments within the study area were estimated (Table 3-10) based on the Federal Highway Administration (FHWA) traffic noise prediction procedure (FHWA 1977). Estimates were made for locations at 100 and 200 feet away from the center line of the selected roadway segments during the peak traffic hour.

As shown in Table 3-10, locations 100 feet or more from the center line of these roadways do not experience noise levels exceeding the FHWA's L_{eq} limit of 67 dBA (FHWA 1982). Therefore, noise from existing traffic on the four roadway segments within the study area is within acceptable limits.

3.6.7 Ambient Noise

Noise is defined as unwanted or undesirable sounds that have an adverse effect on human beings and their environment, including land, structures, natural wildlife, and ecological systems (Canter 1977). The measurements of noise are expressed in a logarithmic ratio of sound pressure, referred to as the sound pressure level, and are quantified using the term "decibel" (dB). To obtain a representative sound level that contains a wide range of frequencies that humans respond to, the "sound pressure level" is A-weighted, resulting in the term dBA. Normal human hearing capabilities range from 0 dBA (the threshold of hearing) to 140 dBA (a jet plane on the ground at 20 ft).

Ambient sound levels have not been measured on Parcel ED-1. Based on present land use, traffic volume, and population density, ambient levels are estimated to be 50 dBA.

Table 3-10. Estimated noise levels during the peak traffic hour[a] (7:30–8:30 a.m.) on the Oak Ridge Reservation near Parcel ED-1

Roadway segment	Estimated noise level (L_{eq})	
	100 feet from center line of the roadway	200 feet from center line of the roadway
Blair Road	59 dBA	55 dBA
SR 95 from junction with SR 58 to Wisconsin Avenue	63 dBA	58 dBA
SR 95 from junction with SR 58 to Bear Creek Road	62 dBA	57 dBA
SR 58 from Gallaher Bridge to junction with SR 95	64 dBA	59 dBA

[a]Based on FHWA traffic noise prediction procedure (FHWA 1977).

3.7 CULTURAL RESOURCES

Several reconnaissance-level surveys for cultural resources have been conducted on the ORR. The first reported reconnaissance of the area was conducted along portions of the Clinch River by Cyrus Thomas (1894) and was reported in the Bureau of American Ethnology. Other reconnaissance surveys conducted on and/or adjacent to the ORR include Webb 1938, Nash 1941, McNutt and Graham 1961, McNutt and Fisher 1960, Schroedl 1972 and 1974, Fielder 1975, GAI 1981, Jolley 1982, and several project-specific surveys conducted by DuVall & Associates, Inc., over the past four years.

Previous surveys conducted on the ORR that identified and evaluated cultural resources within and immediately adjacent to the tract include

(1) surveys by Fielder (1974) and Fielder, Ahler, and Barrington (1977) of specific areas of the ORR focusing on prehistoric and historic sites, respectively;

(2) a survey of the EFPC floodplain by DuVall (1992); and

(3) a recent evaluation of previously recorded and inventoried archaeological and pre-World War II structure sites on the ORR (P. Souza, LMES, personal communication with H. Braunstein, LMES, August 3, 1995).

These surveys reveal that nine pre-World War II structures and one cemetery are located on Parcel ED-1; and five pre-World War II structures, one cemetery, and one prehistoric archaeological site are located adjacent to the parcel, all of which could potentially be affected by development activities (Fig. 3-23). Table 3-11 lists these

structures/sites and provides information pertaining to their function, condition, and eligibility for inclusion in the National Register of Historic Places (NRHP).

3.7.1 Prehistoric Properties

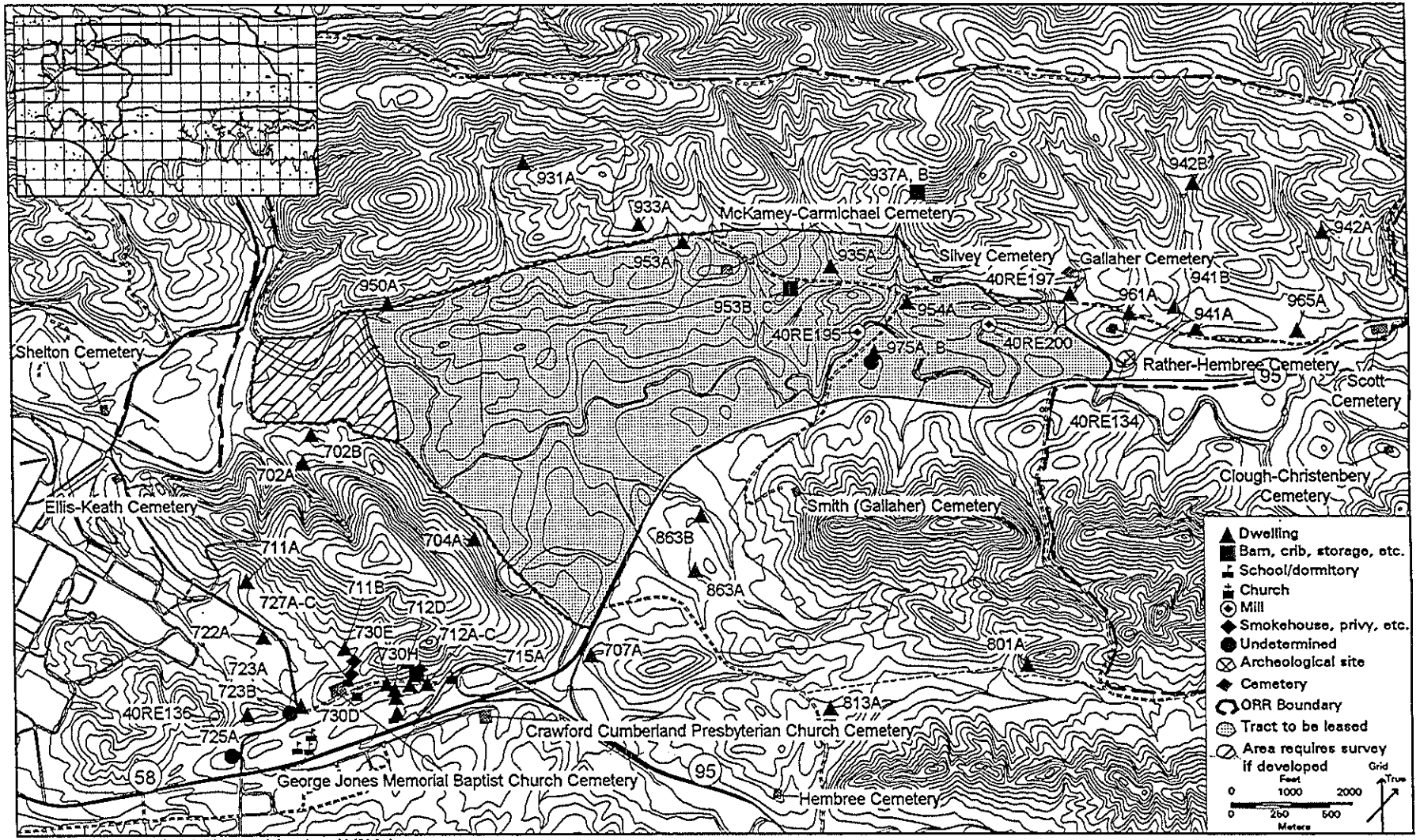
Site 40RE134, East Fork Site, is the only prehistoric archaeological site located within the vicinity of the tract. The site was originally recorded by Fielder (1974) at a time when the area surrounding the site had been recently plowed and planted in pine seedlings. Site investigations recovered 54 artifacts, including unifacial and bifacial implements and projectile points, and revealed that no cultural strata were present below the plowzone. Fielder (1974) suggested that this site was of probable Woodland period cultural affiliation. This site is ineligible for inclusion in the NRHP.

3.7.2 Historic Properties

Fourteen pre-World War II structures and two cemeteries are located within or adjacent to the tract. Of these structures/sites, only three have been determined to be eligible for inclusion in the NRHP: 40RE197 (939A) (outside tract boundary), a foundation-only dwelling believed to be associated with the Gallaher family, based on its location relative to the Gallaher Cemetery and its association with a mill site (40RE200) on EFPC; 40RE200 (939B) (inside tract boundary), a foundation-only mill; and 40RE195 (975C) (inside tract boundary), a foundation-only mill (both saw and grist) that was most likely established by John Nail, Sr., sometime between 1801 (the date deed records begin for Roane County) and 1838 (the time of first mention of the mill in the historical record).

3.7.3 State Historic Preservation Officer (SHPO) Consultation

In accordance with the **Programmatic Agreement Among the Department of Energy Oak Ridge Operations Office, the Tennessee State Historic Preservation Officer, and the Advisory Council on Historic Preservation Concerning Management of Historical and Cultural Properties at the Oak Ridge Reservation**, a project summary entitled **Section 106 Archaeological and Historical Review (AHR) for the Lease of Approximately 1000 Acres of the Oak Ridge Reservation to the East Tennessee Economic Council** was prepared for the proposed action and submitted to the SHPO on July 24, 1995 (see Appendix I).



Note: Coordinate system is Oak Ridge administrative grid (S16A).

Fig. 3-23. Cultural resources within and adjacent to Parcel ED-1 of the Oak Ridge Reservation.

Table 3-11. Pre-World War II structures, cemeteries, and archaeological sites located within and immediately adjacent to Parcel ED-1

Number/ name	Function	Condition *	Condition **	NRHP eligibility	Latitude	Longitude
Structures/sites within tract boundary						
935A	Dwelling	Foundation only	Foundation only	N	35° 58′ 2″	84° 21′ 46″
40RE200 939B	Mill	Not visited	Foundation only	Y	35° 58′ 8.3″	84° 21′ 13.1″
953A	Dwelling	Foundation only	Foundation only	N	35° 57′ 51.7″	84° 22′ 13.5″
953B	Dwelling	Foundation only	Could not relocate	N	35° 57′ 55″	84° 21′ 50″
953C	Barn	Foundation only	Could not relocate	N	35° 57′ 55″	84° 21′ 50″
954A	Dwelling	Foundation only	Foundation only	N	35° 58′ 4″	84° 21′ 29.1″
975A	Dwelling	Foundation only	Foundation only	N	35° 57′ 54″	84° 21′ 29″
975B	Undetermined	Not visited	Foundation only	N	35° 57′ 52.3″	84° 21′ 28.5″
40RE195 975C	Mill	Not visited	Foundation only	Y	35° 57′ 55.2″	84° 21′ 34.1″
McKamey-Carmichael	Cemetery	---	---	N	35° 57′ 51.8″	84° 22′ 3″
Structure/sites adjacent to tract						
702A	Dwelling	Foundation only	Foundation only	N	35° 56′ 46.4″	84° 22′ 52.3″
704A	Dwelling	Foundation only	Foundation only	N	35° 56′ 52″	84° 22′ 15″
933A	Dwelling	Foundation only	Foundation only	N	35° 57′ 50″	84° 22′ 23″
40RE197 939A	Dwelling	Partially standing	Foundation only	Y	35° 58′ 20″	84° 21′ 3″
950A	Dwelling	Foundation only	Foundation only	N	35° 57′ 30.5″	84° 22′ 41.8″

Number/ name	Function	Condition *	Condition **	NRHP eligibility	Latitude	Longitude
40RE134	Archaeological site	---	---	N	35° 58′ 16.3″	84° 20′ 46.4″
Silvey	Cemetery	---	---	N	35° 58′ 9.9″	84° 21′ 26.7″

[a] Fielder, Ahler, and Barrington 1977

[b] DuVall and Souza (draft)

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 PROPOSED ACTION

4.1.1 Land Use

The proposed action would substantively change the present land use of Parcel ED-1 from wildlife management, silviculture, ecosystem research, and environmental monitoring to an industrial park. Because the parcel is in close proximity to the industrial K-25 Site, such a change would be compatible with some nearby land use. ETEC intends to market the land closest to the Oak Ridge Turnpike (hence the public) for "light" uses, such as offices and service-oriented businesses. Areas surrounding buildings would be landscaped and maintained to preserve an aesthetically pleasing environment. Land in the rear portion of the parcel to the north of EFPC would be developed by heavier types of facilities, such as manufacturing plants. Floodplain and wetlands areas (Appendix H), archaeological and historic sites (Appendix I), and other environmentally sensitive areas (Appendix J) would be left in their natural state (Fig. 4-1).

4.1.2 Geology and Soils

Geologic formations underlying Parcel ED-1 would not be affected by the proposed development. Site clearing, grading, and contouring might alter hilly portions of the parcel. Seismic hazards are low in the Oak Ridge area, and structures would be designed to conform to appropriate seismic standards.

The lower side slopes on the north side of the parcel have many karst features, including large solution cavities (i.e., sinkholes). Some areas are unsuitable or are marginally suitable for industrial facilities because of wetness, flooding or water ponding, and the presence of sinkholes. Many of the wetlands and all of the flood-prone areas are in the riparian zones surrounding BC, EFPC, and their smaller tributaries. The floodplain and sinkholes should be avoided during development to prevent damage to geologic features and industrial facilities. For safety reasons, these areas should be identified and mapped prior to construction of roads, buildings, parking lots, and other structures.

Construction would disturb soils; some topsoil might be removed in the process. Topsoil would be replaced after buildings and roads are completed, and nonpaved areas would be landscaped with native vegetation. Some soils on the parcel are prime farmland soils (see Sect. 3.2.4.4) that are protected under the FPPA. DOE has consulted with the NRCS (formerly Soil Conservation Service) with regard to prime farmland soils on Parcel ED-1 and has been advised that because Parcel ED-1 lies wholly within the city of Oak Ridge, the prime farmland designation is waived, and other use of the land, such as industrial development, are permitted (Alan W. Neal, NRCS, personal communication with T. Zondlo, ORNL, August 9, 1995).

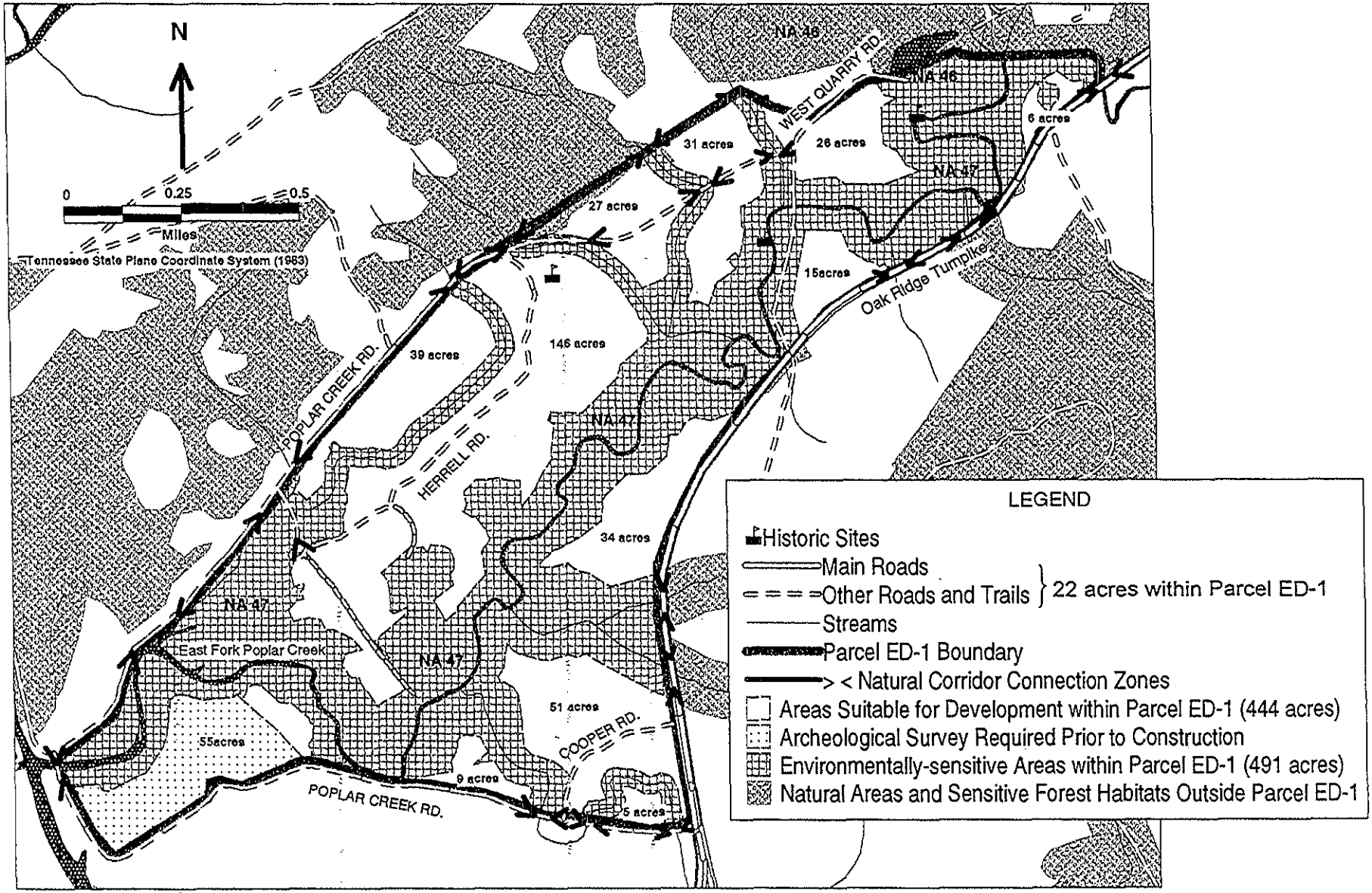


Fig. 4-1. Land suitable for development on Parcel ED-1 of the Oak Ridge Reservation. (Approximately 22 acres are roads.)

4.1.3 Air Quality

4.1.3.1 Construction

Local air quality could be affected by emissions from vehicle and equipment exhaust and fugitive dust from vehicle traffic and disturbance of soils. These emissions would include carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), inhalable particulate matter (particles less than 10 micrometers in diameter, designated PM-10), and unburned hydrocarbons. Emissions of particulate matter would consist primarily of airborne soil. Emissions from site preparation and construction would be short term, sporadic, and localized at the Parcel ED-1 site (except for emissions associated with the personal vehicles of construction workers and vehicles transporting construction materials and equipment to the site). Dispersion would decrease concentrations of pollutants in the ambient air as distance from the site increases.

For the analysis, it was assumed that construction activities on Parcel ED-1 would employ a maximum of 85 workers at any one time, based on the maximum number of workers involved in construction of two existing facilities in Oak Ridge, the Scientific Ecology Group (SEG) facility and the Coors Technical Ceramic Company (Coors) facility. To obtain an upper-bound estimate of the increased number of vehicle trips to and from work sites, it was assumed that (1) workers would not be driving anywhere in the area if construction jobs on Parcel ED-1 were not available, and (2) workers on the job would each make a round trip to Oak Ridge for lunch. With these assumptions, 340 (4×85) one-way trips would be made each day. This number is small compared to the several thousand vehicle trips per day necessary for workers on the ORR to get to and from their jobs or the over 100,000 cars per day passing through Knoxville both ways on Interstate 40. Therefore, there would be no appreciable increases in ambient pollutant concentrations from this traffic.

Not all land available for construction would be disturbed at any one time. Rather, earthwork would likely be undertaken in increments, with the first phase being excavation for utility installation, road construction and upgrading, and grading/contouring. An exceedance of the PM-10 NAAQS would be due to fugitive dust from excavation and earthwork. Water or a chemical dust suppressant would be frequently applied to disturbed areas and spoils piles to minimize these fugitive dust emissions.

Estimates of the largest increments of PM-10 that might result from construction were obtained using an EPA-approved screening model (SCREEN3) for atmospheric dispersion of pollutants (EPA 1995). Screening procedures are used to conserve resources by eliminating from further analysis those emissions sources that clearly will not contribute to pollution concentrations in excess of standards. To prevent erroneous elimination of sources that should be analyzed further, screening models are conservative, i.e., they tend to produce *higher* values of pollutant concentrations than the more refined and complicated models used in detailed analyses (EPA 1988). For example, the SCREEN3 model includes an option to calculate pollutant concentrations under a variety of meteorological conditions and selects the worst case; this option was activated in all the analyses discussed below.

The use of a more complex model, incorporating actual weather data, typically produces lower estimates of pollutant concentrations.

For this analysis, the largest area under construction at any one time was assumed to be 100 m × 200 m (5 acres) for a large building or parking area located with the northeastern boundary of Parcel ED-1 at 1500 m (0.9 mi) from the nearest resident (i.e., at the shortest distance from the nearest resident to any point on the boundary of Parcel ED-1). Because of the configuration of Parcel ED-1, the corners of such an area would extend somewhat beyond the actual parcel boundaries. The wind was assumed to be blowing along the long axis of the construction area, directly toward the nearest residence. It was assumed that the use of dust suppressants would reduce emissions by 50% (EPA 1985). With these assumptions, the maximum 24-hour average increase in PM-10 concentration at the nearest residence was predicted to be 35 $\mu g/m^3$, and the annual increase (assuming that the construction occurred throughout the year) was predicted to be 9 $\mu g/m^3$.

Over the last three years, background 24-hour average values of PM-10 on the ORR have not exceeded 75 $\mu g/m^3$ and annual averages have not exceeded 25 $\mu g/m^3$ (MMES 1993; MMES 1994; LMES 1995b). The highest 24-hour average reported in Knoxville during 1992-1994 was 88 $\mu g/m^3$, and the highest annual value was 40 $\mu g/m^3$. In the city of Rockwood (in Roane County) the two highest 24-hour averages during 1992-1994 were 132 $\mu g/m^3$ and 81 $\mu g/m^3$, and the highest annual average was 30 $\mu g/m^3$. The single anomalous 24-hour average value from Rockwood was not replicated at other monitors in Rockwood or at any of the ORR monitors that are much nearer to Parcel ED-1. The second-highest 24-hour average PM-10 concentration reported from any monitor in Rockwood during the period 1992-1994 was 81 $\mu g/m^3$, which is consistent with the highest value during the same period reported at any monitor in Knoxville (88 $\mu g/m^3$) or on the ORR (74 $\mu g/m^3$). For the 24-hour PM-10 standard, an average of one exceedance per year, over a three-year period, is allowed (40 CFR 50). This provision negates the effect of temporary and localized anomalies such as the one in Rockwood. Therefore, for this analysis, the single anomalous local value from Rockwood was ignored. Adding the remaining highest 24-hour background PM-10 value from any nearby location for the three-year period (88 $\mu g/m^3$, from Knoxville) to the estimated PM-10 increment from construction activities (35 $\mu g/m^3$) results in a PM-10 concentration of 123 $\mu g/m^3$, which is well below the corresponding NAAQS of 150 $\mu g/m^3$.

The highest recorded annual-average concentration from any nearby location for the same three-year period was 40 $\mu g/m^3$ in Knoxville. When added to the maximum annual average predicted to result from construction on Parcel ED-1 (9 $\mu g/m^3$), the result is 49 $\mu g/m^3$, which is below the corresponding NAAQS of 50 $\mu g/m^3$. Because (1) background PM-10 values from the ORR (nearer to Parcel ED-1) are less than those reported in Knoxville and (2) the annual modeling assumed that construction occurred throughout the year, actual PM-10 concentrations (background values plus amounts due to construction activities), especially annual-average concentrations, are likely to be even further below the NAAQS.

In summary, no exceedances of the PM-10 NAAQS would be expected to result from construction activities on Parcel ED-1.

4.1.3.2 Operation

National Ambient Air Quality Standards

It is estimated (see Sect. 4.1.6) that the establishment of industries on Parcel ED-1 would create 1500 direct jobs (jobs with the industries located on Parcel ED-1) and some additional indirect jobs (jobs created to support families involved in direct jobs). The amount of additional traffic generated by an industrial park on Parcel ED-1 was estimated as 7000 vehicle trips per day (see Sect. 4.1.6.6). This is small compared to current traffic in the area (e.g., traffic associated with approximately 15,000 direct jobs at DOE facilities plus related indirect jobs on the ORR, or over 100,000 cars per day both ways passing through Knoxville on Interstate 40) and would not lead to appreciable increases in concentrations of pollutants in the ambient air.

Specific details about atmospheric pollutants that may be emitted by industries that locate on Parcel ED-1 are not available. However, it is assumed that industrial facilities would be permitted by the state, as were those surveyed during preparation of this EA (see Table 2.1), and that operating emissions would be limited for all regulated pollutants.

To obtain conservative (upper-bound) estimates of increases in ambient air concentrations of pollutants that could result from industries located on Parcel ED-1, it was assumed that one new facility (Facility A) would be similar to the existing SEG radioactive waste treatment facility (employing about 1000 people), and another new facility (Facility B) would be similar to the existing Coors facility (employing about 175 people). Both of these industries are located in Oak Ridge. Airborne emissions from these surrogate facilities, while small compared to emissions from large industrial operations, are collectively greater than expected total emissions from all of the small industrial-park facilities planned for Parcel ED-1. To be conservative, it was further assumed that surrogate facilities would be located on that portion of Parcel ED-1 that is closest to a residential area. (Note: it is unlikely that planners would locate such facilities that close to a residential area.) Facility A (with the greater air emissions) was assumed to have four stacks located 1500 m (0.9 mi) southwest of the nearest resident, and Facility B was assumed to have one stack located 500 m (0.3 mi) southwest of Facility A, 2000 m (1.2 mi) southwest of the nearest resident. The four stacks at Facility A were assumed to be very close together. The stack at Facility B was assumed to be located such that a given volume of air passing directly over it would also pass directly over all four Facility A stacks on its way to the nearest residence. These conditions were simulated using the SCREEN3 air dispersion model. Results of this conservative procedure are shown and compared to applicable standards in Table 4-1, which also lists background values of each pollutant, for each applicable averaging period, reported on or within 50 km (31 mi) of the ORR during the three-year period 1992-1994.

Table 4-1. Estimates of ambient air pollutant concentrations from emissions from hypothetical facilities on Parcel ED-1, compared with National Ambient Air Quality Standards (NAAQS)[a]

Pollutant	Averaging time	NAAQS ($\mu g/m^3$)	Modeled increase ($\mu g/m^3$)	Modeled increase as a percentage of NAAQS	Background ($\mu g/m^3$)	Modeled increase plus background ($\mu g/m^3$)	Modeled increase plus background as a percentage of NAAQS
SO_2	3-h	1300	9	0.7	484	493	38
	24-h	365	4	1.1	283	287	79
	Annual	80	1	1.3	11	12	15
NO_2	Annual	100	1	1.0	28	29	29
PM-10	24-h	150	4	2.7	88[b]	92	61
	Annual	50	1	2.0	40[c]	41	82
CO	1-h	40,000	29	0.1	12,075	12,104	30
	8-h	10,000	20	0.2	6,210	6,230	62
Pb	3-month[d]	1.5	0.001	0.07	0.44	0.441	29

[a] EPA SCREEN3 model was used.

[b] The 24-h value is the second highest recorded in the general vicinity of the ORR during 1992–1994. A temporary, localized, and very unusual value (132 $\mu g/m^3$), recorded in Roane County, was not used, as explained in the text, and the second-highest value, given above, was taken as being more indicative of maximum background values near the ORR.

[c] The highest annual value from any reporting station near the ORR was from Knoxville. These data are available on the EPA Aerometric Information Retrieval System (AIRS) data base. Local data are summarized in annual reports (e.g., LMES 1995b); these local values are typically less than those reported from the Knoxville urban area.

[d] Calendar quarter.

Table 4-2. Estimates of ambient air pollutant concentrations from emissions from hypothetical facilities on Parcel ED-1, compared with standards for the Prevention of Significant Deterioration (PSD)[a]

Pollutant	Averaging time	Modeled increase ($\mu g/m^3$)	Allowable PSD increment ($\mu g/m^3$)		Percent (%) of allowable PSD increment	
			Class I	Class II	Class I[b]	Class II[b]
SO_2	3-h	9	25	512	36	1.8
	24-h	4	5	91	80	4.4
	Annual	1	2	20	50	5.0
NO_2	Annual	1	2.5	25	40	4.0
PM-10	24-h	4	8	30	50	13.3
	Annual	1	4	17	25	5.9

[a] EPA SCREEN3 model was used.

[b] Parcel ED-1 is in a Class II PSD area; the nearest Class I area is Great Smoky Mountains National Park.

Values in Table 4-2 indicate that industries located on Parcel ED-1 would increase ambient air concentrations of SO_2, NO_2, CO, PM-10, or Pb by less than 3% of the NAAQS. When modeled increments were added to background, no exceedances of the NAAQS for these pollutants were predicted; estimated total concentrations (modeled increments plus background were always less than 85% of the NAAQS.

SEG has a metal-melting furnace with an associated stack. The maximum 3-month average ambient air concentration of lead predicted by the modeling to result from emissions from that stack was 0.001 $\mu g/m^3$ at the nearest residence. This is less than 0.1% of the corresponding NAAQS. In the past, lead in the atmosphere was largely due to the use of leaded gasoline in internal combustion engines. Lead concentrations in the atmosphere have declined markedly in recent years, largely due to the increased use of unleaded gasoline. The highest lead concentration recorded within 50 km (31 mi) of Parcel ED-1 for any calendar quarter during 19921994 was 0.44 $\mu g/m^3$ recorded at Rockwood (in Roane County) during the second quarter of 1993. This concentration is less than 30% of the NAAQS.

Ozone is formed from complex photochemical reactions involving organic compounds and nitrogen oxides. Because these reactions may take hours to complete, ozone formation continues to occur as the wind transports the contributing pollutants away from their sources. Ozone formation is therefore modeled at the regional level, using complex computer programs that simulate the chemical transformations involved. However, an approximation to the potential contribution of facilities on Parcel ED-1 to regional ozone concentrations can be obtained by comparing the amounts of volatile organic compounds and nitrogen oxides emitted by the surrogate facilities with the total amounts of the same substances emitted in the six-county region including Parcel ED-1. County-level emissions estimates are provided by EPA (1994). Emissions of volatile organic compounds and nitrogen oxides from the SEG and Coors facilities account for less than 0.25% of the estimated emissions of each of these pollutants in the six-county area surrounding Parcel ED-1. The potential collective contributions of industries on Parcel ED-1 to regional ozone concentrations are expected to be correspondingly negligible.

In summary, emissions from hypothetical industries located on Parcel ED-1 would not result in violations of NAAQS. The modeled upper-bound effects of emissions from industries that might potentially be located on Parcel ED-1 are very small, and actual effects are expected to be negligible.

Prevention of Significant Deterioration

Prevention of Significant Deterioration (PSD) standards exist for SO_2, NO_2, and PM-10. These standards are summarized in Table 4-2. One set of allowable increments exists for Class II PSD areas, which cover most of the United States and include the ORR and surrounding area. More stringent increments apply to Class I PSD areas, which include national parks that exceed 2430 ha (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 (GSMNP), located about 56 km (35 mi) southeast of the ORR.

None of the ambient air pollutant increases modeled at the nearest resident are more than 14% of the corresponding limits for Class II PSD areas. At distances as far away as the GSMNP, pollutants emitted from facilities on Parcel ED-1 would be greatly reduced by dispersion. Conservative modeling with SCREEN3 indicated that concentration increments at GSMNP [56 km (35 mi) distant] would be about 10% of those predicted at the nearest residence to Parcel ED-1. Because model-predicted increments for PSD pollutants were, at most, 80% of the allowable Class I increments when predicted at the location of the nearest residence, increments for those pollutants would be expected to be less than 8% of allowable Class I increments at GSMNP. Because of the conservative nature of the modeling assumptions (e.g., the wind is assumed to proceed in a straight line, with no deviations, from the stacks on Parcel ED-1 to the nearest boundary of GSMNP, with no deposition or other loss of pollutants along the way), it is expected that actual pollutant concentration increments in GSMNP resulting from facilities on Parcel ED-1 would be even smaller.

Radionuclides

The SEG facility treats radioactive waste, and it is possible, though unlikely, that such a facility would be permitted on Parcel ED-1. Therefore, the SEG facility was considered as a surrogate for a radiological facility that could be permitted on Parcel ED-1. The estimated effective dose equivalent to a maximally exposed individual, by way of air, water, and food pathways, from the SEG facility is estimated to be 0.09 mrem (0.0009 mSv) per year (SEG 1995). This hypothetical individual is considered to spend 24 hours a day on the property of the International Technology (IT) corporation, 300 m (0.2 mi) from the nearest existing SEG stack. For comparison, the maximum estimated dose equivalent from DOE facilities on the ORR is 5.1 mrem (0.051 mSv) per year to a hypothetical individual continually located about 1100 m (0.7 mile) north-northeast of the Y-12 plant (LMES 1995b). These combined maximum hypothetical doses are less than 6% of the 100 mrem (1 mSv) per year limit given in DOE Order 5400.5. As a comparison, it is estimated that the average American receives about 300 mrem (3 mSv) per year from natural sources (NCRP 1987).

Accidents

Accidental releases of high concentrations and/or large quantities of pollutants could cause standards to be exceeded. Under the Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III, industrial facilities are required to report to state and local emergency response personnel any releases of "reportable quantities" of hazardous substances listed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA). DOE, LMES, and the city of Oak Ridge would activate an emergency preparedness plan should a release of hazardous materials (to any environmental medium—air, surface water, groundwater, soils) occur at K-25 or Parcel ED-1.

4.1.4 Water Resources

4.1.4.1 Surface Water

Surface waters on and near Parcel ED-1 could be affected by (1) alteration of local hydrology, (2) soil erosion, runoff, and sedimentation, (3) contaminated stormwater runoff, (4) effluent discharges from industrial facilities, (5) spills of hazardous materials, and (6) consumption for industrial use. Of these sources, only water consumption use is unlikely to occur with industrial development.

Effects on Local Hydrology

The basic hydrologic properties of overland flow, infiltration, and transpiration that were introduced in Sect. 3.4.1 also apply to urban settings. Development of buildings, pavement, and other impermeable surfaces can affect the local hydrology if infiltration and transpiration are reduced to zero and the time delay for runoff to reach surface water is greatly reduced. These effects combine to increase the volume of runoff and to compress the stream hydrograph in time, increase its peak height, and produce flooding.

Proper management of runoff can help to mitigate these effects. The use of semipermeable pavements, such as concrete grating, can enhance infiltration. The construction of detention basins, which capture the runoff from impermeable surfaces, can return the rate of runoff to an approximation of its previous natural rate, promote infiltration, and provide an opportunity to treat runoff with passive filtration through natural media, such as peat. Detention basins fitted with peat filters and natural buffer zones along streams would help to mitigate overload flow of waterborne particulates into streams. Artificial catchments could also help stabilize the temperature of runoff that has been heated or cooled by buildings and pavement. Excessive runoff can also be mitigated by minimizing paved areas and constructing facilities in a discontiguous manner, i.e. with buffer strips of natural vegetation between small developments.

Paved areas on Parcel ED-1 would affect stream hydrology by the changes that they cause in natural drainage patterns (e.g., infiltration and runoff rates). Seasonal upland headwaters may be affected as well as waters of EFPC, BC, and smaller streams in the floodplain area. Impacts would be minimized by contouring paved areas to direct runoff into man-made catchment basins and by preserving natural vegetation to retard water flow and increase infiltration. Quantification of impacts to local hydrology is not possible at this stage in planning, but it will be part of the design of new facilities. Within the city limits for Oak Ridge, the Erosion Control and Stormwater Management Ordinance applies (City of Oak Ridge 1989). Measures implemented to reduce the degradation of surface water quality must meet the criteria specified in Article IX, Sect. 9-420 of the ordinance, which identifies (1) specific practices for minimizing soil loss from the site, including construction of detention basins and other flow control structures; (2) protection of adjacent and downstream properties; (3) stabilization of disturbed areas and soil stockpiles; (4) treatment of cut and fill slopes; (5) protection of storm sewer inlets; and (6) guidelines for working in wet areas and treating construction access routes.

Construction Impacts

Earthmoving activities have the potential to increase sediment transport and deposition in surface waters (and wetlands; see Sect. 4.1.5.3). Eroded materials have the potential to degrade surface water quality by increasing turbidity and sedimentation. This, in turn, could decrease photosynthesis (instream primary productivity), smother benthic organisms under sediments, reduce benthic invertebrate habitat by filling in interstitial spaces, and limit fish spawning sites by covering needed habitat (e.g., fine gravels) (see Sect. 4.1.5.2). Streams can be protected from siltation by Best Management Practices (Wang and Grubbs 1990; Smoot et al. 1992; Thompson and Green 1994), including (1) avoiding construction within the EFPC and BC floodplains, (2) using siltation fences, (3) providing at least 30 m (100 ft) of natural vegetation riparian zone buffers with a wider buffer in steeper surroundings, and (4) revegetating bare soil with native plants. Maintenance of vegetation in the riparian zone not only serves as a filter strip for eroded soil from upland areas, but also helps prevent stream banks from eroding/slumping, provides aquatic habitat (e.g., woody debris, root wads), and through shading, moderates water temperatures. These impacts may be mitigated with approved erosion and sedimentation control plans (ESCP) and spill prevention controls and countermeasures (SPCC) plans.

Stormwater runoff from asphalt or concrete roads and parking lots and compacted mowed areas has the potential to degrade surface water quality (e.g., with oil and grease, sediment, nutrients, and organic materials). Facilities would be expected to obtain stormwater runoff permits from the state (National Pollution Discharge Elimination System [NPDES] permits), which would impose limitations of chemical constituents in stormwater runoff discharge.

Impacts of Operation

Routine industrial operations typically generate domestic wastes and industrial effluents. Untreated effluents could increase stream turbidity and organic content and decrease dissolved oxygen concentrations downstream. Industrial facilities are required by state permits (NPDES permits) to incorporate design features to minimize contaminants in effluent discharges to surface waters. Tertiary treatment of domestic and industrial wastewater is necessary to remove excessive inorganic nutrients (nitrates and phosphates), chlorine, and organic matter.

Because specific facilities have not yet been identified for development at Parcel ED-1, surrogate industries were selected as representative of the types of enterprises that could be located there. Four companies currently operating in the Oak Ridge area were chosen: Coors Technical Ceramics Company (Coors), ELO Touch Systems, Scientific Ecology Group (SEG), and Vacuum Technologies (see Sect. 2.1.3 and Table 2-1). Of these, ELO Touch Systems (a producer of touch-sensitive screens for computers) and Vacuum Technologies (a manufacturer of high-vacuum equipment) have no industrial liquid effluents. SEG also has no industrial liquid effluents, since its 20 m^3/d (5000 gpd) industrial wastewater is used for temperature control in their waste incinerator. SEG treats brines (from stack scrubbers) on site by evaporation in their waste incinerator, resulting in

solid salts which are transported off-site for disposal at permitted facilities (personal communication from Les Cole, SEG, to John Tauxe, ORNL, January 2, 1996).

In accordance with terms of the lease, industrial effluents from facilities on Parcel ED-1 would be discharged to off-site treatment and disposal facilities, such as the Oak Ridge K-25 Site (downstream) or city of Oak Ridge West (upstream) treatment plants, as capacity allows (see Sects. 3.4.3.1 and 3.4.3.2). Downstream treatment and disposal would be preferred because the effects of effluent discharges on water quality, hydrology, and aquatic communities of BC and EFPC would be directed instead to the larger Poplar Creek embayment of Watts Bar Lake (the Clinch River). Local discharge of treated liquid effluents would require the issuance of an NPDES permit or, if treatment occurs at an existing off-site facility, the modification of an existing NPDES permit. Typically, the state holds a public meeting prior to issuing a new or modified NPDES permit for facilities in the Oak Ridge area (personal communication from Wes Goddard, ORNL, to H. M. Braunstein, ORNL, January 5, 1996).

On-site treatment by land disposal is not feasible because soils on the parcel are highly permeable and karstic, and land-disposed effluents would rapidly enter shallow groundwater. Another wastewater treatment/disposal alternative might be the creation of artificial wetlands, but land requirements for this alternative could be excessive, and the newly created wetlands would have to be carefully located to avoid destruction of natural communities or contamination of groundwater.

Domestic Wastewater

The production of domestic wastewater is primarily a function of the number of employees working at a facility (generating sanitary waste), plus any additional nonindustrial discharges. SEG estimates its contribution to the city of Oak Ridge's wastewater treatment plant at 11 m^3/d (3000 gpd), resulting from sanitary facilities for 700 employees and some noncontact cooling water. However, SEG anticipates that future operations may increase its domestic wastewater discharges to its permitted limit of 26 m^3/d (7000 gpd) (personal communication from Les Cole, SEG, to John Tauxe, ORNL, January 2, 1996). Given the city's 8000 m^3/d available capacity (see Sect. 3.4.3.1) SEG's contribution is 0.3%, which is relatively minor. Coors estimates its domestic wastewater discharge at 9.0 m^3/d (2400 gpd) (personal communication from Chris Nelson, Coors, to John Tauxe, ORNL, January 2, 1996). This also is a minor contribution (0.1%) to the city's POTW. If similar facilities were to locate on Parcel ED-1, their domestic waste waters would not adversely impact the capacity of the city of Oak Ridge POTW (8000 m^3/d) or the K-25 Sewage Treatment Plant (1150 m^3/d).

Industrial Wastewater

The only surrogate industry that produces an industrial liquid waste effluent is Coors Technical Ceramics Company. Coors is classified as an Industrial User by the City, defined as "A source of indirect discharge which does not constitute a 'discharge of pollutants' under regulation issued pursuant to Sect. 402 of the [Federal Water Pollution Control] Act" (City of Oak Ridge, 1991). Coors contributes about 11 m^3/d (3000 gpd) under its

(3000 gpd) under its Wastewater Discharge Permit, which specifies compliance limits for total suspended solids, oil and grease, discolored materials, and aluminum metal (personal communication from Chris Nelson, Coors, to John Tauxe, ORNL, January 2, 1996). All other constituents would be limited to the default values in Table 4-3. If a facility similar to Coors were to locate on Parcel ED-1, its wastes could be handled by the city of Oak Ridge POTW. However, it may be more desirable to employ K-25's Waste Treatment Operations Department, which processes industrial waste for the K-25 Site. This facility is downstream of Parcel ED-1, which would reduce or eliminate pumping costs, and it can accommodate a wide variety of industrial wastes. Use of the facility by private firms, however, would require a modification to the K-25 NPDES permit.

Production of industrial wastewater is strongly process-specific, and with proper containment and treatment techniques employed on-site (as done by SEG) or off-site (as done by Coors), the impact to the environment would be minimal.

Impacts of Accidents

Response to an emergency on Parcel ED-1 would be the responsibility of the city of Oak Ridge. Resources in addition to those of the city are available for response to an event such as a release off-site through mutual aid agreements between the city, the K-25 Site, and the surrounding communities (TEMA 1995).

Accidental spills of hazardous materials can be quickly cleaned up and impacts to soils, groundwater, and surface waters minimized through the use of appropriate equipment and cleanup procedures (i.e., EPA-approved SPCC plan). Accidental releases of high concentrations and/or large quantities of pollutants could cause standards to be exceeded and result in fish kills. Under SARA, Title III, industrial facilities are required to report releases of "reportable quantities" of hazardous substances (CERCLA- and EPCRA-listed) to state and local emergency response personnel. DOE, LMES, and the city of Oak Ridge would execute an emergency response plan should a release of hazardous materials (to any environmental medium—air, surface water, groundwater, or soils) occur at Parcel ED-1.

4.1.4.2 Groundwater

Construction Impacts

Groundwater on and downgradient of the parcel could be affected by (1) soil erosion, runoff, and sedimentation; (2) contaminated stormwater runoff; (3) waste disposal; (4) injection of fluids/liquid wastes; (5) spills of hazardous materials; and (6) withdrawals for process or potable use. Because injection of fluids and wastes is not a foreseeable option, this source of impacts was dismissed.

Table 4-3. City of Oak Ridge default discharge limits for industrial wastewater pollutants

Parameter	Maximum Daily Concentration (mg/L)	Maximum Instantaneous Concentration (mg/L)
Arsenic	0.10	0.20
Benzene	0.87	1.74
Cadmium	0.000024	0.000048
Chromium (Hexavalent)	0.002	0.004
Chromium (Trivalent)	0.44	0.88
Copper	0.04	0.08
Cynanide	0.007	0.014
Iron	1.5	3.0
Lead	0.0016	0.0032
Manganese	1.0	2.0
Mercury	0.0004	0.0008
Nickel	0.10	0.20
Phenols	5.0	10.0
Silver	0.0012	0.002
Toluene	5.35	10.7
Zinc	0.094	0.188
Dichloromethane	0.22	0.44
Trichloroethylene	0.045	0.09
Total Kjeldahl Nitrogen (TKN)	45.0	90.0
Oil and Grease	50.0	100.0
Biological Oxygen Demand (BOD)	200.0	300.0
Total Suspended Solids (TSS)	200.0	300.0
pH	—	$6 < pH < 9$

Source: City of Oak Ridge, 1996.

Earthmoving activities have the potential to increase sediment transport and deposition in karstic features such as cavities and subsurface channels. Eroded materials have the potential to degrade groundwater quality by increasing turbidity and sedimentation. This, in turn, could smother subterranean benthic organisms under sediments and reduce subterranean benthic invertebrate habitat by filling in interstitial spaces. Inlets to the groundwater systems can be protected from siltation by Best Management Practices (Wang and Grubbs 1990; Smoot et al. 1992; Thompson and Green 1994), including (1) avoiding construction near groundwater recharge features such as intermittent streams and sinkholes, (2) using siltation fences, (3) providing at least 30 m of natural vegetation recharge zone buffers with a wider buffer in steeper surroundings, and (4) revegetating bare soil with native plants. These impacts may be mitigated with approved erosion and sedimentation control plans (ESCP) and spill prevention controls and countermeasures (SPCC) plans.

Stormwater runoff from construction of roads and cleared areas, contaminants leached from construction materials (e.g., concrete) and spoils and spills of construction oil liquids (e.g., oils and diesel fuels) are likely to degrade groundwater quality.

Facilities would be expected to obtain stormwater runoff permits from the state that may impose limitations of chemical constituents in stormwater runoff discharge. Siting of detention basins and other stormwater control structures should be done so as to avoid contaminated recharge to groundwater.

Impacts of Operation

Given the shallow depth to the water table and karstic bedrock and the evidence for karstic groundwater flow (relatively rapid) from some areas, Parcel ED-1 is considered a sensitive hydrologic setting. Discharged or spilled materials could reach groundwater relatively quickly and, because of the likelihood of large solution cavities and channels, could be transported off the site towards the Clinch River (Sect. 3.4.2). Thus, groundwater contaminated by industrial activities could quickly affect the quality of water in wells and surface waters both on and to the west of the site.

Stormwater runoff from asphalt or concrete roads and parking lots and compacted mowed areas may also degrade groundwater quality (e.g., with oil and grease, sediment, nutrients, and organic materials). Facilities would be expected to obtain stormwater runoff permits from the state that may impose limitations of chemical constituents in stormwater runoff discharge. Siting of detention basins and other stormwater control structures should be done so as to avoid contaminated recharge to groundwater.

There are several monitoring wells (associated with remedial action sites) within the K-25 Site that are routinely sampled for groundwater quality analysis. These are located about 1 km west of the parcel and are not appropriate for use in detecting pollutant migration from the industrial park. To facilitate detection of pollutant migration from the industrial park, a site-specific monitoring network should be established for baseline preconstruction measurements and post-construction monitoring.

There are presently no known wells on the Parcel ED-1 site. Impacts to groundwater quality from construction and operation of industrial facilities should by minimized by avoiding areas of known or suspected karst formations (e.g., sinkholes). With the availability of city-supplied water to the site, it is unlikely that wells would be drilled for groundwater use.

Impacts of Accidents

Accidental spills of hazardous materials can be quickly cleaned up and impacts to soils, groundwater, and surface waters minimized through the use of appropriate equipment and cleanup procedures. This assumes that diversion structures are in place to prevent spills from entering a sinkhole. Response to an emergency on Parcel ED-1 would be the responsibility of the city of Oak Ridge. Resources in addition to those of the city are available for response to an event such as a release off-site through mutual aid agreements between the city, the K-25 Site, and the surrounding communities (TEMA 1995). Under SARA, Title III, industrial facilities are required to report releases of "reportable quantities" of hazardous substances (CERCLA- and EPCRA-listed) to state and local emergency response personnel. DOE, LMES, the city of Oak Ridge, and Roane

County agencies would execute an emergency response plan should a release of hazardous materials (to any environmental medium–air, surface water, groundwater, soils) occur at Parcel ED-1.

4.1.5 Ecological Resources

4.1.5.1 Terrestrial

Terrestrial ecosystems might be impacted by (1) disturbance, degradation, and/or destruction of habitat, (2) changes in populations that affect the food chain or ecosystem balance, and (3) interference with reproductive patterns or activity.

Construction Impacts

Although the extent of acreage to be developed at any particular time is not known, it is likely that construction would disturb or remove some vegetation on Parcel ED-1. The forest on this parcel is an important segment of the total ORR forested area. Although not all of the site is now natural vegetation, a significant amount of natural vegetation and vegetation that, if left undisturbed, would succeed to natural forest would be lost. Areas disturbed during construction but not needed for facilities should be revegetated with native species after construction is completed following Executive Order 11987, "*Exotic Organisms*" and DOE 5400.1/AI-1, which restrict the introduction of exotic species into natural ecosystems on federally owned land (see discussion below for more details). Thus, more than 100 ha (> 250 acres) of former pine (now old-field succession), upland hardwood, and remaining planted pine habitat would be removed, reducing habitat for species which utilize such areas.

Removal of native vegetation would reduce the value of the area to wildlife because habitat would be removed. Areas of heavy industrial development would be essentially devoid of wildlife habitat. Eventual development of the entire parcel would displace virtually all wildlife habitat except for limited landscaped areas, which would probably be located primarily on the south side of EFPC. In any development scenario, including one that protects bottomland hardwood forest along EFPC, species that are "habitat-specialists," especially amphibians and neotropical migrant songbirds (see below), would be adversely affected. Groups such as these are experiencing declines regionally and nationally (Robbins et al. 1993, Askins 1995, Robinson et al. 1995).

Removal of vegetation would increase forest fragmentation and loss of connectivity at the scale of structural species (e.g., overstory, understory, subcanopy forest structure), keystone species, and rare species (see Appendix J). Dividing or crossing sensitive areas (e.g., with roads, utility corridors, sewer mains, and earthmoving or other construction equipment) and clearing areas for building and parking lots would increase fragmentation. Interior species are adapted to inhabiting large blocks of a particular habitat type rather than the edges between different habitat types. Interior species would not only lose total habitat by forest fragmentation but also would have their mobility within the remaining blocks of forest reduced by activities within cleared corridors (roads, utility lines, etc.).

If bottomland hardwood habitat is avoided, some but not all construction damage would be avoided, and some wildlife value would be preserved. Nonetheless, construction-related human activity as well as erosion and sedimentation might still adversely affect both game and nongame animals, at least temporarily. For example, habitual patterns of deer movement would be temporarily disrupted and would be re-established in new patterns following construction (see below for longer-term effects).

Natural areas found on the parcel (see Chap. 3 and Appendix J) include Natural Areas 46 and 47 (see Figs. 4-1 and J-5); a limestone quarry and spring (see Fig. J-3); EFPC (see Fig. J-2); Aquatic Natural Area 3, an unnamed tributary to EFPC, and Aquatic Natural Area 8 on lower EFPC (see Fig. J-4). These areas, the 100-year floodplain (part of which is found in the natural areas), and buffers around them would not be developed in order to avoid destruction of rare species or their habitat (see Fig. J-1).

Impacts of Operation

Direct effects. Because of the absence of details about what types of industry would locate on Parcel ED-1, this analysis focuses on qualitative impacts to ecological resources. It is assumed that operating permits for facilities located on Parcel ED-1 would limit their emissions, effluents, and wastes to environmentally acceptable levels.

Light industrial facilities could include buildings with associated lawns and other landscaped characteristics. Heavy industrial development results in complete clearing, paving or graveling, and fencing. Furthermore, heavy industry could entail significant emissions of pollutants to air and water of unspecified nature and degree, with a potential for spills or other accidents involving releases of contaminants.

Building and maintaining light industrial facilities would result in permanent loss of most vegetation and reduced structural diversity of remaining plant communities (e.g., grass instead of trees, shrubs, and herbs), thereby greatly simplifying wildlife habitat. This simplification would limit wildlife species diversity. Species that adapt most readily to human presence would predominate (e.g., deer, skunk, raccoon, rabbit, woodchuck, beaver, opossum, starling, resident Canada goose). Some or all of these species can be a nuisance in developed areas.

Some wildlife species (e.g., the ovenbird and the red-shouldered hawk) require larger areas of undisturbed forest than other species. To protect forest specialists that generally do not reproduce in nonwooded habitats, forested areas at least 100 ha (247 acres) or larger are needed (Askins 1995; Robinson et al. 1995). In general, as forest cover is removed from more areas, populations of species that require large forested areas would decline or disappear; and species that use openings and edges of forests and already occupy abundant habitat associated with existing disturbed sites would become even more abundant.

Some species that require large forested areas (e.g., neotropical migratory songbirds) would be adversely affected by increased predation and parasitism from

species that live in openings and edges and hunt in surrounding forest. Parasites such as cowbirds, for example, are active within 100-200 m (328 to 656 ft) of forest edge and can severely affect reproductive success of songbirds in fragmented forests (Askins 1995; Robinson et al. 1993 and 1995). If industries are carefully sited, bottomland habitat would not be separated from the surrounding forest matrix. Extensive forests provide a source for recolonization of surrounding, more fragmented forests (e.g., in the city of Oak Ridge) that are too small to be self-sustaining. Even species preferring forest edge habitat (e.g., indigo bunting) nest more successfully in less fragmented landscapes (Askins 1995; Robinson et al. 1995). Songbird declines also could lead to other damaging effects, including leaf damage of forest trees due to population outbreaks of leaf-feeding insects.

Pollutant emissions (including those from increased vehicular traffic) would affect wildlife habitat both on and off-site. Certain airborne and waterborne contaminants (i.e, boron, radionuclides, chlorine) can injure or kill plants, amphibians, and invertebrates; this indirectly affects animals up the food chain as habitat and the food base are degraded.

The presence of species that adapt to human presence could negatively affect the remaining populations of forest-interior species. For example, nest parasitism, competition, and predation (e.g., by cowbird, starling, European sparrow) would increase in remaining natural habitat (see discussion above).

Deer populations would be affected by loss of habitat on Parcel ED-1. Pavement and buildings might reduce habitat, or populations might increase because of increased open areas and permanent edge created in the landscaped portions of the site.

Total or near-total removal of habitat could displace deer into other areas, including the city of Oak Ridge. Further, restriction of deer hunting on the parcel would add to the 8000 acres of the ORR already restricted (increase from 25% restricted to 31% restricted), thereby further limiting the ability to control the deer herd (see indirect effects below.). The increased presence of people in areas where deer are common could increase the incidence of tick-borne diseases such as Lyme disease, human granulocytic Ehrlichiosis, and monocytic Ehrlichiosis.

Indirect effects. The area north of Parcel ED-1 would be hunted (deer) during the first year of the lease; but as development progresses, hunting might be restricted because of access, safety, security, and practicality (P. Parr, ORNL, personal communication with J. W. Webb, ORNL, July 21, 1995). Specifically, development might limit accessibility by road, and industrial security and safety concerns might arise over the use of firearms. Restriction of hunting would remove a large portion of the most productive area for deer on the ORR. The decrease in hunting pressure would affect control of the size of the ORR deer population. Because of this, it is likely that collisions of deer and vehicles would increase on the ORR. More than 250 collisions per year occurred before hunting was begun in 1985; presently, they are near 150 per year.

In the short term (i.e., next 10-20 years), industrial development would consist of scattered buildings interspersed with landscaped open areas along with clusters or corridors of remaining forest, as evidenced by other industrial and commercial parks recently developed in the Oak Ridge area. Such development provides ideal habitat for deer and other edge species, such as raccoon, skunk, and woodchuck. When considered with the restriction on hunting, it is very likely that the deer herd will grow. A similar situation has already developed on the Boeing site in Oak Ridge (Jim Evans, TWRA, personal communication with J. W. Webb, July 21, 1995).

Secondary loss of rare plant species and rare vegetation communities could occur as a result of development because of

- the introduction of competing species into rare communities and rare species' habitats if non-native species are used in landscaping,
- habitat fragmentation and resulting edge effects, and
- increased deer populations grazing on vegetation.

Impacts could be minimized by maintaining and restoring habitat connectivity and using native species in landscaping to minimize introduction of exotic competitor species (see Appendix J).

Fire is important to the maintenance of the canebrake and limestone barrens, and suppressing fires decreases their extent (Grossman et al. 1994; TNC 1995). If the proposed site is developed, a further gradual decline in these community types on the site due to continued fire suppression would likely occur.

Impacts of Accidents

Accidental spills of construction liquids or other materials during facility operation could kill or injure terrestrial and aquatic plants and animals. Soils contaminated by a spill should be collected in accordance with EPA-approved SPCC plans and taken to appropriate waste disposal facilities. Under SARA, Title III, industrial facilities are required to report releases of "reportable quantities" of hazardous substances (CERCLA- and EPCRA-listed) to state and local emergency response personnel. DOE, LMES, and the city of Oak Ridge would mobilize an emergency preparedness plan should a release of hazardous materials (to any environmental media—air, surface water, groundwater, soils) occur at K-25 or Parcel ED-1.

4.1.5.2 Aquatic

Aquatic biota can be adversely impacted by (1) physical and chemical changes in water quality as a result of construction runoff and spills as well as effluent discharges from industrial operations, and (2) habitat alteration or degradation.

Fugitive particulates released during construction and operation would be dispersed and deposited in nearby terrestrial and aquatic habitat. The proposed industrial site would be contoured to direct runoff and drainage from paved areas to one or more man-made catchment basins. Collected water would be discharged to a sewage treatment facility. To encourage runoff from unpaved areas to percolate to groundwater and decrease sediment loading to surface waters, appropriately sized buffer zones would be established along streams.

Industrial facilities on Parcel ED-1 would be designed to allow no untreated industrial or domestic waste discharge to surface waters. Treated waters would be discharged to surface water in accordance with limitations established under state and/or regulatory permits. If permit limits are consistently met, degradation of aquatic habitat would be reduced. To minimize impacts from thermal alterations, waste cooling water from industrial facilities would not be discharged into streams prior to cooling to ambient water temperatures.

The DOE lease prohibits construction in the floodplain of EFPC and BC. Thus, habitat alteration would not be expected in these aquatic ecosystems.

As noted in Sect. 3.5.2, recovery of streams on Parcel ED-1 to levels in reference streams has not yet occurred. Further impacts to benthic macroinvertebrates might occur during construction and post-construction. These organisms are sensitive to siltation and erosion. One aquatic species that is "in need of management" (State of Tennessee) is the Tennessee dace, which is present in EFPC, BC, and especially abundant in tributary streams on the parcel. For spawning, the dace depends on gravel pits that are made, guarded, and kept free of silt and other debris by other fish species, such as the male creek chub (*Semotilus atromaculatus*) (see Appendix G). Threats to the Tennessee dace include stream channelization, impoundment, flow alterations, and siltation. Channelization and impoundment can degrade habitat, and reduced or altered hydrology can result in extreme fluctuations in flow, drying of streambeds, or alteration of stream thermal and chemical regimes. These effects result in less available habitat and decreased spawning success.

The dace is under discussion for listing as a federal "candidate" species (Appendix G). Because the ORR is considered a stronghold for the species (Etnier and Starnes 1993), adverse impacts to the ORR population could influence the decision to list the species as threatened. Monitoring of the streams affected by development of Parcel ED-1 is recommended to determine long-term effects on the Tennessee dace and other fish species sensitive to land development. Data obtained by monitoring provide the best characterization of the ecological health of the stream, ensuring that all environmental factors are evaluated. Ongoing BMAP sampling has documented the ecological status of the fish community extensively and should be supplemented with additional monitoring sites to provide a cost-effective mechanism for resource assessment and management. Maintaining a BMAP on BC is also important and would complement existing monitoring programs for EFPF.

Industrial development on Parcel ED-1 is further justification for continuing the monitoring program now in place. It is recommended that a monitoring plan be developed to complement the ongoing BMAP. There is a need for additional monitoring at downstream sites where recovery of the ecosystem has been observed. Additional recommendations are given in Appendix G.

4.1.5.3 Wetlands

A recent COE survey of the EFPC floodplain identified 17 wetlands areas, 5 of which are within the parcel. These five wetlands areas are all within the 100-year floodplain of EFPC and total 3.4 acres. The COE survey did not extend beyond the 100-year floodplain. Thus, it did not include upland areas or the BC floodplain, which may contain other wetlands. Most streams on the ORR have small wetlands associated with them. Also, the wetlands on the proposed lease site have not been classified as to uniqueness or special value.

The standard practice for DOE activities on the ORR is to avoid construction on wetlands and/or to mitigate possible damage to nearby wetlands. Similar constraints would be applied to industrial development on the parcel. To prevent the loss of wetlands on the parcel, land clearing would be prohibited within the EFPC floodplain. Should activities be proposed near wetlands, wetland boundary delineations [performed by a field marking of the boundaries and subsequent civil survey or Global Positioning System (GPS)] would be necessary. Such a delineation would provide an accurate measurement of wetland size. Construction activities on upland sites would employ appropriate mitigation measures (e.g., best management practices) to prevent the transport of eroded soil to wetland areas.

4.1.5.4 Biodiversity

Industrial development on Parcel ED-1 would decrease biodiversity on the ORR as plant communities and their associated wildlife are replaced and displaced by roads, buildings, parking lots, and other industrial facilities. Any stream alterations would likewise simplify habitat and thus biodiversity of aquatic biota. As discussed in Sect. 3.5.4, the bottomland hardwood forest community along BC and EFPC exhibits the greatest species, ecosystem, and landscape diversity on the parcel. The Nature Conservancy (TNC 1995) values this area highly because of the increasing rarity of this forest type in the Ridge and Valley Province of East Tennessee and the variety of rare plant and wildlife species that it supports. Loss of this area to industrial development would substantially reduce biodiversity on the ORR and in East Tennessee. Habitat of interior species (i.e., those adapted to large blocks of a particular type of habitat) would be lost by forest fragmentation that results from clearing for buildings and parking lots. In addition, these species would have their mobility within and among the remaining blocks of forest reduced by activities within cleared corridors (roads, utility lines, etc.). Consequently, the diversity of wildlife species would be reduced by forest fragmentation.

Other habitats on the parcel are less important for the maintenance of biodiversity. For example, the pine plantations that comprised much of the upland areas presently have relatively low biodiversity. Maintained in a monoculture of economically valuable pine trees, both the plant and animal communities were greatly simplified (i.e., low species richness) compared to natural mixed stands. However, clearing of some pine plantations in response to infestation of pine bark beetles has provided opportunity for hardwood succession to take place, increasing biodiversity. Industrial development of these cleared areas would stop the ongoing succession of plant and animal communities and make the low-diversity situation permanent. Parcel ED-1 occurs within the Nature Conservancy's Landscape Complex 1 (TNC 1995). Industrial development of Parcel ED-1 will occur in a manner that protects sensitive species on the parcel. Nonetheless, further fragmentation of Landscape Complex 1 could occur, potentially reducing the long-term viability of many of the rare ecological features embedded within it and ultimately resulting in reduced local and regional ecosystem diversity.

4.1.6 Socioeconomics

This section assesses the potential impacts of developing Parcel ED-1 on socioeconomic resources within the ROI, with particular emphasis on resources in the city of Oak Ridge. This assessment is based on a number of assumptions about the type of development that would occur on Parcel ED-1 and the number of jobs that would be created by development.

In terms of the type of development, this analysis assumes that Parcel ED-1 would be developed for light industrial use and that ETEC would be successful in recruiting industries to locate on Parcel ED-1. Although it is assumed for this analysis, the willingness of industries to locate on Parcel ED-1 is not assured, especially given the competitive nature of industrial recruiting among counties in the ROI. Successful industrial recruiting depends on a number of factors, some of which (such as property tax rates, average wage rates, and work force characteristics) have nothing to do with the relative physical suitability of competing industrial sites.

Given these caveats, this analysis assumes that ETEC would be successful in recruiting, and that Parcel ED-1 would be developed over a 10-year period in "clusters," with several small industries clustered around and supporting a few larger industries (Lawrence Young, City of Oak Ridge Chamber of Commerce, personal communication to H. M. Braunstein, ORNL, September 1, 1995). Specific industries that would locate on Parcel ED-1 would not be known until infrastructure is developed and ETEC negotiates subleases. However, examples of the types of industries envisioned as potential tenants include manufacturers of ceramics, auto parts, instruments, computer components, and electronic components. Other potential tenants include copying services and commercial offices. Although current plans do not include waste management facilities, they are included in the assessment to provide analytical boundaries. Additional environmental review would be conducted if ETEC should be interested in locating waste management facilities on Parcel ED-1.

In terms of the number of jobs that would be created, this analysis assumes that industrial development of Parcel ED-1 would create approximately 1500 direct jobs (i.e., jobs with the industries located on Parcel ED-1) by the end of the 10-year period (Lawrence Young, City of Oak Ridge Chamber of Commerce, personal communication to H. M. Braunstein, ORNL, September 1, 1995). This assumption is based on the number of jobs created per acre of development at similar sites in the area (e.g., 800 to 1000 jobs at the 300-acre Commerce Park development) and the amount of land available for development on Parcel ED-1 (approximately 425 acres) (Lawrence Young, City of Oak Ridge Chamber of Commerce, personal communication to H. M. Braunstein, ORNL, September 1, 1995). Assumptions concerning the creation of indirect jobs (i.e., "secondary" jobs created by the purchases of industries located on Parcel ED-1 and their employees) are discussed in Sect. 4.1.6.2.

4.1.6.1 Population

It is expected that the industrial development of Parcel ED-1 would provide jobs for some of the DOE and DOE contractor employees who are displaced because of the agency's strategic realignment. Given the number of persons displaced by DOE downsizing at the ORR facilities during 1993 and 1994 (approximately 1700; see Sect. 4.1.6.2), the additional number expected to be displaced during 1995 and 1996 (approximately 900), and the number of unemployed persons in the ROI (19,441 in 1993), it is likely that almost all of the direct and indirect jobs created by the development of Parcel ED-1 would be filled by current residents of the ROI. Thus, it is expected that worker in-migration resulting from the proposed action and the socioeconomic impacts associated with that in-migration would be insignificant.

Environmental Justice

The assumptions for identifying low-income communities near Parcel ED-1 are given in Sect. 3.6.1.2 as follows: first, the Federal Poverty Guideline income level of $14,800 for a family of four is used, which is very near the $14,999 breakpoint used in the available data; second, the analysis uses the state-of-Tennessee median household income level of $24,807, which is based on 1990 census data and is also very near the $24,999 break point used in the available data (Tables 3-4, 3-5, and 3-6).

The location of the census tracts closest to Parcel ED-1 and the concentration of buildings in each tract are shown in Fig. 4-2. In tract 201, 55% of the households have incomes less than $25,000, and 34% have incomes less than $15,000. In tract 205, 58% of the households have incomes less than $25,000, and 40% have incomes less than $15,000. In other tracts, more than 50% of the households have incomes greater than the Tennessee median income. Also, less than 30% of the households in the other tracts have incomes of less than $15,000. Based on these data, tracts 201 and 205 are identified as having the highest percentage of low-income or minority households in areas near Parcel ED-1. However, tract 206, which is closer to Parcel ED-1, has a smaller black population (5.8%) than either tract 201 or 205, and a much smaller number of low-income residents (only 17.4% with incomes less than $25,000 and 5.1% with incomes under $15,000). Therefore, based on the location of tracts 201, 205, and 206 relative to

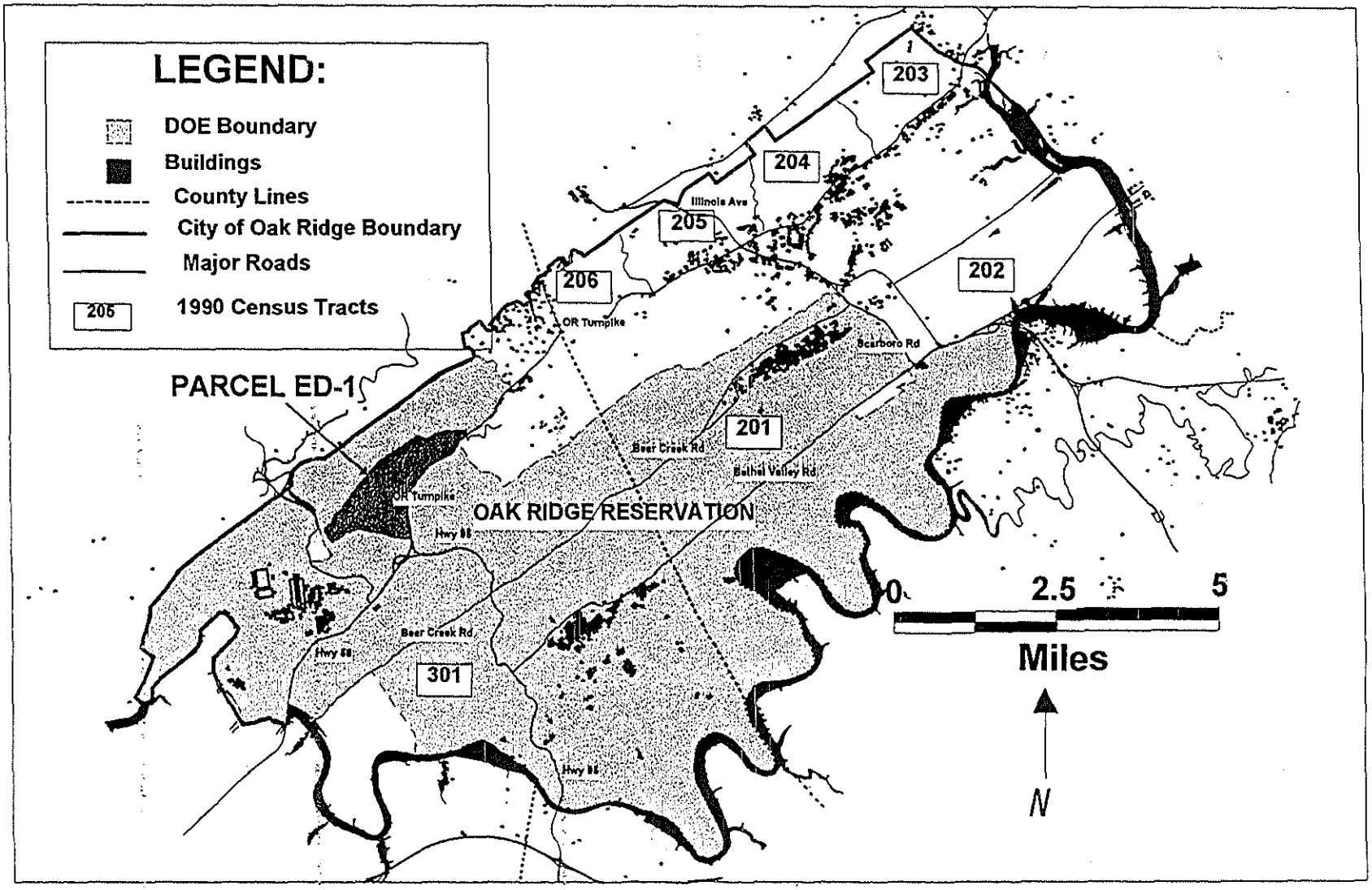


Fig. 4-2. City of Oak Ridge census tracts, 1990.

Parcel ED-1, disproportionate impacts to low-income and minority populations are not expected.

4.1.6.2 Employment and Income

As discussed in the introduction to Sect. 4.1.6, this analysis assumes that industrial development of Parcel ED-1 would create approximately 1500 direct jobs by the end of the initial 10-year development period. Based on existing data about the indirect employment effects of similar manufacturing industries in Tennessee (e.g., electric and electronic equipment, motor vehicles and equipment, instruments and related products), this analysis assumes an employment multiplier of 2.2 indirect jobs per direct job created (U.S. Department of Commerce 1986). With an employment multiplier of 2.2, it is assumed that 1500 direct jobs at the Parcel ED-1 site would lead to the creation of approximately 3300 indirect jobs in the ROI. Thus, it is assumed that a total of approximately 4800 jobs would be created by the end of the 10-year development period.

Although the direct and indirect jobs created by developing Parcel ED-1 would not be identical to those lost due to DOE downsizing at the ORR facilities, the creation of 4800 jobs would have the positive impact of providing employment for residents of the ROI, including some of the displaced DOE and DOE contractor employees. During 1993 and 1994, approximately 1700 workers were displaced by DOE downsizing, and it is projected that approximately 900 more will be displaced during 1995 and 1996 (P. W.Phillips, U.S. Department of Energy, Oak Ridge Operations, personal communication to H. M. Braunstein, ORNL, September 1, 1995). Because some of the DOE downsizing will result in employee retirement rather than displacement, this analysis assumes a smaller employment multiplier for DOE downsizing (1.3) than for Parcel ED-1 development (2.2). Assuming a multiplier of 1.3 indirect jobs lost per direct job lost (Lawrence Young, City of Oak Ridge Chamber ofCommerce, personal communication to H. M. Braunstein, ORNL, September 1, 1995), the loss of 2600 direct jobs due to DOE downsizing between 1993 and 1996 could result in the loss of an additional 3380 indirect jobs in the ROI. Thus, it is assumed that a total of approximately 5980 direct and indirect jobs would be lost in the ROI due to DOE downsizing. Based on these assumptions, the total number of jobs created by developing Parcel ED-1 (4800) would not completely offset the total number of jobs lost due to DOE downsizing (5980).

The creation of 4800 jobs with Parcel ED-1 development would also have the positive impact of generating income for residents of the ROI, including some of the displaced DOE and DOE contractor employees. However, as is the case with employment, it is likely that the income generated by the direct and indirect jobs associated with Parcel ED-1 would not completely offset the income lost due to DOE downsizing.

4.1.6.3 Housing

Given the number of persons to be displaced by DOE downsizing at the ORR facilities and the number of unemployed persons in the ROI, it is likely that almost all of the direct and indirect jobs created by the development of Parcel ED-1 would be filled

by current residents of the ROI. Thus, it is expected that worker in-migration, and subsequent increases in housing demand, would be insignificant. It is likely that any housing demand created by developing Parcel ED-1 could be accommodated by existing vacant units in the ROI, which numbered over 15,000 in 1990 (UT 1994).

4.1.6.4 Public Services and Local Government Expenditures

Because almost all of the direct and indirect jobs created by the development of Parcel ED-1 would be filled by current residents of the ROI, it is expected that worker in-migration, and subsequent increases in demand for education, water and sewer services, and police and fire protection, would be insignificant. Water and sewer services for Parcel ED-1 would be supplied either by connections to existing utilities at DOE's K-25 site, assuming the new industries could meet the Waste Acceptance Criteria of the K-25 permit, or to city of Oak Ridge facilities located in the west end of town. Thus, local government expenditures to provide additional public services for ED-1 development are not expected to be significant.

4.1.6.5 Local Government Revenues

Developing Parcel ED-1 would have the positive impact of generating additional revenue for local governments in the ROI. The primary sources of additional revenue would be the property taxes paid by industries to the city of Oak Ridge and Roane County and the local sales taxes paid by industries for purchases made within the ROI. However, because most of the jobs created by developing Parcel ED-1 would be filled by current residents rather than in-migrants, it is not likely that the additional sales tax revenue generated by the purchases of Parcel ED-1 employees would be significant.

Property taxes paid by Parcel ED-1 industries could have the positive impact of expanding the Oak Ridge and Roane County tax bases and helping to avoid future increases in property tax rates. The amount of property tax revenue generated would depend on the assessed value of each industry's real and personal property and on whether Oak Ridge and Roane County granted property tax abatements to attract the industries. The city of Oak Ridge projects that it will collect property tax revenue of almost $8.9 million in FY 1996 (City of Oak Ridge 1995). The industrial development of Parcel ED-1 would have the positive impact of supplementing, or even replacing, existing revenue sources with a sustainable source of property tax income.

The amount of local sales tax revenue generated by Parcel ED-1 industries would depend on the amount of their purchases within the ROI. In 1992, total sales tax revenue for the five counties that comprise the ROI was approximately $94.4 million, and sales tax revenue for Oak Ridge was approximately $5.5 million (UT 1994). Sales taxes paid by Parcel ED-1 industries would have the positive impact of supplementing this revenue and would also help offset the effects of DOE downsizing in terms of reduced purchases and sales tax payments.

4.1.6.6 Transportation

The peak-hour traffic within the study area is composed mostly of work-related trips. Thus, without any prospect for future DOE budget increases and new DOE or DOE-related employment opportunities, the traffic within the study area would not be expected to increase in the future. If the DOE downsizing and strategic realignment continue, traffic within the study area would actually decrease. For the purpose of this assessment, however, it was assumed that the future traffic in the study area would remain at the existing level should the proposed industrial park not materialize.

Development of the industrial park on Parcel ED-1 would be a continuing process, which might take 10 years for full utilization. Thus, the induced traffic from the industrial park on Parcel ED-1 would gradually increase over the next 10 years. The development histories for the two existing parks are presented in Table 4-4.

Table 4-4. Existing industrial parks' development histories

Year	Gross floor area (ft^2)	
	Commerce Park	Bethel Valley Industrial Park
1988	160,000	45,000
1989	160,000	63,500
1990	225,000	98,500
1991	290,000	108,500
1992	395,500	117,500
1993	455,500	117,500
1994	515,500	135,000
1995	552,500	149,000

Source: L. Young, Oak Ridge Chamber of Commerce, and T. Harvey, Commerce Park, personal communication with S. M. Chin, ORNL, October 1995.

The number of trips that would be generated by the new industrial park was estimated using the publication *Trip Generation* (Institute of Transportation Engineers 1991). For the 425-acre industrial park, it is estimated that 1400 trips would be generated during the peak hour and that 7000 trips would be generated during a typical day. This estimate, along with the existing commuter traffic flow pattern at K-25, has been used to determine the future annual average daily traffic (Fig. 4-3) and levels of service (Table 4-5) for the roadway segments in the study area.

As shown in Table 4-5, the industrial park would not impact the LOS on SR 58; the level of service on this roadway segment would remain at level A. The LOS on Blair

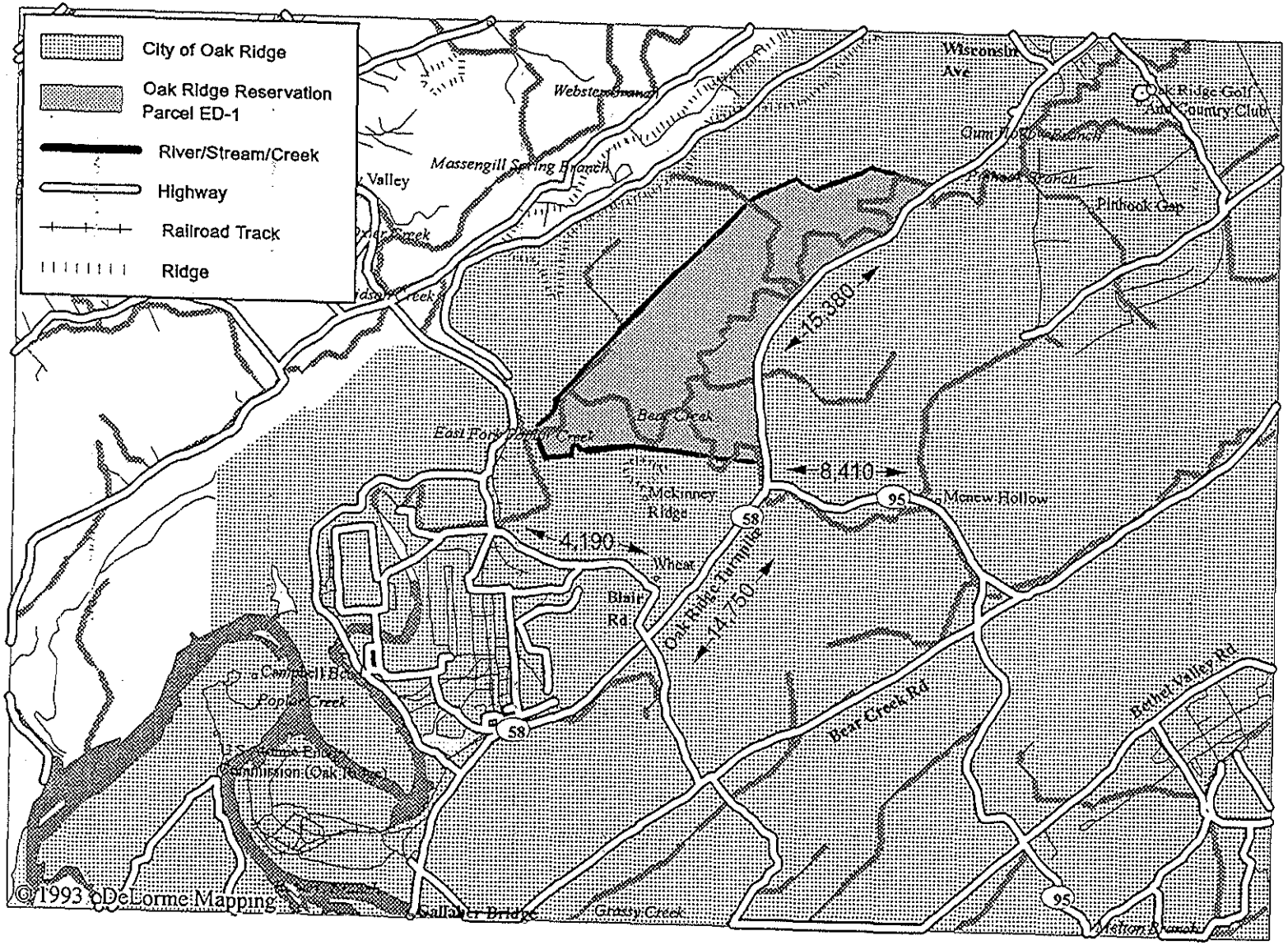


Fig. 4-3. Projected annual average daily traffic, 2004.

Road would drop from level C to Level D, but this would still be an acceptable LOS. However, the LOS on SR 95 would drop to E, an unacceptable level of service. Thus, future improvements to SR 95 might be necessary to alleviate the traffic introduced by the proposed industrial park.

Table 4-5. Estimated future traffic volumes and levels of service during the peak traffic hour

Roadway segment	Peak traffic volume (vehicles per hour)	Level of service
Blair Road	547	D
SR 95 from junction with SR 58 to Wisconsin Avenue	1751	E
SR 95 from junction with SR 58 to Bear Creek Road	1110	E
SR 58 from Gallaher Bridge to junction with SR 95	1236	A

Construction-Related Traffic

The extent to which the proposed industrial park would be developed and the future use of the park by industry is uncertain. However, the future construction of buildings within the proposed industrial park should have little or no persistent, long-term traffic impact on the surrounding roadways. Since the buildings for the park tenant(s) would be built gradually over the years, construction-related traffic would be light and the time duration would be short.

Traffic Noise

The estimated traffic induced by the industrial park and the FHWA traffic noise prediction procedure (FHWA 1977) were used to project future noise levels for roadway segments within the study area during peak hours. The noise levels for the four roadway segments within the study area after 10 years are presented in Table 4-6.

As shown in Table 4-6, locations 100 feet or more from the center line of these roadways would not experience noise levels exceeding the FHWA's L_{eq} limit of 67 dBA. Furthermore, increases in the traffic noise level due to traffic from the industrial park would be less than 3 dBA (see Table 3-9). Thus, noise impact from the associated future traffic on the four roadway segments associated with Parcel ED-1 development would be within acceptable limits.

Table 4-6. Estimated future noise levels during the peak traffic hour

Roadway segment	Estimated noise level (L_{eq})	
	100 feet from center line of roadway	200 feet from center line of roadway
Blair Road	60 dBA	55 dBA
SR 95 from junction with SR 58 to Wisconsin Avenue	66 dBA	61 dBA
SR 95 from junction with SR 58 to Bear Creek Road	63 dBA	58 dBA
SR 58 from Gallaher Bridge to junction with SR 95	64 dBA	60 dBA

Construction Noise

Detailed engineering and construction plans for Parcel ED-1 have not yet been developed, and no construction contracts are in place. Therefore, detailed information is not yet available on the number of pieces of equipment to be used, their specifications, or the schedules for use of such equipment. As a result, a quantitative assessment of construction noise cannot be made at this time. However, it can be anticipated that future construction on Parcel ED-1 would have little persistent, long-term noise impact on the surrounding area. This can be assumed due to two factors: (1) no sensitive receptors (picnic areas, recreation areas, playgrounds, residences, etc.) exist within the surrounding area and (2) buildings for the park tenant(s) would be built gradually over the years. Thus, construction-related noise would be light and the time duration would be short.

Traffic Safety

Based on the historical accident information for the past three years for the two established industrial parks (see Table 3-8), the traffic safety is unsatisfactory at the entrances/exits of these two existing industrial parks. This implies that construction of the Parcel ED-1 industrial park and the induced traffic would have the potential to result in a similar traffic safety problem. Extra traffic safety precautions (e.g., proper sight-distance allowances and construction of acceleration/deceleration lanes) must be taken into consideration in the design of the entrance/exit of the proposed park.

Also, deer-related traffic accidents would increase on SR 58 and SR 95 in the future, even if the deer population remains unchecked. However, it might be possible to reduce the number of deer-related accidents by using either deer-proof fencing to restrict deer movement or some form of population management such as hunting.

4.1.6.7 Ambient Noise

Noise from construction and operation could affect human hearing and could be a nuisance for sensitive receptors, including wildlife. For every doubling of the distance away from a noise source, sound levels decrease by 6 dBA. It is assumed noise levels emitted from activities associated with the proposed action would fluctuate according to the type of activity conducted and might be audible in nearby communities.

Typical sound levels from construction activities are listed in Table 4-7. Earthmoving, transportation, and construction activities would produce an average sound level of approximately 86 dBA (Canter 1977). Noise from a gravel truck or a diesel locomotive at 50 ft would result in sound level of approximately 95 dBA. Assuming a maximum sound level of 100 dBA emitted at the edge of the project area, a receptor located 100 ft from the activity would receive 70 dBA, or 20 dBA over the ambient sound levels. Compared to normal background noise for the area, construction activities at the proposed site would be comparable to a passing passenger car, traveling at 55 mph, at 20 ft. Assuming a maximum sound level of 100 dBA emitted at the edge of the project area, a receptor located 100 ft from the activity would receive 70 dBA, or 20 dBA over the ambient sound levels.

Because noise emissions would be temporary, short-term, and sporadic, human receptors on or near the industrial park would not be subject to hearing loss. Noise might, however, be perceived by some individuals as a nuisance. Noise levels would be minimized through the use of engineering controls on equipment (e.g., mufflers) and administrative controls, such as scheduling of activities to minimize nighttime noise impacts.

Table 4-7. Typical sound levels emitted by construction activities (dBA)

	RESIDENTIAL		OFFICES, HOTELS, HOSPITALS, SCHOOLS		PARKING GARAGE, SERVICE STATION		ROADS, UTILITIES	
Phase	I[a]	II[b]	I	II	I	II	I	II
Site clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundation	81	81	78	78	77	77	88	88
Erect building	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

[a] All equipment present on-site.
[b] Minimum equipment present on-site.

4.1.7 Cultural Resources

A response from the Tennessee State Historic Preservation Officer (SHPO) was received on August 18, 1995; it indicated that no adverse impacts to sites on or eligible for the NRHP and to the McKamey-Carmichael and Silvey cemeteries outlined in DOE's project summary (see Appendix I) would result from the proposed lease and industrial park development given that specific mitigation measures were implemented.

To minimize the potential for impacts due to industrial development, DOE will require that (1) the perimeter of the cemeteries are surveyed and clearly marked on all plat maps generated; (2) at a minimum, a 100-ft buffer zone would be clearly marked around sites 40RE195 and 40RE200; and (3) disturbance of the cemeteries and sites 40RE195 and 40RE200 must be avoided.

Based on the probability that a significant archaeological site might be located within the vicinity of the confluence of EFPC and Poplar Creek, DOE will require that an 80-acre area (see Fig. 3-23) located at the west end of the tract be surveyed and that the survey be accepted by the SHPO prior to commencing development in this area. DOE will also require that, should an unanticipated discovery of cultural materials (e.g., human remains, pottery, bottles, weapon projectiles, and tools) or sites be made during tract development activities, all ground-disturbing activities in the vicinity of the discovery would be halted immediately and DOE would be contacted prior to any further disturbance of the discovery-site area.

In addition, sites 40RE195 and 40RE200 will be periodically inspected by DOE throughout the term of the lease to ensure site integrity has not been compromised. Based on these conditions, DOE concludes that the proposed action would not adversely affect (1) any properties included or eligible for inclusion in the NRHP and (2) the McKamey-Carmichael and Silvey cemeteries.

4.1.8 Health and Safety

Based on the assumption that industrial use of the parcel would be similar to other industrial use in the Oak Ridge area, no unique public health and safety hazards are expected. The city of Oak Ridge permits specific industrial uses in its Zoning Ordinance (Appendix C), and businesses that choose to locate in the new park would be required to conform to it.

Based on the aforementioned assumption, no unique occupational health and safety hazards would be posed by industrial development at Parcel ED-1. Construction workers would be subject to typical hazards and occupational exposures faced at industrial construction sites. Falls, spills, vehicle accidents, confined-space incidents, and injuries from tool and machinery operation could occur. Similar accidents could occur at industrial facilities during operation. For the proposed action, the frequency of such accidents would not be expected to differ from that of similar industrial sites. Workers would use personal protective equipment specified in Occupational Safety and Health

Administration regulations (29 CFR 1910), and job sites would conform to the regulations.

4.1.9 Cumulative Impacts

Cumulative impacts are those that result from the incremental impact of an action considered additively with impacts of past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

No other significant construction has been proposed for areas adjacent to Parcel ED-1. Therefore, the fugitive emissions from land disturbance on the parcel would not exacerbate the effects of fugitive emissions from other sources. Emissions of radionuclides, combustion products, and other pollutants from industries sited on the parcel would be additive to those released by K-25 operations and nearby Scientific Ecology Group emissions. During the state permitting process for new facilities, the cumulative impact of additional emissions will be considered. Emissions from Parcel ED-1, in combination with emissions from upwind facilities, would not be allowed to exceed permissible limits that protect human health and the environment.

Similarly, stormwater and effluent discharges to land or streams on the parcel would be reviewed by the state for potential effects to stream hydrology and quality, as well as aquatic habitat and biota, before NPDES permits are granted. Incremental effects with discharges from other sources on the ORR would be considered during the permitting process so that aquatic resources would be protected.

On the other hand, the disturbance and/or destruction of rare or unique ecosystems at Parcel ED-1 and other natural areas of the ORR would cumulatively impact natural terrestrial and aquatic vegetation and wildlife communities. Unrestricted site development would remove up to 425 acres of bottomland hardwood forest and other rare community types along EFPC, BC, and tributaries. This vegetation provides habitat for a wide variety of birds, mammals, and other terrestrial animals, some of which are state-listed sensitive species (sharp-shinned hawk and southeastern shrew) or are declining nationally (e.g., neotropical migrant songbirds such as the yellow-billed cuckoo and the wood thrush). Site development would also modify habitat for the white-tailed deer and wild turkey. Deer are tolerant of some levels of human development, so populations might remain steady or even increase as a result of the lease. However, the removal of land from managed hunting will add to the 8,000 acres of land already withdrawn. The combined loss of about 11,000 acres (which includes both the lease area and the areas north of Parcel ED-1) (31% of the ORR land) from hunting would further constrain deer population management and increase the probability of deer-vehicle collisions.

Avoidance of Natural Area 46 (limestone quarry and spring) and Natural Area 47 (EFPC floodplain) would greatly reduce, but not eliminate, effects on terrestrial vegetation and wildlife. Maintenance of the bottomland hardwood habitat, including a minimum 200-foot buffer zone, would protect the most valuable existing wildlife habitat.

Mitigation and monitoring would also preserve other wildlife habitats (e.g., small stands of upland hardwoods). While these actions would preclude development of more than half of the site, they would substantially reduce both the individual impacts of industrial development and its contribution to cumulative losses of terrestrial resources in the region.

Past impacts to biological resources of the site result from previous land management activities. For example, the site was altered by agriculture and road building before the development of the ORR and by industrial and silvicultural activities since then. Industrial discharges, primarily from the Y-12 Plant, contaminated the waters of BC and EFPC. Toxicity of the creek and loss of aquatic habitat due to siltation severely limited the fish and aquatic invertebrates at this site. Silvicultural activities included maintaining large areas of the site in pine plantations.

Although the site has been severely impacted by past stresses, present land management actions and remedial activities on the ORR have resulted in substantial improvement. Many of the pine plantations that constituted much of the site were decimated by infestations of southern pine beetle in 1992 and 1993. About half of the 11,000 acres of pine forests on the ORR were infested, and by February 1994 more than 800 acres of pine trees on the ORR had been cleared (MMES 1994). Of 425 acres of pine plantation on the lease site, 245 acres were clearcut in 1993 and 1994. The eventual return of these pine plantations to a more diverse natural community would increase plant and animal diversity at the site. Similarly, reduction of contaminated discharges and other remedial actions have substantially reduced the input of toxic contaminants to BC and EFPC in the last decade. As a result, recovery of the biological communities in these streams has been documented (see Sect. 3.5.2). Continued improvement in both terrestrial and aquatic resources is expected.

Biodiversity

Continued remediation of past impacts, as exemplified by both the waste minimization efforts leading to recovery of aquatic communities in BC and EFPC and the planned succession of former, managed pine plantations to more natural forest communities, will enhance the biodiversity of the site. Second, continued loss of terrestrial and aquatic habitats from land clearing associated with DOE's mission (e.g., development of waste storage/treatment facilities or new research facilities) or lease/sale of ORR land for private use will reduce biodiversity (Sect. 4.1.5.4). For example, of the 58,600 acres (24,000 ha) of land originally included in the ORR in 1942, about 21,000 acres (8,500 ha) have been released from federal ownership to the city of Oak Ridge and other parties. A further 3,000 acres (1,200 ha) have been released to other federal agencies for a variety of developments, and about 10,800 acres (4,400 ha) contain developed sites for DOE facilities, waste sites, or remediation areas (Mann et al. in press). The proposed action would delay or stop the ongoing recovery of the site and add to the total loss of habitat on the ORR.

Areas with the greatest biodiversity on the parcel also contain plant communities that are dwindling in the East Tennessee region. Large contiguous blocks of bottomland

hardwood forests and their associated wildlife are diminishing in the Ridge and Valley Province of East Tennessee (Mann et al. in press) but also across the United States (Noss et al. 1995). The 425-acre EFPC floodplain includes floodplain forest, nine rare plant community types, and populations of five state-listed plant and animal species. Loss of this area to industrial development would reduce biodiversity at all scales, ranging from genetic diversity on the site to landscape diversity in the region. Other portions of the proposed site are presently recovering from past activities that created low biodiversity. For example, nearly 60% of the 425-acre pine plantation on the site has been clear cut in recent years. Use of the pine plantation areas (both clear cut and uncut) for industrial development would do little to reduce biodiversity but would preclude the succession to more natural plant communities that would support a greater variety of plant and animal species.

4.2 NO ACTION

If no action is taken and Parcel ED-1 is not leased for development of an industrial park, land use would remain the same. Air, water, geology, and archaeological/historic resources would not be impacted. The wildlife and vegetation values of the site would be preserved. The area would continue to serve as a refugium and habitat for neotropical migrant songbirds and other breeding birds, small woodland mammals, and amphibians. The area would also continue to provide habitat for several uncommon plant species and would continue to succeed to regionally limited upland deciduous forest. Opportunities would be retained for dispersed recreation (e.g., hiking; wildlife, plant, and wetland viewing; additional hunting; trapping) not now permitted. Because some upland areas on the site have been recently logged, an initial increase would occur in numbers of deer and other edge-dependent animal species. With continued hunting, however, deer numbers might be controlled until natural succession produced a closed-canopy hardwood forest less favorable for these edge-dependent species. These natural successional processes would also favor interior species which, increasingly, face habitat limitations due to human development.

On the other hand, many jobs are expected to be lost due to DOE budget cuts and strategic realignment over the next 5 to 10 years. If no action is taken, the Oak Ridge-Knoxville economy would suffer. Unemployment has a domino effect on other aspects of the community, including the housing market, consumer spending, and the utilization of public services.

5.0 REGULATORY COMPLIANCE

During the NEPA process, DOE is required by (1) Sect. 7 of the ESA to consult with the U.S. Department of Interior, FWS, regarding the presence of T&E species and potential for adverse impacts at a proposed project site, (2) Sect. 106 of the National Historic Preservation Act (NHPA) to consult with the SHPO regarding the presence of archaeological and historic sites and potential for adverse impacts at a proposed project site, and (3) FPPA to consult with the U.S. Department of Agriculture, NRCS, regarding the presence and future use of prime farmland soils at a proposed project site.

Appendix F describes the ESA consultation requirements and procedures, and correspondence between DOE and FWS concerning the lease of Parcel ED-1 is included. Appendix I provides a copy of NHPA correspondence and the opinion of the SHPO regarding impacts of the lease of Parcel ED-1. Consultation with the NCRS was done by telephone; contacts are listed in Sect. 7.0.

The terms of the lease prohibit construction in the 100-year floodplain and in wetlands. In accordance with 10 CFR 1022, the DOE regulations for compliance with Floodplains/Wetlands Review Requirements, the 100-year floodplain is the "base" floodplain, and the 500-year floodplain is referred to only if volatile, toxic, or water-reactive materials are stored in the floodplain. Currently, no such materials are stored in the floodplain. Should ETEC or industrial developers seek to disturb floodplain areas, DOE would conduct an environmental review in accordance with 10 CFR 1022 at the developer's expense. In addition, the lease incorporates language protective of health and the environment as a part of the federal government's responsibility as the continuing fee-owner of the land.

Other environmental statutes apply to the lease of federal lands, including CERCLA and HSWA. The following regulatory compliance issues are applicable to the lease of Parcel ED-1:

1. The requirements of the ORR HSWA Permit require notification of alterations at the permitted facility. To this end, DOE provided notice to EPA and TDEC of the proposed lease of Parcel ED-1 of the ORR (see Appendix K). In addition, the letter requests that the HSWA permit be modified accordingly. (This action is pending.)

2. Sect. 120(h) of CERCLA requires that the lease include a notice of any storage or known release of hazardous substances above specified thresholds, or any disposal of hazardous substances. A review of DOE files indicates that no such notice is required. The results of the review were transmitted to EPA and TDEC in a letter dated August 11, 1995 (Appendix K). The EPA response, dated August 21, 1995, is also provided in Appendix K.

3. CERCLA 120(h)(4) requires that DOE identify uncontaminated property by consulting specified sources of information. In addition, the identification

must include concurrence from EPA. The August 11, 1995, letter to EPA and TDEC includes the required identification of uncontaminated property. EPA concurrence was received on August 21, 1995 (Appendix K).

Private industrial developers will be responsible for seeking and obtaining federal, state, and/or local permits for activities at their facilities. Regulations implementing the Clean Air Act, Federal Water Pollution Control Act (Clean Water Act), Resource Conservation and Recovery Act, Safe Drinking Water Act, Toxic Substances Control Act, Emergency Planning and Community-Right-to-Know Act, and others may apply.

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7.0 AGENCY AND INDIVIDUAL CONSULTATION

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

Name	Affiliation	Location	Topic
Jim Campbell	East Tennessee Economic Council	Oak Ridge, Tenn.	Industrial Development on Parcel ED-1
Larry Hodge	Oak Ridge Chamber of Commerce	Oak Ridge, Tenn.	Industrial Development on Parcel ED-1
Lee Barclay	U.S. Fish and Wildlife Service	Cookeville, Tenn.	Threatened and/or Endangered Species
Herbert Harper	State Historic Preservation Office	Nashville, Tenn.	Section 106, National Historic Preservation Act; Historic Properties on Parcel ED-1
Alan Neal Terry Gupton	U.S. Natural Resource Conservation Service	Anderson & Roane County, Tenn.	Prime Farmland Soils
Jim Evans	Tennessee Wildlife Resources Agency	Oak Ridge, Tenn.	ORR Deer Population & Hunting

8.0 LIST OF PREPARERS

Name/Affiliation	Responsibility	Degree/Area/Univ	Experience
Deborah J. Awl/ JAYCOR	Terrestrial Plants/ T&E Species	B.S. Ecology/ Bradley Univ.	4 years experience in rare plant ecology
T. J. Blasing/ LMES	Air Quality	Ph.D. Meteorology/ Univ. of Wisconsin	20 years experience in atmospheric/ climatic research and environmental assessment
Helen M. Braunstein/ LMES	Coordinator for LMES	Ph.D. Chemistry/ Univ. of Maine M.P.H. Environmental Health/ Univ. of Tennessee	20 years experience in environmental assessment work
Glenn F. Cada/ LMES	Cumulative Impacts, Wetland Impacts, Aquatic Impacts, Geologic Impacts	Ph.D. Zoology/ Univ. of Nebraska	18 years experience in environmental assessment
Andrea W. Campbell/DOE	Environmental Assessment Team Leader; Impacts to Air Quality and Surface Water, Chapters 1 and 2	M.S. Biology/ B.S. Biology/ Wilkes College	15 years experience in environmental assessment
Shih-Miao Chin/ LMES	Traffic and Traffic Noise	Ph.D. Civil Engineering/ Rensselaer Polytechnic Institute M.S. Civil Engineering/ Univ. of Utah Master of Mathematics/Utah State Univ.	15 years experience in traffic-related studies
Roxanna L. Hinzman/LMES	Aquatic Monitoring	M.S. Biology/Univ. of West Florida	6 years experience in aquatic ecology

Name/Affiliation	Responsibility	Degree/Area/Univ	Experience
David T. Kendall/ LMES	Land Use and Public Involvement	M.L.A. Greater Landscape Architecture/ Louisiana State Univ. B.S. Agriculture/ Univ. of Tennessee	15 years experience in land use planning
Suk Young Lee/ LMES	Soils	Ph.D. Soil Science/ Univ. of Wisconsin	20 years experience in soil science
Peter J. Lemiszki/ LMES	Geology	Ph.D. Geology/ Univ. of Tennessee	6 years experience in geology
Linda K. Mann/ LMES	Wetlands and Aquatic Descriptions	M.S. Plant Ecology/ Univ. of Tennessee	25 years experience in ecological research, natural resource management and environmental assessment
Patricia D. Parr/ LMES	Ecological Sections Coordinator	M.S. Ecology/ Univ. of Tennessee	21 years experience in ecological research, and natural resource management
Barbara A. Rosensteel/ JAYCOR	Wetlands Assessment	M.S. Environmental Sciences/ Rutgers Univ.	6 years experience in wetland ecology
Michael G. Ryon/ LMES	Aquatic Ecology and Threatened and/or Endangered Species	M.S. Ecology/ Univ. of Tennessee	10 years experience in aquatic ecology
Martha S. Salk/ LMES	Impacts to Terrestrial and Threatened and/or Endangered Species	Ph.D. Botany/ Univ. of Louisville	21 years experience in environmental assessment
James W. Saulsbury/LMES	Socioeconomics	M.S. Planning/ Univ. of Tennessee	8 years experience in socioeconomics
Elizabeth M. Schilling/LMES	Aquatic Ecology and Threatened and/or Endangered Species	M.S. Ecology-Fisheries/ Univ. of Tennessee	11 years experience in aquatic ecology

Name/Affiliation	Responsibility	Degree/Area/Univ	Experience
Martin Schweitzer/ LMES	Socioeconomics	M.S. Planning/ Univ. of Tennessee	17 years experience in socioeconomics
John G. Smith/ LMES	Aquatic Ecology and Threatened and/or Endangered Species	M.S. Biology/ Tennessee Tech. Univ.	9 years experience in aquatic ecology
Peter A. Souza/ LMES	Cultural Resources	M.S. Geology/ Univ. of Tennessee	5 years experience in NEPA Compliance
John D. Tauxe/ ORNL EAAS	Water Resources	Ph.D., M.S. Civil Engineering/Univ. of Texas at Austin B.A. Earth Science/ Wesleyan Univ.	6 years experience in geology; 6 years experience in water resources engineering; 2 years experience in environmental assessment
Thomas W. Underwood/ BAT Associates	Socioeconomics and Demographics	M.S. Environmental Science/B.S. Sociology/Southern Illinois Univ.	4 years experience in NEPA assessment
Julia A. Watts/ LMES	Geology, Soils, Groundwater	M.S. Mathematics/ Tennessee Tech. Univ.	20 years experience in ecological analyses
John W. Webb/ LMES	Terrestrial Wildlife including Threatened and/or Endangered Species	Ph.D. Insect Ecology/Rhodes Univ. - South Africa	21 years experience in insect ecology, wildlife, and environmental assessment
Thomas F. Zondlo/ LMES	Geology and Groundwater	B.S. Geology/ Rutgers Univ.	16 years experience in geology studies

APPENDIX A

EAST TENNESSEE ECONOMIC COUNCIL AND REGULATORY BASIS FOR LEASE OF DOE PROPERTY

East Tennessee Economic Council

Our mission is to preserve federally funded jobs impacting 37 East Tennessee counties and to diversify the regional economy by decreasing dependence on federal programs.

The East Tennessee Economic Council is a non-profit organization of approximately 80 businesses and individuals representing more than 37,000 employees in East Tennessee. The Council functions to represent the interests of our members through the legislative process with elected officials and federal agencies.

The Council also serves as the Community Reuse Organization (CRO) for the United States Department of Energy in economic development initiatives and in workforce restructuring activities. Those activities include securing a revolving loan fund for small business development, the TECHNOLOGY 2020 program, and pursuing facilities re-use opportunities in federal facilities that are surplus to accomplishing the DOE mission on the Oak Ridge Reservation.

It is the goal of the East Tennessee Economic Council to ensure that the progress in establishing a vibrant and diversified industrial base that has been made in the region to date continues. The federal government's presence remains a strong and viable part of our regional economy. It should be used to stimulate private sector economic growth throughout East Tennessee.

The East Tennessee Economic Council's "Key Federal Issues," which is contained on the pages that follow, identifies the programs and initiatives that need to be accomplished to maintain and improve the region's economic vitality.

ET 2000 Economic Diversification Initiative

The defense and national security missions of the Department of Energy are in a state of major change. This change is impacting historically important defense communities and regions such as Oak Ridge and East Tennessee. The Department of Energy has embarked on an aggressive mitigation program to ease the impacts of this transition through an economic diversification effort aimed at creating private sector jobs in the region. Part of that program, is the East Tennessee Regional Economic Diversification Initiative. Key components of the ET 2000 Plan are:

* Construction of the Technology, Trade, and Exhibition Center.
* Construction of a Regional Industrial Center.
* Easing restrictions on the Re-Use of DOE facilities.
* Obtaining federal land for industrial development.
* Building the TECHNOLOGY 2020 facility to secure the success of the National Information Infrastructure programs in Tennessee.

Business Development Centers

The Technology, Trade and Exhibit Center is a key element in the creation of a national marketing strategy to expand the customer base and market demand for the advanced technology products and services available at DOE facilities in Oak Ridge. As a part of the overall technology-based economic development strategy, the Center provides a critical interface between potential private sector customers and the existing technology transfer efforts and resources at the Department's Oak Ridge

facilities, and is a place for national and international conferences and seminars.

The Regional Industrial Center will allow the region to support the creation of new jobs to replace those being lost due to federal program cuts. The acute shortage of large industrial sites in the East Tennessee are is a serious barrier to economic diversification, and this effort will afford a unique opportunity to market the site by several regional industrial development organizations.

ETEC will see funding for both the Centers from the Department of Energy under Section 3161 of the Defense Conversion Act and from the Economic Development Administration.

Facilities Re-Use
The changing DOE missions have resulted in many underutilized facilities that are attractive to the private sector for business opportunities. These opportunities benefit the community economically and facilitate economic diversification.

ETEC encourages DOE to standardize facility re-use rules and regulations to be more user-friendly and streamline the process; thus enabling the creation of more private sector

Land Transfer
Additional land for industrial development will provide the opportunity to accelerate the process of economic diversification and will provide jobs for displaced defense workers. Additional land will also place additional property on the tax rolls of the City of Oak Ridge, Anderson and Roane counties, helping further stabilize the local economy. ETEC is encouraging the Oak Ridge Operations Office to speed up the process of transferring excess DOE land not being used for programmatic purposes to recognized non-profit economic development organizations or governmental entities for industrial development purposes.

TECHNOLOGY 2020
The TECHNOLOGY 2020 program in Oak Ridge will serve as a major catalyst for putting new business technology to work throughout East Tennessee and the state by linking industry, academia, and capital markets in a synergistic fashion. The National Information Infrastructure grants program is important to Tennessee's information superhighway because of the key impact it will have on business, health care, education, and many other aspects of global competiveness.

ETEC supports the proposal of the State of Tennessee for a National Information Infrastructure Pilot Demonstration Grant and hopes to use the TECHNOLOGY 2020 project as a major example of Tennessee's commitment to NII.

DOE's Environmental Management Program

In 1989 the Department of Energy set a 30-year goal to clean-up and restore the environment at its nuclear sites through sustained excellence in the performance of environmental restoration, waste

management and transportation of DOE waste. The DOE mission for environmental restoration and waste management is to:

* Safely manage the generation, handling, treatment, storage, transportation, and disposal of DOE waste
* Insure that the risks to the environment and human health and safety posed by inactive and surplus facilities and sites are either eliminated or reduced to prescribed safe levels.

Continuing the environmental restoration and waste management programs in Oak Ridge ensures that the risks to the environment and human health and safety are minimized. Lacking this assurance, it is impossible to attract new industry, jobs and people to the region. The national image as well as the future health of the region is directly tied to an effective and aggressive environmental management program.

ETEC will work to ensure continued full funding for the environmental restoration and waste management budget for Oak Ridge.

Preserve the Y-12 Missions

The Y-12 Plant at Oak Ridge is changing to meet new national priorities. At the same time, it needs to preserve those activities and skills that are its strengths-managing the nation's stockpile of highly enriched uranium and maintaining its excellence in all phases of manufacturing. Y-12 is the only facility in the U.S. that can provide the services needed for the dismantlement, production, and storage of uranium, lithium, and secondary materials, and also has a major role to play in the nonproliferation of nuclear weapons throughout the world.

Y-12 historically is the most secure facility in the United States for the long-term storage of highly enriched uranium. The Oak Ridge community is willing to continue this activity provided adequate funding provisions are made for safeguarding the material and for processing and handling additional material from dismantled weapons and from stockpiles purchased from the countries of the former Soviet Union. Oak Ridge is the premier site in the United States for this activity because of the long-term development of proven safety procedures in the processing, storage, and security of highly enriched uranium. Highly skilled and trained personnel are in place and have the immediate capability to handle additional HEU.

ETEC support the development of legislative language to insure that DOE is provided consistent funding levels in the $330 million range for HEU handling and storage at Y-12, and to continue expanding the manufacturing deployment already underway at Y-12.

Oak Ridge Centers of Manufacturing Technology

The Centers were established to capitalize on the manufacturing and fabrication capabilities developed in Oak Ridge for national security purposes-should use existing facilities, skilled workers, engineers, and

scientists to improve the competitiveness of American industry.

The Centers of Manufacturing Technology provided otherwise unavailable assistance to more than 2,000 businesses in 47 states in 1994. It helped them solve tough manufacturing problems. This dual-use facility serves as a national industrial resource for applied research, development and education while maintaining the capability to serve the needs of the defense of the nation.

Continued funding from the Department of Energy of $50 million is required in FY 1996 to ensure that the Centers for Manufacturing Technology can maintain its vital expertise for the benefit of the national defense and American business.

Promote ORNL Initiatives

The Oak Ridge Neutron Source

The Department of Energy has designated Oak Ridge National Laboratory as the "preferred alternative site" for a new neutron source, an accelerator-based neutron facility that will help the laboratory maintain its global role in basic scientific research, and proposed an $8 million budget for a conceptual design report on the facility in its FY 1996 budget.

Neutron science is one of ORNL's four "core competencies", which is a DOE designation meaning the laboratory's research in this area has global impacet and demonstrated success. The administration decided not to continue the Advanced Neutron Source at this time because of cost. The accelerator-based spallation source is a lower cost option for the neutron source.

Funding of the conceptual design for the project needs to be approved in the FY 1996 budget and a commitment to build the project in Oak Ridge needs to be made.

Transportation

Transportation technology, development and research in Oak Ridge is of vital importance to the United States as we plan for the next century. Key work is underway at ORNL in conjunction with the University of Tennessee with an annual budget of $70 million. The work consists of national initiatives of key importance to the future of transportation technology in the nation.

The Oak Ridge Transportation Technology Center is focusing on three national initiatives:

* The Next Generation vehicle, to which Oak Ridge will contribute special expertise in materials, manufacturing, robotics, and alternative energy sources.
* The Intelligent Vehicle Highway System, an initiative of the U.S. Department of Transportation aimed toward substantial improvement in traffic flow, auto safety, and productivity.
* Infrastructure Improvement, toward which Oak Ridge will develop better materials for new construction and repairs, and improve diagnostics by imbedding sensors in new structures.

ETEC will work to ensure that language is maintained in the FY 1996 Appropriates Bill to provide $10 million for equipment for transportation to research and development vital to the Oak Ridge Transportation Research Center initiatives.

Biological Sciences

Biological and genetic research programs are underway in Oak Ridge that will capitalize on emerging opportunities over the next decade. This research has key importance in health care, biotechnology, agriculture, and other areas.

The Center for Biological Science has performed more than 50 of biological research in areas ranging from birth defects, genetic information, and proteins. In cooperation with the University of Tennessee, the Center offers the opportunity to integrate biological science with other areas of scientific expertise and research.

Funds for construction of a new Oak Ridge Center for biological Sciences to replace the existing 50 year old facility need to be appropriated in the 1996 federal budget.

regional economic diversification.

ETEC will encourage the Tennessee congressional delegation and the Office of the U.S. Trade Representative to implement trade treaties approved by the Congress in a timely manner and to work to open additional markets to Tennessee business interests.

ETEC Board of Directors

Ben Adams, Adams Craft Herz Walker
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Chuck Laine, Laine Communications & Marketing
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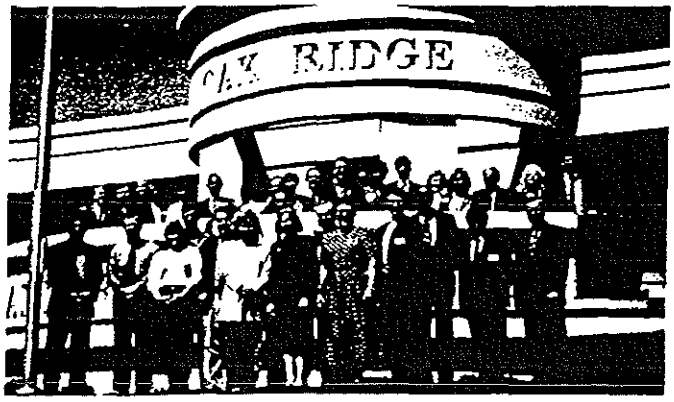
Margaret Morrow, Martin Marietta Energy Systems
Bill Martin, Martin Marietta Energy Systems
Lillian Mashburn, University of Tennessee
Allen Neel, Tennessee's Resource Valley
Dick Parker, Lockwood Greene Engineers
David Patterson, University of Tennessee
Larry Peck, SAIC
Herman Postma, Retired ORNL
George Ritter, Performance Development Corporation
Jim Stone, Boeing Defense & Space-Oak Ridge

Promotion of Sound Trade Policies

The East Tennessee Economic Council wants to ensure that the United States' international trade policies afford American industry fair and equitable opportunities to compete in the global marketplace. Many Oak Ridge companies that contribute significantly to the regional economy conduct business globally. Fair and equitable trade policies will serve to contribute significantly to

1995 Plan of Action



CHAMBER OF COMMERCE
OAK RIDGE

Oak Ridge Chamber of Commerce

Contents

Mission Statement

The mission of the Oak Ridge Chamber of Commerce is to represent the interests of its members in promoting the economic and civic progress of the community.

parts of multiyear activities and projects) that the Secretary of Energy expects to accomplish during that fiscal year.

(C) For the fiscal year for which the budget is submitted, a disaggregation of the Department of Energy defense environmental restoration and waste management budget request into the activities and projects (including discrete parts of multiyear activities and projects) that the Secretary of Energy expects to accomplish during that fiscal year.

(e) COMPLIANCE TRACKING.—In preparing a report under this section, the Secretary of Energy shall provide, with respect to each activity and project identified in the report, information which is sufficient to track the Department of Energy's compliance with relevant Federal and State regulatory milestones.

SEC. 3154. LEASE OF PROPERTY AT DEPARTMENT OF ENERGY WEAPON PRODUCTION FACILITIES.

Section 646 of the Department of Energy Organization Act (42 U.S.C. 7256) is amended by adding at the end the following new subsections:

"(c) The Secretary may lease, upon terms and conditions the Secretary considers appropriate to promote national security or the public interest, acquired real property and related personal property that—

"(1) is located at a facility of the Department of Energy to be closed or reconfigured;

"(2) at the time the lease is entered into, is not needed by the Department of Energy; and

"(3) is under the control of the Department of Energy.

"(d)(1) A lease entered into under subsection (c) may not be for a term of more than 10 years, except that the Secretary may enter into a lease that includes an option to renew for a term of more than 10 years if the Secretary determines that entering into such a lease will promote the national security or be in the public interest.

"(2) A lease entered into under subsection (c) may provide for the payment (in cash or in kind) by the lessee of consideration in an amount that is less than the fair market rental value of the leasehold interest. Services relating to the protection and maintenance of the leased property may constitute all or part of such consideration.

"(e)(1) Before entering into a lease under subsection (c), the Secretary shall consult with the Administrator of the Environmental Protection Agency (with respect to property located on a site on the National Priorities List) or the appropriate State official (with respect to property located on a site that is not listed on the National Priorities List) to determine whether the environmental conditions of the property are such that leasing the property, and the terms and conditions of the lease agreement, are consistent with safety and the protection of public health and the environment.

"(2) Before entering into a lease under subsection (c), the Secretary shall obtain the concurrence of the Administrator of the Environmental Protection Agency or the appropriate State official, as the case may be, in the determination required under paragraph (1). The Secretary may enter into a lease under subsection (c) without obtaining such concurrence if, within 60 days after the Secretary requests the concurrence, the Administrator or appropriate State official, as the case may be, fails to submit to the

APPENDIX B

RESPONSE TO COMMENTS RECEIVED ON THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED LEASE OF PARCEL ED-1 OF THE OAK RIDGE RESERVATION TO THE EAST TENNESSEE ECONOMIC COUNCIL (AUGUST 1995)

RESPONSE TO COMMENTS RECEIVED ON THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED LEASE OF PARCEL ED-1 OF THE OAK RIDGE RESERVATION TO THE EAST TENNESSEE ECONOMIC COUNCIL (AUGUST 1995)

COMMENT FROM:	COMMENT	RESPONSE
E. Steven Helms, P.E., *Senior Vice-President, Lockwood Green Technologies, Inc.*, Oak Ridge, Tennessee	Lockwood Greene reviewed all existing industrial and green field sites within a 25-mile radius of the existing Clinch Bend site (commonly known as the Clinch River Breeder Reactor Site). The Clinch Bend site configuration and topography strongly suggest that the site is unlikely to be fully occupied by a single user representative of a major manufacturing facility. Moreover, the relatively high investment cost to develop site infrastructure and improvements to maximize utilization for late users is a major liability for this site. Of all existing regional industrial parks and sites (31 within the study area), none, as currently configured, meet the criteria for a major industrial project. Throughout the 25-mile radius, only two potential green field sites, not currently designated as industrial sites, were identified, one of which is parcel ED-1, the subject of this EA. In comparing the Clinch Bend site and these two potential green field sites, parcel ED-1 rated, by far, the highest in those factors considered important by corporations conducting site searches for major industrial facilities. In summary, based on our experience in industrial development and sites available in the region, it is crucial to the socioeconomic well being of this region to proceed, in accordance with all applicable laws and regulations, with making parcel ED-1 available for private industrial development.	DOE acknowledges the effort by Lockwood Greene to identify sites in the Oak Ridge area conducive to industrial development. Information from this study has been added to Sect. 1 of the EA.

COMMENT FROM:	COMMENT	RESPONSE
Robert M. Cushman, Oak Ridge, Tennessee	(1) The purpose of rejecting disposal of Parcel ED-1 as an option ("to ensure continuation of DOE's environmental research mission" as stated on page xii) appears to be contradicted elsewhere in the EA: "The proposed action would substantively change the present land use of Parcel ED-1 from...an environmental research area to an industrial park" (page xii) "...construction would disturb or remove a large percentage of vegetation on Parcel ED-1" (page xiv) "The presence of light industrial facilities would greatly simplify the existing natural environment for wildlife which would limit diversity and populations of species likely to persist." (page xiv) Thus, it is not clear how the proposed alternative serves better to "ensure continuation of DOE's environmental research mission" than would the disposal option. (2) Sect. 1.2 and Table 1-1 make no mention of the status of what the City of Oak Ridge calls Site A (see enclosed maps provided to me by the City last year), which the City has requested from DOE, and which DOE is apparently still considering. The EA does not address possible land-use conflicts between the proposed uses of Parcel ED-1 and Site A. Note that in the map entitled "Fig. 1. Status of DOE Land Purchase Requests" the parcel that corresponds roughly with Parcel ED-1 is shown as separated from Site A. The boundaries of Parcel ED-1 shown in the EA, in conjunction with the two enclosed maps, indicate that Parcel ED-1 would either abut or overlap Site A. It appears from Sect. 7.0 that no one in the City of Oak Ridge government was contacted concerning this EA. That, plus the omission of appropriate	(1) The reason given for leasing rather than disposing of (selling or giving away) Parcel ED-1 is not contradicted by statements in the EA. While it is true that some vegetation would be disturbed or removed, some wildlife habitat altered and resident species displaced, and some land use changed from nonindustrial to industrial, environmental research and monitoring would continue where practicable (e.g., along East Fork Poplar Creek) despite industrial development. By retaining ownership of the parcel and offering it to ETEC via a lease, DOE also retains the right to specify terms of environmental protection in the lease, an option that would not be possible otherwise. (2) Site A (or Parcel D), which adjoins Parcel ED-1 to the east, was requested for transfer by the City of Oak Ridge in its 1979 Self-Sufficiency Plan. DOE has not yet determined that this parcel is available for transfer. When DOE reviews its real estate to determine whether land is inactive,

COMMENT FROM:	COMMENT	RESPONSE
Robert M. Cushman, Oak Ridge, Tennessee	text in the EA, leads me to believe that conflicts between the proposed action and existing land-use plans of the City of Oak Ridge were not considered. For example, the enclosed map entitled "Site 'A' Illustrative Site Development" shows an area that might be used for an elementary school - would this be compatible with the proposed action? How about the large areas of Site A that would be residential?	underutilized, or excess, the land-use plans of the City of Oak Ridge are not a primary consideration. DOE reviews *its* mission and programmatic needs, and land that meets the criteria for "use by others" (non-DOE entities) is so designated. Until a decision is made on the disposal of Site A, the question of compatibility is premature.
	(3) The compliance by DOE with the NEPA process might be defensible in terms of the *letter* of the law, but compliance with the *spirit* of the law is clearly lacking. Specifically, the actions of DOE indicate a clear intent to proceed with the proposed action, with minimal and hasty compliance with NEPA, and without probable due regard to the findings of the NEPA process. I am reminded of DOE's "crabbed interpretation" of NEPA that made a "mockery" of the Act and led to the famous Calvert Cliffs decision. (4) In the 28 July 1995 issue of *The Oak Ridger*, DOE placed a "notice of availability" in which it announced that an EA "will be prepared." I wrote to DOE on 29 July asking to see a copy of the "EA Determination." Three weeks later, I was mailed a copy of the draft EA itself. Could a careful analysis truly have been completed in three weeks or less?	(3)&(4) DOE has complied with the letter and the spirit of NEPA in preparing an environmental assessment for the proposed action. This EA was prepared by a team of technical experts who are quite familiar with the ecology of Parcel ED-1. The EA team worked relentlessly to complete the EA within a short time frame to allow for public and agency review.

COMMENT FROM:	COMMENT	RESPONSE
Robert M. Cushman, Oak Ridge, Tennessee	(5) The draft EA states that there will be a "public workshop" on 24 August 1995. However, this workshop comes after the draft EA is released, indicating a disregard by DOE for any issues that might be raised by the public. Thus, the public was shut out of meaningful participation in the scoping process, and is only invited to comment on something that is well underway. This is, I believe, clearly contrary to the spirit of NEPA.	(5) DOE has exceeded Council on Environmental Quality (CEQ) and DOE requirements for public involvement in the EA process. Due to the degree of public interest shown following publication of the Notice of Intent to prepare an EA, a decision was made to hold a public workshop. The workshop was held in the middle of the public comment period to allow time for review of the EA prior to the workshop as well as time to submit written comments prior to the end of the comment period.

COMMENT FROM:	COMMENT	RESPONSE
Robert M. Cushman, Oak Ridge, Tennessee	(6) The draft EA cites the Common Ground process (page 1-4 and 1-5) as its effort to involve the public in its decision making process. However, my recollection is that Common Ground considered Oak Ridge Reservation land-use issues only in a general sense, without reference to specific parcels of land. Thus, Common Ground was not a forum to provide specific comments on the proposed Parcel ED-1 lease. (7) The draft EA was evidently released before the 24 July letter from DOE to the U.S. Fish and Wildlife Service (consultation per the Endangered Species Act) had been answered (page D-7), again suggesting that the EA was hurriedly prepared, without regards to important substantive issues. (8) Sect. 2.1.2 of the EA states that "as this EA is being written, the terms of the proposed lease are being negotiated by DOE and ETEC" and that "Renewal of the lease is being considered for additional periods." These statements strongly suggest that the significant decisions have already been made by DOE, and that the NEPA process is being conducted grudgingly by DOE. (9) The clear impression I am left with is that DOE has already decided on its course of action, that the public has been deliberately excluded from meaningful participation in the NEPA process, and that DOE is treating the NEPA process with the same contempt that marked AEC's behavior in the early 1970s.	(6) DOE agrees that the Common Ground process considered ORR land-use issues in a general sense. The text of Sect. 1 has been revised to clarify the objective of the process. (7) The NEPA requirements of the Endangered Species Act do not require that consultation be completed prior to the issuance of a draft EA. FWS approved DOE's Biological Assessment (BA) for Parcel ED-1, which discussed the presence or absence of listed and candidate species and proposed mitigation and monitoring. The BA and FWS-DOE correspondence are included in Appendix F of the EA. (8) DOE willingly prepared this EA prior to a decision on leasing Parcel ED-1. Negotiating the lease does not imply a decision to sign, as with any real estate transaction. (9) DOE has proposed a course of action and has included the public in its decision-making process to an extent beyond legal requirements. Meaningful comments have been received from several public reviewers.

COMMENT FROM:	COMMENT	RESPONSE
James M. McCarten, Oak Ridge, Tennessee	The purpose of this letter is to voice my support for the ETEC and Chamber proposals on the site and to encourage ORO to move forward as expeditiously as practical and appropriate with the transfer of the property. This thousand acre parcel has already been identified by the City of Oak Ridge as a self-sufficiency parcel and should be transferred to further the City's economic development initiatives. Furthermore, there has already been a great deal of public comment on the use of this parcel as an industrial site, especially the discussions that followed the publication of the City's Comprehensive Land Use Plan in 1984, and nothing of importance has changed. Thus, further hearings will serve no purpose other than to delay the transfer. Important also to the City is the fact that the process should move relatively quickly to allow the City to "strike while the iron is hot," especially given the survey results from Lockwood Greene identifying this property as one of the best industrial sites in the four county area. The City, the Chamber and ETEC have all come forward supporting the development of a first rate industrial park; one that meets the community's high standards for appearance and operation. Standards which everyone involved hope will enable Oak Ridge to attract tenants from non-traditional Oak Ridge industries. These are the types of new businesses that will require safe, clean, high amenity facilities and Oak Ridge, with ORO's support (and without traditional governmental micro management of the property), will be able to meet those needs when the land is transferred and the park developed. It is also worth pointing out the proposals from the Chamber and ETEC call for the portion of the industrial property which lies in the floodplain to be slated for use in a fashion that would further ongoing DOE missions in environmental research. For all the reasons set forth above, I strongly urge the Department of Energy-Oak Ridge Operations to continue to support the expeditious transfer of the property in a fashion that will allow the City of Oak Ridge to quickly develop the property as one of the premier industrial sites in East Tennessee.	DOE acknowledges Mr. McCarten's support for this project and his comments on the need for industrial diversification in the Oak Ridge area.

COMMENT FROM:	COMMENT	RESPONSE
Allan Wimmer, *Tennessee's Resource Valley*	*Tennessee's Resource Valley* is a private, non-profit corporation that was created to market and promote a 15-county region for the purpose of improving its economy. In this role, we recognize the need for communities to have suitable land available for industrial development. The 1,000 acres will provide opportunities for economic growth, technology transfer, and jobs for residents of Oak Ridge and surrounding counties. In addition to our marketing efforts, Resource Valley is managing the 21st Century Jobs Initiative, a strategic plan for our regional economy that addresses the impacts of DOE downsizing. With employment forecasts showing a decreasing rate of job creation in the region over the next ten years, we must be proactive in planning for future economic growth. Tennessee's Resource Valley supports the efforts of ETEC, working in cooperation with DOE to develop this land as a first-rate industrial park that will attract clean industry and create high-quality jobs for our region.	DOE acknowledges Mr. Wimmer's comments and support on behalf of *Tennessee's Resource Valley*.

COMMENT FROM:	COMMENT	RESPONSE
Walt Brown, *Councilman, City of Oak Ridge*, Tennessee	In about 1985, decisions were made to cancel the Breeder Reactor Project, cancel the Gas Centrifuge Project, shutdown the K-25 Gaseous Diffusion Plant and transfer much of the Atomic Vapor Laser Isotope work to California. Oak Ridge and the surrounding communities were very dependent upon government. There was virtually no industrial development land and very few non-DOE contractors or companies in Oak Ridge. It was immediately recognized by the community that extensive efforts were required to become less dependent upon federal funds and employment. Working together, the DOE, City of Oak Ridge, Martin Marietta, local businesses, and the private sector put forth an effort to recruit new business and industry. The end result was a new downtown mall, many additional retail businesses, new motels, new office buildings, and industrial expansion. In 1985 there was no Bethel Valley Industrial Park, no Commerce Park, very little industrial development on Union Valley Road and very little land for residential development. Working together we have seen, with the transfer of DOE property to the City and local community, a significant expansion of our business and industry and a move toward less dependence upon federal funds for employment. Now we are again facing the situation where federal funds are decreasing; and, thus, we must continue to work to become more self sufficient. We have been very successful but federal funding and federal jobs in this area are still the major source of employment. The future of Oak Ridge and this region depends heavily on industrial development to compensate for the reduction in federal funds and to broaden the tax base to keep full employment for the area. We can no longer rely on the flow of dollars from DOE. Oak Ridge is like an island; we are virtually surrounded by the lake and DOE property. We are not like other communities who can keep expanding into farm land surrounding their community. DOE owns the only land we can expand into, and there is currently almost no undeveloped industrial land available. We must have additional land, not to grow but to survive. If we lose jobs and industry, it will drive the tax rate up, which in turn keeps people and industry from coming here. The transfer or lease of land to the East Tennessee Economic Council is imperative for the survival of the region.	DOE acknowledges Councilman Brown's support for this project and his comments about the proposed development of Parcel ED-1.

COMMENT FROM:	COMMENT	RESPONSE
Joe Lenhard, Chairman, *East Tennessee Economic Council*, Oak Ridge, Tennessee	As we have noted in our discussions with the Department of Energy concerning the proposed lease, we still have many questions about the mitigating and monitoring measures included in this environmental assessment. Some of them, we believe, would prevent the accomplishment of the stated goal of this lease, which is to help the region transition from its huge dependence on DOE to a more diversified, high technology economic base for the region. We are especially concerned that the environmental assessment does not adequately include the impacts of DOE budget cuts on the quality of life of workers in East Tennessee. Over the past year approximately 1,000 jobs were eliminated at DOE-ORO. Every indication is that these cuts will continue in the years to come. That is in addition to job losses in FY 1994 and FY 1994 [sic]. Surely these impacts are as critical as a study of the Tennessee dace. We are also concerned about the length of the lease term and about the continued designation of the Parcel as part of the Oak Ridge Reservation CERCLA Superfund Site. An unacceptably short lease term and Superfund designation will make it impossible for ETEC to properly market the property to private sector industry.	DOE's lease with ETEC must incorporate language that protects human health and the environment as part of the federal government's responsibility and liability as the continuing fee-owner of the land. The EA has been revised to include an analysis of the impacts of budget cuts (Sects. 3.6 and 4.1.6). The full lease term is under negotiation. Pursuant to a memorandum dated August 3, 1995, from the U.S. Environmental Protection Agency, entitled "Clarification of National Priorities List (NPL) Listing Policy," it is no longer accurate to state that the entire ORR is on the NPL or is a designated Superfund Site. According to this guidance, an NPL site includes only the contaminated areas. Clean portions are not included even if the site name implies that the entire (fence-line-to-fence-line) facility is listed. Thus, the

COMMENT FROM:	COMMENT	RESPONSE
Joe Lenhard, Chairman, *East Tennessee Economic Council*, Oak Ridge, Tennessee	(continued from page B-11)	proposed lease premises, with the exception of the East Fork Poplar Creek floodplain, should not be part of the ORR NPL designation.
Terry C. Domm, Chairman, *Oak Ridge Regional Planning Commission*	At their regular meeting on August 24, 1995, the Oak Ridge Regional Planning Commission voted 9-0 to advise the Department of Energy that the Planning Commission finds the use of Site ED-1 for industrial and other business-related development to be in conformity with the City of Oak Ridge's approved Comprehensive Plan, including both approved policies and its Land Use Plan element.	DOE acknowledges the support of the City of Oak Ridge Regional Planning Commission.
T. R. Wood, Oak Ridge, Tennessee	I think the biggest issue that was not addressed is a way to keep the process going and not side-tracked in small issues that cloud the larger overall purpose. The question is not how or why the land is to be used, it is when! The time for utilization of this property is now and a schedule for well-planned use is the key to making this property work. A schedule for lease and turn over of the land to civic groups designated should be a priority. I believe that the compromises between industrial and environmental use can be easily made, if the land is made available quickly to the parties representing Oak Ridge. Having a milestone schedule - even a draft schedule - will help focus all interested groups on the real need for those required compromises. No one works toward a common goal without a scheduled due date. We need DOE to give us a target date for turn over of the land and signing of a reasonable, long term lease.	While DOE understands Mr. Wood's impatience with bureaucracy, it is our duty to comply with the requirements of NEPA prior to making a decision about the lease of Parcel ED-1 for industrial development. The draft EA was completed in less than half the time typically required for such an effort.

COMMENT FROM:	COMMENT	RESPONSE
James D. Harless, Oak Ridge, Tennessee	1. One general comment I want to make that I am not sure is an intended EA point is as follows: There are at least two reasons, in my own opinion, that we do not yet see evident public health impacts to citizens in the ORR area: A. The large tracts of land (2/3 of the City 92 square miles) used as a buffer, and thus to help protect public from air and water or soil impacts to John Q. Public. I would think that a large buffer around DOE lands is still important, since the pollution is still present and/or operations might come back up on some of the sites, so let's give a very liberal zone of protection. Think about the recent City of Newport incident of pollution into residential area. The long-ago Union Carbide (outside USA) deaths and injury to thousands might have been minimal or more limited if buffer zones were present and adequate. You have a shot up front to hold an industrial buffer, and still allow a tract for industrial development. What size or width buffer I am not sure, but I think the NEPA document should look at options, based on present and even long term potential use of DOE remaining lands. B. Reason number two that the area public does not appear to have been negatively impacted as far as public health, is because ORR and most of the immediate neighbors drink public potable water from the Clinch River rather than groundwater from sources closer to the DOE operations and disposal areas here in Oak Ridge. If the Clinch River were not present or were a much smaller volume river, the drinking water in this area could be inferior or even worse. If the GW inside the ORR is not kept clean, and if someday industrial development upstream from Oak Ridge is a source of pollution that is hard to control, then it would be great if our Oak Ridge residents or small users/large users could still elect to fall back on the groundwater when desired. So in spite of our present advantage of the location and size of the Clinch, we still want to preserve our GW resource much the same (or better) than our other local natural resources. The size of buffer zones and land use options can impact ORR GW use options	1. (A). Buffer zones are indeed important around industrial facilities. Over 50 years ago, environmental regulations applicable to DOE facilities were few. In contrast, industries that locate on the parcel during the next decade are required to meet current air, water, health and safety, and other applicable environmental permitting requirements and regulations. Therefore, new sources of unregulated pollution would not be expected. Parcel ED-1 can continue to be a buffer between the K-25 Site and Oak Ridge urban areas despite proposed industrial development. 1. (B). DOE's Environmental Restoration Program continues its efforts to monitor and clean up environmental contamination from past operation of Oak Ridge Reservation facilities, including contaminated soils, groundwater and surface water. In addition, the National Pollutant Discharge Elimination System permit process of the U.S. Environmental Protection Agency, which is implemented by the State of Tennessee, continues to ensure that the quality of Tennessee's

COMMENT FROM:	COMMENT	RESPONSE
James D. Harless, Oak Ridge, Tennessee	today and very long term; however, land use on this 1000 acres might impact users downstream from Oak Ridge using surface water more than current city users.	water supplies is maintained to meet Safe Drinking Water Act standards. The worst-case scenario postulated by the reviewer is extremely unlikely given the success of current water treatment technologies.
	2. If the land is federal owned and a pollution type company comes on site, could DOE or taxpayers as land owners be liable for pollution brought to the site by private sector? If this is possible, I do not think my tax dollars should be made liable for private sector mistakes or intended sidestep of laws, or from accidental spills or pollution from some operations of whatever type. Some of what one might call "dirty industry" should either be turned away, or else required to post an adequate bond of protection if the company is too small and might go bankrupt. Do we feel confident that any after audit lease requirement will take care of this example situation? What if Company bankrupt?	2. The lease will contain several conditions to provide DOE as the lessor with protection in the event of environmental contamination by the lessee or sublessees. After it has been signed, the lease will be available for public review.

COMMENT FROM:	COMMENT	RESPONSE
Jane McCullough, Oak Ridge, Tennessee	The area ED-1 is presently being used as an environmental reference base. As soon as the area is fragmented through development or if the wetlands are siltated or polluted through an accident during or after construction, the reference base is lost forever. In view of the stated low impact the development would make economically to Oak Ridge and surrounding area, it would appear foolish to go forward with the development of ED-1 especially when there are other land areas not in use that have already been impacted by man. It was stated at the meeting that this was the only land being considered and being designated for industrial development. Surely there must be better planning for the Oak Ridge Reservation as a whole through talking with other landowners and through self assessment by DOE.	DOE intends to prescribe avoidance and mitigation measures that will minimize impacts to sensitive environmental resources on Parcel ED-1. Based on the EA and FONSI, floodplain, wetlands, bottomland hardwood habitat and wildlife corridors, and specific historic resources will be excluded as potential sites for industrial development. A site map of the parcel, showing exclusion areas, has been added to the EA Summary. The reviewer is referred to the Lockwood Greene comment above, which describes a review of regional and ORR land parcels suitable for industrial development. Parcel ED-1 of the ORR has the largest contiguous acreage available for industrial development. Information from this study has been added to Sect. 1 of the EA.

COMMENT FROM:	COMMENT	RESPONSE
W. L. McCullough, Oak Ridge, Tennessee	I was appalled at the Aug. 24, 1995, DOE workshop on the "EA" on Parcel ED-1 held in Oak Ridge. More questions were raised than answered. It was very disturbing to hear repeated "It's a done deal." What is the big rush? Once you disturb that 1000 acres you will never, never be able to get the land back to the condition it is in today. From what I read and hear it looks like O'Leary, Frist, Wamp and ETEC want it, and that's going to happen. What happened to the Common Ground process, I thought it had to be done first. If DOE bypasses the common ground process then has DOE abandoned it? I have never seen a study or mention of any study, cost/benefit analysis that predicts the lease of the land will be cost effective for the city. I also would like to know why no ENVIRONMENTAL IMPACT STATEMENT is going to be issued. It looks like a political decision has already been made, disregarding "The Common Ground Process," the true need of the land, total disregard for the environment, and sets the precedent for the "cherry picking" (RAPE) of the DOE reservation.	The text of Sect. 1 has been revised to clarify DOE's continuing role in and the objective of the Common Ground process. An EIS was not prepared because the proposed action is not among the classes of actions listed in Appendix D to Subpart D of DOE NEPA Regulations that typically require 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.

COMMENT FROM:	COMMENT	RESPONSE
Kathleen D. Moore, *Mayor, City of Oak Ridge*, Tennessee	The enclosed letter from the City of Oak Ridge Environmental Quality Advisory Board (EQAB), dated August 30, 1995, was accepted by the Oak Ridge City Council at its regular meeting on September 5, 1995, with a directive that EQAB's comments be transmitted to the Department of Energy as the official position of the City on this subject. [Following text is from the enclosure.] *"The Environmental Quality Advisory Board (EQAB) has reviewed the Department of Energy's draft Environmental Assessment for the Lease of Parcel ED-1 on the Oak Ridge Reservation by the East Tennessee Economic Council (ETEC). Based on this review, it is EQAB's conclusion that the Environmental Assessment (EA) adequately addresses the potential environmental impacts associated with the lease to ETEC, and that the mitigating measures proposed in the EA are appropriate and sufficient to proceed with the planned lease. . . EQAB recommends that the City remain involved in monitoring the development plans as they evolve, and that the potential environmental impacts from the specific industries locating on the parcel be reviewed through the public participation opportunities afforded during federal, state, and local environmental permitting, local zoning processes, and any future federal agency environmental assessments that may be undertaken."*	DOE acknowledges the comments offered by EQAB on behalf of the City of Oak Ridge and intends to ensure that development of Parcel ED-1 follows environmental protection requirements identified in the EA.

COMMENT FROM:	COMMENT	RESPONSE
Amy S. Fitzgerald, Ph.D., *Executive Director, Oak Ridge Reservation Local Oversight Committee*	Substantive Comments on the EA 1. Summary, p. xi. Because it is unknown at this time what industries will be located on the site, it is difficult to assess impacts. For example, if waste management facilities are located on the site, the lease should include provisions that waste generated at the site will be disposed of off-site at a licensed facility.	1. ETEC has indicated that waste management facilities would not be acceptable at the site. The EA has been revised accordingly.
	2. "Findings" section, p. xii, third bullet: does the "current ambient particulate concentrations are greater than 50% less than the National Ambient Air Quality Standards..." refer to K-25? If not, what unit do these emissions refer to?	2. "Ambient" refers to the concentrations measured at ORR monitoring stations at and near the K-25 Site. EA text has been reworded to clarify this.
	3. "Findings" section, p. xiii, fourth bullet: if industrial facilities could produce atmospheric pollutants, including radionuclides, how can the EA state that "no unique occupational or public health and safety hazards are expected to be present?"	3. Atmospheric emissions of radionuclides within permitted levels are not considered to be unique in the Oak Ridge area after 50+ years of nuclear facilities operation.
	4. Page xiv, top of page and page 4-5, line 18: is Roane County included in the emergency preparedness plan? Will the plan need to be revised, given that new private industries will be involved, or will the leases require private industries to comply with DOE and LMES requirements?	4. Roane County is part of the emergency response team for the Oak Ridge Reservation. Text has been revised to indicate that surrounding communities are involved.
	5. Page 1-4, Sect. 1.4 and page 1-5, Sect. 1.4.2. While involvement in DOE land-use decisions may have occurred since May 1994, the transfer of this property was not conducted as part of the DOE's "Common Ground" process. As a result, there has been some confusion about how the agency will make decisions regarding future land use.	5. Text has been revised to clarify that lease of this parcel was not the focus of the Common Ground process. DOE will continue to make land-use decisions based on its mission and programmatic needs.

COMMENT FROM:	COMMENT	RESPONSE
Amy S. Fitzgerald, Ph.D., *Executive Director, Oak Ridge Reservation Local Oversight Committee*	6. In Appendix F, the Rosensteel memo states that "it is reasonable to apply the same requirements designed to protect the environment and worker health and safety on any development on this parcel that would apply if it were the DOE that was developing the land instead of a private entity." The final EA should make those requirements more explicit.	6. By mitigation specified in the EA and FONSI, DOE will protect the environment to the same degree that it would if it were the developer. However, the Occupational Safety and Health Administration regulations, not DOE regulations, are applicable to worker health and safety policy for private companies. These regulations are publicly available.
	7. The EA should explain the policy for tax payments to the local jurisdictions. Since DOE still maintains ownership of the property, for example, how will payments-in-lieu-of-taxes be calculated? This type of information should appear in the section on socioeconomic impacts. Currently, this section is largely descriptive rather than analytic.	7. This parcel will be excluded from the federal government's payment-in-lieu-of-taxes program to local entities. ETEC must devise a tax base from its sublessees. Sect. 4.1.6 has been updated with a new socio-economic impacts analysis.
	8. The socio-economic impacts section should also provide figures on revenues lost as a result of displaced workers at the Oak Ridge Reservation if the "no action" alternative is selected.	8. The EA has been revised (Sect. 4) to address loss of revenues.
	9. The DOE should have sent a letter of informal consultation to the host governments, similar to that submitted to the U.S. Fish and Wildlife Service in Appendix D. In this letter, an explanation of the DOE Community Reuse Program might have improved local understanding of this DOE initiative. Although not a legal requirement, such an action could greatly improve communication between the communities and DOE.	9. Informal consultation with local governments can improve communication between the communities and DOE. Typically, a public information office (PIO) news release serves as official notification of an action. Preparation of an EA is typically conducted independently of DOE program and PIO activities.

COMMENT FROM:	COMMENT	RESPONSE
Amy S. Fitzgerald, Ph.D., *Executive Director, Oak Ridge Reservation Local Oversight Committee*	10. The East Tennessee Economic Council, in its capacity as the Oak Ridge Reservation Community Reuse Organization (CRO), should regularly consult with affected local governments, and their respective environmental review boards, as the project proceeds. Similarly, periodic updates to the general public will improve general understanding of the CRO function. Editorial 1. "Finding" section, p. xiii, sixth bullet: what does SPCC refer to? This acronym is not defined on your list. 2. Pages 3-15 and 3-16. The references to the Nature Conservancy's "G" series ranking require additional explanation. Recommendations 1. The DOE and CRO should partner with the City of Oak Ridge, Roane and Anderson Counties, and other affected communities as appropriate, in the development of land use decisions. For example, the host communities should participate in the development of the "integrated plan" referred to in item #9 on p. xvi and on Page 4-10. 2. Decisions should take into consideration land use plans that have previously been adopted by local governing bodies. 3. The DOE and CRO could improve public understanding and acceptance of the CRO program by (1) initiating a public education campaign; and (2) meeting regularly with representatives of state and local governments, environmental review boards and oversight organizations, as well as other interested stakeholders to identify and resolve concerns. 4. In the future, decision makers should identify and reuse "brownfields" rather than removing additional habitat from the Oak Ridge Reservation.	10. DOE suggests that the reviewer approach ETEC with this suggestion. Second suggestion is noted. Editorial 1. Added to Acronyms List. 2. Table 3-2 has been added to explain the ranking system. Recommendations 1. Suggestion noted. The EA is not the appropriate forum for expressing this concept or implementing an action. 2. Comment noted. 3. Comment noted. 4. Comment noted.

COMMENT FROM:	COMMENT	RESPONSE
Amy S. Fitzgerald, Ph.D., *Executive Director, Oak Ridge Reservation Local Oversight Committee*	5. The DOE should identify its ongoing environmental research mission and maintain ownership of the parcels deemed appropriate for research purposes. Additional properties which could be transferred to the communities, particularly for residential use, should be identified. These actions are consistent with several policies: (1) they support DOE's stewardship policy which is based on "the principles of ecosystem management and sustainable development;" (2) the City of Oak Ridge's self-sufficiency plan, as well as the objectives of other host governments; and (3) the expeditious sale or transfer of excess real property by DOE to local communities is a requirement of the "Community Environmental Facilitation Act" (Public Law 102-426, October 19, 1992). 6. The lease of the property by the CRO creates a number of issues that need to be resolved. Among them: payment-in-lieu-of-taxes; requirements associated with the Federal Facilities Agreement under CERCLA (Superfund); liability; and the oversight of, and access to the federally owned property by the State. The proposed lease should address these issues. 7. Since one of the goals of the DOE's Community Workforce and Restructuring Program is to reposition workers, the proposed lease should address how displaced workers from the DOE Oak Ridge facilities could be employed by industries locating at the ED-1 parcel.	5. Because this is a proposed outgrant action, DOE will maintain ownership of the parcel. The term "transfer" relates to ownership and requires that land be declared excess to DOE's needs. DOE intends to preserve as many environmental monitoring and research locations on Parcel ED-1 as practicable. Terms of the lease will exclude such areas from development. 6. These concerns will be addressed in the lease. 7. The lease will address in general terms the intent of continuing employment for employees displaced by work-force restructuring.

COMMENT FROM:	COMMENT	RESPONSE
Amy S. Fitzgerald, Ph.D., *Executive Director, Oak Ridge Reservation Local Oversight Committee*	8. The DOE, the CRO, and affected governments should sign a memorandum of understanding establishing interactions regarding future land use decisions. For this transfer, given the short time frame, a clause in the DOE lease to ETEC should address host government interactions.	8. The lease will not address host government interactions regarding the land use for this action. An outgrant lease can be between DOE and one entity only. To permit other uses by other parties will require a different type of outgrant whether it be an MOU or permission to use the land.
	9. The DOE should issue a "mitigated Finding of No Significant Impact" (FONSI), and address stakeholders' comments and concerns in the final Environmental Assessment.	9. This is being done as suggested.

COMMENT FROM:	COMMENT	RESPONSE
Ellen D. Smith, Oak Ridge, Tennessee	1. **Mitigation measures.** The impacts analysis should be more consistent in identifying lease restrictions and other measures that may be needed to avoid significant impacts. In much of the EA it is assumed that the lease would prohibit development in certain areas. In a few discussions, however, it is stated that lease restrictions are needed (as mitigation) to prevent specific predicted impacts, and in at least one section (cultural resources) it is concluded that the proposed action would have "no adverse effect" without an indication that this is based on the assumption that the lease will restrict development in certain culturally sensitive areas. I hope this inconsistency is eliminated in the final EA. Since the lease still hasn't been negotiated and restrictions in the lease will be based in part on analysis in this EA and on mitigation measures outlined in DOE's decision document, it seems to me that the EA's impacts analyses should not assume that the lease will include certain restrictions. Instead, to assist the decision-makers and to ensure that future readers of the EA can clearly identify the reasons for proposed lease restrictions, all impacts-analysis sections should address the potential impacts of the proposal in the absence of development restrictions, then identify the deed restrictions or other mitigation measures (if any) needed to comply with regulatory requirements or otherwise prevent possible significant adverse impacts.	1. The text of the EA has been revised to indicate that ecologically and culturally sensitive resources will be protected from impacts by exclusion from development or by mitigation. Specific industrial facilities will remain unknown until ETEC's plans progress further. Because DOE is committed to preserving sensitive resources and minimizing impacts, various assumptions were made about the future use of the site. To preserve as many sensitive resources as possible, it was necessary to begin impacts analyses with the assumption that sensitive areas would not be developed. It was also necessary to assume that emissions, effluents, and wastes generated by new facilities would be managed in accordance with federal, state, and/or local permits. Given these assumptions, primary sources of impacts would be *abnormal* situations

COMMENT FROM:	COMMENT	RESPONSE
Ellen D. Smith, Oak Ridge, Tennessee		(i.e., accidents, spills, and uncontrolled emissions). The lease will emphasize that (1) future development must adhere to the assumptions in the EA and FONSI, and (2) DOE has the right to terminate the lease or restrict further development should ETEC and sublessees disregard these terms.
	2. **Correspondence with State Historic Preservation Office.** As chair of the Oak Ridge Environmental Quality Advisory Board, I received a copy of the DOE correspondence with the State Historic Preservation Office (SHPO) on this parcel. The correspondence documented the assessment of cultural resources and indicated that the SHPO's concurrence with the proposed lease was based on a DOE commitment to restrict development in certain parts of the parcel. I was surprised to discover that only a portion of this correspondence was appended to the draft EA. In its current form, the EA does not document that the SHPO's concurrence was conditioned on certain lease restrictions. To ensure that all parties understand the basis for the proposed lease restrictions intended to protect cultural resources, copies of all correspondence between DOE and the SHPO (even those portions that are already also included in the cultural resources analyses in the EA) should be appended to the final EA.	2. Copies of all correspondence between DOE and the SHPO, including those portions that are already also included in the cultural resources analyses in the EA, have been appended to the final EA.

COMMENT FROM:	COMMENT	RESPONSE
Ellen D. Smith, Oak Ridge, Tennessee	3. **Purpose and need for action vs. alternatives considered.** The stated purpose of the proposed action is "to help offset potential economic losses resulting from DOE and contractor downsizing in the near term and to diversify the economic base of the region in the long term" (Sect. 1), but the only other action alternatives contemplated (but dismissed from detailed consideration) in the EA (Sect. 2) are outright sale of Parcel ED-1 and lease of ORR land other than Parcel ED-1. Although it is probably impractical to consider them in this EA, there are certainly numerous other alternative actions that DOE or other parties might consider to try to offset economic losses and diversify the regional economic base. Unless the final EA includes assessment of such alternatives (e.g., active promotion of the region as a retirement destination, development of industrial sites outside Oak Ridge and the ORR, permitting ORNL and other DOE-owned facilities to offer their services to nonfederal customers), it would be appropriate to narrow the statement of purpose and need so that it is specifically tailored to the actual content of the EA. (For example, "to help offset potential economic losses resulting from DOE and contractor downsizing in the near term and to diversify the economic base of the region in the long term *by making ORR land available to the private sector for industrial development*.")	3. The clause "by making ORR land available to the private sector for industrial development" has been added to the purpose and need section of the EA.
	4. Common Ground process. The discussion of the Common Ground process in Sects. 1.4.1 through 1.4.3 (pages 1-4 and 1-5) does not accurately reflect either the results of the first two phases (as reported in the "Visioning Phase" report that is cited in the EA and the "Preliminary Recommendations Phase" report that was issued during the review period for this EA) or the relationship of this proposed action to the Common Ground process. With respect to the results of the "visioning" phase, it is somewhat misleading to focus on participants' views concerning their overall goals for the region (lines 34-37 on page 1-5) but not on their specific views concerning future ORR land uses. Questions about overall goals for the region were asked as lead-in questions and were not perceived by participants to be the focus of the visioning phase. Most	4. The discussion of the Common Ground process was considerably condensed in the final EA in response to comments received. The inference that the Common Ground process forums constituted "public involvement" for the Parcel ED-1 EA has been deleted. In its place is a discussion of the public workshop held on August 24, 1995, with a reference to this comment-response document.

COMMENT FROM:	COMMENT	RESPONSE
Ellen D. Smith, Oak Ridge, Tennessee	participants appeared to be more interested in discussing future land uses for the ORR; their opinions on this subject should be reported in the EA. As I recall, the two land use categories receiving near-consensus support involved support for DOE/government missions and preservation of the natural environment; industrial development and other potential land use categories received lesser degrees of support. With respect to the "preliminary recommendations" phase, the final EA should cite and incorporate information from the report issued in August 1995. With respect to the relationship of this proposed action to the Common Ground process, while it is apparently true that discussions at two of the June 1995 Common Ground public forums focused on the lease of Parcel ED-1 (lines 16-17 on page 1-5), discussion of this action was not an advertised purpose of these meetings, and only a part of Parcel ED-1 had been designated high-priority for industrial use in the Common Ground preliminary recommendation that were to be discussed at these meetings. As a result, it is a bit of a stretch to suggest (as is done in the EA) that the Common Ground process afforded public involvement in this proposed action. Finally, the concluding statement in Sect. 1.4.3 (page 1-5, lines 41-43) that "results obtained in the Common Ground process indicate that the proposed action is in conformance with a stakeholder-oriented and ecosystem-based decision" is contradicted by statements in the Common Ground Preliminary Recommendations Phase report that indicate a lack of stakeholder consensus regarding this type of action, as well as concern that this lease decision is being made outside the context of the stakeholder-oriented Common Ground process.	

COMMENT FROM:	COMMENT	RESPONSE
Ellen D. Smith, Oak Ridge, Tennessee	5. **Socioeconomic Analysis.** The assumptions made in projecting the socioeconomic benefits of this proposed action are largely unstated; in large part, the action is presumed to be economically beneficial. If adverse environmental impacts are supposed to be acceptable because of the overwhelming positive economic impacts of the action, the EA ought to substantiate those positive impacts. Assumptions that should be documented include: (1) approximate costs and assumed financing mechanisms for the infrastructure improvements ETEC would make (I don't think ETEC has a large pool of private capital available); (2) the basis for the estimate that 500 employees would be hired to work in the new facilities (last line on page 4-12 and first line on page 4-13); and (3) the nature of the taxing mechanism expected to yield about $74,000/year in taxes, considering that the leased tract would remain in federal ownership and therefore presumably would not be subject to property taxes (is this all from sales and use tax, or is some other mechanism hypothesized?). The assumptions regarding employment, etc., should be consistent with the number and size of facilities that could be sited on the parcel, considering the expected lease restrictions.	5. A discussion of costs and financing for ETEC and sublessees is beyond the scope of this EA. The projected workforce and tax revenue are discussed in Sects. 3.6 and 4.1.6 of the revised EA.

COMMENT FROM:	COMMENT	RESPONSE
Ellen D. Smith, Oak Ridge, Tennessee	6. **Transportation Impacts (Sect. 4.1.6.5).** Because the names of roads given here (page 4-16, lines 14-23) are not unambiguous, I can't tell whether these projections seem reasonable and I can't figure out what changes are projected for the highways I use. A map would help a lot. East Bear Creek Road is presumably the segment between Y-12 and SR 95, which is closed to public use and should not experience any impact if the analysis is done properly. What is the distinction between SR 58 and SR 58 West? The highway passing Parcel ED-1 is SR 95 (may also be designated 58); where is it listed? Were Oak Ridge Turnpike (within the city) and Blair Road considered in this analysis? Also, the transportation analysis should address the potential for effects on through-traffic and on traffic safety from creation of new intersections off SR 95 to serve the lease area.	6. A comprehensive transportation analysis has been added to Sects. 3.6 and 4.1.6 of the EA. It includes several maps and tables describing local transportation routes and traffic.
	7. **Highway upgrade.** State DOT plans for improvement to (i.e., 4-laning of) SR 95 between the 58-95 intersection and the old guardhouse in west Oak Ridge should be addressed in this EA. The highway improvement project would improve highway service to Parcel ED-1, reduce potential transportation impacts in the vicinity of the parcel, and contribute to cumulative ecological and hydrologic (e.g., floodplain) impacts.	7. The revised transportation analysis accounts for all relevant road improvements in the affected area.

COMMENT FROM:	COMMENT	RESPONSE
Ellen D. Smith, Oak Ridge, Tennessee	**Editorial Comments** page 3-8, line 31. Beginning of line probably should read "axis of the East Fork Valley." page 3-9, line 14. From the context, it appears that "large gravity flow" should be corrected to "large gravity low." page 3-14, line 25. Presumably the "popular" mentioned here is not *Populus*, but *Liriodendron*, and therefore should be called "tulip poplar" or "yellow-poplar" to avoid confusion. page 3-15, lines 20-21. Says that separation of the canebrake community from the greater bottomland forest community "is problematic." Explanation is called for here; what are the problems indicated by the word "problematic"? page 3-18, line 37. Please identify the entity that conducts or sponsors "the national breeding bird survey" referred to here. page 3-29, line 10. Presumably "TVE" should be corrected to "TVA". page 3-29, lines 38-39. It is misleading to state that the city of Oak Ridge has three technical schools and three colleges. With respect to the colleges, it might be more accurate to say that three colleges offer classes in the city. Presumably there is a similar situation with the three technical schools.	**Editorial Comments** Text has been revised. Global change made. p. 3-15: Sentence was deleted to avoid confusion. The point that the canebrake community occurs within the bottomland forest is made elsewhere in the paragraph. p. 3-18: Table 3-3 now identifies participants in the national breeding bird survey. p. 3-29: Typos and errors have been corrected.

COMMENT FROM:	COMMENT	RESPONSE
Ellen D. Smith, Oak Ridge, Tennessee	Page 3-29, lines 39-40. It is even more misleading to say that there are 17 libraries in Oak Ridge, as there is only one public library. I surmise that this number must include the public library; seven school libraries housed in public schools; various ORNL, K-25 Site, and Y-12 Plant libraries; and possibly some of the private libraries maintained by churches and/or private firms. It would be better to state only that there is one public library. Page 3-29, line 40. Total 1993 enrollment in Oak Ridge schools was a good deal greater than 90. Please correct this. Current public school enrollment is estimated at about 5000. Page 4-5, line 40. 100 ha is not the same as 100 acres; which value is correct? Page 4-15, line 19. Need more specific identification of "the K-25 permit" mentioned here (presumably it is the K-25 NPDES permit; the waste acceptance criteria are presumably for a specific wastewater treatment facility covered by that permit).	p. 3-29: Typos and errors have been corrected. p. 4-5: Conversion of units has been corrected. p. 4-15: Text clarified.

COMMENT FROM:	COMMENT	RESPONSE
Lorene L. Sigal, Oak Ridge, Tennessee	General Comment: any time an EA is as long and as thorough as this one, one wonders if the proposed action is such that an EIS is indicated. Any action potentially involving a major change in land use of 1000 acres (or even hundreds of acres) would on the face of it require an EIS. DOE's examples of actions normally requiring an EA include facilities of the sort which might be represented by ANY ONE of the many facilities that might be on this land. Waste management facilities are given as possible industries to be present (i.e., some types of waste management facilities and incinerators are listed by DOE as normally requiring an EIS.) Given the paucity of information on what facilities, and their emissions (allegedly including radionuclides), would be located on the land, an EIS seems called for.	General Comment: ETEC has advised DOE that waste management facilities would not be acceptable at the new park. Reference to them in the EA as candidate facilities has been removed. DOE has historically prepared EAs to review the environmental impacts of previous land transfers to the City of Oak Ridge. An EIS was not prepared because the proposed action is not among the classes of actions listed in Appendix D to Subpart D of DOE NEPA Regulations that typically require 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. Impacts analyses for this proposed action would have been impossible without assumptions. Specific industrial facilities will be unknown until ETEC's plans progress further.

COMMENT FROM:	COMMENT	RESPONSE
Lorene L. Sigal, Oak Ridge, Tennessee	1. p. xi - paragraph 1. who and what is ETEC and how was it chosen to develop Parcel ED-1? 2. p. xi - paragraph 2. "selected. . .after a review of. . needs. . ." See later comment. What was the nature of this review? Who conducted it? When? Did it encompass the ecological concerns expressed in this EA? Please provide reference.	Because specific plans for industrialization are not available, an EIS analysis would be even more difficult. Mitigation specified in the EA and FONSI to protect sensitive resources will be part of the lease agreement. 1. An explanation of ETEC and its mission has been added to Appendix A. ETEC was not "selected" to lease Parcel ED-1. Rather, the lease is an outcome of 15 years of interaction between DOE and the City of Oak Ridge regarding land transfers as part of the City's Self-Sufficiency Plan. ETEC is the Community Reuse Organization working with DOE on economic development initiatives and workforce restructuring. 2. The statement that no other ORR lands were available and/or suitable to meet ETEC's needs is based on DOE Real Estate staff reviews. Periodically, a formal site utilization survey is performed in conjunction with the General Services Administration (GSA) to

COMMENT FROM:	COMMENT	RESPONSE
Lorene L. Sigal, Oak Ridge, Tennessee		determine if land and/or facilities on the ORR are properly utilized. This review also identifies underutilized or excess land and facilities. Current and future programmatic uses of the land are evaluated prior to outgranting or disposal decisions. Ecology is considered to the extent of available information. DOE conducts informal reviews of ORR land use more frequently than GSA-DOE reviews. To date, no lands are deemed to be in excess of programmatic needs (i.e., suitable for disposal). Hence, after consideration of future downsizing of the ORR work force and ETEC's proposals for economic development to offset downsizing, DOE agreed to consider outgranting (leasing) land for industrial development.
	3. p. xi - paragraph 3. There are many references here and throughout to the proposed lease, but it is not provided for review. How then to judge the significance of potential impacts?...long-term DOE reservation management goals...what are these? Have they been formulated and reviewed in a comprehensive framework? Where can they be found? Reference please.	3. The lease will be available to the public after it has been negotiated and signed. In general, long-term ORR land-use goals are being developed through the Common Ground process. The August 1995 Common Ground report has been cited in the revised EA and is available to the public.
	4. p. xi - paragraph 5. The EA should consider other alternatives to the use of the Parcel ED-1 (e.g., other areas on the ORR, reuse of existing facilities and/or disturbed areas.)	4. See the response to Sigal comment #2. Reuse of existing facilities is being planned, but it is not part of this proposed action. There were no other contiguous ORR lands of sufficient size

COMMENT FROM:	COMMENT	RESPONSE
Lorene L. Sigal, Oak Ridge, Tennessee	5. p. xi - paragraph 5. there are many unsubstantiated statements about expected job losses due to DOE budget cuts and strategic realignment, and the expected 500 employees to be hired over the initial lease period (p. 4-12, 4-13) to operate and manage the proposed facilities. The EA states that jobs lost would not be replaceable in the near term (p. 2-2.) An analysis is needed to estimate number, type, and timing of jobs lost to those potentially available as a result of the proposed action and those available in the region. The analysis must consider other industrial development existing and proposed in our area.	to meet ETEC's needs for an industrial park. 5. The revised EA contains a comprehensive socioeconomic analysis that considers all the factors addressed by the reviewer.
	6. p. xi - paragraph 6. additional information is needed to substantiate the selection of parcel ED-1 for lease based on "review of present and future programmatic needs for various land areas of the ORR." What are the needs? Who did the review? (See also p. 2-1). The EA should provide references for this review, and a copy of it should be provided in the public reading room.	6. Same response as for Sigal comment #2. A formal document is not prepared following these reviews.
	7. p. xii - continuation of preceding paragraph. What guarantee is there that a lease would "...ensure that specific environmentally sensitive areas are preserved and to ensure continuation of DOE's environmental research mission"?	7. As part of the Mitigation Action Plan that will accompany the FONSI, DOE will address the approach to be used to monitor industrial development and site conditions over the period of the lease. ETEC is required to uphold the terms of the lease, which includes the mitigation to be implemented to preserve sensitive resources. If ETEC fails to do so, DOE has the right to terminate the lease.
	8. p. xii - paragraph 1. How can the findings be judged when neither the authors nor the public has seen the "...environmental protection requirements of the proposed lease"? Please explain/discuss.	8. The EA is being revised concurrently with lease negotiations. DOE intends to incorporate all recommended mitigation and avoidance measures in the lease to enable a mitigated FONSI to be issued.

COMMENT FROM:	COMMENT	RESPONSE
Lorene L. Sigal, Oak Ridge, Tennessee	9. p. xii - first bullet, the change in land use might be compatible with use at K-25 but it is not compatible with Parcel ED-1's current status as part of the NERP. The EA must explain/discuss the relationship between Parcel ED-1 and the NERP.	9. All of Parcel ED-1 is part of the Oak Ridge National Environmental Research Park, which provides protected areas for research and education in environmental sciences and demonstrates that energy technology development can coexist with a high-quality environment. As the reviewer states, industrial use of Parcel ED-1 is <u>not</u> compatible with Research Park objectives. Thus, DOE intends to specify avoidance and mitigation measures in the lease, the EA, and mitigated FONSI to integrate development with the protection of sensitive resources. Carefully planned implementation of these measures to protect, monitor, and restore resources would be compatible with Research Park goals.
	10. p. xii - fourth bullet. please include examples of "...routine maintenance actions allowable in floodplains or wetlands, ..."	10. Examples have been added to the EA.
	11. p. xiii - second bullet. are these "requirements" written by the SHPO or are they part of the NHPA? Please clarify.	11. These are SHPO requirements.
	12. p. xiii - last four bullets. these bullets are not related to "..environmental protection requirements..." (see your lead sentence to the <u>Findings</u> section.) Suggest you move them to the end of the section and provide an appropriate introductory sentence.	12. Introductory sentence has been rewritten.

COMMENT FROM:	COMMENT	RESPONSE
Lorene L. Sigal, Oak Ridge, Tennessee	13. p. xiv - first bullet. although "State-listed plant species are not required to be protected on DOE property," I believe that it would be irresponsible of DOE to destroy areas having state-listed species. Consideration should be given to such species in a mitigated FONSI. 14. p. xiv - second bullet and p. 2-1. The EA must include a comprehensive map of Parcel ED-1. This map and its description must realistically delineate and estimate acreage that is available for development, acreage (including buffer zones) that is unavailable for development, and acreage that is required for access and infrastructure. 15. p. xiv - second bullet. The EA makes clear that DOE's proposed action will have significant effects on about 1000 acres of the ORR. It states that "The forest on this parcel is an important segment of the total ORR forested area, and includes some unique and rare species." Hence DOE's standard of judgement must be very high, and the decision document must be explicit and binding in order to protect the natural and cultural resources of Parcel ED-1 while still allowing development of specific areas. I urge DOE to prepare a mitigated FONSI based on measures described in the Mitigation and Monitoring section (p. xv), Sects. 4.1.5 and elsewhere in the EA. In addition, given that the use of Parcel ED-1 is an issue of considerable public interest, and may be considered one that normally requires an EIS, I urge that DOE make the FONSI available for public review for 30 days before it makes its final determination - as required in part 1501.4 of the CEQ regulations and part 1021.322 of the DOE NEPA regulations. Furthermore, I urge DOE to prepare a mitigation action plan and make it available to the public for review and comment and to appoint local environmental experts to a committee to oversee the development and monitoring of Parcel ED-1.	13. DOE will recommend that state-listed plant species be avoided during construction, where practicable. This has been noted in the EA. 14. Such a map has been added to the revised EA Summary. 15. DOE will prepare a Mitigation Action Plan for a mitigated FONSI. Both will be publicly available, as will annual reports on implementation and effectiveness of mitigation. DOE does not plan to issue a revised draft EA or the draft FONSI for public review. DOE has exceeded CEQ and DOE requirements for public involvement in the EA process. When a decision has been made, the final EA and decision document will be made available to the public for information purposes.

COMMENT FROM:	COMMENT	RESPONSE
Lorene L. Sigal, Oak Ridge, Tennessee	16. p. xiv - second bullet. "...limited landscape areas, which would probably be located primarily on the south side of..." EFPC. Does this mean that the natural area north of EFPC would be completely destroyed? Please clarify.	16. ETEC has indicated that development along the Oak Ridge Turnpike would consist of office buildings and other light industrial facilities that would be aesthetically pleasing. Heavier industries that might use metal buildings or other less attractive materials would be located to the rear of the site, out of public view. The area would not be completely destroyed. The reviewer is referred to the site development map added to the EA (Fig. S-1).
	17. p. 1-1 - Purpose and Need. "The proposed action is wholly intended to offset..." The socioeconomic analysis in the EA is not adequate to determine if the lease and subsequent development of Parcel ED-1 will "...offset potential economic losses...and diversify the economic base..." Sects. 3.6 and 4.1.6.3 are woefully inadequate. The analysis must take into consideration other existing opportunities and proposed regional development. Nor does the EA contain an adequate discussion of alternative courses of action to satisfy the stated purpose and need.	17. The socioeconomic analysis has been rewritten to include consideration of all factors mentioned by the reviewer.
	18. p. 1-2 - statement of DOE policy. How would a FONSI support the policy of ecosystem management, etc.? Please describe.	18. A mitigated FONSI will restrict development in ecologically sensitive areas while allowing for industrial development. Text has been added to Sect. 1.2 to explain how a FONSI could support a policy of ecosystem management.
	19. p. 1-4 - last paragraph. Please explain how the proposed action maintains "...the natural sustainability and biological diversity of the ecosystem while supporting economic development..." without serious consideration of additional alternatives? See also the statement on p. 1-5, lines 32 and 33, that "...most participants want to keep and improve upon the natural assets of the region..." This begs for better consideration of alternatives.	19. Your opinion is noted. DOE believes that the mitigation specified in the EA and FONSI constitute a valid development alternative that will result in preservation of biodiversity in the area in a sustainable fashion, while at the same time allowing economic development.

COMMENT FROM:	COMMENT	RESPONSE
Lorene L. Sigal, Oak Ridge, Tennessee		This is because the most ecologically valuable habitat on the site will be protected from development and connections between these areas, and adjacent natural habitat will be retained.
	20. p. 1-5 - second paragraph. Discussions at the Common Ground forums "...focused on the lease of Parcel ED-1." I believe this overstates and colors what happened—at least at the meeting I attended. The "Preliminary Recommendations Phase of the Common Ground Process: A Synthesis of External Stakeholder Views" states (p. 30, fifth bullet) that DOE's credibility is diminished when important decisions (e.g., the lease of 1000 acres to ETEC) are made before the Common Ground process is substantially completed. I believe this is an accurate statement of the relationship of the proposed lease to the Common Ground Process. I find the last sentence of p. 1-5 misleading and completely without foundation in the EA. Please consider a rewrite of this section.	20. This section has been rewritten.
	21. p. 2-1 - Sect. 2.1.1. please reference the "review" of needs and provide additional information on why and how Parcel ED-1 was chosen.	21. Refer to response to Sigal comment #2.
	22. p. 2-1 - Sects. 2.1.2 and 2.1.3 - the facts that the terms of the lease are not provided for the EA and that the industries to be located on Parcel ED-1 are not known, suggest that an EIS is needed in order to evaluate the impacts.	22. Refer to response to Sigal General Comment.

COMMENT FROM:	COMMENT	RESPONSE
Lorene L. Sigal, Oak Ridge, Tennessee	23. p. 2-1 - Sect. 2.1.3 - please include comprehensive map (see previous comment 14). 24. p. 2-2 - Sect. 2.2 - is this the only action that DOE can take to replace...jobs lost by downsizing and strategic realignment.."? Please consider revising this section to include alternatives. 25. p. 2-2 - Sect. 2.3 - "The DOE Real Estate Office has reviewed ..." and determined that all other "...lands are currently being utilized or planned for future programmatic uses." Please provide details of and reference for this review. Does this mean that no further leases or cedings would take place? Suggest that you provide a map showing other ORR lands considered and include details of why such lands were excluded from consideration. 26. p. 2-2 - Sect. 2.4 - if the land is not suitable for release to the City of Oak Ridge for environmental reasons [e.g., preservation of environmentally sensitive areas (line 32) and continuation of DOE's environmental research mission (line 33)], then how can DOE justify a lease to ETEC for development that would probably result in the same kind of environmental damage? Please reconcile this discrepancy. A mitigated FONSI, a MAP, and appropriate oversight would resolve the problem.	23. A comprehensive map has been added to the EA Summary. 24. Congressional budget allocations over the next 5 to 7 years will result in loss of jobs at DOE's ORR facilities. Working with its contractors, DOE has previously offered assistance in outplacement, in-house transfers, training in new skills, and employee counseling services. Future anticipated losses are not expected to be offset by these methods. Therefore, DOE has been working with ETEC to create new employment opportunities by development of an industrial park. The largest parcels of land in the Oak Ridge area and those best suited for industrial facilities are government-owned (see comment #1, Lockwood Greene). 25. Refer to response to Sigal comment #2. Further leases and disposal of ORR land will depend on future reviews of programmatic needs. 26. DOE will protect sensitive resources by exclusion from development. Exclusion areas will be defined in the lease, in the EA, and in the mitigated FONSI.

COMMENT FROM:	COMMENT	RESPONSE
Lorene L. Sigal, Oak Ridge, Tennessee	27. Fig. 3-2. please add outline of Parcel ED-1. 28. p. 3-9 - Sect. 3.5.1.1. given the description of Parcel ED-1 landscape elements [i.e., "These elements are quite limited (line 11); "represent a small percentage" (line 17); "critical biological resources" (lines 21 and 22); "encompasses the largest undeveloped lower slope/terraced land and floodplain..." (line 9, p. 3-10)], one wonders WHY is this area chosen for development in light of the DOE policy stated in Sect. 2.4, Sect. 1.4.1, and elsewhere. 29. p. 4-1 - Sect. 4.1.1 - lines 15 and 16 suggest that the terms of the proposed lease are known! If this is true, then the EA should be revised to reflect the lease AND the lease should reflect the findings and mitigation described in the EA. 30. p. 4-12 - Sect. 4.1.6.1 - What is the basis for the assumption that 500 people would be hired? What is the relationship of hiring to downsizing which is the alleged purpose of the proposed action? What are other already existing opportunities (e.g., Pellissippi Technology Corridor, Bethel Valley Industrial Park, Commerce Park)? What about alternatives? What about regional opportunities? Please include a better socioeconomic analysis. 31. p. 4-18 - Sect. 4.1.8 - How can you tell that "No unique health and safety hazards are expected to be presented..." since there is no choice of industries and no plan? This is another of the many unsubstantiated statements found throughout the EA. Please try to remedy these deficiencies.	27. Parcel ED-1 has been highlighted on the figure. 28. See response to Cushman comment #1. 29. DOE used several assumptions about future development of the parcel based on terms of an internal draft lease. All requirements for exclusion of sensitive environmental resources will be part of the lease, the EA, and the FONSI. 30. The socioeconomic analysis has been redone. 31. In Sect. 1, it is clearly stated that several assumptions about future land use were necessary for impacts analyses, and these were based on the types of industries recently developed in Oak Ridge. There have been no reports of unique health and safety hazards at these facilities.

COMMENT FROM:	COMMENT	RESPONSE
Lorene L. Sigal, Oak Ridge, Tennessee	32. p. 4-21 - last paragraph - "On the other hand, many jobs are expected to be lost due to..." This is a critical question, yet there is absolutely no analysis of it, or any substantial analysis of the extent to which this action would address the problem, particularly in comparison to alternatives. Please provide such an analysis. 33. p. 5-1 - third paragraph - Here and elsewhere statements are made about prohibition of action in the floodplain without specifying which floodplain (return interval of 100 or 500 years.) Since radionuclides are mentioned as possible pollutants, are we assuming the 500 year floodplain? Please clarify where needed throughout the EA. 34. Please check all references to ensure that Sect. 6.0 includes references mentioned in the text. I tried to catch discrepancies but may not have found all of them. 35. Please see markup of the EA for additional comments and editorial revisions.	32. The socioeconomic analysis has been redone. 33. The EA shows the 100-year floodplain, the base floodplain for which the potential direct and indirect effects of a project must be assessed (Subpart B, 10 CFR 1022.11, DOE Regulations for Compliance with Flood-plains/Wetlands Environmental Review). The 500-year floodplain must be evaluated for "critical actions," which are those involving construction of utilities and of facilities producing or storing volatile, toxic, radioactive, or water-reactive materials. If these types of industries are proposed for Parcel ED-1, impacts to the 500-year floodplain would need to be reviewed. This information has been added to Sect. 5.0 of the EA. 34. A technical editor has reviewed the revised EA. 35. Responses to comments marked in text are presented below.

COMMENT FROM:	COMMENT	RESPONSE
Earl Leming, Director, State of Tennessee, Department of Environment and Conservation, DOE Oversight Division	1. Page xi. Summary, Alternatives, paragraph 2 - "*Disposal of Parcel ED-1 is not an option because DOE has determined that it should retain fee-title to ensure that specific environmental sensitive areas are preserved and to ensure continuation of DOE's environmental research mission.*" Please clarify exactly what DOE's "*environmental research mission*" is and how it will be protected on Parcel ED-1 once the land is designated for industrial use.	1. Refer to response to Sigal comment #9.
	2. Page xi, Summary, Alternatives, paragraph 2 - Please provide additional information. The alternatives to the proposed action in the summary were dismissed with little or no depth of discussion.	2. Details are provided in Sect. 2. The summary does not need to elaborate.
	3. Page xii, Summary, Findings, bullet #3 - Separate the bullet and clarify it into two statements. Create one bullet dealing with only the construction impacts, and one bullet dealing with the operational impacts from the proposed industrial facilities.	3. Revised as suggested.
	4. Page xii, Summary, Findings, bullet #4 - Clarify if actions will be undertaken in the floodplain and/or wetland, and if so identify the nature of those actions along with the locations of any disturbances. It appears DOE may be failing to take responsibility for a complete assessment from which a floodplain and wetland environmental review may be necessary.	4. The lease will specify that no development shall occur in the 100-year floodplain. As stated in Sect. 1.3 of the EA, if future floodplain or wetlands actions are proposed, ETEC must bear the cost of DOE's environmental review pursuant to 10 CFR 1022 regulations.
	5. Page xiii, Summary, Findings, first full bullet this page - "*it is unlikely that wells would be drilled for groundwater use.*" In accordance with East Fork Poplar Creek Record of Decision, and given the strong possibility of groundwater contamination, a prohibition on groundwater use should be explicit in the lease. Otherwise, sampling and characterization of groundwater should be required before industrial use.	5. If sewage disposal facilities and a water supply system are not provided by the DOE K-25 Site, the lease will require that the lessee and sublessees connect to a publicly approved water and sewage disposal system.

COMMENT FROM:	COMMENT	RESPONSE
Earl Leming, Director, State of Tennessee, Department of Environment and Conservation, DOE Oversight Division	6. Page xiv, Summary, Finding, bullet #2 & Page 4-6, Impacts of Operation, paragraph 3 - "The presence of light industrial facilities would greatly simplify the existing natural environment for wildlife, which would limit diversity and populations of species likely to persist." Please define "greatly simplify" in plain language so as to avoid confusion.	6. Text has been modified for clarity.
	7. Page 1-1, Purpose of and Need for DOE Action - DOE should revise the statement for purpose and need to reflect the need for DOE action, and not the need for the preferred alternative the lease of approximately 1000 acres to the East Tennessee Economic Council.	7. The need for DOE action is explained in Sect. 1.1 as being driven by budget cuts over the next several years, which will impact DOE and contractor employees. No change was made.
	8. Page 1-4, Sect. 1.4, Public Involvement - Provide information to show public and stakeholder involvement in DOE land-use decisions in relation to Parcel ED-1.	8. Text has been added to refer the reader to this comment-response document, which is appended to the EA.
	9. Page 1-4, Sect. 1.4.1 Future-Land-Use-Program - Provide information to show why the "Common Ground Process" was not utilized to identify the needs of Parcel ED-1.	9. The objective of the Common Ground process was to define long-term land use options on the ORR. Parcel ED-1 was included in the review.
	10. Page 2-3, Table 2-1 Characteristics of typical industries that may be located in Parcel ED-1 - Provide information on emissions, effluents, and wastes produced. Also, the table should indicate how waste generated by facilities would be treated.	10. The table identifies emissions, effluents, and wastes. The table indicates that wastes are either recycled or sent to off-site storage or disposal by the industries surveyed. Wastes from the proposed industrial park would be handled similarly.

COMMENT FROM:	COMMENT	RESPONSE
Earl Leming, Director, State of Tennessee, Department of Environment and Conservation, DOE Oversight Division	11. Page 3-9, Sect. 3.4.2 Groundwater, paragraph 3 - With the conclusion of the parcel being considered a sensitive hydrologic area, indicate who would assume liability for possible future industrial groundwater contamination? The shallow depth to groundwater may cause contamination and construction problems in an industrial setting. Those concerns should be evaluated. 12. Page 3-15, bullet #1 - "*The Nature Conservancy ranks forested canebrake as G1? indicating . . .*"Please give correct ranking. 13. Page 3-24, Sect. 3.5.2.2 Threatened and/or Endangered Species - The disclaimers in the second and last paragraph of this section that states no collections were made specifically for threatened or endangered species needs clarification. Also, is this section intended to be comprehensive, or are there some species present that are scheduled to be on the Federal threatened and endangered list but are just awaiting final approval? 14. Page 3-26, Sect. 3.5.3 Wetlands, paragraphs 1 & 3 - If beaver activity has increased the size of the wetland since the 1991-1992 survey, how can the 1995 survey agree with the 1991-1992 survey on a wetland's area of 3.5 acres?	11. The lease will contain several conditions to provide DOE as the lessor with protection in the event of environmental contamination by the lessee or sublessees. After it has been signed, the lease will be available for public review. 12. Table 3-2 has been added to the EA to explain the Nature Conservancy rankings. Errors in the text have been corrected. 13. This text of Sect. 3.5.2.2 is comprehensive and is based on information provided by the U.S. Fish and Wildlife Service. 14. There is a subtle discrepancy between text in Sect. 3.5.3 and Appendix H. The sentence in Sect. 3.5.3 has been revised to say that "the total acreage in five wetlands identified during a COE survey of the floodplain in 1991-1992 is about 1.4 ha (3.5 acres)," with reference to the July 1995 walk-through deleted. Because the COE report made no mention of beaver activity, it was suggested in Appendix H that the size of Wetland 3 may have increased since then because of beaver activity.

COMMENT FROM:	COMMENT	RESPONSE
Earl Leming, Director, State of Tennessee, Department of Environment and Conservation, DOE Oversight Division	15. Page 4-1, Sect. 4.1.2 Geology and Soils, paragraph 3 - Is any soil sampling and subsequent analysis during earthwork required in the lease? 16. Page 4-2, Sect. 4.1.3.2 Operation - Omit the statement that Parcel ED-1 would have minimal emissions since. An analysis of total emissions has not been conducted at this point. 17. Page 4-3, Sect. 4.1.4.1 Surface Water - Are Best Management Practices mandated in the lease to minimize sediment deposition in streams due to construction? 18. Page 4-4, Sect. 4.1.4.2 Groundwater - Last sentence this page: "*These are located down gradient of the parcel, and could be used to detect pollutant migration from the industrial park.*" Given the karst nature of this area, gradient can mean very little. In addition, groundwater located on the K-25 Site is currently contaminated, and it would be very difficult to distinguish between K-25 Site contaminants and contaminants which came from Parcel ED-1. DOE should not imply or state that K-25 well monitoring would be effective in detecting groundwater contaminated from industrial uses of Parcel ED-1. 19. Page 5-1, Sect. 5.0 Regulatory Compliance, paragraph 2 - Provide the consultation letter from the State Historical Preservation Officer in Appendix G as indicated. 20. Page 5-1, Sect. 5.0 Regulatory Compliance, number 1 - Explain the statement that the requirement of the ORR Hazardous and Solid Waste Amendments (HSWA) permits be modified as requested in the letter in Appendix H. The letter in Appendix H only addresses CERCLA without discussing the needed modifications to the HSWA permit.	15. Soil sampling and analysis are not expected to be required by the lease. However, DOE retains the right to conduct such activities on the parcel. 16. Text revised. 17. DOE cannot mandate that BMP be used, but will require in the lease that developers comply with all applicable federal, state, county, and municipality laws, ordinances, and regulations. 18. Text has been revised as suggested. 19. Done in Appendix I. 20. Appendix K now contains correspondence from the Tennessee Department of Environmental Conservation regarding a minor revision to the HSWA permit to include Parcel ED-1.

COMMENT FROM:	COMMENT	RESPONSE
Greg Denton, State of Tennessee, Department of Environment and Conservation, Division of Water Pollution Control	21. Page 5-1, Sect. 5.0 Regulatory Compliance, bullet #2 - A known release has occurred in the EFPC floodplain. Even though activities in this area will be restricted, it is still part of the parcel being leased. Therefore, a notice pursuant to CERCLA 120 (h) is required. Page xii - Concerning potential construction impacts, the document states that the proposed leases would require that no development occur in floodplains or wetlands, but stops short of stating that BMP installation to minimize construction impacts would also be a lease requirement. DOE has a responsibility to insure, to the best of their ability, that additional impacts do not occur on the reservation on leased lands. Page xiii - The EA assumes that the Oak Ridge sewage treatment plant is capable of accepting additional pretreaters and that the streams on the reservation would be appropriate for additional NPDES discharges. These assertions may be true, but should not be assumed to be true. The report needs more discussion of these issues. Page 3-8, line 23 - The classification of these streams as designated by the Tennessee Water Quality Control Board is relevant and important, but not mentioned.	21. DOE has completed documentation for EPA regarding CERCLA, and a 120 (h) notice is in preparation. p. xii. Refer to response to State of Tennessee comment #17. p. xiii. Any new discharges to streams on the ORR will require the issuance of an NPDES permit (or modification of an existing permit). Effluent limitations and discharge locations would be established at that time, when more is known about the quantities and composition of treated effluents from the Parcel ED-1 sites. These were alluded to in Sect. 4.9 of the Draft EA. Sect. 4.1.4.1 has been revised to reflect the expected need to modify or issue new NPDES permits. p. 3-8. The EA has been revised to reflect the fact that Bear Creek and East Fork Poplar Creek are classified for growth and propagation of fish and aquatic life, recreation, including fishing and swimming, irrigation, livestock watering, and wildlife.

COMMENT FROM:	COMMENT	RESPONSE
Reginald G. Reeves, Director, State of Tennessee, Department of Environment and Conservation, Division of Natural Heritage	1. Our review of the existing data bases indicates recorded occurrences of threatened and endangered species within a one-mile radius of the project site. We would request that you consult with our staff scientists concerning these species and methods of avoiding impact to these populations should the proposed development be implemented. These species have very specific or rare habitat. Please see the attached listing for further *habitat* information.	1. Some surveys have been conducted for state and federal protected species, and ORNL ecologist, Warren Webb, has consulted with the Division of Natural Heritage (DNH) during preparation of this EA. Additional surveys will be conducted prior to any ground clearing activities on the parcel. DOE will consult further with TDEC staff before specific developments are initiated.
	2. The results of our review do not mean that a comprehensive biological survey has been completed. We would suggest that a survey of the project sites be conducted prior to construction. Please notify our office of your findings. Please do not make public the exact location of any element listed here-in, as this could lead to possible over-collection and abuse.	2. Mitigation will require that all areas to be developed be surveyed for rare and protected species prior to ground clearing. Species locations will not be divulged in the EA. Survey information will be provided to the DNH as it is updated.
	General Comments: 3. Because the time frame for public response was considerably short and options for use of other parcels were not addressed, we should suggest that DOE issue a revised Draft Environmental Assessment. The Revised EA could specifically address the issues raised by your Division and others and provide for an additional period for a more appropriate public response period.	**General Comments:** 3. DOE has reviewed all ORR land prior to designation of areas available for lease or transfer, and no other options were identified. Also, Lockwood Greene has reviewed DOE and non-DOE sites as candidates for industrial development and has found Parcel ED-1 most suitable. A revised draft EA will not be issued for public review as it would add no value to the NEPA process.

COMMENT FROM:	COMMENT	RESPONSE
Reginald G. Reeves, Director, State of Tennessee, Department of Environment and Conservation, Division of Natural Heritage	4. The significance of the potential of converting such a large parcel of land to industrial development has not been addressed within the EA as a *cumulative* or *regional* impact. In order to comply with the National Environmental Policy Act consideration should be given to the comprehensive and *cumulative* impacts associated with the project actions. At a larger, more regional scale, the ED-1 parcel represents a large parcel (>1000 acres) of land with significant biodiversity. This biodiversity has been documented extensively within Chapter "3.0 Affected Environment" and further referenced throughout the document. 5. Based upon the information provided, it is probable that any proposed stream crossing (specifically East Fork Poplar Creek) will impact instream, aquatic habitat and riparian habitat as part of any construction associated with industrial development. The Department recognizes the importance of stream bank habitat to improving water quality and preventing soil erosion. We would suggest that stream bank, stream side and riparian zones be restored to habitat that is representative of eco-specific communities found within the project area. Any restoration activities should include the use of native plant species. Restoration should be accomplished by using native plant species consistent with local community types. 6. In addition to the data presented by our Division (attached), we would suggest that you consult a document, *Oak Ridge Reservation, Biodiversity, and the Common Ground Process. Preliminary Biodiversity Report on the Oak Ridge Reservation, 1995, The Nature Conservancy, Nashville TN.* This document was developed with considerable input from our technical staff and has been used to evaluate habitat types within the Oak Ridge National (sic) Reservation property. The process for developing this document included public (or stakeholder) input.	4. The contribution of the proposed action to cumulative and regional impacts on air quality, water quality, terrestrial and aquatic ecology, biodiversity and other resources is discussed in Sect. 4. 1.9 of the EA. 5. In the lease, DOE will prohibit construction in floodplains and wetlands. This will prevent direct impacts to aquatic and riparian habitat. Best management practices would be used in non-floodplain/wetland areas to minimize impacts of erosion and sedimentation in streams. Additional stream crossings on the parcel will be avoided. If streams must be crossed, impacted stream banks, sides and riparian zones will either be restored to pre-development conditions or allowed to regenerate naturally to native communities. TDEC erosion and sedimentation control and riparian restoration handbooks will be used. 6. DOE ecologists have used the referenced report extensively in preparation of this EA.

COMMENT FROM:	COMMENT	RESPONSE
Reginald G. Reeves, Director, State of Tennessee, Department of Environment and Conservation, Division of Natural Heritage	7. The Department of Energy instructed all DOE installations to undergo a process that would provide for long-term land use planning for all DOE installations. The process used to prepare such long range plans was the *"Common Ground Process"*. Directed by Martin Marietta and its subcontractors Barge, Waggoner, Sumner and Cannon; Economic Research Associates; and the Nature Conservancy, this process sought out the visions and preferences of citizens and employees who live in the 18-county region surrounding the reservation. A series of interviews, workshops and public meetings were held to give everyone an opportunity to discuss the recommendations for land use. The recommendations have gone to DOE for further use in planning and decision making. Among the agencies and private stakeholders participating within the "*Common Grounds Process*" there was a consensus opinion that this process and resultant information would be used for land use decisions throughout the DOE reservation. Particularly, parcels of land deemed significant for biodiversity, species protection, and habitat protection should not be arbitrarily developed for alternative land uses.	7. Public and stakeholder input to the Common Ground Process was considered by DOE during real estate reviews conducted prior to a decision to lease Parcel ED-1.
	8. Techniques for stream side reconstruction and sediment retention are outlined in the following documents prepared by our Department. Should the proposal be implemented these documents should be followed and incorporated into a thorough land use plan: a. *Tennessee Erosion Control Handbook*, July 1992 b. *Reducing Nonpoint Source Water Pollution by Preventing Soil Erosion and Controlling Sediment on Construction Sites*, March 1992 c. *Riparian Restoration and Streamside Erosion Control Handbook*, November 1994. We would suggest that DOE refer to these documents when planning measures to lessen any proposed construction impacts should the proposal be implemented.	8. DOE has referenced these reports in Sect. 4.1.4.1 of the EA.

COMMENT FROM:	COMMENT	RESPONSE
Reginald G. Reeves, Director, State of Tennessee, Department of Environment and Conservation, Division of Natural Heritage	9. We continue to support economic development and planned protection of ecological diversity for this region as well as other areas of the State. We recommend that other sites within the Oak Ridge Reservation be considered for industrial development based upon the findings of the *"Common Ground Process"*. 10. Based upon information generated through the "Common Ground" process, the proposed development of ED-1 parcel may adversely effect two BSR-2 sites (BSR-2-12 and BSR-2-13) and one Landscape Complex (Landspace Complex-1). The significance of these areas should be considered for potential impact by the project and alternatives presented within the EA. **Technical Comments:** 11. (Line 33, page 3-7 and line 1-26, page 3-8) The EA describes the East Fork Poplar Creek and its tributaries as "ecologically significant." There is no discussion of how these streams and the associated communities (riparian and wetland/floodplain habitat) will be protected should the project be implemented. Information provided by the Nature Conservancy and our technical staff indicate that the Tennessee dace, *Phoxinus tennesseenis*, has been collected at three locations throughout the watershed. This species is a State-protected species and ranked as GS/G3 by the Conservancy, indicating only 6-100 occurrences nationally. 12. (Line 8-23, page 3-10) The sinkhole and associated spring mentioned within this paragraph are described as being high-quality habitat and good water quality. Perhaps a survey would document further the significance of this area when compared to others within the region.	9. See response to Sigal comment #2. 10. DOE ecologists have prescribed mitigation and monitoring to conserve these natural areas and Landscape Complex-1. **Technical Comments:** 11. See response to Reeves Comment #5. 12. DOE has prohibited development in sensitive ecological habitats, such as the sinkhole. Further surveys will be conducted in conjunction with site development and monitoring, as prescribed in DOE's Mitigation Action Plan for this proposed action.

COMMENT FROM:	COMMENT	RESPONSE
Reginald G. Reeves, Director, State of Tennessee, Department of Environment and Conservation, Division of Natural Heritage	13. (Line 31, page 3-14 through line 33 page 3-18) The EA thoroughly discusses critically rare and sub-critically rare (according to the Tennessee Natural Areas Program, 1988 classification) communities that occur throughout the ED-1 parcel. These communities include Giant Cane, *Arundinaria gigantea,* canebrake ecosystem; floodplain or wetland habitat; limestone barrens; and several others. The EA does not address any mechanisms for protecting these regionally significant communities nor does it address any alternative actions. 14. (Line 13-24, page 3-17) The maple-beech forest discussed in this section represents a nationally rare community type. This mesic forest community appears to be one of the only undisturbed forest communities throughout the Oak Ridge Reservation. Again, the EA does not describe the process that will be used to protect this important community type nor address any alternative actions. 15. (Line 9-22, page 3-21) The EA describes several threatened or endangered plant species that have populations identified within the ED-1 parcel. The white-topped sedge, *Rhynchospora colorata*, has been found adjacent to the ED-1 parcel. The EA does not identify any survey of the parcel which would further quantify these plant populations. Again, the EA does not describe the process that will be used to protect these important plant species nor address any alternative actions.	13, 14. In Sect. 1, the EA lists a set of assumptions upon which the impacts analysis is based. Among these is the requirement that development would be prohibited in floodplains, wetlands, and other sensitive areas. 15. See response to Reeves comments #2, 5, 12, and 14.

COMMENT FROM:	COMMENT	RESPONSE
L. Darryl Armstrong, L. Darryl Armstrong Group, Oak Ridge, Tennessee	1. ETEC has a rapidly developing credibility and image issue that doesn't bode them well with the public. Although Larry Clark's (DOE) explanation of how ETEC was chosen may have been politically correct it was not well received by the public in attendance. Key questions were never answered by ETEC. Questions such as: 1) is ETEC accountable under the Tennessee Sunshine Law? In other words, are the meetings open to the public for participation and interaction with this 'appointed' board? 2) Who are the board members, who appointed them, and what backgrounds do they have in industrial and economic development? 3) Who are the paid staff members and what are their salaries, their background and experience in economic and industrial development? 4) How much of the taxpayer money funds this organization? How much of it in dollars is city taxes, county taxes, state and federal taxes? In particular, how much of this money is DOE money? 5) Who at DOE is accountable to the public to ensure that the ETEC books are audited, and that a public accounting is made of the money spent? 6) How much of the taxpayers' money has been spent already and on what? The concern around this issue arises from the experience that I, and others have had with industrial development organizations, where executives in these roles wine and dine, vacation and golf with their 'prospects' at the expense of, in this case, the taxpayer. Although DOE asked ETEC to address these questions, they were never satisfactorily answered in the workshop. You may contend that DOE has no responsibility to the public in regards to ETEC, however, I would strongly disagree. If DOE money (translate that to taxpayers' money) is being spent by ETEC, then DOE has a legal, ethical and moral responsibility to the taxpayer to keep close tabs on the organization and MUST report how such funds are being expended to the public when asked. Further, if Mr. Clark is taking it upon himself to explain how ETEC was chosen, as a taxpayer, I expect him to keep tabs on how their meetings are run (see his	1. These comments do not address the environmental impacts analysis of the proposed action and are beyond the scope of the EA.

COMMENT FROM:	COMMENT	RESPONSE
L. Darryl Armstrong, L. Darryl Armstrong Group, Oak Ridge, Tennessee	comments in the *News* Sentinel, August 25) and funds are spent and account to me as a taxpayer for these actions. 2. Further, there is serious perception issue with Joe Lenhard, a former DOE employee by his own acknowledgment, being in the forefront of the ETEC organization. I understand that ETEC, and others, would want such former insider expertise. That is legitimate and necessary to do business. However, for a former high ranking DOE manager to be at the head of the parade is perceptually inappropriate. This gives the perception, that although he may throw slings and arrows at his former "bureaucratic" agency, the skeptical public can interpret this purely as "smoke and mirrors." The public could possibly think or feel that he is in collusion with DOE and the federal government and that the public is getting less than a proper accounting of what is really going on behind the closed ETEC doors. This is especially suspect in the eyes of the public since DOE can move as quickly as they did on this EA, when in the past such prompt action was all but impossible. I am sure you can understand, if you will distance yourself from the emotions of it, that the public has to be at the very least skeptical. After all there have been other times when quick action has been needed, and DOE has found ways to drag its process out until the public gave up on any hope that something would happen. Suffice this comment to help you understand that the public doesn't believe that DOE can change habits overnight. For those of us who are familiar with and have been involved in the development of EAs and EISs we are skeptical at best that a thorough and thoughtful job was done. We must assume that you have been getting tremendous pressure from your DOE management and perhaps others just to get this done. If this is a new way of doing business under the management of Jim Hall, I for one would applaud the effort, unfortunately what this implies to	2. DOE has no discretion with regard to selection of membership on ETEC. This comment is beyond the scope of the EA. This EA was in a timely fashion in accordance with the June 1994 DOE Secretarial Policy on NEPA.

COMMENT FROM:	COMMENT	RESPONSE
L. Darryl Armstrong, L. Darryl Armstrong Group, Oak Ridge, Tennessee	me is that under the previous administration delaying tactics were used and there wasn't strong management in place to tackle the issue. That is a sad commentary on the professionals at DOE, if that is the case. 3. More than once the issue was raised about alternative land sites having been considered and then discarded. A review of the Common Ground Process draft recommendations and map clearly demonstrates that alternative sites do exist, some of which are even closer to the existing plant sites. These "brown field" sites would allow for even easier access to existing infrastructure and utilities, thereby reducing the overall cost of development. Responses to such questions as, "Why not re-use the S-50 site (the location of the power plant at K-25)?" were inadequate. I recall Ms. Katy Kates' response being there is already a programmatic use planned. Then what is that use? How high is it on the list of priorities? Furthermore, I would highly recommend that the EA team preparing this document, and your decision makers, take a step back and explain fully and comprehensively HOW the proposed lease of Parcel ED-1 integrates into the overall reuse planning that is currently underway within DOE and LMES. In other words, I would like to hear from Andy Loebl, and his DOE counterpart in facility reuse planning, as to how they were consulted in making the determination that Parcel ED-1 was the only acceptable parcel to lease to ETEC. 4. When it was revealed that only about 50 percent of the 1000 acres was actually useable for industrial development, the real estate representative response was not adequate. She did not explain WHY DOE could and would not gerrymander the site and offer for lease to ETEC only the roughly 500 acres that was useable. Later, in the evening however, it became clear, through her remarks, that the potential exists to actually develop the entire 1000 acres if, in her	3. Our review of land availability (alternate sites) for leasing or disposal is intended to determine whether land parcels meet the criteria for inactive, underutilized, or excess status and the further requirement for contiguity. There may be numerous combinations of ORR parcels that would offer the total area of Parcel ED-1, but because they are not contiguous, development of an industrial park would be difficult. The proposed lease of Parcel ED-1 is not part of DOE's facilities' reuse program, because there are no facilities on the parcel that could be reused. The lease is, however, an action within the scope of the 1994 Secretarial Land and Facility Reuse Program. This is discussed in Sect. 1.2 of the EA.

COMMENT FROM:	COMMENT	RESPONSE
L. Darryl Armstrong, L. Darryl Armstrong Group, Oak Ridge, Tennessee	words, "the environmental considerations are worked out". This is unacceptable to me as a taxpayer. This sounds as if DOE and its real estate people are working with ETEC to get all the acreage leased and then somehow allow ETEC to develop all the land, irrespective of what the decision document may require. Do you understand how this perception can exist to me as a taxpayer? If you will distance yourself from this issue, you could see where that remark would make those who are skeptical about the real intentions in this lease arrangement believe that ETEC wants all 1000 acres of this land to do with it as they please. I recognize that you say that the decision documents will be attached and that will guide how the land can be developed but answer these questions: "What are the criminal and civil actions that DOE would take against ETEC if they violated the terms of the decision document?" More importantly, "Would DOE take a legal action against ETEC?" After all, isn't this organization blessed by DOE HQ and the Secretary? "What would be the political ramifications from DOE HQ, if DOE-ORO were to take such legal actions?" 5. It is impossible to assess the completeness of the EA without knowing what the terms of the lease will be. I will not dwell on this point. However, again I don't think it is an appropriate response to say that the lease will be on file at the Register of Deeds office after it is signed. This lease should be made available to the public prior to adoption and agreement by DOE. Afterwards, this lease should be available at the Information Resource Center for public inspection. DOE must begin to accept the reality that they are a service organization and that they exist at the whim of Congress and the taxpayer. There were members of your organization that acknowledged in the public workshop that you are 'public servants.' This term clearly means that you are here to serve the public.	4. DOE recognizes the perceptions of the reviewer. About one-half the acreage of the parcel would be excluded from development by the terms of the lease, the EA, and eventually, the FONSI. Some areas of the parcel are being excluded from development pending an archaeological survey. If these areas are shown to be free from archaeological and historic artifacts, development may be undertaken there, but only with the consent of the Tennessee Historic Preservation Officer. There will be provisions in the lease for DOE actions to be taken should ETEC and/or sublessees violate the lease terms or environmental regulations. 5. The lease will be publicly available after it is signed by DOE and ETEC. There is no precedent for DOE to hold a public workshop on a real estate transaction.

COMMENT FROM:	COMMENT	RESPONSE
L. Darryl Armstrong, L. Darryl Armstrong Group, Oak Ridge, Tennessee	I recommend that the DOE Real Estate professionals get a copy of the lease and deliver it to the IRC immediately after it is signed. However, if you are sincere in wanting to build informed consent around the development of this industrial park, then ETEC and DOE would hold a public workshop to explain the terms of the lease, prior to its execution, and listen intently to any concerns the public might have relative to the terms and then negotiate and mitigate the public concerns. Frankly, I don't know how ETEC and DOE can fail to offer this type of public discussion, especially since ETEC is funded with DOE money, and the Secretary is seemingly so high on stakeholder involvement when it comes to the expenditure of DOE funds and future planning. Even if there would be a new administration during these decisions that might not be as sensitive to the involvement of the taxpayers, you must recognize that taxpayers are demanding more public accountability through public involvement. This trend is unlikely to abate or reverse itself. As we would say back home, "The cow has been let out of the barn and she's not going back willingly". 6. An analysis by an independent and credible institution is needed to determine objectively the impact of the anticipated loss of jobs on the community. There are unsubstantiated comments that are made relative to this in the EA. I recommend that the University of Tennessee, or another organization with some degree of objectivity, be engaged to provide supporting background information for this analysis.	6. A comprehensive socioeconomic analysis, including an assessment of job losses and economic impacts, was prepared after consultation with the University of Tennessee.

COMMENT FROM:	COMMENT	RESPONSE
	7. I concur with the members of the audience, as you did, that additional information and data must be included that demonstrates HOW the real estate professionals at DOE determined that Parcel ED-1 was the only available land for industrial development available at this time. Further, I would caution, that if DOE comes back to the public within the next year, as indicated by your real estate representative, and offers more land to ETEC, or anyone else for industrial expansion, you can expect to see a similar concern raised by the public. The genesis of the concerns by many members of the public at this workshop stems from what appears to be the lack of a comprehensive DOE land use plan. This is especially frustrating since the public has been participating in the Common Ground Process for the past 18-months. Simply stated, DOE did itself an injustice, although probably well intentioned, when it offered up Parcel ED-1 to ETEC without waiting for the final draft of the CGP. Although the conclusions of the CGP draft could be interpreted to support the Parcel ED-1 being leased as industrial land, there are clearly choices that also could have been considered based on the CGP draft report.	7. The draft report on the Common Ground Process was in preparation at the same time as this EA. It indicates that a portion of the parcel is suitable for industrial development while other portions are suitable for other purposes, such as conservation. With this in mind, DOE will exclude sensitive environmental resources from development in the terms of the lease.
	8. The EA needs a comprehensive easily understood map that clearly shows the NERP and the proposed boundaries of the Parcel ED-1.	8. Fig. 3-16 was added to the EA to show the National Environmental Research Park on the ORR.
	9. The recommendations and provisions that ETEC are expected to follow in the development of the land should be clearly spelled out in the report. These should be written in language that doesn't say "should be done" but rather "will be done and shall be done."	9. The EA and FONSI have been revised to use "shall" and "will." Sect. 1.3 lists the assumptions used in the impacts analysis. These are repeated in other sections of the document, as necessary.

COMMENT FROM:	COMMENT	RESPONSE
L. Darryl Armstrong, L. Darryl Armstrong Group, Oak Ridge, Tennessee	10. I recommend that a consortium of interested taxpayers (stakeholders), environmental groups, and ETEC with DOE assistance come together to work toward informed consent to ensure the appropriate development of the Parcel ED-1 site, or a more appropriate site if this is determined preferable, as an environmentally sensitive special mixed use industrial park. This will require focus, commitment, and TIME from all parties. Also, I don't believe the terms of the lease should be extended past 10 years, nor do I want to see the provisions of CERCLA violated. ETEC must be held to comply with the law and the terms of a lease that can be terminated at any point that a violation of the lease is determined.	10. DOE does not have plans to enter into a formal consortium with any parties regarding development of Parcel ED-1. The lease period is being negotiated. CERCLA considerations have been accounted for (Appendix K) in consultation with the U.S. Environmental Protection Agency.
	11. I concur that a guided tour of this property should be offered to interested stakeholders. I can assume that ETEC surely has visited the property prior to requesting that it be leased. If they can see the property, then each member of the EA team and interested stakeholders should see the property prior to finalization of the EA.	11. The EA team has visited the site. Requests for a tour should be directed to DOE's Public Information Office (423) 576-0888.
	12. Any assumptions on which the EA is built need to be clearly identified at the front of the draft report.	12. Sect. 1 of the EA identifies the assumptions on which the impacts analysis is based.
	13. In addition to addressing my above comments, questions and observations, the following are questions that I would like to have specifically addressed in the final draft of the EA: Why is the proximity to K-25 so important? How do the plans to reuse the K-25 site relate to the development of Parcel ED-1? Who, DOE and LMES with name and title, at K-25 has discussed with ETEC the concept of ETEC tapping into the utilities at the K-25 site?	13. Proximity to K-25 is advantageous because of potential use of utilities and other infrastructure. Reuse of the K-25 Site is not related to development of Parcel ED-1. DOE is not aware of anyone discussing the use of K-25 utilities with ETEC.

COMMENT FROM:	COMMENT	RESPONSE
L. Darryl Armstrong, L. Darryl Armstrong Group, Oak Ridge, Tennessee	Why was the S-50 site at K-25 not considered for lease?	The S-50 site was eliminated by DOE Real Estate Office during a programmatic review.
	Who paid for the involvement of Lockwood Green in the study of the "green field" sites?	The study was prepared for the Oak Ridge Chamber of Commerce.
	What are the terms of the lease? When will the lease be available for public review? How do I get a copy of the lease?	The lease will be available for public review after it has been negotiated. Negotiations are underway. When complete, the lease may be obtained from the DOE Real Estate Office (423) 576-0977.
	What are the provisions in the lease for ETEC subleasing the land?	Sublessees must comply with the all terms of the lease, including conditions regarding compliance with environmental laws and land use regulations.
	What is the source for validating the comment on page 4-15 that 1% of the total taxes collected in Oak Ridge can be realized through the leasing of Parcel ED-1?	The socioeconomic impacts analysis (Sect. 4.1.6) of the EA addresses tax revenues.

COMMENT FROM:	COMMENT	RESPONSE
Barbara Walton, Oak Ridge, Tennessee	I was, in general, pleased with the draft Environmental Assessment (EA). A good job has been done in identifying environmentally sensitive areas and many good recommendations are included. Some of these, however, appear only in appendices (E and F are most notable in this reguard [sic]) while others remain buried in the text instead of being numbered as recommendations. The maps and graphics in color are excellent (Fig. F-1 is the only exception). A soils map for section 3.2.4 would be a welcome addition.	Prime farmland soils were identified in Sect. 3.2.4 of the EA and shown on a map of the parcel. A map showing all soils was not necessary for impacts analysis.
	The meeting August 24 was a good one. Many people recommended augmentations to the EA, especially on economic issues, which I think would be helpful.	Comment is appreciated.
	I was especially pleased that DOE agreed at the meeting to a mitigated FONSI. I would like to see a complete list of recommendations from the EA included which use definite language such as "shall" and "must."	Such language will appear in the lease and the FONSI.
	I agree with the estimate given on page 4-19, third paragraph of the draft EA concerning "actions that would preclude as much as half of the site from development". Several additional studies and surveys are suggested throughout the draft EA. Although "DOE is required to monitor a mitigated FONSI and prepare an annual report on the status of the mitigation" and they employ competent environmental scientists, it is imperative that publicly supported environmental organizations also be involved. I noted on page 7-1 that no such groups had been consulted in developing the draft EA. I strongly recommend that an environmental consortium be a partner with ETEC on mitigation aspects of the lease. The Nature Conservancy (which has been consulted in the Common Ground process), the Tennessee Citizens for Wilderness Planning and the Tennessee Chapter of the Audubon Society should be contacted for inclusion	When preparing an EA or EIS, DOE consults with federal, state, and local regulators. While DOE agrees that information from environmental groups can be helpful, if one group is contacted and another overlooked, DOE's intent may be questioned or considered biased. Therefore, environmental groups are encouraged to express their views during public workshops and meetings and in written comments.

COMMENT FROM:	COMMENT	RESPONSE
Barbara Walton, Oak Ridge, Tennessee	in the consortium; they may recommend additional members. I believe this is the only way to insure the stakeholders that the environmental legacy we leave to future generations will be sound.	
	I agree with ETEC that ten years is too short for such a lease. It is vitally important that the lease have provision for an extension for a longer (90 years?) second period with appropriate conditions to be met.	Comment noted. The lease has provisions for renewal.
	It is also vital that ETEC be allowed to proceed rapidly with planning for the parcel. I see no reason Fig. 3-12 could not be used as initial guidance. I recommend development on all areas labeled "Clearcut" and "Pine" be permitted before the recommended studies are completed.	Fig. S-1 has been added to the EA Summary to show areas available for development and areas protected because of the presence of sensitive resources.

COMMENT FROM:	COMMENT	RESPONSE
Linda LaForest, Executive Director, Tennessee Citizens for Wilderness Planning	1. The EA evaluates only the proposed action and the no-action alternative. This is not acceptable because reasonable alternatives to the proposed action exist and should be evaluated. In particular, other land areas on the ORR should be identified and carried through detailed analysis. The statement that all other land on the ORR is either in use or planned for other uses is not credible.	1. The statement that no other ORR lands were available and/or suitable to meet ETEC's needs is based on DOE Real Estate staff reviews. Periodically, a formal site utilization survey is performed in conjunction with the General Services Administration to determine if land and/or facilities on the ORR are properly utilized. This review also identifies underutilized or excess land and facilities. Also, as part of the review, current and future programmatic uses of the land are evaluated prior to decisions for outgranting or disposal actions. DOE conducts informal reviews of ORR land use more frequently than GSA-DOE reviews. To date, no lands are deemed to be in excess of programmatic needs (i.e, suitable for disposal). Hence, after consideration of future downsizing of the ORR work force and ETEC's proposals for economic development to offset downsizing, DOE agreed to consider outgranting (leasing) land for industrial development. Public Law 103-160 (the Hall amendment, Sect. 3154), which has been added to the EA as Appendix A explains the basis for long-term leases of DOE property at facilities.

COMMENT FROM:	COMMENT	RESPONSE
Linda LaForest, Executive Director, Tennessee Citizens for Wilderness Planning		In January 1995, DOE began to review ORR land to identify 1000 *contiguous* acres which were not currently in programmatic use, but were an essential part of ORR land. The sole parcel that met these criteria was Parcel ED-1. Additionally, this parcel was previously requested by the City of Oak Ridge in its 1979 Self-Sufficiency Plan; in the future, it may be conveyed to the City when and if it is deemed excess to DOE's needs. Text has been added to Sect. 1 of the EA to clarify DOE's land review process.
	2. DOE could help the local economy and conserve biodiversity on the ORR by facilitating use of local areas already developed to some extent, for example, the Clinch River Breeder Reactor Site or the property Boeing acquired from DOE almost 10 years ago for a missile assembly facility that was never completed. These areas should be considered reasonable alternative sites along with other areas of the ORR.	2. The reviewer is referred to the response to the first comment in this list, which refers to a study prepared by Lockwood Greene Technologies, Inc. (LG), to identify areas suitable for industrial park development in the Oak Ridge area. LG studied the sites mentioned by the reviewer as well as ORR sites and found that Parcel ED-1 was preferable over the others. The LG report will be made available in the DOE Public Reading Room. Text discussing the LG study has been added to Sect. 1.2 of the EA.

COMMENT FROM:	COMMENT	RESPONSE
Linda LaForest, Executive Director, Tennessee Citizens for Wilderness Planning	3. At the direction of Secretary O'Leary, DOE-OR and LMES have recently spent a great deal of time and effort in a comprehensive plan for future uses on the ORR, a plan that includes land-use preferences of both the public and technical experts. However, the Summary of Preliminary Recommendations for the Common Ground Process released in June 1995 has been ignored in this EA. Specifically: The land areas identified as Primary Industrial Area Uses on the map included in the Summary of Recommendations have not been considered as reasonable alternatives to the proposed area for industrial development. Furthermore, the proposed action is to develop an area that is largely noted as Conservation Area uses on the map! 4. The document is confusing in its description of mitigation measures. For example, on page xii under Findings there is a statement that the proposed lease will require that no development occur in the floodplain or wetland. Please clarify what environmental protection measures would be a requirement of the lease and subleases.	3. While the Common Ground process indeed identifies other areas suitable for industrial development, none of these are sufficiently large to support the industrial park envisioned by ETEC. The reviewer is correct that portions of the parcel are designated as Conservation Areas. DOE, in its lease terms, intends to protect environmentally sensitive areas on the parcel from development and to ensure that DOE's environmental research mission and monitoring continue in specific areas. This is explained in Sect. 1.3 of the EA. 4. The proposed lease would prohibit floodplain and wetlands development. If ETEC or its sublessees propose any activity in these areas, additional environmental documentation would be required by the lease, at the lessee or sublessee's expense. Exclusion areas are depicted in the EA and FONSI, both of which will be referenced in the lease as legally binding documents.

COMMENT FROM:	COMMENT	RESPONSE
Linda LaForest, Executive Director, Tennessee Citizens for Wilderness Planning	5. Have there been any discussions with potential tenants for the proposed industrial park? 6. Why is proximity to K-25 considered so important when none of the businesses listed in the assumptions on pg 1-4 (ceramics, auto parts, electric and computer component manufacturers, and copy services) would appear to require location near K-25? 7. There is no documentation in the EA to support statements that the proposed action is needed to offset DOE downsizing. Where is the study to show that 1000 acres are needed to replace anticipated job loss in the Oak Ridge area? Would the types of jobs resulting from establishment of the proposed industrial park be comparable to those expected to be eliminated by DOE? Shouldn't we have such a study before we commit 1000 acres of the ORR to a proposal that may not even meet our needs? 8. How is reuse of the K-25 site related to the proposed lease of the 1000-acre tract? Are these related actions?	5. DOE asked ETEC to identify potential tenants. ETEC stated that while no tenants have been acquired, certain industries are targeted for marketing to locate in Oak Ridge. Such industries (including waste management, which was not targeted by ETEC) were used in the EA impacts analysis. 6. Proximity to K-25 is beneficial to industrial development because of the nearby TVA power substation as well as wastewater treatment facilities and utilities. Location near K-25 was not a criterion for selection of Parcel ED-1, but rather an advantage. 7. A comprehensive socioeconomic analysis has been added to Sects. 3.6 and 4.1.6 of the EA to address these concerns. 8. The lease of land is a separate action from reuse of K-25 Site facilities and by its general nature requires separate NEPA documentation.

COMMENT FROM:	COMMENT	RESPONSE
Linda LaForest, Executive Director, Tennessee Citizens for Wilderness Planning	9. In summary, the EA is not complete and needs revision before DOE makes a decision on this proposal. The main missing items are: • Additional alternatives to achieve the stated objective should be analyzed, in particular other land areas on the ORR and in the Region of Influence; • The economic need for the proposed action is not established, and there is no explanation of how the proposed action would alleviate the economic impacts of DOE downsizing; • The EA should make clear what environmental protection and monitoring measures would be a requirement of the lease; and, • DOE should review and approve any sublease or subsequent development proposed for the area.	9. Responses to bullets 1, 2, and 3 are the same as responses to comments 1 through 8. With regard to bullet 4, DOE management and legal counsel have agreed that sublessees would be subject to the same terms of the lease as ETEC.

Response to Comments from Lorene Sigal in a Markup of the EA.

Editorial comments (typos, references, grammar) are not listed in the following table.

Page/line	Comment	Response
xi/3	Must let readers know why and how ETEC was chosen, and who/what it is.	Information has been added to Appendix A of the EA to explain ETEC and its mission.
xi/4	Include appropriate section in Appendix (Defense Authorization Act).	Appendix I presents this information.
xi/6-10	This EA must include a socioeconomic analysis.	Socioeconomic analysis has been revised (Sects. 3 & 4 of EA).
xi/12-13	Include reference for the review.	The review of programmatic needs for various land areas of the ORR is a continuing internal DOE process. No document exists for reference.
xi/18	Reference for mgmt goals.	Sentence has been reworded.
xi/20	Add "s" to floodplain. Delete vegetation. Replace with plant and animal.	Changes made.

Page/line	Comment	Response
xi/22	End parentheses.	Change made.
xi/26	Silviculture is not an intended use. Add wildlife mgmt and protection.	Silviculture is still possible in protected areas. Other uses have been added to text.
xi/28-29	Must provide documentation, analysis for statement on downsizing.	Socioeconomic text in Sects. 3 & 4 of EA has been modified to address this.
xi/32	What are these programmatic uses? Include reference.	Programmatic uses may include environmental research, waste management, new energy research facilities, etc. Site development planning is an ongoing process.
xii/2	Should consider reuse of existing industrial areas on the ORR. It is a reasonable alternative.	Reuse of existing industrial areas on the ORR is complicated by safety and security issues associated with past and present operations. Until such issues are successfully resolved, present industrial areas will not be released for unrestricted use.
xii/3	What are the env. protection requirements? Need to see the proposed lease in order to know if findings are valid.	The environmental requirements outlined in Sect. 1.3 will be terms of the lease and FONSI. DOE cannot disclose the lease until negotiations with ETEC are completed.

Page/line	Comment	Response
xii/8	but not capatible (sic) with its current use as part of the NERP!	Research parks provide protected land areas for research and education in the environmental sciences and demonstrate that energy technology can be developed while maintaining a quality environment. Implementation of mitigation specified in the FONSI will protect sensitive ecological resources and make the proposed development compatible with Research Park goals.
xii/22-24	Rephrase.	Change made.
xii/30	What is routine maintenance-describe or provide examples.	Text has been clarified.
xii/31	...and adjacent (affected?) communities.	DOE's floodplain/wetlands environmental review process (10 CFR 1022) involves public notice of proposed actions.
xiii/19	Are these SHPO or NHPA requirements?	The requirements are those defined by the SHPO after his review of the proposed action and a field survey of Parcel ED-1.
xiii/26-27	Where is the evidence that the proposed industrial park will replace jobs lost in the near term?	DOE has revised the socioeconomic analysis in the EA to address this comment (see Sects. 3 & 4).

Page/line	Comment	Response
xiii/28-31	How do we know? How do we know when it is not known what kind of industry would locate on the land and we have not seen the lease?	Text has been revised to indicate that the findings are based on the assumption that industrial facilities on Parcel ED-1 would be similar to those in other Oak Ridge area industrial parks.
xiii/23-36	These 4 bullets are not related to "environmental protection requirements" (see lead sentence). Move these bullets and add another appropriate lead sentence.	The phrase about "environmental protection requirements" will be removed from the lead sentence.
xiv/20	What about state-listed species?	State-listed species have been identified in the Summary.
xiv/22	Seems to me somebody should have figured this out by now.	The amount of land needed by different types of industries is variable. Until ETEC's plans progress further, the individual and collective land requirements will not be known.
xiv/25	Clarify.	Text has been reworded.
xiv/28,29,30	?? Curious terminology.	Text has been reworded.
xv/4	Non seq.	No change.
1-1/40	Not in references.	Reference added.

Page/line	Comment	Response
1-2/4-11	Where is the ORR comprehensive plan? Is there one?	This plan will be one product of the Common Ground Process, which is still in progress.
1-2/25, 27	Not in references.	Reference added.
1-2/31-37	Must have reference for this paragraph. Please provide a copy of the survey and the evaluation in the public reading room.	Internal reviews have not generated formal reports that can be referenced or made available to the public.
1-2/16-19	I don't remember this focused on ED-1.	Text has been rewritten.
1-2/42-43	What is this? What do you mean?	Text has been rewritten.
2-1/11	Must have references and access to document.	See response to previous comment re: p. 1-2, 31-37.
2-1/35-37	Must have map showing area protected and area available for development including roads and other infrastructures. Include table to show acreage.	Fig. S-1 has been added to the Summary to show these areas.
2-2/1-7	I question whether the development would replace lost jobs. Document number, types, and timing of jobs potentially available. Include regional data - (a cumulative analysis is needed!)	The socioeconomic analysis has been redone to address these concerns. See Sects. 3 and 4 of the EA.

Page/line	Comment	Response
2-2/11-14	...to provide development somewhere...	It is in the best interests of the Oak Ridge community and East Tennessee that jobs be provided locally for those lost by downsizing.
2-2/18-20	Does this mean no further leases would take place?? Document and show (map) other ORR lands considered and include reasons for "unavailability".	Figs. 1-3 and 1-4 shows parcels that have been transferred to the City of Oak Ridge and those that were requested by the City in its Self-Sufficiency Plan.
2-2/18-23	Must provide "review" documentation in the public reading room.	See response to comment re: p. 1-2, lines 31-37.
2-2/31-32	If the land is not suitable for release to the City of O.R. on environmental grounds, then how can/does DOE justify a lease to ETEC for development that would probably result in the same kind of environmental damage?	If DOE disposes of the parcel to a developer, it relinquishes control over all actions taken to develop the land. On the other hand, by leasing the land, DOE retains ownership and has the power to restrict certain actions in the lease. In the case of Parcel ED-1, the lease would be the instrument that protects environmentally sensitive areas.
4-6/11-13	Unclear!! Clarify.	Clarified.
4-6/23	What about the 500y floodplain - if not applicable, say so.	This has been done in Sect. 5.0.

Page/line	Comment	Response
4-12/26	What about fragmentation? Please include.	Text has been clarified.
4-12/43 and 4-13/3	What is the basis for this assumption? What is the relationship to downsizing? Context.	Socioeconomic text in Sects. 3 and 4 has been revised to address these concerns.
4-18/22	No plan?	Text has been revised to indicate that conclusions are based on the assumption that industrial facilities at Parcel ED-1 would be similar to those at other Oak Ridge and vicinity industrial parks.
4-21/10-14	Analysis necessary - local and regional.	Socioeconomic text in Sects. 3 and 4 has been revised to address this concern.

APPENDIX C

ZONING REGULATIONS AND WASTEWATER DISCHARGE PERMIT RESTRICTIONS FOR THE CITY OF OAK RIDGE

6-713 IND-2, Industrial Districts

The following regulations shall apply in IND-2, Industrial Districts.

(a) Permitted Principal Uses:

1. Light and heavy manufacturing and processing plants, research and development facilities, and facilities such as processing of radioisotopes, lumber and wood products, food and food products, furniture and fixtures, chemicals, plastics, primary and fabricated metals, metal products, machinery, stone, clay and glass products, and other miscellaneous manufacturing plants.

2. Warehousing and wholesaling facilities, including truck and rail service terminals and related facilities, and tank storage of bulk oil and gasoline and the mixture or bulk storage of illuminating or heating gas, subject to the proper precautions as to locations and otherwise, to prevent fire and explosion hazards.

3. Public and semipublic uses, including any municipal use, state or federal use, public utility structure, or related use.

4. Dwelling units are expressly prohibited except for quarters for watchman, caretaker, or custodian on the premises and housed in a separate building. Such housing may be provided in the same building with Board of Appeals approval.

5. Airport.

6. Office uses resulting from information processing, industrial training, engineering, drafting or graphic arts services and computer hardware or software development.

(Ord. No. 3-88 Revised Effective 1/28/88)

7. Family day care home, child care center, private education institution.

(Ord. No. 16-90 Revised Effective 7/5/90)

6-713 IND-2. Industrial Districts (Cont'd.)

(b) Permitted Accessory Uses

1. Any use customarily incidental to the permitted principal uses.

2. Signs (see Section 6-609 et seq.).

(Ord. No. 31-86 Revised Effective 1/1/87)

3. Automobile parking (see Section 6-606 et seq.).

(c) Uses Requiring Board of Appeals Permit:

1. Any retail use or service permissible in the B-2, General Business Districts, provided such use serves or is auxiliary to the needs of industrial plants or employees thereof within the IND-2 Zone.

2. Caretaker housing as described above in Section 6-713 (a) 4.

3. Helicopter passenger station.

(d) Area, Height, Bulk, and Placement Regulations:

Maximum Usable Floor Area to Lot Area: 60%.

Minimum Required Setback Dimensions in Feet: Front - 30 ft.; Least One Side - 25 ft., Total of Two Sides - 50 ft.; Rear - 25 ft.

Maximum Height in Feet: None.

Maximum Height in Stories: None.

(e) Sampling Port Requirements

Adequate sampling locations and access facilities shall be provided for sampling at every stack or other conduit discharging waste products into the air.

NOTE: See Sections 6-910 through 6-935 of this ordinance for applicable site plan review regulations.

(Ord. No. 25-93 Revised Effective 9/30/93)

CITY OF OAK RIDGE WASTEWATER DISCHARGE PERMIT RESTRICTIONS

Sec. 25-35.2. Prohibitions on Wastewater Discharge.

Regardless of permit status, no person shall discharge or cause to allow to be discharged into the City of Oak Ridge POTW or any connected treatment facilities any waste which contains any of the following:

(1) Oils and Grease: Fats, wax, grease or oils of more than one hundred (100) mg/L, whether emulsified or not, or containing substances which may solidify or become viscous at temperatures between 0 and 65°C (32 and 150°F) at the point of discharge into the system.

(2) Explosive Mixtures: Liquids, solids, or gases which by reason of their nature or quantity are, or may be, sufficient to cause a fire or explosion hazard or be injurious in any other way to the POTW or to the operation of the system. At no time shall two successive readings on an explosion hazard meter, at the point of discharge into the sewer system, be more than five percent (5%) nor any single reading over ten percent (10%) of the Lower Explosive Limit (L.E.L.). Prohibited materials included, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides.

(3) Noxious materials: Noxious or malodorous solids, liquids, or gases, which, either singly or by interaction with other wastes, are capable of creating a public nuisance or hazard to life, or are or may be sufficient to prevent entry into a sewer for its maintenance and repair.

(4) Improperly Shredded Garbage: Garbage that has not been ground or comminuted to a degree that all particles are ½ inch or less in greatest dimension and will be carried freely in suspension under flow conditions normally prevailing in the public sewers.

(5) Radioactive Wastes: Radioactive wastes or isotopes of such half-life or concentration that they are in noncompliance with regulations issued by the appropriate authority having control over their use and which will or may cause damage or hazards to the POTW or personnel operating the system.

(6) Solid or Viscous Wastes: Solid or viscous wastes which will or may cause obstruction to the flow in a sewer, or other interference with the proper operation of the POTW. Prohibited materials include, but are not limited to, grease, uncomminuted garbage, animal guts or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastic, tar, asphalt residues, residues from refining or processing of fuel or lubricating oil, and similar substances.

(7) Excessive Discharge Rate: Wastewaters at a flow rate which is excessive relative to the capacity of the treatment works or which could cause a treatment process upset and subsequent loss of treatment efficiency; or wastewaters containing such concentrations or quantities of pollutants that their introduction into the treatment works over a relatively short time period (sometimes referred to as "slug" discharges) would cause a treatment process upset and subsequent loss of treatment efficiency.

(8) Toxic Substances: Any toxic substances, chemical elements or compounds, phenols or other taste- or odor-producing substances, or any substances in amounts which may interfere with the biological processes or efficiency of the treatment works in concentrations which would cause the POTW to exceed its NPDES permit limits.

(9) Unpolluted Waters: Any unpolluted water including, but not limited to, water from cooling systems or of storm water origin, which will increase the hydraulic load on the POTW.

(10) Discolored Materials: Waste with objectionable color not removable by the treatment process.

(11) Corrosive Wastes: Any waste which will cause corrosion or deterioration of the POTW. All wastes discharged to the public sewer system must have a pH value in the range of six (6) to nine (9). Prohibited materials include, but are not limited to acids, sulfides, concentrated

chloride and fluoride compounds and substances which will react with water to form acidic products.

(12) Thermal Discharge: Heat in amounts which will inhibit biological activity in or cause damage to the POTW resulting in interference, but in no case heat in such quantities that the temperature at the treatment plant exceeds 40°C (104°F). Under no conditions may the temperature at the point of discharge exceed 49°C (120°F).

(13) Human Hazard: Any wastewater which causes hazard to human life or creates a public nuisance.

Sec. 25-35.3. **Limitation on Wastewater Discharge.**

No person shall discharge or convey or cause to be discharged or conveyed to the to the public sewer any wastewater containing pollutants of such character or quantity that will:

(1) Not be amenable to treatment or reduction by the wastewater treatment processes employed, or are amenable to treatment only to such degree that the wastewater treatment plant effluent cannot meet the requirements of other agencies having jurisdiction over discharge to the receiving waters.

(2) Constitute a hazard to human or animal life or to the stream or water course receiving the treatment plant effluent.

(3) Exceed limits as set forth in his Wastewater Discharge Permit or violate the Federal Pretreatment Standards.

(4) Cause the treatment plant to violate its NPDES permit, pass-through limits, or other applicable receiving water standards, or cause interference with plant operations.

(5) Contain any water or wastes whose strength or other characteristics exceed the limits for normal wastewater which may be established by the Control Authority.

APPENDIX D

REGIONAL GEOLOGY

APPENDIX D

SUPPLEMENTAL INFORMATION ON REGIONAL GEOLOGY

D.1 STRATIGRAPHY

The following text describes the rock units depicted in Fig. D-1.

Pond Spring Formation. The Pond Spring Formation was named by Milici and Smith (1969) for exposures in Northwestern Georgia. The Pond Spring is a distinctive mudstone-rich formation at the base of the Chickamauga Supergroup. The thickness of the Pond Spring is fairly constant across the map area at approximately 120 m. Basal exposures of the Pond Spring have been reported to range from a conglomerate of light-greenish-red, fine-grained dolomite, to thin to medium-bedded, light greenish-gray, fine-grained limestone, to lenses of calcareous shale and sandstone (Borowski 1982; Wilson 1986). The basal contact was exposed along the Clinch River in the K-25 area and consisted of calcareous shales and argillaceous limestone overlying thick-bedded dolomite of the Mascot Dolomite. The lower and upper parts of the formation consist of maroon, green, and gray argillaceous limestone. Bedding ranges from thin to medium, even, regular beds to mottled, uneven beds. Interbedded with the limestones are thick, irregularly bedded, calcareous shales that are gray-green and red. Within the middle part of the Pond Spring is a thick to massive-bedded, dark-gray, micritic limestone with bed-parallel grey chert pods. Fossils are very rare, but a few silicified gastropods have been found.

Murfreesboro Limestone. The Murfreesboro Limestone was named by Safford and Killebrew (1900) for exposures in and around Murfreesboro, Rutherford County, Tennessee. The unit averages 100 m in thickness. The lower part of the Murfreesboro consists primarily of micritic and fine-grained crystalline limestone. The limestones are usually thin bedded, although very thick to massive beds do occur in the section. Minor amounts of calcareous shale and argillaceous limestone also occur in the lower part. The middle part of the Murfreesboro consists of similar micritic and fine-grained limestones, but beds are commonly thin to medium, regular and even. Bryozoans are the only fossils that have been observed in the middle part and bed-parallel ropy black chert zones increase in abundance. Thick to massive beds interbedded with even thin to medium beds become more common in the upper part of the Murfreesboro, but they are not as abundant as in the overlying Ridley Limestone. A characteristic feature of the limestones in the upper part of the Murfreesboro is that they commonly contain nodular, ropy, gray-black chert zones with silicified fossils.

Ridley Limestone. The Ridley Limestone was named by Safford (1869) for exposures in Rutherford County and is approximately 75 m thick in the map area. Thick to massively bedded, fucoidal-textured limestone is characteristic of the Ridley Limestone. Fucoidal texture is a term used to describe the presence of tan-brown, irregularly shaped, fine-to coarse-grained dolomitic patches within the limestone. The texture appears to be related to the preferred dolomitization of a pre-existing mottling fabric. The limestones

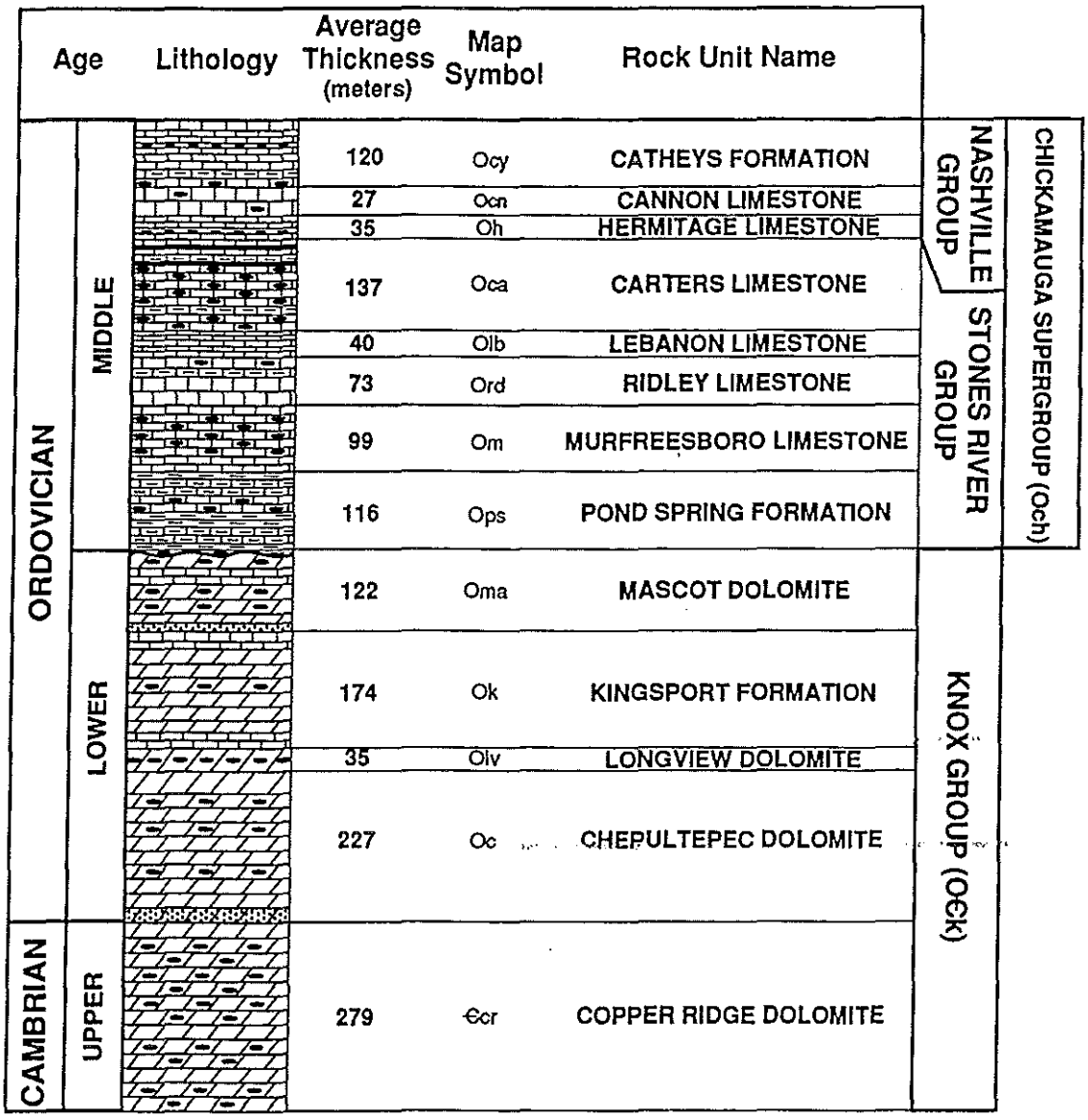


Fig. D-1. Regional stratigraphy in the Oak Ridge, Tennessee, area.

generally dark-gray micrite that are commonly devoid of fossils. Within the middle part of the Ridley is a yellowish-red, calcareous shale. Within the upper part of the Ridley Limestone minor amounts of gray-black chert are present and fossils are very abundant in some coarse-grained limestone beds.

Lebanon Limestone. The Lebanon Limestone was named by Safford and Killebrew (1900) for exposures near Lebanon, Wilson County, Tennessee. The Lebanon Limestone is approximately 40 m thick in the map area. A distinctive characteristic of the Lebanon limestone is the abundance of fossils. Whole body and disarticulated brachiopods, bryozoans, gastropods, and cephelopods have been observed. Bedding in the Lebanon ranges from regular to even, thin to medium beds, to irregular, cobbly beds. Cobbles are more pronounced after the beds have been extensively weathered and are elongate, micritic to coarse-grained limestone lenses, parallel to bedding that are surrounded by thin laminae of calcareous mud. Some thick to massive limestone beds also occur in the Lebanon. Fucoidal texture is common and chert is rare.

Carters Limestone. The Carters Limestone was named by Safford (1869) for exposures along Carters Creek in Maury County, Tennessee. The Carters Limestone is approximately 150 m thick in the study area. The lower part of the Carters Limestone consists of thick to massive beds of interbedded micritic and coarse-grained limestone. Chert in the lower part consists of gray-black pods and lenses. When outcrops are absent, chert blocks are relatively abundant in the residuum. The top of the lower part consists of olive-gray, argillaceous limestone that is mudcracked, devoid of fossils, and weathers into thin chips. The middle part of the Carters Limestone consists of medium to thick, regular and even bedded, blue-gray limestone. Close examination of the beds indicates that some are storm deposits consisting of fining upward sequences of coarse-grained fossil hash to micrite. Fossil hash beds commonly have Tetradium coral. Fucoidal texture and grey chert pods are also common. Although no exposures were found, a quartz siltstone has been commonly observed in float around the middle part of the Carters. At the top of the middle part are two apple green, sometimes partly maroon, metabentonite beds that range from 1 to 3 ft thick. Underlying each metabentonite bed are gray-black cherts that are commonly medium bedded (table-top cherts) and fossiliferous. Soils commonly contain small chert blocks that are fossiliferous and oolitic, as well as pieces of silicified fossils, which helps determine the location of the metabentonites where there is no bedrock exposures. In addition, the cherts are more resistant to weathering, which leads to the development of a small rise in topography that is easily observable on topographic maps. The upper part of the Carters is poorly exposed, but consists of micritic, greenish-gray and yellowish-gray, poorly bedded, mudcracked limestone.

Hermitage Limestone. The Hermitage Limestone was named by Hayes and Ulrich (1903) for exposures near the Hermitage community in Davidson County, Tennessee. The Hermitage is approximately 35 m thick. Limestone consists of thin to medium, irregular, uneven, cobbly beds that are abundantly fossiliferous. Fossils are commonly silicified and include crinoids, brachipods, and bryozoans. Limestones range from light-gray, to slightly reddish-gray, coarse-grained spar and micrite that can be partly argillaceous. A maroon, olive-tan calcareous shale has been observed near the base of the unit and may be a useful marker bed.

Cannon Limestone. The Cannon Limestone was named by Ulrich (1911) for exposures in Cannon County, Tennessee. A type section was designated by Bassler (1932) in Cannon and Rutherford Counties, Tennessee, and is approximately 27 m thick. Limestones in the Cannon are commonly dark-gray, thick to massive beds; but thin and medium beds also occur. Fossils range from rare to a coquina consisting of crinoids, bryozoans, and brachiopods. A few large silicified coral forms were observed. Chert and fucoidal texture is rare, but stylolites are common and produce ridges on weathered outcrops.

Catheys Formation. The Catheys Formation was named by Hayes and Ulrich (1903) for exposures along Catheys Creek in Lewis and Maury Counties, Tennessee, and is approximately 120 m thick. The Catheys Formation is medium to dark-gray, thin to thick bedded, micrite and occasionally coarse-grained limestone with shale seams and partings. Some beds are very fossiliferous, and Tetradium have been found. Near the upper part are interbedded calcareous, green and red shales. Chert and siltstone fragments are common in soil.

D.2 REFERENCES

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APPENDIX E

DESCRIPTION OF RARE PLANT SPECIES ON PARCEL ED-1

APPENDIX E

DESCRIPTION OF RARE PLANT SPECIES ON PARCEL ED-1

E.1 *Cypripedium acaule* Ait.

COMMON NAME: **Pink lady-slipper.**

FAMILY: Orchidaceae.

FEDERAL STATUS: None.

TENNESSEE STATUS: Endangered (due to commercial exploitation).

HABITAT: Bogs and dry, acid pine woods (Radford et al. 1968).

HABITAT ON ORR: Moist to dry acid woods.

RANGE: Eastern United States; south to South Carolina and Alabama.

TENNESSEE COUNTIES: Perhaps in all counties of East Tennessee, but not found west of the eastern Highland Rim.

DESCRIPTION: Two large, ribbed ovate leaves are at the base of a single flowered scape. Flower pink, fissured in front.

FLOWERING DATE: April to July.

FRUITING DATE: Unknown.

LOCATIONS ON ORR: Several locations known.

LOCATIONS ADJOINING ORR: Probably several.

COMMENTS: *C. acaule* is a showy species much prized in the wildflower trade. Evidence to date indicates that not only is the species being removed from its habitat in large numbers across the state, but also no propagation techniques are known to be successful. For this reason, TDEC lists the species as endangered in Tennessee.

THREATS ON ORR: Habitat loss from project development activities, tree canopy removal, and illegal digging.

E.2 *Hydrastis canadensis* L.

COMMON NAME: **Golden seal.**

FAMILY: Ranunculaceae.

FEDERAL STATUS: 3C (Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to an identifiable threat).

TENNESSEE STATUS: Threatened.

HABITAT: Rich woods (Radford et al. 1968).

HABITAT ON ORR: Rich, moist woods.

RANGE: Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kentucky, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, Wisconsin, and West Virginia.

TENNESSEE COUNTIES: Anderson, Blount, Campbell, Cannon, Carter, Clay, Coffee, Cumberland, Davidson, DeKalb, Fentress, Franklin, Grundy, Hancock, Hardin, Jackson, Knox, Loudon, Marion, Montgomery, Morgan, Obion, Putnam, Rhea, Roane, Scott, Shelby, Stewart, Sullivan, Sumner, Tipton, Van Buren, Warren, Wayne, and White.

DESCRIPTION: Erect, perennial herb with thick yellow rhizomes. Stems 1.5 to 5 dm tall. Solitary, greenish-white, epetalate flowers with numerous stamens.

FLOWERING DATE: April to May.

FRUITING DATE: June through July.

COMMENTS: *Hydrastis canadensis* is a valued medicinal herb on both national and international markets. Like ginseng, its rarity is primarily the result of herb collectors digging the plants. Other rare species that co-occur with *H. canadensis* on the ORR are *Spiranthes ovalis* and *Lilium canadense*.

THREATS ON ORR: Habitat destruction from project development, unauthorized digging to remove plants, and tree canopy removal.

E.3 *Panax quinquifolius* L.

COMMON NAME: Ginseng.

FAMILY: Araliaceae.

FEDERAL STATUS: 3C.

TENNESSEE STATUS: Threatened.

HABITAT: Rich woods (Radford et al. 1968).

HABITAT ON ORR: Rich, moist to dry woods.

RANGE: Alabama, Arkansas, Connecticut, Delaware, Georgia, Iowa, Illinois, Indiana, Kentucky, Louisiana, Massachusetts, Maine, Michigan, Minnesota, Missouri, Mississippi, North Carolina, Nebraska, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Virginia, Vermont, Wisconsin, and West Virginia.

TENNESSEE COUNTIES: Virtually all counties.

DESCRIPTION: Glabrous, perennial herb arising from tuberous roots. Stems erect, 1.5 to 6 dm tall. Petiolate, palmately compound leaves in a whorl at apex of the solitary stem.

FLOWERING DATE: May through June.

FRUITING DATE: August through October.

COMMENTS: Ginseng is prized in this country and abroad for its reputed medicinal properties and is highly sought by herb collectors. Its rarity in Tennessee is the result of commercial exploitation.

THREATS ON ORR: Habitat destruction from project development, unauthorized digging to remove plants, and tree canopy removal.

E.4 *Rhynchospora colorata (L.) Pfeiffer*

COMMON NAME: White-topped sedge.

FAMILY: Cyperaceae.

FEDERAL STATUS: None.

TENNESSEE STATUS: Pending.

HABITAT: Damp, often sandy soil (Gleason and Cronquist 1991).

HABITAT ON ORR: Limestone quarry, just above water line.

HABITAT NEAR ORR: Unknown.

RANGE: Virginia to Mexico and West Indies.

TENNESSEE COUNTIES: Roane.

DESCRIPTION: Tufted perennial herb with solitary terminal inflorescence atop triangular, 5-6 dm tall stem. The inflorescence is distinctive, surrounded by 4-6 bicolored bracts that are white at the bases and green at the tips. The bracts are unequal in length. The narrowly linear leaves are usually shorter than the stem.

FLOWERING DATE: May through September.

FRUITING DATE: July through October.

LOCATIONS ON ORR: Natural Area 46, Limestone Quarry.

LOCATIONS NEAR ORR: None known.

COMMENTS: Currently the only verified population existing in Tennessee.

THREATS ON ORR: Habitat destruction, digging up for transplanting.

E.5 REFERENCES

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White-topped sedge information from personal communication with Deborah J. Awl, JAYCOR, Oak Ridge, Tenn.

APPENDIX F

COMPLIANCE WITH REGULATIONS FOR THREATENED AND/OR ENDANGERED SPECIES

APPENDIX F

COMPLIANCE WITH REGULATIONS FOR THREATENED AND/OR ENDANGERED SPECIES

This appendix summarizes (1) endangered species regulations as they apply to the management of the ORR by DOE, (2) recommendations of the U.S. Fish and Wildlife Service (FWS) and the state of Tennessee for endangered species activities on the ORR, and (3) compliance by DOE with these recommendations and regulations. In general, the regulations require DOE to ensure protection of animals and plants listed by FWS under Sect. 7 of the Endangered Species Act (ESA) and animals listed by the Tennessee Wildlife Resources Commission. State-listed plant species are not protected on DOE property.

F.1 COMPLIANCE WITH FEDERAL AND STATE REGULATIONS

Federal Regulations

Federal regulations that implement Sect. 7, *Interagency Cooperation*, of the ESA of 1973 (16 U.S.C. 1531 et seq.) require that DOE consider the impacts of its actions on plant and animal species listed by FWS as threatened or endangered, on species proposed to be listed as threatened or endangered, and on areas designated or proposed for designation as critical habitat. In addition, while none of the substantive or procedural provisions of the Act applies to a species that is designated as a candidate for listing (commonly known as a *candidate species*), the FWS recommends that federal agencies consider them during environmental planning (e.g., in the preparation of NEPA documents). If candidate species are eventually listed as endangered or threatened, it may be necessary for DOE to consult with FWS further to determine the impact of its actions.

Sect. 7 consultation for a "major construction activity" is initiated by DOE contacting the FWS and asking for information on listed or proposed threatened or endangered species or designated or proposed critical habitats in the area of DOE's proposed action. (A copy of such correspondence for the proposed Parcel ED-1 lease is provided at the end of this appendix.) "Major construction activity" is defined in 50 CFR 402.02 as "a construction project (or other undertaking having similar physical impacts) which is a major federal action significantly affecting the quality of the human environment as referred to in the National Environmental Policy Act." If a threatened or endangered species would be affected by a small DOE construction project, the project might have to be defined as "significantly" (40 CFR 1508.27) affecting the environment and as a major federal action requiring an environmental impact statement (EIS) in accordance with 40 CFR 1502.3.

For proposed actions other than major construction, DOE determines whether listed or proposed species are present. If DOE finds that no listed or proposed endangered or threatened species or any designated or proposed critical habitats are present in the area of a proposed

action or that, if present, they will not be affected, and if FWS agrees with that determination, then no further action is required to comply with Sect. 7.

If DOE determines that any listed species or designated critical habitats may be affected, then formal or informal consultation needs to be initiated. The purpose of informal consultation is to determine if formal consultation or a conference is required (see 50 CFR 402.13 for details). During informal consultation, DOE and FWS would discuss the effects of the proposed project on listed species and/or critical habitats and possible alternatives that might preclude the need for formal consultation. Although informal consultation is optional, it is highly recommended by FWS as a way to resolve any potential endangered species problems.

If DOE determines that any *proposed* species or critical habitats may be affected, then a conference must be initiated to resolve potential conflicts by informal discussions. The conclusions of these discussions should be recorded in an appropriate document by DOE. If the proposal to list the species or designate the habitat is eventually finalized, DOE may be required to initiate formal consultation. The record of the conference results would then be used as the basis of information for the formal consultation.

If FWS advises DOE that listed or proposed threatened and/or endangered species or designated or proposed critical habitats may be present in the area of proposed actions which are "major construction activities" and DOE determines that they may be affected, then a biological assessment must be prepared. For DOE actions which are not "major construction activities" and for which an EIS is not being prepared, DOE must still comply with Sect. 7 of the ESA, but a biological assessment is not required. However, for such projects, a biological assessment may be voluntarily prepared to assist DOE in its consultation or conference with FWS. In practice, a biological assessment is normally prepared when a DOE proposed action may affect a threatened and/or endangered species or critical habitat.

If a biological assessment determines that a listed species or designated critical habitat may be affected, or if DOE determines that a proposed minor construction project may affect a listed species, DOE must request formal consultation with FWS. If a biological assessment determines that a species proposed for listing or a habitat proposed for designation as critical may be affected, DOE must confer with the FWS. If DOE determines that no impact would occur and FWS concurs, no further consultation is required.

If a proposed action requiring the preparation of a biological assessment is identical or very similar to a previous action for which a biological assessment has already been prepared, the biological assessment requirement may be fulfilled for the proposed action by incorporating by reference the earlier biological assessment, plus any pertinent supporting data from other documents. A written document should be prepared that certifies that the proposed action involves similar impacts to the same species in the same geographic area, that no new species have been listed or proposed or new critical habitat designated or proposed for the action area, and that the biological assessment has been supplemented with any relevant changes in information. This information should be included in the EA or EIS prepared on the proposed action.

During any consultation, FWS may recommend discretionary studies or surveys that may provide a better information base for assessing impacts on listed species [50 CFR 402.12(d)(2)]. Such studies are optional and not required.

Tennessee Regulations

Tennessee Code Annotated Title 70, Chap. 8, and regulations of the Tennessee Wildlife Resources Commission protect animal species listed by the state as endangered, threatened, or "in need of management." No person or agency may knowingly destroy a listed species or its habitat without a permit from the state.

Plant species listed by the Tennessee Department of Conservation (TDEC) are provided limited protection by the Tennessee Rare Plant Protection and Conservation Act of 1985 (Tennessee Code Annotated Title 11-26, Sects. 201-214). The Act protects listed plants from indiscriminate collecting by plant collectors but does not prohibit landowners such as DOE from destroying listed plants on their own property. Thus, apart from federal requirements, DOE is not required to perform surveys for state-listed plants or to ensure that its proposed actions do not impact listed plants. Nevertheless, DOE attempts to protect all state-listed plant species occurring on the ORR.

The Tennessee Wildlife Resources Agency and TDEC have been requested to provide written descriptions of any surveys and documentation that DOE must perform or prepare to comply with state law.

F.2 DOE ACTIONS CONCERNING COMPLIANCE WITH STATE AND FEDERAL REGULATIONS

Personnel. The DOE Resource Management Organization for the ORR includes two persons designated to coordinate issues concerning threatened and/or endangered (T&E) species—one person for plant species and one for animal species. They serve as coordinators for consultation with state and federal agencies and for surveys for listed plants and animals on the ORR. Activities of the DOE National Environmental Research Park on the ORR also support studies of listed species that are known to occur on the ORR. During 1994 and 1995, field surveys for T&E species are being conducted throughout the ORR as part of the environmental restoration project. No staff positions are designated and funded specifically for surveys or studies of listed species; therefore, such surveys and studies are limited.

Planning and documentation. As part of the planning process for construction projects, DOE prepares literature reviews and conducts surveys to determine whether any listed plant or animal species would be affected. The two endangered species coordinators of the Resource Management Organization have reviewed literature and other information on the status of listed plants and animals on the ORR (Kroodsma 1987; Parr 1984; Cunningham et al. 1993; Pounds et al. 1993; King et al. 1994). Field surveys are conducted as necessary, and documentation is provided in categorical exclusions, EAs, and EISs.

Surveys. There is no evidence that any federally listed plant species occurs on the ORR (Table F-1). Nevertheless, DOE conducts plant surveys for all state-listed, FWS-listed, and FWS candidate plants at all sites with natural habitats that would be affected by construction or operation of a proposed project. Many state-listed and FWS candidate plant species occur on the ORR and are sometimes found on proposed construction sites.

There is evidence that one federally listed animal species occurs on the ORR (Table F-1). A dead gray bat was found in a facility light fixture about 4 km (2.5 miles) from Melton Valley. The Indiana bat is another federally listed animal species for which there was sufficient evidence to indicate potential presence on the ORR. A partial field survey (limited mist netting) was conducted in May 1992 at several sites in the floodplain of East Fork Poplar Creek in habitat that was suitable for this species, but no Indiana bats were trapped during this partial survey (J. W. Webb, ORNL, personal communication to M. S. Salk, ORNL, July 31, 1995).

F.3 REFERENCES

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Table F-1. Status of rare species reported from the Oak Ridge Reservation[a]

Species name	Common name	Legal Status[b] Federal	State
	Plants		
Aureolaria patula	spreading false foxglove	C2	E
Cimicifuga rubifolia	Appalachian bugbane	C2	T
Delphinium exaltatum	tall larkspur	C2	E
Juglans cinerea	butternut	C2	
Cypripedium acaule	pink lady-slipper		E
Liparis loeselii	fen orchid		E
Diervilla lonicera	northern bush-honeysuckle		T
Fothergilla major	mountain witch-alder		T
Hydrastis canadensis	goldenseal		T
Lilium canadense	Canada lily		T
Panax quiinquifolius	ginseng		T
Platanthera flava *var* hebiola	tuberculed rein-orchid		T
Platanthera peramoena	purple frindeless orchid		T
Elodea nuttallii	Nuttall's waterweed		S
Saxifraga careyana	Carey's saxifrage		S
Spiranthes ovalis	lesser lady's tresses		S
Carex gravida	heavy sedge		S
Draba ramosissima	branching whitlow grass		S
Juncus brachycephalus	small-headed sedge		S
Scirpus fluviatalis	river bulrush		S
Carex oxylepis var pubescens	Hairy sharp-scaled sedge		S
Rhynchospora colorata	White-topped sedge		S
Ruellia purshiana	Pursh's wild-petunia		S
Spiranthes lucida	Shining ladies'-tresses		T
	Fish		
Polydon spathula	paddlefish	C2	
Phoxinus tennesseensis	Tennessee dace		NM
	Amphibians and Reptiles		
Aneides aeneus	green salamander	C2	
Cryptobranchus alleganiensis	hellbender	C2	NM

Table F-1. (continued)

Species	Common name	Legal Status[b] Federal	State
	Birds		
Haliaeetus leucocephalus[c]	bald eagle	T	T
Falco peregrinus[c]	peregrine falcon	T	E
Aimophila aestivalis[d]	Bachman's sparrow	C2	E
Ammodramus henslowii[c]	Henslow's sparrow	C2	
Chlindonias niger[c]	black tern	C2	
Dendroica cerulea[d]	cerulean warbler	C2	
Thyromanes bewickii	Bewick's wren	C2	T
Pandion haliaetus	osprey		T
Ammodramus savannarum[d]	grasshopper sparrow		NM
Accipiter striatus[d]	sharp-shinned hawk		NM
Accipiter cooperii[d]	Cooper's hawk		NM
Circus cvaneus[c]	northern harrier		NM
Anhinga anhinga[c]	anhinga		NM
Casmerodius alba[c]	great egret		NM
Contopus borealis[c]	olive-sided flycatcher		NM
Grus canadensis[c]	sandhill crane		NM
Phalacrocorax auritus[c]	double-crested cormorant		NM
Sphyrapicus varius[c]	yellow-bellied sapsucker		NM
Tyto alba	common barn owl		NM
Egretta caerulea[d]	little blue heron		NM
	Mammals		
Myotis grisescens	gray bat	E	E
Sorex longirostris	Southeastern shrew		NM

[a]From Parr and Evans (1992), Cunningham et al. (1993), Kroodsma (1987), Pounds et al. (1993), King et al. (1994), and ongoing environmental restoration field surveys.

[b]E = endangered, T = threatened, C1, C2 = candidate, NM = in need of management, S = special concern in Tennessee.

[c]Uncommon visitor or migrant. Nor currently known to nest on the Oak Ridge Reservation.

[d]Summer.

Department of Energy

Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831—8739
July 24, 1995

Mr. James C. Widlak
Fish and Wildlife Service
United States Department of Interior
446 Neal Street
Cookeville, Tennessee 38501

Dear Mr. Widlak:

INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE PROPOSED LEASE OF OAK RIDGE RESERVATION LAND

In June 1995, the Secretary of Energy announced that the Department of Energy (DOE) proposes to lease approximately 1000 acres (Parcel ED-1) of the Oak Ridge Reservation (ORR) to the East Tennessee Economic Council (ETEC). Parcel ED-1 is expected to be developed for the following industrial uses: advanced materials (e.g., ceramics), instrumentation and controls, auto parts, and electronics manufacturing; offices and administrative support services; and computer services. Additional development may include child-care centers and public areas. The parcel, shown on the attached map, is bounded on the west by the K-25 Site, south by Oak Ridge Turnpike, and east and north by undeveloped ORR land. Lower East Fork Poplar Creek (EFPC) traverses the site.

Surveys for listed species have been undertaken in the recent past for the Pine Bark Beetle control project and the Remedial Investigation/Feasibility Study for EFPC. Oak Ridge National Laboratory ecologists noted that the EFPC floodplain provides suitable foraging/breeding habitat for the Indiana bat and may provide foraging habitat for the gray bat and Rafinesque's big-eared bat. In 1991, surveys of Indiana and gray bats were completed in this area by M. J. Harvey, Tennessee Technological University. Dr. Warren Webb, Lockheed Martin Energy Systems (LMES) Coordinator for Wildlife Management Activities, has expressed concern to DOE about the adequacy of this information, citing problems with suboptimal weather conditions during the surveys. LMES ecologists are presently surveying Parcel ED-1 for listed species to update previously collected data.

This letter is intended to serve as informal consultation under Section 7 of the Endangered Species Act. In this regard, DOE requests an updated list of protected species and habitat on Parcel ED-1 and solicits your recommendations and comments about the potential effects of this proposed action. Your input will be used in the preparation of an environmental assessment of the proposed action, which is currently in preparation. Because of time constraints, a prompt reply would be appreciated.

If you need further information on this request, please do not hesitate to call me at (615) 576-0938.

Sincerely,

James L. Elmore, Ph.D.
Environmental Protection Division

Enclosure

cc w/o enclosure:
H. Braunstein, 130 MIT, MS 6282
A. Campbell, SE-311
P. Phillips, SE-311
K. Kates, AD-42
T. Slack, CC-10

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

August 15, 1995

Dr. James L. Elmore
Environmental Protection Division
Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831-8739

Re: FWS #95-2241

Dear Dr. Elmore:

Thank you for your letter and enclosure of July 24, 1995, regarding a proposal by the Department of Energy to lease 1,000 acres of land (Parcel ED-1) on the Oak Ridge Reservation in Roane County, Tennessee, to the East Tennessee Economic Council (ETEC). The Fish and Wildlife Service (Service) has reviewed the information submitted and offers the following comments.

The land proposed for lease is bounded by the K-25 site on the west, Oak Ridge Turnpike on the south, and undeveloped Oak Ridge Reservation land on the east and north. The lower reach of the East Fork of Poplar Creek flows through the parcel. If leased to the ETEC, it is expected that Parcel ED-1 will be developed for industrial uses including such activities as advanced materials, instrumentation and controls, auto parts, electronics manufacturing, offices, administrative support services, and computer services. Ancillary development such as child care services and public areas may also occur.

The endangered gray bat feeds almost exclusively over streams, feeding primarily on emerging aquatic insects. Although its summer caves are generally close to the streams where they forage, gray bats are known to fly some distance from their caves to foraging areas. Depending on the condition of the macroinvertebrate fauna in the stream, therefore, and provided that caves supporting gray bat summer colonies exist within 4 miles of Parcel ED-1, the East Fork of Poplar Creek may or may not be used by the species as foraging habitat. Little is known about the feeding behavior of the candidate Rafinesque's big-eared bat. It may feed over the stream, but it may also utilize the middle or upper forest canopy. If the area contains mature riparian and upland forest, maternity colonies of the endangered Indiana bat may also be present. Indiana bats may forage in the project area if mature forest habitat exists as far as one and one-half miles away from the stream.

If the area is used as bat foraging and/or breeding habitat, development on Parcel ED-1 that results in further degradation of water quality in the East Fork of Poplar Creek or loss of mature riparian or upland forest could have adverse effects on one or more of the bat species. We recommend that you assess impacts to these species and determine if the proposed development may affect them. A copy of your determination, and any supporting data, should be submitted to this office for review and concurrence. The environmental assessment should also contain measures that will be implemented to avoid or minimize adverse impacts to the species and their habitats.

In addition to the bats, our records indicate that the following federally listed and status review (candidate) species may occur on or within the vicinity of Parcel ED-1:

Virginia spiraea - Spiraea virginiana (T)
Bachman's sparrow - Aimophila aestivalis (SR)
Appalachian bugbane - Cimicifuga rubifolia (SR)
False foxglove - Aureolaria patula (SR)
Barbara's buttons - Marshallia grandiflora (SR)
Tall larkspur - Delphinium exaltatum (SR)
White walnut - Juglans cinerea (SR)

You should assess impacts to the Virginia spiraea and determine if development may affect it. The status review (SR) species are not presently listed or proposed, and the consultation requirements of Section 7 of the Endangered Species Act do not yet apply to them. They are, however, being considered for listing in the future and we would appreciate anything you might do to avoid impacting them.

Thank you for the opportunity to comment on this action. If you have any questions, please contact Jim Widlak of my staff at 615/528-6481.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

JLE

Department of Energy

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

September 6, 1995

Dr. Lee A. Barclay, Ph.D.
Field Supervisor
Fish and Wildlife Service
446 Neal Street
Cookeville, Tennessee 38501

Dear Dr. Barclay:

FWS #95-2241 - ADDITIONAL INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE PROPOSED LEASE OF OAK RIDGE RESERVATION LAND

Thank you for your prompt reply to my letter (July 24, 1995) concerning the proposed lease of approximately 1000 acres of the Oak Ridge Reservation to the East Tennessee Economic Council. As you requested, the Department of Energy (DOE) has prepared a Biological Assessment (BA) of all federally listed species, including candidate species, identified in your August 15, 1995, letter.

The enclosed BA is submitted for your review and concurrence. Based on the BA, DOE has determined that the proposed lease and subsequent development of Parcel ED-1 would not adversely impact federally listed species and critical habitat, assuming that mitigation is implemented as prescribed in the BA. DOE will ensure that these species are protected by either (1) avoidance of potential habitat or (2) preconstruction surveys of potential habitat in consultation with the U.S. Fish and Wildlife Service. Results of the BA will be summarized in the text of the environmental assessment (EA) being prepared for the proposed lease, and the BA will be appended to the EA. Mitigation will be described in the decision document prepared upon completion of the NEPA process.

Following your review of the BA, please check the appropriate concurrence block and sign below. We ask that you fax your concurrence to us at (423) 576-0746 as soon as possible, so that we may expeditiously complete the EA. If you need further information or wish to discuss the BA, please call me at (423) 576-0938.

Thank you in advance for your prompt reply.

Sincerely,

James L. Elmore, Ph.D.
Environmental Protection Division

☑ This Biological Assessment supports the conclusion that the proposed lease of Parcel ED-1 would not adversely impact federally listed protected species and/or habitat. With this BA, DOE has satisfied consultation requirements of Section 7 of the Endangered Species Act.

☐ This Biological Assessment does not support the conclusion that the proposed lease of Parcel ED-1 would not adversely impact federally listed protected species and/or habitat. DOE has not satisfied consultation requirements of Section 7 of the Endangered Species Act.

Signature LEE A. BARCLAY 10/04/95
U. S. Fish & Wildlife Service Date
U. S. Department Of The Interior

cc w/o enclosure:
H. Braunstein, 130 MIT, MS 6282
A. Campbell, SE-311
P. Phillips, SE-311
K. Kates, AD-42
T. Slack, CC-10
P. Parr, ORNL, MS 6034

Department of Energy

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

December 14, 1995

Mr. Reginald G. Reeves, Director
Division of Natural Heritage
State of Tennessee
Department of Environment and Conservation
401 Church Street
Nashville, Tennessee 37243-0443

Dear Mr. Reeves:

REQUEST FOR INPUT ON DRAFT MITIGATION PLAN FOR LEASING PARCEL ED-1 OF THE OAK RIDGE RESERVATION

Thank you for your comments on our draft Environmental Assessment (EA), Lease of Parcel ED-1 of the Oak Ridge Reservation by the East Tennessee Economic Council. We are now preparing the final EA and plan to issue a Mitigated Finding of No Significant Impact (FONSI). In support of the FONSI, we have drafted the enclosed Mitigation Action Plan (MAP), which describes activities that will be undertaken to reduce the impacts to ecological resources on Parcel ED-1. The measures identified in the MAP focus on protecting valuable wildlife habitat and plant communities, maintaining connections with surrounding natural habitats to reduce the effects of fragmentation, monitoring natural communities and populations on the site to assess natural succession and the potential impacts of site development, and lessening the probability of and mitigating the environmental effects of development. With this letter, we are requesting that your office review the MAP and evaluate its effectiveness in protecting state-listed species.

As a further reference, I have enclosed a copy of a Biological Assessment for this action which was prepared by DOE at the request of the U.S. Fish and Wildlife Service (USFWS). This document describes the potential impacts on federally-listed and candidate species from development and identifies proposed mitigation. Please note that the USFWS agreed with our conclusion that the proposed lease of this land would not adversely impact federally-listed species and/or habitat (see enclosed copy of letter) if mitigation is implemented as described in the EA.

We anticipate completing the EA and issuing a FONSI in January 1996. Therefore, we would appreciate your comments by December 29, 1995. Signature and concurrence lines are included at the conclusion of this letter. We would appreciate your returning these to us by fax as soon as you have completed your review. Our fax number is 423-576-0746.

Thank you in advance for your assistance in this endeavor. If you need further information on this request, please do not hesitate to call me at (423) 576-0938.

Sincerely,

James L. Elmore, Ph.D.
Environmental Protection Division

Enclosures

cc w/o enclosures:
H. Braunstein, ORNL, 4500N
A. Campbell, SE-311
P. Phillips, SE-311
K. Kates, AD-42
T. Slack, CC-10
P. Parr, ORNL, MS 6034

☐ Measures described in this Mitigation Action Plan will protect state-listed species during the lease and development of Parcel ED-1.

☐ Measures described in this Mitigation Action Plan would not be adequate to prevent significant adverse impacts to state-listed species during the lease and development of Parcel ED-1.

Signature Date

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
401 Church Street
Nashville, Tennessee 37243

February 1, 1996

Mr. James L. Elmore, Ph. D.
Environmental Protection Division
Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge TN 37831

Subject: Project review information for endangered species and critical or sensitive habitat; Comments on Mitigation Action Plan, Lease of Parcel ED-1-Oak Ridge

Dear Mr. Elmore:

Please be advised that our Division has reviewed the subject document. We appreciate the opportunity to comment on the document. We offer the following general comments concerning the potential for impact to rare, threatened, or endangered species and critical or sensitive habitat.

- The results of your review and the information within the Mitigation Plan do not indicate that a comprehensive biological survey has been completed. We would suggest that a survey of any of the proposed project sites be conducted prior to project implementation.

- In order to comply with the National Environmental Policy Act consideration should be given to the comprehensive and *cumulative* impacts associated with the project actions. Based upon the information provided, it is probable that any proposed stream crossing will impact instream, aquatic habitat and riparian habitat as part of the project implementation. In addition, the Mitigation Plan does not address the loss of public lands nor the loss of habitat. As an example, will additional lands be purchased or set aside to replace the proposed industrial sites?

- Although the Plan addresses the potential for impact to several species, there is no description of species-specific protection strategies. The Plan does not address the loss of parcels that may be adjacent to or integrated with more sensitive habitat.

DIVISION OF NATURAL HERITAGE 401 Church Street 8th Floor L&C Tower Nashville TN 37243-0443 Telephone 615/532-0431

- Should restoration of construction sites be included as an alternative, we would suggest that restoration activities include the use of native plant species. Restoration should be accomplished by using native plant species consistent with local community types.

- The Plan briefly addresses construction impacts and staged construction methodology. We believe that sediment and erosion control are critical to habitat protection. Techniques for sediment retention and streamside reconstruction are outlined in the following documents prepared by our Department:

    1. Tennessee Erosion Control Handbook, July 1992.

    2. Reducing Nonpoint Source Water Pollution by Preventing Soil Erosion and Controlling Sediment on Construction Sites, March 1992.

    3. Riparian Restoration and Streamside Erosion Control Handbook, November 1994.

Please refer to these documents when planning measures to lessen any project or construction impacts. We have included copies for your review.

We would like to reiterate that we support the process and findings of the *Oak Ridge Reservation, Biodiversity, and the Common Ground Process, Final Report.* We have ongoing concerns related to the loss of public lands and habitat for industrial use, especially when there are no plans for replacement of these tracts.

We appreciate the opportunity to assist you with your pre-project planning. If we can be of further assistance with your project please contact our office in Nashville, telephone 615/532-0431.

Respectfully,

Andrew N. Barrass, Ph. D.
Environmental Review Coordinator
Division of Natural Heritage

cc:
Reginald G. Reeves, Director, DNH-TDEC

Endangered Species Act

BIOLOGICAL ASSESSMENT

Proposed 1,000 Acre Lease
Parcel ED-1, Oak Ridge Reservation

September 1995

U. S. Department of Energy
Oak Ridge Operations Office
Oak Ridge, TN

BIOLOGICAL ASSESSMENT FOR THREATENED AND ENDANGERED SPECIES UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE PROPOSED 1,000 ACRE LEASE ON THE ORR

SUMMARY

This biological assessment (BA) assesses potential impacts on federally listed and candidate plant and animal species that could result from the lease of Parcel ED-1 on the Oak Ridge Reservation (ORR) by the Department of Energy (DOE) to the East Tennessee Economic Council (ETEC). Listed species considered include the endangered gray and Indiana bats and the threatened Virginia spiraea. Status review (i.e., candidate) species considered include Rafinesque's big-eared bat, Bachman's sparrow, Appalachian bugbane, false foxglove, Barbara's buttons, tall larkspur, and white walnut. No proposed or designated critical habitats occur on the proposed lease site.

DOE staff concludes, for the reasons described in the main text of this BA, that the proposed 1,000 acre lease is not likely to adversely affect any listed species if all required mitigation is implemented. Mitigation would include (1) protection of potential habitat and/or (2) surveys to approved FWS protocol that demonstrate the species are not likely to be present. Also, since no proposed or designated critical habitat is present on the site, the proposed project would have no effect on critical habitat for any species. Although candidate species are not provided specific protection under the ESA, DOE has considered them in its environmental planning. DOE requests the concurrence of the U.S. Fish and Wildlife Service (FWS) in these conclusions.

INTRODUCTION AND PROJECT DESCRIPTION

The Oak Ridge Operations (ORO) office of DOE is evaluating the potential environmental impacts of the proposed lease of approximately 1,000 acres (405 hectares) of

land on the ORR to ETEC. A draft Environmental Assessment (EA) was issued for public comment on August 17, 1995, and a public workshop was held on August 24, 1995. As the EA was being written, the terms of the proposed lease were being negotiated by DOE and ETEC. According to the draft EA, the lease is scheduled to be signed in mid-September 1995 for an initial ten-year period. Renewal of the lease for additional periods will be negotiated by DOE and ETEC.

The land proposed for lease is bounded by the K-25 site on the west, the Oak Ridge Turnpike on the south, and undeveloped ORR land on the east and north (Fig. 1). The lower reach of the East Fork of Poplar Creek (EFPC) flows through the parcel as do several smaller streams.

The proposed lease site would be developed by ETEC as an industrial park. Specific industries to be located at the proposed lease site will not be known until the lease is signed, infrastructure is developed, and ETEC negotiates subleases. However, industrial use of the proposed lease site must conform to the City of Oak Ridge Zoning Ordinance. Typical industries that may locate in the industrial park include, but are not limited to, manufacturers of ceramics, auto parts, computers, and electronic components; copying services; commercial offices; and waste management facilities. Ancillary development such as child care services and public areas may also occur. Certain uses permitted by the Oak Ridge Zoning Ordinance would not be allowed on the proposed lease site including an airport, wholesaling facilities, bulk oil and similar storage facilities, and utility uses.

Since ETEC has no firm plans for subleases to specific businesses, manufacturers, or industries, details on the exact acreage and location of land disturbance during construction; the precise location of utilities, roads, and bridges; and the nature and quantities of atmospheric emissions, effluent discharges, and wastes from industrial facilities are unknown. Thus, the impacts analysis in the EA was based on a number of assumptions. The following assumptions from the draft EA were also used for the BA:

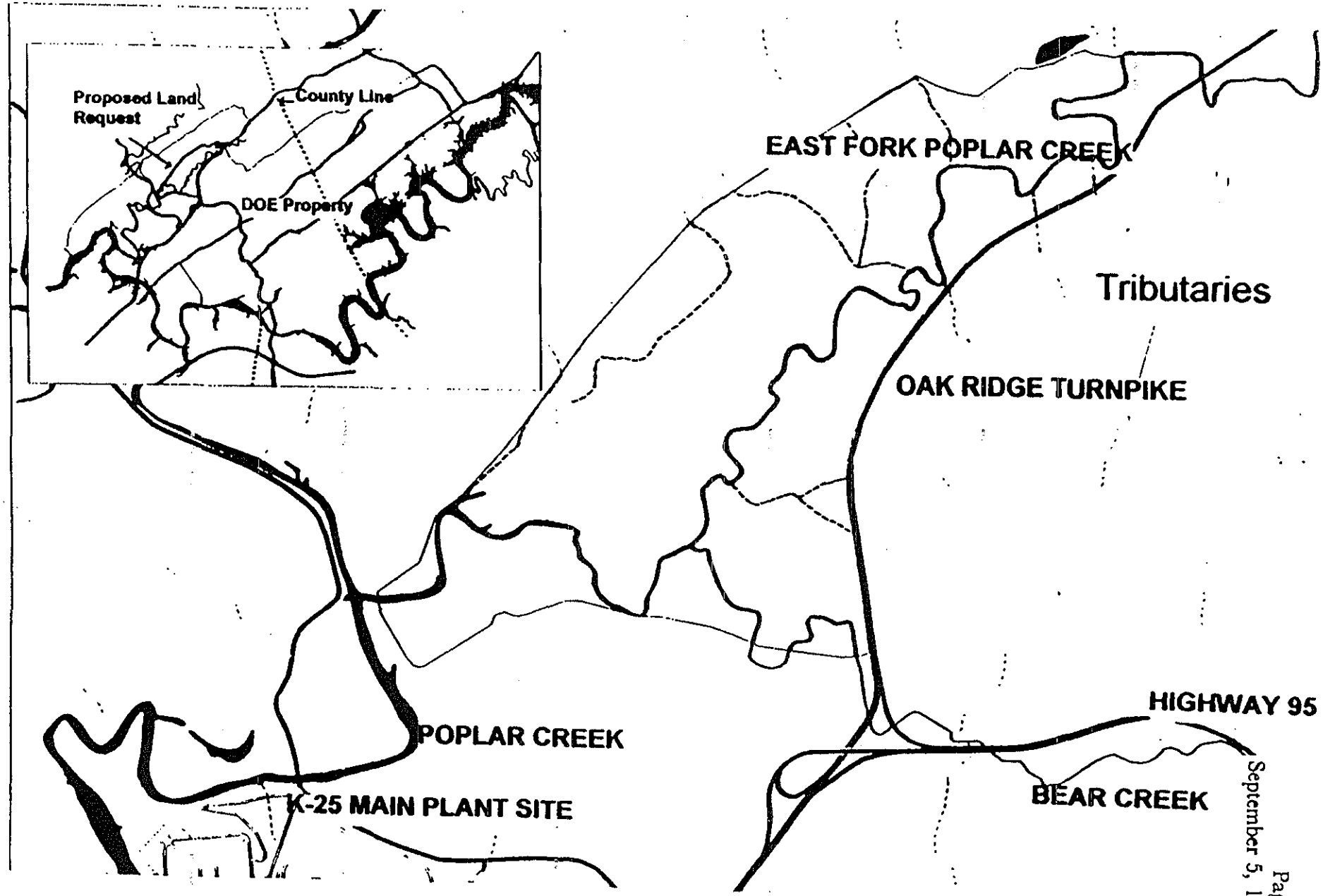

Figure 1. Parcel ED-1 of the Oak Ridge Reservation

- earth movement would occur incrementally and would not disturb the entire parcel at one time;
- buffer zones would be designated to protect sensitive ecological resources, such as floodplains, wetlands, streams, and unique vegetation/communities;
- floodplains and wetlands would be delineated prior to construction and avoided (i.e., they would be left in their natural state and no development would be allowed in them); and
- threatened and endangered species would not be disturbed.

ECOLOGY OF THE PROPOSED LEASE SITE

The proposed lease site contains a number of different land types and formations that provide the underlying structure for the development of biological habitats and communities. Some of these landscape elements are quite limited in their natural state in the Ridge and Valley physiographic province where the ORR is located.

Several streams flow through the proposed lease site. The largest one is the EFPC, a moderately wide, fourth-order stream, bordered by a riparian zone of mixed hardwoods and old pine plantations. The main tributary to the EFPC on the site is Bear Creek (BC), a narrower, third-order stream. Within the parcel BC is bordered by hardwoods, cleared pine plantations, and an access road. Seven other tributaries to EFPC and a sinkhole stream are also present. Several streams on the parcel have been recognized as ecologically significant by Oak Ridge National Laboratory (ORNL) and conservancy organizations. This recognition is based on presence of rare or unusual species, the importance of activities conducted within the stream, or the uniqueness of community assemblages.

Less than half of the proposed lease site consists of cut-over pine plantations. The parcel also contains both natural and planted plant communities. Some of the natural vegetation types are common in the region, while others are rare. The most widespread natural vegetation type on the proposed lease site is bottomland hardwood forest associated

with EFPC and its tributaries. This habitat is rare on the ORR and in the region. The second most common vegetation type is planted pine plantations and other areas that have pines as the dominant species. The main vegetation types on the upland portions of the proposed site, outside the pine plantations, are oak-hickory forest and mixed pine-hardwood forest, which are common regionally. The proposed lease site also includes several other rare communities.

ECOLOGICAL DESCRIPTION AND POTENTIAL IMPACTS OF THE PROPOSED LEASE ON LISTED SPECIES

Federally listed species that may occur on the proposed lease site include the endangered gray and Indiana bats and the threatened Virginia spiraea. The general ecology of these species and the expected impacts from the project on them are summarized below.

Gray Bat (*Myotis griescens*)[1]

The endangered gray bat is concentrated in cave regions of Arkansas, Missouri, Kentucky, Tennessee, and Alabama. Although the population is over 1.5 million and improving, about 95 percent hibernate in only eight known caves, two of which are located in Tennessee. During the summer gray bats are usually found in caves, though frequently different caves than those used for hibernacula. Females form maternity colonies of at least several hundred individuals, while males and non-reproductive females form smaller summer bachelor colonies. Summer caves, especially for maternity colonies, are rarely more than two miles and usually less than one mile from the rivers and lakes used as foraging areas. However, caves within four miles of potential foraging areas should be considered (Barclay to Elmore letter, August 15, 1995). During the spring and autumn transient periods the bats occupy a wider variety of caves. During all seasons males and yearling females seem less restricted to specific caves and roost types. In general, bats enter hibernation in September

[1] Unless otherwise referenced, the bat species descriptions are taken from Harvey 1992.

through October and emerge in late March and April; timing depends on age and gender. Young are born in late May or early June. Bats forage over water, mostly along rivers, large creeks, and lakes, primarily within 15 feet above the surface. Gray bat populations are on the upswing as a result of improved breeding success due to better protection measures, such as cave gates and fences and informational signs near caves.

In November 1994 a single dead gray bat was found in a building at the Y-12 plant on the ORR, several miles upstream of the proposed lease area. In August 1995 a live bat thought to be a gray bat was found in a building at Y-12, but it was released before a positive identification could be made (J. W. Webb, LMES Wildlife Coordinator, personal communication with M. S. Salk, ORNL, August 29, 1995).

Mist netting was conducted on the lower portion of EFPC within the proposed lease area in May 1992 (J. W. Webb, LMES Wildlife Coordinator, personal communication with M. S. Salk, ORNL, August 29, 1995). Nets were set at two locations within the proposed lease area and operated for several nights. Unfortunately, cool temperatures (ca. 50 F) on all trap nights made trap success extremely low and inconclusive. No gray bats were trapped. Several caves on the ORR have been inspected for sensitive animal species, but none harbored endangered bats (J. W. Webb, LMES Wildlife Coordinator, personal communication with M. S. Salk, ORNL, August 29, 1995). However, not all caves that may be within four miles of the site have been identified, and those that are known have not been inspected for sensitive animal species.

The section of EFPC that runs through the proposed lease area may provide suitable foraging habitat for any gray bats inhabiting caves in the area. As stated in the draft EA for the proposed lease, the creek and adjacent floodplain will be protected from development by a provision in any lease which is issued. In the absence of specific and thorough surveys, the floodplain of Bear Creek would also be off-limits to development. These provisions should be adequate to allow foraging by gray bats, if any, to continue. Thus, we expect that the proposed action is unlikely to adversely affect the gray bat.

Indiana Bat (*Myotis sodalis*)

The endangered Indiana bat is distributed in the eastern U.S. from Oklahoma, Iowa, and Wisconsin east to Vermont and south to northwestern Florida. The estimated population is less than 400,000, 85 percent of which hibernate in only seven known mine and cave locations in Missouri, Indiana, and Kentucky. In the summer females form maternity colonies under loose bark of large hardwood trees in both riparian and upland forests throughout the range, though riparian areas appear to be favored. Males apparently roost nearby, though exactly where is not known. Young are born in June; animals depart for hibernation sites in September.

The riparian zones of EFPC and Bear Creek in the vicinity of the proposed lease provide much ideal summer roosting, foraging, and rearing habitat for Indiana bats. No Indiana bats were trapped in the mist netting conducted on EFPC in 1992 (see description under gray bat), but temperatures were suboptimal. Thus, it remains possible that Indiana bats roost and forage in the riparian zone of the lease area during the summer months and that they could also occur in mature upland hardwoods on and near the site.

As stated in the draft EA for the proposed lease, the creek and adjacent floodplain will be protected from development by a provision in any lease which is issued. This provision would protect much, but not all, potential habitat for Indiana bat on the site. Full protection would be achieved by not allowing development in any mature hardwood forests, either bottomland or upland. Hence, in the absence of specific and thorough surveys for Indiana bats, the floodplain of Bear Creek would be off-limits to development; all mature hardwood forest contiguous with the floodplain would be protected from development; and any clearing of upland hardwood forests would be conducted outside the breeding season (between October and April). Any bat surveys would be undertaken in consultation with FWS. Since additional upland habitat is readily available in adjacent areas of the ORR, this scheduling restriction should insure that any bats returning in subsequent years to find their previous upland roosts gone would be able to locate alternative maternity sites nearby. With these

was surveyed for rare plants in July 1995 by JAYCOR staff; no Appalachian bugbane was found at that time (D. Awl, Jaycor, personal communication with M. S. Salk, ORNL, September 1, 1995). In addition, the habitat in this area was found to be only marginally suitable for the species.

False Foxglove (*Aureolaria patula*)

The false foxglove, a Category 2 candidate species for federal listing, is a rather coarse perennial that blooms from August to frost (Kral 1983). It is reported to be a root parasite on oaks. Its narrow range is from central Kentucky south to northern Georgia and Alabama (Cunningham et al. 1993). It has been reported from along the bluffs of the Tennessee and Clinch Rivers and their tributaries in the Valley and Ridge Province in eastern Tennessee (Kral 1983). It is usually found on steep limestone bluffs in the shade of rather open stands of mixed hardwoods and occasionally juniper trees. On the ORR it has been found in shade on calcareous bluffs and talus slopes along the Clinch River and several tributaries, often at the edge of a lake or large stream (Cunningham et al. 1993). Threats to the species on the ORR include habitat destruction from project development, reservoir water level fluctuations, recreational activity on river banks, and tree canopy removal.

False foxglove is known from seven sites on the ORR and two locations adjoining the ORR. Comprehensive surveys of potential habitat on the proposed 1,000 acre lease site have not located any populations of this species, although it is possible that it grows in places that have not been adequately surveyed (D. Awl, JAYCOR, personal communication with M. S. Salk, ORNL, September 1, 1995, and L. R. Pounds, JAYCOR, personal communication with M. S. Salk, ORNL, September 5, 1995).

Barbara's Buttons (*Marshallia grandiflora*)

Barbara's buttons is a Category 2 candidate species for federal listing. It is a perennial herb that flowers from June through August (Gleason and Cronquist 1963). Its

range is the Appalachian region from southwest Pennsylvania to North Carolina and Tennessee. It grows on cobble bars of highly scoured major streams in areas without forest canopy (Larry Pounds, JAYCOR, personal communication with Linda Mann, ORNL, September 1, 1995).

Barbara's buttons has not been found on the ORR (D. Awl, JAYCOR, personal communication with M. S. Salk, ORNL, September 1, 1995). All potential habitat for Barbara's buttons within Parcel ED-1 occurs within the 100-year floodplain of EFPC. This area was surveyed for rare plants during July 1995 by JAYCOR staff; no Barbara's buttons was found at that time. If direct impacts to EFPC or the 100-year floodplain (e.g., road crossings, dredging, fill, emplacement of rip-rap,shoreline stabilization) are planned in the future, the area should be re-surveyed for this species prior to impact.

Tall larkspur (*Delphinium exaltatum*)

The tall larkspur, a Category 2 candidate species for federal listing, is a perennial herb which blooms from August through September and sets fruits in September through October (Cunningham et al. 1993). It is found from Pennsylvania south to North Carolina and west to Ohio, Tennessee, and southern Missouri (Gleason and Cronquist 1963). The most extensive tall larkspur population in the world may occur on the ORR (Linda Mann, ORNL, personal communication with M. S. Salk, ORNL, August 28, 1995). It usually grows in rich, moist, loamy soils of open, calcareous, wooded ravines (Cunningham et al. 1993). On the ORR it is found in open, rocky, calcareous woods and barrens. On the ORR threats to tall larkspur include habitat destruction from project development and invasion of woody species leading to shade.

Tall larkspur has been reported from four locations on the ORR and two locations adjoining the ORR (Cunningham et al. 1993; L. E. Pounds, JAYCOR, personal communication with P. D. Parr, ORNL, September 1, 1995). Potential habitat for it on Parcel ED-1 occurs within the small limestone barrens at the northwest and southwest ends of the parcel. The

measures the proposed action is unlikely to adversely affect Indiana bats which might be present.

Virginia Spiraea (*Spiraea virginiana*)

Virginia spiraea is a shrubby plant that spreads clonally and forms dense clumps in rock crevices and around boulders (FWS 1992). Flowering occurs in June and July. The species has 24 known populations sites in six states: West Virginia, Virginia, Tennessee, North Carolina, Kentucky, and Georgia. Most of these sites have less than ten plant clumps; only three sites have more than 50 clumps (FWS 1990). In Tennessee, Virginia spiraea is known from the Nolichucky River in Unicol County, Abrams Creek and the Little River in Blount County, Cane Creek in Van Buren County, White Oak Creek in Scott County, Clifty Creek in Roane County, Daddy's Creek in Cumberland county, and Clear Fork in Morgan and Scott Counties. Historic populations are known to have been extirpated from Blount County.

Virginia spiraea is found in a narrowly defined habitat: rocky, flood-scoured riverbanks in gorges or canyons (FWS 1992). It grows on acidic, moist soil primarily in areas with sandstone bedrock. It grows best in full sun but can tolerate some shade. It depends on stream connectivity and continuity for establishing new clumps.

Virginia spiraea has been found in Roane County, but has not at this time been identified on the ORR. All potential habitat for the species within Parcel ED-1 occurs within the 100-year floodplain of EFPC. This area was surveyed for rare plants during July 1995 by JAYCOR staff; no *Spiraea virginiana* was found at that time (D. Awl, JAYCOR, personal communication with P. D. Parr, ORNL, August 24, 1995).

As stated in the draft EA for the proposed lease, the creek and adjacent floodplain will be protected from development by a provision in any lease which is issued. With such a buffer, threats to the species would be limited to activities such as stream crossings which could divide stream habitat. If bridge construction or other construction in the floodplain is

necessary, DOE would prepare a floodplain/wetlands assessment to comply with the Executive Orders (EOs) on floodplain/wetland management. If direct impacts to EFPC or the 100-year floodplain (e.g., road crossings, dredging, fill, placing rip-rap, shoreline stabilization) are planned in the future, the area would be re-surveyed for this species prior to impact. With these measures the proposed action is unlikely to adversely affect any Virginia spiraea which might be present.

ECOLOGICAL DESCRIPTION AND POTENTIAL IMPACTS OF THE PROPOSED LEASE ON CANDIDATE SPECIES

Federal status review (i.e., candidate) species that may occur on the proposed lease site include the Rafinesque's big-eared bat, Bachman's sparrow, Appalachian bugbane, false foxglove, Barbara's buttons, tall larkspur, and white walnut. The general ecology of these species and the expected impacts from the project on them are summarized below.

Raffinesque's Big-eared Bat (*Plecotus rafinesquii*)

Perhaps the least known of eastern U.S. bats, Raffinesque's big-eared bat is a Category 2 candidate species for federal listing. Little is known of this animal's numbers, population trend, occurrence, or habits, but it may be declining in all or part of its range. The species is found in the southeast from eastern Texas and Oklahoma to the east coast, north to Illinois, Indiana, Ohio, West Virginia, and Virginia. In the northern part of the range, including Tennessee, these bats hibernate in caves, mines, cisterns, wells, and similar habitats. Maternity colonies have been found frequently in abandoned buildings, sometimes in rather well-lit areas. Less frequently, maternity colonies occur in caves and mines. Males are generally solitary during the summer, roosting in buildings, hollow trees, or behind loose bark (Schmidly 1991).

Ongoing checks of old building structures on the ORR have yet to reveal any of these bats. However, not all structures have been checked, and others have not been visited for

several years. From what is known of this bat's foraging habits, EFPC is probably one of the areas on the ORR providing suitable foraging. There are also many trees in the riparian zones of EFPC and Bear Creek which provide potential summer roost sites. Protection of the creeks and their floodplains would be a positive factor in avoiding habitat loss for this species. Additional protection could be achieved by implementing the measures listed above for the endangered Indiana and gray bats.

Bachman's Sparrow (*Aimophila aestivalis*)

Bachman's sparrow, a federal candidate species, is a year-round resident in the south and a summer breeding bird in Tennessee and points north. Bachman's sparrow breeds very locally (i.e., in small, disjunct populations) from southern Missouri, northeast Illinois, central Indiana, central Ohio, and central Maryland south to southeast Texas, the Gulf coast, and central Florida. It winters chiefly in the south Atlantic and Gulf coastal states.

In Tennessee, the sparrow has declined in recent decades from a fairly common summer resident and breeding bird to perhaps the rarest breeding bird species in the state (Alsop 1979). It is reported as a summer resident (i.e., from late March through mid-August) in Anderson and Roane counties, but there are no nesting records (Eager and Hatcher 1980). Preferred habitat is dry open woods, either pines or oak scrub with grassy cover and some shrubs, but open pastures, thick grass with low trees, open grassy woodlands, abandoned apple orchards, hillside pasture with briar patches and small cedars, and old field of various sorts have all been described as preferred habitat (Eagar and Hatcher 1980). It does not appear that lack or loss of habitat is a major factor in this bird's mysterious decline. Factors that have been suggested include competition with nest parasites such as the brown cowbird and interspecific competition with other sparrows (Alsop 1979).

The proposed lease area includes habitat matching some of the descriptions given above as suitable for Bachman's sparrow, though none that is currently especially suitable (i.e., old weedy fields and very young pine plantations). However, no birds of this species

were detected in a breeding bird survey conducted along the northern edge of the proposed lease site in June 1995. The last known sighting of a Bachman's sparrow on the ORR was in May, 1982. Two singing territorial males were observed several times over a two-week period about 1 km (0.6 mile) northwest of the ORNL central facilities area, several miles from the proposed lease (Boyle et al 1982). Both males were in very young pine plantations with a dense growth of tall grasses. Although it appears unlikely that the species is present on the proposed lease, any protection of upland habitat imposed as a lease restriction for other reasons would be a positive contribution towards conservation of Bachman's sparrow.

Appalachian Bugbane (*Cimicifuga rubifolia*)

Appalachian bugbane is a tall rather slender perennial herb that is a Category 2 candidate species for federal listing. It flowers in July through October and forms fruits from September through October. It occurs sporadically in northeastern Alabama, Tennessee, and Virginia (Kral 1983). It is found in rich, well-drained, loamy soils on open, mixed-mesophytic, forested slopes. Typically these soils are formed over limestones or calcareous shales and are moist, rather than wet. These habitats are found in the ravine slopes of streams and rivers within the region. On the ORR Appalachian bugbane is found in wooded talus slopes along the Clinch River and Grassy Creek which is a tributary of the Clinch River (Cunningham et al. 1993). Clearcutting of the hardwood overstory followed by heavy erosion is the major hazard to the species as a whole (Kral 1983). On the ORR the major hazards to the species are habitat destruction from project development and tree canopy removal (Cunningham et al. 1993).

Appalachian bugbane has been found at four locations on the ORR and three locations adjoining the ORR. Potential habitat for this species occurs in the Ridge and Valley Calcareous Mixed Mesophytic Forest, approximately 19 acres (8 hectares) of which falls within Parcel ED-1. The 19-acre (8 hectare) tract occurs along the northwest boundary of the parcel and is continuous with a much larger Ridge and Valley Calcareous Mixed Mesophytic Forest tract that is greater than 100 acres (41 hectares) in size. The area within Parcel EH-1

ED-1

limestone barrens on Parcel ED-1 are small and floristically depauperate compared to other barrens communities on the ORR. They may be declining due to cessation of a required disturbance regime (such as fire). Most of the area of these small limestone barrens is included within National Environmental Research Park Natural Area 47. These areas were surveyed for rare plants during July 1995 by JAYCOR staff; no tall larkspur was found at that time (D. Awl, JAYCOR, personal communication with M. S. Salk, ORNL, September 1, 1995).

White Walnut (*Juglans cinerea*)

White walnut, also known as butternut, is a Category 2 candidate species for federal listing. Its range is from New Brunswick to Ontario, northern Michigan, and North Dakota, south to Virginia, Georgia, Arkansas, and Kansas (Gleason and Cronquist 1963). It is a deciduous tree that usually grows about 50 feet (15 meters) tall (Gupton and Swope 1987). Its habitat is moist soils of valleys and slopes and dry rocky soils in hardwood forests (Sutton and Sutton 1985). On the ORR it is found in rich woods on slopes near major streams (Cunningham et al. 1993). Butternut is threatened by butternut canker, a disease that kills trees (Keith Langdon, Great Smoky Mountains National Park, personal communication with Linda Mann, ORNL, April 5, 1995). On the ORR it is also threatened by habitat destruction (Cunningham et al. 1993).

Butternut has been found in two locations on the ORR, but no nut production has been observed at either site (Cunningham et al. 1993).. Potential locations for the species within Parcel ED-1 include the slopes near EFPC. These locations were surveyed during July 1995 by JAYCOR staff; no butternut was found at that time (D. Awl, JAYCOR, personal communication with M. S. Salk, ORNL, September 1, 1995).

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APPENDIX G

AQUATIC RESOURCES IN THE VICINITY OF PARCEL ED-1

APPENDIX G

AQUATIC RESOURCES IN THE VICINITY OF PARCEL ED-1

G.1 STREAMS

Within the boundaries of Parcel ED-1, there are two major streams, seven smaller tributaries to these streams, and a tributary to a sinkhole (Fig. G-1). The primary streams are East Fork Poplar Creek (EFPC) and Bear Creek (BC). The smaller streams are tributaries to EFPC and are designated as northern tributaries (NT1 to NT3), southern tributaries (ST1 to ST4), and tributary to a sinkhole (SHC) (Fig. G-2).

East Fork Poplar Creek. EFPC is a moderately wide (approximately 10 to 20 m), fourth-order stream in the area of Parcel ED-1. Within the parcel, EFPC is bordered by a riparian zone of mixed hardwoods and old pine plantations and has recently experienced little development or agricultural land use. Approximately 7 stream-km of EFPC are included in the parcel out of a total EFPC stream length of 26 km.

EFPC originates within the Y-12 Plant and has sustained considerable contamination in the 50 years that the plant has operated. Primary contaminants include mercury and PCBs. Upstream of the parcel, planned remedial actions will focus on removal of contaminated floodplain sediments, and efforts will continue at the Y-12 Plant to reduce contaminated and toxic effluents. An additional remedial action planned for late 1995-early 1996 is a flow augmentation of EFPC at the Y-12 Plant. This will double the base flow of EFPC from 3.5 mgd to 7.0 mgd. Past remedial actions have reduced the contaminant loading to EFPC, and aquatic communities downstream have recovered.

Bear Creek. Bear Creek is a tributary to EFPC that is a narrower (3 to 10 m), third-order stream. Within the parcel, BC is bordered by hardwoods, cleared pine plantations, and an access road. Approximately 1.8 stream-km of BC are included on the parcel out of a total BC stream length of 12.5 km. BC originates west of the Y-12 Plant and has received a variety of contaminant stressors, including heavy metals, PCBs, uranium, and organic compounds. Remedial actions at the headwaters of BC have focused on capping of disposal ponds or springs, although groundwater contamination remains a potential problem.

East Fork Tributaries and Smaller Creeks. The seven tributaries to EFPC and the sinkhole stream are all small, first- or second-order streams that are narrow (generally < 1 m in width) and shallow (< 0.5 m in depth). All seven streams enter EFPC within the parcel and some lie almost totally within the parcel (Table G-1). The three northern tributaries and the sinkhole tributary are seasonal in nature, with subsurface flow and surface drying during periods of limited precipitation. The southern tributaries are spring fed and are intermittent only during the very driest conditions. As with EFPC itself, these streams are bordered by road surfaces, mixed hardwoods, and/or pine plantations. These streams are at most minimally contaminated by Y-12 Plant operations, although several flow through sewage-sludge landfarming areas.

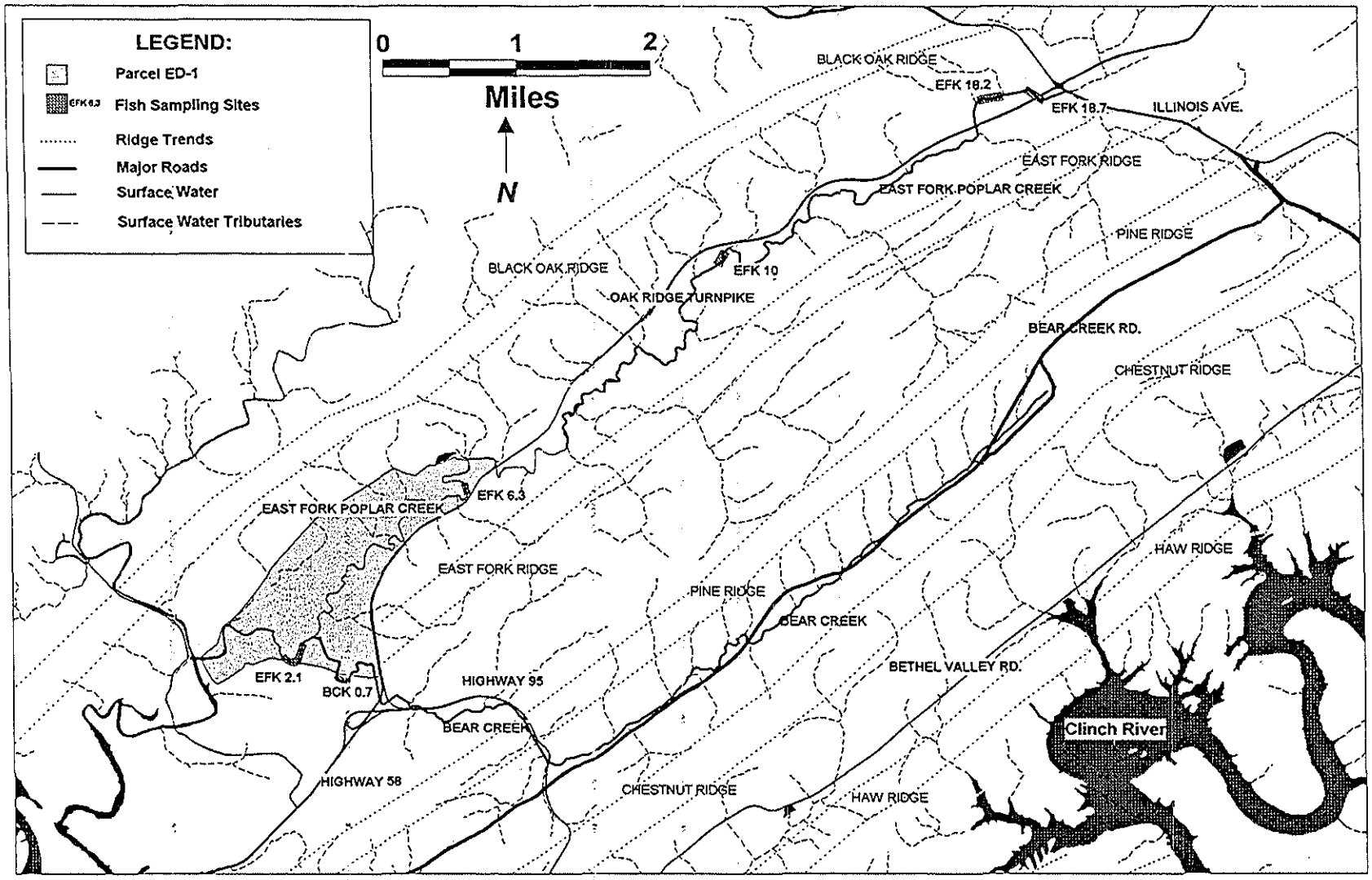

Fig. G-1. Creeks and tributaries in the vicinity of Parcel ED-1 of the Oak Ridge Reservation.

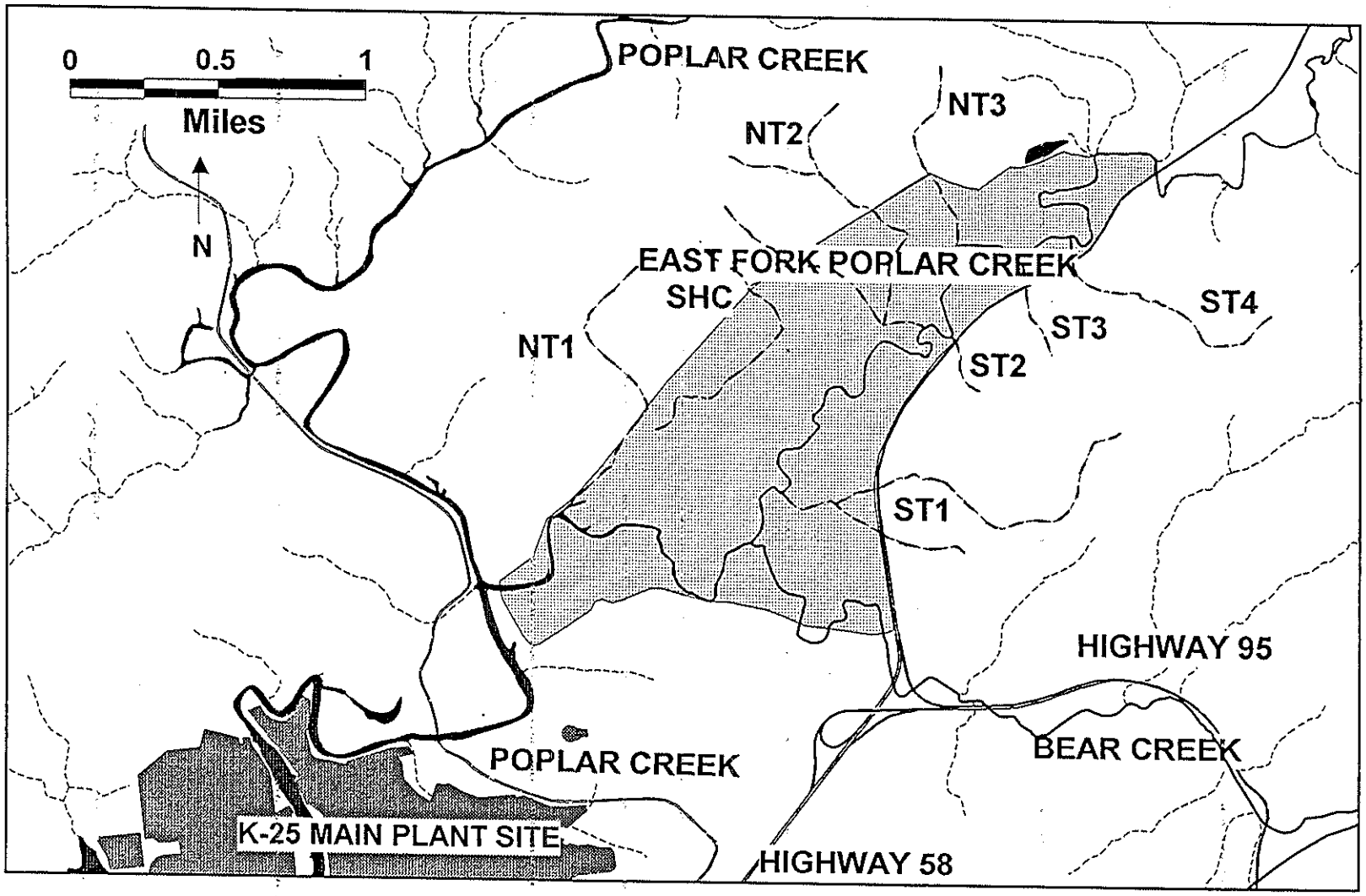

Fig. G-2. Major tributaries in the vicinity of Parcel ED-1 of the Oak Ridge Reservation.

Table G-1. Stream order and stream lengths of smaller creeks on Parcel ED-1

Stream Designation[a]	Stream Order	Stream Length (km)[b]	
		Total	Within Parcel
NT1	1st	1.6	0.75
NT2	2nd	0.8	0.65
NT3	1st	1.2	0.2
ST1	2nd	1.85	0.6
ST2	1st	0.38	0.02
ST3	1st	0.5	0.1
ST4	1st	1.4	0.1
SHC	1st	1.6	1.2

[a]Stream designations are northern tributaries (NT), southern tributaries (ST), and sinkhole creek (SHC); numbers were assigned in ascending order from the mouth of East Fork Poplar Creek.

[b]As taken from topographic maps (e.g., S-16A).

Stream Designations. Based on the presence of rare or unusual species, importance of activities conducted within the stream, or uniqueness of the community assemblages (Table G-2), these streams are considered ecologically important by ORNL and environmental organizations.

Table G-2. Stream classifications on Parcel ED-1, based on Oak Ridge National Laboratory observations

Stream or area	Classification
Lower East Fork	Aquatic Natural Area (ANA8)
Bear Creek	Aquatic Natural Area (ANA2)
ST1	Aquatic Natural Area (ANA3)
ST4	Aquatic Natural Area (ANA7)

G.2 BENTHIC MACROINVERTEBRATES

Benthic macroinvertebrate surveys in streams on Parcel ED-1 and vicinity have been limited to lower Bear Creek and EFPC (Hinzman in preparation; Smith and Dickinson 1994; personal communication from J. G. Smith, Environmental Sciences Division, ORNL, with H. Braunstein, ORNL). Quantitative surveys have been spatially limited to short reaches of < 20 m and to include riffles only. Since June 1985, samples have been collected at regular intervals from the same riffle area in EFPC at kilometer 6.3 (i.e., 6.3 km from the streams confluence with Poplar Creek (see Fig. G-1). Data from 1985 through 1993 indicate that this macroinvertebrate community is impacted, as it shows a reduced number of taxa (taxonomic richness) and pollution-intolerant taxa (taxonomic richness of the Epemeroptera, Plecoptera, and Trichoptera, or EPT richness) of one-half to two-thirds relative to reference streams (Smith and Dickinson 1994). Industrial discharges into the headwaters of EFPC cannot be discounted as a contributor to impacts, but because impacts at a site about 7.5 km farther upstream are significantly less than at km 6.3, the primary source of impacts is most likely associated with urbanization, such as discharges from wastewater treatment facilities, stormwater runoff, sedimentation from construction activities, etc.

Quantitative samples from BC km 0.70 (0.70 km from the confluence with EFPC) are available for two sampling periods in 1992 (Hinzman in preparation). Results indicate that this reach of stream was healthy and had a diverse macroinvertebrate community. Total taxonomic richness and richness of the pollution-sensitive EPT taxa at this site were similar to smaller reference streams on the ORR (Hinzman in preparation.; Southworth et al. 1992), and may possibly be greater than in reference sites located off of the ORR (Smith and Dickinson 1994) where less protection from rural development is provided.

Since 1985, macroinvertebrate collections in EFPC and BC have not shown the presence of threatened or endangered invertebrates (Hinzman in preparation; Southworth et al. 1992; Smith and Tolbert 1993; Smith and Dickinson 1994; J. G. Smith, Environmental Sciences Division, ORNL, personal communication with Helen Braunstein, ONRL, August 1995). In addition to quantitative samples, these collections have included more spatially comprehensive qualitative surveys, although still limited to < 50 m reaches. However, specific collections f or threatened or endangered species were not made. In 1961, the mollusks on the ORR were surveyed (H. V. Van der Schalie and J. Burch, University of Michigan, 1961), but none of t he species currently listed by the state or federal government as threatened or endangered were found. Details of collection techniques were not provided, so suitability of their sampling for threatened and/or endangered species cannot be ascertained.

G.3 FISH

A variety of fish species have been documented in streams within Parcel ED-1. The Fish Community Studies Task of the Biological Monitoring and Abatement Program (BMAP) has several sampling sites in lower EFPC and BC (see Fig. G-2). These sites have been sampled at least twice a year since 1985. Additional BMAP sampling of fish has also occurred at other locations within these two streams as part of other environmental research tasks; these efforts provide qualitative data on species occurrence in EFPC and BC. Other qualitative surveys were

conducted in 1986 to 1988 as part of a general assessment of the fish species on the ORR (Ryon and Loar 1988). The combination of these efforts has noted 50 species in lower EFPC and its tributaries and 25 species in BC (Table G-3). Included are species adapted to large creek-small river systems, headwater streams, and reservoir or lake systems. The proximity of lower EFPC and BC to Poplar Creek, the Clinch River, and two impoundments offers a range of habitats and watersheds from which additional species can migrate into the streams.

Monitoring in EFPC has demonstrated a consistent pattern of recovery in fish communities. When sampling was initiated by BMAP in 1985, average numbers of species at each site in lower EFPC ranged from 10 to 15, while a comparable reference stream averaged 18 to 22 fish species (Loar et al. 1992). During the ten years of sampling, the average number of fish species at each site in lower EFPC has increased to 18 to 20 (Ryon 1993), with a recent spring collection of 25 species (M. Ryon, Environmental Sciences Division, ORNL, unpublished data). Although increases have also been seen at reference sites, the trend in this section of EFPC is greater. The recovery has also included an increase in the number of species that ar e sensitive to stress or that have more restricted habitat and food requirements. The increase in the numbers and densities of such species demonstrates the general recovery of the fish fauna in EFPC. However, the recovery of sensitive species in EFPC is still below levels seen in comparable reference streams.

An important component of fish community assessment is determining the presence or potential presence of rare species and those species afforded some protection by state or federal agencies. Protected species include species which have been categorized as endangered, threatened, in need of management, or of special concern. In the vicinity of Parcel ED-1, sev eral protected species have been found previously (Table G-4), and the potential exists for other species to be found with additional sampling.

Historically, four protected species are documented in BC and EFPC. In surveys of Bear Creek conducted prior to the construction of the Y-12 Plant, a large population of the flame chub (*Hemitremia flammea*) was found by TVA surveyors in 1941 (Etnier 1978). This species is normally associated with springs and spring runs; possible occurrence on Parcel ED-1 would be dependent on the presence of such areas. The blue sucker (*Cycleptus elongatus*) and the highfin carpsucker (*Carpiodes vellifer*) were found in earlier surveys of the Clinch River (Fitz 1968). These species are usually associated with river habitats, and it would be unlikely that they occur on Parcel ED-1. However, EFPC may provide gravel areas over which highfin carpsucker could spawn. Three other protected species could occur in or near the parcel based on habitat requirements and regional distribution (Table G-4), but these have not been documented in th e area. The protected species with the greatest potential impact from the parcel is the Tennessee dace (*Phoxinus tennesseensis*).

Table G-3. Fish species composition in lower East Fork Poplar Creek and Bear Creek for the period 1985 to 1995[a]

Species	Sensitivity	Relative Status[b]	EFPC	BC
Petromyzontidae				
Chestnut lamprey (*Ichthyomyzon castaneus*)		Rare	X	
Lepisosteidae				
Spotted gar (*Lepisosteus oculatus*)		Rare	X	
Clupeidae				
Gizzard shad (*Dorosoma cepedianum*)	Tolerant	Common	X	
Cyprinidae				
Central stoneroller (*Campostoma anomalum*)		Abund.	X	X
Spotfin shiner (*Cyprinella spiloptera*)	Tolerant	Common	X	X
Common carp (*Cyprinus carpio*)	Tolerant	Common	X	
Striped shiner (*Luxilus chrysocephalus*)	Tolerant	Abund.	X	X
Rosefin shiner (*Lythurus ardens*)		Common	X	X
Golden shiner (*Notemigonus crysoleucas*)	Tolerant	Uncomm.	X	
Bigeye chub (*Notropis amblops*)	Intolerant	Uncomm.	X	
Emerald shiner (*N. atherinoides*)		Uncomm	X	X
Tennessee dace (*Phoxinus tennessensis*)		Rare	X	X
Bluntnose minnow (*Pimephales notatus*)		Common	X	X
Fathead minnow (*P. promelas*)	Tolerant	Uncomm	X	
Blacknose dace (*Rhinichthys atratulus*)		Common	X	X
Creek chub (*Semotilus atromaculatus*)	Tolerant	Common	X	X
Catostomidae				
White sucker (*Catostomus commersoni*)	Tolerant	Common	X	X
Northern hog sucker (*Hypentelium nigricans*)	Intolerant	Common	X	X
Smallmouth buffalo (*Ictiobus bubalus*)		Uncom.	X	

Species	Sensitivity	Relative Status[b]	EFPC	BC
Spotted sucker (*Minytrema melanops*)	Intolerant	Common	X	
Black redhorse (*Moxostoma duquesnei*)	Intolerant	Common	X	X
Golden redhorse (*M. erythrurum*)	Intolerant	Common	X	
Ictaluridae				
Yellow bullhead (*Ameiurus natalis*)	Tolerant	Common	X	X
Channel catfish (*Ictalurus punctatus*)		Common	X	
Poeciliidae				
Western mosquitofish (*Gambusia affinis*)	Tolerant	Common	X	
Atherinidae				
Brook silverside (*Labidesthes sicculus*)		Rare	X	
Cottidae				
Banded sculpin (*Cottus carolinae*)	Intolerant	Common	X	X
Percichthyidae				
Yellow bass (*Morone mississippiensis*)		Uncom.	X	
Striped bass (*M. saxatilis*)		Uncom.	X	
Centrarchidae				
Rock bass (*Ambloplites rupestris*)	Intolerant	Common	X	X
Redbreast sunfish (*Lepomis auritus*)		Abund.	X	X
Green sunfish (*L. cyanellus*)	Tolerant	Uncom.	X	X
Warmouth (*L. gulosus*)		Common	X	X
Bluegill (*L. macrochirus*)		Common	X	X
Longear sunfish (*L. megalotis*)	Intolerant	Rare	X	X
Redear sunfish (*L. microlophus*)		Rare	X	
Smallmouth bass (*Micropterus dolomieu*)		Rare	X	
Spotted bass (*M. punctulatus*)		Rare	X	
Largemouth bass (*M. salmoides*)		Common	X	X

Species	Sensitivity	Relative Status[b]	EFPC	BC
Percidae				
Greenside darter (*Etheostoma blennioides*)	Intolerant	Rare	X	
Black darter (*E. duryi*)	Intolerant	Rare	X	X
Blueside darter (*E. jessiae*)	Intolerant	Rare	X	
Stripetail darter (*E. kennicotti*)		Uncom.	X	X
Redline darter (*E. rufilineatum*)	Intolerant	Rare	X	
Snubnose darter (*E. simoterum*)		Common	X	X
Yellow perch (*Perca flavescens*)		Uncom.	X	
Logperch (*Percina caprodes*)	Intolerant	Common	X	X
Dusky darter (*P. sciera*)	Intolerant	Rare	X	
Sauger (*Stizostedion canadense*)		Rare	X	
Sciaenidae				
Freshwater drum (*Aplodinotus grunniens*)		Common	X	
Total species			50	25

[a]Relative abundance is based on sample knowledge of EFPC and BC in the context of regional information on abundance and distribution. Sensitivity to stress is based on guidelines in Karr et al. (1986) and regional information. For more details on species see Ryon and Loar (1988); Etnier and Starnes (1993).

[b]Abundant = occurs in every quantitative sample at high densities; common = occurs in most quantitative samples at varying densities or is regionally common; uncommon = occurs in more than one quantitative sample at low densities; rare = occurs in only one quantitative sample or in qualitative samples.

Table G-4. Protected aquatic species in East Tennessee

Species	Status[a]	Regional distribution[b]	Preferred habitat	Parcel ED-1 area
Spotfin chub (*Cyprinella monacha*)	T - TN; T - US	Emory River	Upland rivers in swift currents-boulders (adults) or moderate current-gravel (juveniles)	No
Flame chub (*Hemitremia flammea*)	IM-TN	Tennessee River	Springs and spring runs; associated with vegetation	Yes - historic record from 1941 in BC[c]
Tennessee dace (*Phoxinus tennesseensis*)	IM-TN	Small tributaries of upper Tennessee River	Shallows and pools in small streams	Yes - widespread in BC and EFPC tributaries
Highfin carpsucker (*Carpiodes velifer*)	IM-TN	Clinch River	Gravel areas in medium to large rivers	Yes - Clinch River[d]
Blue sucker (*Cycleptus elongatus*)	T - TN C2 -US	Clinch River	Swift deep waters in big rivers	Yes - Clinch River[d]
Yellowfin madtom (*Noturus flavipinnis*)	T-US E-TN	Upper Tennessee River and Upper Clinch River	Variable; small swift trout streams to larger, warm, silty rivers	No
Ashy darter (*Etheostoma cinereum*)	IM-TN	Emory River; Little River	Small to medium upland rivers over gravel or bedrock substrate	No

[a]Protected status includes Endangered (E), Threatened (T) and In Need of Management (IM) as determined by state (TN) or federal (U.S.) agencies. (Reference is Johnson 1987).

[b]Regional distribution indicates the closest areas to the proposed industrial site where the species has been found (Reference is Etnier and Starnes (1993).

[c]Reference is Etnier (1978).

[d]Reference is Fitz (1968).

The Tennessee dace occurs in headwater creeks of the upper Tennessee River drainage from Chattanooga to Johnson City and in two creeks in Virginia, where it is rare to uncommon (Starnes and Jenkins 1991). Locally, the Tennessee dace occurs throughout the BC and EFPC watersheds with most of the populations in the tributary streams (Fig. G-1). These populations have been recognized as among the largest in Tennessee, with the ORR representing a stronghold for the species (Etnier and Starnes 1993). Within the parcel, EFPC and lower BC provide important corridors for fish migration and for the exchange of gene flow between the smaller tributaries in which the Tennessee dace occurs in higher population numbers. The Tennessee dace were known from 47 localities (provided by TVA) in the Tennessee River drainage; surveys conducted from 1990 to present indicate the absence of Tennessee dace at 14 of the 47 sites (not all 47 sites have been surveyed). Several of these populations may now be extirpated due to observable human impacts (Starnes and Jenkins 1988). Siltation is suspected in the extirpation of historical populations, as it destroys required spawning habitat (Peggy Shute, TVA, personal communication, with Elizabeth M. Shilling, ORNL, September 1991).

Life-history information for the Tennessee dace is scant. Starnes and Jenkins (1991) report that in Virginia most individuals spawn at age 2 and live up to three years. Observations on the ORR indicate spawning occurs in aggregations over gravel pits made by other fish spe cies (E. M. Schilling and M. G. Ryon, Environmental Sciences Division, ORNL, unpublished data). Under normal conditions, these gravel pits are kept free of siltation and other debris through actions of the host fish species. For example, the male creek chub (*Semotilus atromaculatus*) guards the nest and fans the area with his fins to keep the nest area free of silt which allows the eggs and larval fish to develop. If there is an unusual increase in the movement or amount of sediments, it appears that fish are unable to keep the nest free of silt and debris. This results in the loss of eggs and/or developing larval fish.

Threats to the Tennessee dace include stream channelization, impoundment, flow alterations, and siltation. Channelization and impoundment can negatively impact fish populations through habitat degradation. Reduced or altered flows can result in extreme fluctuations in flow, drying of streambeds, or altering stream thermal and chemical regimes (Hynes 1970, 1974; Starnes and Jenkins 1991) which reduces available habitat and fish spawning success. Excessive siltation reduces substrate heterogeneity, increases turbidity, limits aquatic plant growth, alters invertebrate communities, increases fish egg and larval mortality, and limits the availability o f food, cover, and spawning habitat (Ellis 1936; Chutter 1969; Gammon 1970; Hynes 1970, 1974; Sorensen et al. 1977; Muncy et al. 1979; Berkman and Rabeni 1987).

The Tennessee dace has been classified as a species "deemed in need of management" by Tennessee and as "endangered" by Virginia. In Virginia, the state formulated a recovery plan for the Tennessee dace that focuses on preserving, maintaining, and enhancing existing Tennessee dace populations and habitats. Preservation of habitat includes working with municipal, state, regional, and federal agencies to identify and alleviate any negative impacts to the habitat and may require adoption and/or enforcement of water quality and watershed-use regulations. For the Tennessee populations, the Heritage Program (TVA) has suggested restricting land use practices that cause siltation and reduced flow, reintroducing of the Tennessee dace in the Great Smoky Mountains National Park and other protected areas, and considering the Tennessee dace for listing by the FWS as a candidate species.

Lower EFPC and BC are favorable aquatic habitat for fish for several reasons. The number of species in EFPC and BC represent a large component of the fish fauna of the ORR. Several species are found on the ORR only in lower EFPC. The consistent pattern of recovery that is documented for EFPC also supports the significance of that area. Lower EFPC represents an aquatic microhabitat that is unique within the ORR. No other large creek ecosystem occurs on the ORR, and impacts on the integrity of that resource would reduce the overall diversity of the fish community or the potential fish community on the ORR. Lower EFPC and BC serve as corridors to upstream sections for the migration of new fish species into sections of the stream that are recovering from past impacts. The biological monitoring of these streams is based on the premise that as remediation occurs, improved conditions close to the plants will be reflected by increases in the total number of species and the number of sensitive species. If the connecting portions of EFPC and BC are negatively impacted, then Parcel ED-1 could be a barrier to maximum recovery upstream. This could result in a negative evaluation of the effectiveness o f remedial actions by the Y-12 Plant operations. Finally, the presence of the Tennessee dace i n most of the aquatic systems within the parcel and the possibilities of other protected species occurring in EFPC strongly suggest that a maximum effort be expended to protect these aquatic systems. The Tennessee dace and its population strength on the ORR are in great contrast to the overall trend of the dace's populations in Tennessee. It is important that proper stewardship be provided for the Tennessee dace on the ORR to ensure that this species does not decline further, perhaps to a level warranting increased protective status of threatened or endangered.

Several actions are recommended for the assessment and protection of the fish communities in the streams on Parcel ED-1. First, surveys are needed to determine whether any additional protected species occur in lower EFPC and BC. These surveys should focus on the species with the greatest potential to occur in this area (Table G-4) but should be aware of all possible species. Second, all seven tributaries to EFPC and the sinkhole creek should be resurveyed to determine the current status of Tennessee dace. Third, a sufficient buffer zone should be provided for each stream. This buffer should be a minimum of 30 m with a wider zone in steeper topographic areas. The zone should enhance the development of native riparian vegetation, prevent construction runoff from entering the streams, and provide a corridor for movement of resident wildlife. Some of this area has been cleared to control the destruction caused by the southern pine beetle, but most streams have been flagged with a sufficient buffer zone and some vegetation still exists along the streams. A proper buffer zone would reduce sedimentation impacts on the streams, maintain proper water temperatures by shading, and provide instream cover (e.g., woody debris and root wads). Fourth, limitations should be considered for the industrial effluents from Parcel
ED-1. If industrial effluents are discharged to EFPC, impacts should be addressed in the context of the overall contaminant loading to the stream. For example, Y-12 discharges to upper EFPC have increased mean temperatures by 5 to 10°C; if industrial effluents also raise temperatures then the combined impacts need to be assessed. Finally, monitoring of affected streams would be a wise investment. The current BMAP sampling has documented the fish community extensively; and with the addition of a site or two, sites on Parcel ED-1 could be integrated into the existing monitoring plan to provide a cost-effective mechanism for resource assessment.

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APPENDIX H

SUPPLEMENTAL INFORMATION ON WETLANDS ON PARCEL ED-1

Date: July 18, 1995

To: P. D. Parr

c: D. J. Awl

From: B. A. Rosensteel

Subject: **Wetlands in the area proposed for lease to the East Tennessee Economic Council in the lower East Fork Poplar Creek watershed**

The Army Corps of Engineers (ACOE) conducted an inventory of wetlands in the East Fork Poplar Creek (EFPC) floodplain during October 1991 through May 1992 as part of the East Fork Poplar Creek remedial investigation (DOE/OR/02-1119). The purpose for the ACOE inventory was to serve as baseline information for DOE's remedial action planning and National Environmental Policy Act compliance efforts related to the contamination in the East Fork Poplar Creek floodplain.

The ACOE identified 17 wetlands in the EFPC floodplain. Five of the 17 wetlands are in the area proposed by the DOE for lease to the East Tennessee Economic Council (ETEC). The approximate acreage in the 5 wetlands combined is 3.4 acres. All of the wetlands are within the 100-yr floodline. One of the wetlands may extend outside of the floodline owing to recent beaver activity in the backwater channel on which the wetland is located.

Field visits to the five wetlands were conducted in July 1995. The following descriptions of the 5 wetland areas, proceeding from the most downstream to the most upstream wetland on the lease site, are taken from the ACOE Wetlands Report (ACOE 1992) and from the July 1995 field visits. Basic information on the wetland location, type, hydrology, and dominant species are presented below. For further information on the delineation methodology used by the ACOE and additional description of wetland characteristics the reader can refer to ACOE wetland report which is in Appendix A of the EFPC remedial investigation report (DOE/OR/02-1119).

ACOE IDENTIFIED WETLANDS IN THE LOWER EFPC FLOODPLAIN

Wetland 1: This is the furthest downstream wetland on EFPC. It is formed around a backwater intrusion adjacent to EFPC Mile 0.2. The approximate size of the wetland is

0.8 acres. The primary hydrological source is backwater from Watts Bar Reservoir. There are two plant communities, both of which are dominated by Facultative Wetland (FACW) and Obligate Wetland (OBL) plant species. Species include button bush, flatsedge, soft rush, and dogwood.

Wetland 2: This wetland has formed around a backwater intrusion just downstream of EFPC Mile 0.3. The wetland is approximately 0.39 acres in size. Backwater from Watts Bar Reservoir is the primary source of site hydrology, and inundation of a few inches or saturation within less than 2 - 4 inches of the surface is the normal condition. Plant communities grade from a buttonbush stand next to the mudflat in the inundation zone, through a shrub/herbaceous community dominated by box elder, silky dogwood, buttonbush, creeping jenny, and jewelweed, to an outer zone that includes a tree stratum. Species in the outermost zone include green ash, sycamore, box elder, silky dogwood, smartweed, and unidentified grasses. All of the species are classified as Facultative (FAC), Facultative Wetland (FACW), or Obligate Wetland (OBL).

Wetland 3: This wetland has open water, emergent, and scrub–shrub zones. Dominant species include green ash, sycamore, buttonbush, box elder, silky dogwood, privet, creeping jenny, and two unidentified grasses. All species are FAC, FACW, or OBL. The wetland is located just upstream of the confluence of a seasonal stream with EFPC, and receives hydrologic inputs from upstream sources such as springs and surface runoff, and from Watts Bar Reservoir water level fluctuations. The approximate size of this wetland is reported as 0.86 acres in the ACOE wetland report. However, the geographic information system (GIS) data for this wetland indicates that the wetland size as mapped by the ACOE is actually almost 1.4 acres. That estimate may be low because since the time of the ACOE inventory and mapping, beavers have moved into this wetland. There are two beaver dams in the wetland and a beaver lodge at the confluence with EFPC.

Wetland 4: This is a 0.08 to 0.11 acre wetland is situated in a low area on the inside of a bend of EFPC adjacent to Mile 0.5. The area is frequently saturated by backwater fluctuations from Watts Bar Reservoir. Vegetation is well-distributed among the tree, sapling, shrub, and herbaceous strata, and 89% of the dominant species have indicator statuses of FAC, FACW, or OBL. Species include sycamore, green ash, box elder, silky dogwood, smartweed, and white heath aster.

Wetland 5: This wetland has formed around a backwater intrusion at approximate EFPC Mile 0.6. The approximate size is 0.61 to. 0.69 acres. The wetland includes a shallow open water area, part of which is a mudflat when Watts Bar Reservoir water levels are low (e.g., winter). The primary hydrologic sources are spring flow and backwater from the reservoir. Plant species include black willow, silky dogwood, creeping jenny, and smartweed.

Additional plant species in the wetlands were identified and documented during the July 1995 site visits. The species include:

Acer negundo
Lycopus virginicus
Dulichium sp.
Sagittaria latifolia
Salix nigra
Carpinus caroliniana
Cephalanthus occidentalis
Uniola latifolia
Boehmeria cylindrica
Rumex verticillatus
Apios americana
Lysimachia nummularia
Cyperus sp.
Carex lurida
Carex tribuloides
Scirpus sp.
Polygonum hydropiperoides
Glyceria striata
Eulalia viminea
Fraxinus pennsylvanica
Platanus occidentalis
Cornus amomum
Ligustrum vulgare
Elymus virginicus
Tovara virginica
Amphicarpaea bracteata
Cryptotaenia sp.
Viola sp.
Carex frankii
Carex lupulina
Leersia oryzoides
Impatiens capensis

Potential Wetland Areas and Unsurveyed Areas

Three areas in which wetlands may be present are shown on the attached figure. These areas were noted in the course of conducting other work in the area but have not been closely investigated or monitored.

One of the areas is in the floodplain forest at the confluence of Bear Creek and EFPC. Previous wetland surveys in the Bear Creek watershed identified a wetland in this area, however, the area will need to be revisited to verify this finding and to determine the size and boundaries of the wetland, if present. This area is within the 100-year floodline.

The other two potential wetlands are in areas recently (within the last two years) disturbed by logging. Disruption of natural wetlands or creation of wetlands may have resulted from logging activities. One of the sites is adjacent to a stream. The other may be a seep area that drains to a stream. Additional site investigations are necessary to determine the presence and status of wetlands in these areas.

The ACOE investigation area included only the floodplain of EFPC. Wetland investigations for the remainder of the EFPC watershed, including the land contained within the proposed 1000 acre lease site, have not been formally conducted. A wetland survey of the entire site should be conducted prior to any development on the site.

Date: July 18, 1995

To: P. D. Parr

c: D. J. Awl

From: B. A. Rosensteel

Subject: **Other considerations in the proposed lease of land in the lower East Fork Poplar Creek watershed to the East Tennessee Economic Council**

1. Stream, Floodplain, and Wetland Protection and Buffers

There are many reasons not to build in or remove vegetation from the floodplain and riparian zones of streams. These include downstream flood control, large reductions in onsite property losses due to floods and taxpayer bailouts of the affected parties, protection of stream water quality and aquatic biota from the effects of stormwater runoff, conservation of terrestrial wildlife habitat and corridors for wildlife movement, the maintenance and encouragement of biological diversity, and preservation of green spaces in an otherwise developed and paved landscape.

The stream and wetland buffers should be based on a combination of the 100-yr floodline, the natural vegetation communities, other natural features (e.g., rock outcrops), and topography, with the minimum width not being less than 100 feet. Road crossings of streams should be prohibited on the streams supporting populations of Tennessee dace and should be minimized on the other streams on site. Most of the streams on the northern side of EFPC are seasonal. During the summer and fall water may not be present in the stream channels. However, in the winter and spring the stream channels can convey a large volume of water from springs and surface runoff. The buffer zone requirement of a minimum of 100 feet should apply on these streams. In cases in which wetlands and streams are adjacent to existing roads, any expansion or upgrading of those roads should not encroach any further upon the wetland or stream.

2. Site Development

If one assumes that the lease and development will proceed, it should be recognized that this is a perfect opportunity for DOE to make this a showcase of low-impact, state-of-the-art development that incorporates environmental aesthetics and protection into all aspects of design, construction, and operation. Some suggestions include:

A. CLUSTERING

If development is clustered in logical groupings around the property, leaving green, undeveloped spaces in between it will 1.) reduce the potential localized climatological impact of "heat islands" (produced by large, unbroken areas of paved land and buildings), 2.) allow for economic development while preserving tracts of natural habitat, wildlife corridors, and stream buffers, and 3.) might encourage more interaction between the companies and people located there while providing a more pleasant working environment.

Along the same lines, innovative ideas in landscape architecture incorporate natural vegetation communities into development, promote the use of native species in landscaping in developed areas, and can make exceptionally pleasant living and working "habitats" for people. These ideas should be used in the design, construction, and operation of the site.

B. EROSION CONTROL AND STORMWATER RUNOFF

Virtually all construction plans state that erosion and sedimentation controls will be used. However, oftentimes things are lost between the writing and the execution of the Best Management Practice Plan (BMP). For this site, it should be essential that the most up-to-date materials and methods of erosion and sedimentation control are used. It could even be set up as a demonstration area for regional developers and contractors to view the newest techniques. Oversight provisions should be included in the lease agreement for this and other stages of development and operation.

Appropriate and state-of-the-art stormwater runoff systems should be required. These include, but are not limited to, stormwater detention or retention basins, ponds, constructed wetlands, and oil separators in catch basins in parking lots and storm drains. Current construction projects, in general, for development in East Tennessee do not appear to incorporate these widely accepted and widely used methods for control of stormwater runoff. Detention or filtering of stormwater runoff can reduce downstream flooding and remove particulates and contaminants before the water enters a receiving stream.

C. WASTEWATER

The question of sanitary wastewater treatment is very important. How many buildings are going to be constructed? How many people will be working there? How much wastewater will be generated when the industrial park is complete? Does, or will, the Oak Ridge City Sewage Treatment Plant (STP) have the capacity to treat this volume of wastewater. Apparently, the Oak Ridge City STP is already experiencing difficulties with treating wastewater under storm conditions owing to the combined storm sewer/sanitary wastewater input.

Septic systems take up a great deal of space, and there may be other site constraints (i.e.,

such as soil suitability) for the use of septic systems. Another consideration with using septic systems in industrial (even light industrial) settings is the potential for substances getting into the system that should never be put there. The controls over what goes into the system will be difficult to maintain and, depending on the industries that locate there, there is the potential to pose a threat to groundwater and surface waters, as well as to the operation of the systems themselves.

The third option, apparently, is the K-25 STP. Does this system have the capability to treat additional wastewater? What will happen if, in the future, the K-25 STP shuts down or has its operations curtailed. What are the laws or rules concerning DOE operating what is essentially a private sewage treatment plant?

D. SERVICES PROVIDED BY LOCAL AND COUNTY ENTITIES

The cumulative impact analysis should investigate the impact of development in this area on the services provided by federal, local, and county entities. These services include such things as wastewater treatment, water supply, emergency services, and road maintenance.

E. LOW EMISSION OR NO EMISSION INDUSTRIES

The development of low emission or no emission industrial park will bring Oak Ridge and Roane County into the forefront of 21st century development. Chattanooga, I believe, already has a successful no-emission industrial park. I think such an idea will attract many new industries to East Tennessee and will move us away from our reliance on waste treatment and disposal industries and older, environmentally-unfriendly extraction and manufacturing processes... The products and services provided by the waste management and older industries are needed, however new ways of "doing business" need to be encouraged. In addition, Roane County has a significant share of waste treatment facilities (with air and water emissions) already. The development of a low emission industrial park will indicate the direction that the counties and state want to move for the future and will, I believe, attract innovative industries and capital to the area.

F. REQUIREMENTS FOR ACTIVITIES ON FEDERAL LAND

It is reasonable to apply the same requirements designed to protect the environment and worker health and safety on any development on this parcel that would apply if it were the DOE that was developing the land instead of a private entity. Apparently, the land is going to remain federally-owned, therefore the application of such requirements would seem to be justified, and perhaps required by law.

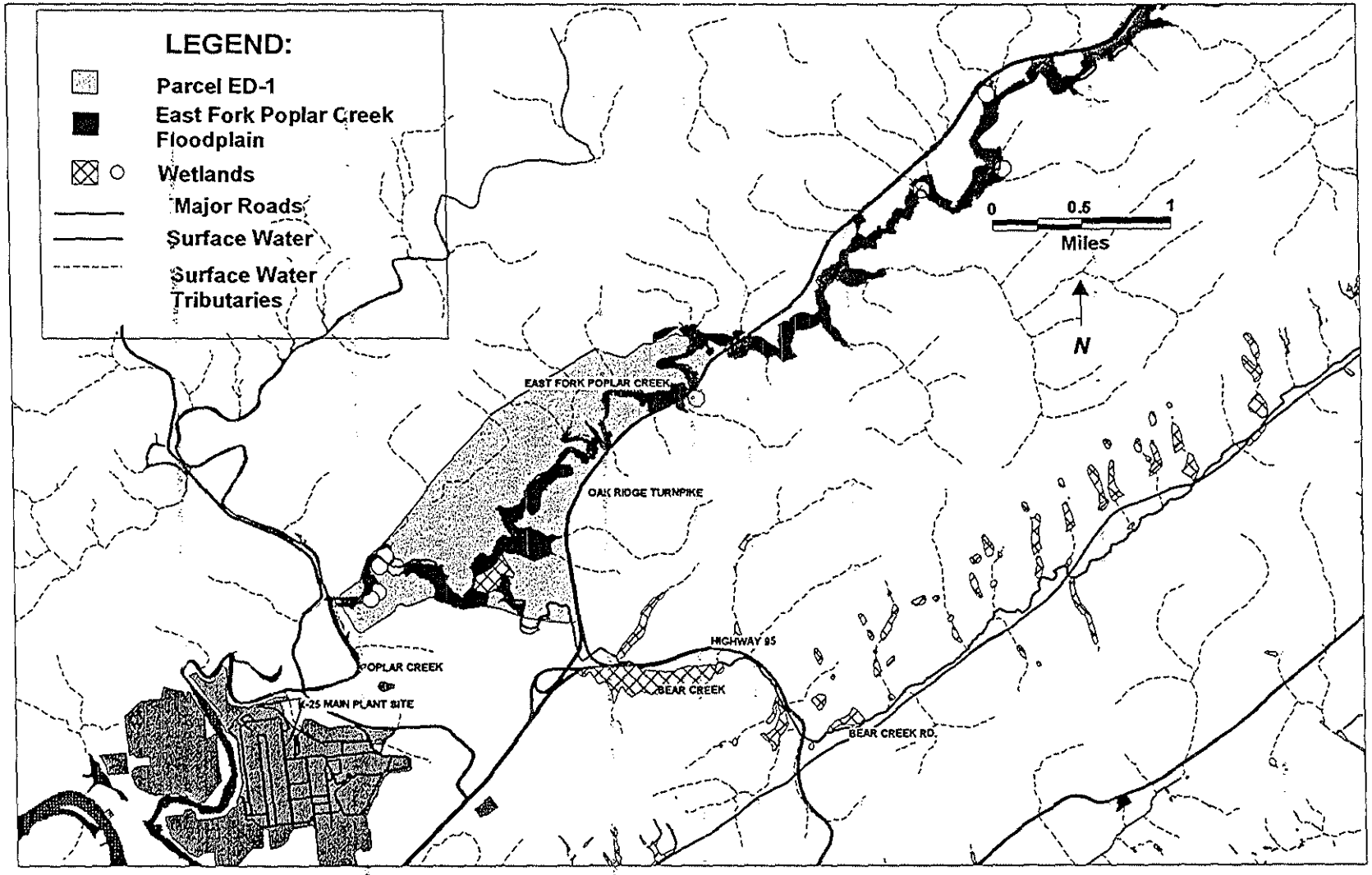


Fig. H-1. Known wetlands on Parcel ED-1 of the Oak Ridge Reservation.

APPENDIX I

NATIONAL HISTORIC PRESERVATION ACT CORRESPONDENCE

Department of Energy

Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831—8739
July 24, 1995

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

NATIONAL HISTORIC PRESERVATION ACT, SECTION 106 COMPLIANCE; DEPARTMENT OF ENERGY OAK RIDGE OPERATIONS (DOE ORO) PROPERTY LEASE TO THE EAST TENNESSEE ECONOMIC COUNCIL (ETEC)

Enclosed are a project summary and a draft of provision 24. Cultural Items to be included in the ETEC lease agreement, for the proposed lease of approximately 1000 acres of the Oak Ridge Reservation (ORR) to the ETEC. The property proposed for lease is located in Roane County, Tennessee. In consultation with your office, and in accordance with stipulations to be included in the lease agreement, DOE ORO has determined that the proposed project would have no adverse effect on historical, archeological, or cultural resources included or eligible for inclusion in the National Register of Historic Places. This determination is included with the Project Summary. With your concurrence in this determination, DOE ORO's responsibilities for compliance with Section 106 of the National Historic Preservation Act will be completed.

If you have questions or need additional information related to this proposed project please call me at (615) 576-9574.

Sincerely,

Ray T. Moore

Ray T. Moore
DOE ORO Cultural Resources
Management Coordinator

Enclosures

cc w enclosures:
See Page 2

PROJECT SUMMARY
SECTION 106 ARCHEOLOGICAL AND HISTORICAL REVIEW (AHR)
FOR THE LEASE OF APPROXIMATELY 1000 ACRES OF THE OAK RIDGE RESERVATION TO THE EAST TENNESSEE ECONOMIC COUNCIL

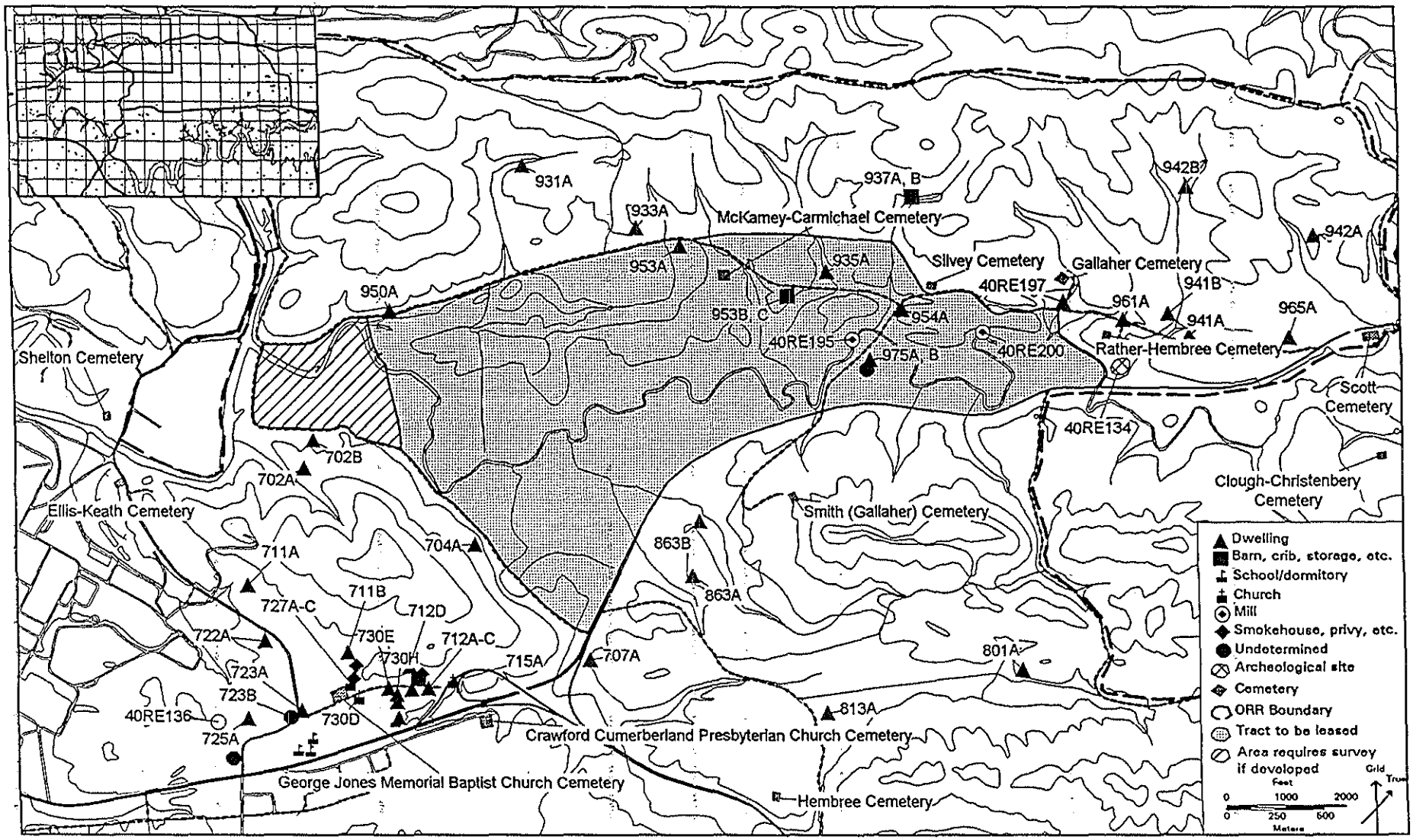
PROPOSED ACTION: The U.S. Department of Energy Oak Ridge Operations Office (DOE-ORO) proposes to lease an approximately 1000-acre tract of land on the Oak Ridge Reservation (ORR) to the East Tennessee Economic Council (ETEC). The ETEC plans to commercially develop this land to offset the economic impact of DOE-ORO and contractor downsizing and to diversify the economic base of this area of East Tennessee.

LOCATION: The proposed action would take place on the ORR in Roane County, Tennessee. The proposed tract of land to be leased to the ETEC, hereafter referred to as tract, is located in the north-central portion of the ORR immediately northeast of the intersection of Tennessee Highways 95 (White Wing Road) and 58 (Oak Ridge Turnpike) (Fig. 1).

DISCUSSION: A number of reconnaissance-level surveys have been conducted on the ORR. The first reported reconnaissance of the area was conducted along portions of the Clinch River by Cyrus Thomas (1894) and was reported in the Bureau of American Ethnology. Other examples of reconnaissance surveys conducted on and/or adjacent to the ORR include Webb 1938, Nash 1941, McNutt and Graham 1960, McNutt and Fisher 1961, Schroedl 1972 and 1974, Fielder 1975, GAI 1981, Jolley 1982, and a number of project-specific surveys conducted by DuVall & Associates, Inc., over the past four years.

Previous surveys conducted on the ORR that identified and evaluated cultural resources within and immediately adjacent to the tract include (1) surveys by Fielder (1974) and Fielder, Ahler, and Barrington (1977) of specific areas of the ORR focusing on prehistoric and historic sites, respectively; (2) a survey of the East Fork Poplar Creek floodplain conducted by DuVall (1992); and (3) a recent evaluation of previously recorded and inventoried archeological and pre-World War II structure sites on the ORR (DuVall and Souza Draft). These surveys reveal that nine pre-World War II structures and one cemetery are located on the tract; and five pre-World War II structures, one cemetery, and one archeological site are located immediately adjacent to the tract, all of which could potentially be affected by tract development activities (see Fig. 1). Table 1 lists these structures/sites and provides information pertaining to their function, condition, and eligibility for inclusion in the National Register of Historic Places (NRHP). Of these structures/sites, only three have been determined to be eligible for inclusion in the NRHP: 40RE197 (939A) (outside tract boundary), a foundation-only dwelling believed to be associated with the Gallaher family based on its location relative to the Gallaher Cemetery and its association with a mill site (40RE200) on East Fork Poplar Creek; 40RE200 (939B) (inside tract boundary), a foundation-only mill; and 40RE195 (975C) (inside tract boundary), a foundation-only mill (both saw and grist) that was most likely established by John Nail, Sr., sometime between 1801 (the date deed records begin for Roane County) and 1838 (the time of first mention of the mill in the historical record).

To minimize effects development activities could have on properties within and immediately adjacent to the tract that are (1) eligible for inclusion in the NRHP and (2) on the McKamey-Carmichael and Silvey cemeteries, DOE-ORO will (1) ensure that the perimeter of the cemeteries are surveyed and clearly marked on all plat maps generated in support of the lease agreement; (2) clearly mark in the field, at a minimum, a 100-foot buffer zone around sites 40RE195 and 40RE200; and (3) indicate in the lease agreement that disturbance of the cemeteries and sites 40RE195 and 40RE200 must be avoided. Based on the probability that a significant archeological site may be located within the vicinity of the confluence of East Fork Poplar Creek and Poplar Creek, DOE-ORO shall indicate in the lease agreement that an approximately 80-acre area (see Fig. 1) located at the west end of the tract must be surveyed and the survey must be accepted by the State Historic Preservation Officer (SHPO) prior to commencing development in this area. DOE-ORO shall also indicate in the lease agreement that should an unanticipated discovery of cultural materials (e.g., human



Note: Coordinate system is Oak Ridge administrative grid (S16A).

Fig. I-1. Pre-World War II structures, archeological sites, and cemeteries within and adjacent to Parcel ED-1 of the Oak Ridge Reservation.

Table 1. List of pre-World War II structures, cemeteries, and archeological sites located within and immediately adjacent to the tract.

Number/ Name	Function	Condition Fielder, Ahler, and Barrington 1977	Condition DuVall and Souza (Draft)	NRHP Eligibility	Latitude	Longitude
Structures/Sites Within Tract Boundary						
935A	Dwelling	Foundation only	Foundation only	N	35° 58' 2"	84° 21' 46"
40RE200 939B	Mill	Not visited	Foundation only	Y	35° 58' 8.3"	84° 21' 13.1"
953A	Dwelling	Foundation only	Foundation only	N	35° 57' 51.7"	84° 22' 13.5"
953B	Dwelling	Foundation only	Could not relocate	N	35° 57' 55"	84° 21' 50"
953C	Barn	Foundation only	Could not relocate	N	35° 57' 55"	84° 21' 50"
954A	Dwelling	Foundation only	Foundation only	N	35° 58' 4"	84° 21' 29.1"
975A	Dwelling	Foundation only	Foundation only	N	35° 57' 54"	84° 21' 29"
975B	Undetermined	Not visited	Foundation only	N	35° 57' 52.3"	84° 21' 28.5"
40RE195 975C	Mill	Not visited	Foundation only	Y	35° 57' 55.2"	84° 21' 34.1"
McKamey-Carmichael	Cemetery	—	—	N	35° 57' 51.8"	84° 22' 3"
Structure/Sites Adjacent to Tract						
702A	Dwelling	Foundation only	Foundation only	N	35° 56' 46.4"	84° 22' 52.3"
704A	Dwelling	Foundation only	Foundation only	N	35° 56' 52"	84° 22' 15"
933A	Dwelling	Foundation only	Foundation only	N	35° 57' 50"	84° 22' 23"
40RE197 939A	Dwelling	Partially standing	Foundation only	Y	35° 58' 20"	84° 21' 3"
950A	Dwelling	Foundation only	Foundation only	N	35° 57' 30.5"	84° 22' 41.8"
40RE134	Archeological site	—	—	N	35° 58' 16.3"	84° 20' 46.4"
Silvey	Cemetery	—	—	N	35° 58' 9.9"	84° 21' 26.7"

remains, pottery, bottles, weapon projectiles, and tools) or sites be made during tract development activities, all ground-disturbing activities in the vicinity of the discovery must be halted immediately, the DOE-ORO Cultural Resources Management Coordinator must be contacted, and consultation with the Tennessee SHPO must be initiated and completed prior to any further disturbance of the discovery-site area. In addition, sites 40RE195 and 40RE200 will be periodically inspected by DOE-ORO representatives throughout the term of the lease to ensure site integrity has not been compromised.

DETERMINATION: DOE-ORO, pursuant to 36 CFR 800.4(c) and in consultation with the Tennessee State Archeologist, has determined that structures 40RE195 and 40RE200 (inside tract boundary) and 40RE197 (outside tract boundary) are eligible for inclusion in the NRHP and that all other known structures/sites located within and immediately adjacent to the tract are not eligible for inclusion in the NRHP. Based on the terms

that are to be outlined in the lease agreement, DOE-ORO has determined that leasing the 1000-acre tract to the ETEC and the subsequent commercial development of the tract will have no adverse effect on any properties (1) included or eligible for inclusion in the NRHP or (2) on the McKamey-Carmichael and Silvey cemeteries.

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24. CULTURAL ITEMS

the premises, not fully compensated by insurance which results from willful misconduct, lack of good faith, or failure to exercise due diligence on the part of the Lessee.

23. ENVIRONMENT - The Lessee shall not unlawfully pollute the air, ground or water or create a public nuisance. The Lessee shall use all reasonable means available to protect the environment and natural resources from damage arising from this Lease or activities incident to it and, where damage nonetheless occurs, the Lessee shall be liable to restore the damaged resources. The Lessee shall at no cost to DOE promptly comply with present and future Federal, State, and local laws, ordinances, regulations, or instructions controlling the quality of the environment. This does not affect the Lessee's right to contest their validity or enjoin their applicability. The Lessee shall not be responsible for pollution caused by others. If the Lessee discovers contamination on the premises, the Lessee shall immediately cease activities and notify DOE's Local Program Representative.

24. CULTURAL ITEMS

(a). General - The Lessee shall not remove or disturb, or cause or permit to be removed or disturbed, any historical, archaeological, architectural, or other cultural artifacts, relics, vestiges, remains (human or otherwise), or objects of antiquity. In the event such items are discovered on the premises, the Grantee shall immediately notify DOE's Realty Officer or Local Program Representative and protect the site and the material from further disturbance until DOE gives clearance to proceed.

(b). Specific - Any cemeteries located within the surveyed boundary of the leased premises shall be fenced and excluded from this lease and shall remain in their same location as a separate land unit. Said cemeteries shall not be disturbed by the Lessee or sublessee(s) and perpetual public ingress and egress to the cemeteries shall be provided at all times. No land-altering or development activities shall be allowed or conducted within Archaeological Survey Sites (millsites) 40RE195 and 40RE-200 or within a 100-foot buffer area surrounding these protected areas. These sites are depicted on Exhibit "--", attached and made a part of this Lease. Prior to any ground disturbances within an approximate 80-acre area located near the confluence of East Fork Poplar Creek and Poplar Creek, said location depicted on Exhibit "--", the Lessee or sublessee(s) shall conduct an archeological survey and provide said survey to DOE. No land-altering or development activities shall proceed within this area until DOE provides clearance to do so. Should any unanticipated discovery of cultural materials be made, the provisions of (a). above shall apply.

25. LAWS, ORDINANCES, REGULATIONS - The Lessee shall comply with all applicable laws, ordinances, and regulations of the Federal Government, State, county, and municipality wherein the leased premises are located with regard to egress, construction, sanitation, safety, licenses or permits to do business, and all other matters. The Lessee shall comply with such rules and regulations regarding DOE security, ingress, egress, safety, sanitation, etc. as may be prescribed from time to time by DOE's Local Program Representative. DOE shall have no oversight responsibility for safety and health conditions of commercial or industrial businesses unless specifically noted in the exhibits attached to this Lease.

August 18, 1995

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

Mr. Ray Moore
Environmental Protection
Post Office Box 2001
Oak Ridge, Tennessee 37831-8739

RE: DOE, TRANSFER/1000 ACRES/ETEC, OAK RIDGE, ROANE COUNTY

Dear : Mr. Moore

Pursuant to your request, this office has reviewed your correspondence plus additional covenant documentation relative to the above-referenced undertaking. Based on available information, we concur that the language of the covenant document as written and submitted on August 16, 1995 adequately protects historic properties within the above-referenced parcel

Unless project plans change, and so long as the covenant is made a part of the lease document, this office has no objection to the implementation of this project Should project plans change, please contact this office to determine what additional action, if any, is necessary. Questions and comments may be directed to Joe Garrison (615)532-1559. Your cooperation is appreciated.

Your cooperation is appreciated.

Sincerely,

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

HLH/jyg

APPENDIX J

DISCUSSION OF NATURAL CORRIDORS

APPENDIX J

DISCUSSION OF NATURAL CORRIDORS

J.1 DEFINITION

The term "natural corridor" refers to a strip of natural vegetation native to an area, left uncut, which is wide enough to include interior habitat and species requiring interior habitat (minimum width of 200 feet) and which connects and allows the movement of native species between the natural areas on a site and the natural areas and upland forests off the site.

> "A corridor is a linear landscape feature that connects to a habitat patch of similar characteristics on one or both ends and functions as a route of exchange and movement between the corridor itself and associated patches . . . Corridors differ from patches due to their more linear form and because of the primary ecological functions they perform: the connection of similar habitat types and the exchange of energy and species between these habitats in a landscape . . . Strip corridors are wider than line corridors. In essence, a strip corridor is wide enough to contain an interior element running down the center of the corridor . . . ." (Schiller 1991)

The natural vegetation which will be left uncut to form the natural corridor system on Parcel ED-1 will primarily include a core of hardwood and mixed pine and hardwood forests with small natural wetlands, thickets, and barrens as interior inclusions. Narrow strips of shrubs and meadows may be maintained along the outer edges of natural corridors as additional wildlife habitat and as buffer zones (Fig. J-1).

J.2 FUNCTIONS

The natural corridors described herein would provide the means for retaining the ecological connectivity of natural communities on Parcel ED-1 with natural communities surrounding the parcel. The functions provided by natural corridors include maintenance of natural landscape connectivity necessary to support natural community and ecosystem viability, reduction of erosion and sedimentation impact to aquatic ecosystems, reduction of noise and light pollution, and reduction of visual and aesthetic impact.

Currently, the natural vegetation of Parcel ED-1 is continuous with (connected to) other areas of natural vegetation both on the parcel and outside the parcel, thereby facilitating movement of organisms between habitats. This continuity of natural vegetation provides landscape connectivity for the natural communities. Should development of Parcel ED-1 reduce the natural landscape connectivity of the site by creating barriers to the movement of native species, it would alter the species composition of the natural areas. The species composition of these natural areas is critical to the functioning of the ecosystems of which they are a part. Furthermore, according to Schiller (1991), "As a landscape is fragmented, it is the remaining corridors of natural vegetation that continue the exchange functions that are critical to maintaining a balanced wildlife community."

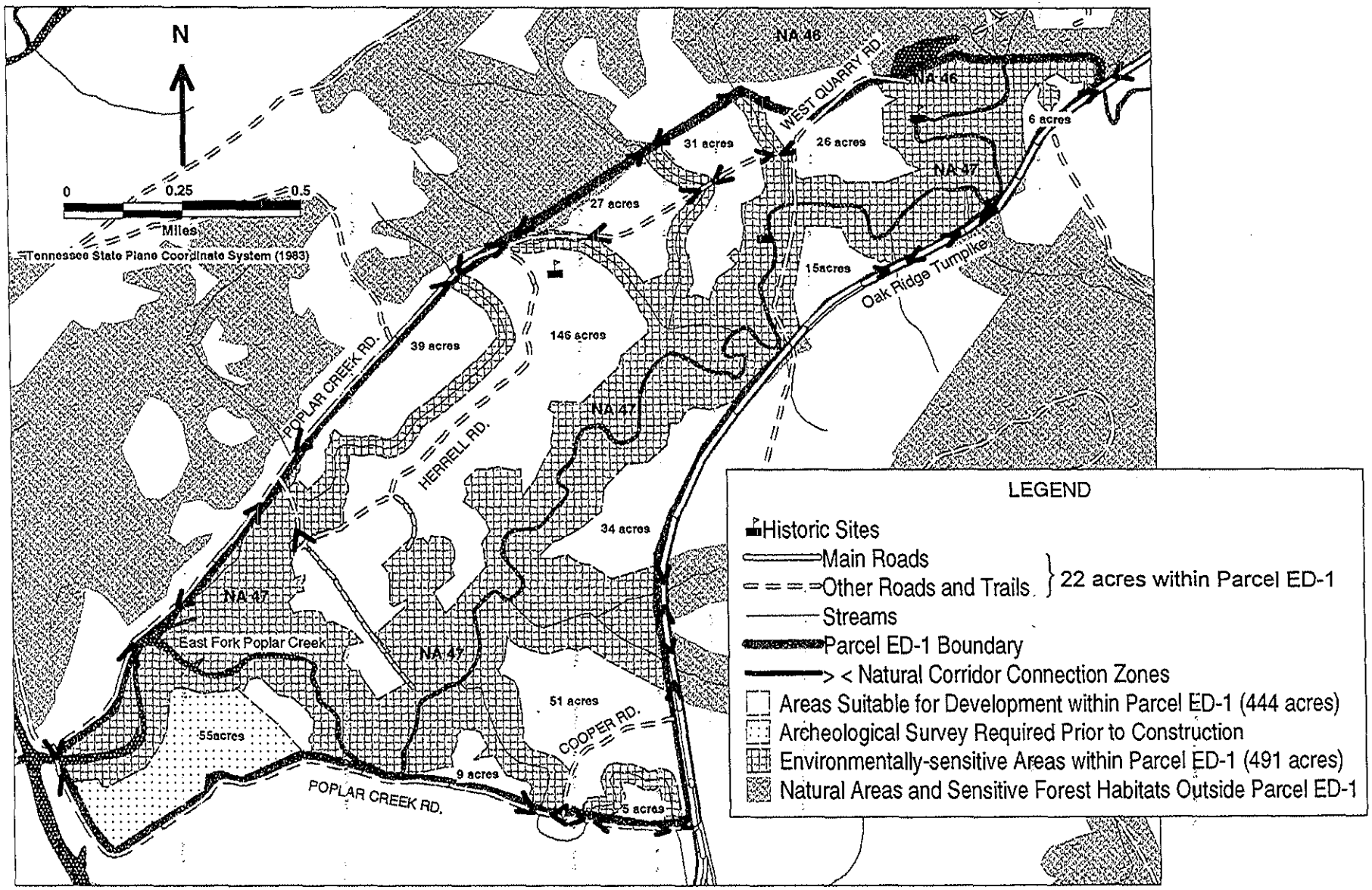

Fig. J-1. Environmentally sensitive areas and natural corridor zones on Parcel ED-1 of the Oak Ridge Reservation.

Many organisms must move between habitats to complete their life cycles. Organisms may be required to move between habitats in the course of foraging (hunting for food), breeding, nesting, dispersal of offspring to new locations, and seasonal migration. Most obvious are the movements of large mammals such as deer and the seasonal migrations of birds between breeding and wintering habitats. While the necessity of travel for smaller animals and plants is less obvious, it is equally critical to the maintenance of these populations and the ecosystem functions of which they are a part. For example, species of salamanders in the family Ambystomatidae (such as the rare mole salamander historically reported as present on the ORR and the spotted salamander currently found on the ORR) spend the first part of their life in seasonal ponds within bottomland areas, migrate to upland forests to forage as adults, and then return to the ponds to locate a mate and breed to complete their life cycles. Many species of plants produce some seeds (e.g., burrs and beggar-ticks) which are adapted to be carried to appropriate habitats by clinging to a host animal, or other seeds (e.g., small seeds in berries) which are eaten and carried in the digestive tract of an animal. These plant species will no longer be propagated if their carrier animals either are not present or are obstructed from traveling into areas where the plants can grow. If a plant species becomes locally extinct due to lack of propagation, other species which depend upon it as a resource (i.e., for food or habitat) may also decline in a domino effect, further damaging the ecosystem.

Besides providing habitat and travel routes for biological organisms, natural corridors reduce impacts of erosion and sedimentation on aquatic ecosystems. Natural corridors, especially along roadsides, also reduce the visual impact of development activities by providing a window through which the travelling public can look at the natural landscape (Hobbs et al. 1990).

J.3 BARRIERS

Over time native species typical of a site will decline if they are prevented from completing their life cycles by barriers to movement. Recolonization of a site by organisms from outside the site will also be reduced by such barriers. Barriers to movement include any areas of artificial or natural vegetation, structures, and surfaces that a species has difficulty traversing. In addition, if crossing an area results in an increased death rate for the species, that too constitutes a barrier. A natural area isolated by such barriers may come to lack the diversity and ecosystem functions necessary to support even those species which are able to make it to the site.

> ". . . to some species an expansive clearcut . . . may appear as no barrier whatsoever, while another species could be totally marooned by the same conditions . . . The existence of riparian forest that could be used as a dispersal corridor was critical to the distribution of many species. Yet an additional indirect effect of [habitat] isolation is of special importance to animals. Because the dispersal of plants to isolated habitats is as problematic as is the dispersal of animals, isolation may also have the effect of reducing plant resource diversity and habitat quality. Thus, even if an animal species reaches a given island, the habitat might not be sufficiently diverse and complex to support it. [It is] concluded that both the impoverishment of bird species and the lower density of species that occurred on Great Basin mountains were due to the impoverishment of plant and insect groups upon which the birds depend for food and habitat" (Harris 1984).

Retention of natural corridors will help to preserve some of the existing natural landscape connectivity of Parcel ED-1. Furthermore, Schiller (1991) states, "According to the principles of landscape ecology, the higher the connectivity of otherwise isolated patches, the better the chances for large-scale, long term wildlife conservation."

Road crossings and resulting road kills can be reduced using bridges or culverts to create "underpasses" in combination with fence funnels to direct animals through the "underpass."

> "Though most ecologists agree that maintaining or enhancing natural connectivity in the landscape is a sound ecological principle for wildlife conservation, there are some examples where corridors have been detrimental. For example, I was made aware of a situation in Raleigh, North Carolina where a bobcat, moving along a riparian corridor from a large state park into the city, was killed by an automobile as it tried to cross a highway that bisected the corridor. In essence, the corridor had led the bobcat down a path that did not truly connect to a patch of appropriate habitat, and thus the cat was killed" (Schiller 1991).

Where feasible, artificial disruptions and obstacles such as roads, paved or gravel surfaces, and fences should be removed from the natural corridor area. Continuity of the natural corridors is obviously important to small animals such as reptiles and amphibians which have limited ability to successfully cross areas such as roads. However, even birds are affected by lack of habitat continuity (particularly the declining neotropical migrants). Due to edge effects (see Sect. J.4), even small forest interruptions, such as unpaved roads as little as 8 meters wide (forest-dividing corridors), could impact native bird species by events such as increased nest parasitism by brownheaded cowbirds (*Molothrus ater*) (Rich et al. 1994).

J.4 DIMENSIONS AND EDGE EFFECTS

For a natural vegetation strip to maintain landscape connectivity between interior forest habitats, the corridor itself must be wide enough to contain interior habitat. Interior habitat is that portion of a community that is far enough from the edges of the community to be sheltered from edge effects. A number of bird species (particularly the declining neotropical migrants) are known to require interior habitat; bird species from the ORR requiring interior habitat are listed in Table J-1. Edge effects may include increased exposure to sunlight, electric light at night, heat, dryness, wind, air pollution, chemical pollution, noise, human disturbance, competition with weeds, parasitism, and predation.

> "Corridor dynamics are dominated by external rather than internal influences unless they are wide enough for there to be an 'interior' portion which is uninfluenced by edge effects. Edge effects include physical and chemical effects such as increased insolation [sunlight penetration] and wind damage, inputs of nutrients, herbicides and pesticides, and biotic effects such as invasion by weedy species or pathogens and increased predation and mortality . . . Under certain conditions a corridor could act as a sink or 'death-trap' in which dispersing individuals could be more likely to suffer mortality, e.g. through predation" (Hobbs et al. 1990).

Ensuring that a forested natural corridor is a minimum of 200 feet wide allows for the maintenance of some interior habitat which is sheltered from edge effects, according to current research.

Table J-1. Bird species of the ORR which require forest interior conditions.[a]

Species	ORR Usage	ORR verification
Acadian Flycatcher	summer breeding	current
Black and White Warbler	summer breeding	current
Black-throated Blue Warbler	spring/fall migration stop-over	current
Black-throated Green Warbler	spring/fall migration stop-over	current
Blackburnian Warbler	spring/fall migration stop-over	current
Cerulean Warbler	spring/fall migration stop-over (historic record for breeding)	current
Golden-crowned Kinglet	wintering site	historic record only
Hermit Thrush	wintering site	current
Hooded Warbler	summer breeding	current
Kentucky Warbler	summer breeding	current
Louisiana Waterthrush	spring/fall migration stop-over (historic record for breeding)	current
Northern Parula	summer breeding	current
Ovenbird	summer breeding	current
Pileated Woodpecker	resident throughout year	current
Prothonotary Warbler	summer breeding	current
Scarlet Tanager	summer breeding	current
Sharp-shinned Hawk	resident throughout year	current
Swainson' Thrushs	spring/fall migration stop-over	historic record only
Swainson' Warbles	spring/fall migration stop-over	historic record only
Veery	spring/fall migration stop-over	historic record only
Winter Wren	wintering site	historic record only
Wood Thrush	summer breeding	current
Worm-eating Warbler	summer breeding	current
Yellow-throated Warbler	summer breeding	current

[a]Bird species requiring forest interior conditions are identified by Hamel (1992) in *The Land Manager's Guide to Birds of the South*, Appendix G. Data on ORR usage and verification was provided by Jason Mitchell, JAYCOR Environmental, in a personal communication to Deborah Awl, October 1995.

"Width is important in the structure and function of corridors . . . Width controls the amount of edge to interior habitat that is found in the corridor and also affects the penetration of outside disturbances (noise, light, airborne pollutants, etc.) into the corridor. Because of the effect of corridor width on habitat type and habitat proportion in a corridor, conserving the width of natural corridors can often be useful for assuring that a particular corridor contains habitat types for several principal wildlife species throughout its length . . . Edge effects generally penetrate into a forest fragment 10-15 meters from the forest fragment's boundary . . . and [sometimes] 30 meters into the fragment . . . This would mean that a wooded corridor would have to be at least 30 to 60 meters wide to contain an interior forest element, depending on individual site conditions. It would seem logical to use widths closer to 60 meters for long term maintenance of the interior" (Schiller 1991).

It may be necessary for species with limited range of movement (plants and small animals) to reside within the corridor in order for the corridor to be functional in the dispersal of these species. The corridor must therefore also be wide enough to contain appropriate habitat for these species. According to Harrison (1992), "the width of the corridor may be estimated from data on home range sizes and shapes . . . in addition to this minimum width, the corridor must be wide enough to maintain the desired habitat against penetration of other vegetation types from the edges.

J.5 LOCATION CRITERIA

The following criteria were used to identify appropriate locations for natural corridors on Parcel ED-1:

- presence of natural vegetation with a minimum width of 200 feet;
- absence of obstruction to native species movement (e.g., fences and roads either not present, removable, or avoidable);
- connection of natural vegetation on-site (particularly bottomland forest) to natural vegetation off-site (particularly upland hardwood forests north of the site);
- connection of natural areas within Parcel ED-1 to natural areas outside Parcel ED-1; and
- use of 100-year floodplain or stream buffer zones as natural area connectors where they cross the Parcel ED-1 boundary into natural areas outside the parcel.

Suitable locations for connecting natural corridors across the Parcel ED-1 boundary (Natural Corridor Connection Zones) are shown in Fig. J-1. Because many of the sensitive natural features on Parcel ED-1 are fairly well grouped within and adjacent to the riparian zones (Fig. J-2, J-3, J-4, and J-5), and since these zones are mostly excluded from development under regulatory requirements that preclude disturbance of the 100-year floodplains on Parcel ED-1, locating natural areas and connecting corridors becomes fairly straightforward (Fig. J-1). Stream corridors are preferred locations for natural corridors because (1) they contribute as aquatic ecosystems and (2) the buffer zones needed for erosion control and maintenance of water quality provide sufficient width for supporting a fully functioning natural corridor (e.g., which contains an interior element for the movement of wildlife dependant on that habitat) (Schiller 1991).

The location of a natural corridor must be such that it connects at both ends to extant natural areas that will be maintained in a long-term natural state. Otherwise, instead of connecting, the corridor will lead wildlife away from appropriate habitat (e.g., the upland forest north of Parcel ED-1) to a nonsupporting habitat at the other end.

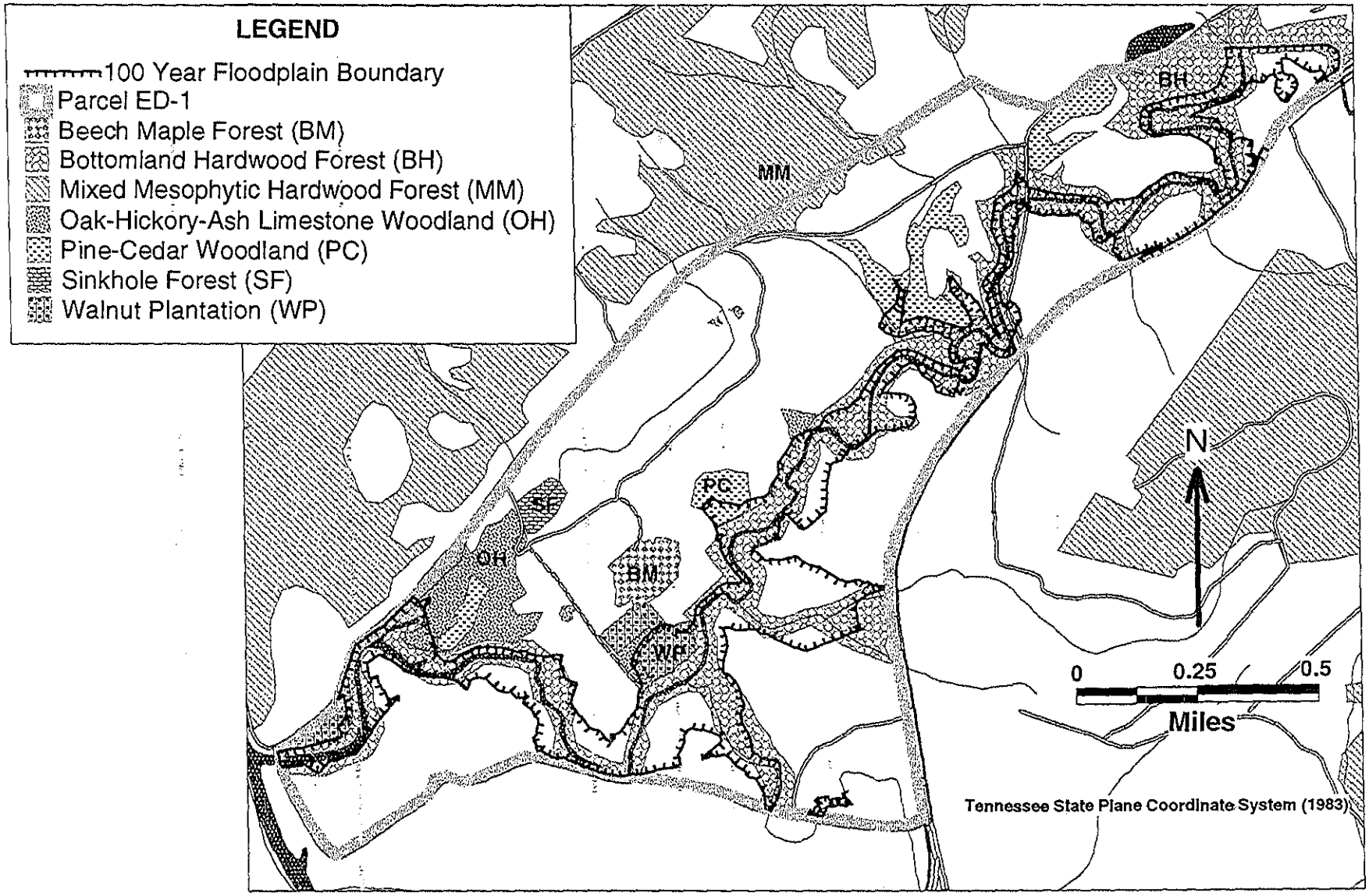

Fig. J-2. East Fork Poplar Creek 100-year floodplain and vegetation communities providing significant wildlife habitat on Parcel ED-1 of the Oak Ridge Reservation.

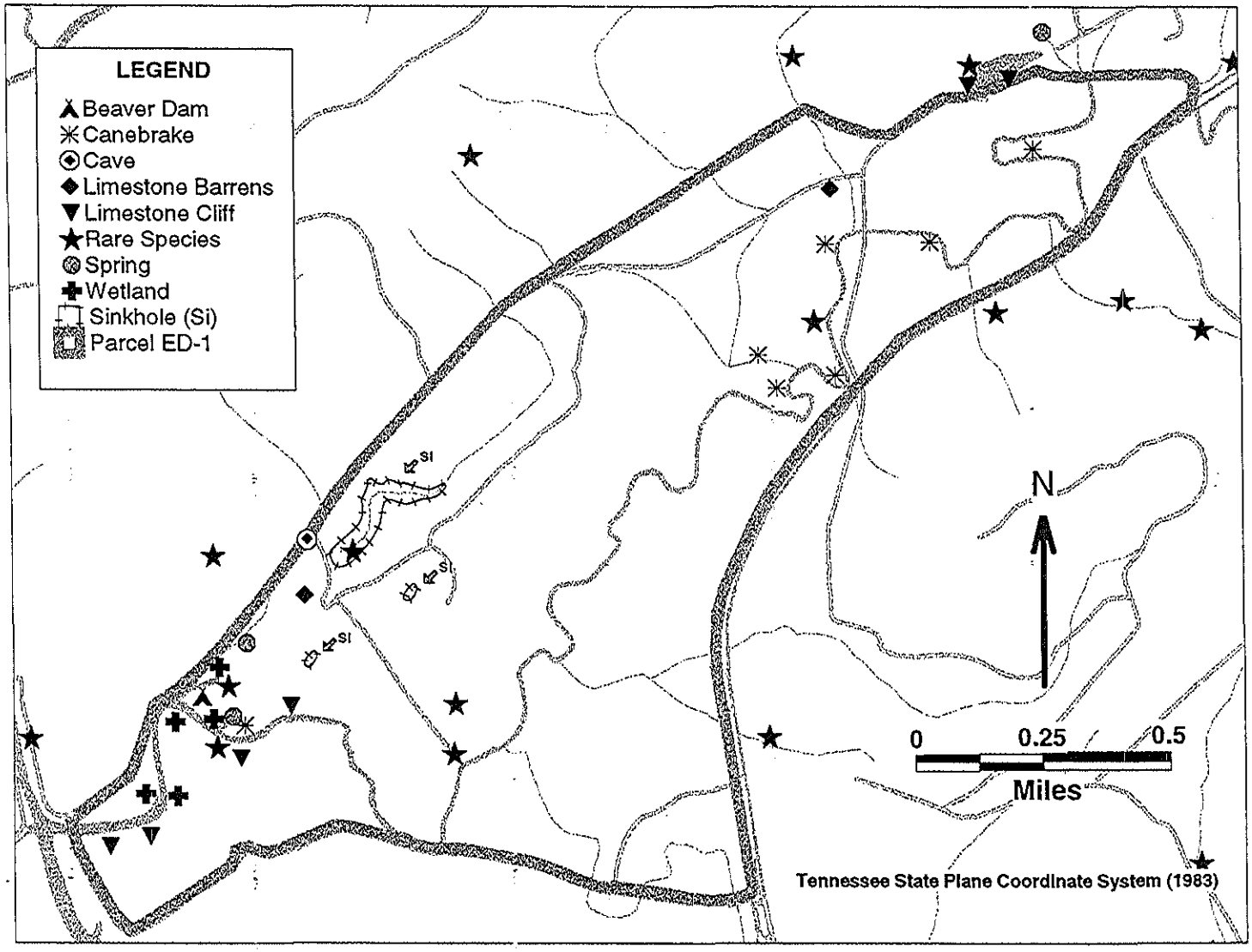

Fig. J-3. Sensitive features within and adjacent to Parcel ED-1 of the Oak Ridge Reservation.

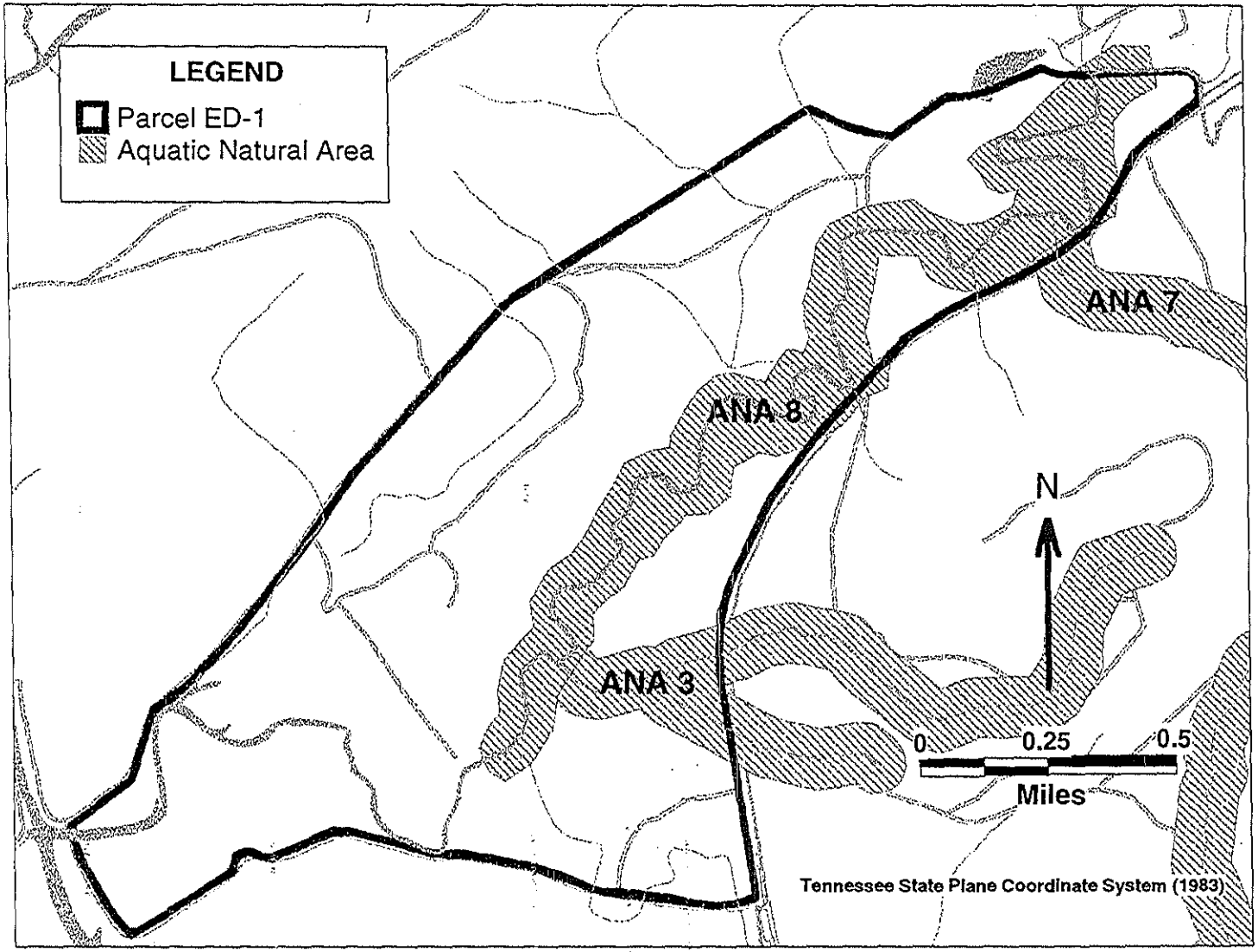

Fig. J-4. Aquatic natural areas (ANAs) within and adjacent to Parcel ED-1 of the Oak Ridge Reservation.

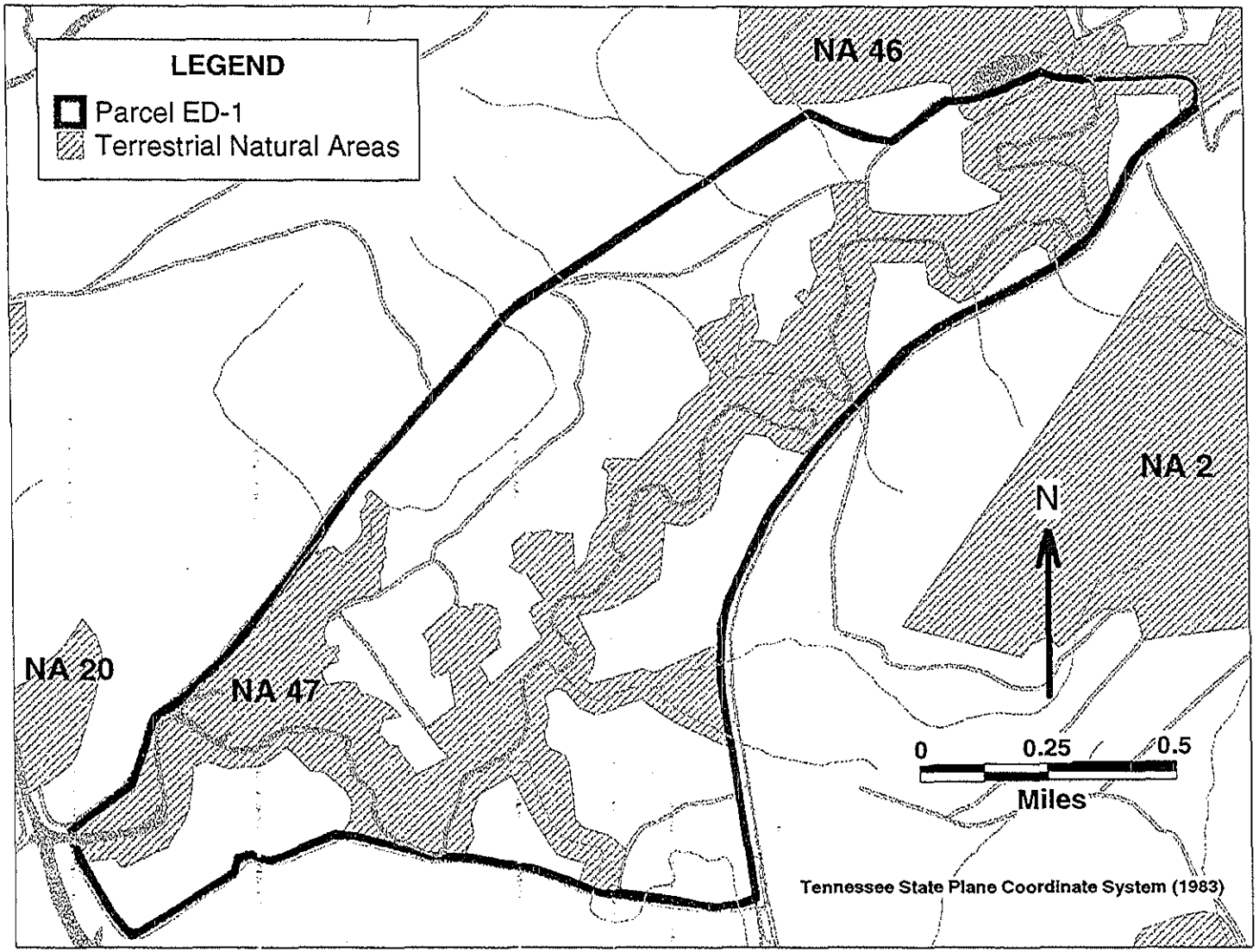

Fig. J-5. Terrestrial natural areas (NAs) within and adjacent to Parcel ED-1 of the Oak Ridge Reservation.

"Corridor integrity must be maintained for successful urban wildlife conservation, or the corridors may instead function as peninsulas, siphoning wildlife away from a reserve or a large population, rather than acting as connections between otherwise isolated habitat patches" (Schiller 1991).

J.6 DESIGN AND MANAGEMENT OF NATURAL CORRIDORS

Heinen and Merriam (1990) found that "corridors may have different survivability values depending on their size and the degree of cover they provide . . . corridor quality is an important element of connectivity. It contributes substantially to the effects of fragmentation and should be carefully considered by landscape planners." Schiller (1991) lists the following guidelines:

"- To preserve patch connectivity, there should be as many alternate routes (corridors) and patches connected together in a landscape structure as possible.

- Corridors should be as wide and continuous as possible.

- Corridors should maintain continuous habitat types throughout.

- Corridors should be functionally (and not just visually) connected to other patches of similar habitat so that they can perform efficiently as routes for species and energy exchange.

- A poorly connected or overly fragmented corridor will function like a peninsula, possibly siphoning species populations away from a reserve by increasing mortality along these fragmented or peninsular routes.

- Corridors should provide a system with ecological connections for all of the principal habitat types that are required for a diverse and characteristic wildlife community."

Furthermore, bridges or culverts should be used where roads cross corridors and natural areas to create underpasses in combination with fence funnels (to direct animals through the "underpass") to reduce road crossings and the resulting road kills.

Management of natural corridors must be directed toward maintaining the corridors in natural vegetation native to the area, preventing fragmentation within the corridors themselves, and maintaining the natural areas to which the corridors connect. Whenever feasible, artificial disruptions and obstacles, such as roads, paved or gravel surfaces, and fences, should be removed from the natural corridor area to improve continuity and reduce fragmentation. Cutting of trees within the corridors should be strictly limited to emergencies, required maintenance around bridges and other structures, and safety measures. Some cutting and mowing may be done within buffer zones along the edges of the natural corridors to maintain the successional stage of the edge vegetation and thereby provide additional wildlife habitat. Invasive non-native (exotic) species should not be planted within or adjacent to natural corridors. Strict

control and planning of activities within and around the corridor should be aimed at preventing the creation of new obstructions to species movement within the corridor and further fragmentation of the corridor. Specifically, careful planning should be done to prevent additional fencing, new roads, and utility corridors from dividing the natural corridors. Buffer zones should be created where detrimental activities would take place near the corridor (Harrison 1992).

In addition, native species to which wildlife are not attracted should be utilized in landscaping around buildings on-site to avoid attracting wildlife out of the natural area and corridor system. A list of appropriate species can be provided by Tennessee Wildlife Resources Agency.

J.7 REFERENCES

Hamel, P. B. 1992. *The Land Manager's Guide to the Birds of the South*, The Nature Conservancy, Chapel Hill, N. C.

Harris, L. D. 1984. *The Fragmented Forest*, The University of Chicago Press, Chicago, Ill.

Harrison, R. L. 1992. "Toward a Theory of Inner-Refuge Corridor Design," Conservation Biology 6(2):293-295.

Hobbs, R. J., Hussey, B. M. J., and Saunders, D. A. 1990. "Nature Conservation: The Role of Corridors," Journal of Environmental Management 31:93-94.

Rich, A. C., Dobkin, D. S., and Niles, L. J. 1994. "Defining Forest Fragmentation by Corridor Width: The Influence of Narrow Forest-Dividing Corridors on Forest Nesting Birds in Southern New Jersey," *Conservation Biology* 8(4):1109-1121.

Schiller, A. 1991. "Wildlife Conservation in Urban Greenways of the Mid-Southeastern United States," M. S. thesis, The University of Tennessee, Knoxville.

APPENDIX K

CORRESPONDENCE FOR CERCLA AND HAZARDOUS SOLID WASTE AMENDMENTS NOTIFICATION REQUIREMENTS

Department of Energy

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

August 11, 1995

Mr. Victor Weeks
U.S. Environmental Protection
Agency, Region IV,
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Mr. Doug McCoy, FFA Project Manager
DOE Oversight Division
Tennessee Department of Environment
and Conservation
761 Emory Valley Road
Oak Ridge, Tennessee 37830-7072

Gentlemen:

PROPERTY LEASE TO THE EAST TENNESSEE ECONOMIC COUNCIL

In accordance to Section XLIII, entitled "Property Transfer," please find enclosed the Environmental Review of Parcel ED-1 under Section 120(h) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This review has been attached to the Lease as Attachment C. Section 39 of this lease also warrants that any remedial action found to be necessary after the effective date of the lease shall be conducted by the Department of Energy.

Senator Frist, Congressman Wamp, and Secretary O'Leary have requested that the lease for this 1000 acre parcel to the East Tennessee Economic Council become effective on September 1, 1995. Therefore, I am requesting that the review and approval of this CERCLA 120(h) Review of Parcel ED-1 by the Environmental Protection Agency and the Tennessee Department of Environment and Conservation be completed by August 21, 1995. I acknowledge the short review and approval period, and sincerely appreciate your time and efforts in assisting DOE in meeting this goal.

If you have any questions or require additional information, please call Gary Bodenstein at (615) 576-9429.

Sincerely,

for W. Nelson Lingle, Chief
Oak Ridge Remediation Branch
Environmental Restoration Division

Enclosure

cc:
K. Kates, AD-42, ORO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
345 COURTLAND STREET N.E.
ATLANTA, GEORGIA 30365

AUG 21 1995

4WD-FFB

Mr. W. Nelson Lingle, Chief
Oak Ridge Remediation Branch
Environmental Restoration Division
U.S. Department of Energy
Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831-8541

SUBJ: IDENTIFICATION OF UNCONTAMINATED PROPERTY
OAK RIDGE RESERVATION, OAK RIDGE, TENNESSEE

Dear Mr Lingle:

In accordance with Section 120(h)(4)(B) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, the Environmental Protection Agency (EPA) concurs with the Department of Energy's (DOE's) identification of uncontaminated property within Parcel ED-1. Based on the "Review of Parcel ED-1", EPA concurs with DOE's determination that there is no evidence of any storage, release or disposal of any hazardous materials or petroleum products on Parcel ED-1 outside of the floodplain sediments of East Fork Poplar Creek and Bear Creek.

On Page 3 and Page 10 of the "Review of Parcel ED-1" DOE states that an unsuccessful attempt was made to contact EPA for information concerning Parcel ED-1. EPA has reviewed its files and has determined that no information with respect to contamination exists concerning Parcel ED-1. Prior to it being incorporated into the final lease agreement as Attachment C, EPA requests that the "Review of Parcel ED-1" be modified to document EPA's determination concerning this parcel. For future reference, EPA does not consider contact via telephone an official inquiry. As required by Section XXV (Notification) of the Federal Facility Agreement (FFA) official inquiries must be documented by correspondence via certified mail.

Due to the contaminated floodplain sediments, the lease should contain a CERCLA 120(h)(1) notice in the form and manner provided by regulations at 40 CFR Part 373, including the level of detail as set forth in 40 CFR Part 373.3(a) and a prominent recitation of the precise statement specified at 40 CFR 373.3(b).

As well, the lease must provide notice of the existence and purpose of the FFA as required by Section XLIII (Property Transfer) of the FFA. The lease must provide for continued DOE access pursuant to the requirements of the FFA. Also, consistent with the purposes of the FFA, the lease should specify in detail any landuse restrictions or requirements (e.g., fish consumption advisories) necessary to protect human health and the environment.

For future reference concerning property sales or other transfers, please see the enclosed 1994 Memorandum of Understanding (MOU) among EPA and the Department of Defense. Such MOU was entered into to facilitate 120(h) property transfers. EPA recommends that DOE consider the MOU's documentation requirements and model lease provisions for future property transfers of this type.

Please provide EPA with a copy of the final lease agreement for Parcel ED-1. If you have any questions regarding this matter, please contact me directly at (404) 347-3016 or by voice mail at (404) 347-3555 extension # 6461.

Sincerely,

Victor L. Weeks
FFA Project Manager
Federal Facilities Branch

Enclosure

cc: Mr. Doug McCoy, TDEC
Ms. Pat Halsey, DOE-OR