ETEC--97000422

MITIGATION ACTION PLAN

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

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DISCLAIMER

LIST OF FIGURES

ACRONYMS

BC	Bear Creek
BMAP	Biological Monitoring and Abatement Program
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
EA	environmental assessment
EFPC	East Fork Poplar Creek
ESD	Environmental Sciences Division
ETEC	East Tennessee Economic Council
FONSI	finding of no significant impact
FWS	U.S. Fish and Wildlife Service
MAP	Mitigation Action Plan
NEPA	National Environmental Policy Act
NPIFP	National Partners In Flight Program
ORNL	Oak Ridge National Laboratory (X-10)
ORR	Oak Ridge Reservation
T&E	threatened and/or endangered
TDEC	Tennessee Department of Environment and Conservation
TWRA	Tennessee Wildlife Resources Agency
TWRC	Tennessee Wildlife Resources Commission

1.0 INTRODUCTION

In April 1996, the U.S. Department of Energy (DOE) completed an environmental assessment (EA) (DOE/EA-1113) for the proposed lease of 957.16 acres (Parcel ED-1) of the Oak Ridge (Tennessee) Reservation (ORR) by the East Tennessee Economic Council (ETEC) for industrial development. DOE plans to issue a Finding of No Significant Impact (FONSI) for the proposed action, conditional upon the implementation of mitigation and monitoring to protect environmental resources. According to DOE's National Environmental Policy Act (NEPA) regulations (10 CFR 1021.322), a FONSI shall include *"any commitments to mitigations that are essential to render the impacts of the proposed action not significant, beyond those mitigations that are integral elements of the proposed action, and a reference to the Mitigation Action Plan prepared under 10 CFR 1021.331"*. Terms of the lease offer DOE the option of terminating the lease with ETEC should the lessee and/or sublessees fail to implement the mitigation defined in the FONSI.

In accordance with 10 CFR 1021.331, this Mitigation Action Plan (MAP) describes measures to be implemented to mitigate significant adverse impacts from industrial development on Parcel ED-1. Mitigation will be accomplished by (1) excluding areas on Parcel ED-1 from disturbance and development and (2) conducting surveys and monitoring of industrial development areas prior to disturbance (predevelopment) and during industrial operations (postdevelopment). The objectives of these measures include (1) protection of wildlife habitat, plant communities, threatened and endangered species, water resources, wetlands, and historic and archaeological resources; (2) maintenance of habitat connections to reduce the ecological effects of fragmentation; (3) pre- and postconstruction assessment of natural succession and impacts of development by collection of data during monitoring of natural communities and populations; and (4) identification of additional mitigation, as needed, to remediate the actual effects of development.

At a minimum, DOE will publish annual progress reports on the implementation of mitigation. This MAP may be revised as data are collected and Parcel ED-1 is developed. Copies of the MAP may be reviewed at and annual reports may be obtained from

DOE Public Reading Room
55 Jefferson Circle, Rm 112
Oak Ridge, Tennessee 37831.

2.0 PROTECTION OF ECOLOGICAL RESOURCES

2.1 PREDEVELOPMENT MITIGATION

2.1.1 Exclusion Areas

Predevelopment mitigation of adverse impacts will be based on exclusion of certain areas of the parcel from development and encroachment. Fig. MAP-1 shows exclusion areas (approximately 491 acres) and areas available for development (approximately 444 acres) with existing roads accounting for about 22 acres of the parcel. Exclusion areas include the 100-year floodplain of on-site streams [East Fork Poplar Creek (EFPC) and its tributaries]; designated natural areas [including bottomland hardwood forests, upland hardwood habitat, areas with features of special value for wildlife (e.g., beech-maple forest, karst hardwood communities, and walnut plantations)]; aquatic natural areas (e.g., Tennessee dace habitat); archaeological and historic sites; special features (caves, springs, and wetlands); wildlife corridors; and stream buffers (Figs. MAP-1 and MAP-2). An archaeological survey will be necessary prior to disturbance in an 80-acre area at the west end of the parcel (Fig. MAP-1). Surveys within the areas available for development may result in the identification of additional exclusion areas.

2.1.2 Unavoidable Encroachment

Some linear developments, such as construction of site access roads and installation of utilities that cross streams, may require unavoidable encroachment in floodplains, streams, and stream buffers. The impacts of such activities would be the subject of further environmental review, including NEPA. However, development and encroachment will not be allowed in Natural Areas 46 and 47 (Fig. MAP-3); natural corridors (Fig. MAP-4); beech-maple forest (Fig. MAP-1); cave and spring areas (Fig. MAP-2); Aquatic Natural Areas (ANAs) (Fig. MAP-5); and wetlands (Fig. MAP-2). In floodplain, stream, or stream buffer areas in which encroachment is unavoidable, the following restrictions will apply:

- The proposed area will be surveyed at the appropriate time of year for rare species, wetlands, and other sensitive areas (e.g., sinkholes, caves, and springs). These surveys will complement and augment previous and current vegetation, wildlife, and aquatic system monitoring by ORNL ecologists. Survey results may require relocation of the proposed crossing or additional mitigation measures.

- Crossings will be allowed at the edge of the protected area where there is the lowest probability of impacts, or, in the case of a stream crossing, at the narrowest point of the floodplain.

- Road crossings and utility line rights-of-way will be as narrow as practicable.

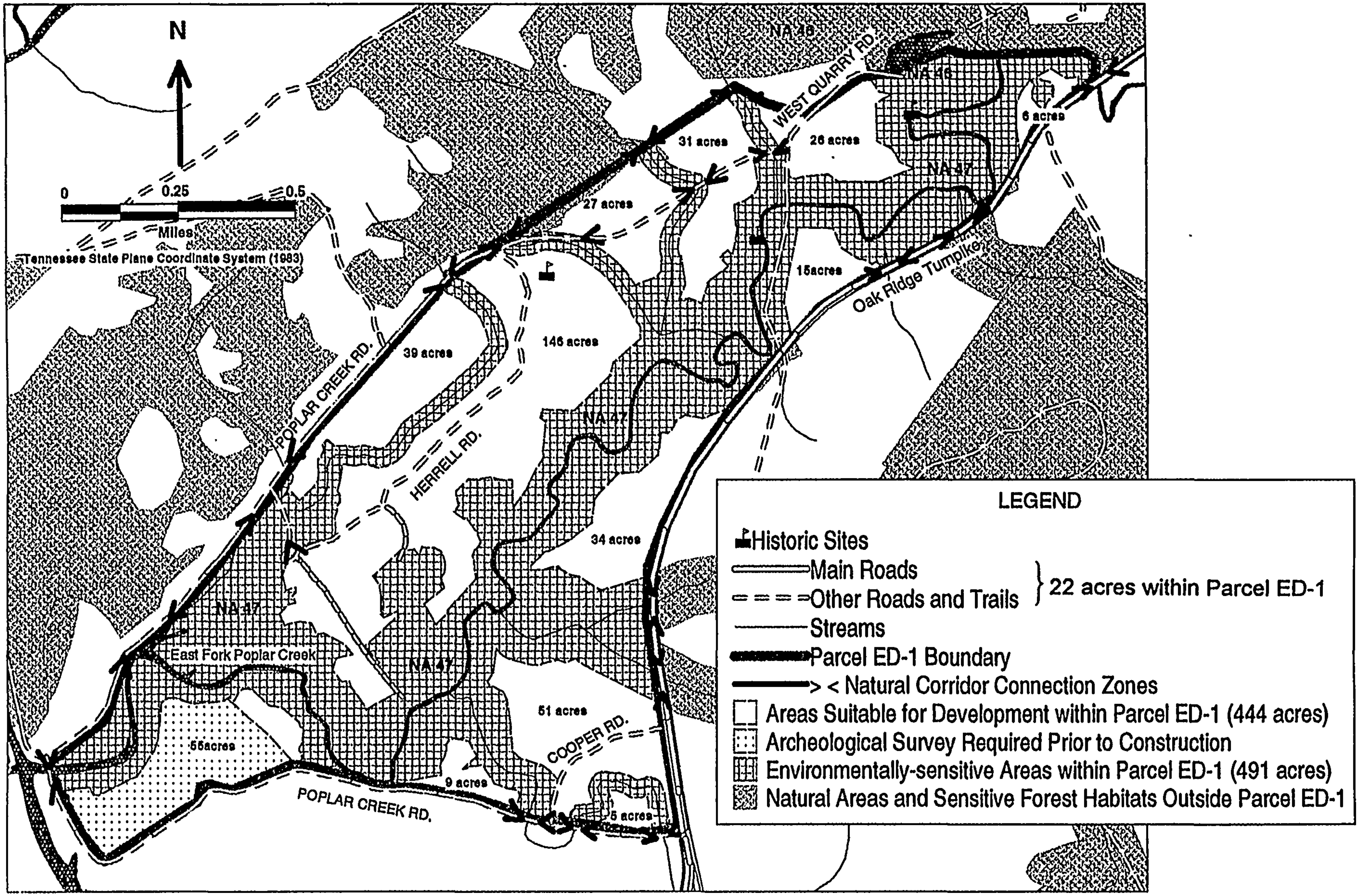


Fig. MAP-1. Areas available for development on Parcel ED-1 of the Oak Ridge Reservation. [Environmentally sensitive areas include the 100-year floodplain, 100-foot stream buffers, Natural Areas (NAs), and sensitive forest habitats.]

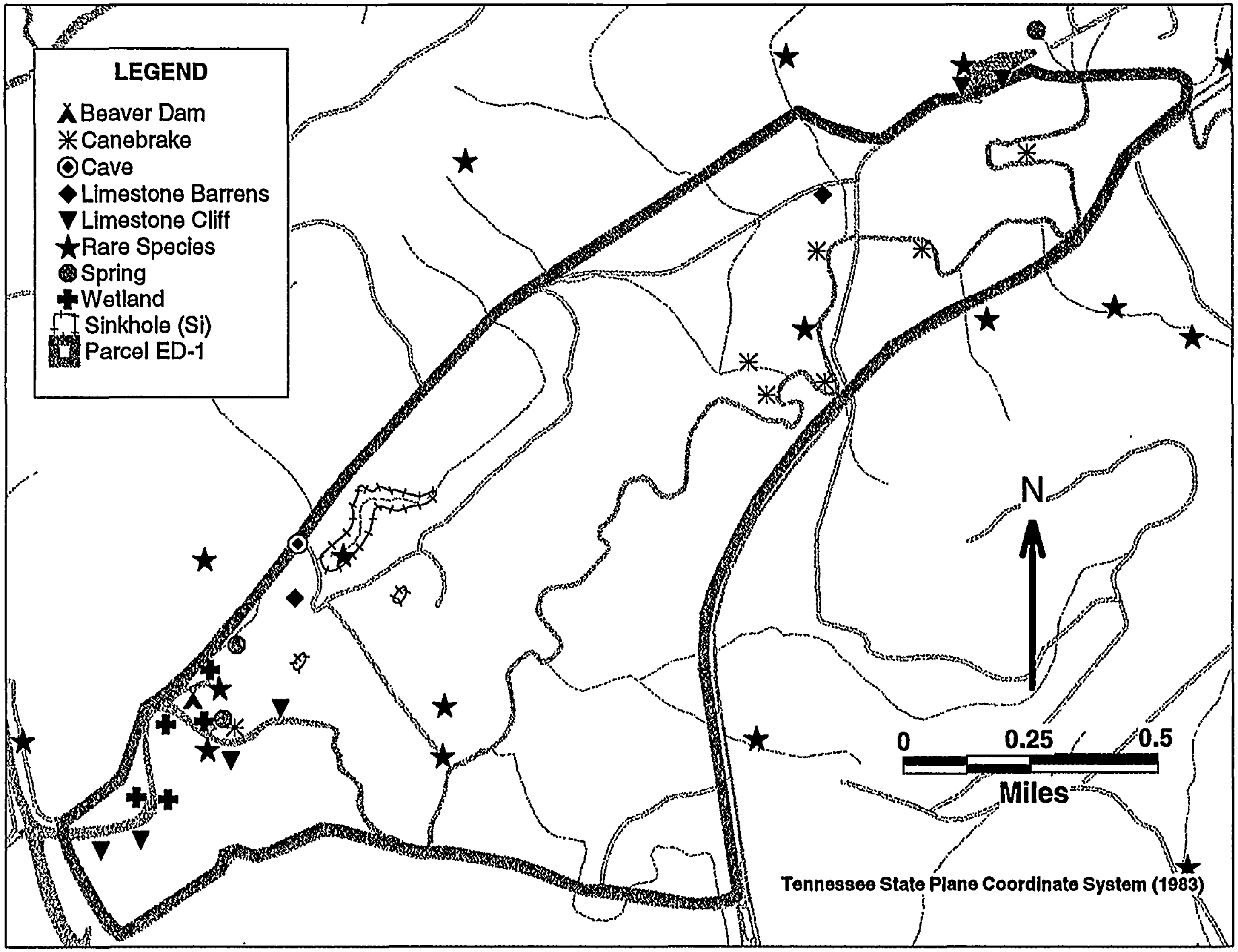


Fig. MAP-2. Sensitive areas within and adjacent to Parcel ED-1 of the Oak Ridge Reservation.

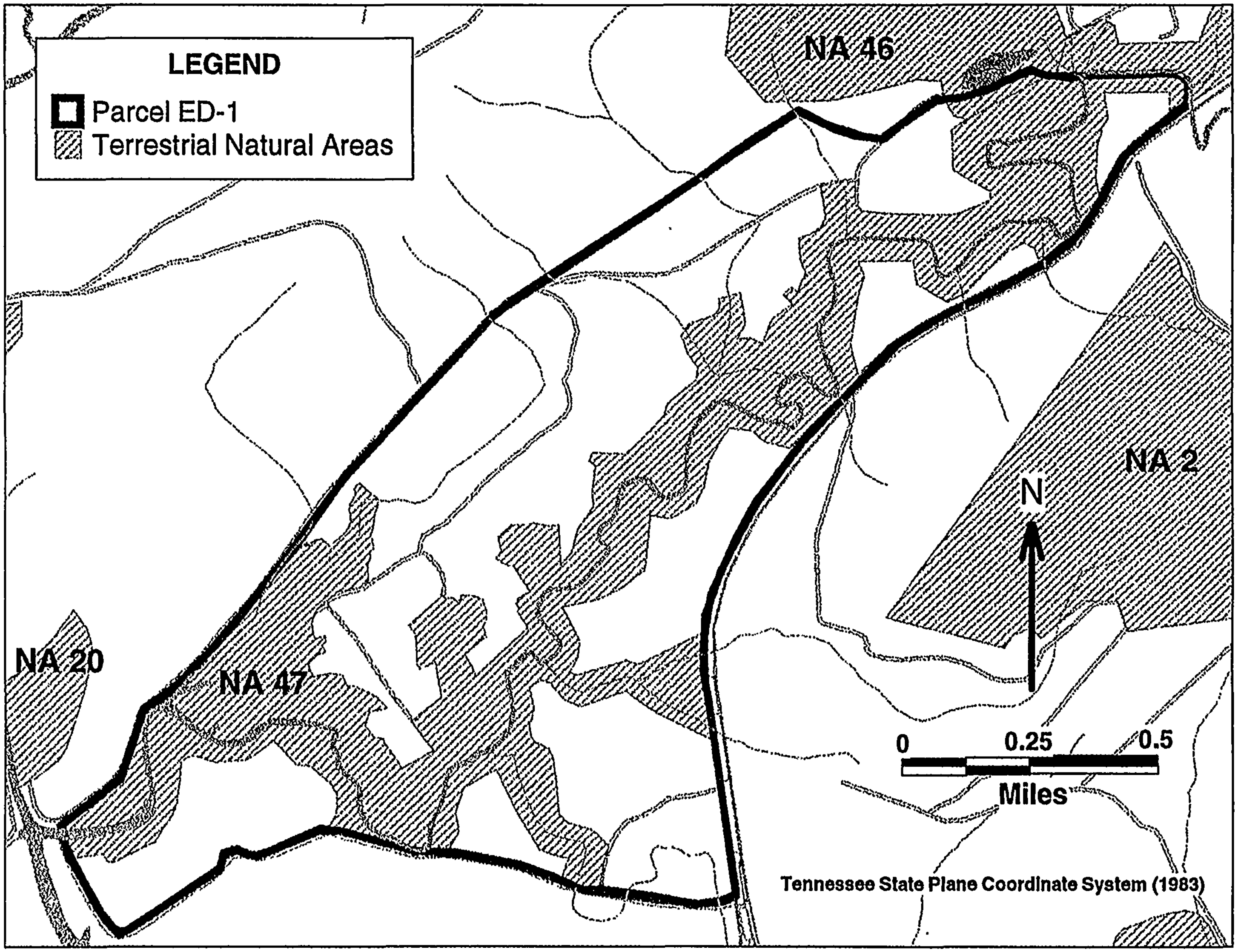


Fig. MAP-3. Terrestrial Natural Areas (NAs) on Parcel ED-1.

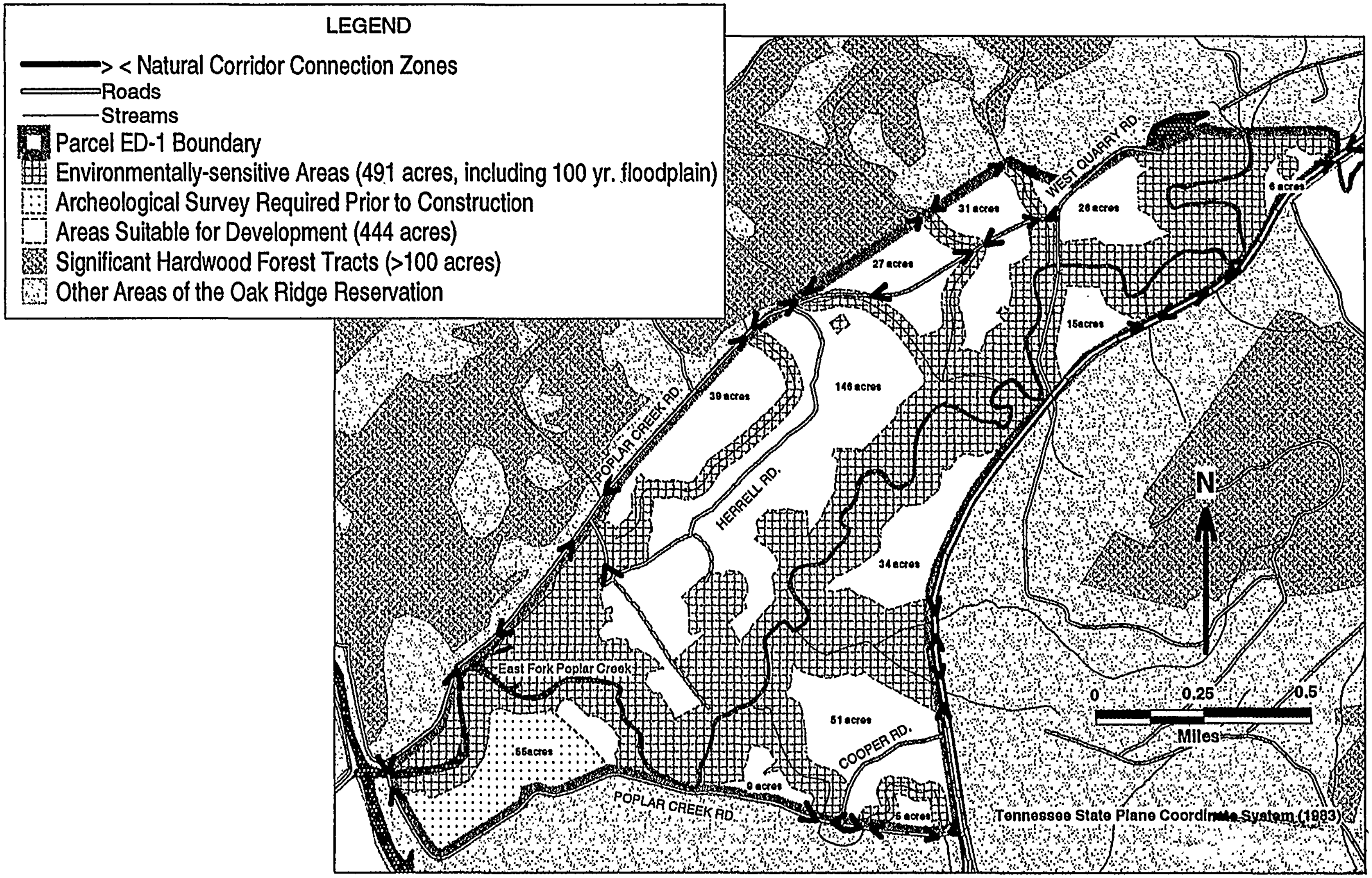


Fig. MAP-4. Natural corridors and connections zones on Parcel ED-1.

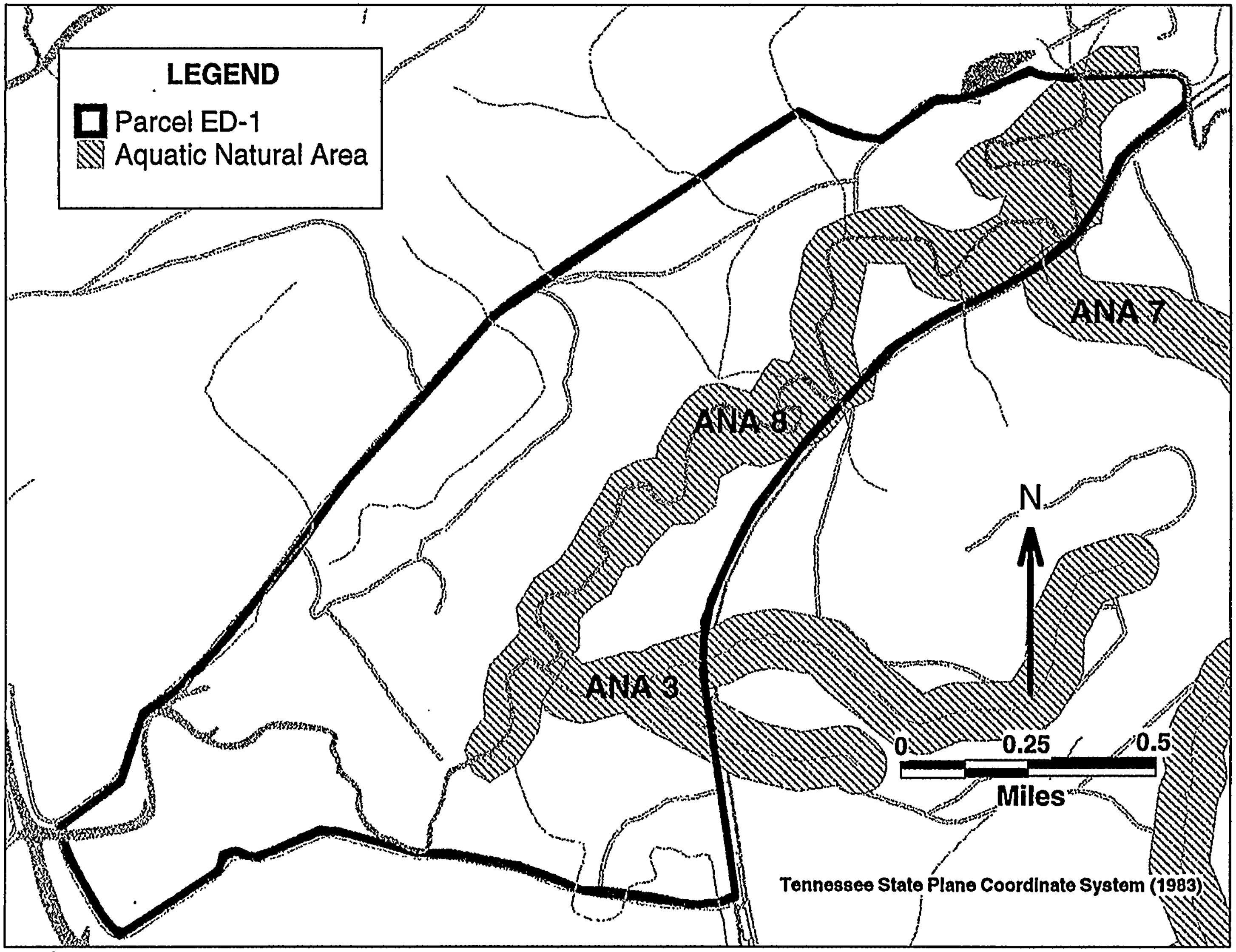


Fig. MAP-5. Aquatic Natural Areas (ANAs) on Parcel ED-1.

- Stream crossings of EFPC and its main tributaries will use bridges instead of culverts to reduce fragmentation and maintain dispersal corridors.

- Cleared areas will be regraded to original contours when feasible and replanted with native vegetation.

2.2 PREDEVELOPMENT MONITORING

The boundaries of exclusion areas reported in the EA were estimated based on past research and monitoring activities, recent walk-through surveys by ORNL ecologists, and preliminary consultation with state and federal agencies. Therefore, ecological resources in environmentally sensitive areas will be surveyed prior to development of utilities and infrastructure on the parcel to accurately delineate exclusion area boundaries and to provide baseline data against which future monitoring data and information can be compared. Further ecological surveys will be conducted incrementally on nonexclusion areas of the parcel as ETEC identifies sites for road, utility, and infrastructure installation and/or proposes specific sites for location of industrial facilities. These surveys will be undertaken prior to land disturbance. DOE will consult with TWRA, TDEC, and U.S. Fish and Wildlife Service (FWS) during this effort. Sensitive resources will be flagged and protective measures will be designed in consultation with federal and state agencies. Species-specific protection and monitoring plans will be developed for threatened and/or endangered (T&E) species and habitat identified during surveys.

The following sections describe the types of surveys to be undertaken and the general methodology to be used.

2.2.1 Threatened and/or Endangered (T&E) Species

Surveys for T&E plant species were conducted within environmentally sensitive areas of the parcel in 1995 by staff of the ORNL Environmental Sciences Division. Therefore, no further surveys for T&E plant species are necessary.

During predevelopment monitoring,surveys will focus on T&E species that are listed by the FWS and TDEC. Wildlife surveys will include habitat analysis and identification of listed species, which include, but are not limited to, the following: mole salamander, black-bellied salamander, four-toed salamander, Eastern slender glass lizard, Northern pine snake, Indiana bat (including maternity colonies), gray bat, Eastern wood rat, masked shrew, smokey shrew, Southeastern shrew, yellow-bellied sapsucker, Cooper's hawk, sharp-shinned hawk, great egret, snowy egret, Northern harrier, grasshopper sparrow, olive-sided flycatcher, little blue heron, Swainson's warbler, vesper sparrow, Bachman's sparrow, and Bewick's wren. A list of additional animals that meet the criteria of having a range and/or nearby presence that warrant a search will be derived from current listings of the Tennessee Wildlife Resources Commission (TWRC) and 50 CFR 17.11, *Federally Threatened and Endangered Animals*. Timing and methods of surveys will vary depending on the group but could include mist netting, harp trap surveys, live trapping, pitfall trapping, active searches (e.g., for amphibians), and transects or point counts. Specialized equipment could include, among other items, live traps for small mammals, commercial harp traps for bat surveys, and insect collecting equipment. Results of surveys will be provided to FWS and TDEC and published by DOE in annual MAP progress reports as data are available. If threatened or endangered species are found, FWS and TDEC will be consulted for recommendations regarding protection strategies.

Past surveys in streams on Parcel ED-1 (Fig. MAP-5) used methods that were not specific for T&E aquatic invertebrate species. Thus, EFPC and Bear Creek (BC) will be surveyed in their entirety for T&E aquatic species, including upstream reaches of the parcel. Any tributaries to these streams that may support T&E aquatic invertebrate species will also be surveyed.

Surveys of protected aquatic vertebrates would focus on habitat of the following species: spotfin chub, flame chub, Tennessee dace, highfin carpsucker, blue sucker, yellowfin madtom, and ashy darter. The flame chub and Tennessee dace would most likely be found in small tributaries or associated with springs. The other species are more likely to inhabit larger creek and river habitats. Electrofishing and seining will be used to survey all suitable aquatic habitat for these species. Surveys may be supplemented by an inventory of suitable habitat for supporting a population of these species at some time in their life cycle.

A similar approach will be used to search for the hellbender, an aquatic salamander protected by the state. If T&E species are found, DOE will immediately notify FWS and TDEC, and decisions will be made regarding appropriate protection measures.

2.2.2 Terrestrial Ecosystem

Other important terrestrial ecosystem components on Parcel ED-1 will be surveyed. These include deer, turkey, waterfowl, breeding birds and their predators, invertebrates, unique and rare plants, plant communities, and wetlands. Permanent plots will be established, and data collection parameters will be standardized for statistical validity in anticipation of their future use in comparing pre- and postdevelopment conditions. Vegetation and wildlife surveys will be designed and conducted in consultation with TDEC, TWRA, and The University of Tennessee Herbarium. Bird surveys will be consistent with National Partners in Flight Program (NPIFP) interagency methodology, and survey data will be input to the NPIFP database. Invertebrate surveys will include butterflies and moths (**Lepidoptera**), which are sensitive to changes in plant species diversity and distribution and are representative of **Insecta**, the largest and most diverse group of organisms in terrestrial environments.

Surveys of predevelopment vegetation will include the following:

- population counts for sensitive plant species (i.e., state-listed species and other indicator species);

- community surveys to characterize species composition, diversity, structural aspects (e.g., tree diameter, basal area, canopy closure, snags), and functional aspects of natural communities, including wetlands, within the natural areas and corridor system;

- delineation and mapping of natural communities on-site, including wetlands; and

- a feasibility study to define measures to enhance the natural areas and natural corridor system, including identification and mapping of "problem areas" (e.g., old road beds, utility corridors, and areas dominated by exotic species) within the natural area and natural corridor system that require work to maintain or enhance ecosystem function.

Baseline surveys will conform to sampling and collection methods used by the Tennessee State Heritage Program. DOE will report the results of baseline surveys to the State Heritage Program and publish the information in MAP annual reports.

2.2.3 Aquatic Ecosystem

Benthic Macroinvertebrates

Characterizing conditions of the macroinvertebrate communities in the streams on Parcel ED-1 and appropriate reference streams prior to development is important for assessing future ecological successes or failures from the development of the site and operations of associated industries. The baseline study will complement site selection, collection methods, and timing of sample collections from monitoring efforts that have been ongoing in the affected streams since the mid-1980s and the proposed long-term monitoring efforts described in Section 3.4.2. The baseline study will include a minimum of two collection periods before any development activities. These collections will take place during the months of April and October, periods currently sampled as part of ongoing monitoring programs on the ORR. Further details on site selection are discussed in Section 3.4.2.

Fish

Predevelopment fish sampling sites will bracket streams flowing through Parcel ED-1, with sites located upstream on BC and EFPC and downstream of all major development. Data from the upstream site on EFPC will show the effects due to Y-12 Plant operations and the city of Oak Ridge and distinguish these impacts from Parcel ED-1-related impacts. Similarly, BC will be bracketed, because the Y-12 Plant is an influence in BC upstream of the parcel. The Tennessee dace, a state-protected species, is known to exist as a reproducing population in the first southern tributary to EFPC upstream from BC, which will be a suitable location for a community assessment. Monitoring of the fish community in this smaller tributary will be compared to a community in a similar-sized reference stream on the ORR, such as Pinhook Branch or Ish Creek.

Monitoring of the fish community will include an assessment of the number of fish species (i.e., species richness) found at the sampling sites. Species richness is one of the most important factors controlling the fish community. It is easily measured and results can be compared to both upstream and reference values. A quantitative measure of individuals of each species (density or catch per unit effort) will be another valuable indication of the status of the fish community. This measure often reflects change when a species is affected but is still present at a sample site. Other measures such as biomass, productivity, and the presence of intolerant or tolerant species will also be useful in assessing any impact of construction or operation. Many of these measures can be combined in an index evaluation (e.g., the Index of Biotic Integrity), which is usually adjusted to the stream size, species distribution, and region of the country. These measures will be generated from an electrofishing sample, preferably a multiple-pass removal sample with a spring and fall sample schedule at each site.

Baseline surveys will conform to sampling and collection methods used by the Tennessee State Heritage Program. Results of baseline surveys will be reported by DOE in MAP annual reports.

2.3 POSTDEVELOPMENT MITIGATION

Executive Order 11987, *Exotic Organisms*, restricts the introduction of exotic species into a natural ecosystem on federally owned land. For all revegetation of disturbed areas and landscaping of developed areas, only species native to the Ridge and Valley Province and consistent with local community types will be used. Lawn areas will be kept to a minimum. TWRA, TDEC and local nurseries will be consulted for guidance on the species to be used, sources of plant material, and planting plans and design.

In situations where rapid revegetation of construction areas is necessary between site clearing and actual construction to minimize soil erosion and sedimentation, a seed mixture of annual rye grass and white clover will be used.

2.4 POSTDEVELOPMENT MONITORING

Surveys will be conducted in protected areas and possibly off-site (e.g., north of the site) as development progresses. Monitoring protocols will be based on data collected during predevelopment surveys and industrial development plans. Such surveys can be conducted shortly after construction and periodically (e.g., at one- to five-year intervals) thereafter. Initially, most surveys will be conducted annually with evaluation for suitability of less frequent sampling after three years.

The monitoring plan will include the following:

- quarterly (seasonal) on-site inspections to assess whether the integrity of the natural area and natural corridor system is being maintained and to identify encroachments and needed maintenance and enhancements; and

- follow-up vegetation and wetland surveys (designed for comparison with the baseline survey) every three years to detect and characterize changes from baseline conditions.

DOE will work with construction, maintenance, and equipment crews to design and implement plans to reduce and avoid impacts when the natural areas and natural corridor system must be entered or crossed during site development.

If unanticipated impacts are noted following site development, additional evaluation will be necessary to design and implement additional mitigative measures. For example, impacts may result from inadequate establishment or maintenance of natural corridors rather than from industrial development *per se*. If corridors are poorly connected to surrounding undeveloped areas (e.g., north of the lease site), they might function negatively as peninsulas that siphon wildlife from riparian zones into less suitable areas (see Appendix J of the EA). If such effects are detected, additional studies on corridor functioning would be required in order to design countermeasures.

2.4.1 Terrestrial Ecosystem

Quarterly on-site inspections of Parcel ED-1 will be performed by a plant ecologist and a wildlife ecologist. These on-site inspections will be scheduled for the spring, summer, fall, and winter of each year. The inspecting ecologists will assess whether the integrity of the natural area and natural corridor system is being maintained, and they will identify any encroachments to the system or any necessary maintenance or enhancements to the natural areas and natural corridor system. Brief letter reports will be prepared by ecologists and provided to DOE; quarterly reports will be consolidated in annual MAP reports.

<u>Wildlife</u>

Populations of wild turkey, waterfowl, and deer will be monitored by DOE and TWRA. Annual bird surveys will be continued because they are an effective indicator of ecosystem status, including presence of nuisance species and nest parasites. Birds are relatively easy to survey, much is known of their distribution and habitat requirements, and their occurrence and abundance are sensitive to changes in structural diversity and other aspects of habitat as well as to increases in predators, parasites, and competitors. Because development may affect both the Parcel ED-1 area and the area north of the site, at least two routes (instead of the existing one) will be surveyed for birds in the spring and summer of each year. One route will be along the perimeter road (i.e., the west and north boundaries of the parcel); another will encompass the area immediately to the north. The results of such surveys will provide indications of changes resulting from development. Survey protocol will, at a minimum, follow that of the National Partners In Flight Program, although additional components may be added and the results will continue to be provided to the NPIFP.

Vegetation

Follow-up vegetation surveys will be performed every three years. Data from the follow-up surveys will be compared to the initial baseline survey data to detect and characterize changes from baseline conditions. Detailed reports of follow-up surveys, including data and recommendations regarding impact reduction and avoidance where impacts are detected, will be reported by DOE in annual MAP progress reports.

Other Species

Development plans are not sufficiently advanced to predict whether accumulation of contaminants in wildlife would be a concern, either from a wildlife or from a public health perspective. As a result of public or agency concerns and the types, design, and effluent streams of industries locating on Parcel ED-1, additional monitoring of specific wildlife species or other taxa may be necessary. Plans for additional monitoring will be described in MAP annual reports.

2.4.2 Aquatic Ecosystem

The lease requires that no industrial or domestic effluents be released to the surface waters and groundwater of the parcel; however, monitoring will be conducted to assess impacts of unplanned events such as spills. A long-term monitoring program will focus on fish and macroinvertebrate communities in specific aquatic habitat on the parcel. Measurements of the bioaccumulation of contaminants in aquatic species and toxicity testing of effluents and/or ambient streams may be necessary to provide information on the actual or potential transport of contaminants from the parcel to off-site locations. Data will be reported in annual MAP reports.

Benthic Macroinvertebrates

Long-term monitoring of the benthic macroinvertebrate communities in EFPC and BC will provide a good measure of the effectiveness of mitigation on Parcel ED-1. Such a program will also provide a measure of the integrity of the aquatic ecosystems on the parcel once industrial operations begin. Collections for the baseline and subsequent monitoring will include a minimum of two collection periods per year (i.e., spring and fall). The need for a biannual sampling frequency will be reevaluated after three years of monitoring; if significant detrimental changes do not occur, the frequency will be reduced to once per year. Maintaining an annual collection schedule is necessary, however, to be able to separate differences associated with natural annual variability from those differences associated with sampling error or perturbations.

Where possible, collection locations will be those used in past or existing monitoring programs on the ORR. This will maximize the information available for characterizing existing conditions and assessing the integrity of the invertebrate community after development and industrial operations begin. A minimum of two locations will be sampled on BC, including one near the mouth of the stream and one upstream of the parcel to serve as a reference. EFPC is represented by two major habitat types: a shallower, faster-flowing reach unaffected by Melton Hill Reservoir and a deeper, slower-flowing reach controlled by Melton Hill Reservoir. The upper unaffected reach will have a minimum of two sampling locations: one upstream of the parcel or any major construction activity and one just upstream of the stream's confluence with BC. One site on EFPC will be selected downstream of BC and downstream of all potential areas of development. Because a suitable reference site will not be available within EFPC (i.e., the entire stream downstream of BC could potentially be affected by development), a suitable reference site will be selected on another stream with similar physical characteristics.

Fish

Postdevelopment fish sampling sites and methods will be the same as those used in predevelopment surveys. Data will be collected to allow a comparison of pre- and postdevelopment effects on stream conditions as well as comparisons with reference streams. An extensive monitoring program has been in place for both EFPC and BC for almost a decade, and monitoring at new sites within the parcel will be combined easily and effectively with these programs. The existing monitoring is administered by the Biological Monitoring and Abatement Program (BMAP) at ORNL. By using the same sampling design and schedule as the existing BMAP monitoring, data will be compared to data from upstream and reference sites, which will enhance the effectiveness of parcel monitoring at minimal cost. A BMAP site in EFPC at the eastern edge of the parcel will serve as an upstream monitoring point. An additional site will be needed in EFPC near the confluence of EFPC with BC. This area is now sampled to provide data on bioaccumulation as part of the BMAP and generally represents the most downstream section of the stream that is not severely influenced by impoundment effects from the Melton Hill Reservoir-Clinch River-Watts Bar Reservoir system. The location is within Parcel ED-1 but downstream of much of the proposed development areas. These two sites will be compared to the existing references sites on Brushy Fork and Hinds Creek used by the EFPC BMAP monitoring. For BC two upstream sample sites within close proximity are now available from the BC BMAP. One site will be added downstream, but above the confluence with EFPC.

3.0 PROTECTION OF CULTURAL RESOURCES

To protect historic and archaeological sites within and adjacent to Parcel ED-1, surveys will be conducted, buffer zones will be established, and disturbance of historic/archaeological sites will be prohibited.

3.1 MITIGATION

3.1.1 Buffer Zones

At a minimum, a 100-foot buffer zone will be established and clearly marked around sites 40RE195 and 40RE200 (Fig. MAP-6).

3.1.2 Disturbance of Cultural Resources

DOE will 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 contacted prior to any further disturbance of the discovery-site area.

DOE will also require that cemeteries and sites 40RE195 and 40RE200 be avoided.

3.2 MONITORING

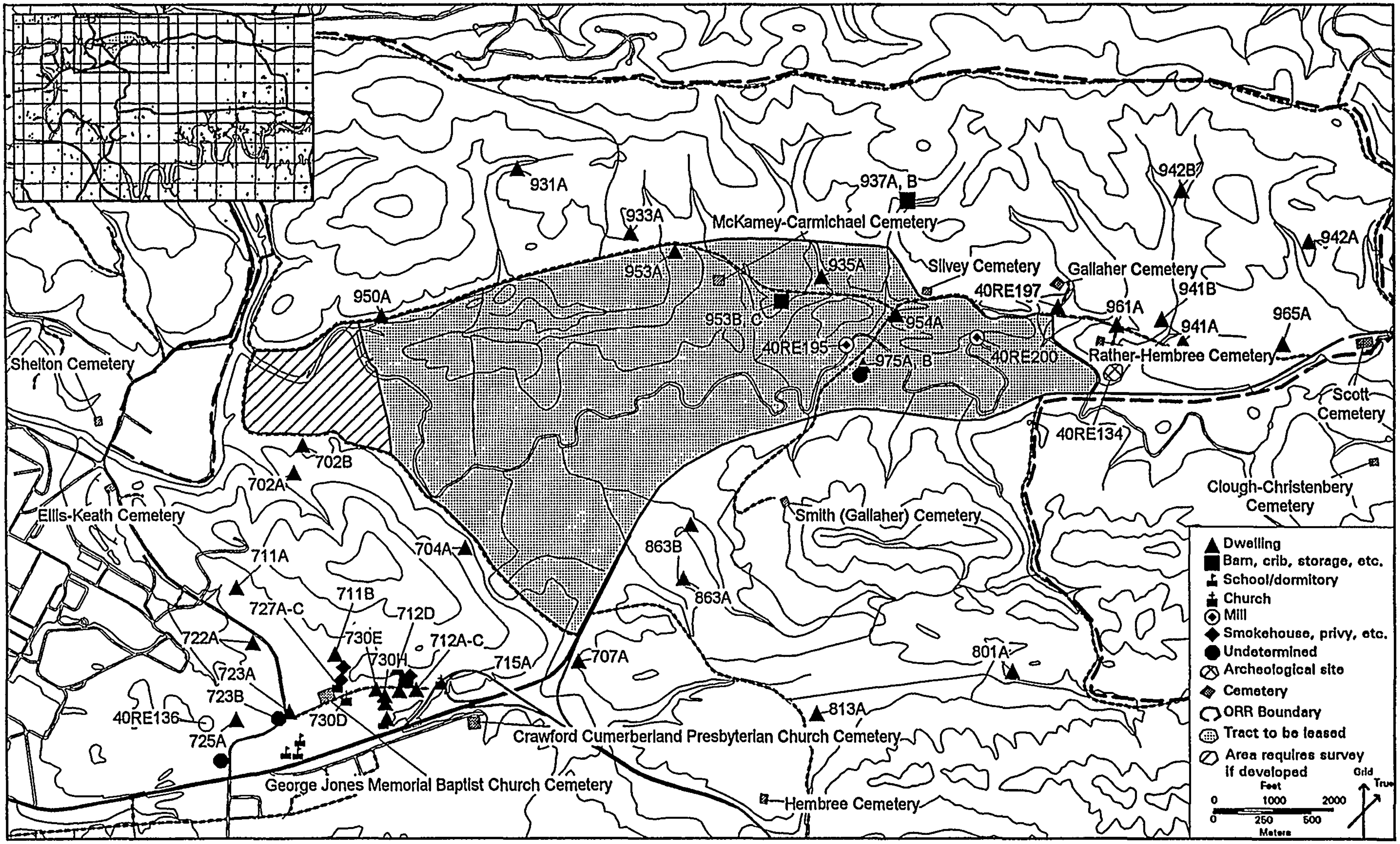
3.2.1 Surveys

The perimeter of the McKamey-Carmichael and Silvey cemeteries just outside the boundary of Parcel ED-1 will be surveyed and clearly marked on all plat maps generated.

Based on the probability that a significant archaeological site may be located within the vicinity of the confluence of EFPC and Poplar Creek, DOE will require that an 80-acre area (Fig. MAP-6) located at the west end of the tract be surveyed and that the survey be accepted by the State Historic Preservation Officer prior to commencing development in this area.

3.2.2 Inspections

Sites 40RE195 and 40RE200 will be periodically inspected by DOE, in consultation with the State Archaeologist to ensure site integrity has not been compromised. Annual inspection results will be reported by DOE in MAP annual reports.



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

Fig. MAP-6. General location of pre-World War II structures, archeological sites, and cemeteries within and adjacent to Parcel ED-1 of the Oak Ridge Reservation.