

Task Order LM00-502  
Control Number 10-0393

February 23, 2010

Mr. Ron Ollis  
Division of Wildlife  
Ohio Department of Natural Resources  
Law Enforcement Section  
2045 Morse Road, Bldg. G  
Columbus, OH 43229-6693

Dear Mr. Ollis:

**SUBJECT:** Contract No. DE-AM01-07000LM00060, Stoller  
Task Order LM00-502, LTS&M – Other Defense Activities  
Request for Scientific Collection Permit

The Fernald Preserve, owned by the U.S. Department of Energy, is situated on a 1,050-acre tract of land, approximately 18 miles northwest of Cincinnati, Ohio. The site includes approximately 395 acres of woodlots, 332 acres of prairie, 81 acres of wetlands, 60 acres of open water and 33 acres of savanna. Paddys Run flows through the site from north to south on the western portion of the property. The Fernald Preserve is located in both Hamilton and Butler counties. The enclosed figure shows the location of ecologically restored areas at the site.

The Fernald Preserve is a former uranium-processing facility that was shut down in 1991. Since then, the site has undergone extensive remediation pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act. Remedial activities and subsequent ecological restoration have converted the site from an industrial production facility to an undeveloped park, encompassing ecologically-restored wetlands, prairies, and forest. When the large-scale soil remediation, and waste disposition were completed in the fall of 2006, the site was successfully transitioned to the U.S. Department of Energy (DOE) Office of Legacy Management.

DOE is responsible for monitoring and maintenance of ecologically-restored areas across the Fernald Preserve. Specific activities contemplated under a Scientific Collection Permit involve amphibian, reptile and macroinvertebrate collection for wetland monitoring.

Two plans are enclosed that describe ecological monitoring activities at the Fernald Preserve. The Natural Resource Monitoring Plan outlines all compliance-based evaluations. This plan is updated annually and is available as an attachment to the draft Legacy Management and Institutional Controls Plan. Note that while surveys for the Indiana Bat (*Myotis sodalis*) are discussed, this permit request excludes collection of this species.

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The Fernald Preserve Wetland Mitigation Monitoring Plan is also enclosed. This plan details wetland mitigation monitoring at the site. Collection activities center primarily around sampling for Amphibian Index of Biotic Integrity. However, reptile cover boards are also in use to inventory reptile and small mammal populations.

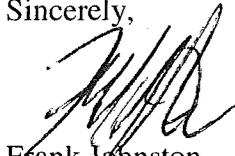
All specimens will be collected from the Fernald Preserve. Specimens will be archived at the Cincinnati Museum Center. The maximum number of each species to be collected is 14. The 14 collected will include two (2) adult male, two (2) adult female and 10 juvenile.

The species desired for collection are included on Table 1.

Sub-permittees to be included on this permit are included on Table 2.

If you have any questions, please contact John Homer at (513) 648-7519.

Sincerely,



Frank Johnston  
Fernald Preserve Site Manager

FLJ:LM/dsm

c: John Homer, Stoller  
Lisa McHenry, Stoller  
re-ferald (Thru Wanda Sumner)

**Table 1**  
**SPECIES TO BE COLLECTED**

Collection Location	Species	Collection Method
Fernald Preserve	AMPHIBIANS	Funnel traps, cover boards, dip nets
	<i>Ambystoma barbouri</i> Streamside Salamander <i>Ambystoma jeffersonianum</i> Jefferson Salamander <i>Ambystoma maculatum</i> Spotted Salamander <i>Ambystoma opacum</i> Marbled Salamander <i>Ambystoma tigrinum</i> Tiger Salamander <i>Desmoganthus fuscus</i> N. Dusky Salamander <i>Eurycea cirrigera</i> Southern Two-lined Salam. <i>Eurycea longicauda</i> Longtail Salamander <i>Eurycea lucifuga</i> Cave Salamander <i>Plethodon cinereus</i> Redback Salamander <i>Plethodon electromorphus</i> Ravine Salamander  <i>Anaxyrus americanus</i> American Toad <i>Anaxyrus fowleri</i> Fowlers Toad  <i>Acris crepitans</i> Cricket Frog <i>Hyla chrysoscelis</i> Grey Tree Frog <i>Pseudacris crucifer</i> Spring Peeper <i>Lithobates catesbeiana</i> American Bull Frog <i>Lithobates clamitans</i> Green Frog <i>Lithobates pipiens</i> Northern Leopard Frog	
Fernald Preserve	REPTILES	Funnel traps, cover boards, dip nets
	<i>Coluber constrictor</i> Eastern Racer <i>Diadophis punctatus</i> Ringneck Snake <i>Heterodon platyrhinos</i> Eastern Hognose Snake <i>Lamproleptus triangulum</i> Eastern Milk Snake <i>Nerodia sipedon</i> Northern Water Snake <i>Pantherophis alleghaniensis</i> Eastern Rat Snake <i>Regina septemvittata</i> Queen Snake <i>Thamnophis sirtalis</i> Eastern Garter Snake  <i>Plestiodon fasciatus</i> Common Five-lined Skink <i>Plestiodon laticeps</i> Broad-headed Skink  <i>Apalone spinifera</i> Spiny Softshell <i>Chelydra serpentina</i> Snapping Turtle <i>Chyrsemys picta</i> Painted Turtle <i>Sternotherus odoratus</i> Common Musk Turtle <i>Terrapene Carolina</i> Eastern Box Turtle <i>Trachemys scripta</i> Red-eared Slider	
Fernald Preserve	MAMMALS	Cover boards, search and seizure, recovery of carcasses

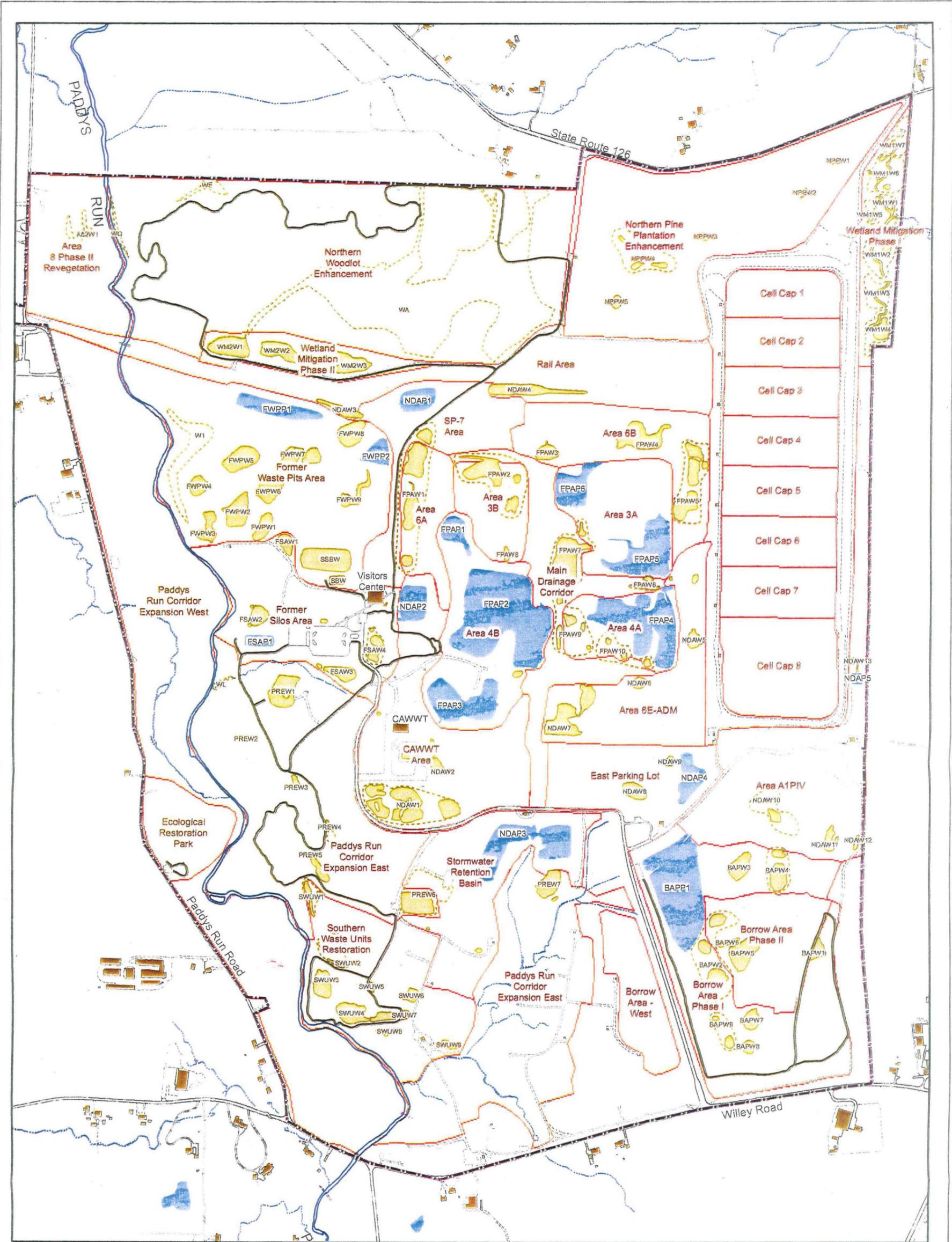
	<i>Blarina brevicauda</i> <i>Canis latrans</i> <i>Castor canadensis</i> <i>Cryptotis parva</i> <i>Didelphis virginiana</i> <i>Eptesicus fuscus</i> <i>Glaucomys volans</i> <i>Lasionycteris noctivagans</i> <i>Lasiurus borealis</i> <i>Lasiurus cinereus</i> <i>Lynx rufus</i> <i>Marmota monax</i> <i>Mephitis mephitis</i> <i>Microtus ochrogaster</i> <i>Microtus pennsylvanicus</i> <i>Microtus pinetorum</i> <i>Mus musculus</i> <i>Mustela frenata</i> <i>Mustela nivalis</i> <i>Mustela vison</i> <i>Myotis keenii</i> <i>Myotis lucifugus</i> <i>Myotis sodalis*</i> <i>Nycticeius humeralis</i> <i>Odocoileus virginianus</i> <i>Ondatra zibethicus</i> <i>Peromyscus leucopus</i> <i>Peromyscus maniculatus</i> <i>Pipistrellus subflavus</i> <i>Procyon lotor</i> <i>Rattus norvegicus</i> <i>Reithrodontomys humulis</i> <i>Scalopus aquaticus</i> <i>Sciurus carolinensis</i> <i>Sciurus niger</i> <i>Spermophilus tridencelineatus</i> <i>Sylvilagus floridanus</i> <i>Synaptomys cooperi</i> <i>Tamias striatus</i> <i>Taxidea taxus</i> <i>Urocyon cinereoargenteus</i> <i>Ursus americanus</i> <i>Vulpes vulpes</i> <i>Zapus hudsonius</i>	Short-tailed shrew Coyote Beaver Least shrew Virginia opossum Big brown bat Southern flying squirrel Silver-haired bat Red bat Hoary bat Bobcat Woodchuck Striped skunk Prairie vole Meadow vole Woodland vole House mouse Long-tailed weasel Least weasel Mink Keen's myotis Little brown myotis Indiana myotis* Evening bat White-tailed deer Muskrat White-footed mouse Deer mouse Eastern pipistrelle Raccoon Norway rat Eastern harvest mouse Eastern mole Gray squirrel Fox squirrel Thirteen-lined ground squirrel Eastern cottontail Southern bog lemming Eastern chipmunk Badger Gray fox Black bear Red fox Meadow jumping mouse	
Fernald Preserve	<b>MACROINVERTEBRATES</b>		Funnel traps, dip nets
	<i>Amphipoda</i> (Sideswimmers) <i>Cladocera</i> (Water Fleas) <i>Coleoptera</i> (Water Beetles) <i>Collembola</i> <i>Copepoda</i> <i>Decapoda</i> (Crayfish, Shrimp)		

	<i>Diptera</i> (True Flies) <i>Eubranchiopoda</i> (Mayflies) <i>Eubranchiopoda</i> <i>Gastropoda</i> (Snails) left right spiral <i>Hemiptera</i> (True Bugs) <i>Hirudinea</i> (Leeches) <i>Isopoda</i> (Sow Bugs) <i>Odonata</i> (Zygoptera) (Anisoptera) <i>Ostracoda</i> <i>Pelecypoda</i> <i>Plecoptera</i> (Stoneflies) <i>Trichoptera</i> (Caddisflies)	
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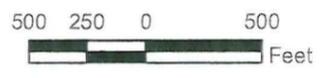
\* *Myotis sodalis* will not be collected under this permit.

**Table 2**

Name	Last four digits of social security number
Stephanie Bien	
Ashlee Decker	
Lisa McHenry	
Harold Swiger	



- Legend
- Fernald Preserve Boundary
  - Building
  - Open Water
  - Wetland
  - Wetland Basin
  - Creek
  - Stream
  - Road-paved
  - Road-gravel
  - Trail



### Restoration Project Areas

**Appendix A**

**Natural Resource Monitoring Plan**

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## Acronyms and Abbreviations

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	U.S. <i>Code of Federal Regulations</i>
DOE	U.S. Department of Energy
DOE-LM	DOE Office of Legacy Management
DOE-EM	DOE Office of Environmental Management
EPA	U.S. Environmental Protection Agency
IEMP	Integrated Environmental Monitoring Plan
NEPA	National Environmental Policy Act
NRMP	Natural Resource Monitoring Plan
NRRDP	Natural Resource Restoration Design Plans
OEPA	Ohio Environmental Protection Agency
U.S.C.	United States Code

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## **1.0 Introduction and Objectives**

The purpose of the Natural Resource Monitoring Plan (NRMP) is to outline a comprehensive plan for monitoring natural resources at the Fernald Preserve. Monitoring requirements related to natural resources include the following: (1) monitoring the status of several priority natural resource areas to maintain compliance with applicable regulations; (2) monitoring of completed restoration projects as specified in Natural Resource Restoration Design Plans (NRRDP); and (3) monitoring impacts to natural resources from site activities. The results of this monitoring will be used to inform the U.S. Environmental Protection Agency (EPA), Ohio Environmental Protection Agency (OEPA), and the Fernald Natural Resource Trustees of the status of natural resources at the Fernald Preserve. Monitoring results will be reported in the annual site environmental reports.

## **2.0 Analysis of Regulatory Drivers**

As shown in Table A-1, regulatory drivers for the management of natural resources and associated impact monitoring include six areas: endangered species protection; wetlands/floodplain regulations; cultural resource management; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) natural resource trusteeship process; the National Environmental Policy Act (NEPA); and the NRRDPs.

### **2.1 Threatened and Endangered Species**

The federal laws and regulations listed below mandate that any action authorized, funded, or carried out by the U.S. Department of Energy (DOE) cannot jeopardize the continued existence of any threatened or endangered (i.e., listed) species or result in the destruction or adverse modification of the constituent elements essential to the conservation of a listed species within a defined critical habitat. Additional requirements may apply if it is determined that a proposed activity could adversely affect these species or their habitat. These laws and regulations include the Endangered Species Act (16 United States Code [U.S.C.] §1531, et seq.) and its associated regulations (*50 Code of Federal Regulations* [CFR] 17 and 50 CFR 402).

State law also protects endangered species by prohibiting the taking or destruction of any state-listed endangered species. These laws are found in Ohio Revised Code §1518 and §1531, as well as in Ohio Administrative Code §1501.

### **2.2 Wetlands/Floodplains**

Executive Order 11990 (Protection of Wetlands) and Executive Order 11988 (Protection of Floodplains), which are implemented by DOE Regulation 10 CFR 1022, "Compliance with Floodplain/Wetlands Environmental Review Requirements," specify the requirement for a Floodplain/Wetland Assessment in cases where DOE is responsible for providing federally undertaken, financed, or assisted construction and improvements that may impact floodplains or wetlands. This regulation further requires that DOE exercise leadership to minimize the destruction, loss, or degradation of wetlands; and preserve and enhance the natural and beneficial values of wetlands.

Table A-1. Fernald Site Natural Resource Monitoring

DRIVER	ACTION
Endangered Species Act Ohio Endangered Species Regulations	The IEMP describes management of existing habitat and follow-up surveys.
Clean Water Act — Section 404	The IEMP describes the monitoring of mitigated wetlands.
National Historic Preservation Act	The IEMP describes the monitoring of cultural resources.
Native American Graves Protection and Repatriation Act	
Archaeological Resources Protection Act	
CERCLA Executive Order 12580	The IEMP describes the CERCLA Natural Resources Trusteeship process.
National Contingency Plan	
NEPA	The IEMP discusses the substantive requirements of NEPA for protecting sensitive environmental resources.
Project-specific NRRDPs	The IEMP discusses restored area monitoring.

Pursuant to Section 404 of the Clean Water Act and 33 CFR § 323.3, any activity that results in the discharge of dredged or fill material out of or into a wetland or water of the United States requires permit authorization by the Army Corps of Engineers. These permits can be in the form of either nationwide permits (33 CFR Part 330) or individual permits (33 CFR Part 323) depending on the nature of the activity.

Section 401 of the Clean Water Act and 33 CFR §325.2(b)(1)(ii) also require that a Section 401 State Water Quality Certification be obtained to authorize discharges of dredged and fill material under a Section 401 permit. In Ohio, the Section 401 State Water Quality Certification program is administered by OEPA pursuant to Chapter 3745-32 of the Ohio Administrative Code.

## 2.3 Cultural Resource Management

Management of cultural resources, particularly archeological sites, is mandated by the National Historic Preservation Act (16 United States Code [U.S.C.] §470), the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001, et seq.), and the Archeological Resources Protection Act (16 U.S.C. §470aa-470ll). The associated regulations for the above laws are found in 36 CFR 800, 43 CFR 10, and 43 CFR 7, respectively. These laws and regulations ensure that archeological resources on federal land are appropriately managed. Section 106 of the National Historic Preservation Act ensures that DOE takes into consideration the effect of its undertakings on properties eligible for listing on the National Register of Historic Places. The Native American Graves Protection and Repatriation Act and 43 CFR 10 require that the rightful control of Native American cultural items discovered on federal land be relinquished to the appropriate, culturally affiliated tribe. Federal land is defined as “land that is owned or controlled by a federal agency.” Cultural items are defined as “human remains, associated funerary objects, unassociated funerary objects, sacred objects, and objects of cultural patrimony.” The Archeological Resources Protection Act and 43 CFR 7 ensure that competent individuals carry out archeological excavations in a scientific manner.

DOE signed a Programmatic Agreement with the Advisory Council on Historic Preservation and the Ohio Historic Preservation Office that streamlines the National Historic Preservation Act, Section 106 consultation process. Monitoring provisions will be included as part of this agreement to ensure that appropriate management is implemented for any eligible properties at the Fernald Preserve.

## **2.4 The CERCLA Natural Resource Trusteeship Process**

CERCLA, Executive Order 12580, and the National Contingency Plan collectively require certain federal and state officials to act on behalf of the public as trustees for natural resources. Natural Resource Trustees for the Fernald Preserve are the Secretary of DOE; the Secretary of the U.S. Department of the Interior; and officials of the OEPA, appointed by the governor of Ohio.

The role of the Natural Resource Trustees is to act as guardians for public natural resources at or near the Fernald Preserve. The trustees are responsible for determining if natural resources have been injured as a result of a release of a hazardous substance or oil spill from the site, and if so, how to restore, replace, or acquire the equivalent natural resources to compensate for the injury. As the responsible party, DOE is potentially liable for costs related to natural resource injury.

The Fernald Natural Resource Trustees began meeting in June 1994 to evaluate and determine the feasibility of integrating the trustees' concerns with site remediation activities. The trustees identified their desire to resolve DOE's liability by integrating restoration activities with the Fernald Site's remediation.

The Fernald Natural Resource Trustees chose to focus on a restoration-based approach to resolve DOE's liability for natural resource impacts. To accomplish this, the trustees signed a Memorandum of Understanding that established implementation of a Natural Resource Restoration Plan (NRRP) as the primary means of settlement for an existing natural resource damage claim by OEPA against DOE. The NRRP set forth a conceptual design for a series of ecological restoration projects that encompasses approximately 904 acres of the Fernald Site. Detailed designs were generated through NRRDPs written for each restoration project. Results of NRMP monitoring were taken into consideration during the design of these area-specific restoration projects. NRRDPs have project-specific monitoring requirements to determine the success of the restoration project. As stated in Section D.1, this monitoring will be summarized in the site environmental reports. Detailed results of restoration monitoring will be provided annually in the appendix to the site environmental report.

## **2.5 National Environmental Policy Act**

In addition to the regulatory drivers summarized above, aspects of natural resource management and monitoring are mandated through the incorporation of substantive NEPA requirements into remedial action planning. In June 1994, DOE issued a revised secretarial policy on NEPA compliance. This policy called for the integration of NEPA requirements into the CERCLA decision-making process. Therefore, requirements for the protection of sensitive environmental resources including threatened and endangered species and cultural resources are to be considered throughout legacy management activities.

## **2.6 Natural Resource Restoration Design Plans**

NRRDPs were written for each ecological restoration project completed on site. The design documents were submitted to EPA and the Fernald Natural Resource Trustees prior to the commencement of restoration activities in a given area. In addition to describing the restoration activities, they also outline the monitoring requirements for each project area once restoration activities were completed. Following is a list of the NRRDPs that are associated with the areas that require monitoring following closure of the site (i.e., physical completion was declared on October 29, 2006).

- Wetland Mitigation Project (Phase II) NRRDP (Area 6, Phase I).
- Borrow Area NRRDP Wetland Mitigation (Phase III).
- Area 8, Phase III NRRDP (Paddys Run West).
- Paddys Run East NRRDP.
- Silos NRRDP.
- Former Production Area NRRDP.
- Waste Pits Area and Paddys Run NRRDP.

## **3.0 Program Expectations and Design Considerations**

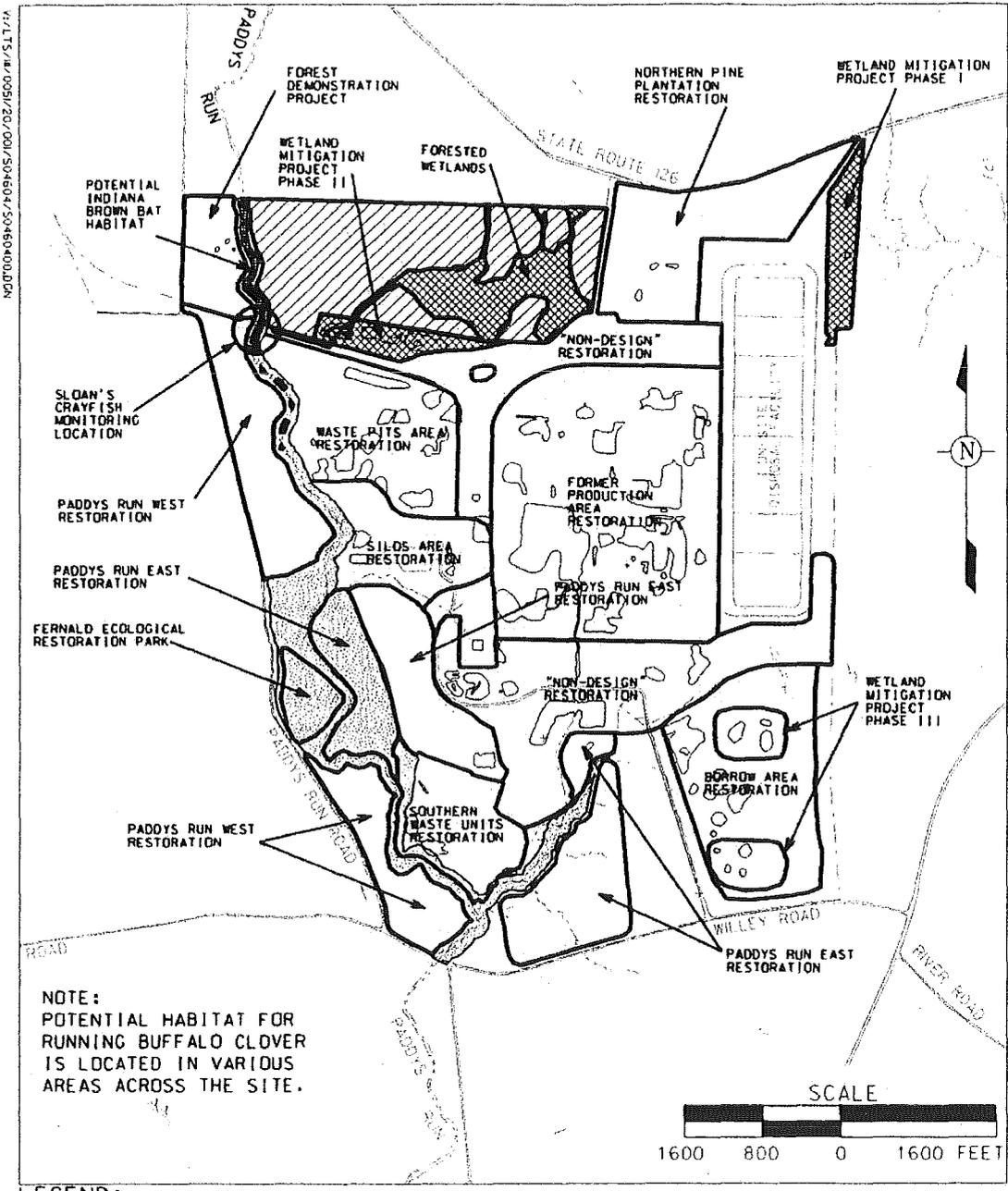
The expectations of the monitoring and reporting as outlined in the NRMP are as follows:

- Provide a mechanism to monitor the status of the Fernald Site's natural resources to remain in compliance with applicable laws and regulations.
- Monitor restored areas to ensure requirements of the NRRDPs are being met and restored areas continue to develop and function as designed.

The results of the monitoring outlined in this NRMP will be compiled and reported to EPA and OEPA. Results will be reviewed to ensure that ecologically restored areas are performing as designed. In the event that results indicate that a restored area is not functioning as intended, decisions will need to be made by the DOE Office of Legacy Management (DOE-LM) in consultation with EPA, OEPA, and Natural Resource Trustees regarding appropriate corrective actions.

## **4.0 Natural Resource Monitoring Plan**

Monitoring was implemented during remediation activities to identify impacts to natural resources at the Fernald Site with particular emphasis placed on meeting regulatory requirements for NEPA, threatened and endangered species, wetlands/floodplains, and cultural resources. To accommodate natural resource monitoring, priority natural resource areas have been established across the Fernald Preserve (Figure A-1). Fernald Site personnel conducted all natural resource monitoring during remediation, with oversight from the DOE Office of Environmental Management (DOE-EM). Monitoring has and will continue during legacy management (post-closure), but will be carried out under DOE-LM.



NOTE:  
 POTENTIAL HABITAT FOR  
 RUNNING BUFFALO CLOVER  
 IS LOCATED IN VARIOUS  
 AREAS ACROSS THE SITE.

LEGEND:

- FERNALD PRESERVE BOUNDARY
- PADDYS RUN AND TRIBUTARIES RIPARIAN CORRIDOR
- SLOAN'S CRAYFISH AREA
- POTENTIAL INDIANA BROWN BAT HABITAT
- WETLANDS
- NORTHERN WOODLOT AREA AND POTENTIAL AREA FOR SPRING CORAL ROOT
- OPEN WATER

Figure A-1. Priority Natural Resource Areas

Outside expertise may be used in limited circumstances depending on the type of monitoring to be conducted. A description of the monitoring strategies to be implemented at the Fernald Preserve is provided below.

#### **4.1 Threatened and Endangered Species**

The state-listed threatened Sloan's crayfish (*Orconectes sloanii*) and the federally endangered Indiana brown bat (*Myotis sodalis*) are the only threatened or endangered species to have a known population at the Fernald Preserve. However, there is the potential for other state-listed and federally listed threatened and endangered species to have habitat ranges that encompass and/or occupy the Fernald Preserve. Monitoring will continue to track the status of the Indiana brown bat populations and their habitat. If activities take place at the Fernald Preserve that could potentially impact the Sloan's crayfish habitat, active monitoring of those areas will resume. Monitoring for several other listed species that may be present at the Fernald Preserve will take place if potential habitat would be impacted by site activities.

##### **4.1.1 Sloan's Crayfish**

The state-listed threatened Sloan's crayfish is a small crayfish found in the streams of southwest Ohio and southeast Indiana. It prefers streams with constant (though not necessarily fast) current flowing over rocky bottoms. A large, well-established population of Sloan's crayfish is found at the Fernald Site in the northern reaches of Paddys Run. In dry periods, the crayfish retreat to the deeper pools that remain, primarily upstream of the former rail trestle, located approximately at the boundary between Hamilton and Butler counties. A significant population of Sloan's crayfish also resides in an off-property section of Paddys Run at New Haven Road.

This species resides with one other competing species of crayfish (*Orconectes rusticus*) that is generally considered more aggressive. In addition, the Sloan's crayfish is sensitive to siltation in streams.

Impacts on Sloan's crayfish are similar to those on other aquatic organisms in Paddys Run. Impacts of concern would include excavation and alteration of the streambed along with increased siltation and runoff into Paddys Run. With the majority of onsite soil disturbance now complete, habitat impacts are not expected. A survey of Sloan's crayfish was conducted in 2008 to assess the post-closure status of the onsite population. If the potential for impacts does return, a Sloan's crayfish management plan will be put in place. This plan would detail monitoring and contingency plans to mitigate impacts.

##### **4.1.2 Indiana Brown Bat**

Good to excellent summer habitat for the federally listed endangered Indiana brown bat (*Myotis sodalis*) has been identified north of the former rail trestle along Paddys Run. The habitat provides an extensive mature canopy from older trees and the presence of water throughout the year. In 1999, one adult female was captured along Paddys Run and released. Potential impacts to Indiana brown bat habitat would include tree removal and/or stream alteration in the northern on-property sections of Paddys Run. Because the bats use loose-bark trees for their maternal colonies, removal of trees would impact this species by eliminating its summer habitat.

The habitat of the Indiana brown bat was monitored during remediation activities to identify any unanticipated impacts during remediation. A follow-up survey was conducted in the summer of

2002 as a result of remediation activities north of the train trestle along Paddys Run. No Indiana brown bats were found during this survey.

DOE and the agencies agreed to keep the former rail trestle in place after a thorough review of the impacts that would result from its removal. The trestle was modified to promote use by bats. Additional monitoring will be conducted in 2008 to determine the extent of bat use.

Monitoring methods for the Indiana brown bat would consist of visual observations of that activity and mist netting in areas suitable as bat flyways and where canopy occurs. Mistnetting would occur between May 15 and August 15, because some bats begin to disperse for winter shelter in late August. Data recorded at each sampling site would include type of habitat, water depth and permanence, type of bottom, tree species and size, and presence of hollow trees or trees with loose bark in the vicinity.

In addition to mistnets, bat detectors (which indicate bat activity) would be used during all sampling to detect echolocation calls near the net. The number of calls on the detector would be recorded to indicate the effectiveness of the nets in relation to bat activity. Bat detectors can also be used to sample areas of marginal habitat to determine if netting should be attempted.

One such sampling event took place in the summer of 2007. While several species of bats were collected, no Indiana brown bats were captured. Visual monitoring for bat activity was conducted through 2008.

#### **4.1.3 Running Buffalo Clover**

Surveys conducted in 1994 of the federally listed endangered running buffalo clover (*Trifolium stoloniferum*) found no individuals of this species at the Fernald Site. However, because running buffalo clover is found nearby in the Miami Whitewater Forest, the potential exists for this species to establish at the Fernald Site. The running buffalo clover prefers habitat with well-drained soil, filtered sunlight, limited competition from other plants, and periodic disturbance. This plant is a perennial that forms long stolons, rooting at the nodes. The plant is also characterized by erect flowering stems, typically 3 to 6 inches tall, with two leaves near the summit topped by a round flower head. In the event surveys are necessary, they would be conducted between May and June, which is the optimal time frame for blooms. An appropriate number of transects would be walked in suspect areas to identify the running buffalo clover. If populations are discovered, then best management practices will be used to minimize impending impacts, if any.

#### **4.1.4 Spring Coral Root**

The state-listed threatened spring coral root (*Corallorhiza wisteriana*) is a white and red orchid that blooms in April and May, and grows in partially shaded areas of mesic deciduous woods, such as forested wetlands and wooded ravines. Although surveys conducted in 1994 and 1995 indicated no individuals were present, suitable habitat exists in portions of the northern woodlot.

A floristic analysis for the northern woodlot and associated northern, forested wetland was conducted in 1998. This analysis showed that no spring coral root was present in the northern woodlot.

## **4.2 Wetlands/Floodplains**

Approximately 11.87 acres of on-property wetlands adjacent to the former production area were impacted as a result of contaminated soil excavation. The 26-acre northern forested wetland area and associated drainage characteristics were avoided and protected during remediation activities. A mitigation ratio of 1.5:1 (i.e., 1.5 acres of wetlands replaced for every one acre of wetland disturbed) was negotiated between DOE and the appropriate agencies (i.e., EPA, OEPA, U.S. Fish and Wildlife Service, and Ohio Department of Natural Resources). As a result of this agreement, 17.8 acres of new wetlands had to be established to compensate for the impacts during remediation.

Wetland mitigation was initiated at the Fernald Site in 1999. Approximately 6 acres of wetlands were constructed within a 12-acre ecological restoration project along the North Access Road. Monitoring requirements for this wetland area have been completed. Two other wetland mitigation projects have been completed: Area 6, Phase I; and the Borrow Area. Monitoring for these two project areas will continue during legacy management under DOE-LM. More detailed monitoring requirements are discussed in the NRRDP for each project.

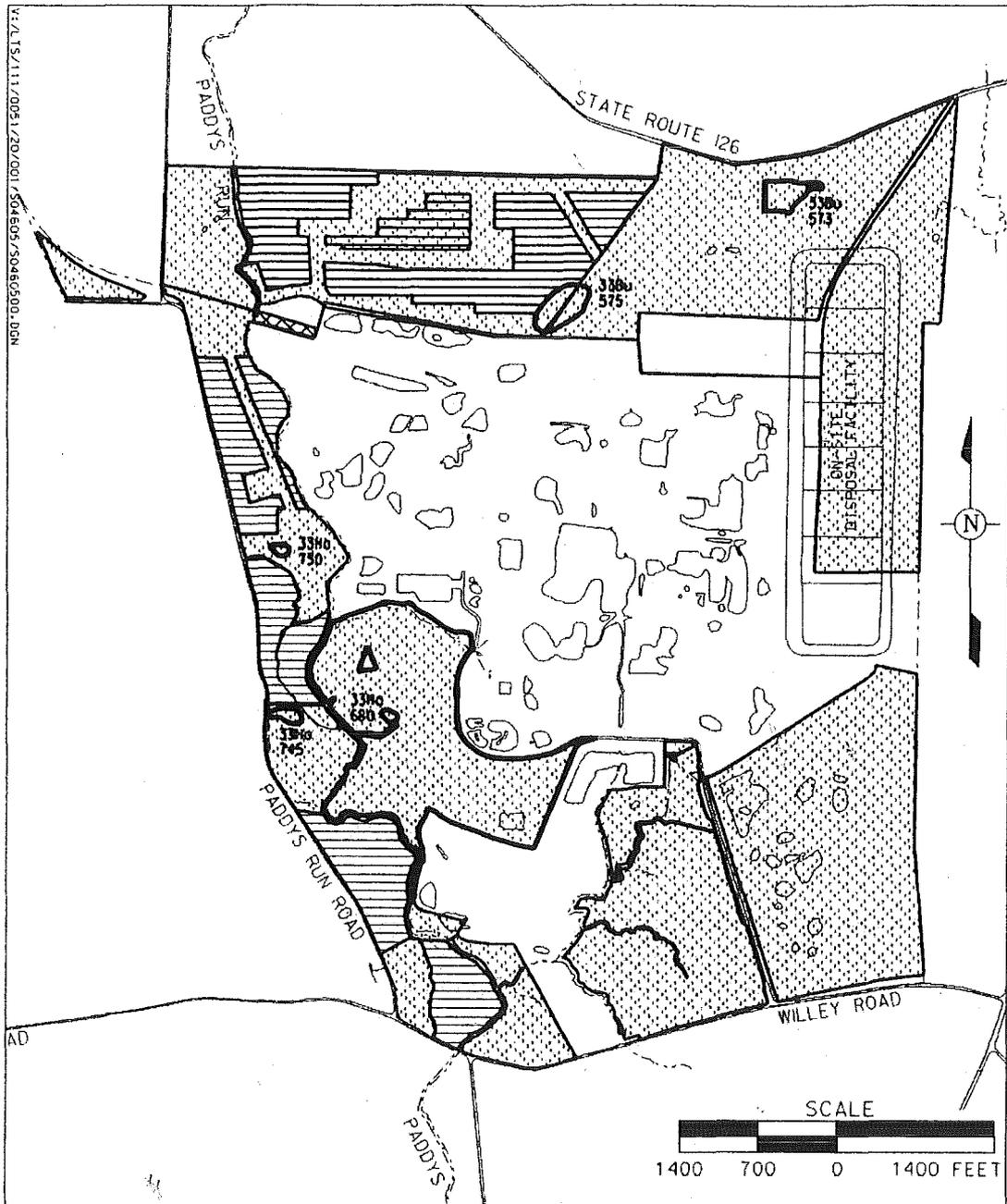
## **4.3 Cultural Resource Management**

All field personnel must comply with the procedure, Unexpected Discovery of Cultural Resources, if cultural resources are uncovered during ground disturbing activities. In the event that ground-disturbing activities must occur during legacy management, limited monitoring will occur in all areas that have been surveyed to identify any unexpected discoveries of human remains (Figure A-2). More intensive field monitoring will take place only in areas known to have a high potential for archaeological sites as determined by previous investigations. In most instances, discovery of human remains in previously surveyed areas will require data recovery work. Disturbance of previously unsurveyed areas will require at least a Phase I investigation. An annual summary of all cultural resource field activities is provided separately from the IEMP under the Programmatic Agreement for Archeological Activities at the Fernald Site. Monitoring of cultural resource areas will continue during legacy management to ensure that the areas are not being disturbed, as is described in the Institutional Controls Plan.

## **4.4 Restored Area Monitoring**

Restored area monitoring is required following the completion of natural resource restoration work. Monitoring of restored areas involved two phases, implementation phase and functional phase monitoring. However, only implementation phase monitoring is currently ongoing at the site.

Implementation phase monitoring is conducted to ensure that restoration projects are completed pursuant to their NRRDP and to determine vegetation survival and herbaceous cover. There must be 80 percent survival of all planted vegetation in any given restored area, determined by mortality counts. There must be 90 percent cover for any seeded area, with 50 percent being native species.



**LEGEND:**

- |                           |            |   |
|---------------------------|------------|---|
| FERNALD PRESERVE BOUNDARY | -----      | AREA SURVEYED   |
| AREAS NOT SURVEYED        | =====      | IDENTIFIED ARCHAEOLOGICAL SITE REQUIRING ADDITIONAL INVESTIGATION |
| OPEN WATER                | OPEN WATER | NOT SURVEYED DUE TO PREVIOUS CONTAMINATION/DISTURBANCE            |

Figure A-2. Cultural Resource Survey Areas

Functional phase monitoring was conducted to evaluate the progress of a restored community against pre-restoration baseline conditions and an ideal reference site. Woody and herbaceous vegetation were evaluated for species richness, density, and frequency. Size of woody vegetation was also recorded. Currently, no further functional monitoring is scheduled for any restored area. The last round of functional monitoring was conducted in the fall of 2005.

#### **4.4.1 Implementation Phase Monitoring**

To determine vegetation survival, mortality counts are conducted at the end of the first growing season. Each container grown tree and shrub will be inspected and assigned one of four categories: alive, resprout, vitality, or dead. Trees and shrubs will be considered "alive" when their main stem and/or greater than 50 percent of the lateral stems are viable. "Resprout" trees and shrubs will have a dead main stem, with one or more new shoots growing from the stem or the root mass. Plants will be categorized as "vitality" when less than 50 percent of its lateral branches are alive. "Dead" trees will have no signs of life at all.

For seeded areas within a restoration project, the Natural Resource Trustees agreed to a 90 percent cover survival rate for cover crops (necessary for slope stabilization and erosion control) and 50 percent survival rate for native species at the end of the implementation monitoring period as a goal.

All seeded areas are evaluated within each restoration project. Depending on the size of the restoration project, seeded areas may be grouped into habitat-specific sub-areas. For each distinct area, at least three one-meter square quadrats are randomly distributed and surveyed. Field personnel will estimate the total cover and list all species present within each quadrat. The data collected will be used to determine total cover, percent native species composition, and relative frequency of native species, as described below.

For total cover, the quadrat-specific cover estimates will be averaged. Percent native species composition will be calculated by dividing the total number of species surveyed into the total number of native species present. The relative frequency of native species will be determined as follows. First, DOE will record the number of times each species appears in a quadrat. To obtain the frequency, the number of times a species appears in a quadrat will be divided by the total number of quadrats surveyed. Next, the frequencies of all native species will be summed and divided by the total of all frequencies within a given area.

By collecting the information described above, DOE will evaluate implementation phase success of seeded areas based on two criteria. First, 90 percent cover must be met by the end of the first growing season. Second, the goal of 50 percent native species composition or relative frequency must be obtained by the end of the implementation monitoring period. These criteria address both erosion control and native community establishment, which are the two primary goals of seeding in restored areas.

Implementation phase monitoring for all restoration projects was completed in 2007. However, additional monitoring may be required in future years in order to ensure adequate herbaceous cover and vegetation survival.

#### **4.4.2 Implementation Monitoring for Mitigation Wetlands**

Area 6, Phase I, and the Borrow Area were the only wetland mitigation projects that required implementation monitoring in 2008. The requirements for the wetland areas were typically for 3 years following completion, instead of just one as with the other restoration areas. The monitoring requirements were also more extensive. The monitoring included water level measurements, water quality sampling, soil sampling, and wetland plant (herbaceous cover) surveys. Implementation monitoring for mitigation wetlands was carried out under DOE-LM, and the requirements are spelled out in the NRRDP for the project. Monitoring of Area 6, Phase I was originally to be completed in 2007. However, given the extremely dry summer in 2007, DOE determined that it was necessary to suspend the final year of monitoring until 2008.

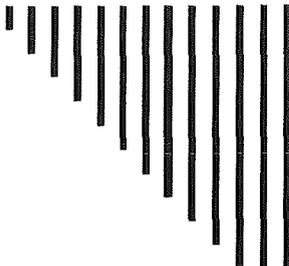
#### **4.4.3 Functional Monitoring**

Currently, negotiations are still ongoing for the Natural Resource Damage Settlement. The negotiations include functional monitoring requirements. At this time, no further functional monitoring is scheduled for any restoration area. However, the outcome of the settlement may require that functional monitoring be resumed. In that case, details of the functional monitoring methodology and the areas that require functional monitoring would be included in the next revision of the Comprehensive Legacy Management and Institutional Controls Plan and this IEMP. If functional monitoring of restored areas is resumed at the Fernald Preserve, the monitoring activities would be carried out under DOE-LM.

#### **4.5 Natural Resource Data Evaluation and Reporting**

The results of natural resource monitoring will be integrated with the annual reporting, a commitment in the IEMP. Annual site environmental reports will provide appropriate updates on unexpected impacts to natural resources and the results of specific natural resource monitoring that have been implemented (e.g., monitoring of crayfish, cultural resources, etc.). A summary of the findings will be provided in the site environmental report. A detailed discussion and evaluation of the available data will be presented in the appendix to the site environmental report. Significant findings as a result of natural resource monitoring will be communicated to EPA and OEPA as needed.

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# Fernald Preserve Wetland Mitigation Monitoring Plan

October 2009

Final



U.S. DEPARTMENT OF  
**ENERGY**

Legacy  
Management

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**Fernald Preserve Wetland Mitigation Monitoring Plan**

**October 2009**

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**Fernald Preserve Wetland Mitigation Monitoring Plan  
Document History**

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Frank Johnston  
Fernald Preserve Site Manager  
S.M. Stoller Corporation

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Date

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## **Acronyms and Abbreviations**

A1PI	Area 1, Phase I
A6PI	Area 6, Phase I
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeters
DOE	U.S. Department of Energy
DOI	U.S. Department of Interior
EPA	U.S. Environmental Protection Agency
HGM	Hydrogeomorphic
NRRP	Natural Resource Restoration Plan
NRTs	Fernald Natural Resource Trustees
OEPA	Ohio Environmental Protection Agency
OU	Operable Unit
USACE	U.S. Army Corps of Engineers

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## Executive Summary

The U.S. Department of Energy (DOE) and the Ohio Environmental Protection Agency (OEPA) have signed a Consent Decree that settles a long-standing natural resource damage claim under Section 107 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). As a result, the Fernald Natural Resource Trustees (DOE, OEPA, and the U.S. Department of Interior) have finalized the Fernald Natural Resource Restoration Plan (NRRP), which is Appendix B of the *Partial Consent Decree Resolving Ohio's Natural Resource Damage Claim against DOE* (State of Ohio 2008). The NRRP provides a conceptual ecological restoration plan for the Fernald Preserve and specifies monitoring and maintenance requirements for restored areas. The NRRP requires the National Resource Trustees to develop a process for resolution of outstanding wetland mitigation obligations at the Fernald Preserve. This *Wetland Mitigation Monitoring Plan* sets forth the process for evaluation and acceptance of wetland restoration projects at the Fernald Preserve that are intended to satisfy wetland mitigation requirements.

The Fernald Preserve is situated on a 1,050-acre tract of land, approximately 18 miles northwest of Cincinnati, Ohio. The site is located near the unincorporated communities of Ross, Fernald, Shandon, and New Haven in Hamilton County. It is a former uranium-processing facility that was shut down in 1991. Since then, the site has undergone extensive remediation pursuant to CERCLA. Remedial activities and subsequent ecological restoration have converted the site from an industrial production facility to an undeveloped park, encompassing wetlands, prairies, and forest. When the large-scale soil remediation and waste disposal was completed in the fall of 2006, the site was successfully transitioned to the DOE Office of Legacy Management. The Fernald Closure Project was then renamed the Fernald Preserve.

In 1993, approximately 36 acres of jurisdictional wetlands were delineated at the Fernald site. According to the Operable Unit 5 Record of Decision, an estimated 10 acres of wetlands would be impacted from remediation activities. Compensatory mitigation pursuant to Section 404 of the Clean Water Act was subsequently negotiated with regulators. In 1995, DOE agreed to on-site mitigation at a 1.5 to 1 ratio. DOE committed to compensating for 11.9 acres of wetlands, based on the original 10-acre estimate as well as an additional 1.9 acres of wetlands delineated during remediation. Wetland mitigation plans were incorporated into sitewide ecological restoration planning through the NRRP. The NRRP established three projects specific for wetland mitigation, and also included wetland creation components within several additional restoration projects. In addition, a 26-acre jurisdictional forested/wet meadow wetland complex has been preserved in the northern portions of the site.

DOE completed the NRRP wetland mitigation projects from 1999 through 2006. An agreement on monitoring of these wetlands remained unresolved until final settlement of the natural resource damage claim. This plan provides a path forward for evaluating mitigation projects using recently established OEPA performance standards and monitoring protocols. In addition, the plan addresses standards and monitoring for newly constructed mitigation projects at the Fernald Preserve.

The size, type, and quality of site-impacted wetlands were estimated from historical information, which provided a basis for using OEPA wetland mitigation performance standards. Performance standards were then established to serve as monitoring objectives for the on-site created

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wetlands. Standards have been established for wetland acreage, basin morphology, hydrology, vegetation, wildlife, and soil biogeochemistry.

Published OEPA monitoring protocols will be used to evaluate the extent to which the performance standards are met. A 3-year monitoring period has been established, which takes into consideration past monitoring that has been conducted by DOE. Reporting requirements are also outlined. The annual Site Environmental Report will be used to report findings to the regulators and the public.

## 1.0 Introduction

The U.S. Department of Energy (DOE) and the Ohio Environmental Protection Agency (OEPA) have signed a Consent Decree that settles a long-standing natural resource damage claim under Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). As a result, the Fernald Natural Resource Trustees (NRTs) (DOE, OEPA, and the U.S. Department of Interior [DOI]) have finalized the Fernald Preserve Natural Resource Restoration Plan (NRRP), which is Appendix B of the *Partial Consent Decree Resolving Ohio's Natural Resource Damage Claim against DOE* (State of Ohio 2008). The NRRP provides a conceptual Ecological Restoration Plan for the Fernald Preserve and specifies monitoring and maintenance requirements for restored areas. The NRRP requires the NRTs to develop a process for resolution of outstanding wetland mitigation obligations at the Fernald Preserve. A combination of mitigation projects implemented under the NRRP achieved the negotiated compensatory acreage. This *Wetland Mitigation Monitoring Plan* meets the requirements of the NRRP by setting forth the process for evaluation and acceptance of wetland mitigation projects at the Fernald Preserve.

### 1.1 Site Description

The Fernald Preserve is situated on a 1,050 acre tract of land, approximately 18 miles northwest of Cincinnati, Ohio. The site is located near the unincorporated communities of Ross, Fernald, Shandon, and New Haven in Hamilton County. It is a former uranium-processing facility that was shut down in 1991. Since then, the site has undergone extensive remediation pursuant to CERCLA. Remedial activities and subsequent ecological restoration have converted the site from an industrial production facility to an undeveloped park, encompassing wetlands, prairies, and forest. The Fernald site is now known as the Fernald Preserve. Several trails and the Fernald Preserve Visitors Center have been constructed on site for public use.

### 1.2 Background

In June 1993, approximately 35.9 acres of jurisdictional wetlands and 8.9 acres of Waters of the United States were identified and documented in the *Wetlands Delineation Report of the Fernald Environmental Management Project Butler and Hamilton Counties, Ohio* (Ebasco 1993). The U.S. Army Corps of Engineers (USACE) approved this delineation in August 1993.

Section 9.1.6 of the Operable Unit 5 (OU5) Record of Decision identified approximately 10 acres of wetlands that would be impacted as a result of implementing OU5 remedial actions (DOE 1996). Mitigation for wetland impacts was not specifically defined but did indicate that mitigation would be consistent with Section 404(b)(1) of the Clean Water Act. Compensatory mitigation was also not specifically defined. The need for compensatory mitigation was to be determined after all practicable steps to avoid or minimize adverse impacts were applied.

In June 1995, DOE met with U.S. Environmental Protection Agency (EPA), OEPA, U.S. Fish and Wildlife Service, and the Ohio Department of Natural Resources to discuss mitigation of impacted wetlands. DOE agreed to conduct on-property (if possible) mitigation and to replace 1.5 acres of wetlands for every acre of wetland dredged or filled. Section 3.2.4 of the NRRP recognizes this agreement.

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DOE committed to compensating for 11.9 acres of wetlands, which consist of the original 1993 delineation of 10 acres that were originally anticipated to be impacted as well as an additional 1.9 acres of wetlands delineated during remediation. Based on the agreed acreage and the agreed mitigation ratio, DOE is responsible for installing 17.85 acres of new wetlands. Wetland compensation was incorporated into sitewide ecological restoration planning for the site through the NRRP. The NRRP established three separate ecological restoration projects to meet this requirement. These projects are described in the NRRP and summarized in Section 2.0 below. Several other ecological restoration projects included a wetland restoration or creation component. While not specifically identified as compensatory wetlands, they nevertheless are worth evaluating for potential additional compensatory acreage. Also, approximately 26 acres of forested jurisdictional wetlands in the northern woodlot have been preserved on site.

An agreement on monitoring of mitigation wetlands remained unresolved until final settlement of the NRT's natural resource damage claim. Over the past several years, DOE has undertaken a variety of monitoring efforts pursuant to project-specific Natural Resource Restoration Design Plans. However, no resolution of compensation was reached, as the NRTs were involved in settlement negotiations. The final NRRP includes a path forward for DOE to meet its mitigation requirements through evaluation of existing projects using recently established OEPA monitoring protocols. In summary, the NRTs will use the monitoring approach set forth in this plan to evaluate the three specific wetland mitigation projects. In addition, several restoration projects included a component of wetland creation, but these newer wetlands were not monitored as part of the compensatory mitigation acreage. This revision of the monitoring approach provides an opportunity to add these areas into the wetlands mitigation program. A combination of these areas should meet DOE's compensatory mitigation requirement.

### 1.3 Scope

The scope of the *Fernald Preserve Wetland Mitigation Monitoring Plan* entails the establishment of performance standards and remaining monitoring requirements for completed wetland mitigation projects. In addition, this plan identifies additional on-site wetlands that may contribute to compensatory wetland acreage. Performance standards and monitoring requirements are set forth for these areas as well.

## 2.0 Wetland Mitigation Projects and Areas

The NRRP provides a summary of existing wetland mitigation projects. These projects include the Area 1, Phase I (A1PI) project (Wetland Mitigation Phase I), the North Woodlot (Wetland Mitigation Phase II), and the Borrow Area (Wetland Mitigation Phase III). Figure 2-1 shows the location of these projects.

### 2.1 A1PI Wetland Mitigation

The A1PI Wetland Mitigation Project is a series of 8 basins across approximately 12 acres in the northeast corner of the site. The project includes a variety of emergent, wet meadow, scrub/shrub, and open water areas, as well as a number of upland prairie and forest patches. Section 4.2 of the NRRP describes this project in more detail. It was designed to create about 6 acres of mitigation wetlands. The project was completed in 2000.

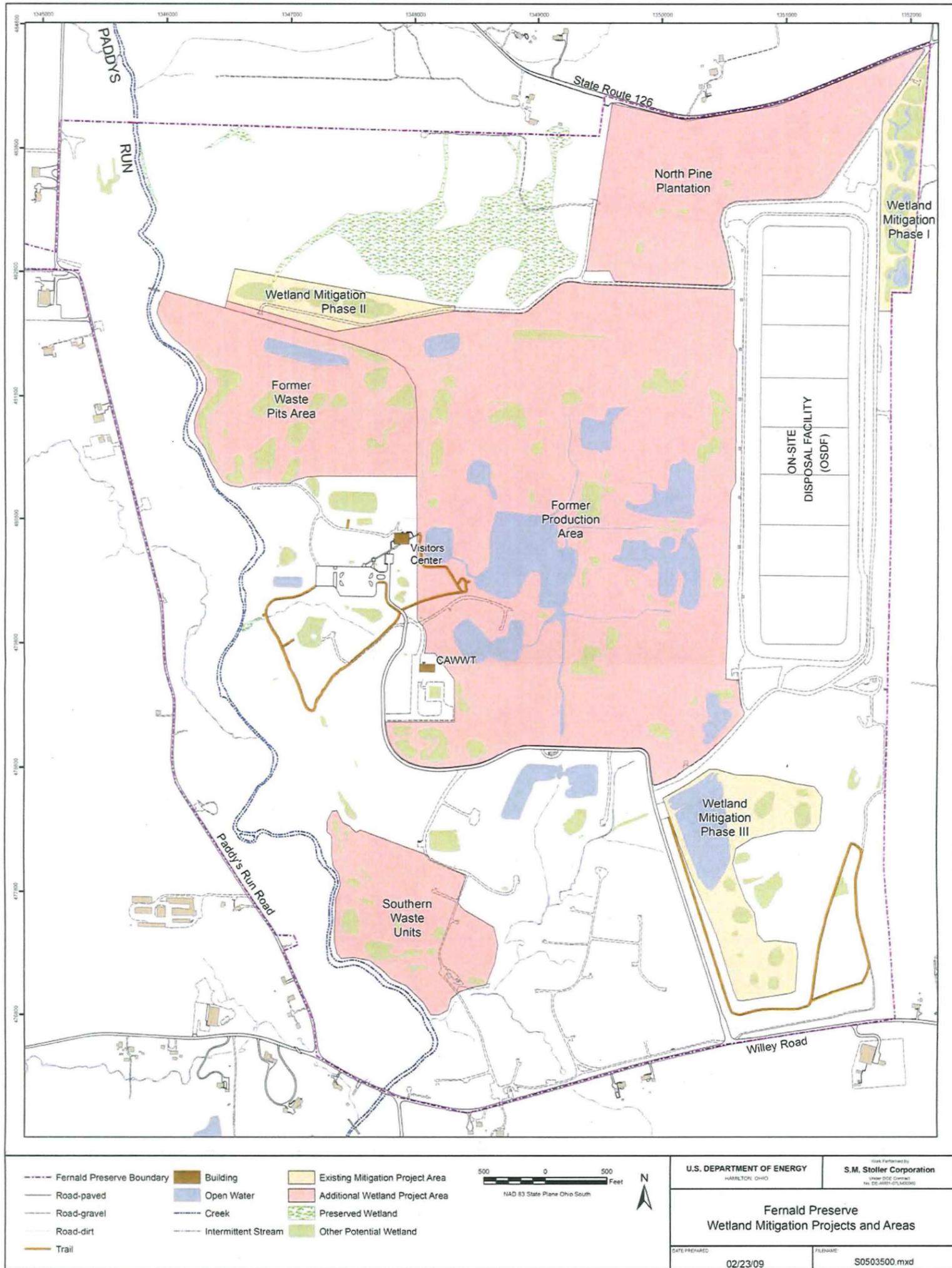


Figure 2-1. Fernald Preserve Wetland Mitigation Projects and Areas

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Monitoring of the A1PI Wetland Mitigation Project took place from 2000 to 2004. A wetland delineation was conducted in 2004 that showed 5.34 acres of compensatory wetlands were created.

### **2.2 A6PI Wetland Mitigation**

The Area 6, Phase I (A6PI) Wetland Mitigation Project consists of three basins that are located on 8 acres along the south side of the northern woodlot. The basins are fed by surface water that drains from the existing 26-acre wetland system. These basins include a mix of open water and emergent and forested wetland communities. This wetland project was designed to create approximately 4 acres of mitigation wetlands. Section 4.5.3 of the NRRP describes this project in more detail.

The project was completed in spring 2005, and monitoring began the following summer. A wetland delineation has not yet been conducted on this system. Several species of salamander larvae and adults have been observed in each of the A6PI basins.

### **2.3 Borrow Area Wetland Mitigation**

The Borrow Area Wetland Mitigation Project involves a series of shallow open water and emergent basins surrounded by marsh and wet prairie. It is located within the 48-acre footprint of the On-site Disposal Facility borrow area. The wetland features were constructed in stages from 2002 to 2006, as borrow activities were completed and areas became available for restoration. Section 4.7 of the NRRP describes this project in more detail.

Monitoring for the borrow area began in 2006. A wetland delineation has not been completed. While the system was designed to be fed by precipitation only, since 2006, groundwater has been pumped into a portion of the area. The addition of groundwater is an effort to provide passive groundwater recharge through downgradient site drainages. The altered average water levels have inundated portions of the wetland mitigation area. Also, upon allowing public access to the site in the summer of 2008, the area was renamed the Lodge Pond. This is in reference to the beavers that have taken up residence within the basin. A walking trail and overlook has been constructed around the perimeter of the project area.

### **2.4 Preserved Wetlands**

In addition to the mitigation projects listed above, construction activities were adjusted during remediation to avoid impacts as much as possible. A 26-acre forested/wet meadow wetland complex is located on site in the northern woodlot (Figure 2-1). Additional isolated wetlands can be found along the Paddys Run riparian corridor. Several of these areas have been enhanced through seeding and invasive species control.

### **2.5 Other Wetland Areas**

As stated in Section 1.2, several ecological restoration projects have included wetland creation. In fact, some of the most diverse wetland communities established on site can be found within these projects. While not originally envisioned as a component of the compensatory mitigation

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program, these areas are worth evaluation. The primary areas to be evaluated are summarized below.

### **2.5.1 Northern Pine Plantation**

Ecological restoration of the Northern Pine Plantation was undertaken in 2003. It consisted primarily of replacing a monoculture evergreen woodlot with deciduous forest. The surface water hydrology of the project area and the discovery of old agricultural drain tiles led to the creation of several wet prairie and emergent wetlands. Section 4.5.1 of the NRRP describes this project in more detail.

### **2.5.2 Former Production Area/Waste Pits Area**

The Former Production and Waste Pits areas represent the bulk of ecological restoration activities that took place within remediated areas. Work was conducted in stages from 2004 through 2006, following remediation and soil certification. Numerous depressions were left across these areas following building demolition and soil excavation. As described in Section 4.10 of the NRRP, restoration involved maximizing open water and wetland establishment where possible, and surrounding these depressions with tallgrass prairie communities.

### **2.5.3 Southern Waste Units**

The Southern Waste Units involved the first restoration effort within a significantly altered topography. This project was constructed in 2001 and 2002. The project was designed primarily as an expansion of the existing Paddys Run riparian corridor, with several wetland and open water areas incorporated into the landscape. The location of this project allowed for an expansion of the Paddys Run floodplain as well. Section 4.4 of the NRRP describes this project in more detail. A portion of the post-excavation topography included an unstable cutbank of sand and gravel. In 2006, this area was regraded using clean concrete from other on-site projects to create additional amphibian and reptile habitats.

## **3.0 Performance Standards**

As stated in Section 1.3, the NRTs have agreed to a path forward for resolving compensatory wetland mitigation requirements at the Fernald Preserve. Section 5.1.1 of the NRRP sets forth the process for accomplishing this. The NRTs will use performance standards and monitoring protocols that were published by OEPA in 2004 (Mack et al. 2004) as the basis for evaluating on-site mitigation wetlands. This section and the following sections on monitoring describe how the OEPA standards apply to the Fernald Preserve.

The OEPA mitigation performance standards are designed to ensure that both the processes (functions) and ecological services (values) that an impacted wetland provided are sufficiently restored through the mitigation process. To do this, a multistep process has been developed to efficiently estimate the size, type, and quality of impacted wetlands. This evaluation results in a set of performance standards that subsequent mitigation wetlands must meet to ensure that similar size, type, and quality wetlands are replaced.

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For the Fernald Preserve, wetland impacts occurred years ago as part of remedial activities. The size and type of impacted wetlands can be approximated from the 1993 wetland delineation, but the quality of the wetlands must be inferred from the original jurisdictional delineation and subsequent discussions with regulators. In Section 3.1 below, existing information was used to estimate the size and type and of wetlands impacted, as well as an approximation of impacted wetland quality at the site.

As with the impacts to on-site wetlands, mitigation efforts have already taken place as well. It is important to distinguish between mitigation projects that are already constructed and additional projects that may be needed in the future. The OEPA mitigation performance standards and monitoring protocols were published in 2004. Each of the primary wetland mitigation projects set forth in the NRRP was at least partially designed prior to finalization of these standards. Retroactively applying these standards to established mitigation wetlands is not feasible. Instead, the published performance standards can be used as a tool to evaluate existing projects and identify opportunities for improvement of functions and values through adaptive management.

For new projects that may be agreed to, the OEPA performance standards and monitoring protocols would be fully applicable. There are two scenarios in which new mitigation projects would be undertaken. First, new mitigation projects could be considered by the NRTs if it is determined that existing created and preserved on-site wetlands do not adequately compensate for past wetland impacts. Second, additional wetland impacts could occur as a result of possible future site construction or some unanticipated dredge or fill.

### **3.1 Description of Impacted Wetlands**

#### **3.1.1 Size of Impacted Wetlands**

The 1993 wetland delineation was conducted using the Routine On-Site Determination methodology established by the 1987 Corp of Engineers Wetland Delineation Manual (USACE 1987). Figure 3-1 shows the results of this delineation. Jurisdictional wetlands included 26.58 acres of palustrine forested wetland, 6.95 acres of drainage ditches/swales, and 2.37 acres of isolated persistent emergent wetlands (Ebasco 1993). Since the 1993 delineation, several additional isolated persistent emergent wetlands have been identified, totaling 1.9 acres. Figure 3-1 confirms that no more than 11.9 acres of wetlands have been impacted (i.e., dredged or filled) at the Fernald Preserve as a result of remedial activities. The actual acreage of wetlands that were dredged or filled due to remediation is less than the 10 acres originally estimated in the OU5 Record of Decision. Based on Figure 3-1 and Table 3-1, about 9 acres have been impacted. In addition, while considered "Impacted" pursuant to Figure 3-1 and Table 3-1, a good portion of Wetlands WG (0.52 acre), WH (0.53 acre), WI (1.77 acres), WK (0.63 acre), and WHH (0.13 acre) have remained intact.

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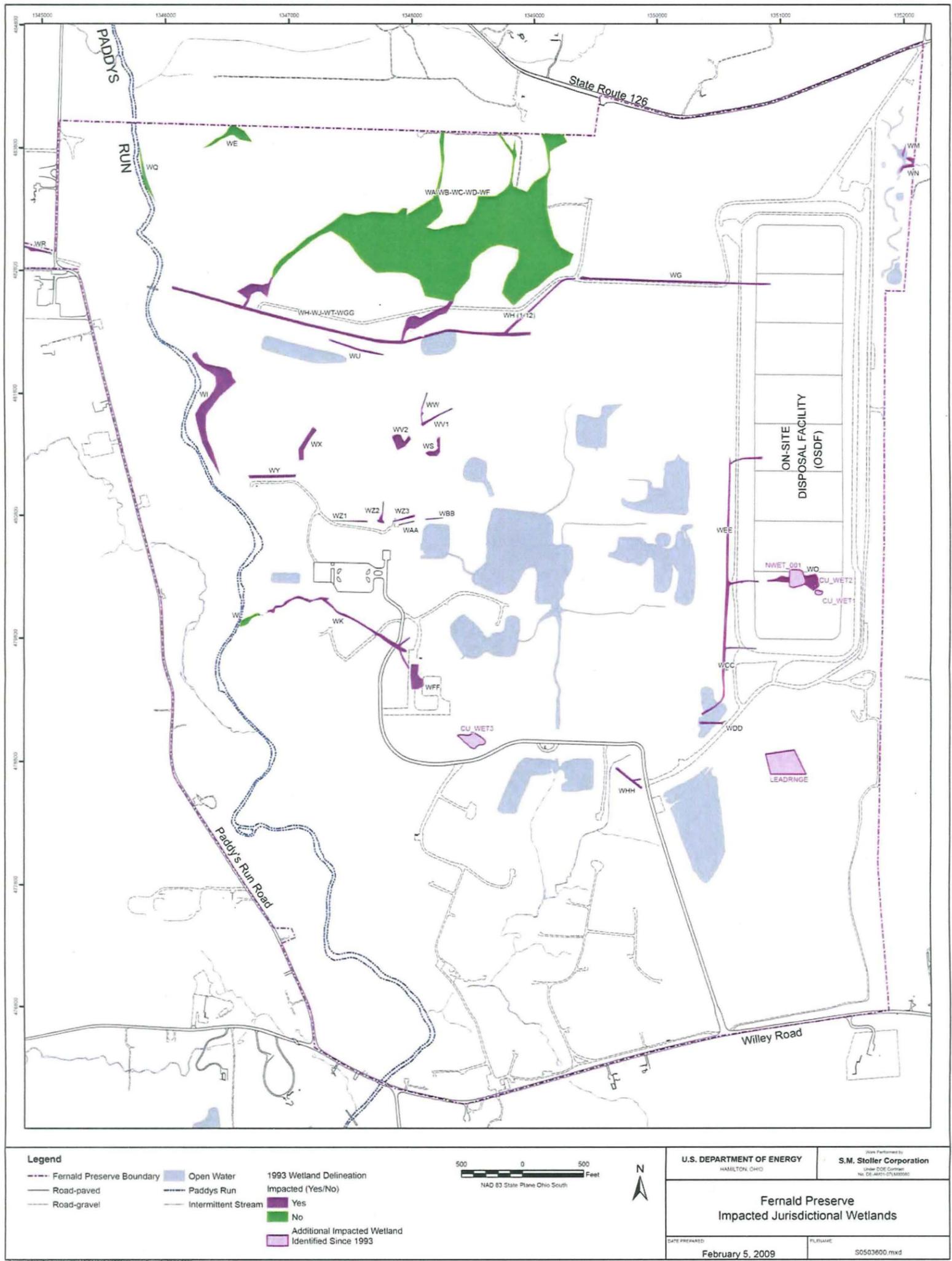


Figure 3-1. Fernald Preserve Impacted Jurisdictional Wetlands

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Table 3-1. Summary of Jurisdictional Wetlands at the Fernald Preserve and Crosswalk of Ohio EPA Hydrogeomorphic (HGM) Wetland Classification

Wetland Boundary Designation	Wetland Classification	Acreage	Impacted?	HGM Class	Class Modifier	Plant Community Modifier	Dominant Plant Community	Comments
<b>1993 Wetland Delineation</b>								
WA-WB-WC-WD-WF	Palustrine Deciduous Forested	26.15	No	Depression	(A) Surface water	(1a) Swamp forest	(vi) mixed forest	Includes some areas of persistent emergent wetlands
WL	Palustrine Deciduous Forested	0.13	No	Depression	(A) Surface water	(1a) Swamp forest	(ix) cottonwood	
WN	Palustrine Deciduous Forested	0.10	Yes	Depression	(A) Surface water	(1a) Swamp forest	(ix) cottonwood	
WQ	Palustrine Deciduous Forested (Riparian)	0.20	No	Depression	(A) Surface water	(1a) Swamp forest	(iii) maple-ash	
WG	Persistent Emergent (Drainage Ditch)	0.52	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WH (1-12)	Persistent Emergent (Drainage Ditch)	0.53	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WH-WJ-WT-WGG	Persistent Emergent (Drainage Ditch)	2.07	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WK	Persistent Emergent (Drainage Ditch)	0.63	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WO	Persistent Emergent (Swale)	0.57	Yes	Depression	(A) Surface water	(2a) Emergent marsh	(iv) cattail marsh	
WR	Persistent Emergent (Drainage Ditch)	0.67	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WU	Persistent Emergent (Drainage Ditch)	0.13	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WV1-WV	Persistent Emergent (Drainage Ditch)	0.37	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WV2	Persistent Emergent (Swale)	0.24	Yes	Depression	(A) Surface water	(2a) Emergent marsh	(iv) cattail marsh	
WX	Persistent Emergent (Drainage Ditch)	0.06	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WY	Persistent Emergent (Drainage Ditch)	0.21	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WZ1	Persistent Emergent (Drainage Ditch)	0.04	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WZ2	Persistent Emergent (Drainage Ditch)	0.06	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WZ3	Persistent Emergent (Drainage Ditch)	0.05	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WAA	Persistent Emergent (Drainage Ditch)	0.02	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WBB	Persistent Emergent (Drainage Ditch)	0.02	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WCC	Persistent Emergent (Drainage Ditch)	0.03	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WDD	Persistent Emergent (Drainage Ditch)	0.07	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WEE	Persistent Emergent (Drainage Ditch)	0.45	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WFF	Persistent Emergent (Swale)	0.08	Yes	Depression	(A) Surface water	(2a) Emergent marsh	(iv) cattail marsh	
WHH	Persistent Emergent (Drainage Ditch/Swale)	0.13	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
WE	Persistent Emergent	0.43	No	Depression	(A) Surface water	(2a) Emergent marsh	(iii) mixed emergent marsh	
WM	Persistent Emergent	0.02	Yes	Depression	(A) Surface water	(2a) Emergent marsh	(iii) mixed emergent marsh	
WI	Scrub-Shrub/Persistent Emergent	1.77	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iii) mixed emergent marsh	Former streambed of Paddys Run—disturbance evident
WS	Scrub-Shrub/Persistent Emergent	0.15	Yes	Impoundment	(B) Human	(3a) Shrub swamp	(iv) other - willow	
<b>Wetlands Delineated During Remediation</b>								
CU_WET1	Persistent Emergent (Swale)	0.04	Yes	Depression	(A) Surface water	(2a) Emergent marsh	(iv) cattail marsh	Similar to Wetland WO
CU_WET2	Persistent Emergent (Swale)	0.01	Yes	Depression	(A) Surface water	(2a) Emergent marsh	(iv) cattail marsh	Similar to Wetland WO
CU_WET3	Persistent Emergent (Drainage Ditch)	0.37	Yes	Impoundment	(B) Human	(2a) Emergent marsh	(iv) cattail marsh	
NWET_001	Persistent Emergent (Swale)	0.37	Yes	Depression	(A) Surface water	(2a) Emergent marsh	(iv) cattail marsh	Similar to Wetland WO
LEADRNGE	Persistent Emergent	1.07	Yes	Depression	(A) Surface water	(2a) Emergent marsh	(iii) mixed emergent marsh	Wetland boundary is approximate

### 3.1.2 Type of Impacted Wetlands

As Figure 3-1 shows, the majority of impacted wetlands consisted of drainage ditches/swales or isolated persistent emergent communities. Table 3-1 lists the impacted wetlands and compares them to the approximate hydrogeomorphic (HGM) class and dominant plant community in accordance with current OEPA methodology. As with other aspects of the impacted wetlands evaluation, the classifications are based on existing historical information instead of actual field walkdowns. As Table 3-1 shows, most of the impacted wetlands at the Fernald Preserve would have fallen into the impoundment HGM class, with an emergent marsh plant community modifier. The dominant plant community description for most of the impacted wetlands was a cattail marsh. As needed, this HGM class and associated plant community modifiers will be used for establishment of performance standards in Section 3.2 below.

### 3.1.3 Quality of Impacted Wetlands

In 1995, regulators and the NRTs discussed the quality of impacted wetlands and agreed upon the current mitigation ratio of 1.5 to 1. As described above, the majority of dredged or filled wetlands consisted of isolated drainage ditches and swales, with mostly monotypic stands of vegetation (i.e., cattails). Therefore, the determination of wetland quality had essentially already been made prior to the current approach for assessment. A brief evaluation of the OEPA assessment approach confirms that, if an assessment was conducted, on-site impacted wetlands would mostly fall within a Category 1 or 2 classification (Mack 2001). For the purposes of establishing present-day performance standards in Section 3.2, impacted wetlands will conservatively be assumed to have scored within Category 2.

## 3.2 Mitigation Performance Standards

A set of performance standards for on-site mitigation wetlands can be formulated using existing information to estimate the size, type, and quality of impacted wetlands at Fernald. Table 3-2 summarizes the representative impacted wetland estimate. With this “representative impacted wetland” established for the Fernald Preserve, the NRTs can set goals and objectives for existing wetland mitigation projects at the site. Future wetland mitigation requirements would depend on an evaluation of the impacted wetland, pursuant to existing OEPA protocols (Mack 2001, Mack et al. 2004).

*Table 3-2. Representative Wetland Impact Estimate*

Wetland Evaluation Parameter		Estimated Wetland Impact/Type
Size	Acres	11.9
Type	HGM Class	Impoundment
	Class Modifier	(B) Human
	Plant Community Modifier	(2a) Emergent Marsh
	Dominant Plant Community	(iv) Cattail Marsh
Quality	Category	2

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**3.2.1 Existing Wetland Areas**

The discussion above establishes that compensatory wetland mitigation is required at the Fernald Preserve to replace the ecological functions and values of an emergent cattail marsh impoundment. Table 3–3 lists the applicable OEPA performance standards for this HGM class and plant community.

*Table 3–3. Performance Standards for Existing Wetlands at the Fernald Preserve*

<b>Standard/Parameter</b>	<b>Value</b>	<b>OEPA Standard Section</b>	<b>Comments</b>
Acreage	17.85 acres	2.1.1	Total mitigation acreage that is required based on past impact.
Basin morphology	less than or equal to 15:1 side slope	2.1.2	Not feasible in some areas given remediation footprint
Perimeter: Area ratio	Greater than or equal to 75% of impacted perimeter length	2.1.3	
Hydrologic regime		2.1.4	
water in root zone (<30 cm)	53% of time		
mean depth of water	29.4 cm		
flashiness index	2.0		
Unvegetated open water	<10%	2.2.1	Not feasible in some areas given remediation footprint
Native perennial hydrophytes	>75%	2.2.2	
Invasive species	<5%	2.2.3	
Vegetation IBI	48–63	2.2.4	
Amphibian IBI	NA	2.3	No standard for emergent marsh impoundments.
Other taxa groups	NA	2.4	Macroinvertebrates, wetland birds, and reptiles.
Soil biogeochemistry		2.5	
% solids	<46.6		
% total organic carbon	>3.9		
% total N	>0.5		

Adapted from Table 8 of the OEPA wetland mitigation performance standards (Mack et al. 2004)

cm = centimeters

IBI = Index of Biological Integrity

NA = not applicable

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As Section 2.0 demonstrates, a wide variety of wetlands have been created or preserved at the Fernald Preserve. A mosaic of open water, emergent marsh, wet prairie, scrub/shrub, and wet forest communities have provided and will continue to provide a number of ecological values and functions, regardless of monitoring and performance standards. As stated previously, it is not practical to apply published performance standards to projects that were not necessarily designed and constructed with the standards in mind. Mitigation wetlands at the Fernald Preserve were driven by the goals of the NRRP and generally aimed to establish native plant communities and promote wildlife use. As a result, some of the wetlands created or preserved at the Fernald Preserve fall within a different (and potentially higher quality) HGM class and plant community than the impacted wetlands.

Instead of determining “pass/fail” compliance, the NRTs will use the OEPA performance standards in Table 3–3 as a set of reference points for evaluating existing on-site wetlands. The performance standards form the basis for additional monitoring, with results collectively evaluated by the NRTs. From this effort, the NRTs will determine the need for corrective action or the creation of additional wetlands. This process is conceptually similar to the functional monitoring approach for restored areas that is described in the NRRP. The performance standards serve as the reference community that monitored on-site wetland areas are compared to. For on-site wetlands, the monitoring parameters are expanded and more structured, as described in Sections 4.0 and 5.0.

### **3.2.2 New Projects**

If the need for new wetland impacts is identified, the full compliment of OEPA guidance will be used to determine the extent and type of mitigation required. This includes the use of the Ohio Rapid Assessment Methodology for Wetlands (Mack 2001) and subsequent application of the OEPA performance standards (Mack et al. 2004).

## **4.0 Monitoring Period**

Some form of monitoring has been ongoing within mitigation projects for a number of years. The project descriptions in Section 2.0 provide a brief summary of monitoring activities for each project. Monitoring on-site mitigation wetlands against the OEPA performance standards will require an increase in both the kind of data collected and the time frames for collection. As with other aspects of this plan, a distinction is made between existing projects and potential new projects.

### **4.1 Existing Wetland Areas**

Existing wetland projects at the Fernald Preserve will be monitored for 3 years, from 2009 through 2011. This monitoring period is consistent with the schedule for functional monitoring as set forth in the NRRP. It is essentially similar to years 3, 4, and 5 of the conceptual schedule that is described in the OEPA performance standards. Table 4–1 lists the applicable monitoring activities and associated year of implementation. The 2009 monitoring activities coincide with the wetlands functional monitoring evaluation as described in the NRRP, so collected data can be used for several purposes.

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Following the 2011 effort, the NRTs will determine whether additional monitoring is needed. Again, this path forward is consistent with the monitoring approach established by the NRTs in Section 5 of the NRRP.

Table 4–1. Monitoring Schedule for Existing Wetlands at the Fernald Preserve

Monitoring Activity	OEPA Standard Section	2009	2010	2011
Delineation	4.1.1		X	
Basin morphology	4.1.2			X
Perimeter:area ratio	4.1.3			X
Hydrologic monitoring	4.1.4		X	X
Vegetation sampling	4.2	X		X
Amphibian sampling	4.3	X	X	X
Soil and water sampling	4.5		X	X
Other taxa group sampling	4.4	X	X	X

Adapted from Table 6a of the OEPA wetland mitigation performance standards (Mack et al. 2004)

## 4.2 New Projects

The monitoring period for any new wetland mitigation projects will be determined on a case-by-case basis. OEPA guidance requires at least 5 years of monitoring and states a preference for 10 years (Mack et al. 2004). If a forested mitigation project is required, then monitoring would be conducted for 10 years.

## 5.0 Monitoring Protocols

The OEPA performance standards provide detailed guidance with respect to monitoring and data analysis. This guidance will be the primary means for evaluation of wetlands at the Fernald Preserve. Table 4–1 provides a reference for the applicable OEPA monitoring protocols. Some modifications to these protocols may be needed due to unusual circumstances (e.g., access). Any changes to monitoring protocols will be agreed to by the NRTs prior to implementation.

The decision on which projects to evaluate was made by the NRTs as part of the field evaluation walkdowns conducted in 2009 pursuant to the NRRP. Figure 5–1 shows the location of all wetlands evaluated under this process. The total acreage for these projects is over 30 acres. This provides a substantial buffer for ensuring that the 17.85-acre compensatory mitigation requirement is met.

## 6.0 Reporting

Reporting will be conducted through annual Site Environmental Reports. All monitoring activities associated with ecological restoration at the Fernald Preserve will be summarized in the main text and documented in an appendix to the annual report. In addition to an annual report, the NRTs will be regularly updated on monitoring activities during periodic meetings.

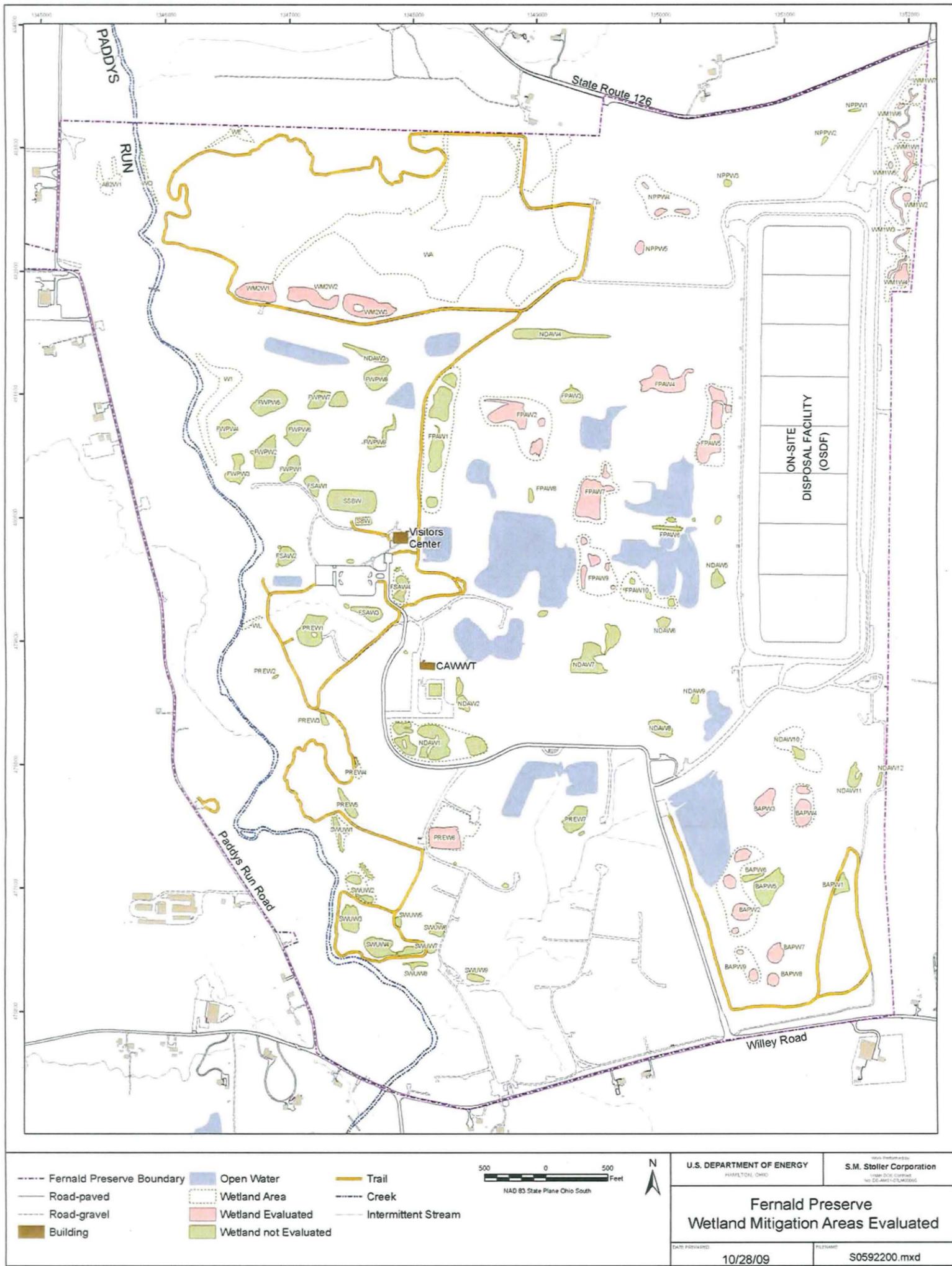


Figure 6-1. Wetland Mitigation Areas Evaluated

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**UNCONTROLLED IF PRINTED****7.0 References**

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