Appendix C

Site Inspections and Natural Resource Management

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Abbreviations

CC	coefficient of conservatism
DOE	U.S. Department of Energy
FQAI	Floristic Quality Assessment Index
GEMS	Geospatial Environmental Mapping System
LMICP	*Comprehensive Legacy Management and Institutional Controls Plan*
NRRP	Natural Resource Restoration Plan
OSDF	On-Site Disposal Facility
RAMP	Restored Area Maintenance Plan

Measurement Abbreviation

m^2	square meters

C.1.0 Introduction

This appendix presents results of the routine inspections of the site and On-Site Disposal Facility (OSDF), OSDF inspection photographs, and data collected as part of natural resource management at the Fernald Preserve, Ohio, Site.

C.2.0 Site and On-Site Disposal Facility Inspections

The Fernald Preserve *Comprehensive Legacy Management and Institutional Controls Plan* (LMICP), Volume II, *Institutional Controls Plan*, and Attachment B, "On-site Disposal Facility Post-Closure Care and Inspection Plan," (PCCIP) (DOE 2023) identifies the inspection processes for the site and OSDF, respectively.

Site and OSDF inspections are conducted quarterly with participation from regulators. Site inspections also include quarterly point-specific institutional control inspections and weekly trail inspections. Inspections document evidence of unauthorized uses of the site, the effectiveness of institutional controls, and the need for repairs. Additional inspections are completed following prescribed burns. Figures C-1 and C-2 show the 2023 site and OSDF inspection findings, respectively. Site and OSDF inspection findings are also presented in Section 5.0. DOE is proposing to modify the frequency of trail inspections from weekly to quarterly. Trail inspections may be performed more frequently based on an event driven issues such as severe weather. Upon receipt of feedback from the public and stakeholders and approval from regulators, these inspection change will be implemented in 2025.

Through calendar year 2021, quarterly inspection reports that included the specific findings of the site and OSDF inspections, and a series of photographs of the OSDF individual cell caps and drainages, were submitted to the regulators. Beginning with calendar year 2022, a more streamlined reporting process was implemented which documents for the regulators the completion of each quarterly inspection. Findings that indicate activity and use limitations for the site are not in compliance are also included in the report. No activity and use limitation inspection findings were reported in the 2023 quarterly inspection reports. Inspection reports are also posted at https://lmpublicsearch.lm.doe.gov/sitedocs/CERCLA_Fernald_Preserve_PD_Index.pdf. With the reporting change in 2022, the OSDF quarterly inspection photographs are no longer included in the quarterly reports. For 2023, the photos are instead reported in the Site Environmental Report as Figures C-3 through C-12K. The OSDF 2023 annual inspection photographs are included as Figures C-13A through C-40. Requirements concerning photographs of significant OSDF findings and subsequent notification of the regulators are discussed in Attachment B, "OSDF Post-Closure Care and Inspection Plan" of the LMICP. The PCCIP requires quarterly inspection photographs as needed of significant findings. With the approval of stakeholders and regulators, the quarterly inspection photographs will no longer be taken with the exception of those required in the PCCIP which are outlined below:

- Any evidence of erosion (e.g., gullies, rivulets, rills) that the inspector considers significant and documents in the inspection notes.
- Any evidence of burrowing animals.

- Any off-OSDF features that may affect the OSDF in the future and that the inspector considers significant and documents in the inspection notes.
- Any evidence of ponded water.
- Erosion protection material (riprap).
- Evidence of leachate seeps.
- Damaged monitoring wells.

C.2.1 Site Inspections Findings

To manage the site inspections more easily, the site was divided into four quadrants: central, south, east, and west. The field walkdowns are conducted by quadrant. Inspection of the west quadrant, originally scheduled for December 2022, was delayed until early 2023 due to inclement weather. As a result, two west quadrant inspections were conducted in 2023 and the findings for both inspections are included in this report. A prescribed burn of 20 acres of prairie in the former production area was completed in 2022. A post-burn inspection was conducted in January 2023 as part of the central quadrant inspection.

The 2023 site inspection findings consisted mainly of noxious or invasive vegetation, deer exclosure fence damage, and debris. Debris (e.g., asphalt, tile, and concrete) continues to be identified, primarily in the Former Production Area and former Waste Storage Area which are both located in the central quadrant. The debris findings during site inspections were higher in 2023 than in recent years, especially in the central quadrant. The higher number of debris findings is attributed to the greater exposure and visibility of the ground surface following the December 2022 prescribed burn. Overall, debris finding numbers continue to decrease. Table C-1 provides a comparison of debris quantities by year. Debris is discovered through the site inspection process as well as during construction activities, site maintenance, and casual observation. In 2023, 79 pieces of debris were identified, radiologically surveyed, and removed. A radiological scan is completed for all debris identified. None of the debris discovered in 2023 had fixed radiological contamination above background levels.

A site inspection finding reported in 2022 was addressed in October 2023, when the access control grating was replaced on the main drainage corridor culvert. The original access control grating had experienced natural degradation of the concrete which caused the rebar to become dislodged. The finding was identified during the December 2022 point-specific institutional control inspection. The culvert, along with an adjacent 18-inch culvert that is completely buried, was left in place even though it has fixed radiological contamination. These culverts are located directly below the OSDF leachate conveyance system and the main effluent line running between the Converted Advanced Wastewater Treatment facility and the Great Miami River. Because of their location, these culverts could not have been removed without potentially impacting ongoing Converted Advanced Wastewater Treatment and OSDF operations. Instead, metal grating was installed to prevent access to the 60-inch culvert. Site inspections ensure that the 60-inch culvert grating is in place and is serviceable and that the 18-inch culvert is not exposed through erosion or other ground disturbance. The approximate location of the main drainage corridor grating is identified on Figure C-1.

C.2.2 Annual Site Photographs

Annual site inspection photographs were taken across the site from 2007 through 2022. The 2018 Site Environmental Report (DOE 2019b) was the first time these photographs were included in the Site Environmental Report. Prior to 2018, the photographs were made available through the Geospatial Environmental Mapping System (GEMS), an internet-based interface that allows for public access to monitoring and inspection data. The annual site inspection photograph process was established to document the restoration following the extensive soil remediation completed in 2006. Because of the successful establishment of vegetation throughout the site, these annual site inspection photographs are less useful in documenting changing conditions.

C.2.3 OSDF Inspections Findings

OSDF inspections consist of a quarterly walkdown around the perimeter of the OSDF and an annual walkdown of the vegetated cap. As discussed in Section 5.1, a prescribed burn of the OSDF vegetated cap, approximately 75 acres, was completed in February 2023. The required post-burn walkdown of the OSDF was completed in March 2023 in conjunction with the regularly scheduled quarterly OSDF inspection. The inspections are conducted to look for indications that there may be an issue with the proper functioning of the cap. If findings are identified, such as erosion rills, animal burrows, noxious weeds, woody vegetation, or settlement cracks they are documented and repaired. Figure C-2 identifies the approximate location, type of finding, and if the finding has been resolved for each finding identified during the March, June, September, and December 2023 inspections.

In 2023, there were no signs that the integrity of the cap had been compromised. As in previous years, findings consisted mainly of woody vegetation and noxious weeds. Woody vegetation continues to be found on the OSDF cap. Field personnel physically remove or apply herbicide to woody vegetation to keep trees and shrubs from becoming established on the cap. Following the prescribed burn, more woody vegetation was exposed and documented in the follow-up inspections. All woody vegetation identified in 2023 was treated with herbicide or removed. Additional findings on the cap included, but were not limited to, animal burrows and evidence of previous erosion that has been stabilized. Representative photographs of these OSDF findings are included as Figures C-41 and C-42, as required by the PCCIP. These findings did not require follow-up inspection because both findings were not active.

Because a prescribed burn allows for a more thorough inspection of the surface of the OSDF, with approval from the regulators and stakeholders, the U.S. Department of Energy (DOE) plans to change the annual walkover inspection required in the PCCIP to every other year to align this complete cap walkover with OSDF prescribed burns. In the event that an OSDF burn cannot be completed, DOE will still complete a walkover of the entire OSDF cap at least every other year. The next prescribed burn of the OSDF is planned for spring 2025.

C.2.4 OSDF Vegetation

Vegetation monitoring on the OSDF is required in accordance with Volume II of the LMICP (DOE 2023). DOE and the regulatory agencies agree that the goal is not necessarily to establish a functioning prairie on the OSDF cap, but 90% total cover with 50% native vegetation are the goals for the vegetated cap. Monitoring to determine the percentage of native cover on one-third

of the OSDF cap is completed annually so that the entire cap is monitored over a 3-year period. Each individual cell cap is divided into a grid that covers the surface of the cap, 4 blocks wide (east to west) and 3 blocks long (north to south). Within each grid block, a 1-meter-square quadrat is randomly located, resulting in 12 vegetation monitoring locations for each cell cap. Total cover and species richness data are collected for each quadrat. From this information, total cap cover, native species composition, and relative frequency of native species are calculated. Vegetation on OSDF cell caps 1, 2, and 3 were monitored in 2023, and the results are presented in Table C-2. The total cover for Cells 2 and 3 averaged 98% and 95%, respectively, exceeding the goal of 90%. The total cover for Cell 1 averaged 87%, slightly below the 90% goal. It is suspected that the less than 90% cover may be due to a combination of the February 2023 prescribed burn removing the thatch build up, followed by spring herbicide application to invasive vegetation on the cap. Native cover for cell caps 1, 2, and 3 were 64%, 60%, and 68%, respectively, exceeding the 50% native vegetation goal.

C.3.0 Ecological Monitoring

Monitoring of ecologically restored areas was required as part of the natural resource damage settlement among DOE, the Ohio Environmental Protection Agency, and the U.S. Department of the Interior who is represented by the U.S. Fish and Wildlife Service (Fernald Natural Resource Trustees). The Fernald Preserve Natural Resource Restoration Plan (NRRP) (State of Ohio 2008) specified ecological restoration monitoring requirements and established the ecological restoration monitoring program at the Fernald site.

The *Fernald Preserve, Ohio, Restored Area Maintenance Plan* (RAMP) (DOE 2012) was an additional document required by the NRRP. The RAMP established a maintenance program for ecologically restored areas across the site. The NRRP called for a 10-year review of the RAMP by the Fernald Natural Resource Trustees. That review was conducted in 2020 and resulted in the development of the *Fernald Preserve, Ohio, Site Natural Resource Management Plan.* In 2022, DOE provided a detailed status of the commitments for ecological restoration, monitoring, and maintenance at the site (DOE 2022) which originated from the "Consent Decree Resolving Ohio's Natural Resource Damage Claim Against DOE" in the State of Ohio versus DOE, et al. 2008 court decision. In 2023, the Fernald Natural Resource Trustees agreed that DOE had completed ecological restoration of the Fernald Preserve in accordance with the requirements identified in the Consent Decree and the NRRP (Ohio EPA 2023 and USFWS 2023). Additionally, DOE communicated that DOE Legacy Management will continue long-term stewardship of site restoration pursuant to the *Fernald Preserve, Ohio, Site Natural Resource Management Plan.*

Beginning in 2023, the Natural Resource Management Plan is included as Appendix A of Volume I of the Fernald Preserve LMICP (DOE 2023). Further detail regarding ecological monitoring for 2023 is provided below.

C.3.1 Ecological Monitoring Methodology

Prior to 2021, a two-tier ecological monitoring program was used to assess restoration efforts. Implementation monitoring was used to evaluate vegetation establishment following seeding and planting projects. Functional monitoring was used to assess the progress of the development of a

restored community (prairie, wetland, forest) by comparing floristic quality parameters to those of baseline and reference sites (DOE 2002). Reference sites are offsite communities that represent an ideal end-state for site restoration projects.

Prior to 2015, functional monitoring was conducted on a sitewide community basis, with wetland monitoring completed one year, prairie monitoring the next, and forest monitoring the third year. From 2015 through 2020, a management-area approach was implemented to ensure that restored areas were maintained on a 3-year rotation (Figure C-43). Functional monitoring in prairie and woodland areas consisted of establishing 15 random 1 square meter (m^2) quadrats that were surveyed for herbaceous vegetation during the growing season (April through September). Surveys were divided into three rounds of five quadrats for each designated monitoring sub-area to ensure coverage throughout the growing season. For each quadrat, species richness and cover data were recorded for herbaceous vegetation. Additional 1,000 m^2 plots were used to collect woody data from each forest community. Species abundance and size data using diameter at breast height measurements were collected for woody vegetation in forest communities. Wetland communities were surveyed via fixed grids as described in the *Fernald Preserve Wetland Mitigation Monitoring Plan* (DOE 2009).

In 2020, a review of 10 years of data showed that NRRP goals for native species were mostly met, there had been much improvement over baseline conditions, and comparison to reference sites were sometimes met. Based on this review, the Fernald Natural Resource Trustees agreed that a shift from project-specific monitoring to a community-based approach for ecological monitoring is more appropriate.

The community-based monitoring involves the development of floristic inventories for each restoration community. Floristic inventories are compiled by conducting a series of walkdowns to survey the vegetation within a particular community type throughout the growing season. The result is a comprehensive list of vascular plant species for each monitoring community type. Figure C-44 shows the breakdown of community types for which floristic inventories are completed. Remediation wetland areas, remediation prairie areas, and remediation successional areas are all located in areas of the site where extensive ground disturbance took place. They are characterized by having little to no topsoil or nearby established vegetation in place when ecological restoration efforts began. Perimeter wetland areas, perimeter successional areas, restoration forest areas, and existing forest areas are all located in areas where little or no ground disturbance took place. Topsoil was usually still in place at the time ecological restoration efforts began. Each community type will be evaluated on a 3-year rotation. In 2021, wetland communities were evaluated using the new floristic inventory method. In 2022, remediation area communities across the site were evaluated through this revised approach to functional monitoring. Remediation areas were divided into remediation successional areas, where the long-term management goal is to allow natural forest succession to take place, and remediation prairie areas, where restored prairies will be maintained as prairie communities through vegetation management. Existing forest areas, restoration forest areas, and perimeter successional areas were monitored in 2023 and the results are presented in this report. In 2024, the monitoring cycle will repeat, beginning with monitoring of perimeter and remediation wetland areas. Prairies will be monitored in 2025 and forests will be monitored in 2026. Floristic monitoring will be reevaluated after 2026.

C.3.2 Ecological Monitoring Results for 2023

The year 2023 is the first year that existing forest, restoration forest, and perimeter successional areas were surveyed using the floristic inventory method. While the long-term goal for all three of these areas is to develop into healthy deciduous woods, the three areas are currently in various stages of succession. The existing forest areas onsite are second growth woodlands that have existed for many decades. Management activities in the existing forest areas is primarily focused on invasive species removal. The restored forest areas are locations where active management has taken place to expand an existing forest area or riparian corridor. These restored forest areas vary from established young woodlands to more open areas still early in the succession process. Some vegetation still resembles that found in prairie communities. Management activities will continue in the restored forest areas, including invasive species removal and supplemental tree and shrub plantings, as needed. The perimeter successional areas onsite were originally planted and managed as prairie communities. In 2020, the decision was made to allow these perimeter prairie pockets, located along Paddys Run Road, to succeed into forest areas. This will establish a contiguous forest community between the western site boundary and Paddys Run. These perimeter successional areas still largely resemble the prairie community type, as succession has just recently been allowed to progress. Management activities for these perimeter successional areas will include invasive species removal and supplemental tree and shrub plantings, only as needed, to help ensure forest development.

The three community types were surveyed in three rounds to ensure that data were collected through the entire growing season. Native and non-native species richness and species composition, average coefficient of conservatism (CC), and Floristic Quality Assessment Index (FQAI) were calculated from the data. Processes for calculating monitoring parameters for all communities are described in the *Fernald Preserve, Fernald, Ohio, Ecological Monitoring Methods Plan and Procedures* (DOE 2021). The latest Ohio FQAI database (Gara 2013) was used to determine nativity status and CC values. Table C-3 lists species identified in 2023 and allows for comparison of the species lists for the monitored communities. A total of 381 species were observed overall, with the most (290) species identified in the restored forest areas. Figure C-45 shows the locations of the notable species from 2023 monitoring.

Table C-4 provides a multiyear comparison of mean CC value, FQAI, and percent native species for the areas surveyed in 2023. For the data presented from the years 2011 to 2020, a species list was compiled from the ecological monitoring data collected during those years. The species list was used to calculate mean CC, FQAI, and percent native species. While FQAI is included in Table C-4, this value is influenced by the size of the surveyed area. The floristic inventory method surveys much larger areas than those surveyed prior to 2021. Because of this, FQAI will be more useful when comparing 2023 data to 2026. Mean CC is a more appropriate index for historical comparisons using previous methods. Spyreas (2016) has shown that mean CC values are useful for comparison when there is variability in plot size and sampling intensity, as well as species misidentification. Mean CC will also be useful for comparisons to future floristic inventories. Species nativity will have value for historical comparisons; however, this could also be influenced slightly by the larger survey areas. This metric will also be useful for future comparisons.

Table C-4 shows a slight increase in mean CC from 2011 to 2023 for existing forest areas; restored forest areas are mostly unchanged since 2011. Mean CC values for perimeter

successional areas increased steadily during this time. FQAI scores for existing forests and restored forest areas were relatively stable through the first four monitoring cycles (2011 through 2020); however, both values increased in 2023. The perimeter successional areas show an upward trend in FQAI since 2011; however, this trend leveled off in 2023. Native species percent in the existing forest areas and restored forest areas show only a slight increase since 2011. In contrast, perimeter successional areas show a strong increasing trend in native species percent since 2011.

Several species of interest were observed in existing forest areas in 2023. Sweet pignut hickory (*Carya ovalis*) and spinulose wood fern (*Dryopteris carthusiana*) were observed for the first time at the Fernald Preserve. Native plants with CC values of 7–10 have very specific habitat requirements and are indicative of healthy communities. Forty-two high CC value (6 and above) species were observed in existing forest areas including:

- Sycamore (*Platanus occidentalis*)
- Chinquapin oak (*Quercus muehlenbergii*)
- Shellbark hickory (*Carya laciniosa*)
- American beech (*Fagus grandifolia*)
- Northern three-lobed bedstraw (*Galium trifidum*)
- Wild hydrangea (*Hydrangea arborescens*)
- Black-gum (*Nyssa sylvatica*)
- Shumard oak (*Quercus shumardii*)
- Black oak (*Quercus velutina*)
- Fescue sedge (*Carex festucacea*)
- Muhlenberg's sedge (*Carex muhlenbergii*)
- Blue ash (*Fraxinus quadrangulata*)
- False rue-anemone (*Isopyrum biternatum*)
- Red mulberry (*Morus rubra*)

Species of interest observed in the restored forest areas in 2023 included three species that had not previously been recorded at the Fernald Preserve: tufted-fescue sedge (*Carex brevior*), cross-vine (*Bignonia capreolata*), and bottomland aster (*Aster ontarionis*). Forty-one high CC species were observed in this community. Highlights from the 2023 inventory, with CC values of 7 and higher include:

- Rattlesnake-master (*Eryngium yuccifolium*)
- Sycamore (*Platanus occidentalis*)
- Chinquapin oak (*Quercus muehlenbergii*)
- Shellbark hickory (*Carya laciniosa*)
- American beech (*Fagus grandifolia*)
- Northern three-lobed bedstraw (*Galium trifidum*)

- Wild hydrangea (*Hydrangea arborescens*)
- Black-gum (*Nyssa sylvatica*)
- Shumard oak (*Quercus shumardii*)
- Black oak (*Quercus velutina*)
- Purple prairie-clover (*Dalea purpurea*)
- Compass plant (*Silphium laciniatum*)
- Stiff goldenrod (*Solidago rigida*)
- Side-oats grama grass (*Bouteloua curtipendula*)
- Tufted-fescue sedge (*Carex brevior*)
- Swamp white oak (*Quercus bicolor*)
- Bottomland aster (*Aster ontarionis*)
- Cross-vine (*Bignonia capreolata*)

In the perimeter successional areas, sullivant's milkweed (*Asclepias sullivantii*) was recorded for the first time at the Fernald Preserve. Seventeen high CC species were observed in this area including:

- Rattlesnake-master (*Eryngium yuccifolium*)
- Sycamore (*Platanus occidentalis*)
- Chinquapin oak (*Quercus muehlenbergii*)
- Compass plant (*Silphium laciniatum*)
- Stiff goldenrod (*Solidago rigida*)
- Swamp white oak (*Quercus bicolor*)
- Sullivant's milkweed (*Asclepias sullivantii*)

Both the existing forest and restored forest areas had more than twice the number of high CC species (value of 6 or greater) than those observed in the perimeter successional areas during the 2023 surveys. The perimeter successional areas are predominantly open habitats with little woody vegetation growth. Over time, these areas will develop into woodlands, but the areas are very early in this process. The restored forest areas have the most diverse habitats, varying from areas that have been woodlands for several decades to open areas that largely lack woody plants. The presence of the open areas is reflected in the high CC species compositions for each area. In the perimeter successional areas, more than half of the high CC species observed are species not found in woodland habitats, but rather, are representative of a prairie community. The same is true for the restored forest areas, in which nearly a quarter of the high CC species observed are species that are not typical of woodland habitats. In contrast, the existing forest areas are very representative of a predominantly woodland community. Of the 42 high CC species observed, only three are not typical woodland species. These results are expected and demonstrate that the restored forest and perimeter successional areas are not as far along in succession as the existing forest areas.

Spring ephemeral wildflowers are a group of plants that are characteristic of woodland habitats. These plants bloom in the early spring from March through May before canopy level trees above them leaf out, resulting in significantly more shade on the forest floor. Examples include toadshade (*Trillium sessile*), bloodroot (*Sanguinaria canadensis*), Dutchman's breeches (*Dicentra cucullaria*), Virginia bluebells (*Mertensia virginica*), and white trout-lily (*Erythronium albidum*). Nearly all spring ephemeral species at the site were growing in the existing forest areas. Some of these species were also found in the restored forest area, but not as many as in the existing forest areas. Relatively few of these species were observed in the perimeter successional areas. The presence or absence of these spring ephemeral wildflower species in the monitored areas is another indicator of their current stages of ecological succession, with the perimeter successional areas being the earliest successional areas, varying stages of succession in the restored forest areas, and the existing forest areas resembling healthy forest habitats.

Monitoring results are used to assess the health of the restored areas and ensure that proper maintenance, if needed, is accomplished. Woody invasive species will continue to try to invade the successional and restoration forest areas where native forest species are only just becoming established or are early in their successional development. Removal of those invasive species will be necessary to ensure that the successional areas continue to follow ecological succession on a desirable trajectory. That success is determined by the sensitivity, diversity, and the frequency of the species present. For example, during the 2023 floristic inventory, a much larger presence of invasive tree-of-heaven (*Ailanthus altissima*) was identified. While quantitative data is not collected via this method, the floristic inventory effort allowed site personnel to identify and map new areas for this invasive species. Because this species is a primary food source and attractant for the invasive spotted lanternfly, treating and removing tree-of-heaven will be a priority for 2024 maintenance activities.

C.4.0 Inspection and Ecological Monitoring Activities in 2024

Quarterly site inspections will continue to be used to identify issues that need to be addressed. To better access remote areas of the site, the timing of field walkdowns is focused in the winter months. This allows for greater visibility and access in densely vegetated areas. Post-burn walkdowns in the central and east quadrants will also be conducted. Vegetation monitoring of the OSDF cap will also continue. Cell caps 4, 5, and 6 will be evaluated in 2024.

The floristic inventories implemented in 2021 will continue in 2024 for remediation wetland areas and perimeter wetland areas. Select perimeter wetland areas will also be monitored for amphibian activity. The inventories and monitoring activities are used to determine the health of, and ensure the continued development of, the various ecological communities onsite as part of ecological stewardship.

C.5.0 References

10 CFR 835. "Occupational Radiation Protection," *Code of Federal Regulations*.

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State of Ohio, 2008. Consent Decree Resolving Ohio's Natural Resource Damage Claim Against DOE, *State of Ohio v. United States Department of Energy, et al*, Civil Action No. C-1-86-0217, Judge Spiegel.

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Table C-1. Annual Debris Quantities

Year	Free-Release Debris Count[a,b]	Contaminated Debris Count[a]	Percent Contaminated[a,b]
2007	-	108	-
2008	-	128	-
2009	-	36	-
2010	-	21	-
2011	204	4	1.9%
2012	1,480	12	0.8%
2013	391	8	2.0%
2014	814	8	1.0%
2015	453	13	2.8%
2016	261	9	3.3%
2017	574	3	0.5%
2018	294	3	1.0%
2019	925	0	0.0%
2020	241	1	0.4%
2021	143	6	4.0%
2022	128	0	0.0%
2023	79	0	0.0%

[a] 10 CFR 835. "Occupational Radiation Protection."
[b] DOE began recording free-release debris counts in 2011.

Table C-2. OSDF Vegetation Monitoring Results for Cells 1, 2 and 3

	Cell 1	Cell 2	Cell 3
Total Species	25	25	19
Native Species	16	15	13
Non-Native Species	9	10	6
Native Species (Percent)	64%	60%	68%
Relative Frequency of Native Species (Percent)	71%	61%	66%
Average Coefficient of Conservatism (CC), range between 0-10	2.4	1.9	2.2
Floristic Quality Assessment Index	12.2	9.6	9.4
Average Total Cover (Percent)	87%	98%	95%

				Relative Frequency		
Scientific Name	**Common Name**	**Type**	**CC**	**Cell 1**	**Cell 2**	**Cell 3**
Achillea millefolium	YARROW	forb	1	-	8.3%	-
Ambrosia artemisiifolia	COMMON RAGWEED	forb	0	58.3%	83.3%	83.3%
Andropogon gerardii	BIG BLUESTEM	grass	5	100.0%	25.0%	41.7%
Apocynum cannabinum	INDIAN HEMP	forb	1		8.3%	8.3%
Asclepias syriaca	COMMON MILKWEED	forb	1	8.3%	33.3%	41.7%
Aster novae-angliae	NEW ENGLAND ASTER	forb	2	8.3%	50.0%	41.7%
Bouteloua curtipendula	SIDE-OATS GRAMA GRASS	grass	8	25.0%	8.3%	25.0%
Carex frankii	FRANK'S SEDGE	sedge	2	8.3%	-	-
Desmodium paniculatum	SHOWY TICK-TREFOIL	forb	3	-	-	8.3%
Echinacea purpurea	PURPLE CONEFLOWER	forb	6	-	8.3%	-
Elymus canadensis	CANADA WILD RYE	grass	6	8.3%	41.7%	50.0%
Erigeron species	FLEABANE SPECIES	forb	0	8.3%	-	8.3%
Eupatorium altissimum	TALL BONESET	forb	0	-	33.3%	-
Heliopsis helianthoides	SMOOTH OXEYE	forb	5	16.7%	-	-
Panicum virgatum	SWITCH GRASS	grass	4	8.3%	16.7%	8.3%
Ratibida pinnata	GRAY-HEADED CONEFLOWER	forb	5	16.7%	41.7%	50.0%
Schizachyrium scoparium	LITTLE BLUESTEM	grass	5	33.3%	-	-
Solidago canadensis	CANADA GOLDENROD	forb	1	33.3%	75.0%	66.7%
Solidago rigida	STIFF GOLDENROD	forb	8	8.3%	-	-
Sorghastrum nutans	INDIAN GRASS	grass	5	25.0%	33.3%	16.7%
Verbena hastata	BLUE VERVAIN	forb	4	8.3%	-	-
Verbena stricta	HOARY VERVAIN	forb	3	-	8.3%	-
Allium species	GARLIC SPECIES	forb	0	16.7%	-	-
Bromus inermis	HUNGARIAN BROME	grass	0	-	58.3%	8.3%
Calystegia species	BINDWEED SPECIES	forb	0	-	25.0%	-
Coronilla varia	CROWN-VETCH	forb	0	8.3%	-	-
Daucus carota	QUEEN-ANNE'S-LACE	forb	0	16.7%	16.7%	-
Dipsacus laciniatus	CUT-LEAVED TEASEL	forb	0	-	-	8.3%
Lactuca species	LETTUCE SPECIES	forb	0	-	8.3%	-
Medicago lupulina	BLACK MEDICK	forb	0	50.0%	91.7%	100.0%
Melilotus alba	WHITE SWEET-CLOVER	forb	0	8.3%	-	-
Melilotus officinalis	YELLOW SWEET-CLOVER	forb	0	25.0%	-	-
Poa species	BLUEGRASS SPECIES	grass	0	8.3%	50.0%	75.0%
Rumex crispus	CURLY DOCK	forb	0	-	8.3%	-
Solanum carolinense	HORSE NETTLE	forb	0	-	8.3%	-
Trifolium hybridum	ALSIKE CLOVER	forb	0	8.3%	8.3%	8.3%
Trifolium pratense	RED CLOVER	forb	0	-	33.3%	33.3%
unknown grass	UNKNOWN	grass	0	8.3%	-	-

Shaded species are non-native.

Table C-3. Forest and Perimeter Successional Areas Florist Inventory

Scientific Name	Common Name	Type	Coefficient of Conservatism	Existing Forest Area	Restoration Forest Area	Perimeter Successional Area
Acer negundo	BOX ELDER	tree	3	X	X	X
Acer rubrum	RED MAPLE	tree	2	X	X	X
Acer saccharinum	SILVER MAPLE	tree	3	X	X	X
Acer saccharum	SUGAR MAPLE	tree	5	X	X	
Achillea millefolium	YARROW	forb	1	X	X	X
Aesculus glabra	OHIO BUCKEYE	tree	6	X	X	X
Aesculus pavia	RED BUCKEYE	tree	0	X		
Agalinis purpurea var. purpurea	LARGE PURPLE FOXGLOVE	forb	6	X		
Agrimonia parviflora	SMALL-FLOWERED AGRIMONY	forb	2	X	X	X
Ambrosia artemisiifolia	COMMON RAGWEED	forb	0	X	X	X
Ambrosia trifida	GIANT RAGWEED	forb	0		X	
Amelanchier laevis	SMOOTH SERVICEBERRY	small tree	5	X		
Amphicarpaea bracteata	HOG-PEANUT	forb	4	X	X	
Andropogon gerardii	BIG BLUESTEM	grass	5		X	X
Andropogon virginicus	COMMON BROOM-SEDGE	grass	3		X	
Anemone virginiana	WOODLAND THIMBLEWEED	forb	3	X		
Anemonella thalictroides	RUE ANEMONE	forb	6	X		
Apocynum cannabinum	INDIAN HEMP	forb	1	X	X	X
Asarum canadense	WILD GINGER	forb	6	X	X	
Asclepias incarnata	SWAMP MILKWEED	forb	4		X	X
Asclepias sullivantii	SULLIVANT'S MILKWEED	forb	8			X
Asclepias syriaca	COMMON MILKWEED	forb	1	X	X	X
Asclepias tuberosa	BUTTERFLY-WEED	forb	4		X	
Asimina triloba	PAWPAW	small tree	6	X	X	
Asplenium platyneuron	EBONY SPLEENWORT	fern	3	X	X	
Aster cordifolius	BLUE WOOD ASTER	forb	4	X		
Aster lanceolatus	EASTERN LINED ASTER	forb	3	X	X	
Aster lateriflorus	CALICO ASTER	forb	2	X	X	X
Aster novae-angliae	NEW ENGLAND ASTER	forb	2		X	X
Aster ontarionis	BOTTOMLAND ASTER	forb	7		X	
Aster pilosus	AWL ASTER	forb	1	X	X	X
Aster racemosus	SMALL-HEADED ASTER	forb	2		X	
Baptisia australis	BLUE FALSE INDIGO	forb	6	X	X	X
Bidens bipinnata	SPANISH-NEEDLES	forb	2	X		
Bidens cernua	NODDING BEGGAR'S-TICK	forb	3	X		
Bidens frondosa	DEVIL'S BEGGAR'S-TICK	forb	2	X	X	
Bignonia capreolata	CROSS-VINE	vine	7		X	
Blephilia hirsuta	HAIRY WOODMINT	forb	4	X		
Boehmeria cylindrica	FALSE NETTLE	forb	4	X	X	X
Botrychium virginianum	RATTLESNAKE FERN	fern	4	X		
Bouteloua curtipendula	SIDE-OATS GRAMA GRASS	grass	8		X	
Calamagrostis canadensis	CANADA BLUEJOINT	grass	4		X	
Calystegia sepium	HEDGE BINDWEED	forb	1	X		
Camassia scilloides	WILD HYACINTH	forb	6	X		
Campanula americana	TALL BELLFLOWER	forb	4	X		
Campsis radicans	TRUMPET-CREEPER	vine	1	X	X	
Cardamine concatenata	CUT-LEAVED TOOTHWORT	forb	3	X	X	
Cardamine douglassii	PURPLE SPRING CRESS	forb	5	X	X	
Cardamine rhomboidea	SPRING CRESS	forb	5		X	
Carex aggregata	GLOMERATE SEDGE	sedge	2	X	X	X
Carex albicans var. albicans	OAK SEDGE	sedge	4	X		
Carex albursina	WING-STEMMED WOOD SEDGE	sedge	6	X		
Carex amphibola	E. NARROW-LEAVED SEDGE	sedge	5	X	X	X
Carex annectens	YELLOW FOX SEDGE	sedge	3		X	X
Carex blanda	COMMON WOOD SEDGE	sedge	1	X	X	X
Carex brevior	TUFTED-FESCUE SEDGE	sedge	8		X	
Carex cephalophora	OVAL-HEADED SEDGE	sedge	5	X		
Carex cristatella	CRESTED SEDGE	sedge	3	X		
Carex davisii	DAVIS' SEDGE	sedge	5	X	X	
Carex digitalis	SLENDER WOOD SEDGE	sedge	4	X	X	
Carex festucacea	FESCUE SEDGE	sedge	7	X		
Carex frankii	FRANK'S SEDGE	sedge	2	X	X	X
Carex granularis	MEADOW SEDGE	sedge	3	X	X	X
Carex grisea	NARROW-LEAVED SEDGE	sedge	4	X	X	X
Carex hirsutella	HIRSUTE SEDGE	sedge	2		X	
Carex hystericina	PORCUPINE SEDGE	sedge	5		X	
Carex jamesii	JAMES' SEDGE	sedge	6	X	X	
Carex laevivaginata	SMOOTH-SHEATHED FOX SEDGE	sedge	6	X		
Carex leavenworthii	LEAVENWORTH'S SEDGE	sedge	3			X

Table C-3. Forest and Perimeter Successional Areas Florist Inventory (continued)

Scientific Name	Common Name	Type	Coefficient of Conservatism	Existing Forest Area	Restoration Forest Area	Perimeter Successional Area
Carex lurida	BOTTLEBRUSH SEDGE	sedge	3		X	
Carex mesochorea	MIDLAND SEDGE	sedge	6			X
Carex molesta	TROUBLESOME SEDGE	sedge	3	X	X	
Carex muhlenbergii	MUHLENBERG'S SEDGE	sedge	7	X		
Carex normalis	LARGE STRAW SEDGE	sedge	4	X	X	X
Carex oligocarpa	FEW-FRUITED SEDGE	sedge	6	X		
Carex pensylvanica	PENNSYLVANIA SEDGE	sedge	3	X		
Carex rosea	ROSE SEDGE	sedge	3	X	X	X
Carex scoparia	POINTED BROOM SEDGE	sedge	3		X	
Carex shortiana	SHORT'S SEDGE	sedge	2	X	X	
Carex sparganioides	BUR-REED SEDGE	sedge	3	X	X	
Carex tribuloides	BLUNT BROOM SEDGE	sedge	4	X	X	X
Carex vulpinoidea	FOX SEDGE	sedge	1	X	X	X
Carpinus caroliniana	BLUE-BEECH	small tree	5	X	X	
Carya cordiformis	BITTERNUT HICKORY	tree	5	X	X	X
Carya laciniosa	SHELLBARK HICKORY	tree	7	X	X	
Carya ovalis	SWEET PIGNUT HICKORY	tree	5	X		
Carya ovata	SHAGBARK HICKORY	tree	6	X	X	
Carya tomentosa	MOCKERNUT HICKORY	tree	6	X	X	
Celtis occidentalis	HACKBERRY	tree	4	X	X	
Cephalanthus occidentalis	BUTTONBUSH	shrub	6		X	
Cercis canadensis	REDBUD	small tree	3	X	X	X
Chaerophyllum procumbens	WILD CHERVIL	forb	4	X	X	
Chamaecrista fasciculata	PARTRIDGE-PEA	forb	3	X	X	
Cirsium discolor	FIELD THISTLE	forb	4	X	X	X
Claytonia virginica	SPRING-BEAUTY	forb	2	X	X	X
Conyza canadensis	HORSEWEED	forb	0		X	X
Cornus amomum	SILKY DOGWOOD	shrub	2		X	X
Cornus drummondii	ROUGH-LEAVED DOGWOOD	shrub	3	X	X	
Cornus florida	FLOWERING DOGWOOD	small tree	5	X	X	
Corydalis flavula	YELLOW HARLEQUIN	forb	4	X	X	
Corylus americana	AMERICAN HAZEL	shrub	4		X	
Crataegus crus-galli	COCKSPUR	small tree	3	X		
Cryptotaenia canadensis	HONEWORT	forb	3	X		
Cyperus esculentus	YELLOW NUT-SEDGE	sedge	0			X
Cystopteris protrusa	LOWLAND BLADDER FERN	fern	5	X		
Dalea purpurea	PURPLE PRAIRIE-CLOVER	forb	9		X	
Delphinium tricorne	DWARF LARKSPUR	forb	4	X	X	
Desmodium canadense	CANADA TICK-TREFOIL	forb	4		X	X
Desmodium paniculatum	SHOWY TICK-TREFOIL	forb	3	X	X	
Dicentra cucullaria	DUTCHMAN'S-BREECHES	forb	6	X	X	
Dioscorea villosa	WILD YAM	vine	4	X		
Diospyros virginiana	PERSIMMON	small tree	4		X	
Dryopteris carthusiana	SPINULOSE WOOD FERN	fern	5	X		
Echinacea purpurea	PURPLE CONEFLOWER	forb	6		X	X
Elymus canadensis	CANADA WILD RYE	grass	6		X	X
Elymus hystrix	BOTTLEBRUSH GRASS	grass	4	X		
Elymus riparius	RIVERBANK WILD RYE	grass	5	X	X	
Elymus villosus	HAIRY WILD RYE	grass	4	X	X	
Elymus virginicus	VIRGINIA WILD RYE	grass	3	X		
Epilobium coloratum	PURPLE-LEAVED WILLOW-HERB	forb	1			X
Equisetum hyemale	SCOURING-RUSH	fern	2		X	
Erigenia bulbosa	HARBINGER-OF-SPRING	forb	6		X	
Erigeron annuus	DAISY FLEABANE	forb	0	X	X	
Erigeron philadelphicus	PHILADELPHIA FLEABANE	forb	2	X	X	X
Erigeron strigosus	ROUGH FLEABANE	forb	1		X	X
Eryngium yuccifolium	RATTLESNAKE-MASTER	forb	7	X	X	X
Erythronium albidum	WHITE TROUT-LILY	forb	5	X		
Euonymus atropurpureus	BURNING-BUSH	shrub	3	X		
Eupatorium altissimum	TALL BONESET	forb	0		X	
Eupatorium perfoliatum	COMMON BONESET	forb	3	X	X	
Eupatorium purpureum	PURPLE JOE-PYE WEED	forb	5	X	X	
Eupatorium rugosum	WHITE SNAKEROOT	forb	3	X	X	X
Eupatorium serotinum	LATE-FLOWERING BONESET	forb	2	X	X	X
Euthamia graminifolia	FLAT-TOPPED GOLDENROD	forb	2	X	X	X
Fagus grandifolia	AMERICAN BEECH	tree	7	X	X	
Festuca subverticillata	NODDING FESCUE	grass	5	X	X	
Floerkea proserpinacoides	FALSE MERMAID-WEED	forb	5	X		
Fraxinus americana	WHITE ASH	tree	6	X	X	

Table C-3. Forest and Perimeter Successional Areas Florist Inventory (continued)

Scientific Name	Common Name	Type	Coefficient of Conservatism	Existing Forest Area	Restoration Forest Area	Perimeter Successional Area
Fraxinus pennsylvanica	GREEN ASH	tree	3	X	X	X
Fraxinus quadrangulata	BLUE ASH	tree	7	X		
Galium aparine	CLEAVERS	forb	0	X	X	X
Galium circaezans	WILD LICORICE	forb	4	X	X	
Galium trifidum	N. THREE-LOBED BEDSTRAW	forb	7	X	X	
Geranium maculatum	WILD GERANIUM	forb	4	X		
Geum canadense	WHITE AVENS	forb	2	X	X	X
Geum laciniatum	ROUGH AVENS	forb	2		X	
Geum vernum	SPRING AVENS	forb	2	X	X	X
Gleditsia triacanthos	HONEY LOCUST	tree	4	X	X	X
Glyceria striata	FOWL MANNA GRASS	grass	2	X	X	
Gymnocladus dioicus	KENTUCKY COFFEE-TREE	tree	3	X		
Hackelia virginiana	VIRGINIA STICKSEED	forb	2	X	X	X
Hamamelis virginiana	WITCH-HAZEL	small tree	5		X	
Heliopsis helianthoides	SMOOTH OXEYE	forb	5	X	X	X
Hydrangea arborescens	WILD HYDRANGEA	shrub	7	X	X	
Hydrophyllum macrophyllum	LARGED-LEAVED WATERLEAF	forb	6	X		
Hypericum prolificum	SHRUBBY ST. JOHN'S-WORT	shrub	3		X	
Hypericum punctatum	SPOTTED ST. JOHN'S-WORT	forb	2	X	X	
Ilex verticillata	WINTERBERRY	shrub	6		X	
Impatiens capensis	SPOTTED TOUCH-ME-NOT	forb	2	X		X
Ipomoea pandurata	POTATO-VINE	forb	2		X	
Iris versicolor	NORTHERN BLUE FLAG	forb	6		X	
Isopyrum biternatum	FALSE RUE-ANEMONE	forb	7	X		
Juglans nigra	BLACK WALNUT	tree	5	X	X	X
Juncus dudleyi	DUDLEY'S RUSH	forb	3	X		
Juncus tenuis	PATH RUSH	forb	1	X	X	X
Juniperus virginiana	EASTERN RED CEDAR	tree	3	X	X	X
Lactuca canadensis	WILD LETTUCE	forb	1	X		
Lactuca floridana	WOODLAND LETTUCE	forb	3	X	X	
Leersia oryzoides	RICE CUT GRASS	grass	1	X	X	
Leersia virginica	WHITE GRASS	grass	4	X	X	
Lespedeza capitata	ROUND-HEADED BUSH-CLOVER	forb	5		X	
Lindera benzoin	SPICEBUSH	shrub	5		X	X
Liquidambar styraciflua	SWEETGUM	tree	6			X
Liriodendron tulipifera	TULIP TREE	tree	6	X	X	X
Lobelia cardinalis	CARDINAL-FLOWER	forb	5			X
Lobelia inflata	INDIAN-TOBACCO	forb	1		X	
Lobelia siphilitica	GREAT BLUE LOBELIA	forb	3	X		X
Ludwigia palustris	WATER-PURSLANE	forb	3	X		
Luzula echinata	ROUND-LEAVED WOODRUSH	forb	4	X		
Lycopus americanus	AMERICAN WATER-HOREHOUND	forb	3			X
Maianthemum racemosum	FALSE SOLOMON'S-SEAL	forb	4		X	
Menispermum canadense	CANADA MOONSEED	vine	5	X	X	
Mertensia virginica	BLUEBELLS	forb	6	X		
Mimulus ringens	COMMON MONKEY-FLOWER	forb	4		X	X
Monarda fistulosa	WILD BERGAMOT	forb	3	X	X	X
Morus rubra	RED MULBERRY	tree	7	X		
Muhlenbergia schreberi	NIMBLEWILL	grass	0	X	X	
Nyssa sylvatica	BLACK-GUM	tree	7	X	X	
Onoclea sensibilis	SENSITIVE FERN	fern	2		X	
Ophioglossum vulgatum	SOUTHERN ADDER'S-TONGUE	fern	6	X	X	
Osmorhiza longistylis	SMOOTH SWEET CICELY	forb	4	X	X	
Ostrya virginiana	HOP-HORNBEAM	tree	5	X	X	X
Oxalis dillenii	SOUTHERN YELLOW WOOD-SOR.	forb	0			X
Oxalis stricta	COMMON YELLOW WOOD-SORREL	forb	0	X	X	
Oxalis violacea	VIOLET WOOD-SORREL	forb	6	X		
Panicum clandestinum	DEER'S-TONGUE PANIC GRASS	grass	2	X	X	
Panicum virgatum	SWITCH GRASS	grass	4	X	X	X
Parthenocissus quinquefolia	VIRGINIA CREEPER	vine	2	X	X	X
Penstemon digitalis	FOXGLOVE BEARD-TONGUE	forb	2	X	X	X
Phacelia purshii	MIAMI-MIST	forb	4	X	X	
Phlox divaricata	BLUE PHLOX	forb	4	X	X	
Phryma leptostachya	LOPSEED	forb	5	X	X	
Physocarpus opulifolius	NINEBARK	shrub	4	X		
Phytolacca americana	POKEWEED	forb	1	X	X	X
Pilea pumila	CLEARWEED	forb	2	X	X	
Pinus strobus	WHITE PINE	tree	6	X		
Plantago rugelii	RUGEL'S PLANTAIN	forb	0	X		

Table C-3. Forest and Perimeter Successional Areas Florist Inventory (continued)

Scientific Name	Common Name	Type	Coefficient of Conservatism	Existing Forest Area	Restoration Forest Area	Perimeter Successional Area
Plantago virginica	VIRGINIA PLANTAIN	forb	1		X	
Platanus occidentalis	SYCAMORE	tree	7	X	X	X
Podophyllum peltatum	MAYAPPLE	forb	4	X		X
Polygonatum biflorum	SMOOTH SOLOMON'S-SEAL	forb	4	X	X	
Polygonum punctatum	DOTTED SMARTWEED	forb	6	X		
Polygonum virginianum	JUMPSEED	forb	3	X	X	
Polymnia canadensis	LEAFCUP	forb	5	X		
Populus deltoides	EASTERN COTTONWOOD	tree	3	X	X	X
Potentilla simplex	OLD FIELD CINQUEFOIL	forb	1	X		
Prunella vulgaris	SELF-HEAL	forb	0	X	X	
Prunus americana	AMERICAN PLUM	small tree	3	X		
Prunus hortulana	HORTULAN PLUM	small tree	3		X	X
Prunus munsoniana	MUNSON'S PLUM	small tree	3		X	
Prunus serotina	BLACK CHERRY	tree	3	X	X	X
Pycnanthemum tenuifolium	NARROW-LEAVED MOUNTAIN-MINT	forb	4			X
Pyrus coronaria	WILD CRABAPPLE	small tree	3	X	X	
Quercus alba	WHITE OAK	tree	6	X	X	
Quercus bicolor	SWAMP WHITE OAK	tree	7		X	X
Quercus imbricaria	SHINGLE OAK	tree	5	X	X	X
Quercus macrocarpa	BUR OAK	tree	6	X	X	X
Quercus muehlenbergii	CHINQUAPIN OAK	tree	7	X	X	X
Quercus palustris	PIN OAK	tree	5		X	X
Quercus rubra	RED OAK	tree	6	X	X	X
Quercus shumardii	SHUMARD OAK	tree	7	X	X	
Quercus velutina	BLACK OAK	tree	7	X	X	
Ranunculus abortivus	KIDNEY-LEAVED BUTTERCUP	forb	1	X	X	X
Ratibida pinnata	GRAY-HEADED CONEFLOWER	forb	5		X	X
Rhus aromatica var. aromatica	FRAGRANT SUMAC	shrub	3		X	
Rhus copallinum	WINGED SUMAC	shrub	4		X	
Rhus glabra	SMOOTH SUMAC	shrub	2	X	X	
Rhus typhina	STAGHORN SUMAC	shrub	2		X	
Robinia pseudoacacia	BLACK LOCUST	tree	0	X	X	X
Rosa carolina	PASTURE ROSE	shrub	4		X	
Rosa setigera	CLIMBING PRAIRIE ROSE	shrub	4	X	X	
Rubus allegheniensis	COMMON BLACKBERRY	shrub	1	X	X	X
Rubus occidentalis	BLACK RASPBERRY	shrub	1	X	X	X
Rudbeckia hirta	BLACK-EYED SUSAN	forb	1	X	X	X
Rudbeckia triloba	THREE-LOBED CONEFLOWER	forb	5	X	X	
Ruellia strepens	SMOOTH RUELLIA	forb	5	X	X	
Salix exigua	SANDBAR WILLOW	shrub	1		X	
Salix nigra	BLACK WILLOW	tree	2		X	
Sambucus canadensis	COMMON ELDERBERRY	shrub	3	X	X	X
Sanguinaria canadensis	BLOODROOT	forb	5	X	X	
Sanicula gregaria	CLUSTERED SNAKEROOT	forb	3	X	X	
Sassafras albidum	SASSAFRAS	tree	3	X		
Schizachyrium scoparium	LITTLE BLUESTEM	grass	5		X	
Schoenoplectus tabernaemontani	SOFT-STEMMED BULRUSH	sedge	2		X	
Scirpus atrovirens	GREEN BULRUSH	sedge	1	X	X	X
Scirpus cyperinus	WOOL-GRASS	sedge	1			X
Scirpus pendulus	DROOPING BULRUSH	sedge	2		X	X
Sedum ternatum	WILD STONECROP	forb	5	X		
Senecio aureus	GOLDEN RAGWORT	forb	4	X	X	X
Senecio obovatus	ROUND-LEAVED SQUAW-WEED	forb	4	X	X	X
Senna hebecarpa	NORTHERN WILD SENNA	forb	4			X
Silphium laciniatum	COMPASS PLANT	forb	8		X	X
Silphium perfoliatum	CUP-PLANT	forb	6			X
Silphium trifoliatum	WHORLED ROSIN-WEED	forb	5	X		
Sisyrinchium angustifolium	STOUT BLUE-EYED-GRASS	forb	2		X	
Smilax hispida	BRISTLY GREENBRIER	vine	3	X	X	
Solidago canadensis	CANADA GOLDENROD	forb	1	X	X	X
Solidago gigantea	SMOOTH GOLDENROD	forb	3	X	X	
Solidago juncea	PLUME GOLDENROD	forb	2	X	X	
Solidago rigida	STIFF GOLDENROD	forb	8		X	X
Sorghastrum nutans	INDIAN GRASS	grass	5	X	X	X
Staphylea trifolia	BLADDERNUT	shrub	6		X	
Symphoricarpos orbiculatus	CORALBERRY	shrub	3	X	X	X
Teucrium canadense	AMERICAN GERMANDER	forb	3	X		X
Tilia americana	AMERICAN BASSWOOD	tree	6	X	X	
Toxicodendron radicans	POISON-IVY	vine	1	X	X	X

Table C-3. Forest and Perimeter Successional Areas Florist Inventory (continued)

Scientific Name	Common Name	Type	Coefficient of Conservatism	Existing Forest Area	Restoration Forest Area	Perimeter Successional Area
Tradescantia ohiensis	OHIO SPIDERWORT	forb	5		X	X
Trillium sessile	TOAD-SHADE	forb	5	X	X	
Ulmus rubra	SLIPPERY ELM	tree	3	X	X	X
Verbena hastata	BLUE VERVAIN	forb	4			X
Verbena urticifolia	WHITE VERVAIN	forb	3	X	X	
Verbesina alternifolia	WINGSTEM	forb	5	X	X	X
Vernonia gigantea	TALL IRONWEED	forb	2	X	X	X
Veronica anagallis-aquatica	WATER SPEEDWELL	forb	6		X	
Viburnum dentatum	ARROW-WOOD	shrub	2	X	X	
Viburnum prunifolium	BLACK-HAW	shrub	4	X	X	
Viola pubescens	DOWNY YELLOW VIOLET	forb	4	X	X	
Viola rafinesquii	FIELD PANSY	forb	2	X		
Viola sororia	COMMON BLUE VIOLET	forb	1	X	X	
Viola striata	STRIPED CREAMY VIOLET	forb	5	X	X	
Vitis aestivalis	SUMMER GRAPE	vine	4		X	X
Vitis labrusca	FOX GRAPE	vine	3	X	X	
Vitis riparia	RIVERBANK GRAPE	vine	3	X	X	X
Vitis vulpina	FROST GRAPE	vine	3	X	X	X
Zizia aurea	GOLDEN ALEXANDERS	forb	6	X		
Ailanthus altissima	**TREE-OF-HEAVEN**	tree	0	X	X	
Alliaria petiolata	**GARLIC MUSTARD**	forb	0	X	X	X
Allium vineale	**FIELD GARLIC**	forb	0	X	X	X
Arctium lappa	**GREAT BURDOCK**	forb	0	X		
Arctium minus	**COMMON BURDOCK**	forb	0	X		X
Barbarea vulgaris	**YELLOW ROCKET**	forb	0	X	X	X
Bromus inermis	**HUNGARIAN BROME**	grass	0	X	X	X
Cardamine hirsuta	**HOARY BITTER CRESS**	forb	0	X	X	
Castanea x-dentata	**AMERICAN CHESTNUT HYBRID**	tree	0		X	
Catalpa speciosa	**NORTHERN CATALPA**	tree	0	X	X	
Celastrus orbiculatus	**ORIENTAL BITTERSWEET**	vine	0	X	X	
Centaurea maculosa	**SPOTTED KNAPWEED**	forb	0		X	
Cichorium intybus	**CHICORY**	forb	0	X	X	
Cirsium arvense	**CANADA THISTLE**	forb	0		X	X
Cirsium vulgare	**BULL THISTLE**	forb	0		X	
Conium maculatum	**POISON-HEMLOCK**	forb	0	X	X	X
Coronilla varia	**CROWN-VETCH**	forb	0		X	
Crateagus phaeno pyrum	**WASHINGTON HAWTHORN**	small tree	0	X	X	
Dactylis glomerata	**ORCHARD GRASS**	grass	0	X	X	X
Daucus carota	**QUEEN-ANNE'S-LACE**	forb	0		X	X
Dianthus armeria	**DEPTFORD-PINK**	forb	0		X	
Dipsacus fullonum	**WILD TEASEL**	forb	0		X	X
Dipsacus laciniatus	**CUT-LEAVED TEASEL**	forb	0	X	X	X
Draba verna	**WHITLOW-GRASS**	forb	0	X	X	
Duchesnea indica	**INDIAN-STRAWBERRY**	forb	0	X		
Echinacea pallida	**PALE PURPLE CONEFLOWER**	forb	0		X	
Echinochloa crusgalli	**BARNYARD GRASS**	grass	0		X	
Elaeagnus umbellata	**AUTUMN-OLIVE**	small tree	0	X	X	X
Euonymus alatus	**WINGED WAHOO**	shrub	0	X		
Euonymus fortunei	**WINTERCREEPER**	vine	0	X	X	
Festuca pratensis	**MEADOW FESCUE**	grass	0			X
Glechoma hederacea	**GROUND IVY**	forb	0	X	X	X
Hemerocallis fulva	**ORANGE DAY-LILY**	forb	0	X	X	
Lamium purpuream	**PURPLE DEAD-NETTLE**	forb	0	X	X	X
Lespedeza cuneata	**CHINESE BUSH-CLOVER**	forb	0		X	
Liatris pycnostachya	**THICK-SPIKED BLAZING-STAR**	forb	0		X	
Lonicera japonica	**JAPANESE HONEYSUCKLE**	vine	0	X	X	X
Lonicera maackii	**AMUR HONEYSUCKLE**	shrub	0	X	X	X
Lysimachia nummularia	**MONEYWORT**	forb	0	X	X	X
Maclura pomifera	**OSAGE-ORANGE**	tree	0	X	X	
Medicago lupulina	**BLACK MEDICK**	forb	0	X	X	X
Melilotus alba	**WHITE SWEET-CLOVER**	forb	0	X	X	
Melilotus officinalis	**YELLOW SWEET-CLOVER**	forb	0	X	X	X
Mentha species	**MINT SPECIES**	forb	0		X	
Microstegium vimineum	**RECLINING EULALIA**	grass	0	X	X	
Morus alba	**WHITE MULBERRY**	tree	0	X	X	X
Narcissus sp.	**DAFFODIL SPECIES**	forb	0	X		
Phalaris arundinacea	**REED CANARY GRASS**	grass	0	X	X	
Phleum pratense	**TIMOTHY**	grass	0		X	
Picea abies	**NORWAY SPRUCE**	tree	0	X		

Table C-3. Forest and Perimeter Successional Areas Florist Inventory (continued)

Scientific Name	Common Name	Type	Coefficient of Conservatism	Existing Forest Area	Restoration Forest Area	Perimeter Successional Area
Pinus nigra	**AUSTRIAN PINE**	tree	0	X	X	
Plantago lanceolata	**ENGLISH PLANTAIN**	forb	0		X	
Poa trivialis	**ROUGH BLUEGRASS**	grass	0		X	
Polygonum persicaria	**LADY'S THUMB**	forb	0	X	X	X
Potentilla recta	**ROUGH-FRUITED CINQUEFOIL**	forb	0			X
Pyrus callieryana	**CALLIERY PEAR**	small tree	0	X	X	X
Quercus acutissima	**SAWTOOTH OAK**	tree	0		X	
Ranunculus ficaria	**LESSER CELANDINE**	forb	0	X	X	
Rhamnus cathartica	**EUROPEAN BUCKTHORN**	small tree	0	X	X	
Rosa multiflora	**MULTIFLORA ROSE**	shrub	0	X	X	X
Rumex crispus	**CURLY DOCK**	forb	0	X	X	X
Saponaria officinalis	**SOAPWORT**	forb	0		X	X
Senecio glabellus	**BUTTERWEED**	forb	0	X	X	
Setaria glauca	**YELLOW FOXTAIL GRASS**	grass	0		X	X
Setaria viridis	**GREEN FOXTAIL GRASS**	grass	0			X
Silphium integrifolium	**PRAIRIE ROSINWEED**	forb	0			X
Solanum carolinense	**HORSE NETTLE**	forb	0	X	X	X
Sorghum halepense	**JOHNSON GRASS**	grass	0		X	X
Stellaria aquatica	**WATER CHICKWEED**	forb	0		X	X
Stellaria media	**COMMON CHICKWEED**	forb	0	X		
Taraxacum officinale	**COMMON DANDELION**	forb	0	X	X	X
Thlaspi alliaceum	**GARLIC PENNY-CRESS**	forb	0	X		X
Thlaspi perfoliatum	**PERFOLIATE PENNY CRESS**	forb	0	X		
Torilis arvensis	**FIELD HEDGE-PARSLEY**	forb	0			X
Trifolium hybridum	**ALSIKE CLOVER**	forb	0		X	X
Trifolium pratense	**RED CLOVER**	forb	0		X	X
Trifolium repens	**WHITE CLOVER**	forb	0		X	X
Typha angustifolia	**NARROW-LEAVED CAT-TAIL**	forb	0		X	
Typha x glauca	**HYBRID CAT-TAIL**	forb	0		X	
Urtica dioica var. dioica	**EUROPEAN STINGING NETTLE**	forb	0	X	X	
Valerianella locusta	**EUROPEAN CORN-SALAD**	forb	0		X	
Verbascum thapsus	**COMMON MULLEIN**	forb	0		X	X
Veronica arvensis	**CORN SPEEDWELL**	forb	0		X	
Veronica hederaefolia	**IVY-LEAVED SPEEDWELL**	forb	0	X		
Xanthium strumarium	**COMMON COCKLEBUR**	forb	0	X	X	X
Yucca filamentosa	**YUCCA**	forb	0		X	
Shading indicates non-native species. X indicates the species is present in the monitoring areas.						

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Table C-4. Comparison of Forest and Perimeter Successional Areas Ecological Monitoring Metrics

Time Period	Mean Coefficient of Conservatism			Floristic Quality Assessment Index			Native Species		
	Existing Forest	Restoration Forest	Perimeter Successional	Existing Forest	Restoration Forest	Perimeter Successional	Existing Forest	Restoration Forest	Perimeter Successional
2011	2.7	2.7	1.7	40.1	37.4	15.3	77%	74%	59%
2014	2.5	2.5	1.9	35.9	34.8	19.4	74%	71%	66%
2015 to 2017[a]	2.7	2.2	2.1	40.5	32.8	25.4	77%	70%	68%
2018 to 2020[a]	2.6	2.4	2.3	36.3	38.2	30.4	73%	72%	74%
2023[b]	3.0	2.8	2.5	48.7	46.9	30.4	81%	76%	73%

[a] Monitoring rotated among site management areas over a 3-year period.
[b] Revised functional monitoring approach implemented using floristic inventories.

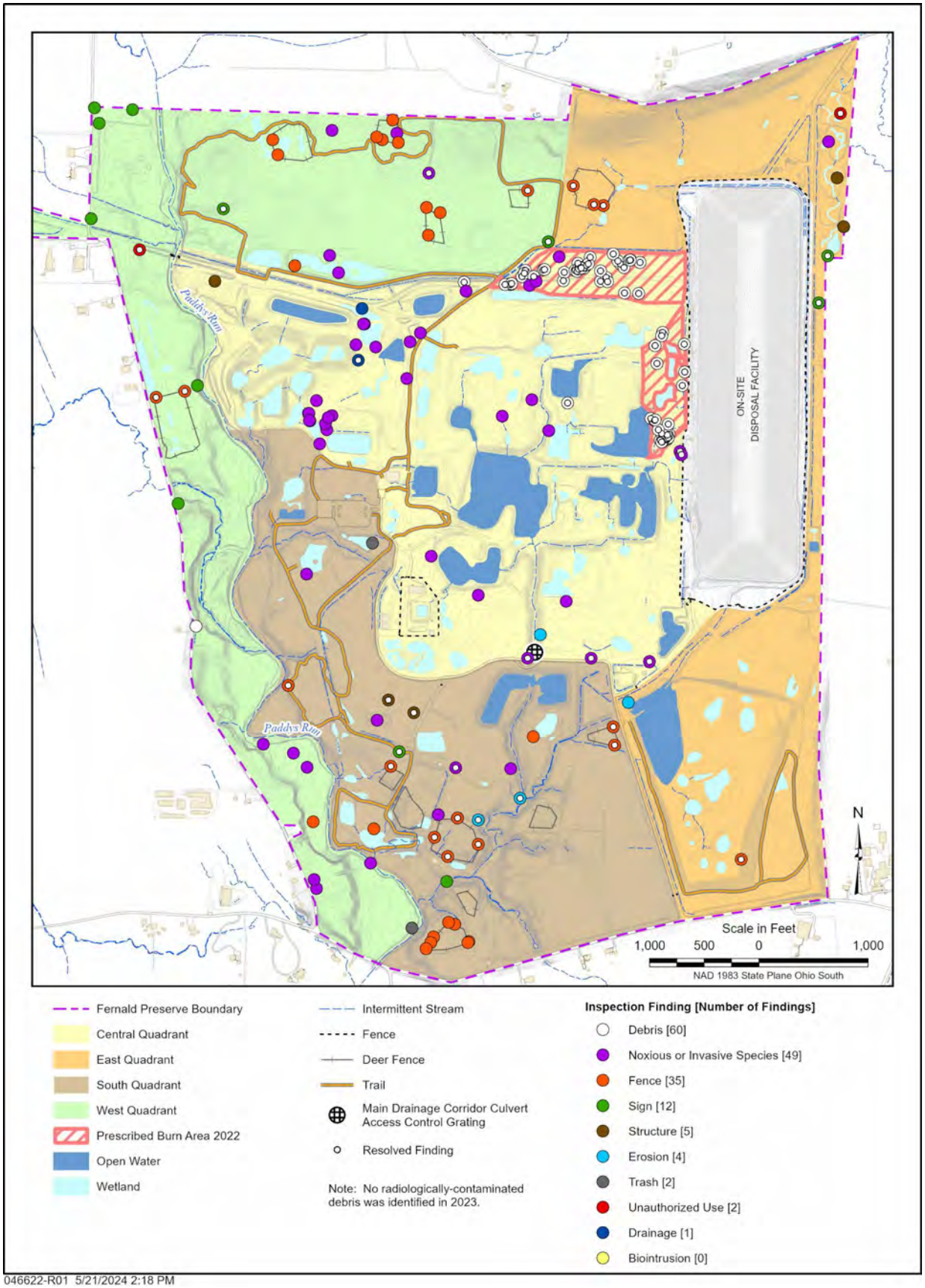


Figure C-1. Site Inspection Findings

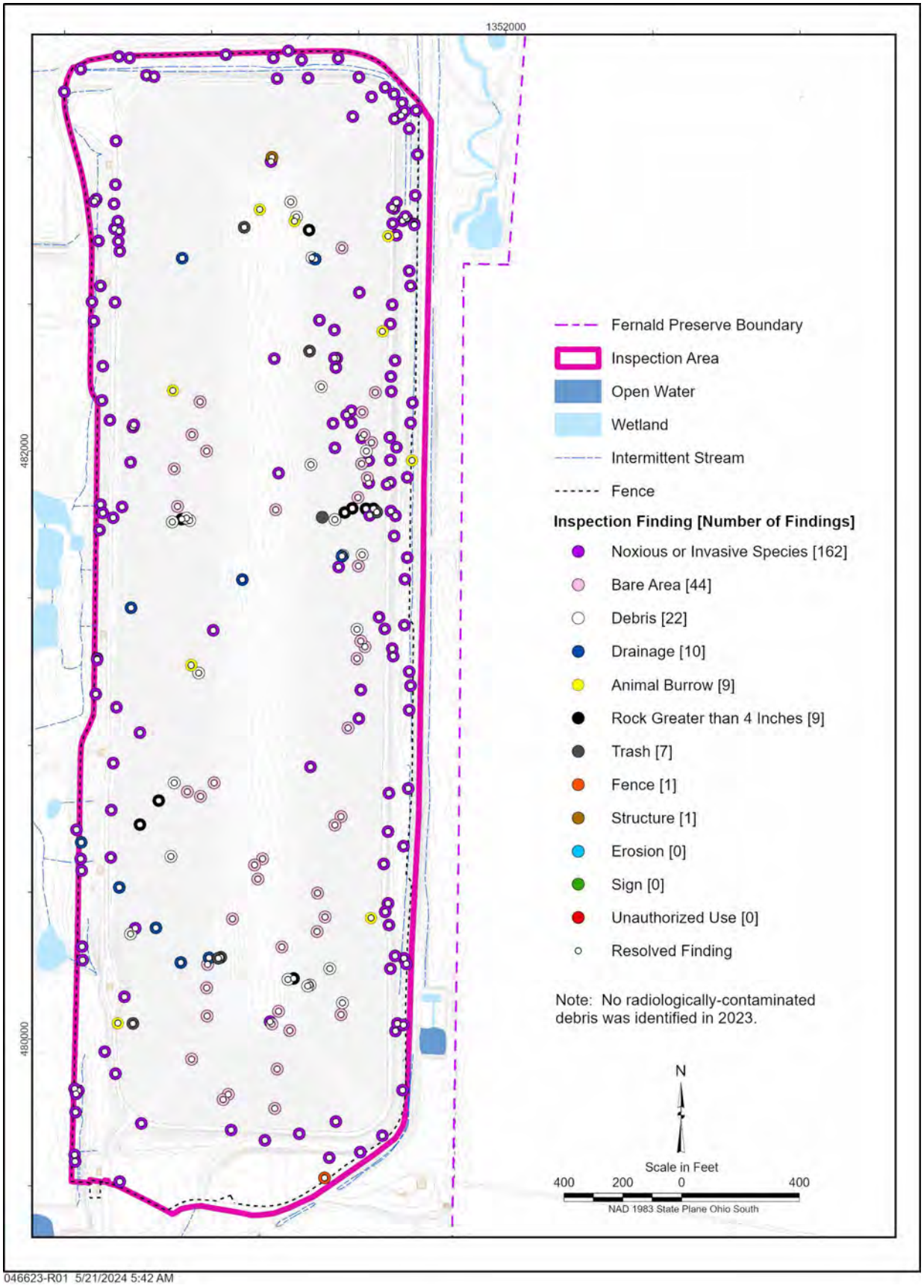


Figure C-2. OSDF Inspection Findings

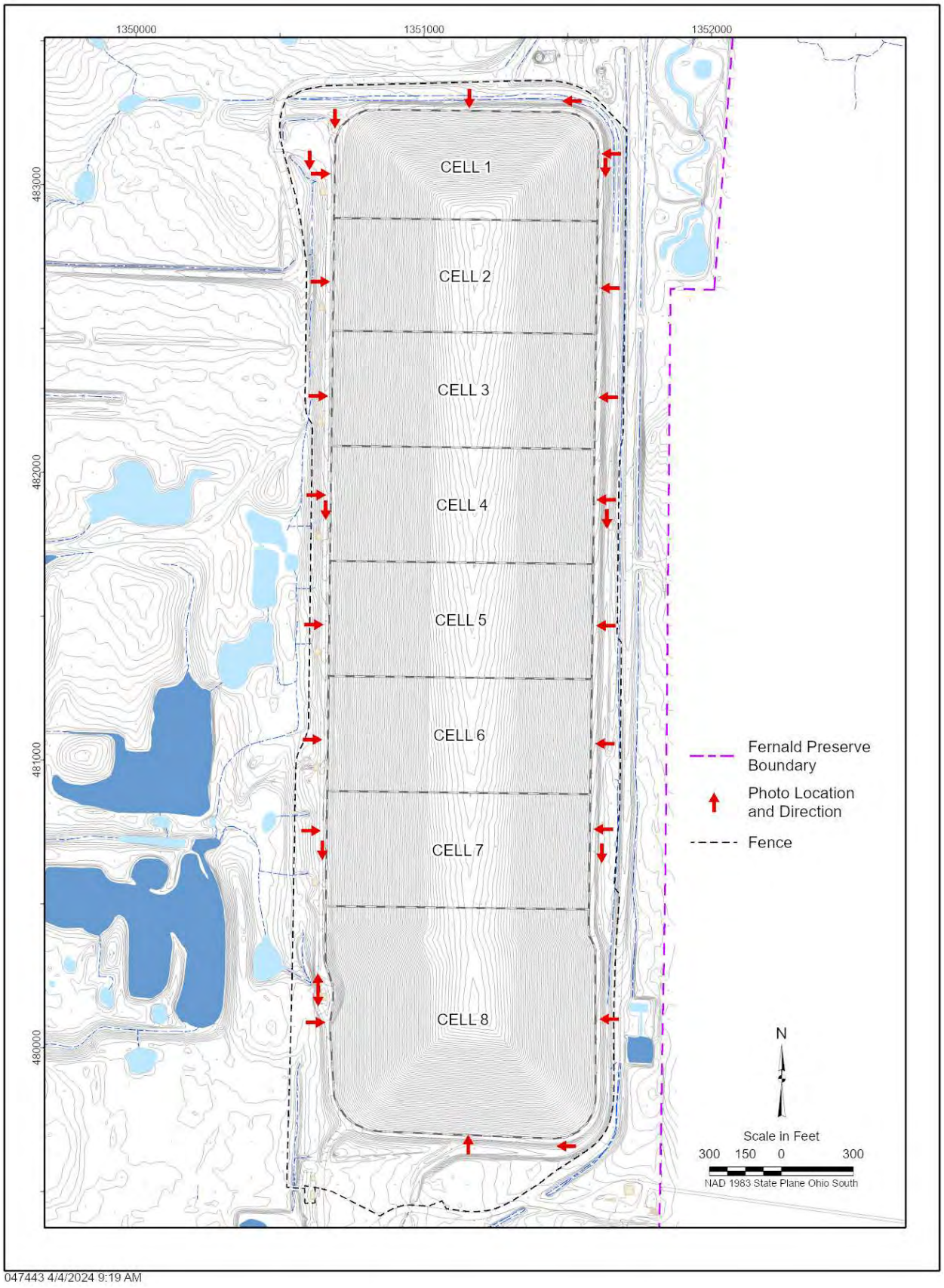


Figure C-3. Quarterly OSDF Photograph Locations

March

June

September

December

Figure C-4A. Cell 1, East Perspective

March

June

September

December

Figure C-4B. Cell 1, North Perspective

March

June

September

December

Figure C-4C. Cell 1, West Perspective

March

June

September

December

Figure C-5A. Cell 2, East Perspective

March

June

September

December

Figure C-5B. Cell 2, West Perspective

March

June

September

December

Figure C-6A Cell 3, East Perspective

March

June

September

December

Figure C-6B. Cell 3, West Perspective

March

June

September

December

Figure C-7A. Cell 4, East Perspective

March

June

September

December

Figure C-7B. Cell 4, West Perspective

March

June

September

December

Figure C-8A. Cell 5, East Perspective

March

June

September

December

Figure C-8B. Cell 5, West Perspective

March

June

September

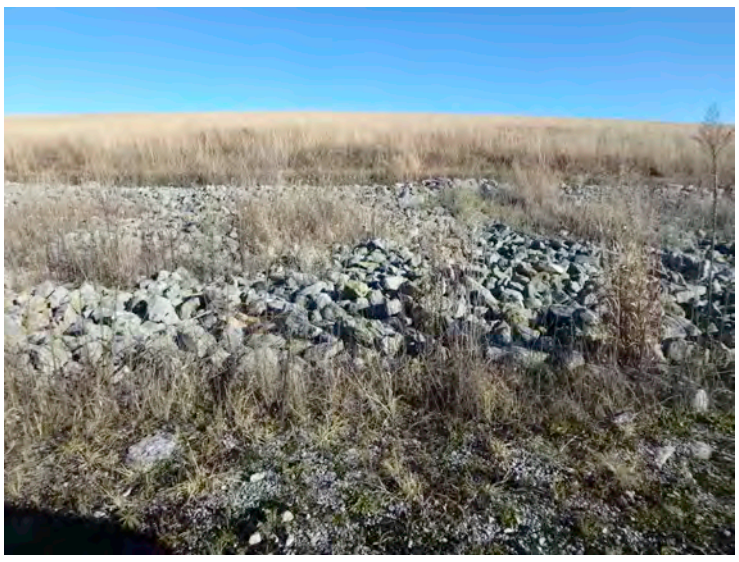
December

Figure C-9A. Cell 6, East Perspective

March

June

September



December

Figure C-9B. Cell 6, West Perspective

March

June

September

December

Figure C-10A. Cell 7, East Perspective

March

June

September

December

Figure C-10B. Cell 7, West Perspective

March

June

September

December

Figure C-11A. Cell 8, East Perspective

March

June

September

December

Figure C-11B. Cell 8, South Perspective

March

June

September

December

Figure C-11C. Cell 8, West Perspective

March

June

September

December

Figure C-12A. East Drainage Cell 1, South Perspective

March

June

September

December

Figure C-12B. East Drainage Cell 4, South Perspective

March

June

September

December

Figure C-12C. East Drainage Cell 7, South Perspective

March

June

September

December

Figure C-12D. North Drainage, West Perspective

March

June

September

December

Figure C-12E. South Drainage, West Perspective

March

June

September

December

Figure C-12F. West Inner Drainage, Cell 1, South Perspective

March

June

September

December

Figure C-12G. West Inner Drainage, Cell 4, South Perspective

March

June

September

December

Figure C-12H. West Inner Drainage, Cell 7, South Perspective

March

June

September

December

Figure C-12I. West Outer Drainage, Cell 1, South Perspective

March

June

September

December

Figure C-12J. West Outer Drainage, Cell 8, North Perspective

March

June

September

December

Figure C-12K. West Outer Drainage, Cell 8, South Perspective

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2007

2023

Figure C-13A. Location 4A, Top of OSDF Cell 8, South Perspective

2007

2023

Figure C-13B. Location 4A, Top of OSDF Cell 8, North Perspective

2007

2023

Figure C-13C. Location 4B, Top of OSDF Cell 8, East Perspective

2007

2023

Figure C-13D. Location 4C, Top of OSDF Cell 8, West Perspective

2007

2023

Figure C-14A. Location 5A, Top of OSDF Cell 5, South Perspective

2007

2023

Figure C-14B. Location 5A, Top of OSDF Cell 5, North Perspective

2007

2023

Figure C-14C. Location 5B, Top of OSDF Cell 5, East Perspective

2007

2023

Figure C-14D. Location 5C, Top of OSDF Cell 5, West Perspective

2007

2023

Figure C-15A. Location 6A, Top of OSDF Cell 1, South Perspective

2007

2023

Figure C-15B. Location 6A, Top of OSDF Cell 1, North Perspective

2007

2023

Figure C-15C. Location 6B, Top of OSDF Cell 1, East Perspective

2007

2023

Figure C-15D. Location 6C, Top of OSDF Cell 1, West Perspective

2007

2023

Figure C-16A. Location 22, OSDF Survey Marker No. 01 (Northwest Corner)

2007

2023

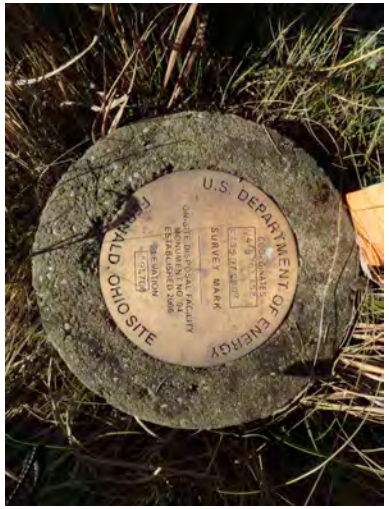
Figure C-16B. Location 23, OSDF Survey Marker No. 02 (Northeast Corner)

2007

2023

Figure C-16C. Location 24, OSDF Survey Marker No. 03 (Southeast Corner)

2007



2023

Figure C-16D. Location 25, OSDF Survey Marker No. 04 (Southwest Corner)

2007

2023

Figure C-17. Location 26, OSDF Southwest Gate, North-Northeast Perspective

2007

2023

Figure C-18. Location 27, OSDF South Gate, North-Northeast Perspective

2007

2023

Figure C-19A. Location 28, OSDF East Fence, North Perspective

2007

2023

Figure C-19B. Location 28, OSDF East Fence, North Perspective

2007

2023

Figure C-19C. Location 28, OSDF East Fence Signage, West Perspective

2007

2023

Figure C-19D. Location 28, OSDF East Fence Signage, North-Northwest Perspective

2007

2023

Figure C-20. Location 29, OSDF East Fence, North Perspective

2007

2023

Figure C-21A. Location 30, OSDF North Gate, Southwest Perspective

2007

2023

Figure C-21B. Location 30, OSDF North Fence, West Perspective

2007

2023

Figure C-22. Location 31, OSDF Northwest Gate, North-Northeast Perspective

2007

2023

Figure C-23. Location 32, OSDF West Fence, South-Southeast Perspective

2007

2023

Figure C-24. Location 33, OSDF Valve Houses 8 Through 1, North Perspective

2007

2023

Figure C-25. Location 34, OSDF Valve House 1, West-Northwest Perspective

2007

2023

Figure C-26. Location 35, OSDF Cell 1 Wells, Northeast Perspective

2007

2023

Figure C-27. Location 36, OSDF Valve House 2, West-Northwest Perspective

2007

2023

Figure C-28. Location 37, OSDF Cell 2 Wells, Northeast Perspective

2007

2023

Figure C-29. Location 38, OSDF Valve House 3, West-Northwest Perspective

2007

2023

Figure C-30. Location 39, OSDF Cell 3 Wells, Northeast Perspective

2007

2023

Figure C-31. Location 40, OSDF Valve House 4, West-Northwest Perspective

2007

2023

Figure C-32. Location 41, OSDF Cell 4 Wells, Northeast Perspective

2007

2023

Figure C-33. Location 42, OSDF Valve House 5, West-Northwest Perspective

2007

2023

Figure C-34. Location 43, OSDF Cell 5 Wells, Northeast Perspective

2007

2023

Figure C-35. Location 44, OSDF Valve House 6, West-Northwest Perspective

2007

2023

Figure C-36. Location 45, OSDF Cell 6 Wells, Northeast Perspective

2007

2023

Figure C-37. Location 46, OSDF Valve House 7, West-Northwest Perspective

2007

2023

Figure C-38. Location 47, OSDF Cell 7 Wells, Northeast Perspective

2007

2023

Figure C-39. Location 48, OSDF Valve House 8, West-Northwest Perspective

2007

2023

Figure C-40. Location 49, OSDF Cell 8 Wells, Northeast Perspective

Figure C-41. Representative Photograph of Animal Burrow

Figure C-42. Representative Photograph of Erosion

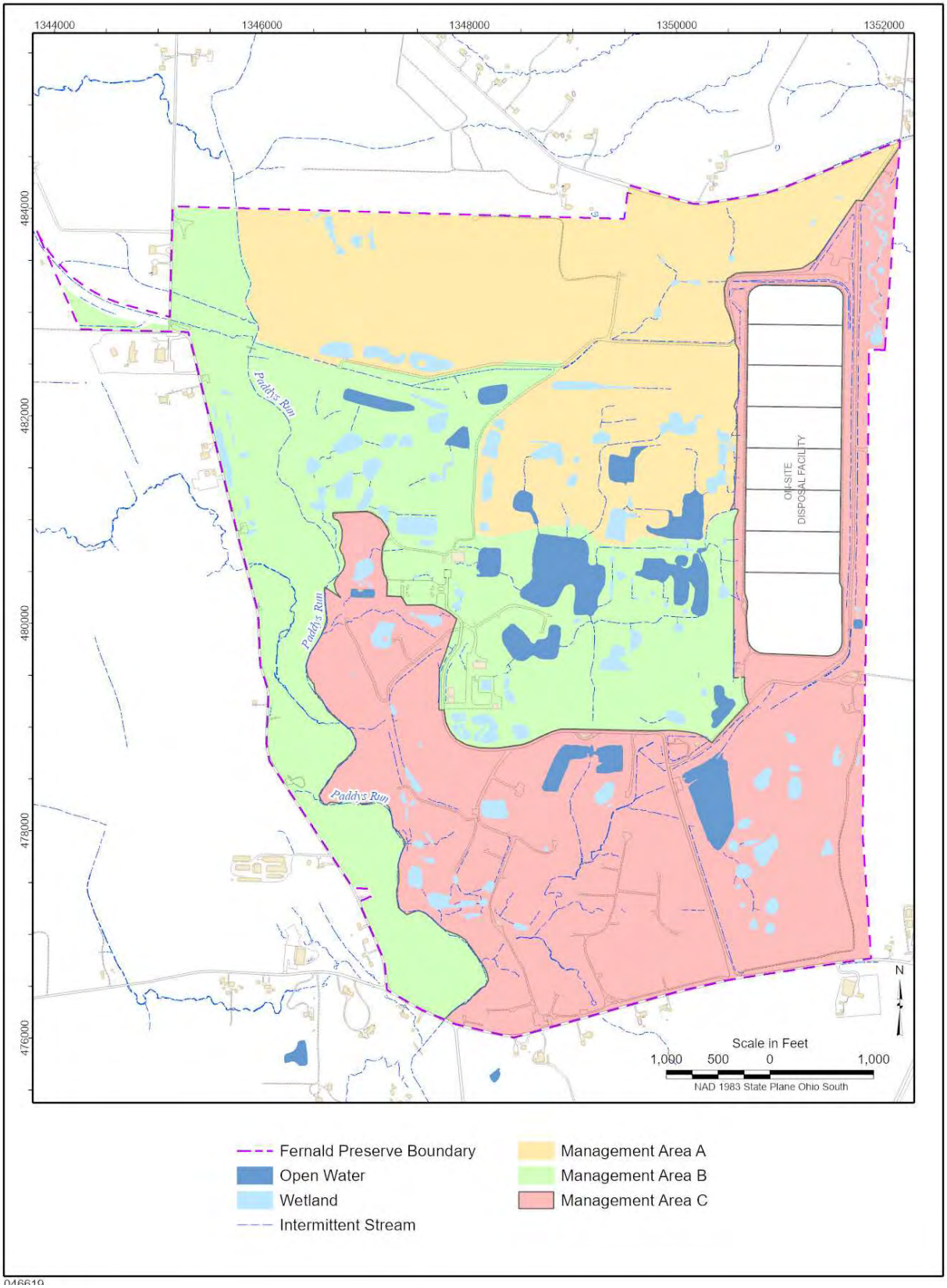


Figure C-43. Area-Based Approach Ecological Monitoring Areas (2014 Through 2020)

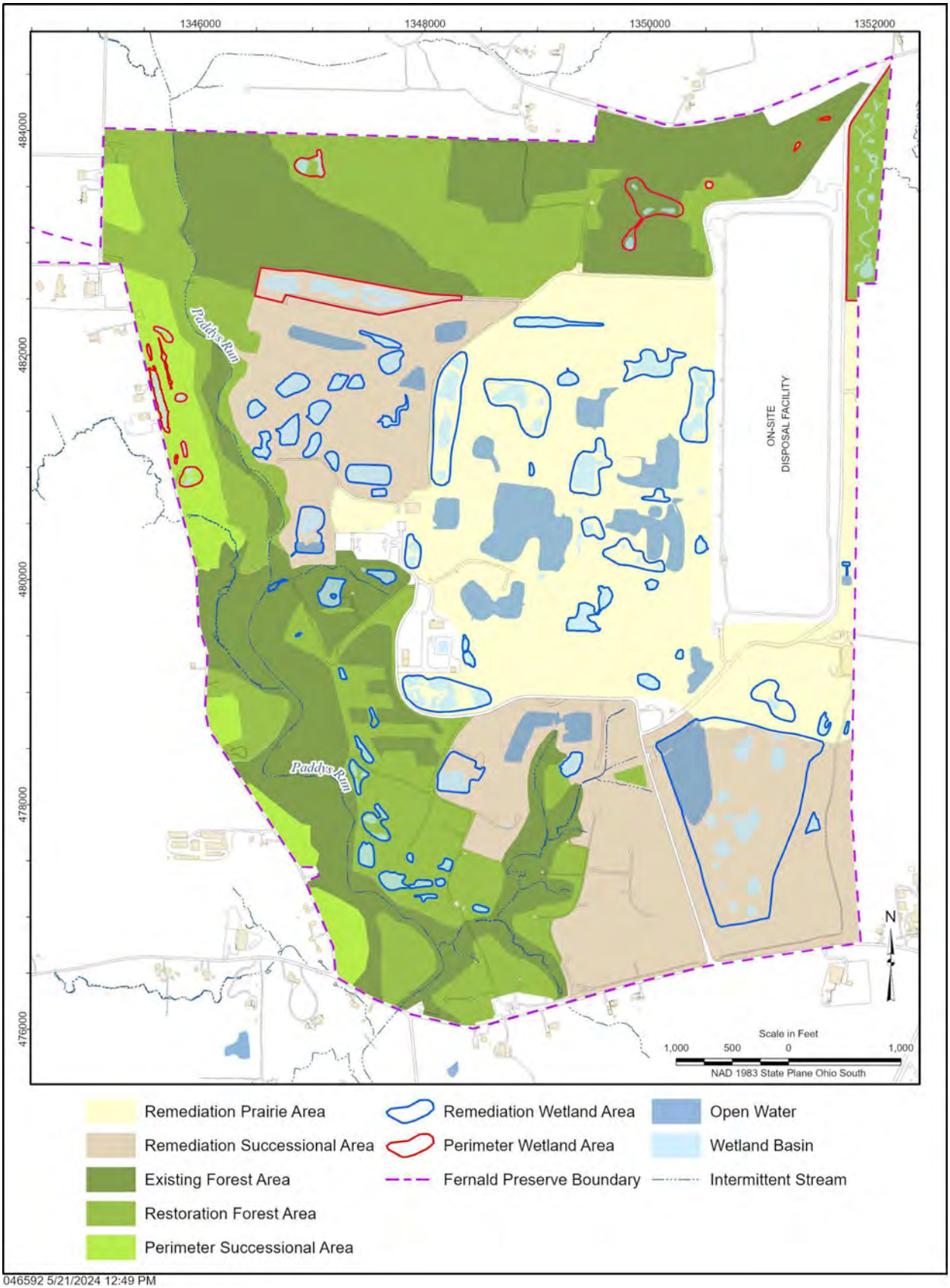


Figure C-44. Ecological Restoration Management Areas (2021 to Present)

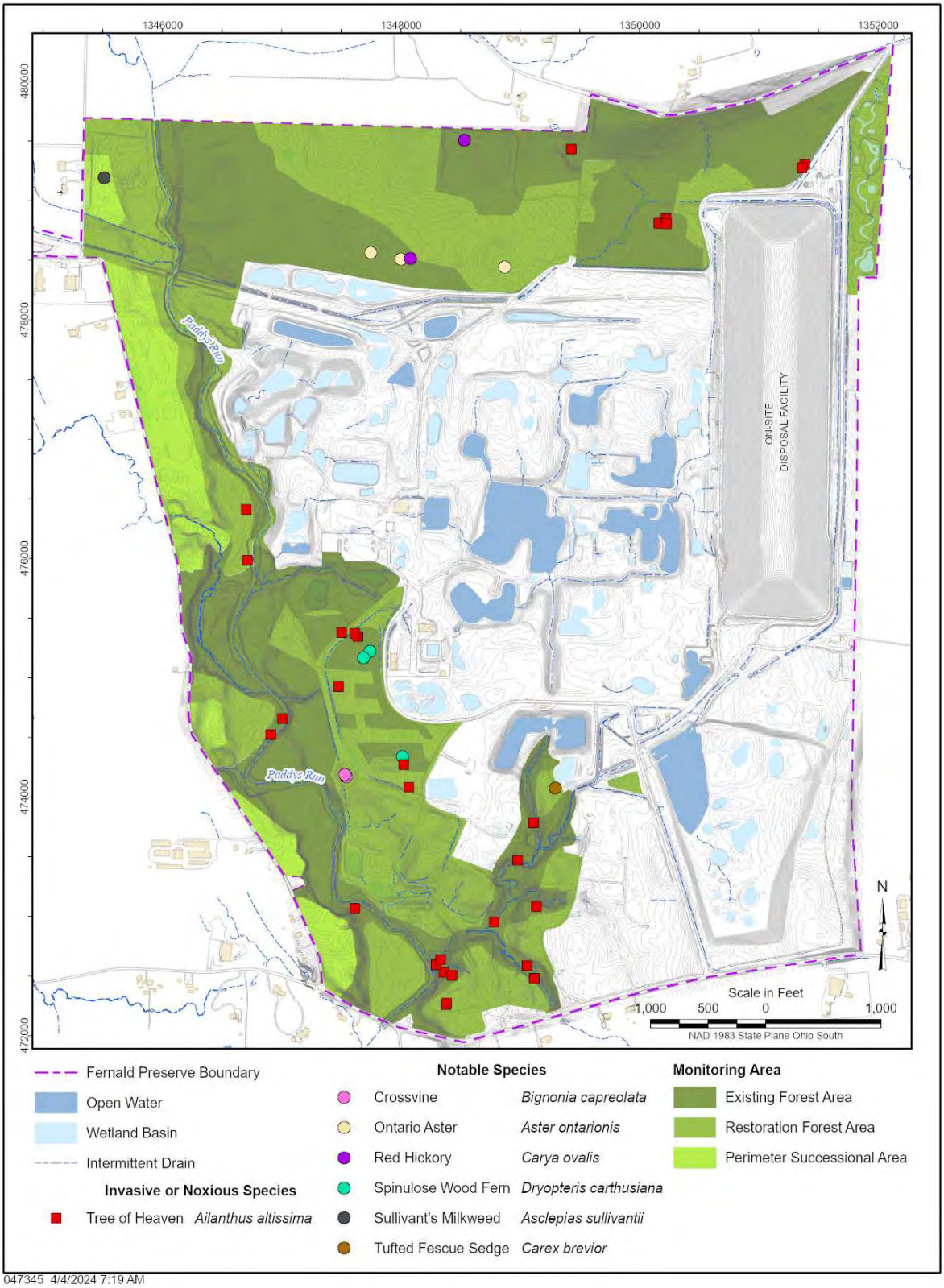


Figure C-45. Results of Ecological Monitoring