Appendix C

Ecological Restoration

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Contents

Tables

Figures

Abbreviations

AIBI	Amphibian Index of Biotic Integrity
CC	coefficient of conservatism
DBH	diameter at breast height
DOE	U.S. Department of Energy
FQAI	Floristic Quality Assessment Index
GEMS	Geospatial Environmental Mapping System
NDA	no determination available
NRRP	Natural Resource Restoration Plan
Ohio EPA	Ohio Environmental Protection Agency
OSDF	On-Site Disposal Facility
VIBI	Vegetation Index of Biotic Integrity
VIBI-FQ	Vegetation Index of Biotic Integrity "Floristic Quality

Measurement Abbreviations

cm	centimeters
m^2	square meters

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C.1.0 Ecological Restoration Monitoring

This appendix presents data collected as part of ecological restoration monitoring activities at the Fernald Preserve, Ohio, Site, along with results from routine inspections of the site and the On-Site Disposal Facility (OSDF). Ecological restoration monitoring in 2021 included an evaluation of wetland communities across the site.

Ecological restoration monitoring is required as part of the natural resource damage settlement among the U.S. Department of Energy (DOE), the Ohio Environmental Protection Agency (Ohio EPA), and the U.S. Department of Interior. The Fernald Preserve Natural Resource Restoration Plan (NRRP) (State of Ohio 2008) specifies ecological restoration monitoring requirements. The *Fernald Preserve Wetland Mitigation Monitoring Report* (DOE 2012a) included provisions to continue evaluation of wetland communities through the functional monitoring program. In addition to the continuation of vegetation and amphibian surveys, water elevations are monitored within select mitigation wetlands.

Vegetation goals were established in the NRRP. These include 50% native species composition and 90% total cover. Additional goals for wetland mitigation monitoring are included in the *Fernald Preserve Wetland Mitigation Monitoring Report* (DOE 2012a). These two documents established the ecological restoration monitoring program at the Fernald site. The *Fernald Preserve Restored Area Maintenance Plan* (RAMP, DOE 2012b) is an additional document that was required by the NRRP. This document established a maintenance program for ecologically restored areas across the site. The NRRP called for a 10-year review of the Restored Area Maintenance Plan by the Fernald Natural Resource Trustees. This effort was conducted in 2020,and resulted in the development of the draft final *Fernald Preserve, Ohio, Site Natural Resource Management Plan*. The Fernald Natural Resource Trustees agreed requirements in the RAMP could be refined to include an evaluation component, since both monitoring and evaluation help to direct maintenance activities. As a result, the *Natural Resource Management Plan* includes not only refinements to maintenance requirements for restored areas, but also refinements to ongoing monitoring requirements. Further detail regarding the revised monitoring approach is provided below.

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. 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 functional monitoring to a community-based approach for ecological monitoring is more appropriate. The new approach and methods are included in the draft final *Fernald Preserve, Ohio, Site Natural Resource Management Plan*.

The new approach involves the development of floristic inventories for each restoration community. Floristic inventories are compiled by conducting a series of walkdowns within a particular community type throughout the growing season. The result is a comprehensive list of

vascular plant species for each monitoring area. Figure C-1A shows the breakdown of community types that will be used for this revised approach. Remediation wetland areas, remediation prairie areas and remediation successional areas are located in portions 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 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 three-year rotation. Perimeter and remediation wetland areas were monitored in 2021 and results are presented in this report. Remediation prairie areas and remediation successional areas will be monitored in 2022. Existing forest areas, restoration forest areas and perimeter successional areas will be monitored in 2023. In years when wetland communities are evaluated, amphibian monitoring will continue to take place.

No new revegetation project implementation monitoring was necessary in 2021. Figure C-1B shows the location of 2021 ecological monitoring activities.

C.2.0 Functional Monitoring

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-1C). 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 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 (DBH) 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 2021, wetland communities across the site were evaluated through the revised approach to functional monitoring using the new floristic inventory method. Wetlands were divided into perimeter wetland areas, where there was little or no soil disturbance and topsoil was largely intact, and remediation wetland areas, where there was extensive soil disturbance and little to no remaining topsoil prior to wetland restoration.

Floristic inventories in 2021 were conducted in five perimeter and three remediation wetland areas (Figure C-1B). Areas were surveyed in three rounds to ensure data was collected through the entire growing season. For each floristic inventory survey, the entire wetland area was examined and each species observed was recorded. 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. Results are presented in Table C-1. This summary table presents a wetland communities species list that will allow for a comparison of the perimeter wetland areas and remediation wetland areas.

Results presented in Table C-1 indicate that several plants could not be identified to species. Nativity and CC value designations for these plants are made on a case-by-case basis. For example, there are a wide variety of CC values for native *Carex* species, so these plants would need to be identified to species level for a CC value to be assigned. In comparison, *Vitis* (grape vines) are often identified only to genus. The Ohio FQAI database assigns a CC of 3 for each of the three likely *Vitis* species in southwest Ohio; therefore, for the purposes of FQAI and nativity calculations, *Vitis* species in Table C-1 is considered native and assigned a CC of 3. This approach is applied conservatively so that there is no possibility of artificially inflating the calculations. If the plant is identified to genus level but there is uncertainty regarding CC values, the plant is not included in the calculations, and no determination available (NDA) is indicated on the table. Unknown species are counted as nonnative but are not included in calculating average CC values.

In 2021, 315 total species were observed in the wetlands during the floristic inventories. Of the 315 total species, 286 species were identified in perimeter wetland areas while 206 were identified in remediation wetland areas. Perimeter wetland areas also had higher native species percent, mean CC and FQAI scores (Table C-1).

Table C-2 provides a multiyear comparison of FQAI, mean CC value, and percent native species for all areas surveyed in 2021. For the time periods presented from 2009 to 2020, a species list was compiled from previous ecological monitoring data and used to calculate percent native species, mean CC, and FQAI values presented for the current floristic inventory areas (Figure C1-B). While FQAI is included in the comparison, this value is influenced by the size of the surveyed area. The new floristic inventory method surveys much larger areas than previously surveyed for functional monitoring. Because of this, FQAI will be more useful for comparisons of future floristic inventories. 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 in the comparisons to past years; however, this could also be influenced slightly by the larger survey areas. This metric will also be useful for future comparisons.

Table C-2 shows higher FQAI scores than previously calculated by the formerly used Vegetation Index of Biotic Integrity – Floristic Quality (VIBI-FQ) method of vegetation monitoring used for wetlands, which is expected with the larger survey areas. Perimeter wetland areas showed slightly higher mean CC values and native species percent. These gains are likely not significant enough to draw major conclusions about habitat development, especially considering the change in monitoring method since the last survey. Remediation wetland areas showed a slight decrease or similar results to those found in previous years. These changes are likely not significant enough to draw conclusions about habitat regression. Both the perimeter and remediation wetland areas results are consistent with previous findings indicating that these wetland communities are stable and have likely plateaued in development.

In 2021, 216 of the 286 species identified in perimeter wetland areas are native species, of these, 22 species of *Carex* sedges were identified in the perimeter wetland areas (Table C-1). *Carex* sedges are of particular interest due to their high diversity, including many sensitive and wetland indicator species. Several species of interest were observed in perimeter wetland areas in 2021. Queen-of-the-prairie (*Filipendula rubra*) and water parsnip (*Sium suave*) continue to be observed in the WM1 wetlands. These obligate wetland species had been previously observed in this same wetland area and may have originated from donor soil that was supplied by Ohio EPA during the initial construction of the wetlands. These species were first observed on site in 2017. Field personnel noted that water parsnip was observed in high numbers in 2021 similar to what was observed in 2020, with several dozen individual plants observed throughout the basin. This is encouraging as it may indicate improved water levels following the 2017 erosion repair project in the WM1 Wetland Area that was completed to repair crayfish damage to these wetland basins. Riddell's goldenrod (*Solidago riddellii*) was again observed in the NPP Wetlands. Other high CC obligate wetland species identified in perimeter wetland areas include sessile toothcup (*Ammannia robusta*), halberd-leaved rose mallow (*Hibiscus laevis*), buttonbush (*Cephalanthus occidentalis*), northern and southern blueflag (*Iris versicolor and Iris virginica*), fragrant water lily (*Nymphaea odorata*), and common bladderwort (*Utricularia vulgaris*).

Of the 206 species identified in remediation wetland areas in 2021, 145 are native species and only 12 species of *Carex* sedges were observed. As stated above, *Carex* sedges are of particular interest due to their high diversity, including many sensitive and wetland indicator species. Several high CC obligate wetland species were observed in remediation wetland areas including sessile toothcup (*Ammannia robusta*), American lotus (*Nelumbo lutea*), buttonbush (*Cephalanthus occidentalis*), northern blue flag (*Iris versicolor*), and common bladderwort (*Utricularia vulgaris*).

C.3.0 Wetland Mitigation Monitoring

Pursuant to the *Fernald Preserve Wetland Mitigation Monitoring Report* (DOE 2012a), wetland mitigation monitoring continued in 2021. Activities included amphibian surveys to calculate Amphibian Index of Biotic Integrity (AIBI) and hydrologic monitoring using shallow wells (piezometers). Beginning in 2021, amphibian monitoring will be completed on a three-year rotation in alignment with the community-based approach established in the Natural Resource Management Plan.

C.3.1 Amphibian Surveys

Amphibian monitoring was conducted in spring 2021 for several basins within the mitigation wetlands (Figure C-1B). Basins include those monitored pursuant to the *Fernald Preserve Wetland Mitigation Monitoring Plan* (DOE 2009), as well as the newer basins constructed in the Paddys Run West and Northern Woodlot Enhancement Natural Resource Trustee Project areas., To support the revised ecological monitoring approach described in the NRMP, amphibian monitoring will only take place in years when wetland areas are monitored in accordance with the new three-year community-based rotation. Table C-3 lists the basins monitored and amphibian species observed. Table C-4 compares AIBI scores for each basin since 2011. Results presented in these tables show that mitigated wetlands established in the northern portions of the site continue to maintain overall quality and function. Results also indicate improvements in

amphibian scores in wetlands established in more heavily disturbed areas that have historically performed poorly.

The presence of ambystomatid salamanders is a key indicator of mitigation wetland success (Micacchion 2011). The proximity of restored wetlands to existing amphibian breeding ponds can greatly impact where ambystomatid salamanders select for a breeding site (Gara and Micacchion 2010). This has proven true at the Fernald Preserve over several years of amphibian monitoring.

Observations for 2021 in the North Pine Plantation restoration area, located adjacent to an established forest community, indicate a continued significant presence of the ambystomatid salamanders. While only three species of ambystomatid salamanders were positively identified in basin NPPW4 in 2021 compared to four ambystomatid species in previous years, 43 spotted salamanders (*Ambystoma maculatum*) were observed in early spring. This count is the highest total recorded for this wetland, and all the individuals were breeding age adults. The spotted salamander is an important indicator species of high-quality vernal pools that has been observed in NPPW4 annually since 2016, and their number has been generally increasing each year. Additionally, 117 total salamanders were observed during all three rounds of monitoring in NPPW4, a significant increase from the previous high count of 51 in 2019. Many of the salamanders (*Ambystoma species*) were unidentified larvae, which are likely predominantly spotted salamanders due to the large number of adults observed early in the year. For the first year since 2017, marbled salamander (*Ambystoma opacum*) was not positively identified in this wetland; however, field personnel encountered several adult marbled salamanders under coverboards in this basin during the fall of 2020, which is this species' mating season, suggesting that this species is still utilizing this wetland.

Unidentified *Ambystoma species* were observed in the Wetland Mitigation Phase II wetlands in 2021 (Table C-3). This is the second consecutive year that ambystomatid salamanders have been identified in these basins after several years of no observations. The Wetland Mitigation Phase II wetlands have been heavily altered by beaver activity, resulting in rapid habitat changes unsuitable for the salamanders. The presence of salamanders in 2021 is very encouraging.

Ambystomatid salamanders appear to be established in the Paddys Run West Natural Resource Trustee Project wetlands (Table C-3). In 2021, 31 spotted salamanders were observed in basin PRTW1, indicating continued and increasing breeding activity in these relatively young wetlands. Of the 31 spotted salamanders identified in PRTW1, 3 were breeding age adults found during the earliest round, and 28 were positively identified larvae in the latter two rounds indicating that this species continues to breed in this relatively young wetland.

During the 2021 amphibian monitoring activities, 277 individual ambystomatid salamander observations were recorded (Table C-3) across the Fernald Preserve mitigated wetlands. This is significantly higher than previous high counts of 104 and 100 observed in 2018 and 2019, respectively. The presence of ambystomatid salamanders in any number indicates that mitigation efforts are providing adequate habitat for sensitive indicator species. Basin NPPW4 has consistently scored 40 or higher in recent years for the AIBI, indicating that mitigation efforts have resulted in a high-functioning wetland (Table C-4).

Northern leopard frogs (*Lithobates pipens*) and northern cricket frogs (*Acris crepitans*) were much more prevalent in 2021 across monitored wetlands. Forty-one leopard frogs and 64 cricket frogs were observed in 2021 (Table C-3) compared to 22 and 15, respectively in 2019, the last year that a full three rounds of monitoring were completed. Only four northern leopard frogs and two northern cricket frogs were found during 2020 monitoring; but, the second round of monitoring was canceled due to the response to the COVID-19 pandemic. The increased numbers of these two species is the main factor in the increases in AIBI scores in several basins, especially in the WM2 and FPA wetlands. In one case, BAPW2 increased AIBI score from 0 in 2020 to 30 in 2021 (Table C-4). This is likely a result of how the score is calculated rather than a genuine change in habitat conditions, as the only two individual amphibians detected were northern cricket frogs, a high CC species that contributes to three of the five categories that make up the score. Field observations indicate that the wetland is heavily impacted by beaver activity, which has resulted in deeper water more conducive to fish habitat and shoreline vegetation disturbance. Fish presence likely contributed to the lack of other amphibian species. The cricket frog is a pioneer species that frequents recently disturbed areas. Their presence then often declines as the area reestablishes itself over time.

The increased number of cricket frogs in 2021 is a change from the decline of this species that had been observed across the Fernald Preserve for several years. Northern cricket frogs are pioneer species and observations are expected in newly created wetlands, such as the Northern Woodlot Enhancement Natural Resource Trustee Project wetland (basin NWEW1 on Figure C-1B), but as created wetlands mature, it is expected that populations would decline. All observations in 2021 were in more recently constructed wetlands and in wetlands altered with recent beaver activity. Wetland disturbance from beaver activity may actually be benefiting this species.

Wetlands in the Paddys Run West Natural Resource Trustee Project wetlands continued to host large numbers of toads (*Anaxyrus species*) and frogs (*Lithobates species*) as has been frequently observed in newer wetland projects at the Fernald Preserve. In PRWW1, 20 *Ambystoma* larvae were identified in 2021, including 6 marbled salamander (*Ambystoma opacum*) larvae (Table C-3). This wetland is in close proximity to the Paddys Run Tributary project wetlands and increased amybstoma numbers may be an expansion of the population that appears to be establishing itself in PRTW1. The presence of ambystomatid salamanders in Paddys Run West Natural Resource Trustee Project wetlands is encouraging, as creating ambystomatid breeding habitat was a primary goal of this project.

Changes in the amphibian species discussed above are reflected in AIBI scores (Table C-4). The AIBI score increased in 9 basins in 2021; however, most of these increases are linked to increased cricket frog numbers as mentioned above, and likely indicate recent beaver disturbance rather than developing habitat. The score for two basins decreased when compared to those of 2020. The decreased score for NPPW4 was largely due to only two salamander species being observed. However, it still scores as excellent amphibian habitat and more spotted salamanders, a key indicator species, were recorded in this basin than any prior year. WM1W7 scored 0 on the AIBI in 2021 despite good numbers of ambystoma salamanders. This is due to very high numbers of tolerant tadpole species that lowered the mean CC value and impacted the relative abundance of “tolerant” and “sensitive” species. The WM1W7 wetland continues to provide good breeding habitat for streamside salamanders, an ambystomatid salamander. The AIBI values generally reinforce the trends that have been observed in recent years: wetlands near

established forests are sustaining good amphibian habitat. Score increases in wetlands in remediated areas may be reflective of short-term changes due to beaver disturbance.

C.3.2 Hydrologic Monitoring

Hydrologic monitoring consists of daily water level measurements from three shallow wells (i.e., piezometers) installed in 2012. Figure C-1B shows the locations of piezometers within site wetlands. Figures C-2A through C-2C provide hydrographs for each basin monitored in 2021.

Data are collected from transducers that are positioned inside the piezometers. Transducers collect data at approximately 90 centimeters (cm) below ground surface. Data are uploaded from transducers at the most on a monthly basis, and usually only several times a year. Therefore, if a transducer fails, there is the potential to miss periods of time for data collection. Significant data gaps can be observed on the hydrographs from year to year and are noted in Table C-5. This occurred in 2021 for all the wetlands and is discussed further below. While examining the data for 2021 hydrologic monitoring, an error was discovered in the calculation of mean depth in PRTW1-PZ3 for 2019 and 2020. This was recalculated and updated values are presented in Table C-5.

Table C-5 compares results to the performance standards established in the *Fernald Preserve Wetland Mitigation Monitoring Plan* (DOE 2009). Standards include the percent of time water is present in the root zone, the mean depth of water, and the flashiness index. The standard associated with saturation of the root zone is based on a root zone of 30 cm below ground surface where water is present a minimum of 53% of the time throughout the year. The mean depth to water must be less than 29.4 cm. The flashiness index is a measurement of how fast water elevations rise or fall and is calculated by taking the absolute value of the annual average difference between water elevations on consecutive days. For wetlands to meet the flashiness standard, the flashiness index must be less than 2.

Recorded results were incomplete in 2021. No data was collected in any of the piezometers in three of the historically wettest months of the year (January through March). Additionally, PRTW1-PZ1 also failed through August. However, based on a review of 12 years of historical water level patterns in the piezometers, it is likely that PRTW1-PZ2 and PRTW1-PZ3 would have met the days of water in the root zone performance standard. Both piezometers showed a pattern similar to that of previous years, with saturated conditions observed through the winter and spring, followed by drier conditions in the summer and fall; however, water persisted in the root zone later into the summer than seen most other years. Saturated conditions returned somewhat later than typical in the fall and winter, as shown in Figure C-2B and C-2C. These findings are also similar to those at other emergent wetlands in Ohio. The influence of surface water is evident, as spikes in water elevations are usually observed (Mack et al. 2004) following precipitation events in summer months. Additionally, vegetation and amphibian monitoring results presented above indicate that the Paddys Run Tributary project area is indicative of a quality wetland. DOE proposes to eliminate hydrologic monitoring beginning in 2022 with regulatory and stakeholder approval.

C.4.0 Site and On-Site Disposal Facility Inspections

The Fernald Preserve *Comprehensive Legacy Management and Institutional Controls Plan* (DOE 2019b) identifies the inspection process for the site and the OSDF. Inspections are conducted quarterly with participation from regulators. Inspections document evidence of unauthorized uses of the site, the effectiveness of institutional controls, and the need for repairs. Regulators were not able to participate in person in most 2021 inspections due to the continued response to the COVID-19 pandemic. Instead, regulator participation was virtual, similar to the 2020 inspections. Regulators did participate in person for the December 2021 site and OSDF inspections.

Ecologically restored areas are evaluated for the presence of noxious weeds and erosion, the condition of vegetation, potentially contaminated debris, and signs of damage from nuisance animals. Section 5.0 of this Site Environmental Report provides a narrative summary of inspection results. Inspection reports are generated quarterly and are posted on the DOE Office of Legacy Management website at https://www.lm.doe.gov/Fernald/reports/.

Follow-up maintenance activities are conducted to address findings from site and OSDF inspections. For a number of findings, it is determined that no action or continued monitoring is required. Some 2021 inspection findings remain to be addressed. DOE continues to resolve older findings even as new ones are generated during inspections. Updated information is presented in the 2021 quarterly inspection reports.

C.4.1 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. The 2021 site inspection findings, resolution detail, and date of resolution are presented by quadrant in Tables C-6 through C-9. The approximate location of each finding for which a location was identified during the inspection is presented in Figures C-3A to C-3D. Similar to recent years, site inspection findings for 2021 consisted mainly of the presence of noxious weeds, invasive vegetation, and damage to deer ex-closure fencing. Site signage, fencing, and access points are also inspected quarterly. All inspection findings are included in the quarterly inspection reports.

Debris (e.g., asphalt, tile, and concrete) continues to be identified, primarily in the Former Production Area and former Waste Storage Area located in the central quadrant. The site radiological control technician performs a radiological scan of all debris identified. Table C-10 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 2021, 149 pieces of debris were identified and removed, including six pieces of concrete debris from an onsite drainage north of the former waste pits that had fixed radiological contamination above background levels discovered during casual observation. It is often the case that when one piece of debris is observed during an inspection, additional debris is discovered nearby when returning to remove the debris.

Annual site inspection photographs have been taken across the site (Figure C-4) since 2007. The 2018 Site Environmental Report (DOE 2019) was the first time these photos were included as part of the Site Environmental Report. Prior to that, they were made available through the

Geospatial Environmental Mapping System (GEMS), an internet-based interface that allows for public access to monitoring and inspection data. Due to changes in the internal review process for posting to this public interface, annual site photographs have not been posted on GEMS since 2015. The 2021 photo set is provided in this report. The first photograph taken at each location along with photographs from 2021 are provided in Figures C-5A through C-73. Note that the angle and perspective at some locations has shifted slightly over the years. The series of photographs show significant vegetation growth and development, and generally stable conditions across the site. The annual site inspection photograph process was established to document the restoration following the extensive soil remediation completed in 2006. Additional photographs have been added over the years as newer restoration projects were completed. Because of the successful establishment of vegetation throughout the site, these annual site inspection photographs are less useful in documenting changing conditions at the site. DOE is proposing to reduce the annual site inspection photographs to include those required for the OSDF per the Attachment C of the LMICP, *Post-Closure Care and Inspection Plan*. A smaller subset of inspection photographs will be collected to support the Comprehensive Environmental Response, Compensation, and Liability Act five-year review.

C.4.2 OSDF Inspection Findings

OSDF inspections consist of a quarterly walkdown around the perimeter of the OSDF and an annual walkdown of the vegetated cap. Erosion rills, animal burrows, noxious weeds, woody vegetation, settlement cracks, and other indications that there may be an issue with the proper functioning of the cap are identified and repaired. Tables C-11 through C-14 provide the 2021 OSDF findings, resolution detail, and date of resolution, and Figure C-3E identifies the approximate location of each listed finding. In 2021, there were no signs that the integrity of the cap had been compromised. As in previous years, findings consisted mainly of woody vegetation, noxious weeds, and animal burrows. Callery pear (*Pyrus calleryana*) and other woody vegetation continue to invade the OSDF cap. Field personnel physically remove or apply herbicide to woody vegetation to keep trees from becoming established on the cap.

C.5.0 Monitoring and Inspection Activities in 2022

The revised approach to functional monitoring using floristic inventories implemented in 2021 will continue in 2022 for remediation prairie areas and remediation successional areas (Figure C-1A).

Quarterly site inspections will continue to be used to identify issues that need to be addressed through restored area maintenance. 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. Herbaceous monitoring of the OSDF cap, which is reported through quarterly inspection reports, will continue. Cell caps 7 and 8 will be evaluated in 2022.

C.6.0 References

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Table C-1. 2021 Wetland Functional Monitoring Area Summary

	Remediation Wetland Areas			Perimeter Wetland Areas				
Wetland Areas	**BAP**	**FPA**	**FSA**	**NPP**	**NWE**	**PRW**	**WM1**	**WM2**
Total Species	203			286				
Native Species	145			216				
Non-Native Species	58			70				
Native Species	71%			76%				
Average Coefficient of Conservatism (CC), range 0-10	2.23			2.69				
Floristic Quality Assessment Index (FQAI)	31.79			45.53				

					Remediation Wetland Areas			Perimeter Wetland Areas				
Species	**Common Name**	**Type**	**CC**	**Wetland Indicator[a]**	**BAP**	**FPA**	**FSA**	**NPP**	**NWE**	**PRW**	**WM1**	**WM2**
Acalypha rhomboidea	RHOMBIC THREE-S. MERCURY	forb	0	FACU-	X	X						
Acer negundo	BOX ELDER	tree	3	FAC		X	X	X		X	X	X
Acer rubrum	RED MAPLE	tree	2	FAC			X	X	X	X	X	X
Acer saccharinum	SILVER MAPLE	tree	3	FACW	X			X	X	X	X	X
Acer saccharum	SUGAR MAPLE	tree	5	FACU-			X		X	X	X	
Achillea millefolium	YARROW	forb	1	FACU	X	X	X	X	X	X		X
Aesculus glabra	OHIO BUCKEYE	tree	6	FACU+							X	
Agalinis purpurea var. purpurea	LARGE PURPLE FOXGLOVE	forb	6	FACW-				X	X			
Agalinis tenuifolia	SLENDER FOXGLOVE	forb	4	FAC	X	X						X
Agrimonia parviflora	SMALL-FLOWERED AGRIMONY	forb	2	FACW	X	X		X	X		X	X
Alisma subcordatum	SOUTHERN WATER-PLANTAIN	forb	2	OBL	X	X	X	X		X	X	X
Ambrosia artemisiifolia	COMMON RAGWEED	forb	0	FACU	X	X	X	X	X	X	X	X
Ammannia robusta	SESSILE TOOTH-CUP	forb	7	OBL	X				X			X
Amorpha fruticosa	FALSE INDIGO	forb	3	FACW	X						X	
Andropogon gerardii	BIG BLUESTEM	grass	5	FAC	X	X	X	X		X	X	X
Andropogon virginicus	COMMON BROOM-SEDGE	grass	3	FACU				X	X	X		
Anemone virginiana	WOODLAND THIMBLEWEED	forb	3	FACU			X					
Apocynum cannabinum	INDIAN HEMP	forb	1	FAC	X	X	X	X		X	X	X
Asclepias incarnata	SWAMP MILKWEED	forb	4	OBL	X	X	X	X	X	X	X	X
Asclepias syriaca	COMMON MILKWEED	forb	1	FACU	X	X	X	X		X	X	X
Asclepias tuberosa	BUTTERFLY-WEED	forb	4	UPL	X		X			X	X	
Asimina triloba	PAWPAW	sm tree	6	FACU+				X		X	X	
Aster ericoides	WHITE HEATH ASTER	forb	2	FACU	X	X	X		X			X
Aster lateriflorus	CALICO ASTER	forb	2	FACW-		X	X	X	X	X	X	
Aster novae-angliae	NEW ENGLAND ASTER	forb	2	FACW-	X	X	X	X	X	X	X	X
Aster pilosus	AWL ASTER	forb	1	UPL	X	X	X	X	X	X	X	X
Baptisia australis	BLUE FALSE INDIGO	forb	6	FACU-	X	X	X	X		X		X
Baptisia lactea	WHITE FALSE INDIGO	forb	8	FACU	X		X	X	X		X	X
Bidens cernua	NODDING BEGGAR'S-TICK	forb	3	OBL				X				
Bidens frondosa	DEVIL'S BEGGAR'S-TICK	forb	2	FACW	X	X	X	X	X	X	X	X
Boehmeria cylindrica	FALSE NETTLE	forb	4	FACW+	X	X						
Bouteloua curtipendula	SIDE-OATS GRAMA GRASS	grass	8	UPL			X				X	X
Calamagrostis canadensis	CANADA BLUEJOINT	grass	4	FACW+	X	X		X			X	
Calystegia sepium	HEDGE BINDWEED	forb	1	FAC-				X			X	X
Campsis radicans	TRUMPET-CREEPER	vine	1	FACU						X		X
Carex amphibola	E. NARROW-LEAVED SEDGE	sedge	5	FAC				X				X
Carex annectens	YELLOW FOX SEDGE	sedge	3	FACW	X	X		X	X	X	X	
Carex blanda	COMMON WOOD SEDGE	sedge	1	FAC				X		X	X	
Carex comosa	BEARDED SEDGE	sedge	2	OBL	X	X	X			X	X	
Carex crinita var. crinita	TASSELED SEDGE	sedge	3	OBL			X			X		
Carex cristatella	CRESTED SEDGE	sedge	3	FACW	X	X		X		X	X	X
Carex frankii	FRANK'S SEDGE	sedge	2	OBL	X	X	X	X	X	X	X	X
Carex granularis	MEADOW SEDGE	sedge	3	FACW+			X	X			X	X
Carex grayi	GRAY'S SEDGE	sedge	5	FACW					X	X		
Carex grisea	NARROW-LEAVED SEDGE	sedge	4	FAC				X				
Carex hystericina	PORCUPINE SEDGE	sedge	5	OBL	X	X	X	X			X	X
Carex lupulina	HOP SEDGE	sedge	3	OBL					X	X	X	
Carex lurida	BOTTLEBRUSH SEDGE	sedge	3	OBL	X	X	X	X	X	X	X	X
Carex molesta	TROUBLESOME SEDGE	sedge	3	FACU							X	X
Carex normalis	LARGE STRAW SEDGE	sedge	4	FACW	X	X	X	X		X	X	X
Carex scoparia	POINTED BROOM SEDGE	sedge	3	FACW		X	X				X	
Carex shortiana	SHORT'S SEDGE	sedge	2	FAC					X		X	X
Carex squarrosa	SQUARROSE SEDGE	sedge	4	FACW					X			
Carex stipata	CROWDED SEDGE	sedge	2	OBL				X			X	
Carex stricta	TUSSOCK SEDGE	sedge	5	OBL				X				
Carex tribuloides	BLUNT BROOM SEDGE	sedge	4	OBL		X	X	X	X	X		X
Carex vulpinoidea	FOX SEDGE	sedge	1	FACW		X	X	X	X	X	X	X
Carpinus caroliniana	BLUE-BEECH	sm tree	5	FAC				X				
Carya cordiformis	BITTERNUT HICKORY	tree	5	FACU							X	X
Carya laciniosa	SHELLBARK HICKORY	tree	7	FAC							X	
Carya tomentosa	MOCKERNUT HICKORY	tree	6	UPL					X	X		X
Cephalanthus occidentalis	BUTTONBUSH	shrub	6	OBL	X	X	X	X	X	X	X	X
Ceratophyllum demersum	COONTAIL	forb	2	OBL	X	X		X				X
Cercis canadensis	REDBUD	sm tree	3	FACU-					X	X	X	
Chamaecrista fasciculata	PARTRIDGE-PEA	forb	3	FACU	X		X					
Cirsium discolor	FIELD THISTLE	forb	4	UPL				X				
Conyza canadensis	HORSEWEED	forb	0	UPL	X	X					X	X

Table C-1. 2021 Wetland Functional Monitoring Area Summary (continued)

					Remediation Wetland Areas			Perimeter Wetland Areas				
Species	**Common Name**	**Type**	**CC**	**Wetland Indicator[a]**	**BAP**	**FPA**	**FSA**	**NPP**	**NWE**	**PRW**	**WM1**	**WM2**
Cornus amomum	SILKY DOGWOOD	shrub	2	FACW	X	X	X		X	X	X	
Cornus drummondii	ROUGH-LEAVED DOGWOOD	shrub	3	FAC				X	X			
Cornus racemosa	GRAY DOGWOOD	shrub	1	FAC-	X	X						X
Cyperus bipartitus	UMBRELLA-SEDGE	sedge	3	FACW+	X							
Cyperus esculentus	YELLOW NUT-SEDGE	sedge	0	FACW	X	X	X	X	X	X	X	X
Cyperus strigosus	STRAW-COLORED UMBRELLA-S.	sedge	1	FACW	X	X						
Desmodium canadense	CANADA TICK-TREFOIL	forb	4	FAC	X	X	X	X	X	X	X	X
Desmodium paniculatum	SHOWY TICK-TREFOIL	forb	3	UPL							X	X
Echinacea purpurea	PURPLE CONEFLOWER	forb	6	UPL						X		X
Eclipta prostrata	YERBA-DE-TAJO	forb	3	FACW								X
Eleocharis erythropoda	RED-FOOTED SPIKE-RUSH	sedge	4	OBL	X	X			X	X	X	X
Eleocharis obtusa	BLUNT SPIKE-RUSH	sedge	1	OBL	X	X	X	X	X	X	X	X
Elymus canadensis	CANADA WILD RYE	grass	6	FACU	X	X				X	X	X
Elymus villosus	HAIRY WILD RYE	grass	4	FACU-			X	X				
Elymus virginicus	VIRGINIA WILD RYE	grass	3	FACW-			X					
Epilobium coloratum	PURPLE-LEAVED WILLOW-HERB	forb	1	OBL	X	X						
Equisetum arvense	FIELD HORSETAIL	fern	0	FAC								X
Equisetum hyemale	SCOURING-RUSH	fern	2	FACW	X		X					
Erechtites hieracifolia	PILEWORT	forb	2	FACU	X	X				X	X	
Erigeron annuus	DAISY FLEABANE	forb	0	FACU		X					X	
Erigeron philadelphicus	PHILADELPHIA FLEABANE	forb	2	FACU				X		X	X	X
Erigeron strigosus	ROUGH FLEABANE	forb	1	FACU	X	X	X	X		X	X	X
Eryngium yuccifolium	RATTLESNAKE-MASTER	forb	7	FAC	X	X	X	X		X	X	
Eupatorium altissimum	TALL BONESET	forb	0	UPL	X	X	X	X	X	X	X	X
Eupatorium coelestinum	MISTFLOWER	forb	3	FAC					X			X
Eupatorium maculatum	SPOTTED JOE-PYE WEED	forb	6	FACW				X				
Eupatorium perfoliatum	COMMON BONESET	forb	3	OBL	X	X	X	X	X	X	X	X
Eupatorium purpureum	PURPLE JOE-PYE WEED	forb	5	FAC				X				
Eupatorium rugosum	WHITE SNAKEROOT	forb	3	FACU				X				X
Eupatorium serotinum	LATE-FLOWERING BONESET	forb	2	FAC	X	X	X	X	X	X	X	X
Euthamia graminifolia	FLAT-TOPPED GOLDENROD	forb	2	FACW	X	X	X	X	X	X	X	X
Fagus grandifolia	AMERICAN BEECH	tree	7	FACU					X		X	
Filipendula rubra	QUEEN-OF-THE-PRAIRIE	forb	8	FACW							X	
Fraxinus pennsylvanica	GREEN ASH	tree	3	FACW	X	X	X	X	X	X	X	X
Galium aparine	CLEAVERS	forb	0	FACU				X		X	X	X
Galium tinctorium	SMALL THREE-LOBED BEDSTRAW	forb	4	OBL	X						X	
Gentiana andrewsii	BOTTLE GENTIAN	forb	5	FACW						X		
Geranium carolinianum	CAROLINA CRANE'S-BILL	forb	3	UPL								X
Geum canadense	WHITE AVENS	forb	2	FACU		X		X			X	
Geum species	AVENS SPECIES	forb	2	ND						X		
Geum vernum	SPRING AVENS	forb	2	FACU				X				
Gleditsia triacanthos	HONEY LOCUST	tree	4	FACU	X					X	X	
Gnaphalium obtusifolium	FRAGRANT CUDWEED	forb	2	UPL		X						
Hamamelis virginiana	WITCH-HAZEL	sm tree	5	FAC-				X				X
Helenium autumnale	COMMON SNEEZEWEED	forb	4	FACW+						X		
Helianthus grosseserratus	SAWTOOTH SUNFLOWER	forb	4	FACW		X				X		
Helianthus mollis	ASHY SUNFLOWER	forb	7	UPL								X
Helianthus tuberosus	JERUSALEM-ARTICHOKE	forb	3	FAC							X	
Heliopsis helianthoides	SMOOTH OXEYE	forb	5	FACU	X		X		X	X		X
Hibiscus laevis	HALBERD-LEAVED ROSE-MALLOW	forb	7	OBL					X	X	X	
Hibiscus moscheutos	SWAMP ROSE-MALLOW	forb	4	OBL			X		X	X		
Hypericum prolificum	SHRUBBY ST. JOHN'S-WORT	shrub	3	FACU	X		X		X	X		
Ilex verticillata	WINTERBERRY	shrub	6	FACW				X				
Iris versicolor	NORTHERN BLUE FLAG	forb	6	OBL		X	X			X	X	
Iris virginica	SOUTHERN BLUE FLAG	forb	6	OBL					X			
Juglans nigra	BLACK WALNUT	tree	5	FACU			X	X		X	X	X
Juncus dudleyi	DUDLEY'S RUSH	forb	3	FACW-	X					X		
Juncus effusus	SOFT RUSH	forb	1	OBL	X	X	X	X	X	X	X	X
Juncus interior	INLAND RUSH	forb	4	FAC	X	X	X	X		X	X	X
Juncus tenuis	PATH RUSH	forb	1	FAC	X	X		X	X	X	X	X
Juncus torreyi	TORREY'S RUSH	forb	3	FACW	X	X	X	X	X	X	X	X
Juniperus virginiana	EASTERN RED CEDAR	tree	3	FACU	X		X	X	X	X	X	X
Leersia oryzoides	RICE CUT GRASS	grass	1	OBL	X	X		X	X	X	X	X
Lemna minor	COMMON DUCKWEED	forb	3	OBL	X	X	X	X			X	X
Lespedeza capitata	ROUND-HEADED BUSH-CLOVER	forb	5	FACU-						X		X
Leucospora multifida	LEUCOSPORA	forb	5	FACW	X					X		X
Liatris spicata	SPIKED BLAZING-STAR	forb	7	FAC+	X	X		X			X	X
Lindera benzoin	SPICEBUSH	shrub	5	FACW-						X		
Lindernia dubia	FALSE PIMPERNEL	forb	2	OBL	X							
Liquidambar styraciflua	SWEETGUM	tree	6	FAC							X	
Liriodendron tulipifera	TULIP TREE	tree	6	FACU					X	X		
Lobelia cardinalis	CARDINAL-FLOWER	forb	5	OBL	X			X		X		
Lobelia siphilitica	GREAT BLUE LOBELIA	forb	3	OBL	X	X	X					X
Ludwigia palustris	WATER-PURSLANE	forb	3	OBL	X	X	X		X	X	X	X
Lycopus americanus	AMERICAN WATER-HOREHOUND	forb	3	OBL	X	X	X		X	X	X	X
Menispermum canadense	CANADA MOONSEED	vine	5	FACU				X				
Mentha arvensis	FIELD MINT	forb	2	FACW							X	
Mimulus ringens	COMMON MONKEY-FLOWER	forb	4	OBL	X	X	X	X	X	X	X	X

Table C-1. 2021 Wetland Functional Monitoring Area Summary (continued)

					Remediation Wetland Areas			Perimeter Wetland Areas				
Species	**Common Name**	**Type**	**CC**	**Wetland Indicator[a]**	**BAP**	**FPA**	**FSA**	**NPP**	**NWE**	**PRW**	**WM1**	**WM2**
Monarda fistulosa	WILD BERGAMOT	forb	3	FACU	X	X	X	X		X	X	X
Nelumbo lutea	AMERICAN LOTUS	forb	7	OBL	X							
Nuphar advena	SPATTERDOCK	forb	4	OBL				X				
Nymphaea odorata	FRAGRANT WATER-LILY	forb	6	OBL							X	
Oenothera biennis	COMMON EVENING-PRIMROSE	forb	1	FACU-		X	X					
Oxalis stricta	COMMON YELLOW WOOD-SORREL	forb	0	FACU				X			X	X
Panicum acuminatum	TAPERED ROSETTE GRASS	grass	2	FAC							X	
Panicum capillare	WITCH GRASS	grass	1	FAC-	X	X						
Panicum clandestinum	DEER'S-TONGUE PANIC GRASS	grass	2	FAC+					X		X	X
Panicum virgatum	SWITCH GRASS	grass	4	FAC	X	X	X	X	X	X	X	X
Parthenocissus quinquefolia	VIRGINIA CREEPER	vine	2	FACU	X	X	X		X	X	X	X
Penstemon digitalis	FOXGLOVE BEARD-TONGUE	forb	2	FAC	X	X	X			X	X	X
Penthorum sedoides	DITCH-STONECROP	forb	2	OBL			X	X	X	X	X	X
Phyla lanceolata	FOG-FRUIT	forb	3	OBL	X							X
Phytolacca americana	POKEWEED	forb	1	FACU+		X						
Pilea pumila	CLEARWEED	forb	2	FACW				X				
Pinus strobus	WHITE PINE	tree	6	FACU				X				
Platanus occidentalis	SYCAMORE	tree	7	FACW	X	X	X	X	X	X	X	X
Polygonum hydropiper	WATER-PEPPER	forb	1	OBL							X	X
Populus deltoides	EASTERN COTTONWOOD	tree	3	FAC	X	X	X	X	X	X	X	X
Potamogeton nodosus	LONG-LEAVED PONDWEED	forb	3	OBL	X	X	X		X		X	X
Prunella vulgaris	SELF-HEAL	forb	0	FACU+	X			X			X	
Prunus americana	AMERICAN PLUM	sm tree	3	FACU-							X	X
Prunus serotina	BLACK CHERRY	tree	3	FACU						X		X
Ptelea trifoliata	HOP-TREE	sm tree	5	FAC							X	
Pycnanthemum tenuifolium	NARROW-LEAVED MOUNTAIN-MINT	forb	4	FACW		X	X	X	X	X	X	
Quercus alba	WHITE OAK	tree	6	FACU-					X		X	X
Quercus bicolor	SWAMP WHITE OAK	tree	7	FACW			X		X	X	X	
Quercus imbricaria	SHINGLE OAK	tree	5	FAC					X	X	X	X
Quercus macrocarpa	BUR OAK	tree	6	FAC-						X		
Quercus palustris	PIN OAK	tree	5	FACW			X			X	X	
Quercus rubra	RED OAK	tree	6	FACU			X		X	X	X	X
Quercus shumardii	SHUMARD OAK	tree	7	FAC+							X	
Ratibida pinnata	GRAY-HEADED CONEFLOWER	forb	5	UPL	X	X	X	X		X	X	X
Rhus aromatica var. aromatica	FRAGRANT SUMAC	shrub	3	UPL						X		
Ribes americanum	WILD BLACK CURRANT	shrub	4	FACW							X	
Ribes cynosbati	DOGBERRY	shrub	3	UPL							X	
Robinia pseudoacacia	BLACK LOCUST	tree	0	FACU-	X	X						
Rosa palustris	SWAMP ROSE	shrub	5	OBL	X			X	X	X	X	X
Rosa setigera	CLIMBING PRAIRIE ROSE	shrub	4	FACU							X	
Rubus allegheniensis	COMMON BLACKBERRY	shrub	1	FACU-		X		X	X	X	X	X
Rubus occidentalis	BLACK RASPBERRY	shrub	1	UPL				X				
Rudbeckia hirta	BLACK-EYED SUSAN	forb	1	FACU	X	X	X	X			X	
Rudbeckia laciniata	GREEN-HEADED CONEFLOWER	forb	6	FACW							X	
Rudbeckia triloba	THREE-LOBED CONEFLOWER	forb	5	FACU			X					X
Sagittaria latifolia	COMMON ARROWHEAD	forb	1	OBL			X		X	X		
Salix exigua	SANDBAR WILLOW	shrub	1	OBL	X	X	X				X	X
Salix nigra	BLACK WILLOW	tree	2	OBL	X	X	X	X	X	X	X	
Sambucus canadensis	COMMON ELDERBERRY	shrub	3	FACW-		X		X		X		
Schizachyrium scoparium	LITTLE BLUESTEM	grass	5	FACU-	X	X	X	X			X	X
Schoenoplectus tabernaemontani	SOFT-STEMMED BULRUSH	sedge	2	OBL	X	X	X	X	X	X	X	X
Scirpus atrovirens	GREEN BULRUSH	sedge	1	OBL	X	X	X	X	X	X	X	X
Scirpus cyperinus	WOOL-GRASS	sedge	1	OBL	X	X	X	X	X	X	X	X
Scirpus pedicellatus	STALKED BULRUSH	sedge	3	OBL					X			
Scirpus pendulus	DROOPING BULRUSH	sedge	2	OBL	X	X	X			X	X	X
Scutellaria lateriflora	MAD-DOG SKULLCAP	forb	3	OBL		X						
Senna hebecarpa	NORTHERN WILD SENNA	forb	4	FAC	X	X	X		X		X	
Silphium laciniatum	COMPASS PLANT	forb	8	UPL	X		X				X	
Silphium perfoliatum	CUP-PLANT	forb	6	FACU		X	X			X	X	X
Silphium terebinthinaceum	PRAIRIE DOCK	forb	8	UPL							X	
Sisyrinchium angustifolium	STOUT BLUE-EYED-GRASS	forb	2	FACW-							X	
Sisyrinchium species	BLUE-EYED GRASS	forb	2	ND					X	X		
Sium suave	WATER-PARSNIP	forb	6	OBL							X	
Solidago canadensis	CANADA GOLDENROD	forb	1	FACU	X	X	X	X	X	X	X	X
Solidago juncea	PLUME GOLDENROD	forb	2	UPL								X
Solidago riddellii	RIDDELL'S GOLDENROD	forb	8	OBL				X				
Solidago rigida	STIFF GOLDENROD	forb	8	UPL		X				X		
Sorghastrum nutans	INDIAN GRASS	grass	5	FACU	X	X	X	X	X	X	X	X
Sparganium eurycarpum	GIANT BUR-REED	forb	4	OBL	X	X	X			X	X	X
Spartina pectinata	PRAIRIE CORD GRASS	grass	5	FACW	X	X	X			X	X	
Spiraea alba	MEADOW-SWEET	shrub	3	FACW	X	X		X		X		
Symphoricarpos orbiculatus	CORALBERRY	shrub	3	UPL							X	
Teucrium canadense	AMERICAN GERMANDER	forb	3	FACW-	X							X
Toxicodendron radicans	POISON-IVY	vine	1	FAC	X	X	X	X	X	X	X	X
Tradescantia ohiensis	OHIO SPIDERWORT	forb	5	FAC	X	X	X		X	X	X	X
Ulmus americana	AMERICAN ELM	tree	2	FACW	X		X	X		X	X	
Ulmus rubra	SLIPPERY ELM	tree	3	FACW-	X			X	X	X		X
Utricularia vulgaris	COMMON BLADDERWORT	forb	6	OBL	X	X	X				X	X

Table C-1. 2021 Wetland Functional Monitoring Area Summary (continued)

					Remediation Wetland Areas			Perimeter Wetland Areas				
Species	**Common Name**	**Type**	**CC**	**Wetland Indicator[a]**	**BAP**	**FPA**	**FSA**	**NPP**	**NWE**	**PRW**	**WM1**	**WM2**
Verbena hastata	BLUE VERVAIN	forb	4	FACW	X	X	X		X		X	X
Verbena urticifolia	WHITE VERVAIN	forb	3	FAC	X	X						X
Verbesina alternifolia	WINGSTEM	forb	5	FAC				X				
Vernonia gigantea	TALL IRONWEED	forb	2	FAC	X	X	X	X	X	X	X	X
Viburnum dentatum	ARROW-WOOD	shrub	2	FAC							X	
Viburnum prunifolium	BLACK-HAW	shrub	4	FACU							X	
Vitis cinerea	PIGEON GRAPE	vine	6	FACW							X	
Vitis riparia	RIVERBANK GRAPE	vine	3	FACW							X	
Vitis species	GRAPEVINE SPECIES	vine	3	ND	X		X	X	X	X		X
Vitis vulpina	FROST GRAPE	vine	3	FAC							X	
Agrostis gigantea	**REDTOP**	grass	0	FACW	X		X			X		X
Agrostis stolonifera	**CREEPING BENT GRASS**	grass	0	FACW			X				X	
Allium vineale	**FIELD GARLIC**	forb	0	FACU	X		X			X	X	
Anthoxanthum odoratum	**SWEET VERNAL GRASS**	grass	0	FACU						X		
Azolla caroliniana	**MOSQUITO-FERN**	fern	0	OBL	X	X		X				
Barbarea vulgaris	**YELLOW ROCKET**	forb	0	FAC	X	X					X	
Brassica rapa	**FIELD MUSTARD**	forb	0	UPL				X			X	
Brassica species	**MUSTARD SPECIES**	forb	0	UPL					X	X		
Bromus inermis	**HUNGARIAN BROME**	grass	0	UPL							X	X
Bromus japonicus	**JAPANESE BROME**	grass	0	FACU-		X						
Carduus nutans	**NODDING THISTLE**	forb	0	UPL		X					X	
Catalpa speciosa	**NORTHERN CATALPA**	tree	0	FAC	X							
Celastrus orbiculatus	**ORIENTAL BITTERSWEET**	vine	0	FACU								X
Cichorium intybus	**CHICORY**	forb	0	UPL	X					X	X	X
Cirsium arvense	**CANADA THISTLE**	forb	0	FACU	X	X		X		X	X	X
Cirsium vulgare	**BULL THISTLE**	forb	0	FACU-	X	X						X
Conium maculatum	**POISON-HEMLOCK**	forb	0	FACW	X			X				X
Convolvulus arvensis	**FIELD BINDWEED**	forb	0	UPL	X			X	X			X
Coronilla varia	**CROWN-VETCH**	forb	0	UPL	X			X			X	
Dactylis glomerata	**ORCHARD GRASS**	grass	0	FACU				X			X	
Daucus carota	**QUEEN-ANNE'S-LACE**	forb	0	UPL	X	X	X	X	X	X	X	X
Dipsacus fullonum	**WILD TEASEL**	forb	0	FACU	X	X	X	X	X	X	X	X
Dipsacus laciniatus	**CUT-LEAVED TEASEL**	forb	0	UPL	X	X	X	X	X	X	X	X
Echinacea pallida	**Pale Purple Coneflower**	forb	0	ND			X					
Echinochloa crusgalli	**BARNYARD GRASS**	grass	0	FACU	X	X		X		X	X	X
Elaeagnus umbellata	**AUTUMN-OLIVE**	sm tree	0	FACU	X			X	X		X	X
Euphorbia species	**SPURGE SPECIES**	forb	0	ND			X					
Festuca pratensis	**MEADOW FESCUE**	grass	0	FACU-			X				X	X
Glechoma hederacea	**GROUND IVY**	forb	0	FACU	X			X		X		
Hydrocotyle ranunculoides	**BUTTERCUP-PENNYWORT**	forb	0	OBL	X	X					X	
Hypericum perforatum	**COMMON ST. JOHN'S-WORT**	forb	0	UPL								X
Lepidium campestre	**FIELD PEPPER-GRASS**	forb	0	UPL								X
Lespedeza cuneata	**CHINESE BUSH-CLOVER**	forb	0	FACU-			X	X			X	
Lolium multiflorum	**ITALIAN RYEGRASS**	grass	0	ND			X				X	
Lonicera japonica	**JAPANESE HONEYSUCKLE**	vine	0	FAC-		X		X		X	X	X
Lonicera maackii	**AMUR HONEYSUCKLE**	shrub	0	UPL	X	X	X	X		X	X	X
Lotus corniculatus	**BIRD'S-FOOT TREFOIL**	forb	0	FACU-							X	
Lysimachia nummularia	**MONEYWORT**	forb	0	FACW				X	X	X	X	X
Lythrum salicaria	**PURPLE LOOSESTRIFE**	forb	0	FACW+	X	X						
Medicago lupulina	**BLACK MEDICK**	forb	0	UPL	X	X	X			X	X	X
Melilotus alba	**WHITE SWEET-CLOVER**	forb	0	FACU-			X				X	X
Melilotus officinalis	**YELLOW SWEET-CLOVER**	forb	0	FACU-			X				X	X
Microstegium vimineum	**RECLINING EULALIA**	grass	0	FAC				X				
Mollugo verticillata	**CARPET-WEED**	forb	0	FAC				X				
Morus alba	**WHITE MULBERRY**	tree	0	UPL	X					X	X	
Pastinaca sativa	**WILD PARSNIP**	forb	0	UPL	X					X		
Phalaris arundinacea	**REED CANARY GRASS**	grass	0	FACW+		X	X				X	
Phleum pratense	**TIMOTHY**	grass	0	FACU				X		X	X	X
Phragmites australis subsp. australis	**GIANT REED**	grass	0	FACW	X			X			X	
Plantago lanceolata	**ENGLISH PLANTAIN**	forb	0	UPL	X		X			X	X	X
Plantago major	**COMMON PLANTAIN**	forb	0	FACU	X							
Poa species	**BLUEGRASS SPECIES**	grass	0	ND		X	X					
Polygonum persicaria	**LADY'S THUMB**	forb	0	FACW	X	X	X		X	X		X
Pyrus callleryana	**CALLERY PEAR**	sm tree	0	ND	X	X	X	X	X	X	X	X
Rhamnus cathartica	**EUROPEAN BUCKTHORN**	sm tree	0	FACU+								X
Rosa multiflora	**MULTIFLORA ROSE**	shrub	0	FACU			X	X	X	X	X	X
Rumex crispus	**CURLY DOCK**	forb	0	FAC	X	X	X		X	X	X	X
Schoenoplectus mucronatus	**RICEFIELD BULRUSH**	sedge	0	OBL	X	X	X				X	
Secale cereale	**ANNUAL RYE**	grass	0	UPL								X
Senecio glabellus	**BUTTERWEED**	forb	0	OBL							X	X
Setaria faberi	**GIANT FOXTAIL GRASS**	grass	0	UPL	X	X					X	
Setaria glauca	**YELLOW FOXTAIL GRASS**	grass	0	FAC	X							X
Setaria Pumila	**YELLOW FOXTAIL**	grass	0	ND							X	
Setaria species	**FOXTAIL GRASS**	grass	0	ND			X					
Setaria viridis	**GREEN FOXTAIL GRASS**	grass	0	UPL		X						
Silene latifolia	**WHITE CAMPION**	forb	0	UPL			X				X	
Solanum carolinense	**HORSE NETTLE**	forb	0	FACU	X	X	X		X	X	X	X
Sonchus arvensis	**FIELD SOW-THISTLE**	forb	0	UPL		X						

Table C-1. 2021 Wetland Functional Monitoring Area Summary (continued)

					Remediation Wetland Areas			Perimeter Wetland Areas				
Species	**Common Name**	**Type**	**CC**	**Wetland Indicator[a]**	**BAP**	**FPA**	**FSA**	**NPP**	**NWE**	**PRW**	**WM1**	**WM2**
Sorghum halepense	**JOHNSON GRASS**	grass	0	FACU		X	X					X
Taraxacum officinale	**COMMON DANDELION**	forb	0	FACU-						X	X	X
Torilis arvensis	**FIELD HEDGE-PARSLEY**	forb	0	UPL	X							
Trifolium hybridum	**ALSIKE CLOVER**	forb	0	FACU-	X		X	X	X	X	X	X
Trifolium pratense	**RED CLOVER**	forb	0	FACU-					X	X		
Trifolium repens	**WHITE CLOVER**	forb	0	FACU-						X	X	X
Typha angustifolia	**NARROW-LEAVED CAT-TAIL**	forb	0	OBL							X	
Typha x glauca	**HYBRID CAT-TAIL**	forb	0	OBL	X	X	X		X	X	X	X
Ulmus parviflora	**CHINESE ELM**	tree	0	ND							X	
Urtica dioica var. dioica	**EUROPEAN STINGING NETTLE**	forb	0	FACU							X	
Valeriana species	**VALERIAN SPECIES**	forb	0	ND								X
Verbascum blattaria	**MOTH MULLEIN**	forb	0	UPL	X							X
Verbascum thapsus	**COMMON MULLEIN**	forb	0	UPL			X					
Xanthium strumarium	**COMMON COCKLEBUR**	forb	0	FAC	X	X	X	X		X	X	X

Highlighted species are non-native, X indicates the species is present in the wetland.

[a]OBL = obligate, FAC = facultative, UPL = upland, FACU = facultative-upland, FACW = facultative-wet, ND = not determined

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Table C-2. Comparison of Select Wetland Ecological Monitoring Metrics

Time Period	Mean Coefficient of Conservatism		Floristic Quality Assessment Index		Native Species	
	Remediation Wetland Areas	Perimeter Wetland Areas	Remediation Wetland Areas	Perimeter Wetland Areas	Remediation Wetland Areas	Perimeter Wetland Areas
2009	2.2	2.2	25.7	28.3	79%	76%
2012	2.1	2.2	23.5	27.5	74%	75%
2015 to 2017[a]	2.2	2.2	26.1	30.4	76%	75%
2018 to 2020[a]	2.4	2.3	29.8	29.3	77%	72%
2021[b]	2.2	2.7	31.8	46.0	71%	76%

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

Table C-3. 2021 Amphibian Monitoring Summary, Species, and Number of Individuals

Basin	Northern Cricket Frog (*Acris crepitans*)	Jefferson Salamander (*Ambystoma jeffersonianum*)	Streamside Salamander (*Ambystoma barbouri*)	Spotted Salamander (*Ambystoma maculatum*)	Marbled Salamander (*Ambystoma opacum*)	Salamander Species (*Ambystoma species*)	American Toad (*Anaxyrus americanus*)	Fowlers Toad (*Anaxyrus fowleri*)	Toad Species (*Anaxyrus species*)	Gray Tree Frog (*Hyla versicolor*)	American Bull Frog (*Lithobates catesbeiana*)	Green Frog (*Lithobates clamitans*)	Northern Leopard Frog (*Lithobates pipiens*)	Frog Species (*Lithobates species*)	Spring Peeper (*Pseudacris crucifer*)	Tadpoll species (*Anura species*)
Borrow Area																
BAPW2	2															
BAPW4														5		
BAPW7												1	2	3	25	
Former Production Area																
FPAW2	3						8					1		3		
FPAW7	5										1		2	13	2	
FPAW9	5												4	1	1	
PREW6	9						8		20		3	5	6	4	7	
North Pine Plantation Enhancement																
NPPW4			6	43		68						1				
NPPW5	7								2						3	
Northern Woodlot Enhancement Natural Resource Trustee Project																
NWEW1	19								200		1	13	10	12	58	
Paddys Run West Natural Resource Trustee Project																
PRTW1				31		78			150		2		1		61	
PRWW1					6	14			105		2	2	2	12	75	
Wetland Mitigation Phase I																
WM1W1			2										1	12	19	
WM1W4											2		1	10	5	
WM1W7			16			10		1				1		350	11	
Wetland Mitigation Phase II																
WM2W1	4					3						1	5	19	1	2
WM2W2	5										3	5	6	12	3	
WM2W3	5											2	1	7		
Totals	64	0	24	74	6	173	16	1	477	0	14	32	41	463	271	2

Table C-4. Amphibian Index of Biotic Integrity Comparison

Restoration Area	Basin	Amphibian Index of Biotic Integrity Score										
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Borrow Area	BAPW2	0	0	0	3	0	0	0	0	0	0	30
	BAPW4	0	0	0	3	0	0	0	0	0	0	0
	BAWP7	13	0	0	0	0	0	0	0	0	0	0
Former Production Area	FPAW2	13	0	0	0	0	0	0	0	10	3	7
	FPAW7	10	30	30	7	3	0	0	0	0	0	10
	FPAW9	10	24	24	3	3	0	0	0	0	3	24
	PREW6	13	3	0	0	0	3	3	10	7	0	10
North Pine Plantation	NPPW4	23	6	6	6	3	16	24	40	50	47	40
	NPPW5	0	13	13	13	0	0	0	0	3	3	3
Northern Woodlot Enhancement Natural Resource Trustee Project	NWEW1							0	0	3	3	3
Paddys Run West Natural Resource Trustee Project	PRTW1				3	27	20	16	20[a]	3	3	9
	PRWW1						0	6	0	0	3	3
Wetland Mitigation Phase I	WM1W1	3	0	0	3	0	0	6	0	0	0	0
	WM1W4	3	3	3	0	0	0	0	3	0	0	0
	WM1W7	0	3	3	20	9	10	16	20	3	13	0
Wetland Mitigation Phase II	WM2W1	3	20	13	16	3	0	16	13	0	0	10
	WM2W2	6	10	10	10	6	0	7	0	0	0	10
	WM2W3	12	6	6	10	9	13	28	0	0	3	13

Shading indicates monitoring not conducted prior to construction of the basin.
[a] Corrected value.

Table C-5. Wetland Mitigation Hydrologic Monitoring Results

Restoration Project	Piezometer	Parameter	Performance Standard	2013	2014	2015	2016	2017	2018	2019	2020	2021
Paddys Run	PRTW1-PZ1	Water in Root Zone	>53%	21%	18%	30%	ND[a]	24%	38%	ND[a]	38%	ND[a]
		Mean Depth of Water (cm)	<29.4	68.9	68.7	58.5	ND[a]	61.8	47.6	ND[a]	59.5	ND[a]
		Flashiness Index	<2	0.07	0.08	0.06	ND[a]	0.04	0.03	ND[a]	0.02	ND[a]
	PRTW1-PZ2	Water in Root Zone	>53%	40%	37%	48%	25%	50%	12%	37%	ND[a]	28%
		Mean Depth of Water (cm)	<29.4	52.6	55.0	47.5	63.6	45.1	67.7	56.8	ND[a]	56.3
		Flashiness Index	<2	0.06	0.08	0.06	0.05	0.03	0.04	0.04	ND[a]	0.04
	PRTW1-PZ3	Water in Root Zone	>53%	39%	ND[b]	46%	39%	46%	38%	37%	44%	30%
		Mean Depth of Water (cm)	<29.4	55.1	ND[b]	44.1	46.5	47.0	47.0	55.9[c]	50.0[c]	52.7
		Flashiness Index	<2	0.05	ND[b]	0.05	0.06	0.05	0.05	0.02	0.02	0.02

Shading indicates the performance standard has been met.

[a] ND = not determined, partial data collected due to transducer failure.

[b] ND = not determined, no data collected due to transducer failure.

[c] Corrected value.

Table C-6. Central Quadrant Site Inspection Findings, January 2021

Map Number	Inspection Finding	Finding Resolution or Path Forward	Date Resolved
1	Pear trees	To be addressed	3/31/2022
2	Teasel	Herbicide applied	8/17/2021
3	Bird box hanging upside down	Bird box replaced	6/21/2021
4	Metal rod	Metal rod removed	6/21/2021
5	Broken post	Metal post removed	6/21/2021
6	Pear tree	To be addressed	TBD
7	Pear tree	To be addressed	TBD
8	Several pear trees	To be addressed	3/31/2022
9	Several pear trees	To be addressed	3/31/2022
10	Concrete	Free released and disposed	4/13/2021
11	Erosion	To be addressed	TBD
12	Erosion	To be addressed	TBD
13	Asphalt	Free released and disposed[b]	4/13/2021
14	Concrete	Free released and disposed[b]	4/13/2021
15	Metal cages and posts	Metal cages and posts removed	6/22/2021

[a] TBD = to be determined.
[b] Per 10 CFR 835, "Occupational Radiation Protection."

Table C-7. South Quadrant Site Inspection Findings, March 2021

Map Number	Inspection Finding	Finding Resolution or Path Forward	Date Resolved[a]
1	Hole in deer fence	Deer fence repaired	9/1/2021
2	Hole in deer fence	Deer fence repaired	9/1/2021
3	Hole in deer fence	Deer fence repaired	1/27/2022
4	Top panel of deer fence down	Deer fence repaired	1/27/2022
5	Top and bottom of deer fence torn	Deer fence repaired	1/27/2022
6	Path to creek	No action required; vegetation has grown and obscured any trail	12/8/2021
7	Concrete	To be addressed	TBD
8	Phragmites	Herbicide applied	8/5/2021
9	Deer fence separating	Deer fence repaired	9/1/2021
10	Hole in deer fence	Deer fence repaired	1/27/2022
11	Metal wire on ground	Metal wire removed	8/31/2021
12	Top of bird box is coming off	To be addressed	TBD
13	Concrete riprap washed away	To be addressed	TBD
14	Old drum and concrete	Drum free released[b] and disposed	3/9/2021

[a] TBD = to be determined.
[b] Per 10 CFR 835, "Occupational Radiation Protection."

Table C-8. East Quadrant Site Inspection Findings, March 2021

Map Number	Inspection Finding	Finding Resolution or Path Forward	Date Resolved[a]
1	Hole in deer fence	Deer fence repaired	8/26/2021
2	Aerial utility marker	Marker disposed	3/16/2021
3	Pear trees	To be addressed	3/31/2022
4	Hole in deer fence	Deer fence repaired	8/26/2021
5	Hole in deer fence	Deer fence repaired	8/26/2021
6	Hole in deer fence	Deer fence repaired	8/26/2021
7	Hole in deer fence	Deer fence repaired	8/26/2021
8	Tree cage	Tree cage removed	8/31/2021

[a] TBD = to be determined.

Table C-9. West Quadrant Site Inspection Findings, December 2021

Map Number	Inspection Finding	Finding Resolution or Path Forward	Date Resolved[a]
1	Vegetative debris inside culvert	To be addressed	TBD
2	Japanese honeysuckle	To be addressed	TBD
3	Japanese honeysuckle	To be addressed	TBD
4	Asphalt	Surveyed and disposed	12/21/2021
5	Tear in deer fence	To be addressed	TBD
6	Vegetation growing on deer fence	To be addressed	TBD
7	Animal burrows	No action required	12/7/2021
8	Tree on deer fence	To be addressed	TBD
9	Deer fence falling down	To be addressed	TBD
10	Boards nailed to trees; tarps	Board and tarps removed	12/7/2021
11	Tree protection tubes on the ground	Tree protection tubes removed	12/7/2021
12	Deer skull hung on tree branch	Deer skull removed from tree	12/7/2021
13	Deer fencing material laying in the woods	To be addressed	TBD
14	Utility cart left in the woods	Utility cart removed	12/7/2021
15	Trash	Trash removed	12/7/2021
16	Electrical substation transformer leaking oil	Owner of utility notified	12/2/2021
17	Fencing without trees inside	To be addressed	TBD
18	Broken cable and plastic ties	Deer fence repaired	1/20/2022
19	Broken plastic ties and rings missing	Deer fence repaired	1/25/2022
20	Broken top cable	Deer fence repaired	1/25/2022
21	Broken plastic ties	Deer fence repaired	1/25/2022
22	Hole in deer fence	Deer fence repaired	1/25/2022
23	Hole in deer fence; fence falling down	Deer fence repaired	1/20/2022
24	Hole in deer fence	Deer fence repaired	1/20/2022
25	Hole in deer fence	Deer fence repaired	1/19/2022
26	Hole in deer fence	Deer fence repaired	1/19/2022
27	Hole in deer fence	Deer fence repaired	1/19/2022

[a] TBD = to be determined.

Table C-10. Annual Debris Quantities

Year	Free-Release[a,b] Debris Count	Contaminated[a] Debris Count	Percent Contaminated[a]
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%

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

Table C-11. OSDF Inspection Findings Including Post-Prescribed Burn Inspection Findings, March 2021

Map Number	Inspection Finding	Finding Resolution or Path Forward	Date Resolved[a]
1	Cedar tree	Woody vegetation cut	3/16/2021
2	Cedar tree	Woody vegetation cut	3/16/2021
3	Cedar tree	Woody vegetation cut	3/16/2021
4	Hole under fence	Filled hole with rock	3/17/2021
5	Hole under fence	Rocks placed in opening	3/2/2021
6	Hole under fence	Filled hole with rock	3/17/2021
7	Hole under fence	Filled hole with rock	3/17/2021

[a] TBD = to be determined.

Table C-12. OSDF Inspection Findings, June 2021

Map Number	Inspection Finding	Finding Resolution or Path Forward	Date Resolved[a]
1	Woody vegetation	Woody vegetation cut; herbicide applied to cut stumps	6/29/2021
2	Pear tree	Woody vegetation cut; herbicide applied to cut stump	6/29/2021
3	Mulberry shrub	Woody vegetation cut; herbicide applied to cut stump	6/29/2021
4	Woody vegetation	Woody vegetation cut; herbicide applied to cut stumps	6/29/2021
5	Pear tree	To be addressed	TBD
6	Grapevine growing on fence	Woody vegetation cut; herbicide applied to cut stumps	6/30/2021
7	Woody vegetation	Woody vegetation cut; herbicide applied to cut stumps	6/30/2021
8	Honeysuckle	Woody vegetation cut; herbicide applied to cut stump	6/29/2021
9	Honeysuckle and teasel	Woody vegetation cut; herbicide applied to cut stumps and herbaceous vegetation	6/29/2021
10	Honeysuckle, blackberry	Woody vegetation cut; herbicide applied to cut stumps	6/29/2021
11	Honeysuckle, poison ivy	Woody vegetation cut; herbicide applied to cut stumps	6/29/2021
12	Hackberry, bull thistle, dogwood, honeysuckle	Woody vegetation cut; herbicide applied to cut stumps	6/29/2021
13	Pear, honeysuckle, musk thistle, box elder	Woody vegetation cut; herbicide applied to cut stumps	6/29/2021
14	Vines, honeysuckle, hackberry, teasel, cherry, ash tree	Woody vegetation cut; herbicide applied to cut stumps	6/29/2021
15	Honeysuckle, teasel	Woody vegetation cut; herbicide applied to cut stumps	6/29/2021
16	Teasel, honeysuckle, poison hemlock, vines, musk thistle	Woody vegetation cut; herbicide applied to cut stumps	6/29/2021
17	Honeysuckle, bull thistle, cottonwood, sycamore, wild parsnip, vines	Woody vegetation cut; herbicide applied to cut stumps	6/30/2021
18	Honeysuckle, teasel, vines	Woody vegetation cut; herbicide applied to cut stumps	6/30/2021
19	Teasel	Woody vegetation cut; herbicide applied to cut stumps	6/30/2021
20	Cherry tree	Woody vegetation cut; herbicide applied to cut stumps	6/30/2021
21	Wild parsnip, honeysuckle	Woody vegetation cut; herbicide applied to cut stumps	7/8/2021
22	Sycamore, honeysuckle, musk thistle, teasel, pear, cottonwood, vines	Woody vegetation cut; herbicide applied to cut stumps	7/8/2021
23	Pear, crown vetch, teasel, honeysuckle, dogwood, vines	Woody vegetation cut; herbicide applied to cut stumps	7/8/2021
24	Honeysuckle	Woody vegetation cut; herbicide applied to cut stumps	7/8/2021
25	Pear, honeysuckle	Woody vegetation cut; herbicide applied to cut stumps	6/29/2021
26	Crown vetch	Herbicide applied	6/29/2021
27	Teasel	Herbicide applied	6/29/2021

Table C-12. OSDF Inspection Findings, June 2021 (continued)

Map Number	Inspection Finding	Finding Resolution or Path Forward	Date Resolved[a]
28	Honeysuckle	Woody vegetation cut; herbicide applied to cut stump	6/29/2021
29	Teasel	Herbicide applied	6/29/2021
30	Willow	Woody vegetation cut and herbicide applied	8/4/2021
31	Teasel, thistle	Herbicide applied	6/29/2021
32	Wild parsnip	Herbicide applied	6/29/2021

[a] TBD = to be determined.

Table C-13. OSDF Inspection Findings, September 2021

Map Number	Inspection Finding	Finding Resolution or Path Forward	Date Resolved[a]
1	Sycamore, cottonwood	Vegetation cut and herbicide applied	11/22/2021
2	Honeysuckle	Vegetation cut and herbicide applied	11/22/2021
3	Ash tree	Vegetation cut and herbicide applied	11/22/2021
4	Honeysuckle, ash, mulberry	Vegetation cut and herbicide applied	11/22/2021
5	Pear tree	Vegetation cut and herbicide applied	11/22/2021
6	Pear, dogwood	Vegetation cut and herbicide applied	11/22/2021
7	Cedar	Vegetation cut and herbicide applied	11/22/2021
8	Sycamore, cottonwood	Vegetation cut and herbicide applied	11/22/2021
9	Honeysuckle	Vegetation cut and herbicide applied	11/22/2021
10	Honeysuckle	Vegetation cut and herbicide applied	11/22/2021
11	Sycamore	Vegetation cut and herbicide applied	11/22/2021
12	Hackberry	Vegetation cut and herbicide applied	11/23/2021
13	Honeysuckle, pear, cedar	Vegetation cut and herbicide applied	11/23/2021
14	Pear	Vegetation cut and herbicide applied	11/22/2021
15	Cedar, dogwood	Vegetation cut and herbicide applied	11/22/2021
16	Dogwood	Vegetation cut and herbicide applied	11/23/2021
17	Cherry	TBD	TBD
18	Dogwood, honeysuckle	Vegetation cut and herbicide applied	11/23/2021
19	Willow, cottonwood, cedar, honeysuckle	Vegetation cut and herbicide applied	11/23/2021
20	Ash tree	TBD	TBD
21	Cedar	Woody vegetation cut	11/23/2021
22	Muskrat tunnel at fence	Tunnel filled with soil	12/8/2021
23	Sycamore, cottonwood, thistle	Vegetation cut and herbicide applied	11/23/2021
24	Woody vegetation, teasel	TBD	TBD
25	Cottonwood, teasel	Vegetation cut and herbicide applied	11/22/2021
26	Cottonwood	Vegetation cut and herbicide applied	11/22/2021
27	Cottonwood	Vegetation cut and herbicide applied	11/22/2021
28	Honeysuckle	Vegetation cut and herbicide applied	11/22/2021
29	Cottonwood, honeysuckle	Vegetation cut and herbicide applied	11/23/2021
30	Pear tree	Vegetation cut and herbicide applied	11/22/2021
31	Woody vegetation	Vegetation cut and herbicide applied	11/22/2021
32	Small tree, reddish leaves	Vegetation cut and herbicide applied	11/22/2021
33	Honeysuckle	Vegetation cut and herbicide applied	11/22/2021
34	Poison ivy	Herbicide applied	11/22/2021
35	Thistle	TBD	TBD
36	Erosion around concrete drainage inlet	Gravel added to reinforce road edge	12/8/2021

[a] TBD = to be determined.

Table C-14. OSDF Inspection Findings, November 2021

Map Number	Inspection Finding	Finding Resolution or Path Forward	Date Resolved[a]
1	Honeysuckle	Vegetation cut and herbicide applied	1/20/2022
2	Honeysuckle	TBD	TBD
3	Honeysuckle	Vegetation cut and herbicide applied	1/24/2022
4	Pear tree	Vegetation cut and herbicide applied	1/20/2022
5	Pear tree	Vegetation cut and herbicide applied	1/20/2022
6	Pear tree	Vegetation cut and herbicide applied	1/20/2022
7	Pear trees	Vegetation cut and herbicide applied	1/20/2022
8	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
9	Pear trees	Vegetation cut and herbicide applied	1/31/2022
10	Pear tree	Vegetation cut and herbicide applied	1/27/2022
11	Pear trees	Vegetation cut and herbicide applied	1/27/2022
12	Pear tree	Vegetation cut and herbicide applied	1/27/2022
13	Pear tree	Vegetation cut and herbicide applied	1/24/2022
14	Pear tree	Vegetation cut and herbicide applied	1/24/2022
15	Woody vegetation	Vegetation cut and herbicide applied	1/20/2022
16	Pear tree	Vegetation cut and herbicide applied	1/20/2022
17	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
18	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
19	Woody vegetation	Vegetation cut and herbicide applied	1/27/2022
20	Pear trees	Vegetation cut and herbicide applied	1/24/2022
21	Woody vegetation	Vegetation cut and herbicide applied	1/24/2022
22	Woody vegetation	Vegetation cut and herbicide applied	1/24/2022
23	Woody vegetation	Vegetation cut and herbicide applied	1/20/2022
24	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
25	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
26	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
27	Woody vegetation	Woody vegetation cut and herbicide applied	1/27/2022
28	Woody vegetation	Woody vegetation cut and herbicide applied	1/27/2022
29	Pear tree	TBD	TBD
30	Pear tree	TBD	TBD
31	Pear tree	Vvegetation cut and herbicide applied	1/20/2022
32	Pear trees	Vegetation cut and herbicide applied	1/24/2022
33	Pear tree resprout	Vegetation cut and herbicide applied	1/20/2022
34	Pear tree	Vegetation cut and herbicide applied	1/20/2022
35	Pear tree	Vegetation cut and herbicide applied	1/31/2022
36	Pear trees	Vegetation cut and herbicide applied	1/31/2022
37	Pear trees	Vegetation cut and herbicide applied	1/27/2022
38	Pear trees	Vegetation cut and herbicide applied	1/27/2022
39	Pear tree	Vegetation cut and herbicide applied	1/20/2022
40	Pear tree	Vegetation cut and herbicide applied	1/24/2022
41	Pear tree	Vegetation cut and herbicide applied	1/24/2022

*Table C-14. OSDF Inspection Findings, November 2021 (continued_*

Map Number	Inspection Finding	Finding Resolution or Path Forward	Date Resolved[a]
42	Pear tree	Vegetation cut and herbicide applied	1/20/2022
43	Pear trees	Vegetation cut and herbicide applied	1/31/2022
44	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
45	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
46	Pear tree	Vegetation cut and herbicide applied	1/31/2022
47	Woody vegetation	Vegetation cut and herbicide applied	1/27/2022
48	Woody vegetation	Vegetation cut and herbicide applied	1/20/2022
49	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
50	Woody vegetation	Vegetation cut and herbicide applied	1/27/200
51	Woody vegetation	Vegetation cut and herbicide applied	1/27/2022
52	Woody vegetation	Vegetation cut and herbicide applied	1/27/2022
53	Dogwood tree	Vegetation cut and herbicide applied	1/24/2022
54	Pear tree	Vegetation cut and herbicide applied	1/31/2022
55	Pear trees	Vegetation cut and herbicide applied	1/31/2022
56	Woody vegetation	Vegetation cut and herbicide applied	1/20/2022
57	Animal burrow	Animal burrow filled in	12/9/2022
58	No description provided	Unable to locate	1/31/2022
59	Trash	Trash picked up	1/31/2022
60	Woody vegetation	Vegetation cut and herbicide applied	1/24/2022
61	Woody vegetation	Vegetation cut and herbicide applied	1/24/2022
62	Woody vegetation	Vegetation cut and herbicide applied	1/20/2022
63	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
64	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
65	Woody vegetation	Vegetation cut and herbicide applied	1/31/2022
66	Woody vegetation	Vegetation cut and herbicide applied	1/27/2022
67	Exposed landscape fabric	Covered exposed fabric with riprap	1/20/2022
68	Bent fence post	Fence post is secure	1/20/2022
69	Bent fence post	Fence post is secure	1/20/2022
70	Sign attachment broken	Sign reattached	12/8/2022

[a] TBD = to be determined.

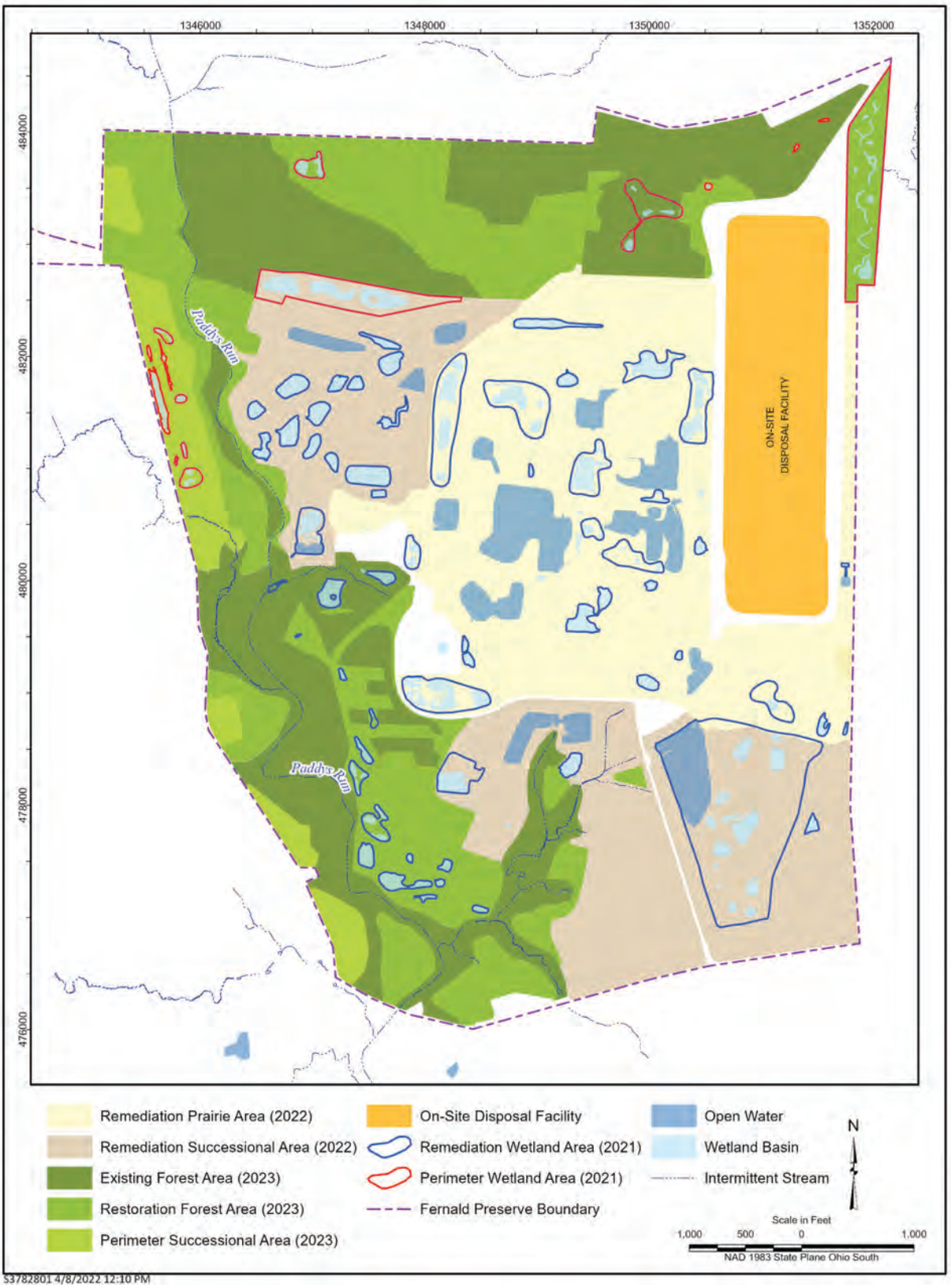


Figure C-1A. Ecological Restoration Management Areas

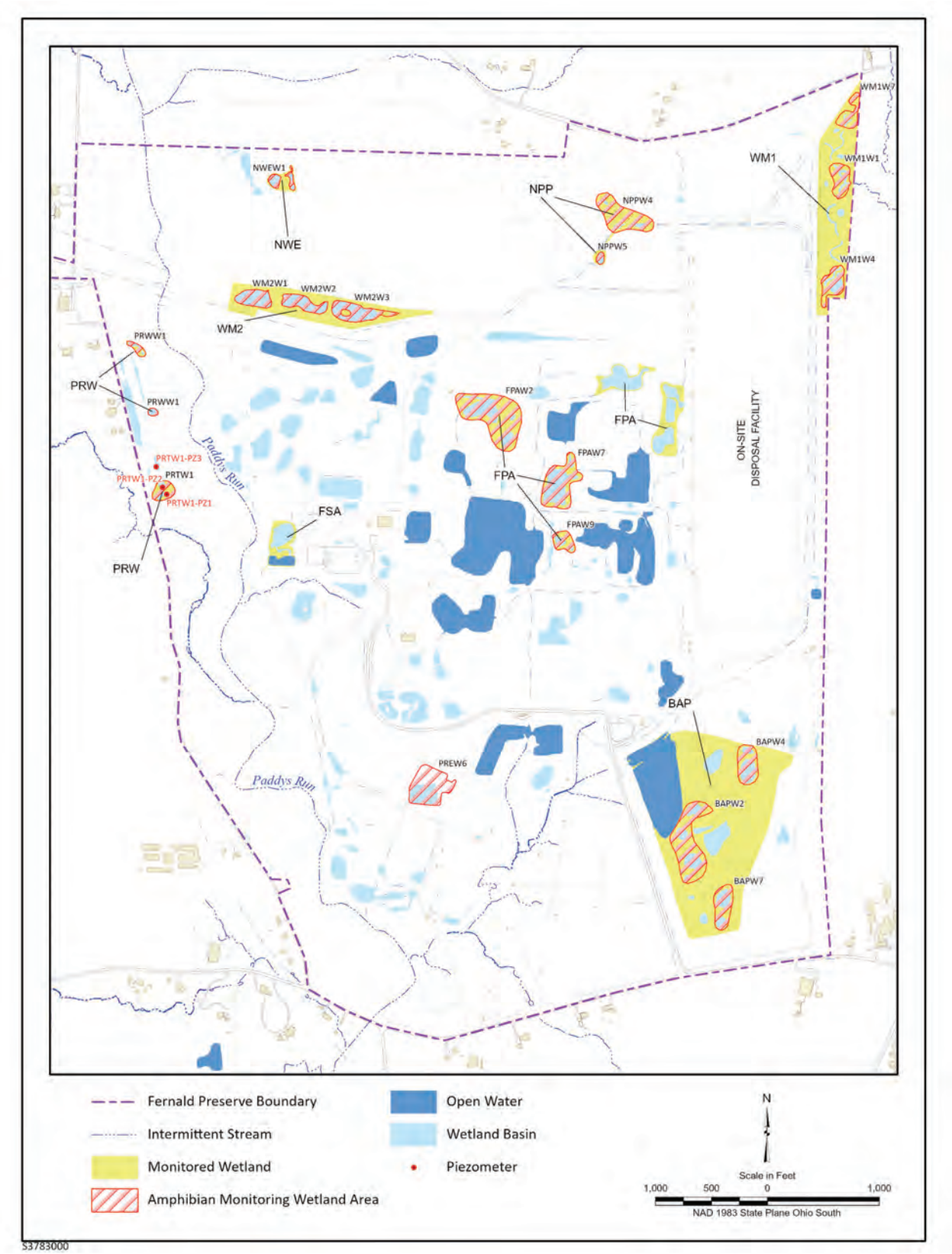


Figure C-1B. 2021 Ecological Monitoring Activities

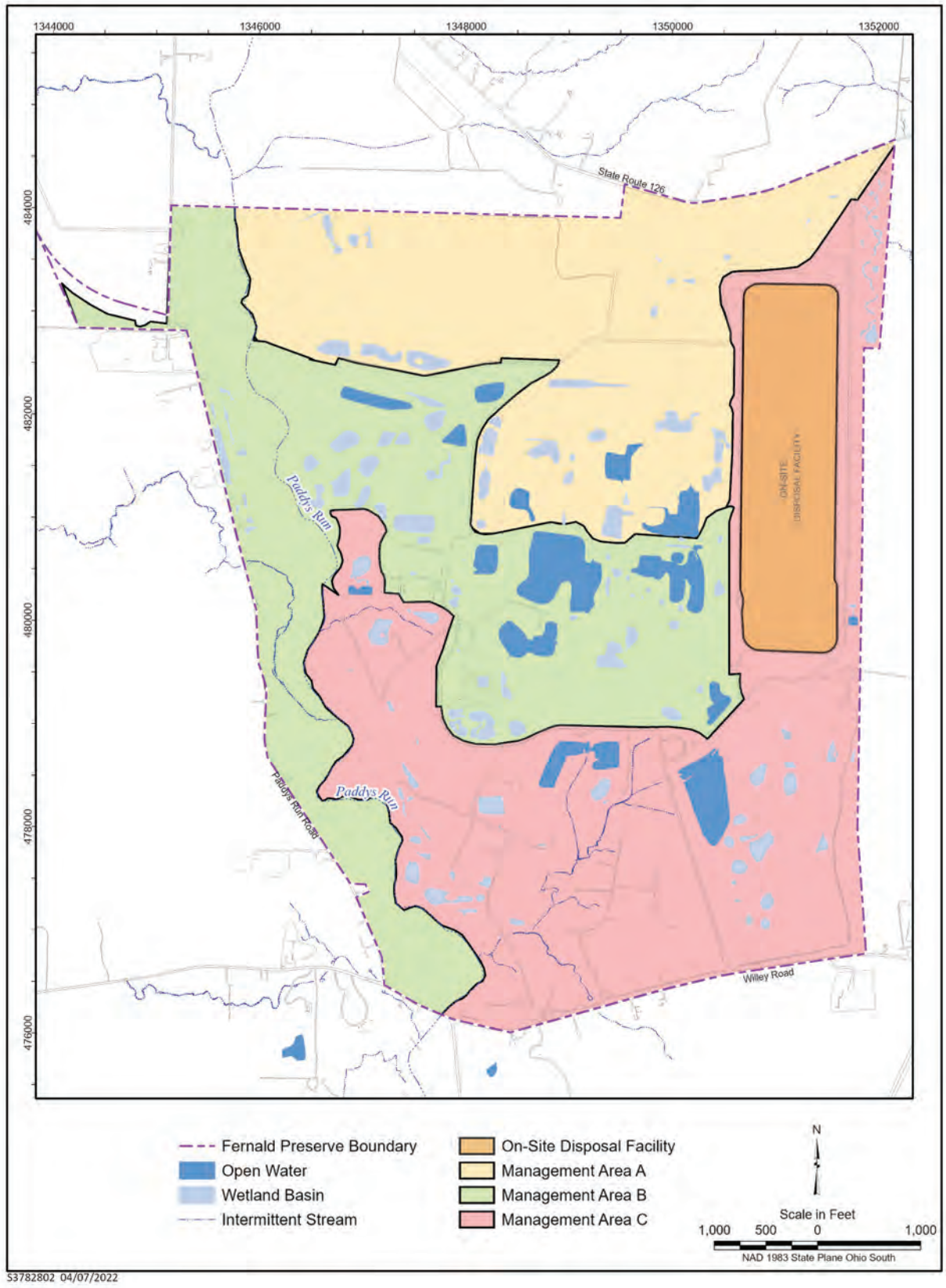


Figure C-1C. Area- Based Approach Ecological Management Areas

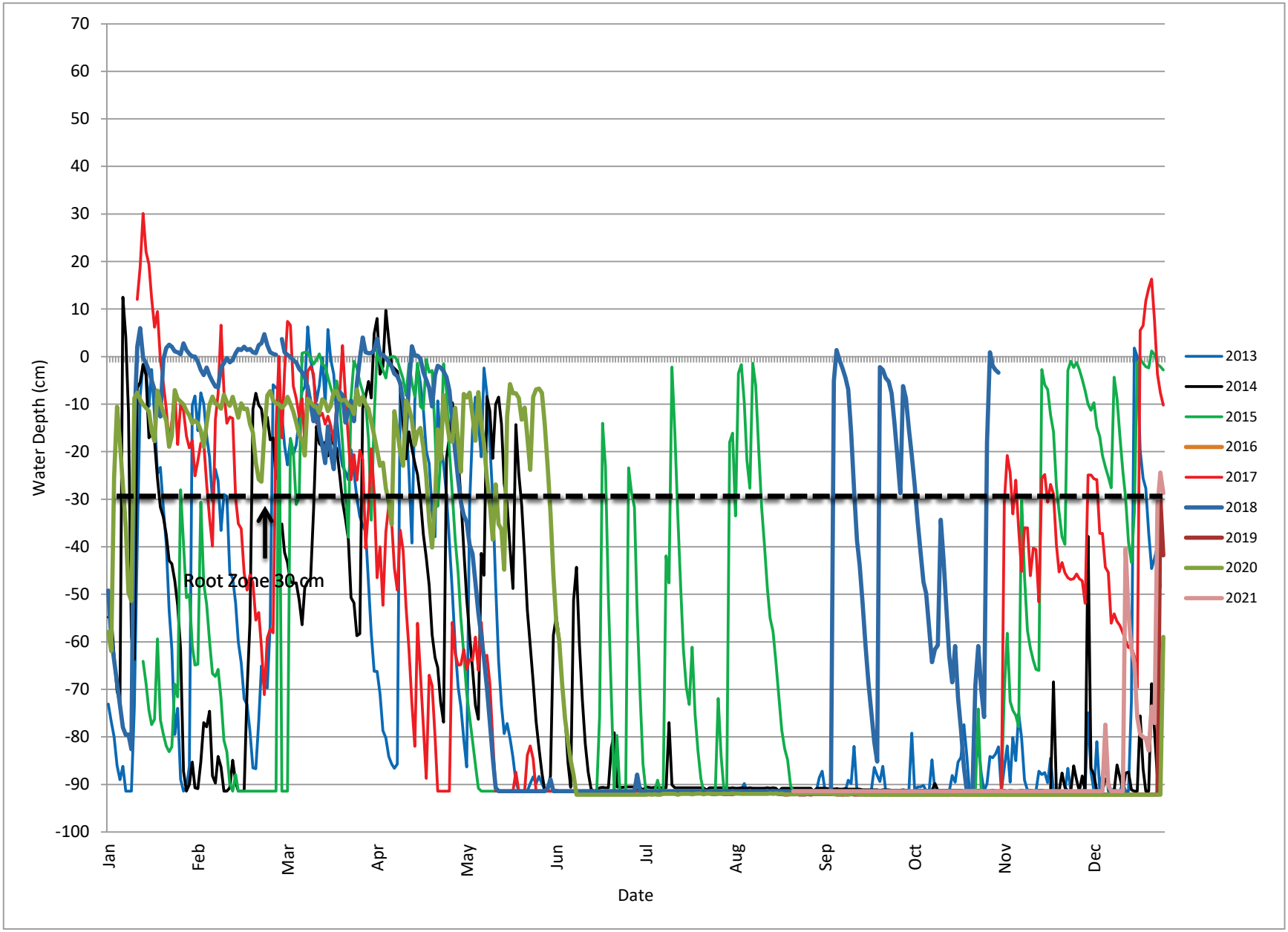


Figure C-2A. Wetland Area PRTW1-PZ1 Hydrograph

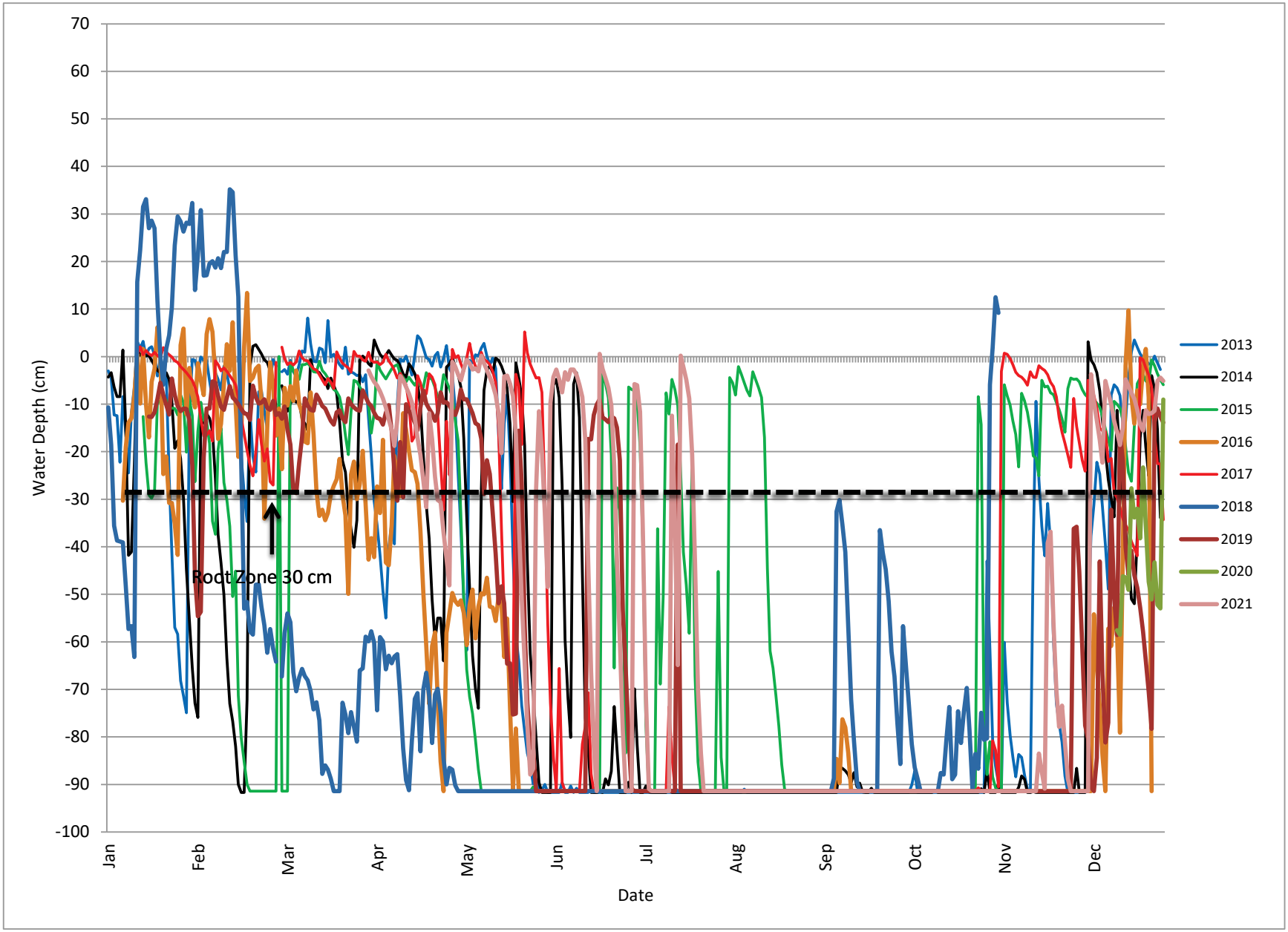


Figure C-2B. Wetland Area PRTW1-PZ2 Hydrograph

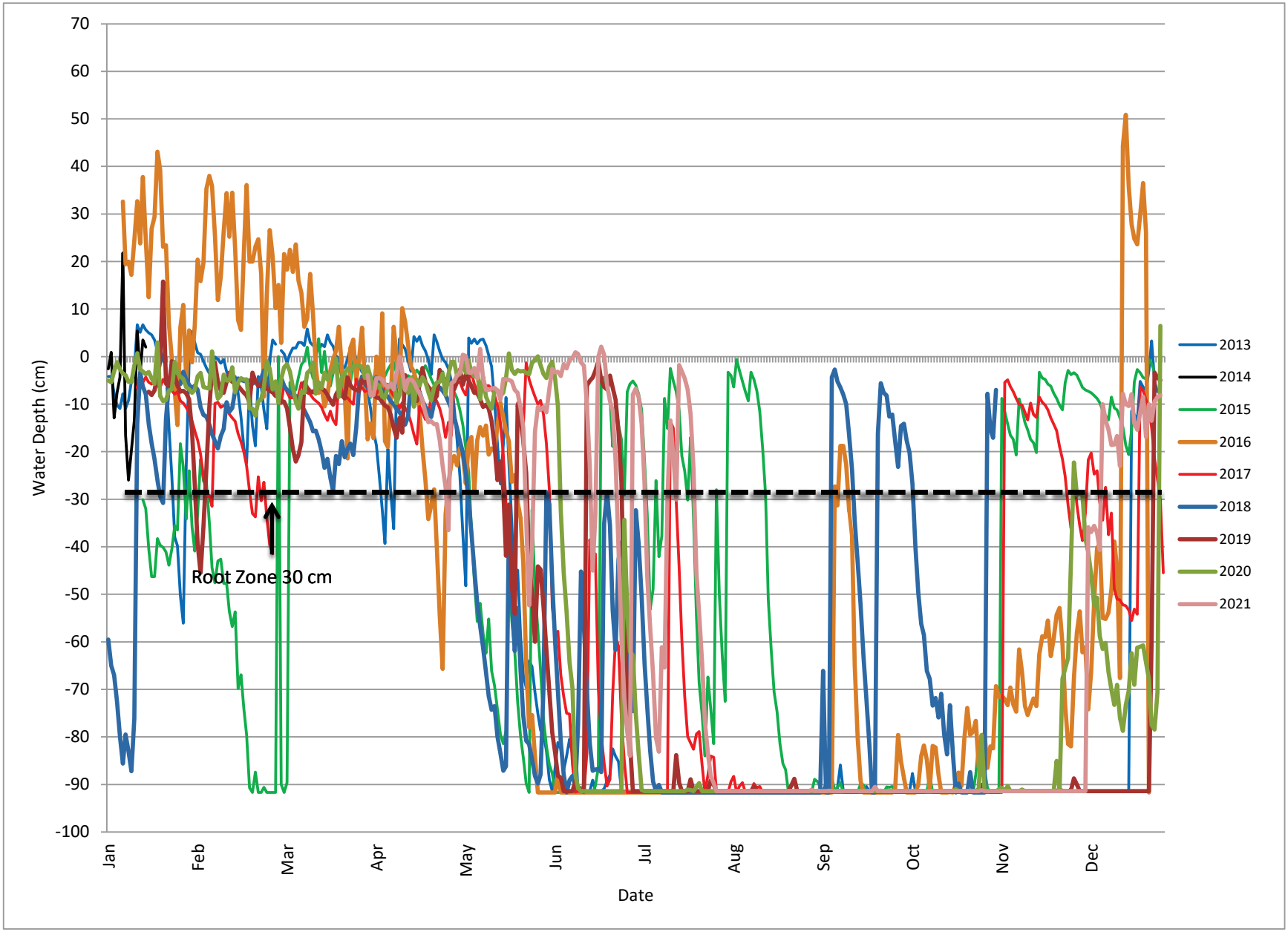


Figure C-2C. Wetland Area PRTW1-PZ3 Hydrograph

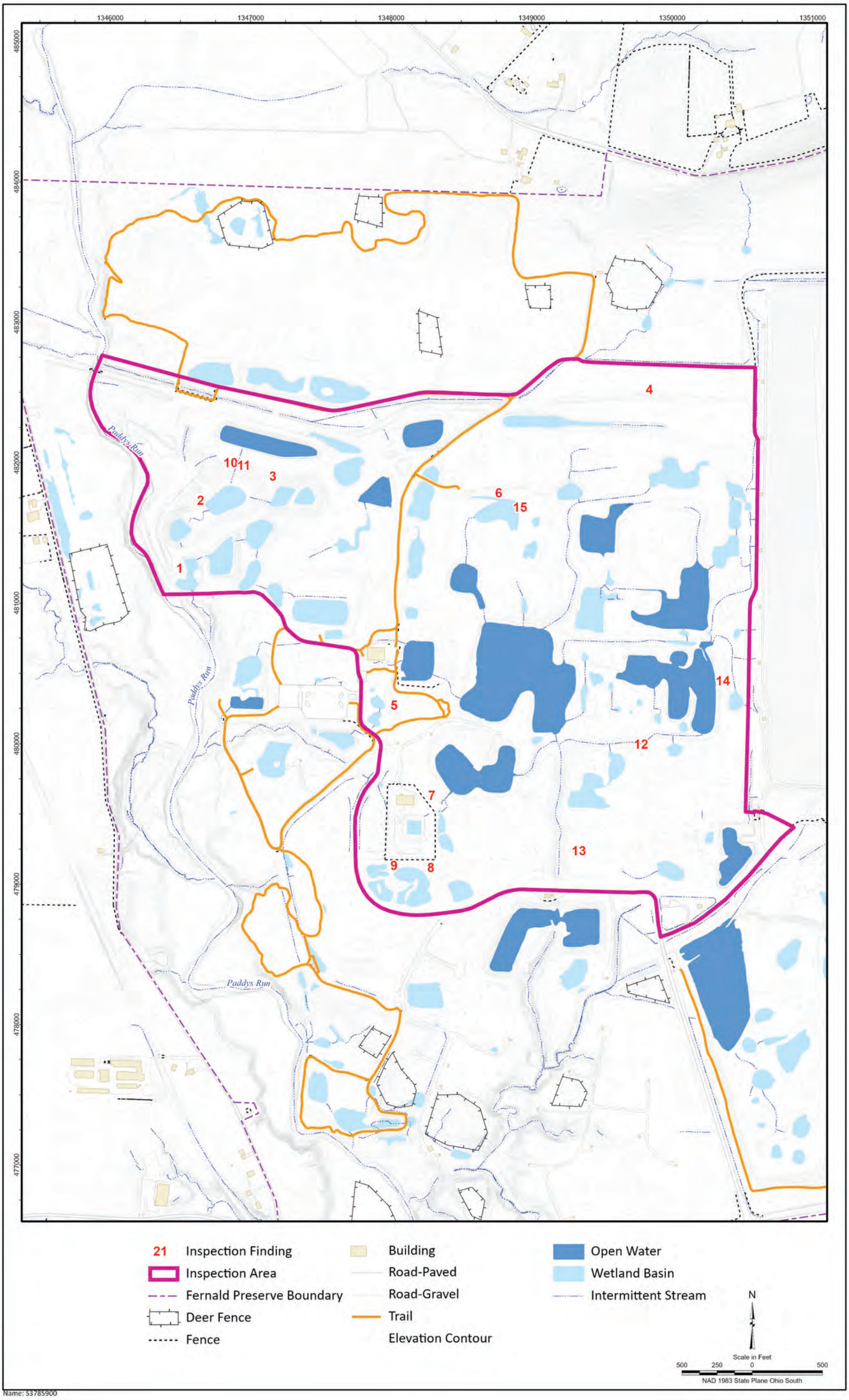


Figure C-3A. Central Quadrant Site Inspection Findings, January 2021

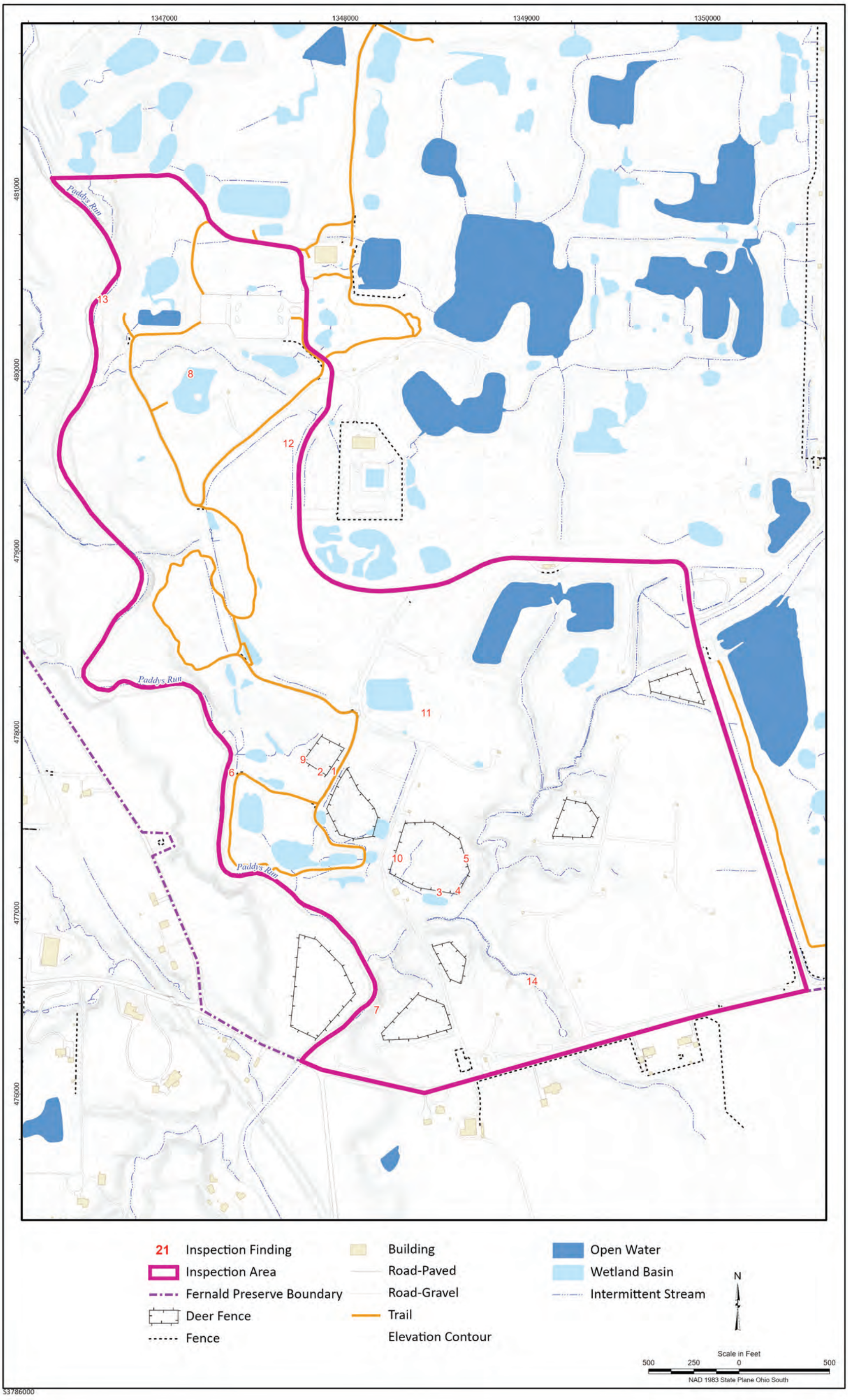


Figure C-3B. South Quadrant Site Inspection Findings, March 2021

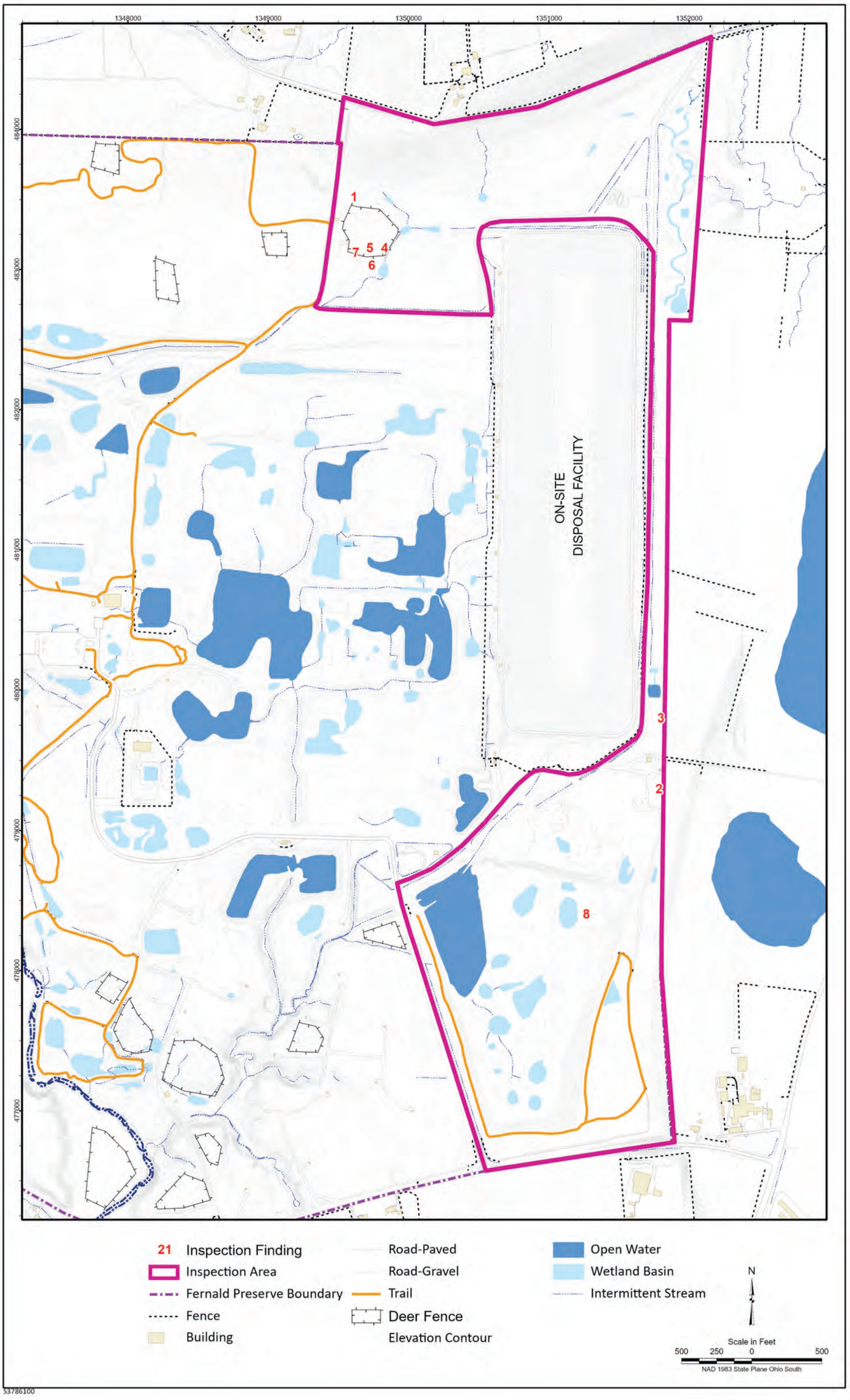


Figure C-3C. East Quadrant Site Inspection Findings, March 2021

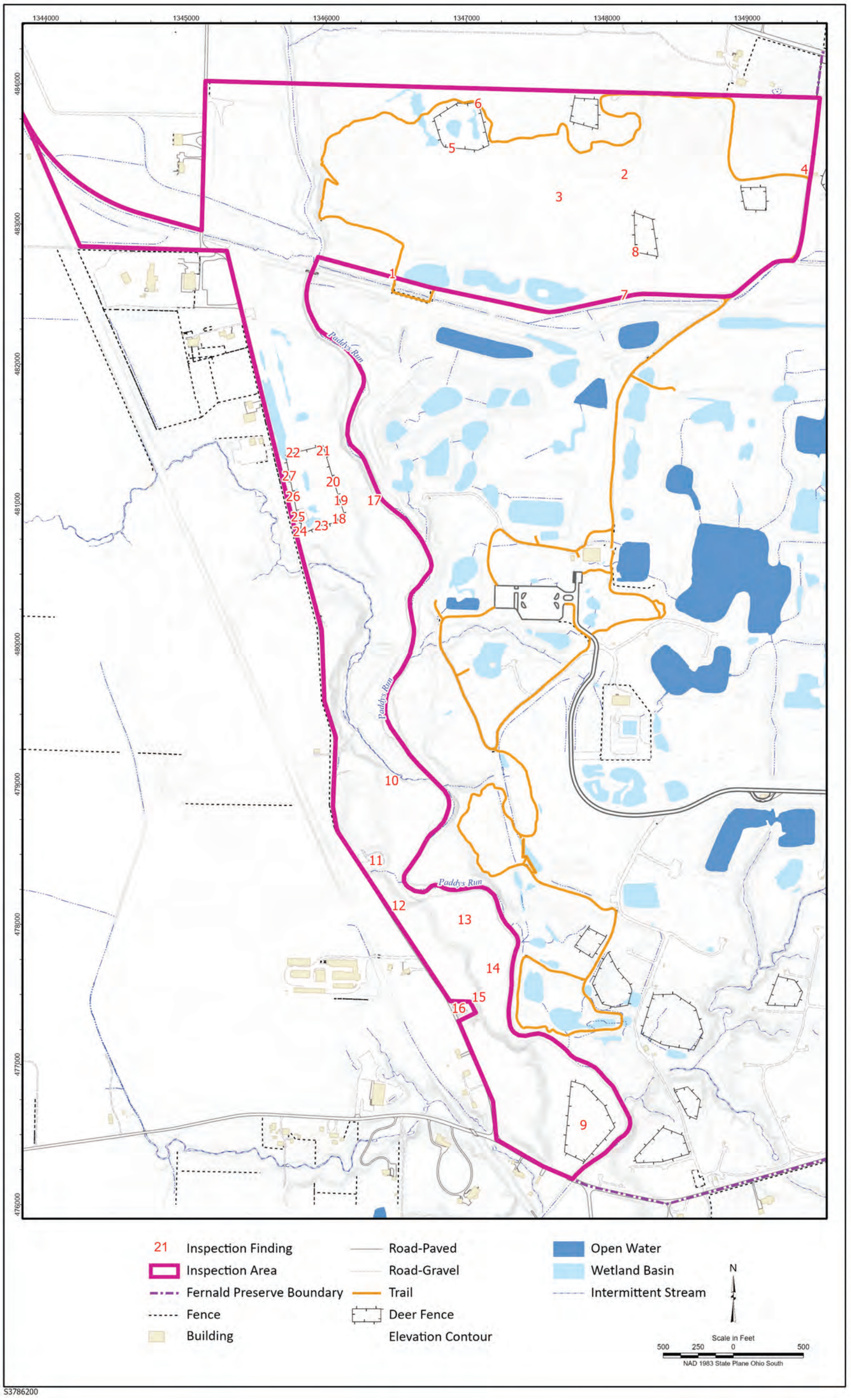


Figure C-3D. West Quadrant Site Inspection Findings, December 2021

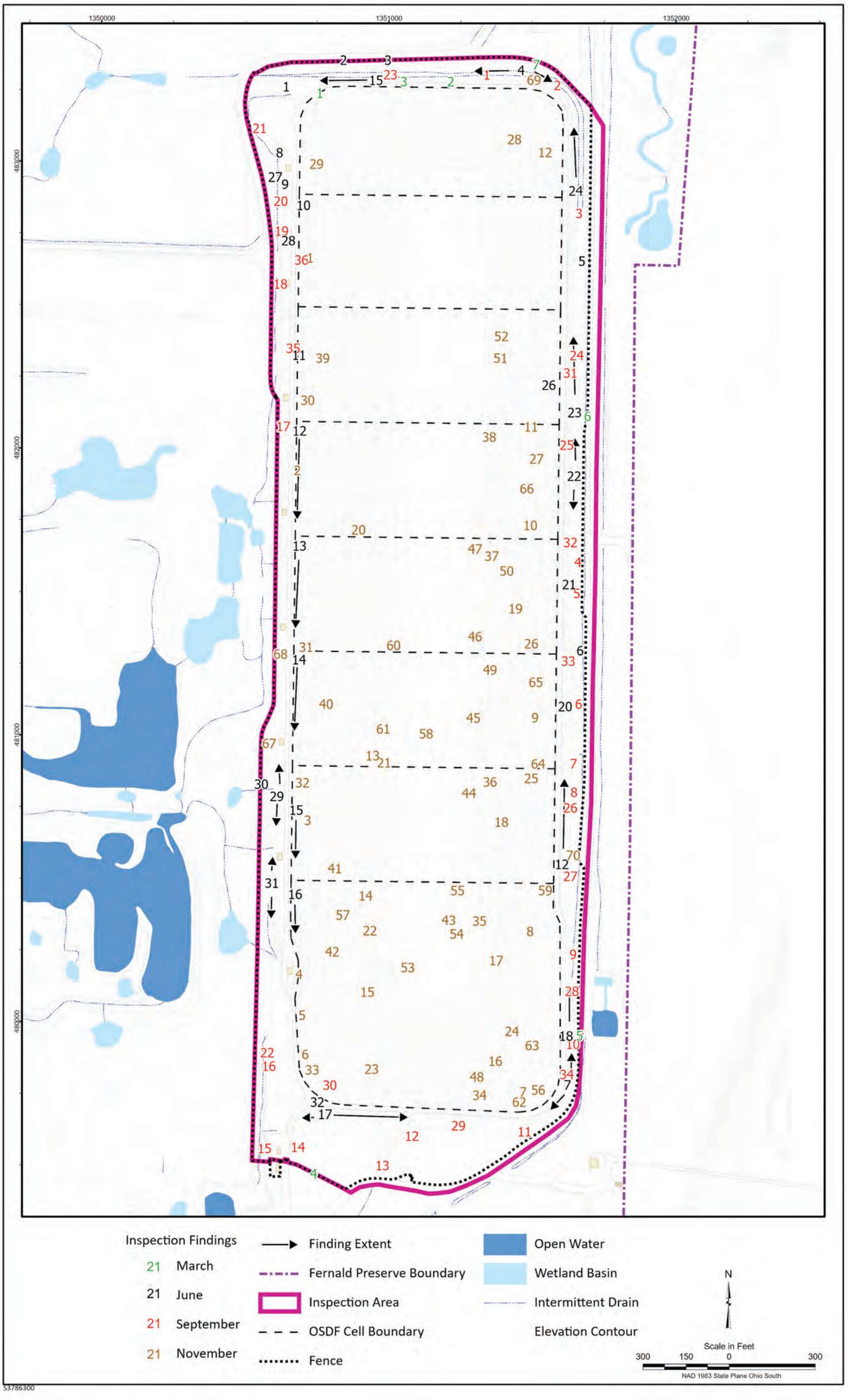


Figure C-3E. 2021 OSDF Inspection Findings

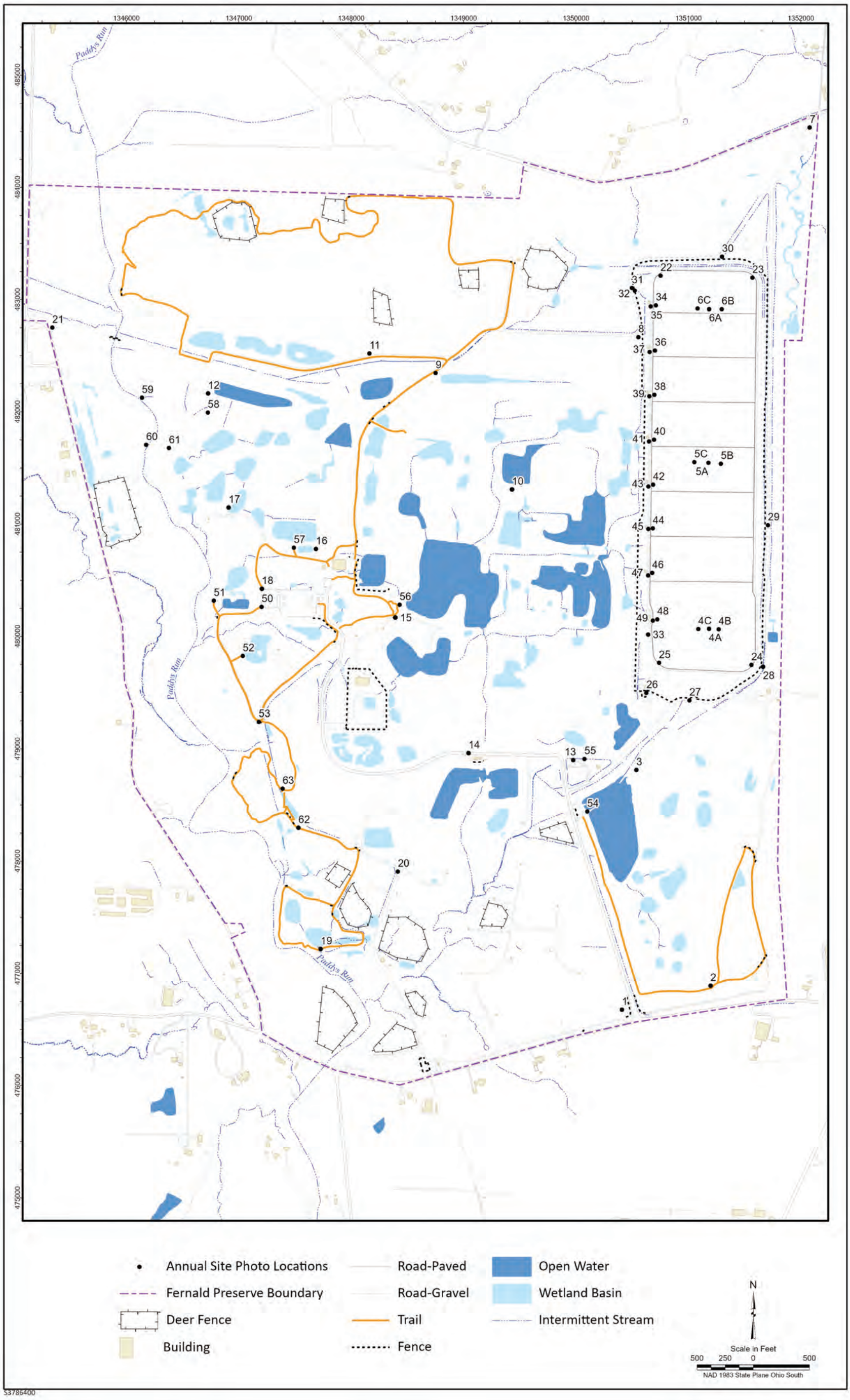


Figure C-4. Location of Site Inspection Photographs

2007

2021

Figure C-5A. Location 1, South Well Field, West Perspective

2007

2021

Figure C-5B. Location 1, South Well Field, North Perspective

2007

2021

Figure C-6A. Location 2, Borrow Area, West Perspective

2007

2021

Figure C-6B. Location 2, Borrow Area, West-Northwest Perspective

2007

2021

Figure C-6C. Location 2, Borrow Area, North Perspective

2007

2021

Figure C-7A. Location 3, Borrow Area, South Perspective

2007

2021

Figure C-7B. Location 3, Borrow Area, West Perspective

2007

2021

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

2007 **2021**

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

2007 **2021**

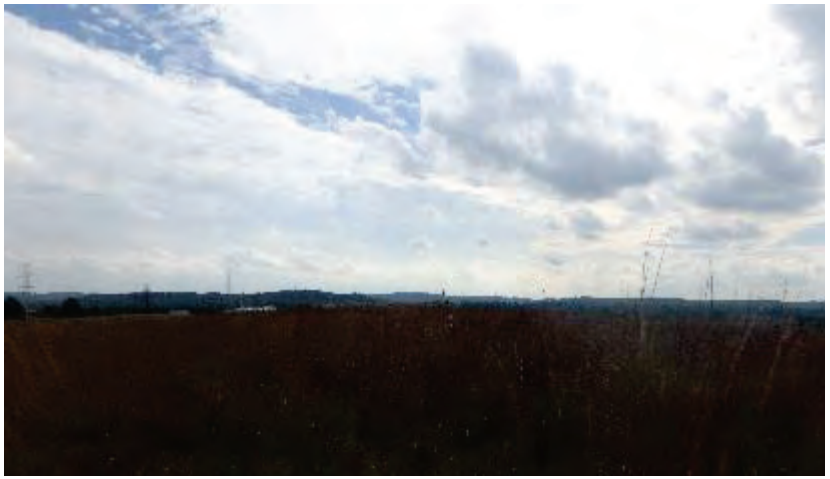
Figure C-9. Location 4B, Top of OSDF Cell 8, East Perspective

2007

2021

Figure C-10. Location 4C, Top of OSDF Cell 8, West Perspective

2007



2021

Figure C-11A. Location 5A, Top of OSDF Cell 5, South Perspective

2007

2021

Figure C-11B. Location 5A, Top of OSDF Cell 5, North Perspective

2007

2021

Figure C-12. Location 5B, Top of OSDF Cell 5, East Perspective

2007

2021

Figure C-13. Location 5C, Top of OSDF Cell 5, West Perspective

2007

2021

Figure C-14A. Location 6A, Top of OSDF Cell 1, South Perspective

2007

2021

Figure C-14B. Location 6A, Top of OSDF Cell 1, North Perspective.

2007

2021

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

2007 **2021**

Figure C-16. Location 6C, Top of OSDF Cell 1, West Perspective

2007 **2021**

Figure C-17A. Location 7, Northeast Property Corner, South Perspective

2007

2021

Figure C-17B. Location 7, Northeast Property Corner, South-Southwest Perspective

2007

2021

Figure C-18. Location 8, Former Production Area, Southwest Perspective

2007

2021

Figure C-19. Location 9, Former Production Area, Southeast Perspective

2007

2021

Figure C-20A. Location 10, Former Production Area, South Perspective

2007

2021

Figure C-20B. Location 10, Former Production Area, Southwest Perspective

2007

2021

Figure C-20C. Location 10, Former Production Area, West Perspective

2007

2021

Figure C-20D. Location 10, Former Production Area, Northwest Perspective

2007

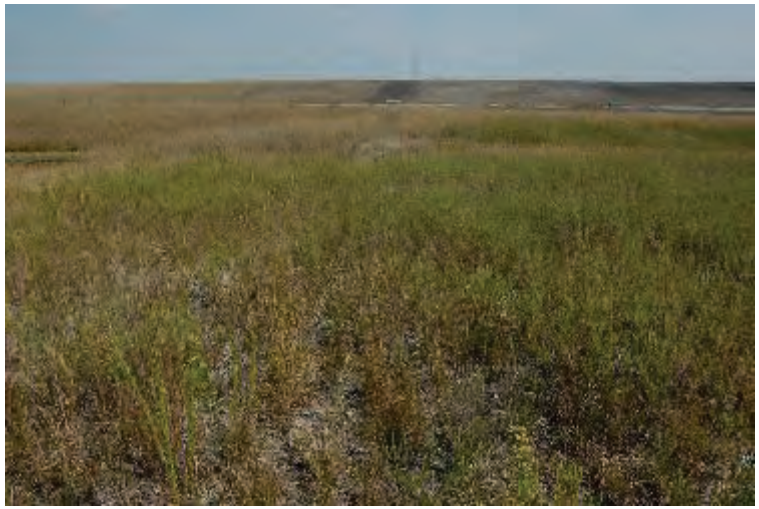
2021

Figure C-20E. Location 10, Former Production Area, North Perspective

2007

2021

Figure C-20F. Location 10, Former Production Area, Northeast Perspective



2007

2021

Figure C-20G. Location 10, Former Production Area, East Perspective

2007 **2021**

Figure C-20H. Location 10, Former Production Area, Southeast Perspective

2007 **2021**

Figure C-21. Location 11, Wetland Mitigation Phase II, West Perspective

2007

2021

Figure C-22A. Location 12, Former Waste Pits Area, East Perspective

2007

2021

Figure C-22B. Location 12, Former Waste Pits Area, Southeast Perspective

2007

2021

Figure C-22C. Location 12, Former Waste Pits Area, South Perspective

2007

2021

Figure C-23A. Location 13, Former Production Area, Northwest Perspective

2007

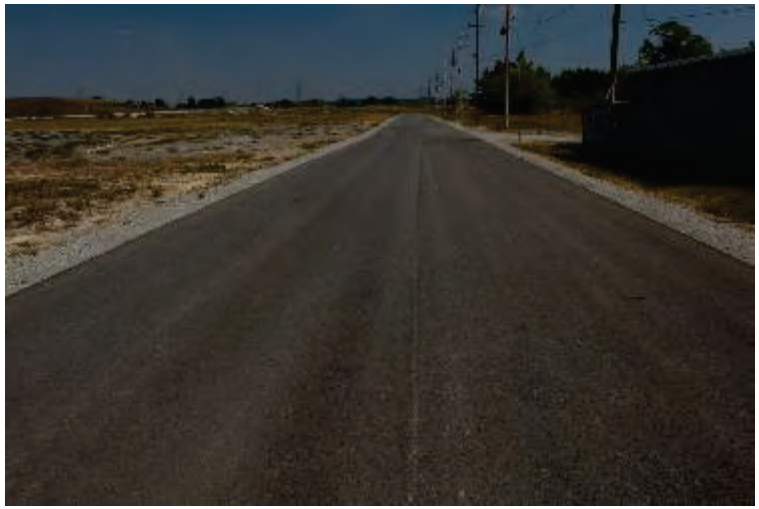
2021

Figure C-23B. Location 13, Former Production Area, Northeast Perspective

2007

2021

Figure C-24A. Location 14, Former Production Area, North Perspective



2007

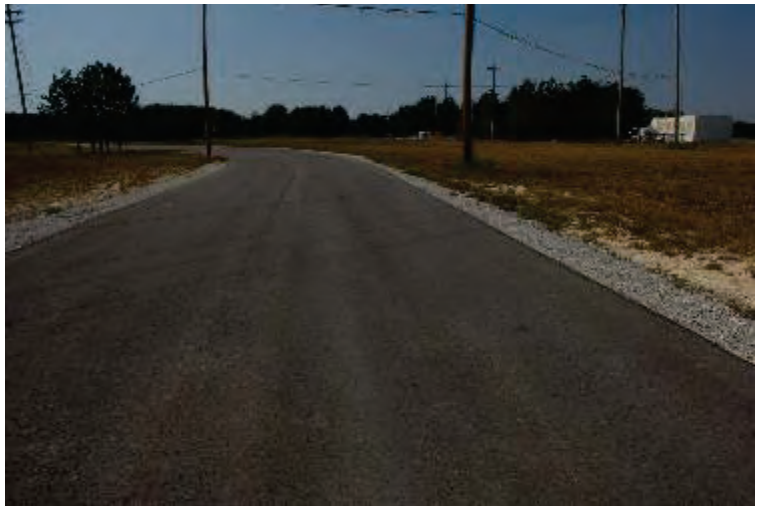
2021

Figure C-24B. Location 14, Former Production Area, East Perspective

2007

2021

Figure C-24C. Location 14, Former Production Area, South Perspective



2007

2021

Figure C-24D. Location 14, Former Production Area, West Perspective

2007

2021

Figure C-25A. Location 15, Former Production Area, North Perspective

2007

2021

Figure C-25B. Location 15, Former Production Area, Northeast Perspective

2007

2021

Figure C-25C. Location 15, Former Production Area, East Perspective

2007

2021

Figure C-25D. Location 15, Former Production Area, Southeast Perspective

2007

2021

Figure C-25E. Location 15, Former Production Area, South Perspective

2007

2021

Figure C-25F. Location 15, Former Production Area, Southwest Perspective

2007

2021

Figure C-25G. Location 15, Former Production Area, West Perspective

2007

2021

Figure C-25H. Location 15, Former Production Area, Northwest Perspective

2007

2021

Figure C-26A. Location 16, Biowetland, West-Northwest Perspective

2007

2021

Figure C-26B. Location 16, Biowetland, West Perspective

2007

2021

Figure C-27A. Location 17, Former Waste Pits Area, West Perspective

2007

2021

Figure C-27B. Location 17, Former Waste Pits Area, Northwest Perspective

2007

2021

Figure C-27C. Location 17, Former Waste Pits Area, North Perspective

2007

2021

Figure C-28A. Location 18, Former Silos Area, West-Southwest Perspective

2007

2021

Figure C-28B. Location 18, Former Silos Area, West-Northwest Perspective

2007

2021

Figure C-28C. Location 18, Former Silos Area, North Perspective

2007

2021

Figure C-28D. Location 18, Former Silos Area, East Perspective

2007

2021

Figure C-29A. Location 19, Southern Waste Units Area, North-Northwest Perspective

2007

2021

Figure C-29B. Location 19, Former Southern Waste Units Area, North-Northeast Perspective

2007

2021

Figure C-29C. Location 19, Former Southern Waste Units Area, East-Southeast Perspective

2007

2021

Figure C-30. Location 20, Former Southern Waste Units Area, West-Southwest Perspective

2007

2021

Figure C-31. Location 21, Western Paddys Run Corridor, South-Southeast Perspective

2007

2021

Figure C-32. Location 22, OSDF Survey Marker No. 01 (Northwest Corner)

2007

2021

Figure C-33. Location 23, OSDF Survey Marker No. 02 (Northeast Corner)

2007

2021

Figure C-34. Location 24, OSDF Survey Marker No. 03 (Southeast Corner)

2007

2021

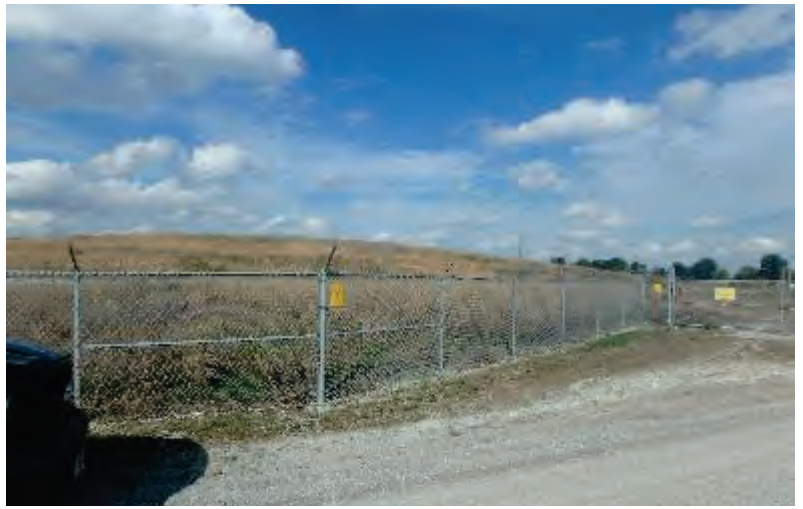
Figure C-35. Location 25, OSDF Survey Marker No. 04 (Southwest Corner)

2007

2021

Figure C-36. Location 26, OSDF Southwest Gate, North-Northeast Perspective

2007



2021

Figure C-37. Location 27, OSDF South Gate, North-Northeast Perspective

2007

2021

Figure C-38A. Location 28, OSDF East Fence, North Perspective

2007

2021

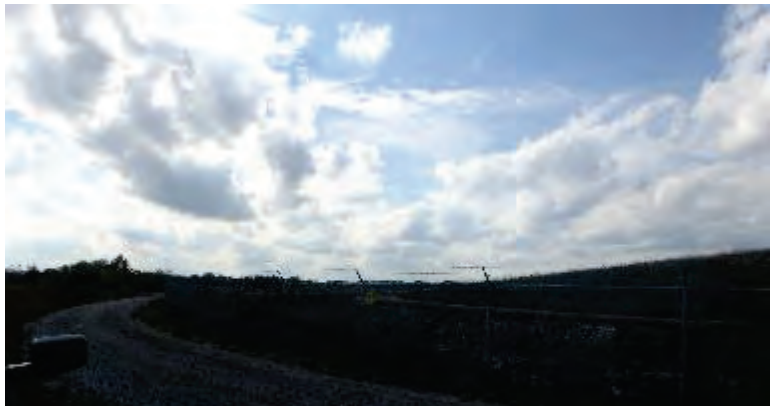
Figure C-38B. Location 28, OSDF East Fence, North Perspective

2007

2021

Figure C-38C. Location 28, OSDF East Fence Signage, West Perspective

2007



2021

Figure C-38D. Location 28, OSDF East Fence Signage, North-Northwest Perspective

2007

2021

Figure C-39. Location 29, OSDF East Fence, North Perspective

2007

2021

Figure C-40A. Location 30, OSDF North Gate, Southwest Perspective

2007

2021

Figure C-40B. Location 30, OSDF North Fence, West Perspective

2007

2021

Figure C-41. Location 31, OSDF Northwest Gate, North-Northeast Perspective

2007

2021

Figure C-42. Location 32, OSDF West Fence, South-Southeast Perspective

2007

2021

Figure C-43A. Location 33, OSDF Valve Houses 7 Through 1, North Perspective

2007

2021

Figure C-43B. Location 33, OSDF Valve Houses 8 Through 1, North Perspective

2007

2021

Figure C-44. Location 34, OSDF Valve House 1, West-Northwest Perspective

2007

2021

Figure C-45. Location 35, OSDF Cell 1 Wells, Northeast Perspective

2007

2021

Figure C-46. Location 36, OSDF Valve House 2, West-Northwest Perspective

2007

2021

Figure C-47. Location 37, OSDF Cell 2 Wells, Northeast Perspective

2007

2021

Figure C-48. Location 38, OSDF Valve House 3, West-Northwest Perspective

2007

2021

Figure C-49. Location 39, OSDF Cell 3 Wells, Northeast Perspective

2007

2021

Figure C-50. Location 40, OSDF Valve House 4, West-Northwest Perspective

2007

2021

Figure C-51. Location 41, OSDF Cell 4 Wells, Northeast Perspective

2007

2021

Figure C-52. Location 42, OSDF Valve House 5, West-Northwest Perspective

2007

2021

Figure C-53. Location 43, OSDF Cell 5 Wells, Northeast Perspective

2007

2021

Figure C-54. Location 44, OSDF Valve House 6, West-Northwest Perspective

2007

2021

Figure C-55. Location 45, OSDF Cell 6 Wells, Northeast Perspective

2007

2021

Figure C-56. Location 46, OSDF Valve House 7, West-Northwest Perspective

2007

2021

Figure C-57. Location 47, OSDF Cell 7 Wells, Northeast Perspective

2007

2021

Figure C-58. Location 48, OSDF Valve House 8, West-Northwest Perspective

2007

2021

Figure C-59. Location 49, OSDF Cell 8 Wells, Northeast Perspective

2008

2021

Figure C-60. Location 50, Shingle Oak Trail, West Perspective at Trailhead

2008

2021

Figure C-61. Location 51, Shingle Oak Trail, North Perspective at Paddys Run Overlook

2008

2021

Figure C-62. Location 52, Shingle Oak Trail, East Perspective at Wildlife Viewing Area

2008

2021

Figure C-63. Location 53, Shingle Oak Trail, North Perspective at Southernmost Trail Section

2007

2021

Figure C-64. Location 54, Lodge Pond Deck, East Perspective

2010

2021

Figure C-65. Location 55, Overlook Deck, North Perspective

2010

2021

Figure C-66. Location 56, Weapons-to-Wetlands Deck, East Perspective

2010

2021

Figure C-67. Location 57, Biowetland Deck, North Perspective

2014

2021

Figure C-68. Location 58, Paddys Run, Streambank Stabilization Area, West Perspective

2014

2021

Figure C-69A. Location 59, Paddys Run, Downstream View

2014

2021

Figure C-69B. Location 59, Paddys Run, Upstream View

2014

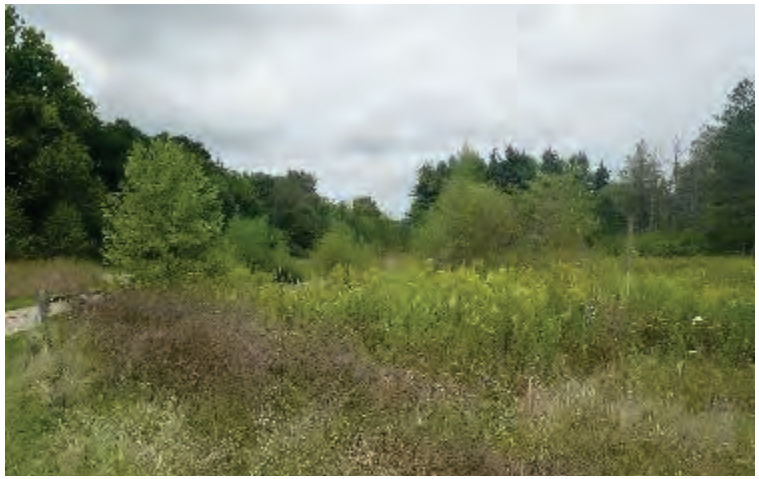
2021

Figure C-70. Location 60, Paddys Run, Streambank Stabilization Area, Upstream View of Crossvane

2014

2021

Figure C-71. Location 61, Paddys Run, Streambank Stabilization Area, Northwest Perspective



2014

2021

Figure C-72A. Location 62, South End of Boardwalk, North Perspective

2014

2021

Figure C-72B. Location 62, South End of Boardwalk, South Perspective

2014

2021

Figure C-73. Location 63, North End of Boardwalk, South Perspective