



August 18, 2026

Christopher Biro
Ohio Environmental Protection Agency
Northeast District Office
2110 East Aurora Road
Twinsburg, Ohio 44087

**Re: Level 3 Ecological Risk Assessment
Material Sciences Corporation
460 W Main Street
Canfield, Ohio 44406
OHD000810283
August Mack Project Number: KA0061.382**

Dear Mr. Biro,

On behalf of Material Sciences Corporation (MSC), August Mack Environmental, Inc. (August Mack) is submitting the enclosed Level III Ecological Risk Assessment prepared by Integral Consulting, Inc. (Integral).

Should you have any questions or need any additional information, please do not hesitate to contact us.

Sincerely,

Brandon C. Lewis, CP, CHMM
Regional Director, Ohio Offices

Charles T. Gomez, LPG
Principal of Closure Services

Level III Ecological Risk Assessment

Material Sciences Corporation Site, Canfield, Ohio

Prepared for
August Mack Environmental
7830 North Central Drive, Suite B
Lewis Center, OH 43035



Integral Consulting Inc.
8742 E. Washington, #115
Chagrin Falls, OH 44022

August 2026

CONTENTS

List of Figures	v
List of Tables	vi
Acronyms and Abbreviations	viii
Executive Summary	x
1 Introduction	1-1
1.1 Facility History	1-2
1.2 Regulatory Status	1-2
1.3 Summary of Previous Ecological Evaluations	1-4
1.4 Ecological Risk Assessment Guidance.....	1-5
1.5 Document Organization.....	1-6
2 Problem Formulation	2-1
2.1 Ecological Habitats and Exposure Areas	2-1
2.1.1 MSC Parcel Assessment Area and Adjacent Wetland (Onsite)	2-2
2.1.2 Sawmill Creek Assessment Area (Downgradient)	2-2
2.2 Environmental Media of Interest	2-4
2.3 Receptors of Concern	2-4
2.3.1 Terrestrial Receptors.....	2-4
2.3.2 Aquatic Receptors	2-5
2.3.3 Threatened and Endangered Species	2-6
2.4 Major Exposure Pathways	2-6
2.5 Selection of Assessment and Measurement Endpoints	2-7
2.6 Conceptual Site Model.....	2-8
2.7 Level III ERA Analysis Plan	2-9
2.8 Analytical Data Used in the Level III ERA.....	2-9
3 Chemicals of Potential Ecological Concern	3-1
3.1 Background Concentrations	3-1
3.1.1 Soil Background Values	3-1
3.1.2 Sediment Reference Values	3-2
3.2 Ecological Screening Values.....	3-2

3.2.1	Screening-Level Benchmarks for Soil	3-2
3.2.2	Screening-Level Benchmarks for Sediment	3-2
3.2.3	Screening-Level Benchmarks for Surface Water	3-3
3.3	Selected COPECs	3-3
3.3.1	Surface Soil COPECs	3-3
3.3.2	Surface Sediment COPECs	3-3
3.3.3	Surface Water COPECs	3-4
3.3.4	PBT COPECs	3-4
4	Ecological Exposure Characterization	4-1
4.1	Benchmark Screen of Abiotic Media	4-1
4.2	Characterizing Potential Wildlife Exposures	4-2
4.2.1	Calculation of Average Daily Dose	4-2
4.2.2	Area Use Factor	4-3
4.2.3	Bioaccumulation Factors	4-3
5	Ecological Effects Characterization	5-1
5.1	Direct Contact Exposure Pathway	5-1
5.2	Wildlife Toxicity Reference Values	5-1
6	Ecological Risk Characterization	6-1
6.1	Terrestrial Plant Community	6-1
6.2	Soil Invertebrate Community	6-2
6.3	Benthic Invertebrate Community	6-2
6.4	Aquatic Life	6-3
6.5	Terrestrial Wildlife Populations	6-4
6.5.1	Wildlife Benchmark Screen	6-5
6.5.2	Terrestrial Food Web Model	6-5
6.6	Semi-aquatic Wildlife Populations	6-6
6.7	Uncertainty Analysis	6-8
6.7.1	Uncertainties Associated with the Ecological Receptors	6-8
6.7.2	Uncertainties in the COPEC Selection Process	6-9
6.7.3	Uncertainties in the Ecological Exposure Assessment	6-9

6.7.4	Uncertainties with the Ecological Toxicity Assessment	6-11
6.7.5	Uncertainties with the Risk Characterization.....	6-11
7	Summary and Conclusions	7-1
8	References.....	8-1
Appendix A.	Ecological Risk Assessment Assumptions Memorandum	
Appendix B.	Information from USFWS and ODNR Regarding Threatened and Endangered Species	
Appendix C.	Analytical Data Used in the Ecological Risk Assessment	

LIST OF FIGURES

- Figure 1-1. Regional Map of Assessment Area
- Figure 1-2. Local Map of Area and Adjacent Properties
- Figure 1-3. MSC Parcel Assessment Area
- Figure 1-4. Sawmill Creek Assessment Area (Downgradient)
- Figure 2-1. Conceptual Site Model
- Figure 2-2. Sampling Locations for Soil
- Figure 2-3a. Sampling Locations for Wetland Sediment
- Figure 2-3b. Sampling Locations for Adjacent Ditch Sediment
- Figure 2-4. Sampling Locations for Wetland and Adjacent Ditch Surface Water
- Figure 2-5. Sampling Locations for Sediment and Surface Water in Sawmill Creek
- Figure 2-6. Sampling Locations for Sediment and Surface Water in Sawmill Creek (Downgradient)

LIST OF TABLES

Table 2-1.	Assessment and Measurement Endpoints
Table 3-1.	Ecological Screening Values for Surface Soil
Table 3-2.	Ecological Screening Values for Surface Sediment and Surface Water
Table 3-3.	COPECs Retained for Further Evaluation
Table 3-4.	COPEC Selection for Surface Soil
Table 3-5.	COPEC Selection for Wetland Sediment
Table 3-6.	COPEC Selection for Adjacent Ditch Pre-Interim Action Sediment
Table 3-7.	COPEC Selection for Downgradient Sediment
Table 3-8.	COPEC Selection for Wetland Surface Water
Table 3-9.	COPEC Selection for Adjacent Ditch Pre-Interim Action Surface Water
Table 3-10.	COPEC Selection for Downgradient Surface Water
Table 4-1.	Pre-interim Action Exposure Point Concentrations and Modeled Bioaccumulation in Diet Components for Terrestrial Receptors
Table 4-2.	Post-interim Action Exposure Point Concentrations and Modeled Bioaccumulation in Diet Components for Terrestrial Receptors
Table 4-3.	Exposure Point Concentrations and Modeled Bioaccumulation in Diet Components for Adjacent Ditch Semi-Aquatic Receptors
Table 4-4.	Exposure Point Concentrations and Modeled Bioaccumulation in Diet Components for Wetland Semi-aquatic Receptors
Table 4-5.	Exposure Point Concentrations and Modeled Bioaccumulation in Diet Components for Downgradient Semi-aquatic Receptors
Table 4-6.	Exposure Factors and Area Use Factors for Terrestrial and Semi-aquatic Receptors
Table 4-7.	Bioaccumulation Equations Used to Estimate COPEC Concentrations in Wildlife Food Items
Table 5-1.	Refinement Screening Values Used for Surface Soil and Sediment
Table 5-2.	LOAEL-based Toxicity Reference Values for Birds and Mammals
Table 6-1.	Hazard Quotients for Direct Contact with Surface Soil
Table 6-2.	Hazard Quotients for Direct Contact with Surface Sediment and Surface Water
Table 6-3.	Terrestrial Wildlife Dietary Exposure Hazard Quotients

Table 6-4. Adjacent Ditch and Wetland Semi-aquatic Wildlife Dietary Exposure Hazard Quotients

Table 6-5. Downgradient Semi-aquatic Wildlife Dietary Exposure Hazard Quotients

ACRONYMS AND ABBREVIATIONS

ADD	average daily dose
AUF	area use factor
August Mack	August Mack Environmental
BW	body weight
COPEC	chemical of potential ecological concern
CSM	conceptual site model
DERR	Division of Environmental Response and Revitalization
dw	dry weight
Eco-SSL	ecological soil screening level
EDR	Environmental Data Resources, Inc.
EOLP	Erie/Ontario Lake Plain
EPC	exposure point concentration
ERA	ecological risk assessment
ESL	ecological screening level
HQ	hazard quotient
Integral	Integral Consulting Inc.
LANL	Los Alamos National Laboratory
LD50	median lethal dose
LOAEL	lowest-observed-adverse-effect level
MAD Scientist	MAD Scientist Associates LLC
MRL	maximum reporting limit
MSC	Material Sciences Corporation
NOAEL	no observed adverse effect level
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
PBT	persistent, bioaccumulative, and toxic
PCB	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation

RSL	regional screening level
RSV	refinement screening value
SRV	sediment reference value
SVOC	semivolatile organic compound
TRV	toxicity reference value
UCL	upper confidence limit
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

EXECUTIVE SUMMARY

Integral Consulting Inc. prepared this Level III ecological risk assessment (ERA) for the Material Sciences Corporation (MSC) site in Canfield, Ohio, on behalf of August Mack Environmental. In July 2024, MSC conducted a cleaning of process lines and equipment during its regularly scheduled maintenance operations, which appeared to dislodge dark brown process water with high pH containing cyanide and metals. Integral prepared this ERA to evaluate potential ecological risk. The assessment builds on prior Level I and Level II ERAs and evaluates whether chemicals of potential ecological concern (COPECs) in surface soil, surface sediment, and surface water could pose risks to ecological receptors on the MSC parcel, in the adjacent wetland, and in downgradient portions of Sawmill Creek.

ASSESSMENT APPROACH

The ERA follows the general framework in Ohio Environmental Protection Agency (Ohio EPA) ERA guidance and uses existing site data, habitat observations, ecological screening values, toxicity reference values, and conservative exposure assumptions to evaluate potential risk. Integral focused the assessment on terrestrial plant and soil invertebrate communities, benthic invertebrates, aquatic life, terrestrial wildlife, and semi-aquatic wildlife. We selected representative wildlife receptors to evaluate relevant feeding guilds and exposure pathways, including direct contact with soil, sediment, and surface water and dietary exposure through modeled food-web pathways.

KEY FINDINGS

Potential ecological risks are not uniformly distributed across the assessment areas. Forest soil does not appear to present an ecological risk. Riparian/ditch-adjacent soil near the Adjacent Ditch remains the primary terrestrial area with elevated HQs. The pre-interim Adjacent Ditch sediment and surface water data show the highest aquatic HQs, but the ditch exposure pathway has been substantially changed by excavation and lining. The adjacent wetland represents a moderate potential risk area, driven mainly by zinc and cyanide-related results. Downgradient Sawmill Creek shows comparatively lower potential risk, and the available biological community data do not indicate broad aquatic community impairment. For cyanide, total cyanide remains useful as a conservative indicator of cyanide occurrence and distribution, but free cyanide is the more relevant toxicity metric because it represents the more bioavailable and toxic fraction. Therefore, conclusions give greater weight to free cyanide, while retaining total cyanide as a conservative supporting line of evidence.

Surface soil results support a clear distinction between the forest area and riparian/ditch-adjacent soil. The forest soil data set includes three sample locations, each evaluated at two depth intervals, and none of these forest soil samples exceeded terrestrial screening levels.

Therefore, the potential for ecological risk in the forest area is negligible. In contrast, riparian/ditch-adjacent soil near the Adjacent Ditch and outfalls had localized exceedances for zinc, chromium, and related metals under pre-interim action conditions. Interim actions included excavation of the upper 0 to 0.5 ft. of material and placement of a liner in the Adjacent Ditch channel, as well as targeted removal near Outfall #2. These actions removed or isolated source-area material and changed aquatic exposure conditions in the ditch; terrestrial HQs did not decrease uniformly. Accordingly, riparian/ditch-adjacent soil remains the primary terrestrial area with elevated HQs.

Table ES-1. Risk Summary for Direct Contact with Adjacent Ditch Riparian Surface Soil

Chemical	Plant HQ (Pre-Interim Action)	Plant HQ (Post-Interim Action)	Soil Invertebrate HQ (Pre-Interim Action)	Soil Invertebrate HQ (Post-Interim Action)
Total Cyanide	--	--	--	--
Cadmium	<1	ND	<1	ND
Chromium	--	--	88	92
Lead	<1	<1	<1	<1
Zinc	12	12	16	16

Notes:

-- = A receptor-specific screening value was not available; an HQ could not be calculated.

ND = Not detected.

Surface sediment results indicate that the pre-interim action Adjacent Ditch condition produced elevated HQs for benthic receptors, with potential risks associated with total cyanide, copper, selenium, zinc, and total PCBs. However, because ditch surface sediments were excavated and the ditch was lined as part of the interim action, the pre-interim action Adjacent Ditch sediment HQs should not be interpreted as representative of current ditch exposure conditions. Surface sediment in the adjacent wetland represents a moderate potential risk area, primarily because zinc and total cyanide HQs exceed screening levels. Cyanide results should be interpreted in the context of speciation: free cyanide is the better predictor of ecological toxicity because it represents the more bioavailable and toxic fraction, whereas total cyanide may include cyanide bound in metal complexes or other forms that are less bioavailable. The free cyanide HQ for the wetland is 1, indicating that toxicity is not predicted based on the bioavailable cyanide fraction. Downgradient Sawmill Creek sediment generally had fewer retained COPECs and lower concentrations than the onsite aquatic areas. Total cyanide and zinc exceeded sediment HQs downgradient, but the free cyanide HQ was at or below 1, indicating that cyanide-related toxicity is less likely than the total cyanide HQ alone would suggest.

Table ES-2. Risk Summary for Direct Contact with Surface Sediment

Chemical	Adjacent Ditch HQ (Pre- Interim Action)	Adjacent Wetland HQ	Adjacent Wetland Refined HQ	Downgradient HQ	Downgradient Refined HQ
Free Cyanide	1	1	1	1	1
Total Cyanide	724	386	386	103	103
Arsenic	1	--	--	1	1
Chromium	1	--	--	--	--
Copper	3	--	--	--	--
Lead	1	--	--	--	--
Selenium	2	1	<1	--	--
Zinc	41	65	17	13	13
Total PCB Aroclors	3	--	--	--	--

Notes:

-- = the chemical was not retained as a COPEC for that exposure area

DL = detection limit

ND = nondetect

NSV = No receptor-specific screening value was available; an HQ could not be calculated.

PCB = polychlorinated biphenyls

Onsite surface water results are presented for both the Adjacent Ditch and adjacent wetland exposure areas. Because the Adjacent Ditch was lined in 2024, aquatic HQs should not be interpreted as representative of current ditch exposure conditions. The pre-interim Adjacent Ditch surface water data show high HQs for multiple metals and cyanide, whereas the current wetland exposure area is best interpreted as a moderate potential risk area for cyanide and zinc. Downgradient Sawmill Creek surface water shows lower cyanide HQs than the onsite aquatic areas. For cyanide, free cyanide is the stronger toxicity line of evidence because it represents the more directly bioavailable and toxic form. Total cyanide provides useful information on cyanide occurrence and distribution but may include cyanide bound in metal complexes or other forms that are less bioavailable and less likely to cause adverse ecological effects. Therefore, where free and total cyanide both appear as COPECs, total cyanide HQs should be interpreted as conservative supporting indicators rather than as the primary basis for judging cyanide toxicity.

Table ES-3. Risk Summary for Direct Contact with Surface Water

Chemical	Adjacent Ditch HQ (Pre- Interim Action)	Adjacent Wetland HQ	Downgradient HQ
Free Cyanide	9	11	2
Total Cyanide	285	675	17
Arsenic	4	--	--
Barium	8	--	--
Cadmium	5	--	--
Chromium	19	--	--

Copper	54	--	--
Lead	95	1	--
Mercury	923	--	--
Selenium	10	--	--
Zinc	408	25	--

Notes:

-- = the chemical was not retained as a COPEC for that exposure area

DL = detection limit

ND = nondetect

NSV = No receptor-specific screening value was available; an HQ could not be calculated.

Wildlife food-web modeling identified potential risks for some lower-trophic-level terrestrial receptors and selected semi-aquatic wildlife receptors. The modeled exposure assumptions did not predict risk to upper-trophic-level terrestrial receptors or mallard. The Adjacent Ditch terrestrial wildlife evaluation distinguishes pre-interim action and post-interim action riparian soil exposure conditions. The post-interim action results indicate that the interim actions removed or isolated some source-area material, but modeled wildlife HQs did not decrease uniformly and remain elevated for some lower-trophic-level wildlife receptors exposed to riparian/ditch-adjacent soil. In the adjacent wetland, potential wildlife risks appear moderate and are driven primarily by selenium and cyanide-related exposure; however, free cyanide is the better predictor of toxicity than total cyanide because total cyanide may include bound, less bioavailable forms. For downgradient Sawmill Creek, the available chemistry, modeled HQs, habitat observations, and biological community results indicate lower to moderate potential risk. HQs are screening and modeling ratios and should be interpreted as indicators of potential risk rather than direct measures of population- or community-level effects.

Table ES-4. Dietary Exposure Hazard Quotients for Adjacent Ditch Riparian Soil Terrestrial Receptors

Chemical	American Robin		American Woodcock		Short-Tailed Shrew	
	Pre-Interim Action	Post-Interim Action	Pre-Interim Action	Post-Interim Action	Pre-Interim Action	Post-Interim Action
Total Cyanide	1,007	1,011	111	111	12	12
Cadmium	4	ND	<1	ND	22	ND
Chromium	4	4	<1	<1	1	1
Lead	48	35	5	4	14	10
Zinc	36	36	3	3	14	14

Notes:

ND = not evaluated because not detected

Table ES-5. Dietary Exposure Hazard Quotients for Onsite Semi-aquatic Receptors

Chemical	Great Blue Heron		Mallard		Mink		Muskrat	
	Adjacent Ditch (Pre-Interim Action)	Wetland	Adjacent Ditch (Pre-Interim Action)	Wetland	Adjacent Ditch (Pre-Interim Action)	Wetland	Adjacent Ditch (Pre-Interim Action)	Wetland
Free Cyanide	--	<1	--	<1	--	<1	--	<1
Total Cyanide	64	34	<1	<1	2	1	<1	<1
Arsenic	<1	--	<1	--	1	--	<1	--
Chromium	<1	--	<1	--	<1	--	<1	--
Copper	<1	--	<1	--	<1	--	1	--
Lead	1	--	<1	--	<1	--	<1	--
Selenium	<1	<1	<1	<1	1	<1	2	2
Zinc	<1	<1	<1	<1	<1	<1	1	1
Total PCB Aroclors	<1	--	<1	--	<1	--	<1	--

Notes:

-- = not applicable; the chemical was not a COPEC in the exposure area

Table ES-6. Dietary Exposure Hazard Quotients for Downgradient Semi-aquatic Receptors

Chemical	Great Blue			
	Heron	Mallard	Mink	Muskrat
Free Cyanide	<1	<1	<1	<1
Total Cyanide	9	<1	<1	<1
Arsenic	<1	<1	1	<1
Zinc	<1	<1	<1	1

SUMMARY AND CONCLUSIONS

The ERA intentionally uses conservative methods and assumptions that are likely to overestimate actual ecological risks. These include upper-bound exposure concentrations, modeled rather than measured tissue concentrations, assumed year-round site use, no adjustment for site-specific bioavailability, and toxicity reference values derived primarily from laboratory studies of individual organisms. Field observations did not identify visibly stressed terrestrial or aquatic vegetation, and several site-specific factors—including localized exposure areas, limited aquatic habitat in portions of Sawmill Creek, sediment embeddedness, and likely reduced metal bioavailability—suggest that population- and community-level effects may be lower than the screening-based estimates indicate.

Overall, the Level III ERA indicates that potential ecological risks are concentrated in limited onsite areas, while downgradient areas show comparatively lower potential for toxicity.

- Forest soil presents negligible ecological risk because concentrations did not exceed terrestrial screening levels.
- Adjacent Ditch riparian/ditch-adjacent soil remains the primary terrestrial exposure area with elevated HQs. The interim actions implemented in the Adjacent Ditch and near Outfall #2 removed or isolated some source-area material, but terrestrial HQs did not decrease uniformly. Post-interim action HQs remain elevated for some lower-trophic-level birds and mammals exposed to riparian/ditch-adjacent soil.
- The adjacent wetland represents a moderate potential risk area. Selenium is the clearest non-cyanide driver, and cyanide results warrant continued consideration. However, free cyanide should be given greater weight than total cyanide because free cyanide is the more bioavailable and toxic fraction, whereas total cyanide may include bound forms that are less likely to cause adverse effects.
- Farther downgradient, Sawmill Creek presents lower to moderate potential risk and is comparatively lower than the onsite aquatic areas. Free cyanide HQs are lower than total cyanide HQs and provide the more relevant toxicity line of evidence. Biological community sampling at the Ohio EPA-recommended downstream location showed excellent habitat, a fair fish community, and a good benthic community, providing an additional field line of evidence that downgradient conditions do not indicate broad aquatic community impairment.

Taken together, this risk assessment supports targeted risk management decisions for the different assessment areas.

1 INTRODUCTION

Integral Consulting Inc. (Integral) prepared this Level III ecological risk assessment (ERA) on behalf of August Mack Environmental (August Mack) for the Material Sciences Corporation (MSC) site in Canfield, Ohio. The site is located in northeastern Ohio in Mahoning County (Figure 1-1) and includes the MSC parcel at 460 West Main Street, the adjacent wetland, and portions of Sawmill Creek. The MSC parcel includes the MSC facility and Adjacent Ditch. The site is bordered to the north and east by the Mill Creek Metroparks Bikeway, to the west by Hometown Produce Company and Mill Creek Metroparks property, and to the south by Route 224/Main Street (Figure 1-2).

In July 2024, MSC conducted a cleaning of process lines and equipment during its regularly scheduled maintenance operations, which appeared to dislodge dark brown process water with high pH containing cyanide and metals. On July 11, 2024, process water was visually observed in the Adjacent Ditch by a pedestrian on the bike path who notified the local Canfield Fire Department. Interim actions included excavation of the upper 0 to 0.5 ft. of material and placement of a liner in the Adjacent Ditch channel, along with targeted removal near Outfall #2. Integral prepared this Level III ERA to address the Ohio Environmental Protection Agency's (Ohio EPA's) request for further evaluation of potential ecological risks associated with the site and downgradient assessment areas.

This Level III ERA builds on prior Level I and Level II ERAs completed for the MSC parcel and adjacent wetland (Integral 2025a,b), and a portion of Sawmill Creek (Integral 2025c,d). This Level III ERA evaluates the following assessment areas (Figures 1-3 and 1-4):

- The terrestrial habitat of the MSC parcel consists of 6.3 acres of undeveloped forested and scrub-shrub habitat.
- The aquatic habitats of the MSC parcel consist of two ditches totaling 0.6 acres of stream habitat and the downgradient portion of the wetland, approximately 1.6 acres.
 - An unnamed ditch runs west of the facility, and the Adjacent Ditch is located east of the facility.
 - The adjacent wetland is located north of the facility. Water from the unnamed ditch and Adjacent Ditch flows north to the wetland and into Sawmill Creek. The water level in the wetland is controlled by a gated culvert located on Mill Creek Metroparks property, which allows water to pass under the bikeway at Sawmill Creek.
- A portion of Sawmill Creek and the associated floodplain from the bikeway to approximately 800m downstream of where Sawmill Creek crosses South Turner Road (Figure 1-4).

- The portion of Sawmill Creek from the bikeway to Cardinal Drive consists of 3.6 acres in total, including the following:
 - Approximately 3.5 acres of terrestrial habitat consists of forested upland habitat, residential riparian zones, and scrub-shrub habitat.
 - Less than 0.1 acres of stream habitat flows from the Mill Creek Metroparks bikeway in a northeasterly direction along the northern border of the Canfield High School parcel.

1.1 FACILITY HISTORY

The MSC Canfield facility building was constructed in 1950 for the Life Time Products Corporation, Coated Steel Division (Ohio EPA and MSC 2024). Manufacturing operations included surface coating, machining, spray painting, and metal fabricating (Ohio EPA and MSC 2024). In the 1950s or 1960s, the facility became known as Canfield Steel, which Pittsburgh Steel Corporation purchased in 1968 to form Pittsburgh-Canfield Corporation. New Star Metals acquired the facility in 2013. The facility remains operational.

The coating and electrogalvanizing processes use multiple solvents and metals, and the facility is classified as a large quantity generator (EPA ID: OHD000810283). During normal operations, waste is disposed of offsite at an appropriate disposal facility. Chemicals listed on Toxic Release Inventory forms include cyanide, xylene, ethylbenzene, methyl isobutyl ketone, *n*-butyl alcohol, 1,2,4-trimethylbenzene, nitric acid, phosphoric acid, sodium hydroxide, toluene, and methyl ethyl ketone.

The facility operates under an approved 80 percent synthetic minor air permit (OH0000000250030020).¹

1.2 REGULATORY STATUS

In 1992, the U.S. Environmental Protection Agency (USEPA) issued a preliminary assessment/visual site inspection assessment report in response to a permit application. Of the 12 solid waste management units identified, USEPA recommended that the former waste chromate solution treatment area undergo closure under the Resource Conservation and Recovery Act (RCRA). Documentation was not available to indicate the solid waste management unit locations, potential overlap with the current assessment area, or any implemented actions.

¹ <https://enviro.epa.gov/envirofacts/icis-air/plant?handlerId=OH0000000250030020>.

In 2008, Ohio EPA reached a settlement with Canfield Metal Coating Corporation for past hazardous waste violations and issued an administrative consent order² for violations that occurred at 460 West Main Street in Canfield. The settlement included a \$10,300 penalty of which \$8,240 was deposited into the state's hazardous waste cleanup fund and the remainder was contributed to the Ohio EPA Clean Diesel School Bus Program.

The facility had three informal violations in 2022 related to waste storage and disposal. All violations were corrected before the next inspection. The facility has not had any air permit violations in the last 5 years.

In July 2024, MSC and state and local agencies responded to a report of process fluids in the Adjacent Ditch. During the initial response, personnel observed conditions indicating that fluid had entered the groundwater and the Adjacent Ditch. Emergency response actions were initiated immediately in close coordination with Ohio EPA and other agencies. Initial sampling indicated the presence of "residual byproducts from the metal coating process, including elevated levels of sodium hydroxide, zinc, chromium and cyanide." The emergency response included placing temporary fencing; sealing drains, pipes, and manholes; bypassing the Adjacent Ditch; extracting potentially contaminated water; excavating the upper 0 to 0.5 ft. of material from the Adjacent Ditch channel; placing a liner in the ditch to prevent surface water from contacting impacted sediment; and completing targeted removal near Outfall #2.

The site was transferred into the RCRA program to address potential historical contamination. Ohio EPA issued an administrative consent order on December 31, 2024, to conduct corrective actions necessary at the site.

August Mack conducted an initial site investigation to characterize chemical concentrations in groundwater, soil/sediment, and surface water throughout the assessment area. The results are summarized in the Initial Site Investigation Report (August Mack 2024). Surface water and soil data indicated that the primary chemicals of concern were cyanide, zinc, hexavalent chromium, and trichloroethene, as follows:

- **Soil/Sediment**
 - Hexavalent chromium and zinc in sediment within the Adjacent Ditch exceeded the USEPA residential regional screening level (RSL).
 - Total cyanide in sediment within the Adjacent Ditch exceeded the USEPA industrial RSL.
 - Total cyanide and zinc in the wetland sediment exceeded the USEPA residential RSL.

2

<https://dam.assets.ohio.gov/image/upload/epa.ohio.gov/Portals/32/pdf/Signed%20DFFO.web.Canfield%20Metal%20Coating%20Corp.%2009.03.08.pdf>.

- Arsenic in the Adjacent Ditch sediment and wetland sediment exceeded residential and/or industrial RSLs but has not historically been used at the site, and concentrations are generally consistent with background concentrations.
 - Other chemicals in the Adjacent Ditch that exceeded the 2024 USEPA residential RSLs for soil were benzo[a]pyrene and benzo[b]fluoranthene.
 - Other chemicals in the Adjacent Ditch and/or the wetland that exceeded the 2024 USEPA industrial regional soil screening levels included benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, cadmium, and lead.
 - High pH (8.3 to 11.7) was measured within the Adjacent Ditch.
- **Surface Water**
 - Zinc in the Adjacent Ditch exceeded the Ohio River Basin Human Health Tier 1 Criteria for non-drinking surface water.
 - Other chemicals that exceeded Ohio River Basin Human Health Tier 1 Criteria for non-drinking surface water were mercury, benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, and indeno[1,2,3-cd]pyrene.

Ohio EPA approved a ditch-lining plan to separate stormwater flow in the ditch from potential subsurface groundwater impacts and eliminate direct-contact exposure to ditch soils by human and ecological receptors. Because the liner and associated channel work changed current exposure conditions in the Adjacent Ditch, this ERA distinguishes pre-interim action HQs from post-interim action HQs where post-interim action data and calculations are available, including the updated terrestrial wildlife evaluation for birds and mammals exposed to riparian/ditch-adjacent soil.

1.3 SUMMARY OF PREVIOUS ECOLOGICAL EVALUATIONS

Integral prepared Level I and Level II ERAs for two areas: the MSC parcel and adjacent wetland (Integral 2025a,b) and a portion of Sawmill Creek (Integral 2025c,d).

The Level II ERA for the MSC parcel and adjacent wetland (Integral 2025b) and the Level II ERA for Sawmill Creek (Integral 2025d) identified chemicals of potential ecological concern (COPECs) for both areas. For the MSC parcel and adjacent wetland, the following COPECs were identified:

- Surface soil: chromium, lead (as a persistent, bioaccumulative, and toxic [PBT] chemical), zinc, and total cyanide

- Surface water: 17 metals,³ polycyclic aromatic hydrocarbons (PAHs) (including benz[*a*]anthracene, benzo[*a*]pyrene, benzo[*ghi*]perylene, benzo[*a*]fluoranthene, indeno[1,2,3-*cd*]pyrene), free cyanide, and total cyanide
- Surface sediment: 29 COPECs including metals, PAHs, polychlorinated biphenyls (PCBs),⁴ semivolatile organic compounds (SVOCs), free cyanide, and total cyanide.

For Sawmill Creek, the following COPECs were identified:

- Surface water: free cyanide
- Surface sediment: 16 COPECs including metals and PAHs.

In addition to the identification of COPECs, the Level II reports also concluded:

- Ecological habitats (including habitats that may be used by threatened and endangered species) are present in the assessment area.
- Signs of relevant ecological receptors were observed during the site visit, but the timing of the observations (i.e., November) prohibited a full ecological characterization.
- Wetlands are present, of moderate quality, and dominated by invasive species.

Both Level II ERAs could not rule out the potential for adverse ecological risk because multiple COPECs exceeded screening thresholds in surface soil, surface sediment, and surface water. Therefore, Integral recommended a Level III ERA to evaluate site-specific ecological risks, assess how interim actions changed potentially complete exposure pathways, and identify whether additional action is warranted.

1.4 ECOLOGICAL RISK ASSESSMENT GUIDANCE

This Level III ERA follows the general framework described in Ohio EPA guidance (Ohio EPA 2018). This guidance is complementary to, and takes precedence over, guidance issued by USEPA (USEPA 1997) because Ohio EPA has lead oversight responsibility for investigation and remediation work at the site. However, the ERA practices favored by Ohio EPA are generally consistent with USEPA guidance.

A formal ERA work plan was not prepared for this study. Instead, Integral submitted an Ecological Risk Assessment Assumptions Memorandum to Ohio EPA on May 22, 2026, describing the ERA approach (Appendix A). On June 8, 2026, Ohio EPA provided verbal comments during a conference call with MSC, August Mack, and Integral. Additional comments received from Ohio EPA on August 7, 2026, have been incorporated into this report.

³ Metals were identified as COPECs in both dissolved and total fractions.

⁴ PCBs were evaluated as total PCB Aroclors where applicable.

The assumptions memorandum served as the analysis-plan equivalent for this Level III ERA by documenting the proposed exposure areas, receptors, exposure pathways, toxicity thresholds, and risk characterization methods before completion of the risk calculations.

In accordance with Ohio EPA guidance (Ohio EPA 2018), this assessment is based on existing data, including the Initial Site Investigation Report (August Mack 2024), the RCRA Facility Investigatoin (August Mack 2026), assessment area photos, aerial imagery, and a site visit that included evaluation of habitat type and extent, species observations, signs of ecological use, and wetland delineation. We reviewed the following documents, maps, and publications in preparing this report:

- Environmental Data Resources, Inc. (EDR), The EDR Aerial Photo Decade Package, Inquiry Number 7821917.5, dated November 14, 2024
- EDR, The EDR-City Directory Image Report, Inquiry Number 7821917.8, dated November 18, 2024
- EDR, The EDR Radius Map with GeoCheck, Inquiry Number 07821917.2r, dated November 14, 2024
- EDR, Certified Sanborn Map Report, Inquiry Number 7821917.3, dated November 14, 2024
- Federal Emergency Management Agency, National Flood Insurance Program, Flood Insurance Maps
- U.S. Department of Agriculture, Soil Conservation Service, Soil Surveys
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory database, <http://www.fws.gov/wetlands/Data/Mapper.html>
- U.S. Geological Survey, Topographic Maps
- U.S. Department of the Interior, Fish and Wildlife Service, National Wetlands Inventory Map.

Additional site information and data used in the ERA are described further in the problem formulation.

1.5 DOCUMENT ORGANIZATION

The remainder of this report is organized as follows:

- Section 2: Problem Formulation—provides a conceptual site model (CSM) and discusses the analytical data used in the Level III ERA.
- Section 3: Chemicals of Potential Ecological Concern—identifies the chemicals in each medium that require further evaluation.

- Section 4: Ecological Exposure Characterization—presents the COPEC exposure concentrations and doses to selected receptors of concern.
- Section 5: Ecological Effects Characterization—discusses the toxicity criteria used to evaluate COPECs.
- Section 6: Ecological Risk Characterization—integrates the ecological exposure and effects assessments to generate estimates of potential risks by environmental media and ecological receptor groups. It also evaluates major uncertainties.
- Section 7: Summary and Conclusions—summarizes the assessment results and the conclusions.
- Section 8: References—cites the literature referenced in this report.

2 PROBLEM FORMULATION

Problem formulation defines the scope and focus of the Level III ERA. A key outcome is the CSM, which describes how facility-related chemicals may migrate through affected environmental media to ecological receptor groups and the exposure routes by which those receptors may be exposed. The CSM provides the basis for identifying assessment endpoints that warrant protection and selecting measurement endpoints to evaluate each assessment endpoint.

The site investigation has been conducted by August Mack in coordination with Ohio EPA (August Mack 2024, 2026). A description of the site characterization and nature and extent of contamination are available in the RCRA Facility Investigation (RFI) report (August Mack 2026).

Consistent with Ohio EPA guidance, the Level III problem formulation reviews and refines the assessment endpoints, CSM, and risk hypotheses developed during the Level II ERAs. The risk questions presented in Section 2.5 serve as the functional risk hypotheses for this assessment and are evaluated using measurement endpoints tied to the relevant exposure media and receptor groups.

2.1 ECOLOGICAL HABITATS AND EXPOSURE AREAS

The assessment areas and ecological exposure areas identified for this Level III ERA are shown on Figure 1-3 and Figure 1-4 and include:

- The MSC parcel assessment area (Onsite)
 - Facility/paved area
 - Terrestrial forested habitat north of the facility
 - Aquatic habitats associated with the Adjacent Ditch and the adjacent wetlands
- Sawmill Creek assessment area (Downgradient) including the area immediately downgradient of the site (from the bikeway to Cardinal Drive) and area of the creek farther downgradient (from Cardinal Drive to approximately 800m downstream of where Sawmill Creek crosses South Turner Road)
 - Aquatic habitat of the creek
 - Riparian habitat adjacent to the creek.

As detailed in the Level II ERAs (Integral 2025b,d), site surveys were conducted to collect qualitative and semiquantitative data needed to identify ecological habitats and exposure areas. Habitat observations from each main exposure area are summarized below.

2.1.1 MSC Parcel Assessment Area and Adjacent Wetland (Onsite)

The MSC parcel boundary assessment area (MSC assessment area) consists of four distinct areas: the facility/paved area, the terrestrial forested habitat and riparian soil area, the Adjacent Ditch aquatic habitat area, and the adjacent wetland aquatic habitat area.

The facility/paved area covers approximately 4.9 acres, or 37 percent of the total MSC assessment area. This area includes paved parking lots, facility buildings, and gravel areas. No vegetation or wildlife was observed in this area during the 2024 site visit.

The terrestrial habitat area is composed of wooded habitat and covers 6.0 acres, or 45 percent of the MSC assessment area. This deciduous forested habitat is dominated by oak (*Quercus* spp.), hickory (*Carya* spp.), and maple (*Acer* spp.). Mature trees typically have a diameter at breast height of 12 in. During the 2024 site visit, squirrels were observed, and deer signs, including game paths, prints, and tree bark scraping approximately 3 to 4 ft above ground surface, were noted. Birds seen or heard during the 2024 site visit included American crow, song sparrow, northern cardinal, swamp sparrow, and blue jay. The riparian soil area along the Adjacent Ditch is approximately 0.3 acre, or 2 percent of the MSC assessment area, and is primarily comprised of scrub-shrub habitat. The area along the bikeway includes grasses and poison ivy.

The Adjacent Ditch aquatic habitat area covers approximately 0.6 acres, or 4 percent of the MSC assessment area. Based on its shape and alignment, the ditch appears to have been straightened. No standing water was present in the ditch during the 2024 site visit, which occurred after a ditch bypass had been installed as part of the emergency response actions.

The adjacent wetland aquatic area covers approximately 1.6 acres, or 12 percent of the MSC assessment area. The wetland was delineated by MAD Scientist Associates LLC (MAD Scientist) on November 21, 2024, and is classified as a palustrine emergent wetland. The wetland includes a large open-water area, small open channels that are 6 to 12 in. wide and less than 12 in. deep, and areas with submerged and emergent vegetation. The wetland is dominated by invasive species, including stands of *Phragmites australis* and reed canary grass. Other typical wetland vegetation observed included *Carex* species. Where present, this vegetation was dense and tall, greater than 5 ft. A shrub buffer along the southeastern edge of the wetland includes red-osier dogwood, bush honeysuckle, and multiflora rose.

2.1.2 Sawmill Creek Assessment Area (Downgradient)

Terrestrial wooded habitat covers 1 acre, or 27 percent of the Sawmill Creek assessment area. This deciduous forested habitat is dominated by oaks (*Quercus* spp.), hickories (*Carya* spp.), and maples (*Acer* spp.). The mature trees typically have a diameter at breast height of 6 to 8 in. Squirrels and deer signs, including game paths and prints, were noted in the forested area.

Birds seen or heard during the site visit included northern cardinal, American robin, and mallard.

Residential yards are present in 2.5 acres, or 68 percent of the Sawmill Creek assessment area. In some portions of this area, mowed lawns extend to the creek bank, while other portions include limited areas of juvenile and mature trees and shrubs. Along the high school, pine trees were historically planted in a row next to the baseball field. A few small burrows were observed along the southern bank of the creek.

Approximately 0.1 acre, or 3 percent of the Sawmill Creek assessment area, consists of scrub-shrub habitat near the culvert under Cardinal Drive. Approximately 175 ft upstream of Cardinal Drive, a debris pile appeared to be a remnant beaver dam.

The portion of Sawmill Creek shown in Figure 1-3 is less than 0.1 acre, or approximately 1,750 linear feet, and makes up 2 percent of the Sawmill Creek assessment area. The creek ranges from 1 to 4 ft wide and is generally shallow, ranging from 6 to 12 in. deep throughout the assessment area. Large boulders and concrete debris are scattered around the upstream culvert. The creek substrate has a moderate degree of embeddedness and is dominated by cobbles at the western extent of the assessment area and by silt and muck at the eastern extent. Debris was observed throughout the Sawmill Creek assessment area during the 2025 site visit.

The streambanks show substantial erosion, including undercutting and incision. Along the western portion of the assessment area, the banks range from 1 to 7 ft above the creek channel. In this area, several mature trees have exposed roots because of bank undercutting. Toward the eastern extent of the Sawmill Creek assessment area, the banks are lower in elevation.

Vegetation conditions observed in the Sawmill Creek assessment area were characteristic of spring. Because the site visit occurred in early April 2025, many understory trees and emergent plants had not yet leafed out.

Biological community data were collected in July 2025. Integral and Ohio EPA conducted a joint site reconnaissance to identify appropriate biological sample locations. Ohio EPA recommended that sampling occur at a single downstream location in Sawmill Creek at approximately 41.064767°, 80.799662°. Ohio EPA indicated that sampling in other upstream locations might provide less useful or interpretable data given the likely influence of urban runoff in the small headwaters area. The biological sampling at the selected location in Sawmill Creek was characterized by excellent habitat, “fair” fish community, and “good” benthic community (MAD Scientist Associates LLC 2025). Because biological community data are limited in the onsite area, the aquatic-life evaluation relies on available chemical data, habitat observations, and the uncertainty analysis to interpret potential risk to aquatic receptors.

2.2 ENVIRONMENTAL MEDIA OF INTEREST

Consistent with Ohio EPA guidance (Ohio EPA 2018), the environmental media relevant to ERA vary between terrestrial and aquatic exposure areas. In terrestrial upland forested and riparian areas, the medium of interest is surface soil. Surface soil is defined as the first 0 to 1.2 m below ground surface, based on the depth of burrowing mammals.

In the aquatic exposure areas of Sawmill Creek, the Adjacent Ditch, and the adjacent wetland, the media of interest are surface sediment and surface water. Wildlife tissue from food items, including invertebrates and plants that live in soil or wetlands, is relevant for both terrestrial and aquatic exposure areas and will be modeled using bioaccumulation factors, as described further in Section 4.4. Surface sediment is defined as the first 0 to 15 cm, based on the bioactive zone specified by Ohio EPA (2018).

Sawmill Creek is evaluated as a lotic aquatic habitat in this ERA. Surface water data are compared to applicable Ohio water quality criteria and other selected surface water benchmarks as described in Section 3.2.3.

2.3 RECEPTORS OF CONCERN

Receptors of concern represent key ecological resources to be protected from harm. These receptors generally include populations, communities, and relevant trophic guilds that may be exposed to COPECs and susceptible to their effects. The selected receptors are well studied and have relatively large toxicity data sets available in peer-reviewed literature and guidance. Integral selected ecological receptors after considering potentially threatened and endangered species, species observed in the assessment area, and species known to occur near the assessment area.

2.3.1 Terrestrial Receptors

As described in Section 2.1.1, the MSC assessment area supports forested habitat dominated by deciduous trees in which wildlife observations included deer, small mammals (squirrels), and several birds common to wooded areas.

Three main types of terrestrial receptors were identified:

- Soil invertebrate community (represented by earthworms)
- Terrestrial plant community
- Terrestrial wildlife.

For terrestrial wildlife, two tiers of receptors were identified: small terrestrial wildlife species that consume plants and insects and larger wildlife predators that consume small mammals.

Lower-trophic-level wildlife receptors were selected to represent species with restricted home ranges and high incidental soil ingestion rates, including:

- American robin, *Turdus migratorius* (avian omnivore)
- American woodcock, *Scolopax minor* (avian invertivore)
- Meadow vole, *Microtus pennsylvanicus* (mammalian herbivore)
- Short-tailed shrew, *Blarina brevicauda* (mammalian invertivore).

Top avian and mammalian carnivores were identified in accordance with Ohio EPA (2018), which requires evaluation of these receptors when at least PBT compound is detected in media of concern. The carnivores identified include:

- Red-tailed hawk, *Buteo jamaicensis* (avian carnivore)
- Red fox, *Vulpes vulpes* (mammalian carnivore).

2.3.2 Aquatic Receptors

As described in Sections 2.1.1 and 2.1.2, aquatic habitats range from the Adjacent Ditch and adjacent wetland in the MSC assessment area to the riparian habitat and creek channel in the Sawmill Creek assessment area.

Several types of aquatic receptors were identified:

- Wetland plant community
- Benthic invertebrate community
- Fish, amphibian, and aquatic invertebrate community
- Semi-aquatic wildlife.

For wildlife, two tiers of receptors are identified based on trophic level. The following lower trophic level receptors consume plants or plants and invertebrates:

- Mallard, *Anas platyrhynchos* (avian omnivore)
- Muskrat, *Ondatra zibethicus* (mammalian herbivore).

The following upper trophic level receptors primarily consume fish:

- Great blue heron, *Ardea herodias* (avian piscivore)
- Mink, *Mustela vison* (mammalian piscivore).

2.3.3 Threatened and Endangered Species

For the Level II ERAs, Integral requested information from USFWS and the Ohio Department of Natural Resources (ODNR) on the presence and distribution of threatened and/or endangered species in the assessment area. The information obtained from this request is included in Appendix B.

The site is located within the range of the following state/federal listed or candidate species:

- Northern long-eared bat (*Myotis septentrionalis*, federally threatened and state endangered)
- Indiana bat (*M. sodalis*, federally and state endangered)⁵
- Tricolored bat (*Perimyotis subflavus*, state endangered, proposed as federally endangered)
- Little brown bat (*M. lucifugus*, state endangered)
- Monarch butterfly (*Danaus plexippus*, proposed as federally threatened).

No threatened or endangered species were observed during the site visit. However, because presence/absence surveys have not been conducted for threatened or endangered species in the assessment area, their potential use of the assessment area cannot be ruled out.

For this Level III ERA, it is assumed that the ecological receptors discussed above for terrestrial and aquatic habitats will also be protective of habitats that could be used by potentially threatened and endangered species.

Because targeted presence/absence surveys for threatened and endangered species were not conducted, this ERA does not evaluate listed species as site-specific endpoint species. Instead, the generic terrestrial and aquatic receptors selected for this ERA are used as conservative surrogates for potentially complete exposure pathways that could also be relevant to listed species using similar habitats. This surrogate approach is consistent with the receptor framework documented in the assumptions memorandum and remains subject to Ohio EPA review.

2.4 MAJOR EXPOSURE PATHWAYS

The major exposure pathways for the target receptor groups evaluated in this Level III ERA are as follows:

⁵ USFWS has previously stated that Indiana bats are assumed to be present in Ohio during the summer wherever suitable habitat occurs unless a presence/absence survey has been performed to document their absence (USFWS 2007).

- The terrestrial plant and soil invertebrate communities are assumed to be exposed to COPECs through direct contact (dermal exposure) with surface soil.
- The benthic invertebrate community is assumed to be exposed to COPECs through direct contact with surface sediment.
- The fish, amphibian, and aquatic invertebrate communities are assumed to be exposed to COPECs through direct contact (skin contact or respiration through gills) with surface water.⁶
- Wildlife are assumed to be exposed to COPECs through ingestion of contaminated food items (e.g., plant and invertebrate and fish tissue).⁷ Other pathways were considered but not evaluated, as described below:
 - Groundwater does not represent an exposure medium relevant to wildlife or aquatic community-level receptor groups. Surface water is the more relevant medium for these ecological exposures and is evaluated in this ERA.
 - Exposure to surface soils is assumed to be the most relevant pathway for terrestrial receptors, and therefore, subsurface soil is not evaluated as an exposure medium.
 - Air is not evaluated as an exposure medium because COPECs are not expected to be meaningfully volatile under site exposure conditions.

2.5 SELECTION OF ASSESSMENT AND MEASUREMENT ENDPOINTS

This section identifies the assessment and measurement endpoints that guide data evaluation and interpretation of potential adverse ecological effects from site-related COPECs. Assessment endpoints are the key ecological resources to be protected and generally represent populations, communities, or trophic guilds. The assessment endpoints evaluated are protective of other similar terrestrial and aquatic receptors that may be present at the facility. The selected assessment endpoints address the following risk questions for each receptor group:

- **Terrestrial plant community:** Are the concentrations of COPECs in surface soil likely to adversely affect the survival, growth, or reproduction of the terrestrial plant community present in the forest habitat at the facility?

⁶ Fish exposure to COPECs from direct contact with sediment were assumed insignificant because fish species are not bottom dwellers and contact with sediment would be limited.

⁷ Wildlife exposure to COPECs from direct contact with surface soil/sediment and surface water were assumed insignificant based on the duration of exposure. Amphibian exposures to surface soil/sediment from ingestion were considered insignificant.

- **Terrestrial soil invertebrate community:** Are the concentrations of COPECs in surface soil likely to adversely affect the survival, growth, or reproduction of the soil invertebrate community present in the forest habitat at the facility?
- **Benthic invertebrate community:** Are the concentrations of COPECs in the sediment in the Adjacent Ditch and the adjacent wetland and in Sawmill Creek downgradient of the site likely to adversely affect the survival, growth, or reproduction of the benthic invertebrate community?
- **Fish, amphibian, and aquatic invertebrate communities:** Are the concentrations of COPECs in surface water in the Adjacent Ditch, adjacent wetland, and Sawmill Creek downgradient of the site likely to adversely affect the survival, growth, or reproduction of the fish, amphibian, and aquatic invertebrate communities?
- **Wildlife:** Are the concentrations of COPECs in the food items (e.g., fish tissue) modeled from onsite surface soil or surface sediment in the Adjacent Ditch or downgradient in Sawmill Creek likely to adversely affect the survival, growth, or reproduction of birds and mammals?

Measurement endpoints are measurable ecological characteristics, quantified through laboratory or field evaluation, that can be related back to the valued ecological resources selected as assessment endpoints. Measurement endpoints are required because it is often not possible to directly quantify changes in an assessment endpoint. Relevant and useful measurement endpoints represent the same exposure pathways and mechanisms of toxicity as the assessment endpoints.

The assessment endpoints and associated measurement endpoints are presented in Table 2-1. The measurement endpoints include comparisons of COPEC concentrations to ecological screening values protective of each ecological receptor group and comparisons of modeled dietary exposure doses to toxicity reference values (TRVs) protective of wildlife.

2.6 CONCEPTUAL SITE MODEL

A CSM provides a framework for understanding how COPECs interact with the environment by defining potential sources, release and transport mechanisms, exposure routes, and ecological receptors. It identifies areas where exposure may occur and informs risk assessment and management decisions. CSMs are dynamic tools that can be refined as new data become available.

Figure 2-1 presents the refined CSM, which illustrates the relationships among potentially affected environmental media, including surface soil, surface water, surface sediment, and biological tissue, and major ecological receptor groups, including invertebrate, plant, bird, and mammal communities. These receptor groups may be exposed to COPECs in these media through direct contact, incidental ingestion, or dietary ingestion. This CSM is based on the

preliminary CSMs developed for the Level II ERA reports and updated to reflect the combined evaluation in this Level III ERA.

2.7 LEVEL III ERA ANALYSIS PLAN

The following sections describe how the Level III ERA evaluates potential ecological risk for each ecological receptor group. The approach includes the following major components:

- **Ecological exposure characterization:** The major exposure pathways described in the CSM (Figure 2-1) are evaluated quantitatively. The COPEC-specific exposure point concentrations (EPCs) are based on either measured values (e.g., soil and sediment concentrations) or modeled values (i.e., modeled concentrations in plants, invertebrates, fish, and small mammals that serve as food to the wildlife receptors).
- **Ecological effects characterization:** This step characterizes potential effects using chemical-, receptor-, and media-specific literature-derived toxicity values. These values provide estimates of chemical concentrations that, if not exceeded, are expected to protect ecological receptors from unacceptable adverse effects on survival, growth, or reproduction. These effects thresholds were summarized in the Assumptions Memo (Appendix A).
- **Ecological risk characterization:** This step integrates information on potential chemical exposure and effects to estimate impacts on each ecological receptor group. Different estimation methods are used for the various measurement endpoints evaluated in this Level III ERA.
- **Uncertainty analysis:** The ecological risk characterization qualitatively evaluates the major sources of uncertainty and their impacts on the conclusions.

2.8 ANALYTICAL DATA USED IN THE LEVEL III ERA

Consistent with Ohio EPA guidance (Ohio EPA 2018), the environmental media of interest for the ERA are surface soil, surface sediment, and surface water. Environmental samples were collected during several field efforts conducted in 2024 and 2025. All data used in the ERA are presented in Appendix C. The COCs identified in the RFI (Section 3.3 of RFI) are the focus of the analyses in the ERA.⁸

Soil samples were collected from the forested upland north of the facility and from riparian or ditch-adjacent areas near the Adjacent Ditch and outfalls (Figure 2-2). For this ERA, the terrestrial onsite soil data set included both forest soil and riparian/ditch-adjacent soil. The soil analysis included both pre-interim action conditions and post-interim action conditions (i.e.,

⁸ In the RFI, VOCs and SVOCs are eliminated as site-related COCs in soil and groundwater and are therefore, not included in the ERA.

where samples excavated as a part of the remediation were excluded) for direct-contact and wildlife exposure pathways. Interim actions included excavation of the upper 0 to 0.5 ft of material and placement of a liner in the Adjacent Ditch channel, as well as targeted removal near Outfall #2. Samples collected to a depth of 1.2 m below ground surface were retained for evaluation in this risk assessment. This depth threshold was selected following Ohio EPA (2018) guidance based on the depth of burrowing mammals and is likely conservative because most mammals burrow to shallower depths. Soil samples collected from non-ecologically relevant areas, including beneath developed and engineered portions of the facility, were excluded from this risk evaluation.⁹

Sediment and surface water samples were collected from the Adjacent Ditch, the wetland north of the facility property, and throughout Sawmill Creek (Figures 2-3 through 2-6). Sediment samples collected to a depth of 15 cm were retained for evaluation in this assessment, following Ohio EPA (2018) guidance based on the biologically active zone in sediment.

In the final data set, field duplicates were addressed following Ohio EPA (2018) guidance by retaining the sample with the maximum concentration. For parent/duplicate pairs in which one sample had a detection and the other did not, the detected concentration was retained. PCB Aroclors were evaluated as summed totals, with nondetects represented by one-half the method detection limit. The 95 percent upper confidence limits (95UCLs) were calculated using ProUCL version 5.2 (USEPA 2022). For the 95UCL calculations, chemicals with nondetects were represented by the reporting limit.

For Level III exposure calculations, EPCs are selected consistent with Ohio EPA guidance as the lesser of the 95UCL on the arithmetic mean and the maximum detected concentration for each COPEC in the relevant medium, as described further in Section 4.1.

⁹ In July 2024, a single surface soil sample was collected upgradient of the release in the Adjacent Ditch as an intended background sample. That sample was excluded from this evaluation consistent with the methodology presented in the RFI (August Mack 2026).

3 CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN

This section describes the screening process and resulting soil, sediment, and surface water COPECs. The process generally follows Ohio EPA (2018). A chemical was retained as a COPEC for further evaluation if it met one or more of the following criteria:

- The maximum detected concentration exceeded the screening benchmark.
- The maximum detected concentration exceeded both the screening benchmark and the regional background concentration.
- The chemical is identified by Ohio EPA (2018) as PBT, as in the case of mercury¹⁰.

A chemical was not retained as a COPEC but is discussed further in the uncertainty analysis if it met either of the following criteria:

- The maximum detection limit of a nondetected chemical exceeded the screening benchmark.
- A detected chemical lacked a screening benchmark.

The following sections present the regional background concentrations, the ecological screening values, and the identification of COPECs for each medium.

3.1 BACKGROUND CONCENTRATIONS

Regional background values were identified from Ohio EPA sources for both soil and sediment. The soil and sediment background data sets and selected values are described below.

3.1.1 Soil Background Values

Background metal concentration in soils were previously collected by Ohio EPA for Mahoning County (Ohio EPA 2022). These values were used to represent soil background in the COPEC screen for surface soil (Section 3.3). For this data set, Ohio EPA Division of Environmental Response and Revitalization (DERR) sampled and analyzed surface soils at 10 Mahoning County properties for background concentrations of RCRA metals, including arsenic, barium, cadmium, chromium, lead, mercury, and selenium in addition to nickel and thallium. Silver was removed from the RCRA analytical suite due to repeated nondetections found in other Ohio counties. Statistical evaluations were performed to determine the representative background concentration for each metal.

¹⁰ PBT chemicals are evaluated qualitatively where concentrations do not exceed applicable screening or reference values.

3.1.2 Sediment Reference Values

Sediment reference values (SRVs) for lotic water bodies in the Erie/Ontario Lake Plain (EOLP) ecoregion (Ohio EPA 2018) were used in the COPEC screen for sediment (Section 3.3). Per Ohio EPA (2018), SRVs can be used to determine whether site sediments contain chemical concentrations above levels considered representative of the area. In some cases, the statewide SRV was used when an EOLP value was not available. The SRV represents a UCL on the 90th percentile.

3.2 ECOLOGICAL SCREENING VALUES

This section presents the hierarchy of sources used to identify ecological screening levels (ESLs) for surface soil, sediment, and surface water. Cyanide ESLs are limited; because cyanide is of particular interest at the site, appropriate ESLs were identified from a literature review presented in Attachment A of Appendix A. Table 3-1 presents the screening values for soil, and Table 3-2 presents the screening values for sediment and surface water.

3.2.1 Screening-Level Benchmarks for Soil

The hierarchy for screening-level surface soil benchmarks is as follows:

- USEPA ecological soil screening levels (EcoSSLs) (USEPA 2023)
- Soil preliminary remediation goals for ecological endpoints (Efroymson et al. 1997)
- USEPA soil screening values for hazardous waste sites (USEPA 2018, Table 3)
- Los Alamos National Laboratory (LANL) ECORISK Database (LANL 2024)
- Health Canada cyanide risk values (Health Canada 2023).

3.2.2 Screening-Level Benchmarks for Sediment

The hierarchy for screening-level surface sediment benchmarks is as follows:

- Consensus-based threshold effect concentrations from MacDonald et al. (2000)
- USEPA freshwater sediment ecological and refined screening values (USEPA 2018, Table 2a)
- USEPA Region 5 RCRA sediment screening levels (USEPA 2003a)
- LANL ECORISK Database (LANL 2024)
- RIVM risk concentrations for sediment (RIVM 2001).

3.2.3 Screening-Level Benchmarks for Surface Water

The hierarchy for screening-level surface water benchmarks is as follows:

- Ohio outside mixing zone average chemical criteria presented in Ohio Administrative Code 3745-1-35
- USEPA chronic freshwater screening levels for hazardous waste sites (USEPA 2018, Table 1)
- USEPA recommended water quality criteria (USEPA 2011)
- USEPA Region 5 RCRA surface water screening levels (USEPA 2003a).

Metals with hardness-dependent criteria will be evaluated based on a water hardness of 200 mg/L, which is representative of aquatic systems in the area. For surface water screening, metals were screened based on total analytical results, except for cyanide, which was screened as free cyanide.

3.3 SELECTED COPECS

This section presents the COPEC-selection process for surface soil, surface sediment, and surface water. Table 3-3 lists the COPECS retained for further evaluation in this ERA. COPECS by medium are discussed in the subsections below.

3.3.1 Surface Soil COPECS

The COPECS identified for surface soil are presented in Table 3-4. Retained surface soil COPECS include total cyanide and four metals—cadmium, chromium, lead, and zinc. Although certain VOCs and PAHs were detected or screened in the broader data set, they were not identified in the RFI as site-related ecological COCs and are not carried forward as retained Level III ERA COPECS. Detected compounds lacking ecological screening values, and nondetected compounds with reporting limits above screening values, are addressed qualitatively in the uncertainty analysis where appropriate.

3.3.2 Surface Sediment COPECS

The COPECS identified for wetland surface sediments are presented in Table 3-5. Retained wetland sediment COPECS include free cyanide, total cyanide, selenium, and zinc. The COPECS identified for the pre-interim action Adjacent Ditch surface sediments are presented in Table 3-6. Retained pre-interim action Adjacent Ditch sediment COPECS include total cyanide; arsenic, chromium, copper, lead, selenium, and zinc; and total PCB Aroclors. Barium, cadmium, silver,

and certain individual Aroclors exceeded screening criteria by maximum concentration but were not retained based on the overall COPEC-selection criteria shown in Table 3-6.

The COPECs identified for downgradient surface sediment are presented in Table 3-7. Retained downgradient sediment COPECs include free cyanide, total cyanide, arsenic, and zinc.

3.3.3 Surface Water COPECs

The COPECs identified for onsite wetland surface water are presented in Table 3-8. Cyanide (free and total) and two metals—lead (PBT) and zinc had maximum detected concentrations that exceeded their respective ESLs. There were only two surface water samples collected in the wetland and thus 95UCLs were not calculated for this area. Several metals were not detected but had MRLs that exceeded ESLs. These constituents are discussed in the uncertainty analysis.

The COPECs identified for the pre-interim action Adjacent Ditch surface water are presented in Table 3-9. Cyanide (free and total) and nine metals—arsenic, barium, cadmium, chromium, copper, lead (PBT), mercury (PBT), selenium, and zinc —had maximum detected concentrations that exceeded their respective ESLs. Chromium hexavalent (VI) was detected in Adjacent Ditch surface water and lacks an ESL; therefore, it is discussed qualitatively in the uncertainty analysis but was not retained for quantitative HQ calculations. Silver was not detected but the MRL exceeds the ESL and is discussed in the uncertainty section.

The COPECs identified for downgradient surface water are presented in Table 3-10. Cyanide (free and total) had maximum detected concentrations that exceeded the respective ESLs. Several metals were not detected but had MRLs that exceeded ESLs. These constituents are discussed in the uncertainty analysis.

3.3.4 PBT COPECs

Mercury was not detected in surface soil samples but was detected in sediment in the wetland, Adjacent Ditch, and downgradient in Sawmill Creek. Mercury is identified by Ohio EPA (2018) as a PBT chemical; however, measured sediment concentrations were below the benthic invertebrate screening value, the USEPA wildlife-based sediment benchmark, and the Ohio EPA sediment reference value. Therefore, mercury is discussed qualitatively as part of the uncertainty evaluation but was not retained for quantitative sediment or food-web risk evaluation.

4 ECOLOGICAL EXPOSURE CHARACTERIZATION

The ecological exposure assessment describes the basis for quantifying exposure for identified ecological receptors. Ecological exposures were estimated based on each receptor's dose or concentration of each COPEC in the relevant environmental media in each assessment unit. This process builds on the CSM (Figure 2-1) and COPEC selection process (Section 3.3), and directly reflects the exposure pathways, media of concern, measurement endpoints, and receptor groups selected for evaluation.

The following subsections describe exposure characterization for direct contact with media by terrestrial and aquatic receptors, based on comparisons of the EPC to the respective ESLs, and for dietary exposures by terrestrial and semi-aquatic wildlife.

4.1 BENCHMARK SCREEN OF ABIOTIC MEDIA

Risks from direct contact with surface soil, surface sediment, and surface water were evaluated by comparing the EPC, represented by the lesser of the maximum detected concentration and the 95UCL for each COPEC, to the relevant screening benchmarks. The magnitude of ecological risk for each exposure pathway and receptor was estimated by calculating COPEC-specific hazard quotients (HQs). An HQ represents the ratio of exposure, such as the direct sediment exposure concentration for benthic invertebrates, to the toxicity value, such as the effects-based sediment benchmark, using the following equation:

$$HQ = EPC / ESL$$

An HQ equal to or less than 1 indicates that the potential for adverse effects is low and acceptable under the assumptions of the screening evaluation. An HQ greater than 1 indicates increased potential for adverse ecological effects. HQs greater than 1 do not necessarily indicate adverse effects at the population or community level. Although an HQ greater than 1 may represent potential individual-level risk, it is likely to overestimate potential risk at the community level. Therefore, the HQ should be considered an indicator of potential risk, not a direct measure of effect magnitude. HQs greater than 1 warrant further consideration, particularly relative to uncertainty inherent in the methodology.

For cyanide, HQs should also be interpreted with attention to cyanide speciation. Free cyanide is the more directly bioavailable and toxic fraction in surface water and is the most relevant indicator of potential aquatic toxicity. Total cyanide is useful for identifying cyanide occurrence and distribution but may include cyanide that is bound in metal complexes or other forms that are less bioavailable and less likely to cause adverse effects. Therefore, large total cyanide HQs are interpreted as conservative indicators of potential cyanide-related exposure and are considered in context with free cyanide results and site-specific exposure conditions.

4.2 CHARACTERIZING POTENTIAL WILDLIFE EXPOSURES

Integral conducted a deterministic food-web analysis for six terrestrial wildlife receptors—American robin, American woodcock, meadow vole, short-tailed shrew, red-tailed hawk, and red fox—and four semi-aquatic wildlife receptors—mallard, great blue heron, muskrat, and mink—that are potentially exposed to COPECs through food ingestion, including plants, terrestrial invertebrates, and fish, and incidental ingestion of soil or sediment while foraging in terrestrial and aquatic exposure areas. The average daily dose (ADD) for each wildlife receptor was based on the following estimates:

- EPCs of COPECs in surface soil or surface sediment represent COPEC concentrations in environmental media to which wildlife may be exposed while foraging.
- EPCs of COPECs in surface water represent COPEC concentrations in wildlife drinking water.
- EPCs in food items consumed by wildlife, including plant, invertebrate, fish, and small mammal tissue concentrations, were derived from measured soil or sediment data for each exposure area using bioaccumulation factors.

The EPCs used in the pre-interim action and post-interim action terrestrial wildlife exposure assessments based on onsite soil COPECs are provided in Table 4-1 and Table 4-2. For semi-aquatic wildlife, EPCs for pre-interim action Adjacent Ditch sediment are provided in Table 4-3, EPCs for wetland sediment are provided in Table 4-4, and EPCs for downgradient sediment are provided in Table 4-5.

4.2.1 Calculation of Average Daily Dose

ADDs quantify exposure of each wildlife receptor to COPECs through incidental soil or sediment ingestion and consumption of preferred diet items. Table 4-6 presents the species-specific exposure factors obtained from Ohio EPA (2018) and used in these calculations. Normalized ingestion rates for soil, surface water, invertebrates, plants, fish, and small mammals were adjusted for moisture content values from Ohio EPA (2018). Ohio EPA's (2018) specific ADD equations were used to derive the ADDs and are not repeated here. Ohio EPA's (2018) generalized ADD equation is:

$$\text{Exposure} = \text{Total ADD} = (\text{ADD}_p + \text{ADD}_a + \text{ADD}_s + \text{ADD}_w) \times \text{AUF}$$

Where:

ADD _p	=	Average daily dose from ingesting plant matter (mg dry weight [dw]/kg body weight [BW]-day)
ADD _a	=	Average daily dose from ingesting animal matter (mg dw/kg BW-day)
ADD _s	=	Average daily dose from incidental ingestion of soil (mg dw/kg BW-day)

ADD _w	=	Average daily dose from ingestion of surface water (mg/L BW-day)
AUF	=	Area use factor (unitless; described in Section 4.2.2)

ADD calculations can also include a temporal use factor to adjust for migration or other conditions that might reasonably limit site-related wildlife exposure. However, this ERA conservatively assumes that all wildlife receptors could be present onsite and forage year-round.

4.2.2 Area Use Factor

The AUF is the ratio of the exposure area to the home range size for each wildlife receptor (Table 4-6). Some receptors, including the American robin and short-tailed shrew, have home ranges smaller than the site, and therefore the AUF is 1, assuming these receptors can reside and forage onsite continuously. Other receptors, including the red-tailed hawk and mink, have home or foraging ranges much larger than the habitat available onsite. For these receptors, the AUF is less than 1 and reflects the proportion of the receptor's home or foraging range represented by the exposure area.

4.2.3 Bioaccumulation Factors

Plant, invertebrate, fish, and small mammal EPCs were derived from modeled concentrations calculated from measured onsite or downgradient soil or sediment data. Modeled tissue concentrations were calculated using literature-derived generic regression equations or uptake factors applicable to each tissue type. Table 4-7 presents the equations used to estimate COPEC concentrations in biota tissue in the terrestrial exposure area.

5 ECOLOGICAL EFFECTS CHARACTERIZATION

This section identifies the media- and receptor-specific toxicity thresholds for surface soil, surface sediment, and surface water for the direct contact exposure pathway for aquatic and terrestrial receptors and for the food web evaluation for terrestrial and semi-aquatic wildlife.

5.1 DIRECT CONTACT EXPOSURE PATHWAY

For COPECs identified in surface soil (Table 3-4), the EPC (represented by the 95UCL) was compared to receptor-specific ESLs, when available. These values represent conservative literature-derived COPEC concentrations in soil that, if exceeded, have the potential to cause adverse effects to the terrestrial receptor community under chronic exposure conditions. These ESLs were identified for plants, soil invertebrates, birds, and mammals following the same hierarchy of sources outlined in Section 3.2.2 and presented in Table 5-1. Most values were available from USEPA Eco SSLs, but some receptor-specific ESLs were reported from other sources.

For COPECs in surface sediment and surface water, the ESLs presented in Table 3-2 were used for comparison with the EPCs for those media. Sediment COPEC concentrations were also compared to refinement screening values available from USEPA 2018. These ESLs represent conservative literature-derived COPEC concentrations in surface sediment or surface water that, if exceeded, have the potential to cause adverse effects to aquatic life, including fish, aquatic invertebrates, and amphibians, under chronic exposure conditions.

5.2 WILDLIFE TOXICITY REFERENCE VALUES

The literature-derived wildlife TRVs (in units of mg COPEC/kg bw-day) are derived from laboratory studies in which avian and mammalian test species are orally dosed over subchronic or chronic periods to identify dose levels that cause adverse effects on survival, growth, or reproduction. TRVs represent a toxicity threshold above which a potential negative response by the receptor species becomes more likely. The TRVs used here are recommended by USEPA Region 4 (USEPA 2019) augmented by other sources when needed. Both no-observed-adverse-effect level (NOAEL) and lowest-observed-adverse-effect level (LOAEL) TRVs were identified, when available.

For cyanide, chronic exposure TRVs are not readily available; therefore, literature sources were reviewed to identify TRVs. For birds, Wiemeyer et al. (1986) exposed domestic chicken, eastern screech-owl, black vulture, American kestrel, Japanese quail, and European starling to various dose rates of sodium cyanide to observe lethality. Cyanide was administered via oral capsule. Exposed birds showed acute median lethal dose (LD50) values ranging from 4.0 to 21 mg/kg bw. All observations of toxic outcomes were determined the same day as the oral

dose; therefore, the single dose was treated as equivalent to a daily dose. The geometric mean LD50 across the test species was 10.4 mg/kg bw-day. Based on this study, a NOAEL TRV of 0.14 mg/kg bw-day was calculated by applying a factor of 1/100 to the geometric mean value. The LOAEL TRV was assumed to be a factor of 10 times higher than the NOAEL, and therefore, was set at 1.40 mg/kg bw-day.

For mammals, two studies evaluated exposures of rats and mice to cyanide (Tewe and Maner 1981; NTP 1993). Tewe and Maner (1981) exposed rats to a diet containing 500 parts per million of cyanide for 19 days before mating and throughout gestation and lactation. The offspring were also fed a diet at this concentration for 28 days post-weaning. There was a slight reduction in body weight gain in the offspring, less than 7 percent relative to control, but this was not considered to be biologically significant. Based on this study, Sample et al. (1986) derived a NOAEL TRV of 68.7 mg/kg bw-day using the food consumption rates and body weights reported in the Tewe and Maner (1981) study.

NTP (1993) performed a 13-week drinking water study during which rats and mice were exposed to control water and water containing 3, 10, 30, 100, or 300 mg/L of sodium cyanide. Reproduction, growth, and survival endpoints were monitored throughout the study. There were no statistically significant differences for any of these endpoints in female rats across all doses. Male rats exhibited reproductive effects at 300 mg/L, which represented the test dose LOAEL. The next lowest dose (100 mg/L) represented the NOAEL. NTP (1993) reported that the NOAEL and LOAEL doses were equivalent to 4.50 and 12.5 mg/kg bw-day. For mice, there were no statistically significant differences with any of the metrics across all test doses. Therefore, the maximum test dose (300 mg/L) was considered the NOAEL. NTP (1993) reported that the NOAEL dose was equivalent to 28.8 mg/kg bw-day. A LOAEL cannot be calculated from this study.

Combining the results of the Tewe and Maner (1981) and NTP (1993) studies yields geometric mean NOAEL and LOAEL values of 17.6 and 92.7 mg/kg bw-day.

Table 5-2 lists the avian and mammalian TRVs and their sources used in this Level III ERA. The LOAEL serves as the basis for the TRVs used in the risk characterization (Section 6).

6 ECOLOGICAL RISK CHARACTERIZATION

The exposure assessment (Section 4) and effects assessment (Section 5) are integrated in the ecological risk characterization to evaluate the potential for adverse effects for each assessment endpoint, given the assumptions built into the evaluation. The uncertainty analysis provides context for how those assumptions influence the risk estimation process. This section discusses the lines of evidence used to evaluate each assessment endpoint and determine the potential for ecological risks onsite.

6.1 TERRESTRIAL PLANT COMMUNITY

The assessment endpoint for the terrestrial plant communities focused on the following question:

Are the concentrations of COPECs in surface soil likely to adversely affect the survival, growth, or reproduction of the terrestrial plant community present in the forest habitat at the facility?

For the measurement endpoint, the EPCs were compared against the selected ESLs protective of plants (Section 5.1). Table 6-1 presents the HQs calculated for terrestrial plants. The surface soil evaluation included forest soil and riparian/ditch-adjacent soil. Zinc exceeded the plant screening level, with an HQ of 12.

The highest zinc concentrations were measured in samples collected in 2024 from four locations along the Adjacent Ditch (SS#1, SS#2, SS#3, and SS#4) followed by samples collected at the outfalls (Outfall #1, Outfall #2, and Outfall #3). Concentrations at these locations were 1 to 3 orders of magnitude greater than concentrations measured in other surface soil samples. None of the three forest samples had zinc concentrations that exceeded the ESLs protective of plants. The absence of exceedances in the forest soil data indicates that zinc-related risk to terrestrial plants is limited to the riparian/Adjacent Ditch area and does not extend into the forest exposure area.

For some COPECs (total cyanide and chromium), plant-specific ESLs are not available. The highest concentrations of cyanide and chromium were also measured in the samples collected at the four locations next to the Adjacent Ditch (described above for zinc).

Based on these results, the potential for risk to terrestrial plants is associated with zinc measured at a few locations near the Adjacent Ditch and outfalls. Concentrations detected in the three forested surface soil samples did not exceed the plant-specific screening levels for zinc; therefore, zinc in the forest area does not pose a risk to the survival, growth, or reproduction of the terrestrial plant community.

6.2 SOIL INVERTEBRATE COMMUNITY

The assessment endpoint for the soil invertebrate communities focused on the following question:

Are the concentrations of COPECs in surface soil likely to adversely affect the survival, growth, or reproduction of the soil invertebrate community present in the forest habitat at the facility?

For the measurement endpoint, EPCs were compared with the selected ESLs protective of soil invertebrates (Section 5.1). Table 6-1 presents the hazard quotients calculated for soil invertebrates. The surface soil evaluation includes forest soil and riparian/ditch-adjacent soil. In the forest soil data set, which includes three sample locations with two depth intervals each, neither zinc nor total cyanide exceeded screening levels protective of terrestrial invertebrates.

In the riparian/ditch-adjacent soil samples, chromium and zinc exceeded soil invertebrate screening levels, with HQs of 88 and 16, respectively. Cadmium and lead did not exceed soil invertebrate screening levels. Cadmium and chromium were only measured in the soil samples collected around the Adjacent Ditch, (i.e., not in the three forest soil samples), so potential risk to terrestrial invertebrates in the forested area from those COPECs remains unknown.

As described for terrestrial plants above, the highest concentrations of these metals were measured in samples collected at four locations along the Adjacent Ditch in 2024 (locations SS#1, SS#2, SS#3, and SS#4) followed by samples collected at the outfalls (Outfall #1, Outfall #2, and Outfall #3). For zinc, invertebrate risk estimates are primarily driven by localized riparian/ditch-adjacent samples rather than by forest soil conditions.

Invertebrate-specific ESLs are not available for total cyanide. As noted for terrestrial plants, the highest concentrations of cyanide were also measured in the samples collected at the four locations next to the Adjacent Ditch (described above for zinc).

Based on these results, the potential for risk to soil invertebrates is associated with chromium and zinc primarily measured at a few locations near the Adjacent Ditch and outfalls. The forest soil samples did not exceed terrestrial invertebrate screening levels for total cyanide or zinc.

6.3 BENTHIC INVERTEBRATE COMMUNITY

The assessment endpoint for the benthic invertebrate communities focused on the following question:

Are the concentrations of COPECs in the sediment in the Adjacent Ditch and the adjacent wetland and in Sawmill Creek downgradient of the site likely to adversely affect the survival, growth, or reproduction of the benthic invertebrate community?

For the measurement endpoint, EPCs were compared with the selected sediment ESLs (Section 5.1). Table 6-2 summarizes HQs calculated for benthic invertebrates exposed to pre-interim action Adjacent Ditch sediment, wetland sediment, and downgradient surface sediment.

The Adjacent Ditch sediment HQs represent pre-interim action conditions because the interim actions excavated the upper 0 to 0.5 ft. of material and placed a liner in the channel, thereby removing or isolating the shallow interval most relevant to benthic direct-contact exposure. For retained COPECs with sediment ESLs, HQs greater than 1 were calculated for copper, selenium, zinc, total cyanide, and total PCB Aroclors; arsenic, chromium, and lead had HQs of approximately 1. The total cyanide HQ is 724 and the zinc HQ is 41. The highest concentrations of these COPECs were generally clustered in the ditch near the outfalls to the east of the facility. Because ditch surface sediments were excavated and the ditch was lined as part of the interim action, the pre-interim action sediment HQs should not be interpreted as representative of current ditch exposure conditions.

Wetland sediment HQs were calculated using ESVs and then refined using RSVs, when available. The total cyanide HQ was 386, and the refined zinc HQ was 17. Free cyanide and selenium had HQs of 1 and <1, respectively. The highest concentrations of zinc and cyanide were in the eastern area of the wetland, near the bike path. In downgradient sediment, the total cyanide HQ was 103, and the refined zinc HQ was 3. The highest concentrations of COPECs were measured in samples collected at T2-375-S (zinc). Concentrations of total cyanide measured throughout the downgradient exposure area ranged widely, up to 350 mg/kg (T2-1375-N).

The elevated total cyanide HQs in sediment are interpreted as conservative indicators of potential cyanide-related exposure. Total cyanide may include bound cyanide forms that are less bioavailable than free cyanide and therefore less likely to cause toxicity. Because sediment free cyanide HQs were approximately 1 for both onsite and downgradient sediment, the total cyanide results identify areas where cyanide warrants continued consideration, but they should not be interpreted as direct evidence that all measured cyanide is present in a readily toxic form. The highest concentrations of COPECs were measured in 2024 at locations in the Adjacent Ditch and in the adjacent wetland. Surface sediment COPEC concentrations measured in 2025 were typically lower.

Based on these results, the potential for risk to benthic invertebrates in wetland and downgradient surface sediment is related to total cyanide and zinc based on concentrations measured at locations in the wetland and downgradient in Sawmill Creek.

6.4 AQUATIC LIFE

The assessment endpoint for the aquatic life communities focused on the following question:

Are the concentrations of COPECs in surface water in the Adjacent Ditch, adjacent wetland, and Sawmill Creek downgradient of the site likely to adversely affect the survival, growth, or reproduction of the fish, amphibian, and aquatic invertebrate communities?

For the measurement endpoint, the surface water EPCs were compared against the selected surface water ESLs (Section 5.1). Table 6-2 summarizes HQs calculated for aquatic life exposure to surface water from pre-interim action Adjacent Ditch surface water, wetland surface water, and downgradient surface water.

The Adjacent Ditch surface water HQs represent pre-interim action conditions. For those COPECs for which aquatic ESLs are available, HQs exceed 1 for 9 metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, and zinc) and cyanide (total and free). HQs ranged from 4 for arsenic to 923 for mercury.

In the wetland, the HQ for free cyanide was 11 and total cyanide had an HQ of 675. The HQs for lead and zinc were 1 and 25, respectively. The highest concentrations of all COPECs were measured at SB-29, along the eastern edge of the wetland. Free cyanide was also measured at an identically high concentration at SB-36.

Table 6-2 summarizes HQs calculated for downgradient surface water concentrations measured in Sawmill Creek. For those COPECs for which aquatic ESLs are available, HQs exceed 1 for total and free cyanide, ranging from 2 (free cyanide) to 17 (total cyanide). The highest concentrations were measured downgradient on the creek at T2-GLENVIEW (free cyanide) and at T2-1820-C (total cyanide).

Based on these results, potential risk to aquatic life is highest in pre-interim action Adjacent Ditch surface water, where cyanide and multiple metals exceeded screening levels. In the adjacent wetland, potential risk is associated primarily with cyanide and zinc, with lead approximately equal to 1. In downgradient Sawmill Creek surface water, potential risk is associated with cyanide. For cyanide, free cyanide is the most relevant indicator of potential aquatic toxicity because it represents the more bioavailable and toxic fraction. Total cyanide provides supporting information on cyanide occurrence and distribution but may include bound cyanide forms that are less likely to cause adverse effects. Therefore, the much larger total cyanide HQs are interpreted as conservative indicators and are considered in context with the lower free cyanide HQs.

6.5 TERRESTRIAL WILDLIFE POPULATIONS

The assessment endpoint for the terrestrial wildlife populations focused on the following question:

Are the concentrations of COPECs in the food items (e.g., terrestrial invertebrates) modeled from onsite surface soil near the Adjacent Ditch and outfalls, or downgradient in

Sawmill Creek, likely to adversely affect the survival, growth, or reproduction of birds and mammals?

To answer this question, the surface soil data were first screened against ESLs protective of birds and mammals. COPECs that exceeded these ESLs were carried forward and evaluated for potential risk to the selected terrestrial receptors using a food web model.

6.5.1 Wildlife Benchmark Screen

Table 6-1 presents the HQs calculated for wildlife based on exposures to COPECs in surface soil. Based on ESLs protective of birds, the 95UCLs exceed ESLs for four COPECs: total cyanide, chromium, lead, and zinc. For mammals, the 95UCL exceeds the respective ESL for zinc. These COPECs, along with cadmium because it was retained as a surface soil COPEC, are further evaluated in the terrestrial food web model described below.

6.5.2 Terrestrial Food Web Model

The Level III ERA compares modeled ADDs of soil COPECs for the three bird receptors to avian LOAEL TRVs to determine the potential for adverse effects on survival, growth, or reproduction. The feeding strategies represented by these three receptors are omnivore (American robin), invertivore (American woodcock), and top carnivore (red-tailed hawk). Table 6-3 presents results for both pre- and post-interim action conditions. For the post-interim action conditions, which represent current conditions, LOAEL HQs exceed 1 as follows:

- American robin HQs exceed 1 for total cyanide, chromium, lead, and zinc.
- American woodcock HQs exceed 1 for total cyanide, lead, and zinc.
- Red-tailed hawk HQs are equal to or less than 1 for all COPECs.

The conservative calculations and exposure assumptions used in the dietary exposure model identify the potential for ecological effects to omnivorous and invertivorous birds that forage onsite.

Modeled ADDs of soil COPECs for the two mammal receptors were compared to the LOAEL TRVs to determine the potential for adverse effects on survival, growth, or reproduction. The feeding strategies represented by these two receptors are invertivore (short-tailed shrew) and top carnivore (red fox). For the post-interim action conditions, which represent current conditions, LOAEL HQs exceed 1 as follows:

- Short-tailed shrew HQs exceed 1 for total cyanide, lead, and zinc.
- Red fox HQs are equal to or less than 1 for all COPECs.

The conservative calculations and exposure assumptions used in the dietary exposure model identify the potential for adverse effects in small invertivorous mammals that forage onsite.

However, these risk estimates reflect highly conservative, worst-case scenarios and likely overestimate actual exposure conditions, particularly at the population level. The main reasons for this conclusion are as follows:

- The EPCs do not account for bioavailability. Bioavailability, is the degree to which a chemical that is present in an environmental medium, such as soil, can separate from that medium and become available for uptake into an ecological receptor. In basic soils (pH greater than 7), some metals more readily bind and complex, making them less bioavailable.
- COPEC concentrations in plants and soil invertebrates were based on highly conservative uptake models because site-specific measured tissue residue data were not available.
- The uptake equations used in these calculations are additionally conservative because they do not consider site-specific factors likely to affect the bioavailability of COPECs in soil, such as organic carbon content of the soil. Hence, these estimated tissue concentrations likely overestimated the tissue EPCs and, by extension, ADDs and HQs.
- The TRVs, and associated HQs, are based on laboratory data obtained on individual test organisms. Therefore, the wildlife HQs presented in this ERA are predictive of individual-level effects and may overestimate population-level impacts.

6.6 SEMI-AQUATIC WILDLIFE POPULATIONS

The assessment endpoint for the semi-aquatic wildlife populations focused on the following question:

Are the concentrations of COPECs in the food items (e.g., fish tissue) modeled from wetland sediment or downgradient in Sawmill Creek likely to adversely affect the survival, growth, or reproduction of birds and mammals?

To answer this question, COPECs that are known to be of concern to wildlife and/or PBTs were evaluated for potential risk to the selected semi-aquatic wildlife receptors using a food web model.

Modeled ADDs of sediment COPECs for two bird receptors were compared with avian LOAEL TRVs to determine the potential for adverse effects on survival, growth, or reproduction. The two bird receptors represent herbivorous (mallard) and piscivorous (great blue heron) feeding strategies. The two mammal receptors represented herbivorous (muskrat) and piscivorous (mink) feeding strategies.

For semi-aquatic wildlife, total cyanide HQs provide a conservative line of evidence for potential exposure through sediment-derived food-web pathways. Free cyanide dietary HQs were less than 1 for the semi-aquatic wildlife receptors, indicating that the more directly

bioavailable cyanide fraction did not drive modeled wildlife risk. Accordingly, total cyanide HQs are interpreted in context with cyanide speciation, food-web modeling assumptions, and other site-specific exposure uncertainties.

Table 6-4 lists wildlife HQs for the pre-interim action Adjacent Ditch sediment and wetland sediment COPECs. Because the interim actions excavated the upper 0 to 0.5 ft. of material and placed a liner in the Adjacent Ditch channel, the pre-interim action ditch exposure estimates should not be interpreted as representative of current ditch exposure conditions. Key findings for wetland sediment are as follows:

- Great blue heron HQs only exceed 1 for total cyanide.
- Mallard and mink HQs are less than 1.
- Muskrat HQs exceed 1 for selenium.

Table 6-5 presents wildlife HQs for the downgradient sediment with key findings as follows:

- Great blue heron HQs only exceed 1 for total cyanide.
- For mallard, mink, and muskrat, all HQs are equal to or less than 1.

As discussed for benthic invertebrates, the locations with the highest sediment concentrations varied across the adjacent wetland and downgradient in the creek. Concentrations were generally lower downstream in the creek. Under current wetland and downgradient exposure conditions, potential risks to semi-aquatic wildlife are limited to the great blue heron and muskrat; the pre-interim action Adjacent Ditch evaluation also produced an HQ greater than 1 for mink but is not representative of current ditch exposure conditions. As noted for terrestrial wildlife, these risk estimates reflect highly conservative, worst-case scenarios and likely overestimate actual exposure conditions, particularly at the population level. The main reasons for this conclusion are as follows:

- COPEC concentrations in plant and fish tissue were based on highly conservative uptake models because site-specific measured tissue residue data were not available.
- The uptake equations used in these calculations are additionally conservative because they do not consider site-specific factors likely to affect COPEC bioavailability in sediment, such as organic carbon content. Therefore, estimated tissue concentrations likely overestimate tissue EPCs and, by extension, ADDs and HQs.
- The TRVs, and associated HQs, are based on laboratory data obtained on individual test organisms. Therefore, the wildlife HQs presented in this ERA are predictive of individual-level effects and may overestimate population-level impacts.

6.7 UNCERTAINTY ANALYSIS

Uncertainty is inherent in ERAs because of incomplete knowledge about key input parameters. Knowledge gaps are addressed through the use of conservative assumptions. Major uncertainties associated with this ERA are discussed below.

6.7.1 Uncertainties Associated with the Ecological Receptors

Terrestrial plants were evaluated in this ERA, and the assessment identified low potential for risk from zinc outside localized areas near the Adjacent Ditch and outfalls. Metal phytotoxicity is typically evident as reduced growth, reduced germination, or chlorosis. However, during previous site visits, field personnel did not observe stained or stressed vegetation or other signs of chemical stressors. Although these observations are qualitative, they do not suggest that vegetation growing in the forested upland habitat is visibly impaired or stressed. Therefore, it is unlikely that plants have been adversely affected at the community level.

Aquatic plants were not evaluated separately in this ERA because ESLs specific to aquatic plants are not available. However, similar to the terrestrial habitat observations noted above, no evidence of stained or stressed vegetation or other signs of chemical stressors was apparent during site visits. Therefore, it is unlikely that aquatic plants in the adjacent wetland or in the creek have been adversely affected.

Biological community data provide useful field-based context for downgradient Sawmill Creek but are limited to one Ohio EPA-recommended downstream location; therefore, these data support interpretation of downgradient conditions but do not directly characterize onsite aquatic habitats or the full spatial extent of potential aquatic community response.

The terrestrial wildlife receptor species (American robin, short-tailed shrew, American woodcock, red fox, and red-tailed hawk) represent different feeding guilds. Although all are native to the region, none have been observed in onsite habitat at the facility. Similarly, for the semi-aquatic wildlife receptor species (mallard duck, great blue heron, muskrat, and mink), not all species have been observed in onsite or downgradient habitats. Therefore, the receptor species are best viewed as proxies for any species in a given feeding guild that regularly forages in the habitats onsite and/or downgradient habitats.

This ERA conservatively assumes that both mink and great blue heron consume fish caught onsite and in the creek downgradient of the site. However, given the size of the creek, fish are not likely to be abundant onsite or downgradient close to the site. Therefore, the piscivorous-receptor exposure assumption may overestimate the amount of fish that these receptors could consume from the site and nearby downgradient habitat.

6.7.2 Uncertainties in the COPEC Selection Process

Some chemicals were analyzed in site media but fell into one of the following three categories:

- Detected in at least one sample but lacking an ESL
- Not detected in any samples but with the method detection limit exceeding the screening benchmark
- Not detected in any samples and lacking a screening benchmark.

In all cases, data limitations preclude their quantitative evaluation. Although these data gaps introduce uncertainty, inclusion of these chemicals is unlikely to materially change the conclusions of this ERA.

6.7.3 Uncertainties in the Ecological Exposure Assessment

Separating onsite terrestrial soil into forest soil and riparian/ditch-adjacent soil reduces uncertainty in interpreting terrestrial risk. The highest-concentration samples occur near the Adjacent Ditch and outfalls and may bias combined onsite EPCs high if applied across the broader terrestrial habitat. The forest soil data set includes three sample locations with two depth intervals each and did not exceed terrestrial screening levels, supporting negligible risk in the forest exposure area. Therefore, terrestrial risk estimates driven by riparian/ditch-adjacent samples should not be interpreted as representative of the forested upland habitat.

Additionally, the sediment in the Adjacent Ditch has a high degree of embeddedness, which may reduce the potential for ecological exposure to sediment containing COPECs. The assumption that all environmental material contains COPECs overestimates EPCs and associated HQs and, therefore, overestimates the potential risk at the site.

The current Level III ERA distinguishes pre-interim action Adjacent Ditch, adjacent wetland, and downgradient aquatic exposure areas in the sediment and surface water risk characterization. This distinction reduces uncertainty by separating the pre-liner Adjacent Ditch condition from the wetland and downgradient exposure areas that remain relevant to current aquatic exposure. Because the Adjacent Ditch was lined as part of the 2024 emergency/interim response action, pre-interim action ditch HQs should not be interpreted as fully representative of current ditch conditions. The onsite aquatic results remain conservative for identifying whether aquatic COPECs warrant further consideration, with current risk-management focus placed on the adjacent wetland and any remaining complete exposure pathways.

Cyanide speciation is an additional source of uncertainty. Free cyanide is the more directly bioavailable and toxic form in surface water, whereas total cyanide can include cyanide bound in metal complexes or other forms that are less bioavailable. Use of total cyanide in sediment

and wildlife modeling is therefore conservative and may overestimate potential toxicity where a substantial portion of cyanide is present in bound or otherwise less bioavailable forms.

Exposure estimates for wildlife feeding on invertebrates, plants, fish, and small mammals rely on literature-derived uptake equations, rather than concentrations measured in diet items. Because these equations are not facility-specific and do not reflect local conditions, they tend to overestimate COPEC concentrations in food items, resulting in overestimates of ADDs and HQs.

In addition, EPCs do not account for bioavailability, which is the degree to which a chemical present in an environmental medium, such as soil, can separate from that medium and become available for uptake by an ecological receptor. In basic soils (pH greater than 7), some metals more readily bind and form complexes, making them less bioavailable.

ESLs were not adjusted for bioavailability based on organic carbon or acid-volatile sulfides. In soil and sediment with high organic carbon content or sediment with high acid volatile sulfides relative to simultaneously extracted metals, metals are more likely to be bound and therefore less bioavailable to ecological receptors.

Exposure estimates assume 100 percent bioavailability of COPECs (i.e., complete mass transfer of COPECs from soil and food items to receptors). Reported metal bioavailability in soil is substantially less than 100 percent, including 3.6 percent for cadmium (Prokop et al. 2003), 50 percent for chromium (Witmer et al. 1991), 44 percent for zinc (Ma and Rao 1997), and 60 percent for arsenic (USEPA 2012). Dietary exposure estimates also assume COPECs are 100 percent bioavailable in plants, terrestrial invertebrates, and small mammals. Together with other conservative assumptions in the model and calculations, these assumptions result in overestimated exposures and HQs.

The AUF, which represents the proportion of the habitat used by the receptor species, is derived from literature sources that may not accurately reflect site-specific conditions. Variability in habitat preferences, seasonal movements, and territorial behaviors among species introduces moderate uncertainty. The AUF assumptions may overestimate or underestimate exposure due to site-specific movement patterns.

The ERA did not evaluate two other potentially complete but minor exposure pathways: dermal uptake and inhalation by birds and mammals. USEPA (2003b) reports that insufficient information is available to evaluate dermal exposures, estimating that for most chemicals, this pathway contributes from <1 to 11 percent of the total risk. The presence of feathers and fur is expected to greatly limit dermal uptake. USEPA (2003b) considers that burrowing animals may be exposed via inhalation of VOCs and some of the more volatile PAHs; however, VOCs and volatile PAHs were not retained as site-related Level III ERA COPECs, and the retained terrestrial COPECs are not meaningfully volatile. Even if volatile COPECs were present, quantitative evaluation of inhalation exposures would be constrained by very limited available species-specific information on inhalation rates. Finally, USEPA (2003b) estimates that

inhalation of chemicals associated with dust particles is expected to contribute less than 0.1 percent of total risk. Hence, this ERA assumes that inhalation and dermal uptake represent minor exposure pathways relative to food and incidental soil ingestion. Omitting these two exposure pathways is therefore unlikely to affect the conclusions of this ERA.

6.7.4 Uncertainties with the Ecological Toxicity Assessment

The ESLs for surface soil, surface sediment, and surface water are literature-derived toxicity values that do not account for facility-specific factors that influence bioavailability, such as organic carbon or acid-volatile sulfides. These benchmarks tend to overestimate the toxicity.

Assessment endpoints focus on preserving populations and communities, whereas wildlife TRVs and toxicity-based sediment benchmarks are typically derived from laboratory data obtained on individual test organisms. Extrapolating individual-level laboratory effects to population-level effects in natural settings is common in ERA, but it is conservative and highly uncertain. Laboratory and field conditions differ substantially, and individual-level effects rarely translate to proportional population-level responses. Populations can compensate for the loss of individual organisms through compensatory or depensatory mechanisms, and multiple feedback loops (Suter et al. 2005). Therefore, the HQs presented in this ERA are predictive of individual-level effects and are likely to overestimate population- or community-level responses.

The wildlife TRVs apply equally to all bird species or to all mammal species (i.e., the same COPEC-specific TRVs are used for the American robin and the red-tailed hawk, as well as for the red fox and the short-tailed shrew). This practice implies that all birds (or all mammals) are equally sensitive to a given COPEC, even though the toxicity literature shows large variations in species sensitivity. It is unknown how much more or less sensitive the receptor species evaluated in this ERA are relative to the laboratory test species used in the study that underpins each TRV. Using one-size-fits-all TRVs adds considerable uncertainty about the actual toxicity of a COPEC to a given target wildlife receptor. The TRV-derivation process is purposely conservative, such that TRVs are more likely to overestimate effects, ultimately yielding conservative HQs (Allard et al. 2010).

6.7.5 Uncertainties with the Risk Characterization

The risk characterization for the terrestrial wildlife receptors and benthic invertebrates is based on HQs, which are ratios of potential exposure to potential toxicity. An HQ does not represent the probability that an adverse effect will occur, nor should it be assumed to be proportional to the magnitude of an effect. An HQ greater than 1 indicates that modeled exposure exceeds a literature-derived toxicity threshold. Although higher HQs reflect greater differences between potential exposure and toxicity, doubling an HQ does not mean that the potential for adverse effects also doubles. The relationship among HQs is not necessarily linear; therefore, HQs have inherent uncertainty.

In summary, the cumulative effect of these uncertainties yields conservative HQs. Actual effects from ecological exposure to COPECs are very likely lower than the estimates presented in this report. This is particularly relevant for cyanide, where total cyanide HQs may appear large but do not necessarily represent the fraction that is bioavailable or toxic; free cyanide provides the more direct line of evidence for aquatic toxicity.

7 SUMMARY AND CONCLUSIONS

This Level III ERA evaluates the potential for adverse ecological effects associated with COPECs in surface soil, surface sediment, and surface water at the MSC facility in Canfield, Ohio, and downgradient portions of Sawmill Creek. The assessment was prepared to address Ohio EPA requirements following the July 2024 release of process fluids to the Adjacent Ditch and subsequent emergency response actions. The Level III ERA builds on prior Level I and Level II ERAs that identified ecological habitat, potentially complete exposure pathways, and multiple COPECs warranting more refined evaluation for the MSC parcel, the adjacent wetland, and a portion of Sawmill Creek downgradient of the MSC site.

The assessment area includes terrestrial forested and scrub-shrub habitat on the MSC parcel, aquatic habitat associated with onsite ditches and the adjacent wetland, and portions of Sawmill Creek and associated riparian habitat downgradient of the site. Ecological receptors evaluated include terrestrial plant and soil invertebrate communities, benthic invertebrates, aquatic life, terrestrial wildlife, and semi-aquatic wildlife. Representative wildlife receptors were selected to reflect relevant feeding guilds and exposure pathways, including omnivorous, invertivorous, herbivorous, piscivorous, and carnivorous birds and mammals.

The ecological CSM identified potentially complete exposure pathways for terrestrial and aquatic receptors. Terrestrial plants and soil invertebrates were evaluated for direct contact with surface soil; benthic invertebrates were evaluated for direct contact with surface sediment; fish, amphibians, and aquatic invertebrates were evaluated for direct contact with surface water; and wildlife were evaluated for dietary exposure through modeled ingestion of plants, invertebrates, fish, small mammals, and surface water, as well as incidental ingestion of soil or sediment. Groundwater, subsurface soil, air, dermal uptake, and inhalation were either not relevant or were considered minor exposure pathways relative to direct contact and dietary ingestion.

COPECs were identified by comparing maximum detected concentrations and EPCs to ecological screening levels and, where applicable, regional background concentrations of soil and sediment. In surface soil, retained COPECs included total cyanide, cadmium, chromium, lead, and zinc, with the highest concentrations generally measured near the Adjacent Ditch and outfalls. In surface sediment, retained COPECs included cyanide and selected metals in the wetland and downgradient Sawmill Creek, and cyanide, selected metals, and total PCB Aroclors in pre-interim action Adjacent Ditch sediment. In surface water, the pre-interim action Adjacent Ditch data showed HQs greater than 1 for cyanide and multiple metals. In the adjacent wetland, HQs were driven primarily by cyanide and zinc, with lead approximately equal to 1. Downgradient surface water HQs were driven by cyanide.

For terrestrial plant communities, the assessment identified negligible risk in the forest area. The forest soil data set includes three sample locations, each evaluated at two depth intervals, and no forest soil concentrations exceeded terrestrial screening levels. Potential terrestrial risk

is instead limited to riparian/ditch-adjacent soil near the Adjacent Ditch and outfalls, where zinc and chromium concentrations were elevated relative to screening levels. These findings indicate localized potential for adverse effects to terrestrial plants and soil invertebrates in the riparian/ditch-adjacent area, but do not indicate risk in the forested terrestrial habitat.

For benthic invertebrates, pre-interim action Adjacent Ditch sediment showed the greatest potential risk associated with retained COPECs, including cyanide, selected metals, and total PCB Aroclors. Those results reflect the pre-interim action ditch condition and are not representative of the current excavated and lined ditch habitat. The adjacent wetland remains a complete exposure area and represents a moderate potential risk area, driven mainly by zinc and cyanide-related results. Downgradient sediment in Sawmill Creek showed fewer retained COPECs and generally lower concentrations, although arsenic, zinc, and cyanide remained relevant in some samples. Importantly, free cyanide HQs were much lower than total cyanide HQs.

For aquatic life, the pre-interim action Adjacent Ditch surface water data show the highest and broadest exceedances, with HQs greater than 1 for cyanide and multiple metals. Current ditch aquatic exposure conditions have been changed by excavation and lining, so those pre-interim action results should not be interpreted as representative of current ditch conditions. In the adjacent wetland, cyanide and zinc remain the primary surface-water considerations. Downgradient Sawmill Creek surface water is driven by cyanide and does not have retained metal COPECs. As with sediment, free cyanide is the more relevant toxicity metric, while total cyanide is best interpreted as a conservative supporting indicator of cyanide occurrence and distribution.

Wildlife risk estimates were developed using conservative food web models. For terrestrial wildlife, modeled exposures indicated potential risk to small, lower-trophic-level receptors such as the American robin, American woodcock, and short-tailed shrew, whereas upper-trophic-level receptors such as the red-tailed hawk and red fox were not predicted to be at risk. For semi-aquatic wildlife, current wetland and downgradient exposure conditions identified potential risk for great blue heron based primarily on total cyanide, and for muskrat in the adjacent wetland based on selenium. Because free cyanide is the toxicity-relevant cyanide fraction and free cyanide HQs were not elevated in the semi-aquatic wildlife evaluation, the total cyanide wildlife results should be interpreted as conservative. Pre-interim action Adjacent Ditch results also showed some elevated HQs, including for mink, but those results are not representative of current ditch exposure conditions. Mallard HQs were below levels of concern.

The risk estimates are intentionally conservative and likely overestimate actual ecological risks. Major conservative assumptions include use of upper-bound exposure concentrations, modeled rather than measured tissue concentrations, assumed year-round site use, no adjustment for site-specific bioavailability, and reliance on TRVs derived from laboratory studies of individual organisms. Field observations did not indicate visibly stressed terrestrial or aquatic vegetation. Habitat conditions, limited creek size, sediment embeddedness, and

likely reduced metal bioavailability provide additional context suggesting that population- and community-level effects may be lower than the screening-based estimates indicate.

Overall, the Level III ERA indicates that potential ecological risks are not uniformly distributed across the assessment area. The highest potential risks are associated with localized areas near the outfalls, pre-interim action Adjacent Ditch sediment and surface water, and the adjacent wetland, where retained COPEC concentrations are greatest. Downgradient portions of Sawmill Creek generally show lower concentrations and fewer retained COPECs, although cyanide and selected sediment COPECs continue to warrant consideration. Because interim response actions lined the Adjacent Ditch, the aquatic exposure pathway represented by the pre-liner ditch data has been changed, and risk associated with the Adjacent Ditch should not be considered fully representative of current ditch conditions.

The July 2025 biological community data provide an additional line of evidence for interpreting potential downgradient risks in Sawmill Creek. At the Ohio EPA-recommended downstream sampling location, habitat was rated excellent, the fish community was rated fair, and the benthic community was rated good. Although these data are limited to one downstream location and do not characterize onsite aquatic habitats, they support the conclusion that downgradient Sawmill Creek does not show broad aquatic community impairment despite conservative chemical-screening exceedances.

Key conclusions are summarized below:

- Forest soil presents negligible ecological risk because concentrations did not exceed terrestrial screening levels.
- Adjacent Ditch riparian/ditch-adjacent soil remains the primary terrestrial exposure area with elevated HQs. The interim actions implemented in the Adjacent Ditch and near Outfall #2 addressed several source-area locations with elevated concentrations and changed aquatic exposure conditions in the Adjacent Ditch. However, the pre- and post-interim action terrestrial evaluation does not show uniform reductions in HQs; post-interim action HQs remain elevated for some lower-trophic-level birds and mammals exposed to riparian/ditch-adjacent soil.
- In the adjacent wetland, potential risk is moderate and is driven primarily by zinc and cyanide in sediment and surface water. Where cyanide is a major contributor, free cyanide should be given greater weight than total cyanide because free cyanide is the more bioavailable and toxic fraction, whereas total cyanide may include bound forms that are less likely to cause adverse effects. The selenium HQ for muskrat is 2, indicating limited potential for risk in the adjacent wetland.
- Downgradient Sawmill Creek sediment generally contains fewer retained COPECs and lower concentrations than onsite sediment, although arsenic, zinc, and cyanide remain relevant in some locations.

-
- Surface water HQs for aquatic life show the highest and broadest exceedances in pre-interim action Adjacent Ditch surface water, where cyanide and multiple metals exceeded screening levels. In the adjacent wetland, the primary surface-water considerations are cyanide and zinc. Downgradient Sawmill Creek surface water is driven by cyanide and does not have retained metal COPECs.
 - Biological community sampling at the Ohio EPA-recommended downstream Sawmill Creek location showed excellent habitat, a fair fish community, and a good benthic community, providing an additional field line of evidence that downgradient conditions do not indicate broad aquatic community impairment.
 - Wildlife and community-level risk estimates are conservative because they rely on upper-bound exposure assumptions, modeled tissue concentrations, literature-derived toxicity values, and no site-specific bioavailability adjustments.
 - Observed field conditions, including the absence of visible vegetation stress and the limited aquatic habitat available in portions of Sawmill Creek, suggest that actual population- or community-level effects may be lower than estimated.

Taken together, these results support a focused interpretation of ecological risk. The ERA identifies localized areas associated with the Adjacent Ditch soil and the adjacent wetland as the primary areas for continued ecological evaluation and risk-management consideration, while recognizing that the combined onsite aquatic results also include pre-liner Adjacent Ditch data that are not fully representative of current ditch exposure conditions. Downgradient Sawmill Creek has lower estimated potential risk than onsite aquatic areas, with remaining risk estimates driven primarily by cyanide in sediment and surface water and modeled exposure to sensitive semi-aquatic receptors. The available lines of evidence do not support a conclusion of broad ecological impairment across the assessment area; instead, they indicate that potential risks are concentrated in areas with the highest measured COPEC concentrations and should be interpreted in light of the conservative assumptions used in the assessment.

8 REFERENCES

Allard, P., A. Fairbrother, B.K. Hope, R.N. Hull, M.S. Johnson, L. Kapustka, G. Mann, B. McDonald, and B.E. Sample. 2010. Recommendations for the development and application of wildlife toxicity reference values. *Integrated Environmental Assessment and Management* 6(1):28–37. doi:10.1897/IEAM_2009-010.1.

August Mack. 2024. Initial Site Investigation Report. Material Sciences Corporation Site, Canfield, Ohio.

August Mack. 2026. RCRA Facility Investigation, Material Sciences Corporation, 460 West Main Street, Canfield, Ohio, OEPA Number: OHD000810283, June 24.

Bechtel-Jacobs. 1998. Empirical Models for the Uptake of Inorganic Chemicals from Soil by Plants. Prepared for the U.S. Department of Energy Office of Environmental Management. BJC/OR-133.

Efroymson, R.A., G.W. Suter II, B.E. Sample, and D.S. Jones. 1997. Preliminary remediation goals for ecological endpoints. ES/ER/TM-162/R2. Oak Ridge National Laboratory, Oak Ridge, TN. August.

Health Canada. 2023. Risk Management Approach for Cyanides. Environment and Climate Change Canada. Health Canada February.

Integral. 2025a. Level I ecological risk assessment. Material Sciences Corporation parcel and adjacent wetland, Canfield, Ohio. Prepared for August Mack Environmental. Integral Consulting Inc., Chagrin Falls, OH. February.

Integral. 2025b. Level II Ecological Risk Assessment: Material Sciences Corporation Parcel and Adjacent Wetland, Canfield, Ohio. Revision 1. Prepared for August Mack Environmental, Lewis Center, OH. Prepared by Integral Consulting Inc, Chagrin Falls, OH. August.

Integral. 2025c. Level I Ecological Risk Assessment. Sawmill Creek, Canfield, Ohio. Prepared for August Mack Environmental. Prepared by Integral Consulting Inc., Chagrin Falls, OH. May.

Integral. 2025d. Level II Ecological Risk Assessment: Sawmill Creek, Canfield, Ohio. Prepared for August Mack Environmental, Lewis Center, OH. Prepared by Integral Consulting Inc, Chagrin Falls, OH. May.

LANL. 2024. ECORISK Database version 4.4. Los Alamos National Laboratory.

Larsen, M. 2005. Plant uptake of cyanide. DTU Environment. Available online at https://backend.orbit.dtu.dk/ws/portalfiles/portal/127332128/MR2005_044.pdf.

Ma, L.Q., and G.N. Rao. 1997. Chemical fractionation of cadmium, copper, nickel, and zinc in contaminated soils. *Journal of Environmental Quality* 26(1):259–264.

MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. *Archives of Environmental Contamination and Toxicology* 39:20–31.

MAD Scientist Associates LLC. 2025. Results from 2025 Sawmill Creek Fish, Macroinvertebrates, and Habitat Assessment, Sawmill Creek, Mahoning County, Ohio. December.

NTP. 1993. Toxicity studies of sodium cyanide (CAS No. 143-33-9) administered in drinking water to F344/N rats and B6C3F1 mice. Toxicity Report Series No. 37. NIH Publication 94-3386. National Toxicology Program, Research Triangle Park, NC. November.

Ohio EPA. 2009. Use of background for remedial response purposes. Ohio EPA Division of Environmental Response and Revitalization Assessment, Cleanup and Reuse Section, Remedial Response Program. August 21.

Ohio EPA. 2018. Guidance for conducting ecological risk assessments. Ohio Environmental Protection Agency. <https://epa.ohio.gov/static/Portals/30/rules/RR-031.pdf>.

Ohio EPA. 2022. Evaluation of Background Metal Soil Concentrations. Division of Environmental Response and Revitalization Voluntary Action Program. Updated January 12.

Ohio EPA and MSC. 2024. Administrative consent order / site-related regulatory document for the Material Sciences Corporation facility, Canfield, Ohio.

ORNL RAIS Online Database. Available online at <https://rais.ornl.gov/>. Accessed July 2026.

Prokop, Z., P. Čupr, V. Zlevorová-Zlámáliková, J. Komárek, L. Dušek, and I. Holoubek. 2003. Mobility, bioavailability, and toxic effects of cadmium in soil samples. *Environmental Research* 91:119–126.

RIVM. 2001. Ecotoxicological serious risk concentrations for soil, sediment and (ground) water: Updated proposals for first series of compounds. National Institute for Public Health and the Environment.

Sample, B.E., D.M. Opresko, and G.W. Suter II. 1996. Toxicological benchmarks for wildlife: 1996 revision. ES/ER/TM-86/R3. Oak Ridge National Laboratory, Oak Ridge, TN. June.

Sample, B.E., J.J. Beauchamp, R.A. Efroymsen, G.W. Suter, and T.L. Ashwood. 1998. Development and validation of bioaccumulation models for earthworms. Oak Ridge National Laboratory. ES/ER/TM-220.

Suter, G.W. II, S.B. Norton, and A. Fairbrother. 2005. Individuals versus organisms versus populations in the definition of ecological assessment endpoints. *Integrated Environmental Assessment and Management* 1(4):397–400.

Tewe, O.O., and J.H. Maner. 1981. Long-term and carry-over effect of dietary inorganic cyanide (KCN) in the life cycle performance and metabolism of rats. *Toxicology and Applied Pharmacology* 58(1):1–7.

USEPA. 1993. Wildlife exposure factors handbook. Volume I of II. EPA-600-R-93-187a. U.S. Environmental Protection Agency.

USEPA. 1995. Great Lakes Water Quality Initiative Technical Support Document for the Procedure to Determine Bioaccumulation Factors. EPA-820-B-95-005. U.S. Environmental Protection Agency.

USEPA. 1997. Ecological risk assessment guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. EPA-540-R-97-006. U.S. Environmental Protection Agency.

USEPA. 1999. Screening level ecological risk assessment protocol for hazardous waste combustion facilities. Volume 3, Appendices B to H. EPA/530/D-99/001C. Available at <https://www.csu.edu/cerc/researchreports/documents/ScreeningLevelEcologicalRiskAssessmentProtocolHazardousWasteCombustionFacilitiesVolume3.pdf> U.S. Environmental Protection Agency.

USEPA. 2001. Planning for ecological risk assessment: Developing management objectives. EPA 630-R-01-001A. U.S. Environmental Protection Agency.

USEPA. 2003a. USEPA Region 5 RCRA ecological screening levels (RSLs). EPA Region 5 Waste Program. August. <https://archive.epa.gov/region5/waste/cars/web/pdf/ecological-screening-levels-200308.pdf>.

USEPA. 2003b. Guidance for developing ecological soil screening levels (Eco-SSLs). Attachment 1-3. Evaluation of Dermal Contact and Inhalation Exposure Pathways for the Purpose of Setting Eco-SSLs. OSWER Directive 92857-55. U.S. Environmental Protection Agency. November 2003.

USEPA. 2007. Attachment 4-1. Guidance for developing ecological soil screening levels (Eco-SSLs). Exposure factors and bioaccumulation models for derivation of wildlife Eco-SSLs. OSWER Directive 9285.7-55. U.S. Environmental Protection Agency.

USEPA. 2011. National Recommended Water Quality Criteria - Aquatic Life Criteria Table. Updated June 9, 2026. <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#table>.

USEPA. 2012. Recommendations for default value for relative bioavailability of arsenic in soil. OSWER 9200.1-113. <http://www.epa.gov/superfund/bioavailability/pdfs/Arsenic%20Bioavailability%20POLICY%20Memorandum%2012-20-12.pdf>. December.

USEPA. 2018. Region 4 ecological risk assessment supplemental guidance. Interim Draft. March 2018 Update. Available at <https://www.epa.gov/risk/regional-ecological-risk-assessment-era-supplemental-guidance>. U.S. Environmental Protection Agency.

USEPA. 2019. Draft EPA Region 4 preferred parameters to be used in ecological risk assessments in Region 4. Version 10. Last Revised June 18, 2019. U.S. Environmental Protection Agency.

USEPA. 2022. ProUCL version 5.2. Available online at <https://www.epa.gov/land-research/proucl-software>.

USEPA. 2023. Ecological soil screening level (Eco-SSL) guidance and documents. Website. Last Updated May 23, 2023. Last Accessed December 4, 2023. <https://www.epa.gov/risk/ecological-soil-screening-level-eco-ssl-guidance-and-documents>.

USFWS. 2007. Indiana bat-related survey or consultation guidance for Ohio; cited in footnote regarding assumed presence in suitable habitat unless presence/absence surveys document absence.

Wiemeyer, S.N., E.F. Hill, J.W. Carpenter, and A.J. Krynitsky. 1986. Acute oral toxicity of sodium cyanide in birds. *Journal of Wildlife Diseases* 22(4):538–546.

Witmer, C.M., R. Harris, and S.I. Shupack. 1991. Oral bioavailability of chromium from a specific site. *Environmental Health Perspectives* 92:105–110.

Figures

N:\GIS\Projects\Projects_4000_to_4999\CA274_AirCanfield\Mapa\Working\working.aprx Layout Name: Figure 1-1. Regional Overview 7/31/2026 3:13 PM

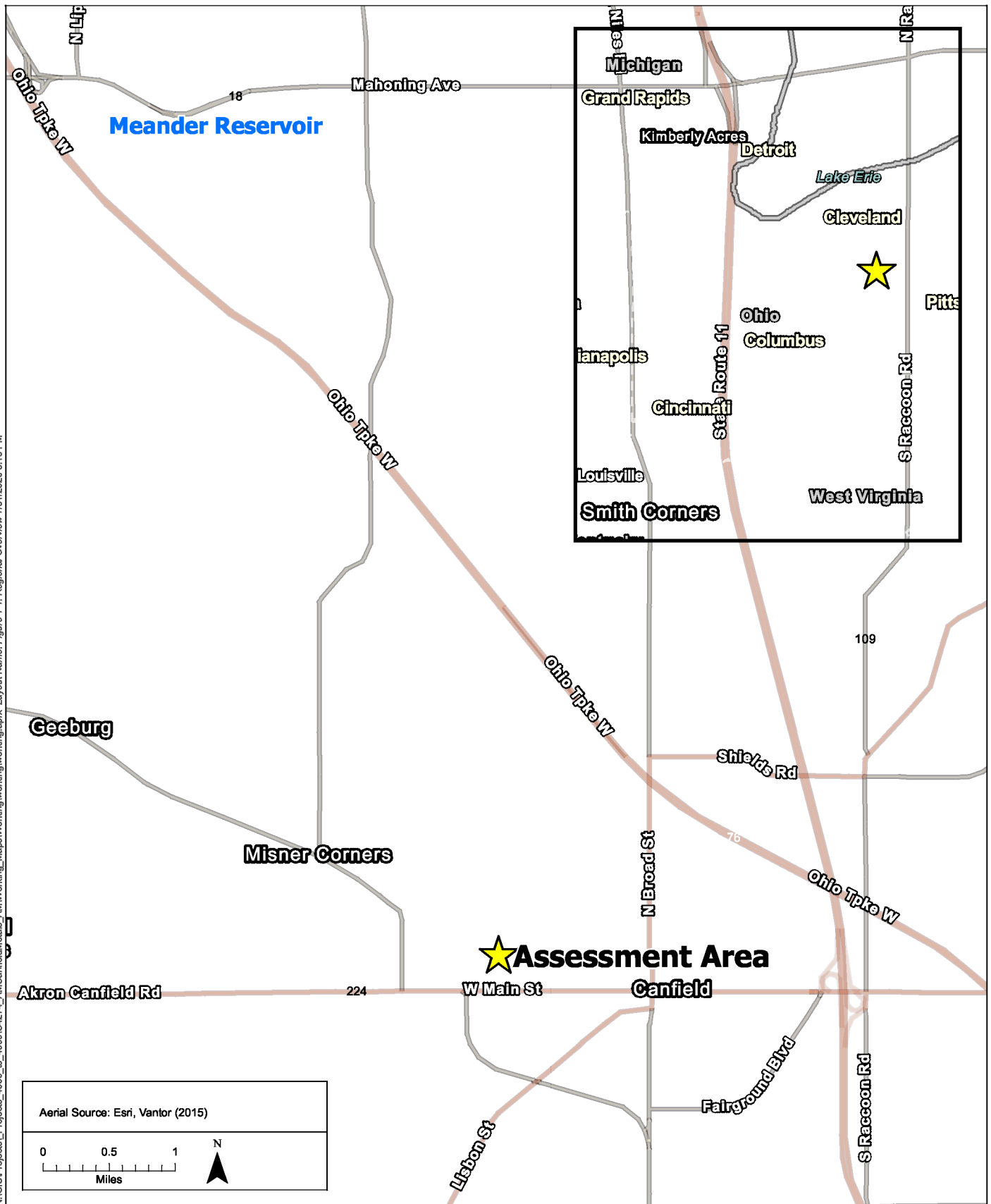


Figure 1-1.
Regional Map of Assessment Area
Canfield, Ohio

N:\GIS\Projects\Projects_4000_to_4899\CA274_AirCanfieldMetals_AM\Working_Maps\Working\working.aprx Layout Name: Figure 1-2. Local Map of Site 7/31/2026 4:19 PM

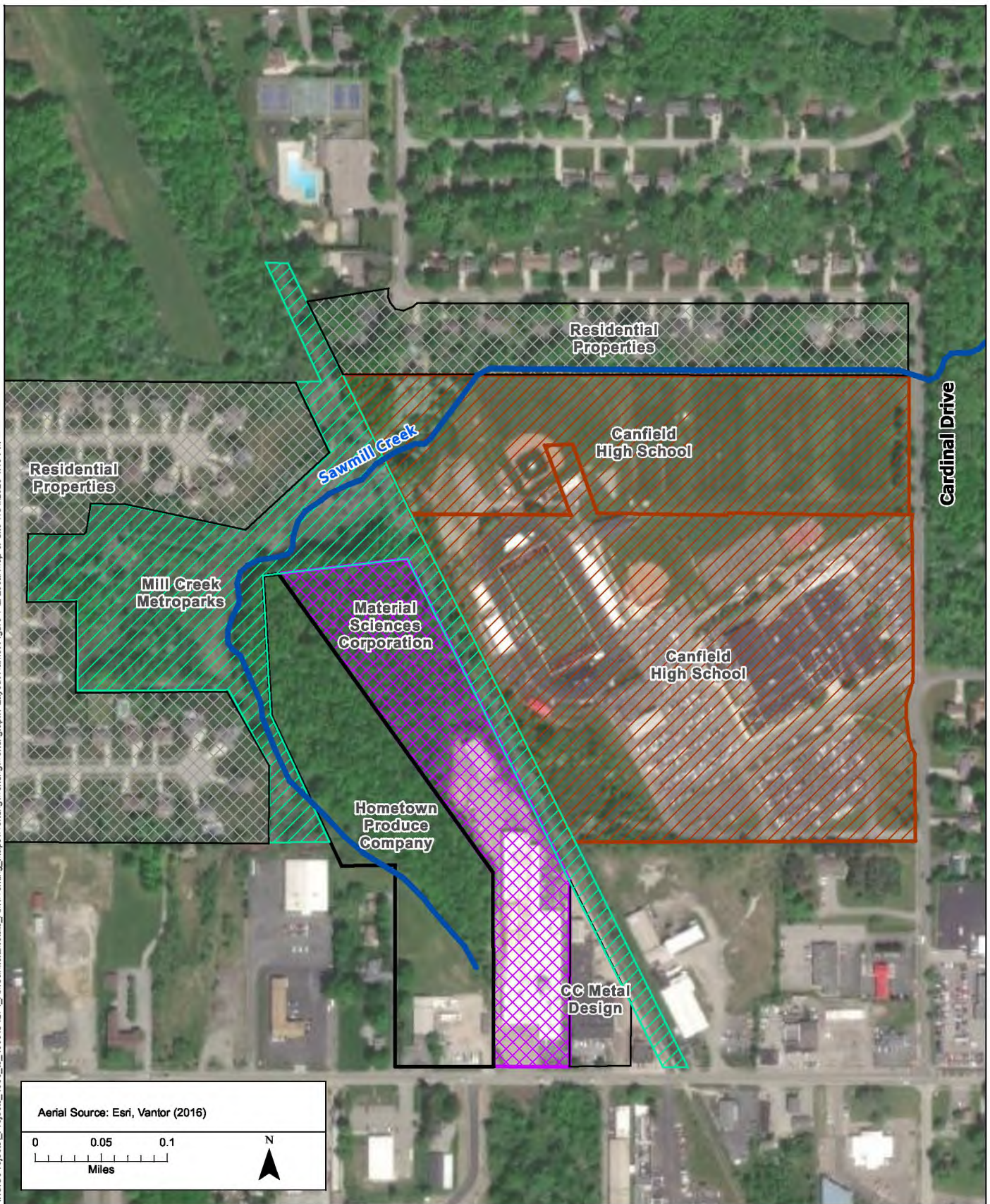


Figure 1-2.
Local Map of Assessment Area and Adjacent Properties

N:\GIS\Projects\Projects_4000_to_4999\C4274_AM\CanfieldMetals_AM\Working_Maps\Working\working.aprx Layout Name: Figure 1-3. Level III ERA Onsite Creek Exposure Unit 8/13/2026 10:55 AM

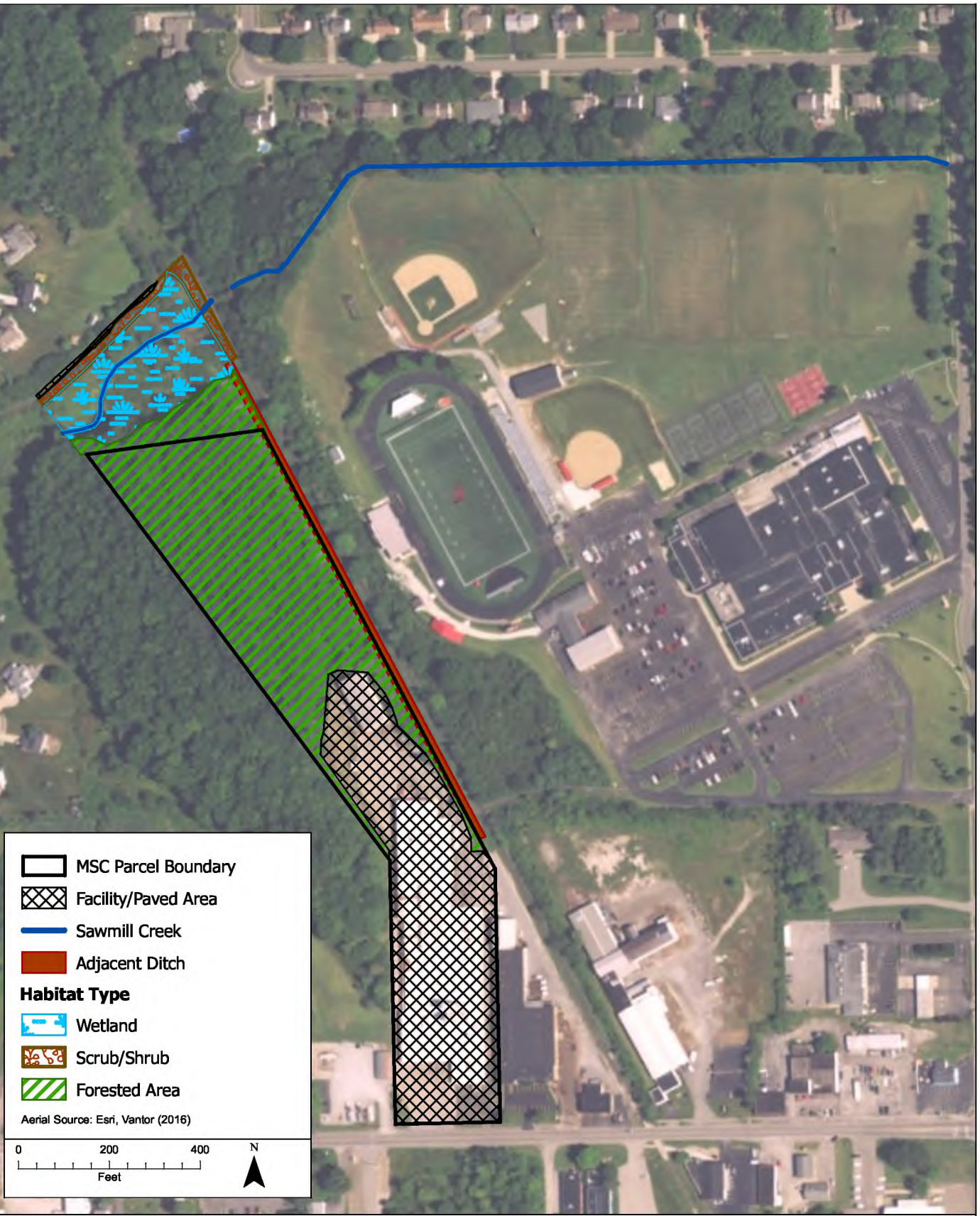


Figure 1-3.
MSC Parcel Assessment Area

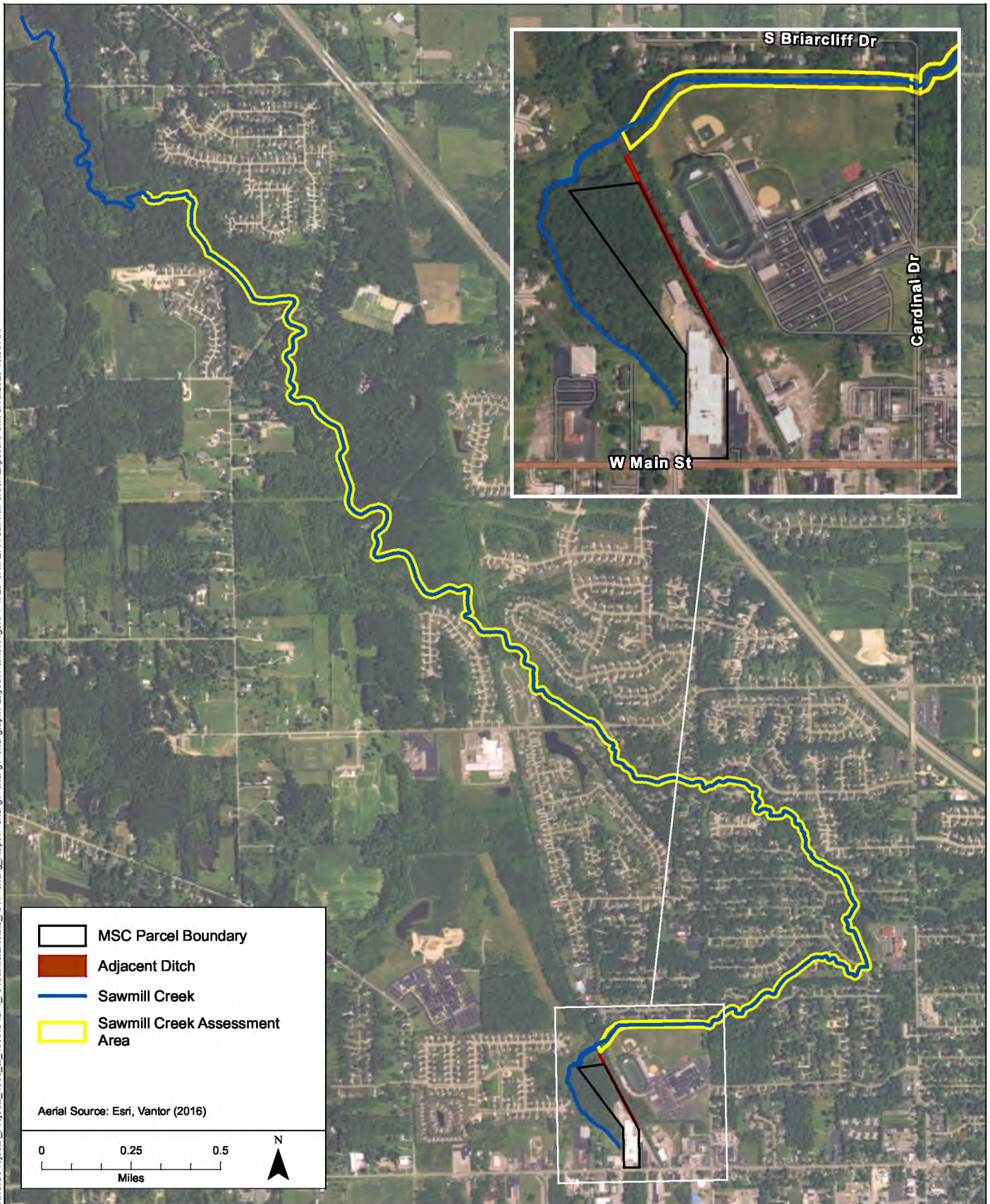
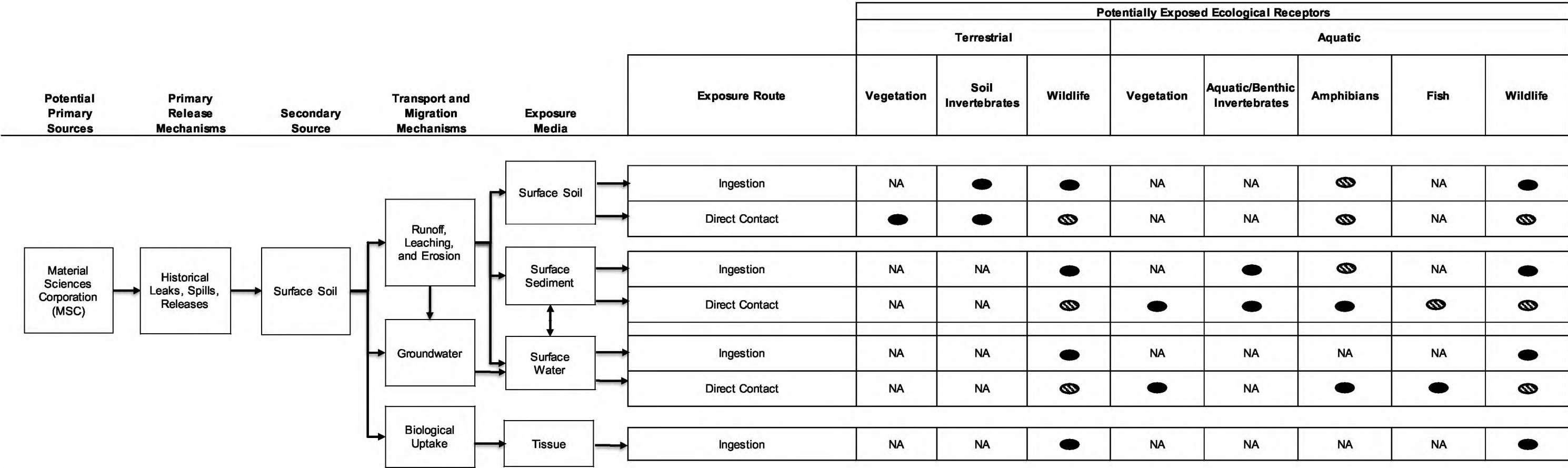


Figure 1-4.
Sawmill Creek Assessment Area (Downgradient)



Notes:
● Potentially complete and significant exposure route
▨ Exposure route potentially complete but insignificant
NA Not Applicable - receptor is not potentially exposed via this pathway

N:\GIS\Projects\Projects_4000_to_4899\4274_AM\Working_Maps\Working\working.aprx Layout Name: Figure 2-2. Sampling Locations for Onsite Soil 8/13/2026 10:55 AM

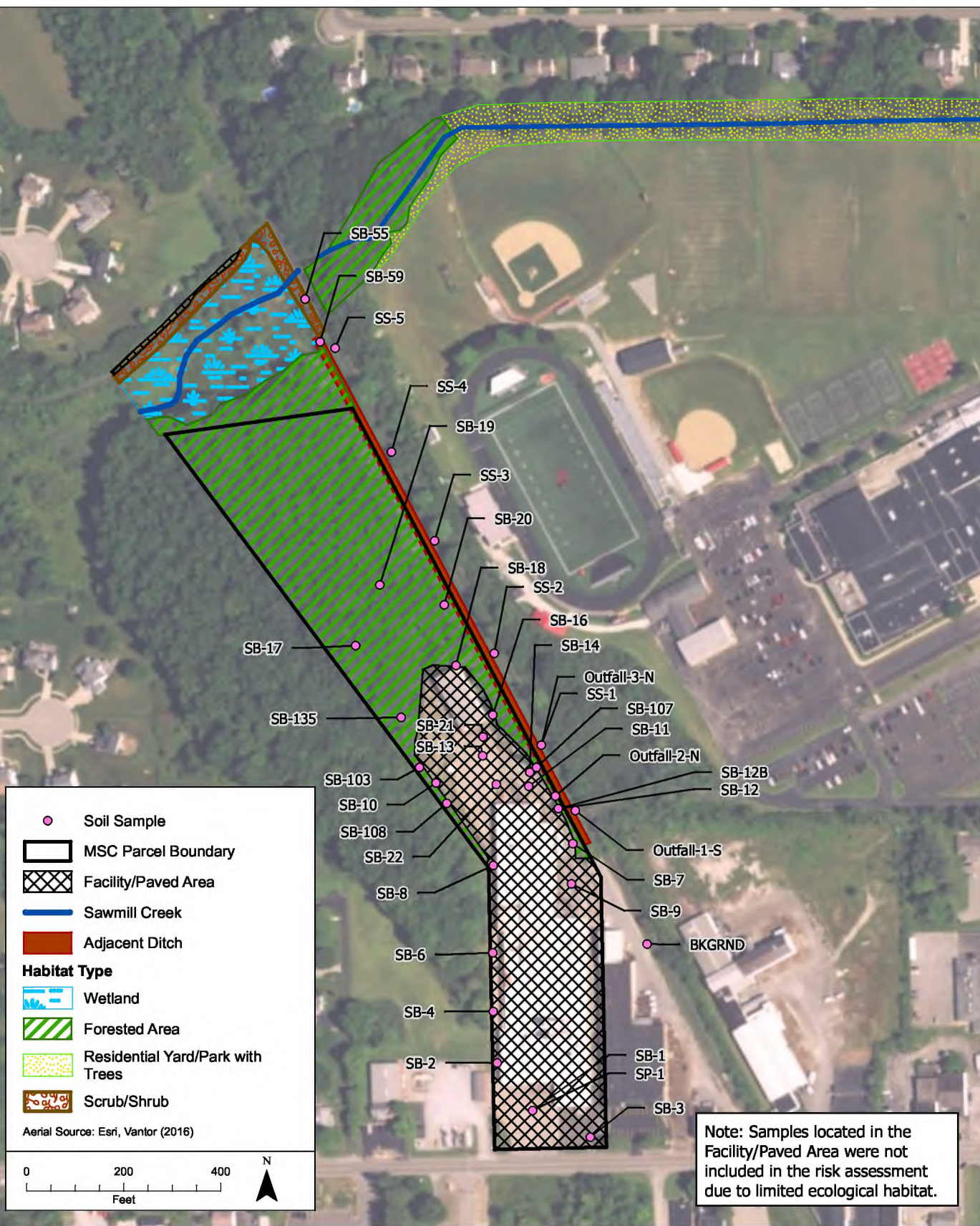


Figure 2-2.
Sampling Locations for Soil

N:\GIS\Projects\Projects_4000_to_4899\CA274_AirCanfieldMetals_AirWorking_Maps\Working\working.aprx Layout Name: Figure 2-3. Onsite Sediment [Welland] 8/13/2026 10:55 AM

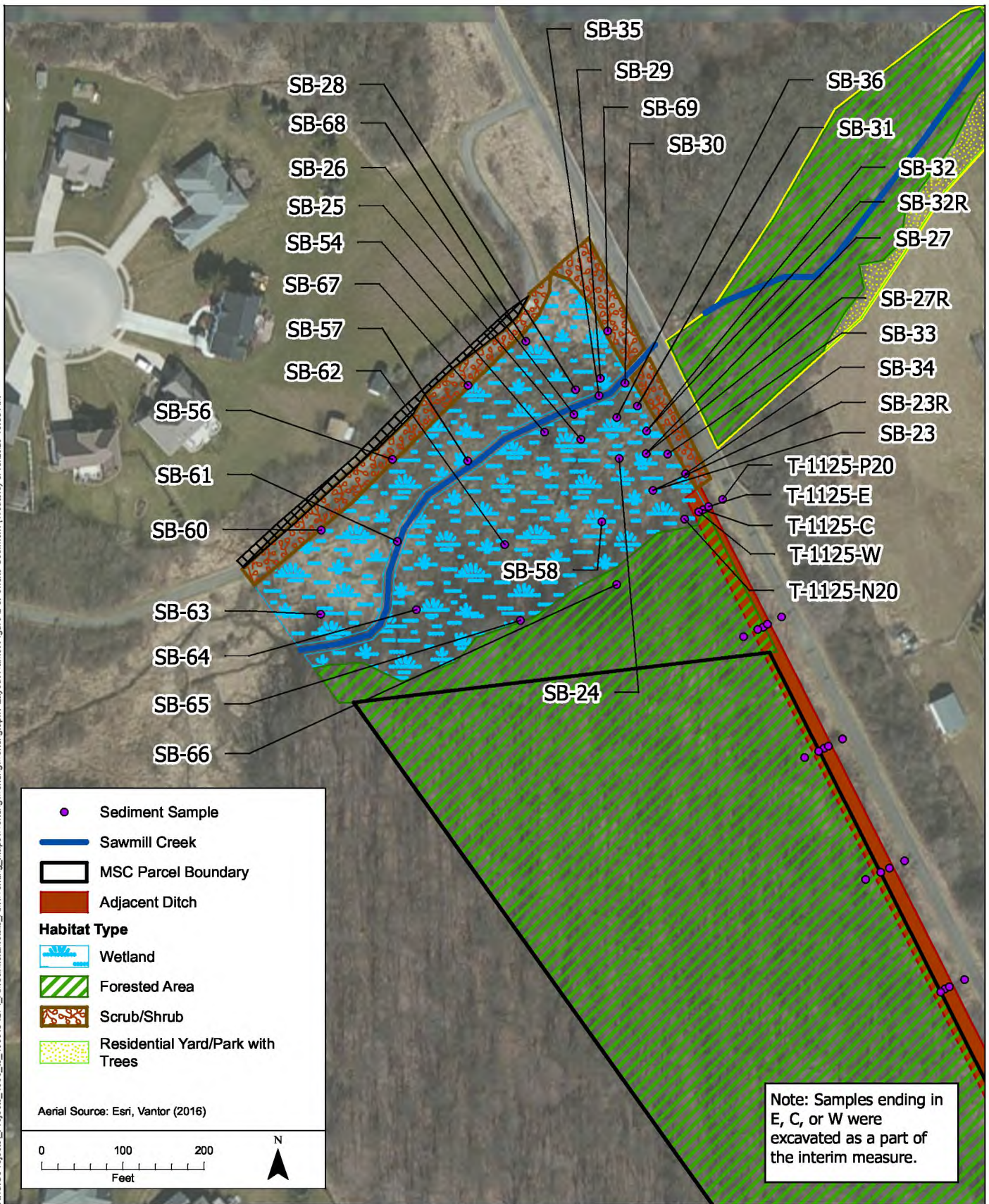


Figure 2-3a.
Sampling Locations for Wetland Sediment

N:\GIS\Projects\Projects_4000_to_4899\4274_AM\Working_Maps\Working\working.aprx Layout Name: Figure 2-3. Onsite Sediment (Ditch) 8/13/2026 10:55 AM

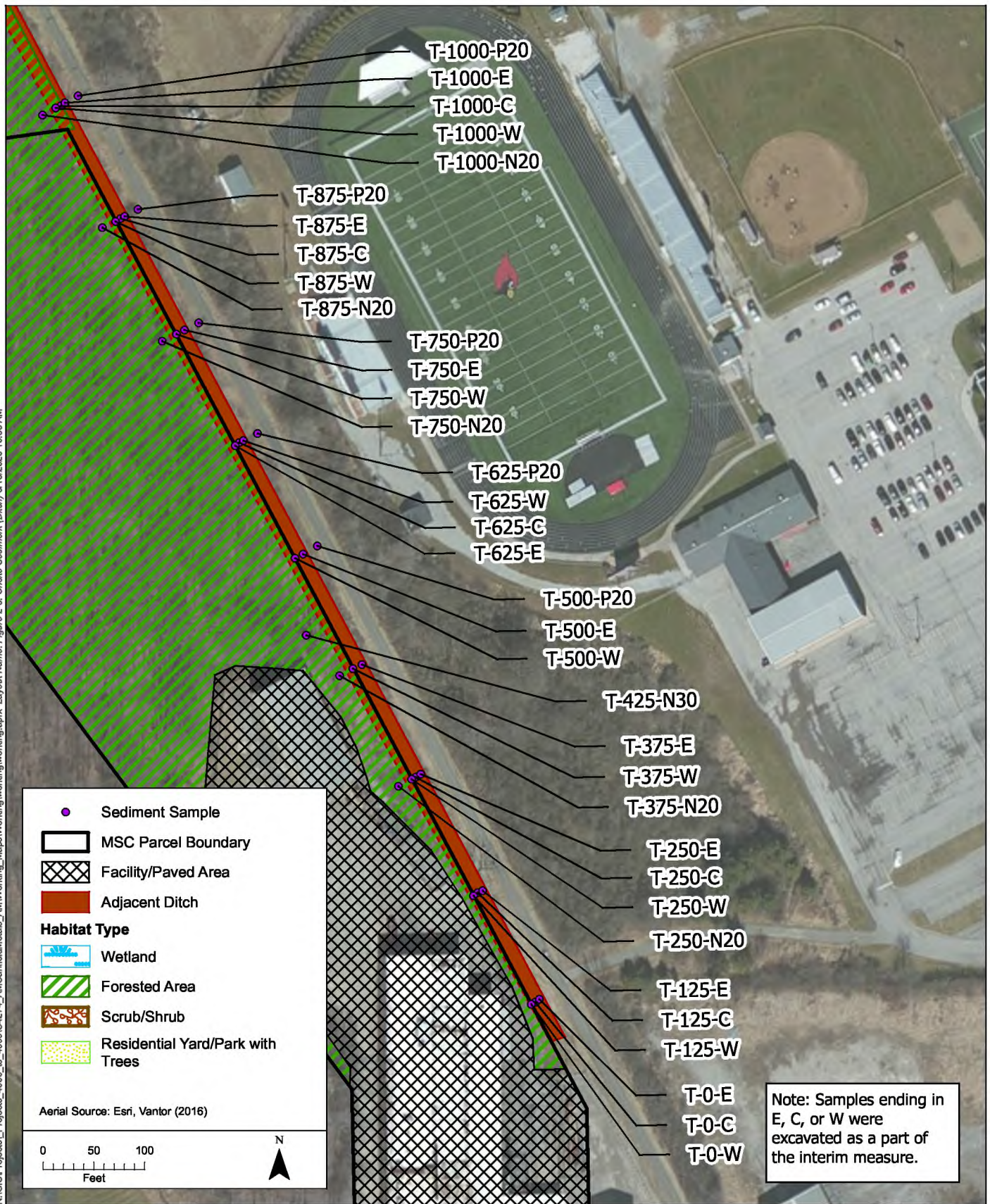


Figure 2-3b.
Sampling Locations for Adjacent Ditch Sediment

N:\GIS\Projects\Projects_4000_to_4899\104274_AM\Working_Maps\Working\working.aprx Layout Name: Figure 2-4. Onsite Surface Water 8/13/2026 10:55 AM

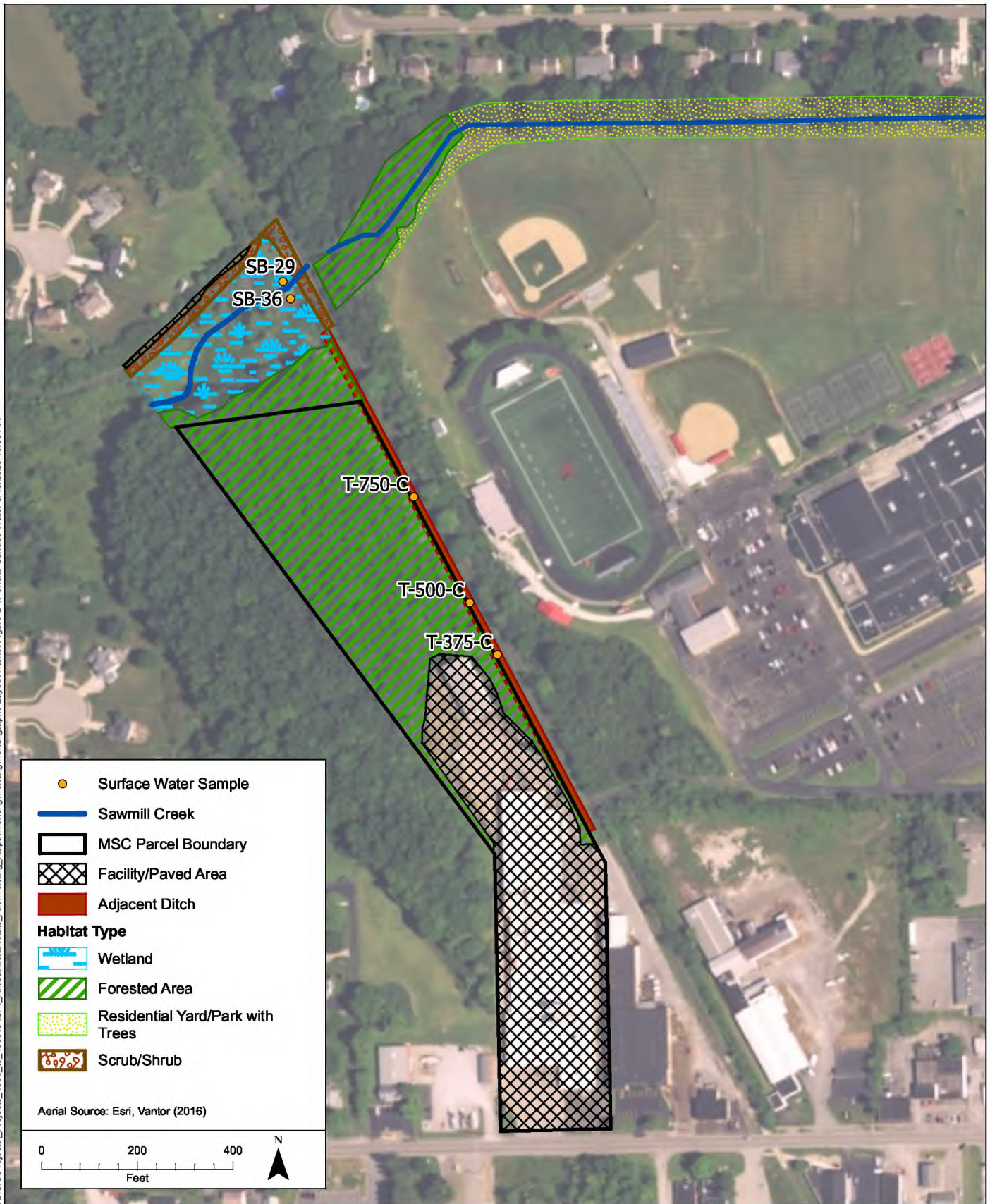


Figure 2-4.
Sampling Locations for Wetland and Adjacent Ditch
Surface Water

N:\GIS\Projects\Projects_4000_to_4999\C4274_AM\Canfield\Mapa\Working\working.aprx Layout Name: Figure 2-5 B132026 10:30 AM

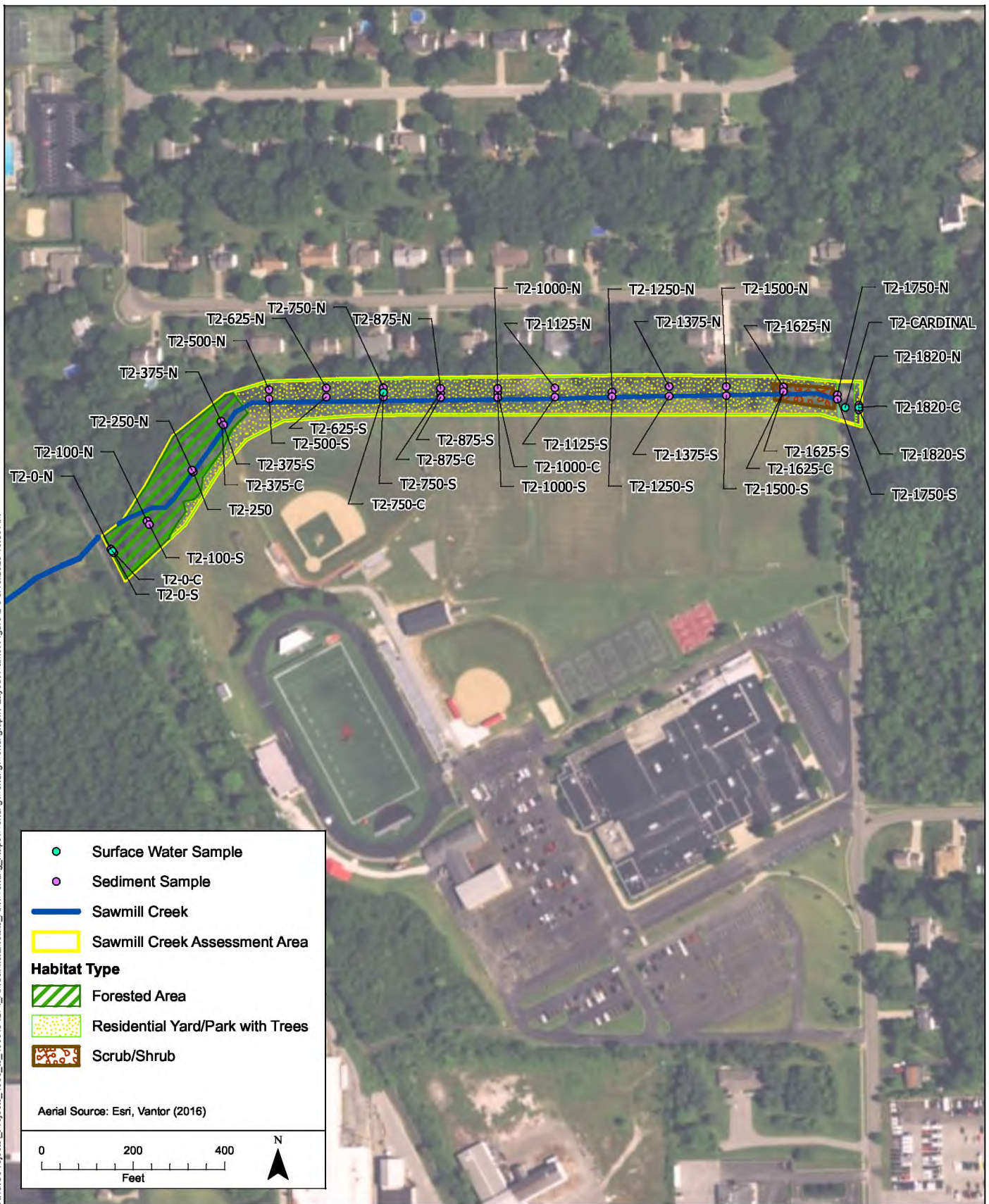


Figure 2-5.
Sampling Locations for Sediment and Surface Water in
Sawmill Creek

N:\GIS\Projects\Projects_4000_to_4999\C4274_AM\Canfield\Mapa\Working\working.aprx Layout Name: Figure 2-6 8/13/2026 10:30 AM



Figure 2-6.
Sampling Locations for Sediment and Surface Water in
Sawmill Creek (Downgradient)

Tables

Table 2-1. Assessment and Measurement Endpoints

Receptor	Assessment Endpoint	Measurement Endpoint
Terrestrial Vegetation	Assess the potential for adverse effects (survival, growth, and reproduction) to the terrestrial plant community exposed to COPECs in the uplands surface soil.	Compare concentrations of COPECs measured in surface soil to ecological screening values, when available, or literature-based benchmarks protective of vegetation.
Terrestrial Soil Invertebrate Community	Assess the potential for adverse effects (survival, growth, and reproduction) to the soil invertebrate community exposed to COPECs in the uplands surface soil.	Compare concentrations of COPECs measured in surface soil to ecological screening values, when available, or literature-based benchmarks protective of soil invertebrates.
Benthic Invertebrates	Assess the potential for adverse effects (survival, growth, and reproduction) to the benthic invertebrate community exposed to COPECs in sediment of the ditch onsite and the adjacent wetland and in Sawmill Creek downgradient of the site.	Compare concentrations of COPECs measured in surface sediment to ecological screening values, when available, or literature-based benchmarks protective of benthic invertebrates.
Fish, Amphibians, and Aquatic Invertebrates	Assess the potential for adverse effects (survival, growth, and reproduction) to the fish, amphibians, and aquatic invertebrate communities exposed to COPECs in surface water of the ditch onsite and the adjacent wetland and in Sawmill Creek downgradient of the site.	Compare concentrations of COPECs measured in surface water to ecological screening values, when available, or literature-based benchmarks protective of fish, amphibians, and aquatic invertebrates.
Wildlife	Assess the potential for adverse effects (survival, growth, and reproduction) to populations of terrestrial and semi-aquatic wildlife exposed to COPECs in surface soil of the upland or sediment in the ditch and in Sawmill Creek downgradient of the site.	Compare concentrations of COPECs measured in surface soil, surface sediment, and surface water to ecological screening values protective of wildlife. Compare the average daily dietary doses calculated for avian and mammalian representative species based on the ingestion of COPECs in food items (e.g., plant and fish tissues) to toxicity reference values protective of wildlife.

Notes:

COPEC = chemical of potential ecological concern

Table 3-1. Ecological Screening Values for Surface Soil

Chemical Class	Chemical	Screening Value (mg/kg)	Screening Value Source
Inorganics	Free Cyanide	1	LANL (2024)
Inorganics	Total Cyanide	0.9	Health Canada (2023)
Metals	Arsenic	18	USEPA (2023)
Metals	Cadmium	0.36	USEPA (2023)
Metals	Chromium	0.4	Efroymson et al. (1997)
Metals	Chromium Hexavalent (VI)	130	USEPA (2023)
Metals	Copper	28	USEPA (2023)
Metals	Lead	11	USEPA (2023)
Metals	Mercury	0.00051	Efroymson et al. (1997)
Metals	Nickel	38	USEPA (2023)
Metals	Silver	4.2	USEPA (2023)
Metals	Zinc	46	USEPA (2023)

Notes

-- not applicable

NSV = no screening value

Table 3-2. Ecological Screening Values for Surface Sediment and Surface Water

Chemical Class	Chemical	Sediment (mg/kg)		Surface Water (µg/L)	
		Screening Value	Source	Screening Value	Source
Inorganics	Free Cyanide	1	LANL (2024)	12	OAC 3745-1-35
Inorganics	Total Cyanide	1	RIVM (2001)	12	OAC 3745-1-35
Metals	Arsenic	9.79	MacDonald et al. (2000)	148	OAC 3745-1-35
Metals	Barium	20	USEPA (2018)	220	USEPA (2018)
Metals	Cadmium	0.99	MacDonald et al. (2000)	1.37	OAC 3745-1-35
Metals	Chromium	43.4	MacDonald et al. (2000)	42	OAC 3745-1-35
Metals	Chromium Hexavalent (VI)	660	LANL (2024)	NSV	--
Metals	Copper	31.6	MacDonald et al. (2000)	16.9	OAC 3745-1-35
Metals	Lead	35.8	MacDonald et al. (2000)	7.7	OAC 3745-1-35
Metals	Mercury	0.18	MacDonald et al. (2000)	0.0013	OAC 3745-1-35
Metals	Selenium	0.72	USEPA (2018)	5	OAC 3745-1-35
Metals	Silver	1	USEPA (2018)	3.2	USEPA 2011
Metals	Zinc	121	MacDonald et al. (2000)	216	OAC 3745-1-35
PCBs	1,1'-Biphenyl	0.198	USEPA (2018)	6.5	USEPA (2018)
PCBs	Aroclor 1016	0.059	LANL (2024)	NSV	--
PCBs	Aroclor 1221	NSV	--	NSV	--
PCBs	Aroclor 1232	NSV	--	NSV	--
PCBs	Aroclor 1242	0.059	LANL (2024)	NSV	--
PCBs	Aroclor 1248	0.0081	LANL (2024)	NSV	--
PCBs	Aroclor 1254	0.053	LANL (2024)	NSV	--
PCBs	Aroclor 1260	0.059	LANL (2024)	NSV	--
PCBs	Aroclor 1262	NSV	--	NSV	--
PCBs	Aroclor 1268	NSV	--	NSV	--
PCBs	Total PCBs (ND=1/2DL)	0.0598	MacDonald et al. (2000)	0.00012	USEPA (2018)

Notes

-- not applicable

DL = detection limit

ND = not detected

NSV = no screening value

PCB = polychlorinated biphenyl

Table 3-3. COPECs Retained for Further Evaluation

Chemical Class	Chemical	Soil	Sediment			Surface Water		
			Adjacent Ditch	Wetland	Downgradient	Adjacent Ditch	Wetland	Downgradient
Inorganics	Free Cyanide	--	NE	x	x	x	x	x
Inorganics	Total Cyanide	x	x	x	x	x	x	x
Metals	Arsenic	--	x	--	x	x	--	--
Metals	Barium	--	--	--	--	x	--	--
Metals	Cadmium	x	--	--	--	x	--	--
Metals	Chromium	x	x	--	--	x	--	--
Metals	Copper	--	x	--	--	x	--	--
Metals	Lead	x	x	--	--	x	x	--
Metals	Mercury	--	--	--	--	x	--	--
Metals	Selenium	--	x	x	--	x	--	--
Metals	Zinc	x	x	x	x	x	x	--
PCBs	Total PCB Aroclors (ND = 1/2DL)	--	x	--	--	--	--	--

Notes:

Individual PCB Aroclors were evaluated as total PCBs.

COPEC = chemical of potential ecological concern

DL = detection limit

ND = nondetect

NE = not evaluated

PCB = polychlorinated biphenyl

x = chemical was retained as a COPEC

-- chemical was not retained as a COPEC

Table 3-4. COPEC Selection for Surface Soil (mg/kg)

Chemical Class	Chemical	CAS Number	Number Detected	Number of Samples	Percent Detected	FOD	Maximum Detected Concentration	Maximum Reporting Limit	Location of Maximum Detected Concentration	Screening Value	Screening Value Source ^a	PBT (Yes/No) ^b	UCL Method ^c	95UCL ^c	COPEC by Max (Yes/No)	Reason by Max	COPEC by UCL (Yes/No)	Reason by UCL	Regional Background Value	Max Exceeds Background (Yes/No)
Inorganics	Free Cyanide	57-12-5	7	48	15	7 / 48	1.2	J	SB-59	1	d	No	95% KM (t) UCL	0.978	Yes	ASV	No	BSV	NA	--
Inorganics	Total Cyanide	57-12-5	42	61	69	42 / 61	3700	18	SS-1	0.9	e	No	95% KM (t) UCL	295.5	Yes	ASV	Yes	ASV	NA	--
Metals	Arsenic	7440-38-2	12	12	100	12 / 12	24	2.4	Outfall-1-S	18	a	No	95% Student's-t UCL	16.14	Yes	ASV	No	BSV	15.1	Yes
Metals	Cadmium	7440-43-9	1	12	8	1 / 12	0.63	0.92	Outfall-2-N	0.36	a	No	NC	NC	Yes	ASV	--	--	NA	--
Metals	Chromium	7440-47-3	12	12	100	12 / 12	95	1.6	SS-1	0.4	b	No	95% Student's-t UCL	35.38	Yes	ASV	Yes	ASV	15.4	Yes
Metals	Chromium Hexavalent (VI)	18540-29-9	0	21	0	0 / 21	ND	0.59	--	130	a	No	NC	NC	No	ND	--	--	NA	--
Metals	Copper	7440-50-8	8	12	67	8 / 12	34	4.8	Outfall-1-S	28	a	No	95% KM (t) UCL	19.1	Yes	ASV	No	BSV	NA	--
Metals	Lead	7439-92-1	12	12	100	12 / 12	93	1.6	Outfall-2-N	11	a	Yes	95% Adjusted Gamma UCL	45.79	Yes	ASV	Yes	ASV	28.6	Yes
Metals	Mercury	7439-97-6	0	12	0	0 / 12	ND	0.22	--	0.00051	b	Yes	NC	NC	No	ND	--	--	0.05	NC
Metals	Nickel	7440-02-0	8	12	67	8 / 12	29	7.3	SS-4	38	a	No	95% KM (t) UCL	20.97	No	BSV	No	BSV	17.4	Yes
Metals	Silver	7440-22-4	0	12	0	0 / 12	ND	1.8	--	4.2	a	No	NC	NC	No	ND	--	--	NA	--
Metals	Zinc	7440-66-6	61	61	100	61 / 61	20000	29	SS-1	46	a	No	95% Student's-t UCL	1886	Yes	ASV	Yes	ASV	NA	--

Notes:

Bolded chemicals are retained as soil COPECs for further evaluation.

-- = not applicable

ASV = above screening value; maximum detected concentration exceeds screening value

BSV = below screening value; maximum detected concentration falls below screening value

COPEC = chemical of potential ecological concern

FOD = frequency of detection

NA = not available

NC = not calculated; there was not enough data available to calculate this value for this analyte

ND = nondetect

NSV = no screening value

PBT = persistent, bioaccumulative, toxic

UCL = upper confidence limit

Data Qualifier:

J = estimated concentration

^a Screening benchmark sources: a = USEPA 2023³; b = Efraymon et al. 1997; c = USEPA 2018⁴; d = LANL 2024; e = Health Canada 2023

^a (the selected screening values are the lowest available for birds and mammals)

^b Persistent, bioaccumulative, and toxic pollutant as identified in Ohio EPA (2018)

^c UCL was calculated using ProUCL.

Table 3-5. COPEC Selection for Wetland Sediment (mg/kg)

Chemical Class	Chemical	CAS Number	Number Detected	Number of Samples	Percent Detected	FOD	Maximum Detected Concentration	Maximum Reporting Limit	Location of Maximum Detected Concentration	Screening Value	Screening Value Source ^a	PBT (Yes/No) ^b	UCL Method ^c	95UCL ^c	COPEC by Max (Yes/No)	Reason by Max	COPEC by UCL (Yes/No)	Reason by UCL	Sediment Reference Value	Max Exceeds SRV
Inorganics	Free Cyanide	57-12-5	6	18	33	6 / 18	2.5	2.2	SB-54	1	d	No	95% KM (t) UCL	1.333	Yes	ASV	Yes	ASV	NA	--
Inorganics	Total Cyanide	57-12-5	22	32	69	22 / 32	930	71	SB-27	1	e	No	95% KM (t) UCL	386.4	Yes	ASV	Yes	ASV	NA	--
Metals	Arsenic	7440-38-2	14	14	100	14 / 14	17	3.9	SB-25	9.79	a	No	95% Students-t UCL	10.8	Yes	ASV	Yes	ASV	25	No
Metals	Barium	7440-39-3	14	14	100	14 / 14	130	51	SB-25	20	b	No	95% Students-t UCL	90.78	Yes	ASV	Yes	ASV	190	No
Metals	Cadmium	7440-43-8	14	14	100	14 / 14	0.52	J	SB-26; SB-35	0.99	a	No	95% Students-t UCL	0.445	No	BSV	--	--	0.79	No
Metals	Chromium	7440-47-3	14	14	100	14 / 14	34	2.6	SB-26	43.4	a	No	95% Students-t UCL	26.54	No	BSV	--	--	29	Yes
Metals	Chromium Hexavalent (VI)	18540-29-9	2	32	6	2 / 32	13	J	SB-27	660	d	No	95% KM (t) UCL	1.604	No	BSV	--	--	NA	--
Metals	Copper	7440-50-8	10	13	77	10 / 13	15	6.4	SB-28	31.6	a	No	95% KM (t) UCL	7.009	No	BSV	--	--	32	No
Metals	Lead	7439-92-1	14	14	100	14 / 14	30	2.6	SB-26	35.8	a	Yes	95% Students-t UCL	27.44	No	BSV	--	--	47	No
Metals	Mercury	7439-97-6	14	14	100	14 / 14	0.091	J	SB-26	0.18	a	Yes	95% Students-t UCL	0.0699	No	BSV	--	--	0.12	No
Metals	Selenium	7782-49-2	6	14	43	6 / 14	1.8	J	SB-29	0.72	b	No	95% KM (t) UCL	0.399	Yes	ASV	Yes	ASV	1.7	Yes
Metals	Silver	7440-22-4	0	14	0	0 / 14	ND		--	1	b	No	NC	NC	No	ND	--	--	0.43	--
Metals	Zinc	7440-66-6	32	32	100	32 / 32	27000	600	SB-32	121	a	No	95% Student's-t UCL	7918	Yes	ASV	Yes	ASV	160	Yes

Notes:
Bolded chemicals are retained as sediment COPECs for further evaluation.
 Individual PCB Aroclors were evaluated as total PCBs.
 -- = not applicable
 ASV = above screening value; maximum detected concentration exceeds screening value
 BSV = below screening value; maximum detected concentration falls below screening value
 COPEC = chemical of potential ecological concern
 DL = detection limit
 FOD = frequency of detection
 NA = not available
 NC = not calculated; there was not enough data available to calculate this value for this analyte
 ND = nondetect
 NSV = no screening value
 PBT = persistent, bioaccumulative, toxic
 PCB = polychlorinated biphenyl
 SRV = sediment reference value
 UCL = upper confidence limit
 Data Qualifier:
 J = estimated concentration

^a Screening benchmark source: a = MacDonald et al. 2000; b = USEPA 2018^a; c = USEPA 2003a; d = LANL 2024; e = RIVM 2001
^b freshwater sediment BSVs were used for screening
^c Persistent, bioaccumulative, and toxic pollutant as identified in Ohio EPA (2018)
^d UCL was calculated using ProUCL

Table 3-6. COPEC Selection for Adjacent Ditch Pre-interim Action Sediment (mg/kg)

Chemical Class	Chemical	CAS Number	Number Detected	Number of Samples	Percent Detected	FOD	Maximum Detected Concentration	Maximum Reporting Limit	Location of Maximum Detected Concentration	Screening Value	Screening Value Source ^a	PBT (Yes/No) ^a	UCL Method ^c	95UCL ^c	COPEC by Max (Yes/No)	Reason by Max	COPEC by UCL (Yes/No)	Reason by UCL	Sediment Reference Value	Max Exceeds SRV
Inorganics	Total Cyanide	57-12-5	27	27	100	27 / 27	1400	220	T-250-E	1	a	No	95% Adjusted Gamma UCL	724.2	Yes	ASV	Yes	ASV	NA	--
Metals	Arsenic	7440-38-2	27	27	100	27 / 27	32	4.3	T-125-E	9.79	a	No	95% H-UCL	14.12	Yes	ASV	Yes	ASV	25	Yes
Metals	Barium	7440-39-3	27	27	100	27 / 27	160	33	T-125-C; T-375-E	20	b	No	95% Student's-t UCL	109.8	Yes	ASV	Yes	ASV	190	No
Metals	Cadmium	7440-43-9	26	27	96	26 / 27	1	3.2	T-1000-E; T-125-E	0.99	a	No	95% KM (t) UCL	0.59	Yes	ASV	No	BSV	0.79	Yes
Metals	Chromium	7440-47-3	27	27	100	27 / 27	340	1.7	T-125-E	43.4	a	No	95% H-UCL	62.02	Yes	ASV	Yes	ASV	29	Yes
Metals	Chromium Hexavalent (VI)	18540-29-9	1	27	4	1 / 27	2.4	7.3	T-625-E	660	d	No	NC	--	No	FOD	No	No UCL	NA	--
Metals	Copper	7440-50-8	27	27	100	27 / 27	800	16	T-125-E	31.6	a	No	95% Student's-t UCL	96.59	Yes	ASV	Yes	ASV	32	Yes
Metals	Lead	7439-92-1	27	27	100	27 / 27	71	6.5	T-125-E	35.8	a	Yes	95% Student's-t UCL	40.49	Yes	ASV	Yes	ASV	47	Yes
Metals	Mercury	7439-97-6	24	27	89	24 / 27	0.085	J	T-1000-E	0.18	a	Yes	95% KM (t) UCL	0.0594	No	BSV	No	BSV	0.12	No
Metals	Selenium	7782-49-2	20	27	74	20 / 27	2.3	J	T-375-E	0.72	b	No	95% KM (t) UCL	1.113	Yes	ASV	Yes	ASV	1.7	Yes
Metals	Silver	7440-22-4	16	27	59	16 / 27	1.1	J	T-125-E	1	b	No	95% KM Adjusted Gamma UCL	0.291	Yes	ASV	No	BSV	0.43	Yes
Metals	Zinc	7440-66-6	27	27	100	27 / 27	12000	130	T-625-C	121	a	No	95% Adjusted Gamma UCL	4978	Yes	ASV	Yes	ASV	160	Yes
PCBs	1,1'-Biphenyl	92-52-4	3	27	11	3 / 27	0.14	J	T-250-C	0.198	b	No	95% KM (t) UCL	0.0503	No	BSV	No	BSV	NA	--
PCBs	Aroclor 1016	12674-11-2	0	27	0	0 / 27	ND	0.086	--	0.059	d	Yes	NC	--	No	ND	No	No UCL	NA	--
PCBs	Aroclor 1221	11104-28-2	0	27	0	0 / 27	ND	0.086	--	NSV	--	Yes	NC	--	No	ND	No	No UCL	NA	--
PCBs	Aroclor 1232	11141-16-5	0	27	0	0 / 27	ND	0.086	--	NSV	--	Yes	NC	--	No	ND	No	No UCL	NA	--
PCBs	Aroclor 1242	53469-21-9	6	27	22	6 / 27	0.12	0.086	T-125-C	0.059	d	Yes	95% KM (t) UCL	0.0361	Yes	ASV	No	BSV	NA	--
PCBs	Aroclor 1248	12672-29-6	3	26	12	3 / 26	0.073	J	T-250-W	0.0081	d	Yes	95% KM (t) UCL	0.0313	Yes	ASV	Yes	ASV	NA	--
PCBs	Aroclor 1254	11097-69-1	6	27	22	6 / 27	0.048	J	T-250-C	0.053	d	Yes	95% KM (t) UCL	0.0303	No	BSV	No	BSV	NA	--
PCBs	Aroclor 1260	11096-82-5	1	27	4	1 / 27	0.03	J	T-250-E	0.059	d	Yes	NC	--	No	FOD	No	No UCL	NA	--
PCBs	Aroclor 1262	37324-23-5	0	27	0	0 / 27	ND	0.086	--	NSV	--	Yes	NC	--	No	ND	No	No UCL	NA	--
PCBs	Aroclor 1268	11100-14-4	0	27	0	0 / 27	ND	0.086	--	NSV	--	Yes	NC	--	No	ND	No	No UCL	NA	--
PCBs	Total PCB Aroclors (ND = 1/2DL)	--	11	27	41	11 / 27	0.273	J	T-125-C	0.0598	a	Yes	95% KM (t) UCL	0.161	Yes	ASV	Yes	ASV	NA	--

Notes:

Bolded chemicals are retained as sediment COPECs for further evaluation.

Individual PCB Aroclors were evaluated as total PCBs.

-- = not applicable

ASV = above screening value; maximum detected concentration exceeds screening value

BSV = below screening value; maximum detected concentration falls below screening value

COPEC = chemical of potential ecological concern

DL = detection limit

FOD = frequency of detection

NA = not available

NC = not calculated; there was not enough data available to calculate this value for this analyte

ND = nondetect

NSV = no screening value

PBT = persistent, bioaccumulative, toxic

PCB = polychlorinated biphenyl

SRV = sediment reference value

UCL = upper confidence limit

Data Qualifier:

J = estimated concentration

^a Screening benchmark source: a = MacDonald et al. 2000; b = USEPA 2018^a, c = USEPA 2003a, d = LANL 2024, e = RVM 2001

^a freshwater sediment ESVs were used for screening

^a Persistent, bioaccumulative, and toxic pollutant as identified in Ohio EPA (2018)

^c UCL was calculated using ProUCL

Table 3-7. COPEC Selection for Downgradient Sediment (mg/kg)

Chemical Class	Chemical	CAS Number	Number Detected	Number of Samples	Percent Detected	FOD	Maximum Detected Concentration	Maximum Reporting Limit	Location of Maximum Detected Concentration	Screening Value	Screening Value Source ^A	PBT (Yes/No) ^B	UCL Method ^C	95UCL ^C	COPEC (Yes/No) by Max	Reason by Max	COPEC by UCL (Yes/No)	Reason by UCL	Sediment Reference Value	Max Exceeds SRV
Inorganics	Free Cyanide	57-12-5	1	7	14	1 / 7	1.3	J	T2-NATURE	1	c	No	NC	NC	Yes	ASV	—	—	NA	—
Inorganics	Total Cyanide	57-12-5	39	43	91	39 / 43	350	220	T2-1375-N	1	d	No	95% KM Adjusted Gamma UCL	102.7	Yes	ASV	Yes	ASV	NA	—
Metals	Aspenic	7440-38-2	35	35	100	35 / 35	27	4.3	T2-1000-C	9.79	a	No	95% H-UCL	13.58	Yes	ASV	Yes	ASV	25	Yes
Metals	Barium	7440-39-3	35	35	100	35 / 35	93	51	T2-1500-S	20	b	No	95% Student's-t UCL	70.95	Yes	ASV	Yes	ASV	190	No
Metals	Cadmium	7440-43-9	34	35	97	34 / 35	0.48	J	T2-375-S	0.99	a	No	95% KM (t) UCL	0.278	No	BSV	—	—	0.79	No
Metals	Chromium	7440-47-3	35	35	100	35 / 35	32	2.6	T2-250-N	43.4	a	No	95% Student's-t UCL	20.58	No	BSV	—	—	29	Yes
Metals	Chromium Hexavalent (VI)	18540-29-9	5	33	15	5 / 33	2.8	J	T2-1250-S	660	c	No	KM H-UCL	0.283	No	BSV	—	—	NA	—
Metals	Copper	7440-50-8	35	35	100	35 / 35	20	16	T2-625-N; T2-250	31.6	a	No	95% Student's-t UCL	13.98	No	BSV	—	—	32	No
Metals	Lead	7439-92-1	35	35	100	35 / 35	29	6.5	T2-1375-N	35.8	a	Yes	95% Student's-t UCL	20.03	No	BSV	—	—	47	No
Metals	Mercury	7439-97-6	20	35	57	20 / 35	0.071	J	T2-100-N	0.18	a	Yes	95% KM (t) UCL	0.0363	No	BSV	—	—	0.12	No
Metals	Selenium	7782-49-2	26	35	74	26 / 35	1.55	J	T2-250-N	0.72	b	No	95% KM (t) UCL	0.925	Yes	ASV	Yes	ASV	1.7	No
Metals	Silver	7440-22-4	0	35	0	0 / 35	ND	2.6	ND	1	b	No	NC	NC	No	ND	—	—	0.43	NC
Metals	Zinc	7440-66-6	35	35	100	35 / 35	4800	600	T2-375-S	121	a	No	95% Adjusted Gamma UCL	1568	Yes	ASV	Yes	ASV	160	Yes

Notes:

Bolded chemicals are retained as sediment COPECs for further evaluation.

— = not applicable

ASV = above screening value

BSV = below screening value; maximum detected concentration falls below screening value

COPEC = chemical of potential ecological concern

FOD = frequency of detection

NA = not available

NC = not calculated; there was not enough data available to calculate this value for this analyte

PBT = persistent, bioaccumulative, toxic

SRV = sediment reference value

UCL = upper confidence limit

Data Qualifier:

J = estimated concentration

^A Screening benchmark source: a = MacDonald et al. (2000), b = USEPA (2018), c = LANL (2024); d = RIVM (2001)

^B freshwater sediment ESVs were used for screening

^B Persistent, bioaccumulative, and toxic pollutant as identified in Ohio EPA (2018)

^C UCL was calculated using ProUCL

Table 3-8. COPEC Selection for Wetland Surface Water (µg/L)

Chemical Class	Chemical	CAS Number	Fraction	Number Detected	Number of Samples	Percent Detected	FOD	Maximum Detected Concentration	Maximum Reporting Limit	Location of Maximum Detected Concentration	Screening Value	Screening Value Source ^a	PBT (Yes/No) ^b	UCL Method ^c	95UCL ^c	COPEC by Max (Yes/No)	Reason by Max	COPEC by UCL (Yes/No)	Reason by UCL
Inorganics	Free Cyanide	57-12-5	T	2	2	100	2 / 2	130	6	SB-29; SB-36	12	a	No	NC	—	Yes	ASV	—	—
Inorganics	Total Cyanide	57-12-5	T	2	2	100	2 / 2	8100	250	SB-29	12	a	No	NC	—	Yes	ASV	—	—
Metals	Arsenic	7440-38-2	T	2	2	100	2 / 2	4.2	J 15	SB-29; SB-36	148	a	No	NC	—	No	BSV	—	—
Metals	Barium	7440-39-3	T	2	2	100	2 / 2	88	J 200	SB-29	220	b	No	NC	—	No	BSV	—	—
Metals	Cadmium	7440-43-9	T	0	2	0	0 / 2	—	5	—	1.37	a	No	NC	—	No	ND	—	—
Metals	Chromium	7440-47-3	T	2	2	100	2 / 2	12	10	SB-29	42	a	No	NC	—	No	BSV	—	—
Metals	Chromium Hexavalent (VI)	18540-29-9	T	0	2	0	0 / 2	—	20	—	NSV	—	No	NC	—	No	ND	—	—
Metals	Copper	7440-50-8	T	2	2	100	2 / 2	10	J 25	SB-29	16.9	a	No	NC	—	No	BSV	—	—
Metals	Lead	7439-92-1	T	2	2	100	2 / 2	11	10	SB-29	7.7	a	Yes	NC	—	Yes	ASV	—	—
Metals	Mercury	7439-97-6	T	0	2	0	0 / 2	—	0.2	—	0.0013	a	Yes	NC	—	No	ND	—	—
Metals	Selenium	7782-49-2	T	0	2	0	0 / 2	—	20	—	5	a	No	NC	—	No	ND	—	—
Metals	Silver	7440-22-4	T	0	2	0	0 / 2	—	10	—	3.2	c	No	NC	—	No	ND	—	—
Metals	Zinc	7440-66-6	T	2	2	100	2 / 2	5500	50	SB-29	216	a	No	NC	—	Yes	ASV	—	—
PCBs	1,1'-Biphenyl	92-52-4	T	0	2	0	0 / 2	—	1	—	6.5	b	No	NC	—	No	ND	—	—
PCBs	Aroclor 1016	12674-11-2	T	0	2	0	0 / 2	—	0.099	—	NSV	—	Yes	NC	—	No	ND	—	—
PCBs	Aroclor 1221	11104-28-2	T	0	2	0	0 / 2	—	0.099	—	NSV	—	Yes	NC	—	No	ND	—	—
PCBs	Aroclor 1232	11141-16-5	T	0	2	0	0 / 2	—	0.099	—	NSV	—	Yes	NC	—	No	ND	—	—
PCBs	Aroclor 1242	53469-21-9	T	0	2	0	0 / 2	—	0.099	—	NSV	—	Yes	NC	—	No	ND	—	—
PCBs	Aroclor 1248	12672-29-6	T	0	2	0	0 / 2	—	0.099	—	NSV	—	Yes	NC	—	No	ND	—	—
PCBs	Aroclor 1254	11097-69-1	T	0	2	0	0 / 2	—	0.099	—	NSV	—	Yes	NC	—	No	ND	—	—
PCBs	Aroclor 1260	11096-82-5	T	0	2	0	0 / 2	—	0.099	—	NSV	—	Yes	NC	—	No	ND	—	—
PCBs	Aroclor 1262	37324-23-5	T	0	2	0	0 / 2	—	0.099	—	NSV	—	Yes	NC	—	No	ND	—	—
PCBs	Aroclor 1268	11100-14-4	T	0	2	0	0 / 2	—	0.099	—	NSV	—	Yes	NC	—	No	ND	—	—
PCBs	Total PCB Aroclors (ND=1/2DL)	—	T	0	2	0	0 / 2	—	—	—	0.00012	b	Yes	NC	—	No	ND	—	—

Notes:

Bolded chemicals are retained as surface water COPECs for further evaluation.

— = not applicable

ASV = above screening value; maximum detected concentration exceeds screening value

BSV = below screening value; maximum detected concentration falls below screening value

COPEC = chemical of potential ecological concern

DL = detection limit

FOD = frequency of detection

NC = not calculated; there was not enough data available to calculate this value for this analyte

ND = nondetect

NSV = no screening value

PBT = persistent, bioaccumulative, toxic

PCB = polychlorinated biphenyl

T = total

UCL = upper confidence limit

Data Qualifier:

J = estimated concentration

^a Screening benchmark source: a = OAC 3745-1-35, b = USEPA 2018*, c = USEPA 2011, d = USEPA 2003a

* freshwater chronic values were used for screening

^b Persistent, bioaccumulative, and toxic pollutant as identified in Ohio EPA (2018)

^c UCL was calculated using ProUCL

Table 3-9. COPEC Selection for Adjacent Ditch Pre-interim Action Surface Water (µg/L)

Chemical Class	Chemical	Fraction	Number Detected	Number of Samples	Percent Detected	FOD	Maximum Detected Concentration	Maximum Reporting Limit	Location of Maximum Detected Concentration	Screening Value	Screening Value Source ^a	PBT (Yes/No) ^b	UCL Method ^c	95UCL ^c	COPEC by Max (Yes/No)	Reason by Max	COPEC by UCL (Yes/No)	Reason by UCL
Inorganics	Free Cyanide	T	3	3	100	3 / 3	94	6	T-500-C	12	a	No	95% Student's-t UCL	108.1	Yes	ASV	Yes	ASV
Inorganics	Total Cyanide	T	3	3	100	3 / 3	2690	J 500	T-375-C	12	a	No	95% Student's-t UCL	3419	Yes	ASV	Yes	ASV
Metals	Arsenic	T	3	3	100	3 / 3	600	75	T-500-C	148	a	No	95% Student's-t UCL	775.3	Yes	ASV	Yes	ASV
Metals	Barium	T	3	3	100	3 / 3	1800	200	T-500-C	220	b	No	95% Student's-t UCL	2328	Yes	ASV	Yes	ASV
Metals	Cadmium	T	2	2	100	2 / 2	6.7	J 25	T-500-C	1.37	a	No	NC	—	Yes	ASV	No	No UCL
Metals	Chromium	T	3	3	100	3 / 3	620	10	T-500-C	42	a	No	95% Student's-t UCL	796.9	Yes	ASV	Yes	ASV
Metals	Chromium Hexavalent (VI)	T	1	3	33	1 / 3	490	J 1000	T-500-C	NSV	—	No	NC	—	Yes	NSV	No	No UCL
Metals	Copper	T	3	3	100	3 / 3	710	130	T-500-C	16.9	a	No	95% Student's-t UCL	908.9	Yes	ASV	Yes	ASV
Metals	Lead	T	2	2	100	2 / 2	730	50	T-500-C	7.7	a	Yes	NC	—	Yes	ASV	No	No UCL
Metals	Mercury	T	1	3	33	1 / 3	1.2	0.2	T-500-C	0.0013	a	Yes	NC	—	Yes	ASV	No	No UCL
Metals	Selenium	T	1	2	50	1 / 2	51	J 100	T-500-C	5	a	No	NC	—	Yes	ASV	No	No UCL
Metals	Silver	T	0	3	0	0 / 3	ND	10	—	3.2	c	No	NC	—	No	ND	No	No UCL
Metals	Zinc	T	3	3	100	3 / 3	69000	250	T-500-C	216	a	No	95% Student's-t UCL	88217	Yes	ASV	Yes	ASV
PCBs	1,1'-Biphenyl	T	0	3	0	0 / 3	ND	1.1	—	6.5	b	No	NC	—	No	ND	No	No UCL
PCBs	Aroclor 1016	T	0	3	0	0 / 3	ND	0.5	—	NSV	—	Yes	NC	—	No	ND	No	No UCL
PCBs	Aroclor 1221	T	0	3	0	0 / 3	ND	0.5	—	NSV	—	Yes	NC	—	No	ND	No	No UCL
PCBs	Aroclor 1232	T	0	3	0	0 / 3	ND	0.5	—	NSV	—	Yes	NC	—	No	ND	No	No UCL
PCBs	Aroclor 1242	T	0	3	0	0 / 3	ND	0.5	—	NSV	—	Yes	NC	—	No	ND	No	No UCL
PCBs	Aroclor 1248	T	0	3	0	0 / 3	ND	0.5	—	NSV	—	Yes	NC	—	No	ND	No	No UCL
PCBs	Aroclor 1254	T	0	3	0	0 / 3	ND	0.5	—	NSV	—	Yes	NC	—	No	ND	No	No UCL
PCBs	Aroclor 1260	T	0	3	0	0 / 3	ND	0.5	—	NSV	—	Yes	NC	—	No	ND	No	No UCL
PCBs	Aroclor 1262	T	0	3	0	0 / 3	ND	0.5	—	NSV	—	Yes	NC	—	No	ND	No	No UCL
PCBs	Aroclor 1268	T	0	3	0	0 / 3	ND	0.5	—	NSV	—	Yes	NC	—	No	ND	No	No UCL
PCBs	Total PCB Aroclors (ND=1/2DL)	T	0	3	0	0 / 3	ND	—	—	0.00012	b	Yes	NC	—	No	ND	No	No UCL

Notes:

Bolded chemicals are retained as surface water COPECs for further evaluation.

-- = not applicable

ASV = above screening value; maximum detected concentration exceeds screening value

BSV = below screening value; maximum detected concentration falls below screening value

COPEC = chemical of potential ecological concern

DL = detection limit

FOD = frequency of detection

NC = not calculated; there was not enough data available to calculate this value for this analyte

ND = nondetect

NSV = no screening value

PBT = persistent, bioaccumulative, toxic

PCB = polychlorinated biphenyl

T = total

UCL = upper confidence limit

Data Qualifier:

J = estimated concentration

^a Screening benchmark source: a = OAC 3745-1-35, b = USEPA 2018*, c = USEPA 2011, d = USEPA 2003a

* freshwater chronic values were used for screening

^b Persistent, bioaccumulative, and toxic pollutant as identified in Ohio EPA (2018)

^c UCL was calculated using ProUCL

Table 3-10. COPEC Selection for Downgradient Surface Water (µg/L)

Chemical Class	Chemical	CAS Number	Fraction	Number Detected	Number of Samples	Percent Detected	FOD	Maximum Detected Concentration	Maximum Reporting Limit	Location of Maximum Detected Concentration	Screening Value	Screening Value Source ^A	PBT (Yes/No) ^B	UCL Method ^C	95UCL ^C	COPEC (Yes/No) by Max	Reason by Max	COPEC by UCL (Yes/No)	Reason by UCL
Inorganics	Free Cyanide	57-12-5	T	10	12	83	10 / 12	27	6	T2-GLENVIEW	12	a	No		18.03	Yes	ASV	Yes	ASV
Inorganics	Total Cyanide	57-12-5	T	12	12	100	12 / 12	440	10	T2-1820-C	12	a	No	95% Adjusted Gamma UCL	209.3	Yes	ASV	Yes	ASV
Metals	Arsenic	7440-38-2	T	0	3	0	0 / 3	ND	15	--	148	a	No	NC	NC	No	ND	--	--
Metals	Barium	7440-39-3	T	3	3	100	3 / 3	73	J 200	T2-1820-C	220	b	No	95% Student's-t UCL	82.91	No	BSV	--	--
Metals	Cadmium	7440-43-9	T	0	3	0	0 / 3	ND	5	--	1.37	a	No	NC	NC	No	ND	--	--
Metals	Chromium	7440-47-3	T	2	3	67	2 / 3	3.8	J 10	T2-1820-C	42	a	No	NC	NC	No	BSV	--	--
Metals	Chromium Hexavalent (VI)	18540-29-9	T	0	3	0	0 / 3	ND	20	--	NSV	--	No	NC	NC	No	ND	--	--
Metals	Copper	7440-50-8	T	0	3	0	0 / 3	ND	25	--	16.9	a	No	NC	NC	No	ND	--	--
Metals	Lead	7439-92-1	T	0	3	0	0 / 3	ND	10	--	7.7	a	Yes	NC	NC	No	ND	--	--
Metals	Mercury	7439-97-6	T	0	3	0	0 / 3	ND	0.2	--	0.0013	a	Yes	NC	NC	No	ND	--	--
Metals	Selenium	7782-49-2	T	0	3	0	0 / 3	ND	20	--	5	a	No	NC	NC	No	ND	--	--
Metals	Silver	7440-22-4	T	0	3	0	0 / 3	ND	10	--	3.2	c	No	NC	NC	No	ND	--	--
Metals	Zinc	7440-66-6	T	2	3	67	2 / 3	130	50	T2-750-C	216	a	No	NC	NC	No	BSV	--	--

Notes:

Bolded chemicals are retained as surface water COPECs for further evaluation.

-- = not applicable

ASV = above screening value; maximum detected concentration exceeds screening value

BSV = below screening value; maximum detected concentration falls below screening value

COPEC = chemical of potential ecological concern

DL = detection limit

FOD = frequency of detection

NC = not calculated; there was not enough data available to calculate this value for this analyte

ND = nondetect

NSV = no screening value

PBT = persistent, bioaccumulative, toxic

T = total

UCL = upper confidence limit

Data Qualifier:

J = estimated concentration

^A Screening benchmark source: a = OAC 3745-1-35, b = USEPA (2018)^{*}, c = USEPA (2011)

^B Persistent, bioaccumulative, and toxic pollutant as identified in Ohio EPA (2018)

^C UCL was calculated using ProUCL

Table 4-1. Pre-interim Action Exposure Point Concentrations and Modeled Bioaccumulation in Diet Components for Terrestrial Receptors

Chemical Class	Chemical	CAS Number	Units	Soil		Surface Water		Modeled Diet Component EPCs		
				EPC	Selection Rationale	EPC	Selection Rationale	Plant	Terrestrial Invertebrates	Small Mammal
Inorganics	Total Cyanide	57-12-5	mg/kg dw-dw	295.5	a	2.69	b	6.80	295.5	127.66
Metals	Cadmium	7440-43-9	mg/kg dw-dw	0.63	b	0.0067	b	0.48	5.74	0.23
Metals	Chromium	7440-47-3	mg/kg dw-dw	35.38	a	0.62	b	1.45	10.83	3.18
Metals	Lead	7439-92-1	mg/kg dw-dw	45.79	a	0.73	b	2.26	17.60	5.85
Metals	Zinc	7440-66-6	mg/kg dw-dw	1886	a	69	b	315.26	1015.21	133.71

Notes:

Modeled diet components are based on soil EPCs and calculated using the bioaccumulation equations presented in Table 4-7.

Maximum detected concentrations and 95UCLs are presented in Tables 3-4 and 3-9.

a = the lesser of the maximum detected concentration and 95UCL was selected as the EPC

b = if a chemical had fewer than 4 detects or a 95UCL was not available, the maximum detected concentration was used as the EPC

EPC = exposure point concentration

UCL = upper confidence limit

Table 4-2. Post-interim Action Exposure Point Concentrations and Modeled Bioaccumulation in Diet Components for Terrestrial Receptors

Chemical Class	Chemical	CAS Number	Units	Soil	Selection Rationale	Modeled Diet Component EPCs		
				EPC		Plant	Terrestrial Invertebrates	Small Mammal
Inorganics	Total Cyanide	57-12-5	mg/kg dw-dw	296.9	a	6.83	296.9	128.26
Metals	Cadmium	7440-43-9	mg/kg dw-dw	ND	--	--	--	--
Metals	Chromium	7440-47-3	mg/kg dw-dw	36.5	a	1.50	11.17	3.25
Metals	Lead	7439-92-1	mg/kg dw-dw	31.15	a	1.82	12.90	4.94
Metals	Zinc	7440-66-6	mg/kg dw-dw	1896	a	316.18	1016.97	133.76

Notes:

Surface water was not evaluated in the post-interim action scenario because no data were available.

Modeled diet components are based on soil EPCs and calculated using the bioaccumulation equations presented in Table 4-7.

Maximum detected concentrations are presented in Tables 3-4.

a = the lesser of the maximum detected concentration and 95UCL was selected as the EPC

b = if a chemical had fewer than 4 detects or a 95UCL was not available, the maximum detected concentration was used as the EPC

-- = not evaluated

EPC = exposure point concentration

ND = not detected

UCL = upper confidence limit

Table 4-3. Exposure Point Concentrations and Modeled Bioaccumulation in Diet Components for Adjacent Ditch Semi-aquatic Receptors

Chemical Class	Chemical	CAS Number	Units	Sediment		Surface Water		Modeled Diet Component EPCs	
				EPC	Selection Rationale	EPC	Selection Rationale	Plant	Fish
Inorganics	Total Cyanide	57-12-5	mg/kg dw-dw	724.2	a	2.69	b	16.66	724.20
Metals	Arsenic	7440-38-2	mg/kg dw-dw	14.12	a	0.6	b	0.53	5.69
Metals	Chromium	7440-47-3	mg/kg dw-dw	62.02	a	0.62	b	2.54	5.23
Metals	Copper	7440-50-8	mg/kg dw-dw	96.59	a	0.71	b	11.81	14.55
Metals	Lead	7439-92-1	mg/kg dw-dw	40.49	a	0.73	b	2.11	10.13
Metals	Selenium	7782-49-2	mg/kg dw-dw	1.11	a	0.051	b	0.57	1.10
Metals	Zinc	7440-66-6	mg/kg dw-dw	4978	a	69	b	539.74	46.07
PCBs	Total PCB Aroclors (ND = 1/2DL)	NA	mg/kg dw-dw	0.161	a	--	--	0.0011	0.30

Notes:

Modeled diet components are based on sediment EPCs and calculated using the bioaccumulation equations presented in Table 4-7.

Maximum detected concentrations and 95UCLs are presented in Tables 3-6 and 3-9.

PCBs were not detected in surface water.

a = the lesser of the maximum detected concentration and 95UCL was selected as the EPC

b = if a chemical had fewer than 4 detects or a 95UCL was not available, the maximum detected concentration was used as the EPC

-- = not evaluated

DL = detection limit

EPC = exposure point concentration

NA = not available

ND = nondetect

PCB = polychlorinated biphenyl

UCL = upper confidence limit

Table 4-4. Exposure Point Concentrations and Modeled Bioaccumulation in Diet Components for Wetland Semi-aquatic Receptors

Chemical Class	Chemical	CAS Number	Units	Sediment		Surface Water		Modeled Diet Component EPCs	
				EPC	Selection Rationale	EPC	Selection Rationale	Plant	Fish
Inorganics	Free Cyanide	57-12-5	mg/kg dw-dw	1.333	a	0.13	b	0.03	1.33
Inorganics	Total Cyanide	57-12-5	mg/kg dw-dw	386.4	a	8.1	b	8.89	386.40
Metals	Selenium	7782-49-2	mg/kg dw-dw	0.999	a	ND	--	0.51	0.99
Metals	Zinc	7440-66-6	mg/kg dw-dw	7918	a	5.5	b	697.99	51.54

Notes:

Modeled diet components are based on sediment EPCs and calculated using the bioaccumulation equations presented in Table 4-7.

Maximum detected concentrations and 95UCLs are presented in Tables 3-5 and 3-8.

Selenium was not detected in surface water.

a = the lesser of the maximum detected concentration and 95UCL was selected as the EPC

b = if a chemical had fewer than 4 detects or a 95UCL was not available, the maximum detected concentration was used as the EPC

-- = not evaluated

EPC = exposure point concentration

ND = not detected

UCL = upper confidence limit

Table 4-5. Exposure Point Concentrations and Modeled Bioaccumulation in Diet Components for Downgradient Semi-aquatic Receptors

Chemical Class	Chemical	CAS Number	Units	Sediment		Surface Water		Modeled Diet Component EPCs	
				EPC	Selection Rationale	EPC	Selection Rationale	Plant	Fish
Inorganics	Free Cyanide	57-12-5	mg/kg dw-dw	1.3	b	0.01803	a	0.03	1.30
Inorganics	Total Cyanide	57-12-5	mg/kg dw-dw	102.7	a	0.2093	a	2.36	102.70
Metals	Arsenic	7440-38-2	mg/kg dw-dw	13.58	a	ND	--	0.51	5.50
Metals	Zinc	7440-66-6	mg/kg dw-dw	1568	a	NA	--	284.60	34.83

Notes:

Modeled diet components are based on sediment EPCs and calculated using the bioaccumulation equations presented in Table 4-7.

Maximum detected concentrations and 95UCLs are presented in Tables 3-7 and 3-10.

Arsenic and zinc were not COPECs in surface water.

a = the lesser of the maximum detected concentration and 95UCL was selected as the EPC

b = if a chemical had fewer than 4 detects or a 95UCL was not available, the maximum detected concentration was used as the EPC

-- = not evaluated

COPEC = chemical of potential ecological concern

EPC = exposure point concentration

NA = not applicable

ND = not detected

UCL = upper confidence limit

Table 4-6. Exposure Factors and Area Use Factors for Semi-aquatic and Terrestrial Receptors

Ecological Receptor	BW (kg)	HR (ha)	AUF	Diet Component	Fraction Moisture	Fraction of Diet	NIRf	
							(kg ww/kg BW-day)	(kg dw/kg BW-day)
American robin	0.081	0.25	1	Plant	0.85	0.5	1.2	8
				Soil	NA	0.05	1.2	NA
				Terrestrial Invertebrates	0.87	0.5	1.2	9.23
				Water	NA	1	0.14	NA
American woodcock	0.17	25	0.1	Soil	NA	0.1	0.77	NA
				Terrestrial Invertebrates	0.87	0.9	0.77	5.92
				Water	NA	1	0.1	NA
Red fox	4.535	504	0.005	Plant	0.85	0.046	0.095	0.63
				Small Mammal	0.68	0.95	0.095	0.30
				Soil	NA	0.028	0.095	NA
				Water	NA	1	0.085	NA
Red-tailed hawk	1.134	876	0.003	Small Mammal	0.68	1	0.1	0.31
				Water	NA	1	0.057	NA
Short-tailed shrew	0.017	0.39	1	Plant	0.85	0.13	0.56	3.73
				Soil	NA	0.06	0.56	NA
				Terrestrial Invertebrates	0.87	0.87	0.56	4.31
				Water	NA	1	0.223	NA
Great blue heron	2.336	3.1 (km shoreline)	0.17	Fish	0.75	1	0.18	0.72
				Water	NA	1	0.045	NA
Mallard	1.162	435	0.0001	Plant	0.85	0.98	0.063	0.42
				Sediment	NA	0.03	0.063	NA
				Water	NA	1	0.057	NA
Mink	1.02	2.24 (km shoreline)	0.24	Fish	0.75	1	0.16	0.64
				Water	NA	1	0.079	NA
Muskrat	1.174	0.13	0.31	Plant	0.85	1	0.3	2
				Water	NA	1	0.98	NA

Source: Ohio EPA (2018)

Notes:

AUF = area use factor

BW = body weight

dw = dry weight

HR = home range

NIRf = normalized food ingestion rate (normalized to BW)

ww = wet weight

^a Ohio EPA (2018) provides the NIRf in kg ww/kg BW-day. These values were converted to kg dw/kg BW-day using the equation $dw = ww / (1 - \text{fraction moisture})$.

^b Some diet summations exceed 100% because the data came from multiple sources.

Table 4-7. Bioaccumulation Equations Used to Estimate COPEC Concentrations in Wildlife Food Items

Chemical	CAS Number	Equation	Source
Soil-to-plant			
Cadmium	7440-43-9	$\ln(C_p) = 0.546 * \ln(C_s) - 0.475$	Bechtel-Jacobs (1998)
Chromium	7440-47-3	$C_p = 0.041 * C_s$	Bechtel-Jacobs (1998)
Lead	7439-92-1	$\ln(C_p) = 0.561 * \ln(C_s) - 1.328$	Bechtel-Jacobs (1998)
Zinc	7440-66-6	$\ln(C_p) = 0.554 * \ln(C_s) + 1.575$	Bechtel-Jacobs (1998)
Total Cyanide	57-12-5	$C_p = 0.023 * C_s$	Larson et al. (2005)
Soil-to-invertebrate			
Cadmium	7440-43-9	$\ln(C_e) = 0.795 * \ln(C_s) + 0.795$	Sample et al. (1999)
Chromium	7440-47-3	$C_e = 0.306 * C_s$	Sample et al. (1999)
Lead	7439-92-1	$\ln(C_e) = 0.807 * \ln(C_s) - 0.218$	Sample et al. (1999)
Zinc	7440-66-6	$\ln(C_e) = 0.328 * \ln(C_s) + 4.449$	Sample et al. (1999)
Total Cyanide	57-12-5	$C_e = C_s$	NA
Soil-to-mammal			
Cadmium	7440-43-9	$\ln(C_m) = 0.4723 * \ln(C_s) - 1.2571$	Sample et al. (1998)
Chromium	7440-47-3	$\ln(C_m) = 0.7338 * \ln(C_s) - 1.4599$	Sample et al. (1998)
Lead	7439-92-1	$\ln(C_m) = 0.4422 * \ln(C_s) + 0.0761$	Sample et al. (1998)
Zinc	7440-66-6	$\ln(C_m) = 0.0706 * \ln(C_s) + 4.3632$	Sample et al. (1998)
Total Cyanide	57-12-5	$C_m = 0.432 * C_s$	LANL (2024)
Sediment-to-plant			
Arsenic	7440-38-2	$C_p = 0.03752 * C_s$	Bechtel-Jacobs (1998)
Chromium	7440-47-3	$C_p = 0.041 * C_s$	Bechtel-Jacobs (1998)
Copper	7440-50-8	$\ln(C_p) = 0.394 * \ln(C_s) + 0.668$	Bechtel-Jacobs (1998)
Lead	7439-92-1	$\ln(C_p) = 0.561 * \ln(C_s) - 1.328$	Bechtel-Jacobs (1998)
Selenium	7782-49-2	$\ln(C_p) = 1.104 * \ln(C_s) - 0.677$	Bechtel-Jacobs (1998)
Zinc	7440-66-6	$\ln(C_p) = 0.554 * \ln(C_s) + 1.575$	Bechtel-Jacobs (1998)
Free Cyanide	57-12-5	$C_p = 0.023 * C_s$	Larson et al. (2005)
Total Cyanide	57-12-5	$C_p = 0.023 * C_s$	Larson et al. (2005)
Total PCBs (ND = 1/2DL)	--	$C_p = 0.00654 * C_s$	ORNL RAIS Online Database ^a

Table 4-7. Bioaccumulation Equations Used to Estimate COPEC Concentrations in Wildlife Food Items

Chemical	CAS Number	Equation	Source
Sediment-to-fish			
Arsenic	7440-38-2	$\ln(C_f) = -0.5720 + 0.8730 \times \ln(C_{sed})$	Bechtel-Jacobs (1998)
Chromium	7440-47-3	$\ln(C_f) = 0.246 + 0.341 \times \ln(C_{sed})$	Bechtel-Jacobs (1998) ^b
Copper	7440-50-8	$\ln(C_f) = 1.037 + 0.3590 \times \ln(C_{sed})$	Bechtel-Jacobs (1998) ^b
Lead	7439-92-1	$\ln(C_f) = -0.8640 + 0.8590 \times \ln(C_{sed})$	Bechtel-Jacobs (1998) ^b
Selenium	7782-49-2	$C_f = 0.99 \times C_{sed}$	Bechtel-Jacobs (1998) ^b
Zinc	7440-66-6	$\ln(C_f) = 1.770 + 0.2420 \times \ln(C_{sed})$	Bechtel-Jacobs (1998) ^b
Free Cyanide	57-12-5	$C_f = C_{sed}$	NA
Total Cyanide	57-12-5	$C_f = C_{sed}$	NA
Total PCBs (ND = 1/2DL)	--	$C_f = 1.85 \times C_{sed}$	USEPA (1995)

Notes

-- = not applicable
 Ce = concentration in earthworm
 Cf = concentration in fish
 Cm = concentration in mammal
 Cp = concentration in plant
 Csed = concentration in sediment
 COPEC = chemical of potential ecological concern
 Cs = concentration in soil
 DL = detection limit
 NA = not available
 ND = nondetect
 PCB = polychlorinated biphenyl

^aTransfer factor is for Aroclor-1254.

^bA fish-specific equation was not available. Benthic invertebrate equation used as a surrogate.

^cA fish-specific equation was not available. Terrestrial invertebrate equation used as a surrogate.

Table 5-1. Refinement Screening Values Used for Surface Soil and Sediment (mg/kg)

Chemical Class	Chemical	Soil				Sediment
		Plant	Invertebrate	Avian	Mammal	Freshwater RSV ^d
Inorganics	Free Cyanide	--	--	--	--	NSV
Inorganics	Total Cyanide	NSV	NSV	0.098 ^c	330 ^c	NSV
Metals	Arsenic	--	--	--	--	33
Metals	Cadmium	32 ^a	140 ^a	0.77 ^a	0.36 ^a	--
Metals	Chromium	NSV	0.4 ^b	23 ^d	63 ^d	--
Metals	Selenium	--	--	--	--	2.9
Metals	Lead	120 ^a	1700 ^a	11 ^a	56 ^a	--
Metals	Zinc	160 ^a	120 ^a	46 ^a	79 ^a	459

Notes

-- the chemical was not a COPEC

NSV = no screening value

RSV = refinement screening value

Sources

a = USEPA 2007

b = Efroymsen et al. 1997

c = LANL ECORISK Database 2024

d = USEPA 2018

Table 5-2. LOAEL-Based Toxicity Reference Values for Birds and Mammals

Chemical Class	COPEC	CAS Number	Avian (mg/kg bw-day)	Mammalian (mg/kg bw-day)
Inorganics	Total Cyanide ^a	57-12-5	1.4	92.7
Inorganics	Free Cyanide ^a	57-12-5	1.4	92.7
Metals	Arsenic	7440-38-2	3.55	1.66
Metals	Cadmium	7440-43-9	6.35	1.00
Metals	Chromium ^b	7440-47-3	15.6	58.2
Metals	Copper	7440-50-8	4.68	6.8
Metals	Lead	7439-92-1	1.94	5.00
Metals	Selenium	7782-49-2	0.37	0.157
Metals	Zinc	7440-66-6	170	298
PCBs	PCBs	--	0.13	0.10

Source: USEPA (2019)

Notes:

-- = a TRV was not available

bw = body weight

COPEC = chemical of potential ecological concern

LOAEL = lowest-observed-adverse-effect level

PCB = polychlorinated biphenyl

TRV = toxicity reference value

^a Total and Free Cyanide mammalian TRVs are the geometric means of the Tewe and Maner (1981) and NTP (1993) study results.

^b The TRVs for Chromium III was used as a surrogate value for Chromium.

Table 6-1. Hazard Quotients for Direct Contact with Surface Soil

Chemical Class	Chemical	CAS Number	Terrestrial Plants		Soil Invertebrates		Avian		Mammals	
			Pre-Interim Action	Post-Interim Action	Pre-Interim Action	Post-Interim Action	Pre-Interim Action	Post-Interim Action	Pre-Interim Action	Post-Interim Action
Inorganics	Total Cyanide	57-12-5	NSV	NSV	NSV	NSV	3015	3030	1	1
Metals	Cadmium	7440-43-9	<1	ND	<1	ND	<1	ND	<1	ND
Metals	Chromium	7440-47-3	NSV	NSV	88	92	2	2	1	1
Metals	Lead	7439-92-1	<1	<1	<1	<1	4	3	1	1
Metals	Zinc	7440-66-6	12	12	16	16	41	41	24	24

Notes:

The interim action removed soils from Outfall-2-N. This sample is excluded in the post-interim action analysis.

HQs were calculated by dividing the EPC by the ESV.

Refined HQs were calculated by dividing the EPC by the RSV.

HQs >1 are **bolded**

COPEC = chemical of potential ecological concern

EPC = exposure point concentration

ESV = ecological screening value

ND = the COPEC was not detected

NSV = no screening value

RSV = refinement screening value

Table 6-2. Hazard Quotients for Direct Contact with Surface Sediment and Surface Water

			Benthic Invertebrates				Aquatic Life (Surface Water)			
Chemical Class	Chemical	CAS Number	Adjacent Ditch	Adjacent Wetland		Downgradient		Adjacent Ditch	Adjacent Wetland	Downgradient
			(Pre-Interim Action)	HQ	Refined HQ	HQ	Refined HQ	(Pre-Interim Action)		
Inorganics	Free Cyanide	57-12-5	1	1	1	1	1	9	11	2
Inorganics	Total Cyanide	57-12-5	724	386	386	103	103	285	675	17
Metals	Arsenic	7440-38-2	1	--	--	1	<1	4	--	--
Metals	Barium	7440-39-3	--	--	--	--	--	8	--	--
Metals	Cadmium	7440-43-9	--	--	--	--	--	5	--	--
Metals	Chromium	7440-47-3	1	--	--	--	--	19	--	--
Metals	Copper	7440-50-8	3	--	--	--	--	54	--	--
Metals	Lead	7439-92-1	1	--	--	--	--	95	1	--
Metals	Mercury	7439-97-6	--	--	--	--	--	923	--	--
Metals	Selenium	7782-49-2	2	1	<1	--	--	10	--	--
Metals	Zinc	7440-66-6	41	65	17	13	3	408	25	--
PCBs	Total PCB Aroclors (ND = 1/2DL) --	--	3	--	--	--	--	--	--	--

Notes:

HQs were calculated by dividing the EPC by the ESV.

Refined HQs were calculated by dividing the EPC by the RSV.

HQs >1 are **bolded**

Individual PCB Aroclors were evaluated as total PCBs.

-- = the chemical was not a COPEC for the exposure area

COPEC = chemical of potential ecological concern

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

RSV = refinement screening value

Table 6-3. Terrestrial Wildlife Dietary Exposure Hazard Quotients

Chemical Class	Chemical	American Robin		American Woodcock		Red-Tailed Hawk		Red Fox		Short-Tailed Shrew	
		Pre-Interim Action	Post-Interim Action	Pre-Interim Action	Post-Interim Action	Pre-Interim Action	Post-Interim Action	Pre-Interim Action	Post-Interim Action	Pre-Interim Action	Post-Interim Action
Inorganics	Total Cyanide	1,007	1,011	111	111	<1	<1	<1	<1	12	12
Metals	Cadmium	4	ND	<1	ND	<1	ND	<1	ND	22	ND
Metals	Chromium	4	4	<1	<1	<1	<1	<1	<1	1	1
Metals	Lead	48	35	5	4	<1	<1	<1	<1	14	10
Metals	Zinc	36	36	3	3	<1	<1	<1	<1	14	14

Notes:

Bolded values indicate HQs>1.

HQs were calculated by dividing the EPC by the LOAEL TRV and summing across diet components for each receptor.

The only sample with a detection of cadmium was excavated during the interim action.

EPC = exposure point concentration

HQ = hazard quotient

LOAEL = lowest-observed-adverse-effect level

ND = not evaluated because not detected

TRV = toxicity reference value

Table 6-4. Adjacent Ditch and Wetland Semi-aquatic Wildlife Dietary Exposure Hazard Quotients

Chemical Class	Chemical	CAS Number	Great Blue Heron		Mallard		Mink		Muskrat	
			Adjacent Ditch (Pre-Interim Action)	Wetland	Adjacent Ditch (Pre-Interim Action)	Wetland	Adjacent Ditch (Pre-Interim Action)	Wetland	Adjacent Ditch (Pre-Interim Action)	Wetland
Inorganics	Free Cyanide	57-12-5	–	<1	–	<1	–	<1	–	<1
Inorganics	Total Cyanide	57-12-5	64	34	<1	<1	2	1	<1	<1
Metals	Arsenic	7440-38-2	<1	–	<1	–	1	–	<1	–
Metals	Chromium	7440-47-3	<1	–	<1	–	<1	–	<1	–
Metals	Copper	7440-50-8	<1	–	<1	–	<1	–	1	–
Metals	Lead	7439-92-1	1	–	<1	–	<1	–	<1	–
Metals	Selenium	7782-49-2	<1	<1	<1	<1	1	<1	2	2
Metals	Zinc	7440-66-6	<1	<1	<1	<1	<1	<1	1	1
PCBs	Total PCB Aroclors (ND = 1/2DL)	–	<1	–	<1	–	<1	–	<1	–

Notes:

Bolded values indicate HQs>1.

HQs were calculated by dividing the EPC by the LOAEL TRV and summing across diet components for each receptor.

-- = not applicable, not a COPEC for the exposure area

DL = detection limit

EPC = exposure point concentration

HQ = hazard quotient

LOAEL = lowest-observed-adverse-effect level

ND = nondetect

PCB = polychlorinated biphenyl

TRV = toxicity reference value

Table 6-5. Downgradient Semi-aquatic Wildlife Dietary Exposure Hazard Quotients

Chemical Class	Chemical	CAS Number	Great Blue			
			Heron	Mallard	Mink	Muskrat
Inorganics	Free Cyanide	57-12-5	<1	<1	<1	<1
Inorganics	Total Cyanide	57-12-5	9	<1	<1	<1
Metals	Arsenic	7440-38-2	<1	<1	1	<1
Metals	Zinc	7440-66-6	<1	<1	<1	1

Notes:

Bolded values indicate HQs>1.

HQs were calculated by dividing the EPC by the LOAEL TRV and summing across diet components for each receptor.

-- = not applicable

DL = detection limit

EPC = exposure point concentration

HQ = hazard quotient

LOAEL = lowest-observed-adverse-effect level

ND = nondetect

TRV = toxicity reference value

Appendix A

Ecological Risk Assessment Assumptions Memorandum



Integral Consulting Inc.
8472 E. Washington St, #115
Chagrin Falls, OH 44023

telephone: 856.399.7700
www.integral-corp.com

MEMORANDUM

To:	Mike Concanig, Material Sciences Corporation
From:	Jen Lyndall and Samantha Dietz
Date:	November 7, 2025
Subject:	Ecological Risk Assessment Assumptions
Project No.:	C4274A

As discussed with the Ohio Environmental Protection Agency (Ohio EPA), Integral Consulting Inc. (Integral) has prepared this memorandum summarizing the initial assumptions that will be used to support the Level III Ecological Risk Assessment (ERA) for the Material Sciences Corporation (MSC) site, located in Canfield, Ohio. The Level III ERA will build upon the Level I and Level II reports for the MSC parcel and Sawmill Creek (as revised based on the July 2025 Ohio EPA comments on the RCRA Facility Investigation Work Plan) and may be expanded based on additional investigation sampling that has been conducted more recently. For the purposes of this memorandum, the term “site” refers to the MSC parcel and adjacent portions of the wetland and Sawmill Creek that were the subject of site investigation sampling.

The assumptions presented in this memorandum are consistent with Ohio EPA guidance and state regulations, including Ohio Administrative Code and Ohio Revised Code. When Ohio EPA guidance does not address a specific issue, we use guidance from the U.S. Environmental Protection Agency (USEPA), publicly available literature, and/or best professional judgement to select the approaches outlined in this document. The assumptions below are based on our current understanding of the available information and may be updated if additional information or analyses become available.

AVAILABLE DATA

The ERA will use the analytical chemistry and physical data compiled for the site. Additional data collection is ongoing, and information about these efforts is available online at www.mscreponse.com.

Sample Depths

Data from soil and sediment samples collected from depths most representative of surface conditions will be used in the risk assessment. Surface soil and sediment will be defined as follows:

- Surface sediment samples are defined as those collected from the top 0–0.5 ft based on the depth of benthic invertebrate activities (Ohio EPA 2018).
- Surface soil samples are defined as those collected from the top 0–2 ft, assumed to be the depth of the majority of burrowing mammal activity (USEPA 1993).

Other Data

Fish community data, benthic community data, and habitat quality evaluations collected by Ohio EPA and MAD Scientist from Sawmill Creek will be used to support the findings of the aquatic portion of the ERA. Ohio EPA conducted a site reconnaissance with Integral and August Mack to evaluate potential sites and recommended that the Kirk Road location would be appropriate and sufficient to represent the biological condition of the creek.

ECOLOGICAL RISK ASSESSMENT ASSUMPTIONS

The Level III ERA will build on the Level I and Level II ERAs. The Level III ERA will be based on the following assumptions for the selection of the chemicals of potential ecological concern (COPECs) and the evaluation of exposure, toxicity, and risk.

Exposure Units

Exposure units for the Level III ERA include:

- MSC parcel terrestrial habitat
- Adjacent Ditch
- Adjacent wetland
- Sawmill Creek and associated floodplain.

These exposure areas are presented in Figure 1. Any updates to the exposure areas would expand the area(s) to incorporate any additional analytical chemistry.

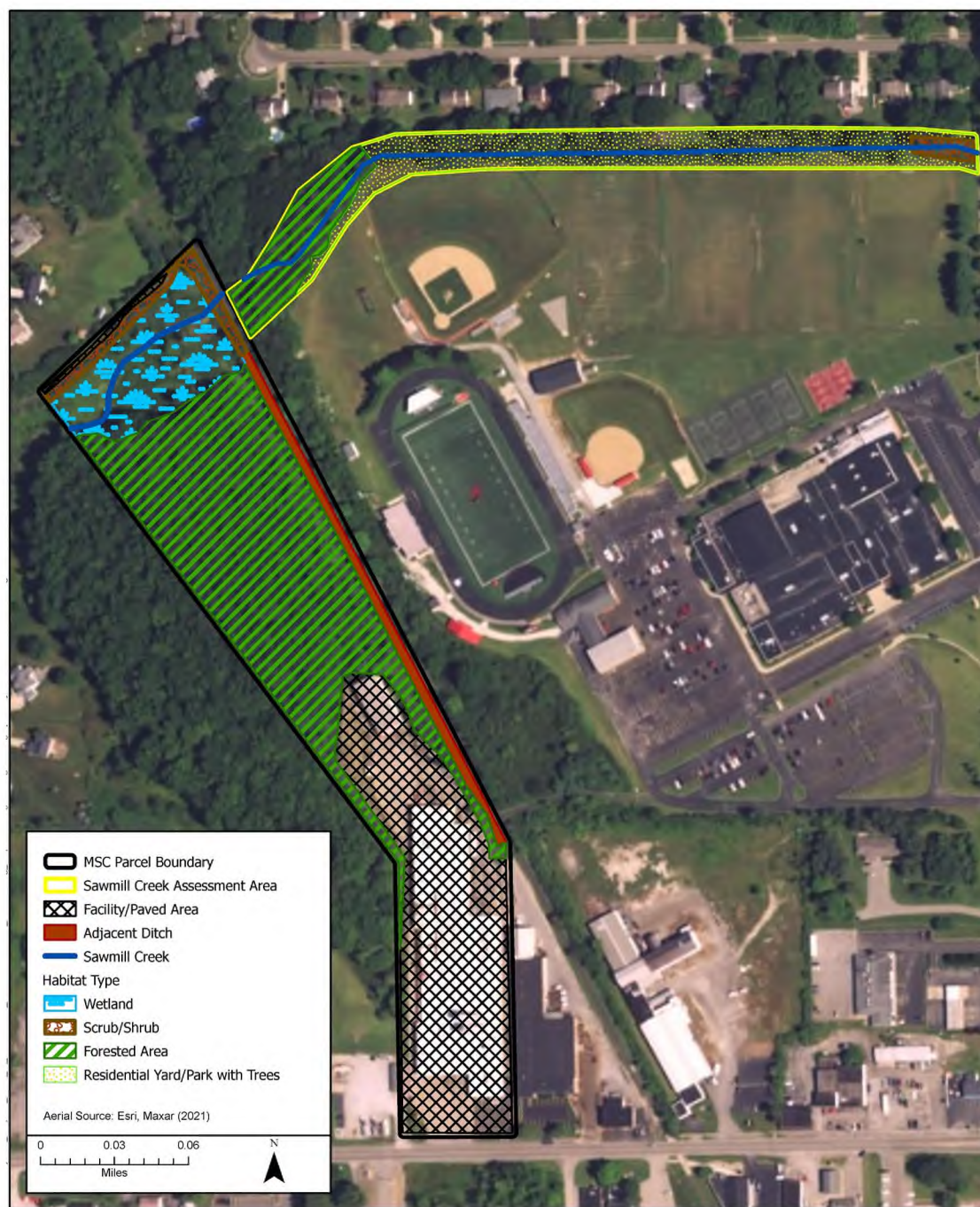


Figure 1. Level III ERA Exposure Units

Ecological Receptors

In the terrestrial habitat, the receptors of concern are:

- Soil invertebrate community, represented by earthworms

- Small terrestrial wildlife species with restricted home ranges and high incidental soil ingestion rates including:
 - American robin (avian omnivore)
 - American woodcock (avian invertivore)
 - Short-tailed shrew (mammalian invertivore)
- A top avian and mammalian carnivore that feeds on small mammals (to address the Ohio EPA [2018] requirement based on the presence of at least one persistent, bioaccumulative, and toxic [PBT] compound):
 - Red-tailed hawk (avian carnivore)
 - Red fox (mammalian carnivore).

In the aquatic habitat, the receptors of concern are:

- Aquatic vegetation community
- Invertebrate community
- Fish community
- Amphibian community
- Small semiaquatic wildlife species with restricted home ranges and high incidental sediment ingestion rates including:
 - Mallard (avian omnivore)
 - Heron (avian piscivore)
 - Muskrat (mammalian herbivore)
 - Mink (mammalian piscivore).

Exposure Matrices

Exposure matrices consist of surface soils in the upland and floodplain soil; surface sediment and surface water in the Adjacent Ditch, adjacent wetland, and Sawmill Creek; and plants and invertebrates (as food for wildlife receptors).

Exposure Pathways

In the Level III ERA, the conceptual site models from the two Level II ERAs (MSC Parcel and Wetland, Sawmill Creek) will be combined and updated to represent the entire site area. Potential terrestrial exposure pathways consist of direct contact (dermal exposure), incidental ingestion of soils and sediments, or dietary exposure (ingestion of plants, invertebrates, and

small mammals.¹ Potential aquatic exposure pathways include direct contact (skin contact or respiration through gills), incidental ingestion, dietary exposure.²

Though some chemicals were detected in groundwater and subsurface soils, ecological receptors will not contact these media and therefore do not require further evaluation in the risk assessment.

Measurement Endpoints

Measurement endpoints differ based on the ecological receptor:

- Concentrations of surface soil COPECs will be the measure of exposure of soil invertebrates, and the low-effect concentration soil benchmark will be the measure of effect.
- Concentrations of sediment COPECs will be the measure of exposure of benthic invertebrates, and the low-effect concentration sediment benchmark will be the measure of effect.
- COPEC-specific daily doses will be the measure of exposure, and the low-effect toxicity reference values (TRVs) for birds and mammals will be the measure of effect.

Threatened and Endangered Species

The site is within the range of four federally listed species: tricolored bat (*Perimyotis subflavus*, state endangered), northern long-eared bat (*Myotis septentrionalis*, federally threatened and state endangered), Indiana bat (*M. sodalis*, federally and state endangered), and little brown bat (*M. lucifugus*, state endangered). It is expected that the protection of the ecological receptors identified in the risk assessment will also be protective of the habitat that potentially could be used by threatened and endangered species.

Selection of COPECs

All chemicals for which analytical data are available in surface soil, surface sediment, or surface water will be screened to identify COPECs based on frequency of detection, screening benchmarks, and background concentrations in the following steps:

- Chemicals detected in <5 percent of the samples of each matrix will be excluded from further consideration, in accordance with Ohio EPA (2018).

¹ Wildlife exposure to COPECs from direct contact with surface soil/sediment and surface water were assumed insignificant based on the duration of exposure. Amphibian exposures to surface soil/sediment from ingestion were considered insignificant.

² Fish exposure to COPECs from direct contact with sediment were assumed insignificant because fish species are not bottom dwellers and contact with sediment would be limited.

- Screening-level sediment benchmarks will be based on the following (in order of priority):
 - Consensus based threshold effect concentrations from MacDonald et al. (2000)
 - USEPA freshwater sediment ecological screening values (USEPA 2018, Table 2a)
 - USEPA Region 5 RCRA sediment screening levels (USEPA 2003)
 - LANL ECORISK Database (LANL 2022)
- Screening-level soil benchmarks will be based on the following (in order of priority):
 - USEPA ecological soil screening levels (EcoSSLs) (USEPA 2023)
 - Soil preliminary remediation goals for ecological endpoints (Efroymson et al. 1997)
 - USEPA soil screening values for hazardous waste sites (USEPA 2018, Table 3)
 - LANL ECORISK Database (LANL 2022)
- Screening-level surface water benchmarks
 - Ohio outside mixing zone average chemical criteria presented in OAC 3745-1-35
 - USEPA chronic freshwater screening levels for hazardous waste sites (USEPA 2018, Table 1)
- Background concentrations will include any sample locations that are outside of the site boundaries (i.e., the MSC parcel and Sawmill Creek to Cardinal Road).

Metals with hardness-dependent criteria will be evaluated based on a water hardness of 200 mg/L, which is representative of aquatic systems in the area. For surface water screening, metals will be screened based on total analytical results, except for cyanide, which will be screened for free cyanide. Cyanide is of particular interest at the site, but ESLs are limited. We conducted a review of available ESLs and literature toxicity studies. This review is summarized in Attachment A.

Any chemical that exceeds the screening benchmark (or does not have a corresponding benchmark) and background concentrations will be retained for the exposure, toxicity, and risk characterization.

All PBT chemicals and organic chemicals with a $\text{Log } K_{ow} \geq 3.0$ will be automatically retained as COPECs. Ohio EPA (2018) provides a complete list of PBT chemicals. These PBT chemicals will be evaluated via food chain modeling, if detected, regardless of other considerations.

Exposure Assessment

The assessment of exposures will be different for each target receptor, as described below:

- Soil invertebrates: The exposure point concentration (EPC) for all surface soil COPECs will be the lesser of the maximum detected concentration and the 95 percent upper confidence limit on the arithmetic mean (95UCL).
- Aquatic vegetation community: The EPC for all sediment COPECs will be the lesser of the maximum detected concentration and the 95UCL.
- Benthic invertebrate community: The EPC for all sediment COPECs will be the lesser of the maximum detected concentration and the 95UCL.
- Fish community: The EPC for all sediment COPECs will be the lesser of the maximum detected concentration and the 95UCL.
- Amphibian community: The EPC for all sediment COPECs will be the lesser of the maximum detected concentration and the 95UCL.
- Birds and mammals: The EPC will be the lesser of the maximum detected concentration and the 95UCL for each soil COPEC. Dietary exposures will be modeled by calculating an average daily dose (ADD) based on the modeling equations presented in Level III, Attachment B in Ohio EPA (2018), the receptor-specific exposure parameters (e.g., body weights, food and soil ingestion rates, area use factors) presented in Table D-1 of Ohio EPA (2018), and the COPEC-specific soil to plant or worm bioaccumulation factors also presented in Ohio EPA (2018). Per Ohio EPA (2018), two top terrestrial carnivorous species will be added to the evaluation due to the presence of PBT compounds.

Toxicity

Toxicity assessments will be based on COPEC-specific toxicity thresholds from the peer-reviewed literature or agency reports. In general, toxicity thresholds will be based on observed effects (e.g., lowest observed effect concentrations, consensus-based probable effect concentrations from MacDonald et al. [2000]) for growth, survival, or reproduction. Birds and mammals will be evaluated based on COPEC-specific lowest-observed-adverse-effect levels from the avian and mammalian TRVs presented in USEPA (2019).³

Risk Characterization

Risk will be estimated by calculating hazard quotients derived from the EPC or ADD divided by the toxicity concentration. COPECs with hazard quotients above 1 will be evaluated for the need for potential further action (e.g., no action, investigation, monitoring, risk management, remediation) in consideration with nearby community data and the uncertainty analysis.

³ Ohio EPA (2018) does not provide a preferred list of wildlife TRVs.

REFERENCES

Efroymson, R.A., G.W. Suter II, B.E. Sample, and D.S. Jones. 1997. Preliminary remediation goals for ecological endpoints. ES/ER/TM-162/R2. Oak Ridge National Laboratory, Oak Ridge, TN. August. <https://rais.ornl.gov/documents/tm162r2.pdf>

LANL. 2022. ECORISK Database, Version R4.3. Los Alamos National Laboratory. September. <https://www.intellusnm.com/documents/document-library.cfc?method=retrieveLanlFile&nodeId=113331>.

MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environmental Contamination and Toxicology* 39: 20-31.

Ohio EPA. 2018. Guidance for conducting ecological risk assessments. Ohio Environmental Protection Agency. <https://epa.ohio.gov/static/Portals/30/rules/RR-031.pdf>.

USEPA. 1993. Wildlife exposure factors handbook. Volume I of II. EPA-600-R-93-187a. U.S. Environmental Protection Agency.

USEPA. 2003. USEPA Region 5 RCRA ecological screening levels (RSLs). EPA Region 5 Waste Program. August. <https://archive.epa.gov/region5/waste/cars/web/pdf/ecological-screening-levels-200308.pdf>.

USEPA. 2018. Region 4 ecological risk assessment supplemental guidance. Interim Draft. March 2018 Update. U.S. Environmental Protection Agency. <https://www.epa.gov/risk/regional-ecological-risk-assessment-era-supplemental-guidance>.

USEPA. 2019. Draft EPA Region 4 preferred parameters to be used in ecological risk assessments in Region 4. Version 10. Last Revised June 18, 2019. U.S. Environmental Protection Agency.

USEPA. 2023. Ecological soil screening level (Eco-SSL) guidance and documents. Website. Last Updated May 23, 2023. Last Accessed December 4, 2023. <https://www.epa.gov/risk/ecological-soil-screening-level-eco-ssl-guidance-and-documents>.

Attachment A

Cyanide Screening Value Review

Attachment A. Cyanide Screening Value Review

This memorandum provides a summary of 1) the evaluation of toxicity and ecological screening levels (ESLs) for cyanide in surface water, soil, and sediment; and 2) recommendations regarding ESLs applicable to the Material Sciences Corporation site in Canfield, Ohio. The Ohio Environmental Protection Agency (Ohio EPA) advises that ESLs for each medium be selected according to a hierarchical framework of references, as outlined in Ohio EPA (2018). In instances where this hierarchy does not supply values for specific chemicals—such as cyanide ESLs for soil and sediment—alternative sources must be evaluated. This assessment considered both the established ESLs and the associated toxicity data underlying their derivation.

The site investigation has included analysis of both free cyanide and total cyanide in surface water, sediment, and soil. Therefore, free cyanide forms (HCN and CN⁻) and total cyanide will be the priority for ESL selection. Although cyanide may be present in the aquatic environment in various metalocyanide or organic complexes, the toxicity associated with these compounds is primarily determined by their ability to dissociate into free cyanide species (i.e., HCN or CN⁻) (Gensemer et al. 2006). The speciation of cyanide is influenced by pH, its binding potential, temperature, redox potential, and the presence of metal ions. In surface water, free cyanide forms are more prevalent at elevated pH levels, whereas in sediment and soil, cyanide tends to be complexed. Free cyanide is generally regarded as more significant for surface water because of its high toxicity and greater bioavailability to aquatic organisms. Conversely, total cyanide may serve as a more appropriate metric in sediment, where various cyanide species can persist across diverse environmental conditions. Regulatory frameworks and ecological assessments typically prioritize free cyanide owing to its heightened capacity to impact ecological systems adversely.

For the purposes of this evaluation, we prioritized low-effect or threshold-based screening values. Typically, ESLs are derived from empirical toxicity evidence with the objective of protecting 95 percent of species (Gensemer et al. 2006). In certain cases, screening values may be even more conservative, prioritizing protection of the most sensitive species or employing safety factors that, while highly precautionary, facilitate the inclusion of data with uncertain toxicity outcomes.

The following sections detail the sources reviewed and the rationale applied in selecting ESLs for free cyanide and total cyanide across surface water, soil, and sediment.

SURFACE WATER

A surface water ESL for free cyanide is available in the Ohio Administrative Code (OAC) Chapter 3745-1-35, the recommended reference in the Ohio EPA risk assessment guidance (Ohio EPA 2018). An ESL based on free cyanide is appropriate in surface water because free cyanide is the most toxic form of cyanide and because cyanide present in surface water is most likely to be present as CN⁻ or HCN⁻. The ESL is 12 µg/L free cyanide based on the outside mixing zone average for warmwater habitats in the Ohio River drainage basin (OAC 3745-1-35).¹ The basis for this ESL is not reported; however, this value aligns with the geometric mean of the chronic maximum acceptable toxicant concentrations (MATCs, geometric mean of no observed effect concentration and lowest observed effect concentration) presented in Gensemer et al. (2006) for brook trout (*Salvelinus fontinalis*), fathead minnow (*Pimephales promelas*), and bluegill sunfish (*Lepomis macrochirus*), which were 7.8, 16.4, and 13.6 µg CN/L, respectively.

This surface water ESL is also lower than low-effect ESLs, which range from 22 µg/L for aquatic community organisms to 7,900,000 µg/L for gray fox (LANL 2022). This OAC ESL has the potential to be overly conservative (i.e., protective) because it may include toxicity values for cold water species, which are more sensitive to free cyanide than warm water species (Gensemer et al. 2006). Gensemer et al. (2006) reviewed the acute and chronic toxicity of cyanide to freshwater invertebrates and fish to support USEPA's derivation of ambient water quality criteria. Acute effects were observed at a range of concentrations, from 46 to 10,000 µg/L. The four most sensitive genera were used to derive a final acute value of 55.64 µg/L.² Interestingly, Gensemer et al. (2006) noted, "For the most part, once removed from the presence of cyanide, an organism receiving less than an acute dose should recover, because cyanide is detoxified to SCN⁻. In some cases, however, some sublethal effects can exert lasting (i.e., one week or greater) negative impacts on the exposed organism."

Based on this evaluation, we recommend using 12 µg/L free cyanide as the surface water ESL.

SOIL

A soil ESL of 1 mg/kg total cyanide is available from USEPA (2018), one of the recommended references in Ohio EPA (2018). This soil screening value is based on the Los Alamos National Laboratory's (LANL's) ECORISK database (LANL 2022), which includes a low effect soil screening value based on American robin (*Turdus migratorius*). The American robin value was derived using a wildlife exposure model based on the lowest-

¹ The basis for this value is not clear but may be based on the geometric mean of the three MATCs for freshwater fish presented in Gensemer et al. (2006).

² The value presented in Table 14.7 of Gensemer et al. (2006) is 46.27 with a footnote that this was a deviation from the method based on other factors. The unadjusted value is presented here.

observed-adverse effect level toxicity reference value for American kestrel (*Falco sparverius*) from Wiemeyer et al. (1986).

Other soil ESLs for total cyanide include 1.33 mg/kg based on toxicity to meadow vole (USEPA 2003), 3.6 mg/kg (American kestrel, *F. sparverius*) to 33,000 mg/kg (gray fox, *Urocyon cinereoargenteus*).

None of the sources recommended in Ohio EPA (2018) includes an ESL for free cyanide in soil, resulting in the need to consider several alternatives. Health Canada (2023) presented a soil free cyanide ESL of 0.9 mg/kg based on toxicity to vascular plants and earthworms. Dutch guidance includes free cyanide soil ESLs ranging from 1 to 10 mg/kg (RIVM 2001; Moen et al. 1986).

We recommend soil ESLs of 1 mg/kg total cyanide and 0.9 mg/kg free cyanide.

SEDIMENT

None of the sources recommended by the Ohio EPA (2018) include an ESL for cyanide in sediment, resulting in the need to evaluate alternatives. LANL (2022) presented ESLs for total cyanide in sediment ranging from 1 mg/kg (aquatic community organisms) to 3,800 mg/kg (occult little brown bat). RIVM (2001) presented “target” values of 1 mg/kg and 5 mg/kg for free and total cyanide, respectively.

We recommend sediment ESLs of 1 mg/kg total cyanide and 1 mg/kg free cyanide.

SUMMARY

Recommended ESLs for cyanide were assembled from surface water, soil, and sediment. The values of these ESLs and the sources are shown below.

Media	Ecological Screening Level	Source
Surface water	12 µg/l free cyanide	OAC 3745-1-35
Soil	1 mg/kg total cyanide, 0.9 mg/kg free cyanide	LANL ECORISK Database (2022), Health Canada (2023)
Sediment	1 mg/kg total cyanide, 1 mg/kg free cyanide	LANL ECORISK Database (2022), RIVM (2001)

REFERENCES

Gensemer, R.W., D.K. DeDorest, A.J. Stenhouse, C.J. Higgins, and R.D. Cardwell. 2006. Chapter 14: Aquatic Toxicity of Cyanide. In: *Cyanide in Water and Soil: Chemistry, Risk, and Management*. Dzombak, D.A., R.S. Ghosh, R.S., and G.M. Wong-Chong (eds.). Taylor & Francis Group.

Health Canada. 2023. Screening assessment, cyanides. Environment and Climate Change Canada, Health Canada. February.

LANL. 2022. ECORISK Database Release 4.3. Lawrence Livermore National Laboratory. Available at: <https://www.intellusnm.com/documents/document-library.cfc?method=retrieveLanlFile&nodeId=113331>.

Moen, J.E.T., J.P. Cornet, and E.W.A. Evers. 1986. Dutch B Standards from soil protection and remedial actions: Criteria for decision-making and standardisation of requirements. In *Contaminated Soils*: First International TNO Conference on Contaminated Soil.

Ohio EPA. 2018. Guidance for conducting ecological risk assessments. Ohio Environmental Protection Agency. <https://epa.ohio.gov/static/Portals/30/rules/RR-031.pdf>.

RIVM. 2001. Ecotoxicological serious risk concentrations for soil, sediment and (ground) water: Updated proposals for first series of compounds. National Institute for Public Health and the Environment.

USEPA. 2003. US EPA Region 5 RCRA ecological screening levels. U.S. Environmental Protection Agency.

USEPA. 2018. Region 4 ecological risk assessment supplemental guidance. U.S. Environmental Protection Agency. <https://www.epa.gov/risk/regional-ecological-risk-assessment-era-supplemental-guidance>.

Wiemeyer, S.N., E.F. Hill, J.W. Carpenter, and A.J. Krynitsky. 1986. Acute oral toxicity of sodium cyanide in birds. *Journal of Wildlife Diseases* 22: 538–546.

Appendix B

Information from USFWS and
ODNR Regarding Threatened
and Endangered Species



Office of Real Estate & Land Management

Tara Paciorek - Chief
2045 Morse Road – E-2
Columbus, Ohio 43229-6693

June 11, 2025

Cristal Reagh
Integral Consulting
111 Park Place
Richmond, California 94801

Re: 25-0709_MSC Site

Project: The proposed project involves the development of a site.

Location: The proposed project is located in Canfield Township, Mahoning County, Ohio.

The Ohio Department of Natural Resources (ODNR) has completed a review of the above referenced project. These comments were generated by an inter-disciplinary review within the Department. These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act, the Coastal Zone Management Act, Ohio Revised Code and other applicable laws and regulations. These comments are also based on ODNR's experience as the state natural resource management agency and do not supersede or replace the regulatory authority of any local, state, or federal agency nor relieve the applicant of the obligation to comply with any local, state, or federal laws or regulations.

Natural Heritage Database: A review of the Ohio Natural Heritage Database indicates there are no records of state or federally listed plants or animals within one mile of the specified project area. Records searched date from 1980.

Please note that Ohio has not been completely surveyed and we rely on receiving information from many sources. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area.

Fish and Wildlife: The Division of Wildlife (DOW) has the following comments.

The DOW recommends that impacts to streams, wetlands and other water resources be avoided and minimized to the fullest extent possible, and that Best Management Practices be utilized to minimize erosion and sedimentation.

The entire state of Ohio is within the range of the Indiana bat (*Myotis sodalis*), a state endangered and federally endangered species, the northern long-eared bat (*Myotis septentrionalis*), a state endangered and federally endangered species, the little brown bat (*Myotis lucifugus*), a state endangered species, and the tricolored bat (*Perimyotis subflavus*), a state endangered species. During the spring and summer (April 1 through September 30), these species of bats predominately roost in trees behind loose,

exfoliating bark, in crevices and cavities, or in the leaves. However, these species are also dependent on the forest structure surrounding roost trees. If trees are present within the project area, and trees must be cut, the DOW recommends cutting only occur from October 1 through March 31, conserving trees with loose, shaggy bark and/or crevices, holes, or cavities, as well as trees with DBH $\geq$ 20 if possible. If trees are present within the project area, and trees must be cut during the summer months, the DOW recommends a mist net survey or acoustic survey be conducted from June 1 through August 15, prior to any cutting. Mist net and acoustic surveys should be conducted in accordance with the most recent version of the "[OHIO DIVISION OF WILDLIFE GUIDANCE FOR BAT SURVEYS AND TREE CLEARING](#)". If state listed bats are documented, DOW recommends cutting only occur from October 1 through March 31. However, limited summer tree cutting may be acceptable after consultation with the DOW (contact Eileen Wyza at Eileen.Wyza@dnr.ohio.gov).

The DOW also recommends that a desktop habitat assessment is conducted, followed by a field assessment if needed, to determine if a potential hibernaculum is present within the project area. Direction on how to conduct habitat assessments can be found in the current USFWS "[RANGE-WIDE INDIANA BAT & NORTHERN LONG-EARED BAT SURVEY GUIDELINES](#)." If a habitat assessment finds that a potential hibernaculum is present within 0.25 miles of the project area, please send this information to Eileen Wyza for project recommendations. If a potential or known hibernaculum is found, the DOW recommends a 0.25-mile tree cutting and subsurface disturbance buffer around the hibernaculum entrance, however, limited summer or winter tree cutting may be acceptable after consultation with the DOW. If no tree cutting or subsurface impacts to a hibernaculum are proposed, this project is not likely to impact these species.

The project is within the range of the western banded killifish (*Fundulus diaphanus menona*), a state endangered fish. The DOW recommends no in-water work in perennial streams from March 15 through June 30 to reduce impacts to indigenous aquatic species and their habitat. If no in-water work is proposed in a perennial stream, this project is not likely to impact this or other aquatic species.

The project is within the range of the eastern massasauga (*Sistrurus catenatus*), a state endangered and a federally threatened snake species. The eastern massasauga uses a range of habitats including wet prairies, fens, and other wetlands, as well as drier upland habitat. Due to the location, the type of habitat within the project area, and the type of work proposed, this project is not likely to impact this species.

The project is within the range of the northern harrier (*Circus hudsonius*), a state endangered bird. This is a common migrant and winter species. Nesters are much rarer, although they occasionally breed in large marshes and grasslands. Harriers often nest in loose colonies. The female builds a nest out of sticks on the ground, often on top of a mound. Harriers hunt over grasslands. If this type of habitat will be impacted, construction should be avoided in this habitat during the species' nesting period of April 15 through July 31. If this habitat will not be impacted, the project is not likely to impact this species.

The project is within the range of the sandhill crane (*Antigone canadensis*), a state threatened species. Sandhill cranes are primarily a wetland-dependent species. On their wintering grounds, they will utilize agricultural fields; however, they roost in shallow, standing water or moist bottomlands. On breeding grounds they require a rather large tract of wet meadow, shallow marsh, or bog for nesting. If grassland, prairie, or wetland habitat will be impacted, construction should be avoided in this habitat during the species' nesting period of April 1 through August 31. If this habitat will not be impacted, this project is not likely to have an impact on this species.

Due to the potential of impacts to federally listed species, as well as to state listed species, we recommend that this project be coordinated with the US Fish & Wildlife Service.

Water Resources: The Division of Water Resources has the following comment.

If the subject project is in a floodplain regulated by the Federal Emergency Management Agency (FEMA), the [local floodplain administrator](#) should be contacted concerning the possible need for any floodplain permits or approvals. The FEMA National Flood Hazard Layer (NHFL) Viewer [website](#) can be utilized to see if the project is in a FEMA regulated floodplain. If the project is not in a FEMA regulated floodplain, then no further action is required.

ODNR appreciates the opportunity to provide these comments. Please contact Mike Pettegrew (Environmental Services Administrator) at mike.pettegrew@dnr.ohio.gov if you have questions about these comments or need additional information.

Expiration: ODNR Environmental Reviews are typically valid for 2 years from the issuance date. If the scope of work, project area, construction limits, and/or anticipated impacts to natural resources have changed significantly from the original project submittal, then a new Environmental Review request should be submitted.

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Mahoning County, Ohio



Local office

Ohio Ecological Services Field Office

☎ (614) 416-8993

📠 (614) 416-8994

4625 Morse Road, Suite 104
Columbus, OH 43230-8355

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

-
1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
 2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office

of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Indiana Bat <i>Myotis sodalis</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5949	Endangered

Insects

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> Wherever found There is proposed critical habitat for this species. https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, should follow appropriate regulations and consider

implementing appropriate conservation measures, as described in the links below. Specifically, please review the "[Supplemental Information on Migratory Birds and Eagles](#)".

Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to [Bald Eagle Nesting and Sensitivity to Human Activity](#)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "[Supplemental Information on Migratory Birds and Eagles](#)", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey

effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

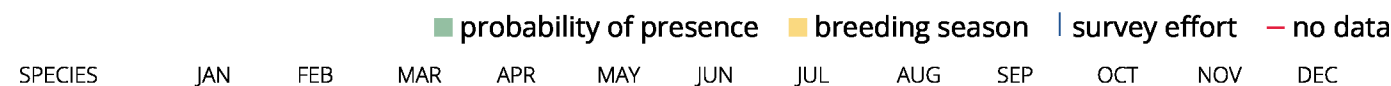
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (—)

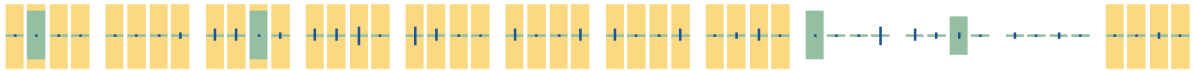
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Bald Eagle
Non-BCC
Vulnerable



What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply). To see a list of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the [Eagle Act](#) should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats³ should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the ["Supplemental Information on Migratory Birds and Eagles"](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern \(BCC\)](#) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Belted Kingfisher <i>Megasceryle alcyon</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Mar 15 to Jul 25

Blue-winged Warbler *Vermivora cyanoptera*

Breeds May 1 to Jun 30

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Bobolink *Dolichonyx oryzivorus*

Breeds May 20 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Canada Warbler *Cardellina canadensis*

Breeds May 20 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Chimney Swift *Chaetura pelagica*

Breeds Mar 15 to Aug 25

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Eastern Meadowlark *Sturnella magna*

Breeds Apr 25 to Aug 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Red-headed Woodpecker *Melanerpes erythrocephalus*

Breeds May 10 to Sep 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Rose-breasted Grosbeak *Pheucticus ludovicianus*

Breeds May 15 to Jul 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Wood Thrush *Hylocichla mustelina*

Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read ["Supplemental Information on Migratory Birds and Eagles"](#), specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

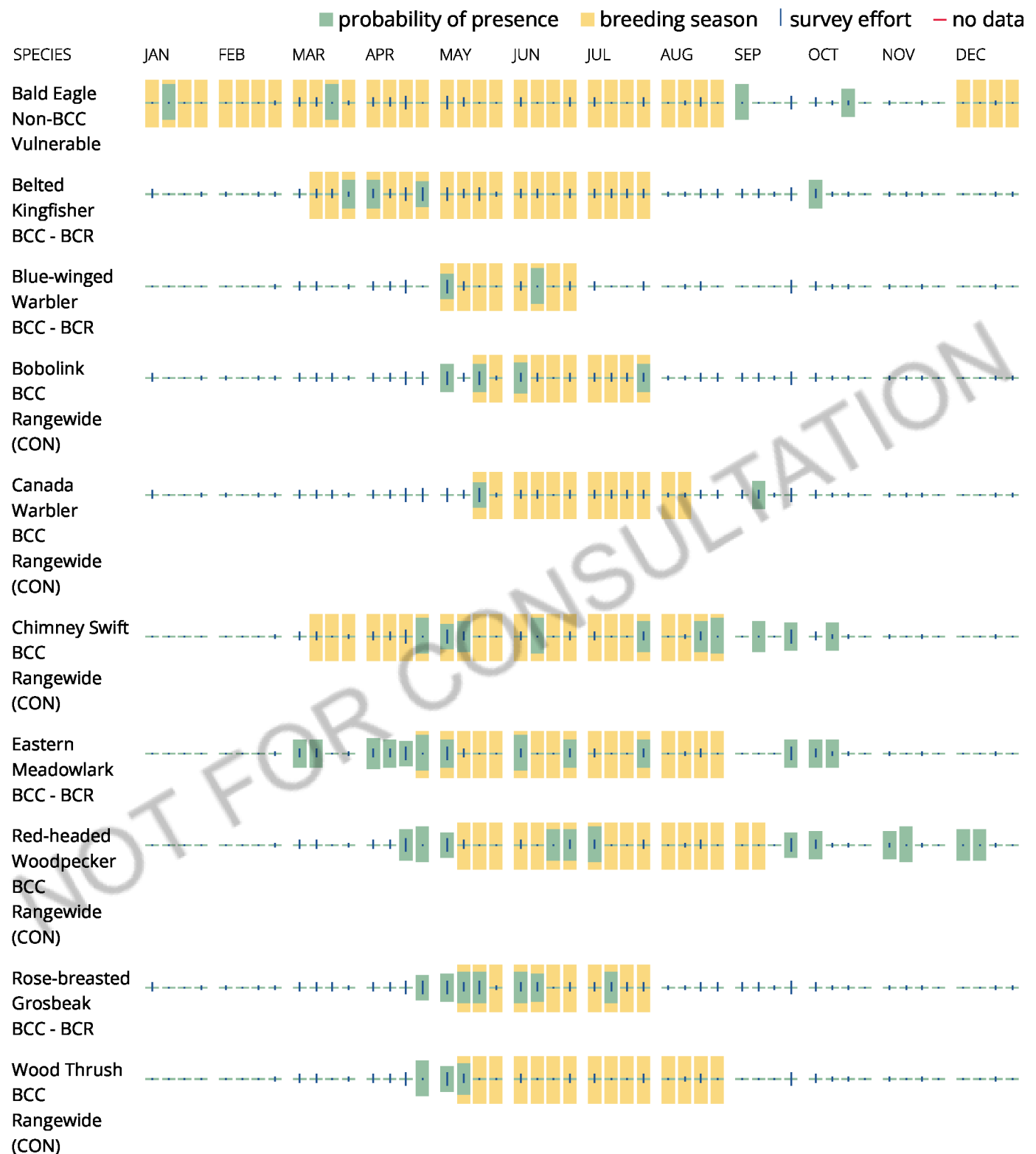
No Data (—)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are

based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds

are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the [RAIL Tool](#) and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);

2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation

measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

[R4SBC](#)

A full description for each wetland code can be found at the [National Wetlands Inventory website](#)

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix C

Analytical Data Used in the Ecological Risk Assessment

Table C-1. Surface Soil Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	DUP-8 05/22/2025		DUP-9 05/22/2025		OUTFALL #1 - S 08/08/2024		OUTFALL #2 - N 08/08/2024	
Inorganics	Total Cyanide	57-12-5	0.90	0.460	U	2.80		1.20		220.0	
Inorganics	Free Cyanide	57-12-5	1.0	0.940	U	1.10	J				
Metals	Lead	7439-92-1	11.0					48.0		93.0	
Metals	Nickel	7440-02-0	38.0					28.0		13.0	
Metals	Silver	7440-22-4	4.20					0.130	U	0.093	U
Metals	Cadmium	7440-43-9	0.360					0.077	U	0.630	
Metals	Zinc	7440-66-6	46.0	59.0		160.0		220.0		1300.0	
Metals	Arsenic	7440-38-2	18.0					24.0		12.0	
Metals	Chromium	7440-47-3	0.40					19.0		25.0	
Metals	Copper	7440-50-8	28.0					34.0		19.0	
Metals	Mercury	7439-97-6	0.00051					0.026	U	0.023	U
Metals	Chromium Hexavalent (VI)	18540-29-9	130.0	0.160	U	0.180	U				

Notes:

Bolded values represent detected results that exceed the ESV.

ESV = ecological screening value

NSV = no screening value

Data Qualifier:

J = estimated concentration

U = not detected

Table C-1. Surface Soil Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	OUTFALL #3 - N 08/08/2024	SB-103-0-0.5 10/21/2025	SB-103-2-2.5 10/21/2025	SB-103-4-4.5 10/21/2025
Inorganics	Total Cyanide	57-12-5	0.90	38.0	0.790	0.650 J	0.500 U
Inorganics	Free Cyanide	57-12-5	1.0		1.10 U	1.10 U	1.0 U
Metals	Lead	7439-92-1	11.0	26.0			
Metals	Nickel	7440-02-0	38.0	17.0			
Metals	Silver	7440-22-4	4.20	0.072 U			
Metals	Cadmium	7440-43-9	0.360	0.043 U			
Metals	Zinc	7440-66-6	46.0	230.0	62.0	64.0	71.0
Metals	Arsenic	7440-38-2	18.0	17.0			
Metals	Chromium	7440-47-3	0.40	17.0			
Metals	Copper	7440-50-8	28.0	21.0			
Metals	Mercury	7439-97-6	0.00051	0.021 U			
Metals	Chromium Hexavalent (VI)	18540-29-9	130.0		0.480 U	0.460 U	0.430 U

Notes:

Bolded values represent detected results that exceed the ESV.

ESV = ecological screening value

NSV = no screening value

Data Qualifier:

J = estimated concentration

U = not detected

Table C-1. Surface Soil Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	SB-107-0-0.5 10/22/2025		SB-107-2-2.5 10/22/2025		SB-107-4-4.5 10/22/2025		SB-108-0-0.5 10/21/2025	
Inorganics	Total Cyanide	57-12-5	0.90	16.0		0.560	J	0.540	U	0.610	J
Inorganics	Free Cyanide	57-12-5	1.0	0.920	U	1.0	U	1.10	U	1.10	U
Metals	Lead	7439-92-1	11.0								
Metals	Nickel	7440-02-0	38.0								
Metals	Silver	7440-22-4	4.20								
Metals	Cadmium	7440-43-9	0.360								
Metals	Zinc	7440-66-6	46.0	340.0		97.0		74.0		44.0	
Metals	Arsenic	7440-38-2	18.0								
Metals	Chromium	7440-47-3	0.40								
Metals	Copper	7440-50-8	28.0								
Metals	Mercury	7439-97-6	0.00051								
Metals	Chromium Hexavalent (VI)	18540-29-9	130.0	0.410	U	0.410	U	0.460	U	0.460	U

Notes:

Bolded values represent detected results that exceed the ESV.

ESV = ecological screening value

NSV = no screening value

Data Qualifier:

J = estimated concentration

U = not detected

Table C-1. Surface Soil Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	SB-108-2-2.5 10/21/2025		SB-108-4-4.5 10/21/2025		SB-135-0-0.5 10/21/2025		SB-135-2-2.5 10/21/2025	
Inorganics	Total Cyanide	57-12-5	0.90	0.500	U	0.440	U	0.530	U	0.470	U
Inorganics	Free Cyanide	57-12-5	1.0	1.0	U	0.990	U	1.0	U	0.980	U
Metals	Lead	7439-92-1	11.0								
Metals	Nickel	7440-02-0	38.0								
Metals	Silver	7440-22-4	4.20								
Metals	Cadmium	7440-43-9	0.360								
Metals	Zinc	7440-66-6	46.0	70.0		76.0		93.0		70.0	
Metals	Arsenic	7440-38-2	18.0								
Metals	Chromium	7440-47-3	0.40								
Metals	Copper	7440-50-8	28.0								
Metals	Mercury	7439-97-6	0.00051								
Metals	Chromium Hexavalent (VI)	18540-29-9	130.0	0.410	U	0.460	U	0.450	U	0.440	U

Notes:

Bolded values represent detected results that exceed the ESV.

ESV = ecological screening value

NSV = no screening value

Data Qualifier:

J = estimated concentration

U = not detected

Table C-1. Surface Soil Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	SB-135-4-4.5 10/21/2025		SB-55-0.5-1 05/22/2025		SB-55-0-0.5 05/22/2025		SB-55-1-2 05/22/2025		SB-55-2-3 05/22/2025	
Inorganics	Total Cyanide	57-12-5	0.90	0.480	U	6.20		4.50		4.0		29.0	
Inorganics	Free Cyanide	57-12-5	1.0	0.960	U	1.10	U	1.20	U	1.10	U	1.20	U
Metals	Lead	7439-92-1	11.0										
Metals	Nickel	7440-02-0	38.0										
Metals	Silver	7440-22-4	4.20										
Metals	Cadmium	7440-43-9	0.360										
Metals	Zinc	7440-66-6	46.0	95.0		200.0		220.0		140.0		420.0	
Metals	Arsenic	7440-38-2	18.0										
Metals	Chromium	7440-47-3	0.40										
Metals	Copper	7440-50-8	28.0										
Metals	Mercury	7439-97-6	0.00051										
Metals	Chromium Hexavalent (VI)	18540-29-9	130.0	0.410	U	0.180	U	0.180	U	0.190	U	0.200	U

Notes:

Bolded values represent detected results that exceed the ESV.

ESV = ecological screening value

NSV = no screening value

Data Qualifier:

J = estimated concentration

U = not detected

Table C-1. Surface Soil Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	SB-55-3-4 05/22/2025		SB-59-0.5-1 05/22/2025		SB-59-0-0.5 05/22/2025		SB-59-1-2 05/22/2025		SB-59-2-3 05/22/2025	
Inorganics	Total Cyanide	57-12-5	0.90	4.60		0.860		15.0		1.10		0.460	U
Inorganics	Free Cyanide	57-12-5	1.0	1.10	U	1.0	J	1.10	U	0.950	U	1.10	J
Metals	Lead	7439-92-1	11.0										
Metals	Nickel	7440-02-0	38.0										
Metals	Silver	7440-22-4	4.20										
Metals	Cadmium	7440-43-9	0.360										
Metals	Zinc	7440-66-6	46.0	47.0		77.0		180.0		62.0		55.0	
Metals	Arsenic	7440-38-2	18.0										
Metals	Chromium	7440-47-3	0.40										
Metals	Copper	7440-50-8	28.0										
Metals	Mercury	7439-97-6	0.00051										
Metals	Chromium Hexavalent (VI)	18540-29-9	130.0	0.180	U	0.160	U	0.170	U	0.160	U	0.160	U

Notes:

Bolded values represent detected results that exceed the ESV.

ESV = ecological screening value

NSV = no screening value

Data Qualifier:

J = estimated concentration

U = not detected

Table C-1. Surface Soil Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	SB-59-3-4 05/22/2025	SS #1 07/24/2024	SS #2 - N 08/08/2024	SS #2 07/24/2024	SS #3 - N 08/08/2024
Inorganics	Total Cyanide	57-12-5	0.90	0.720	3700.0	14.0	2500.0	41.0
Inorganics	Free Cyanide	57-12-5	1.0	1.20 J				
Metals	Lead	7439-92-1	11.0		47.0	18.0	25.0	13.0
Metals	Nickel	7440-02-0	38.0		7.30 U	20.0	5.20 U	26.0
Metals	Silver	7440-22-4	4.20		1.80 U	0.094 U	1.30 U	0.074 U
Metals	Cadmium	7440-43-9	0.360		0.920 U	0.056 U	0.650 U	0.044 U
Metals	Zinc	7440-66-6	46.0	68.0	20000.0	140.0	19000.0	460.0
Metals	Arsenic	7440-38-2	18.0		10.0	9.80	11.0	19.0
Metals	Chromium	7440-47-3	0.40		95.0	17.0	20.0	16.0
Metals	Copper	7440-50-8	28.0		4.60 U	19.0	3.20 U	17.0
Metals	Mercury	7439-97-6	0.00051		0.220 U	0.024 U	0.150 U	0.022 U
Metals	Chromium Hexavalent (VI)	18540-29-9	130.0	0.160 U				

Notes:

Bolded values represent detected results that exceed the ESV.

ESV = ecological screening value

NSV = no screening value

Data Qualifier:

J = estimated concentration

U = not detected

Table C-1. Surface Soil Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	SS #3 07/24/2024	SS #4 - N 08/08/2024	SS #4 07/24/2024	SS #5 - N 08/08/2024	SS #5 07/24/2024
Inorganics	Total Cyanide	57-12-5	0.90	990.0	79.0	1900.0	38.0	89.0
Inorganics	Free Cyanide	57-12-5	1.0					
Metals	Lead	7439-92-1	11.0	27.0	12.0	20.0	14.0	17.0
Metals	Nickel	7440-02-0	38.0	4.20 U	29.0	4.40 U	18.0	22.0
Metals	Silver	7440-22-4	4.20	1.10 U	0.093 U	1.10 U	0.089 U	1.20 U
Metals	Cadmium	7440-43-9	0.360	0.530 U	0.055 U	0.550 U	0.053 U	0.610 U
Metals	Zinc	7440-66-6	46.0	6200.0	440.0	10000.0	380.0	550.0
Metals	Arsenic	7440-38-2	18.0	11.0	11.0	13.0	13.0	16.0
Metals	Chromium	7440-47-3	0.40	14.0	18.0	11.0	14.0	17.0
Metals	Copper	7440-50-8	28.0	2.60 U	16.0	2.80 U	15.0	16.0
Metals	Mercury	7439-97-6	0.00051	0.130 U	0.022 U	0.160 U	0.024 U	0.130 U
Metals	Chromium Hexavalent (VI)	18540-29-9	130.0					

Notes:

Bolded values represent detected results that exceed the ESV.

ESV = ecological screening value

NSV = no screening value

Data Qualifier:

J = estimated concentration

U = not detected

Table C-2. Onsite Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	DUP-11 10/09/2024	DUP-1 10/03/2024	DUP-12 10/09/2024	DUP-2 10/03/2024	DUP3 10/03/2024	DUP-9 10/08/2024	SB-23-0 10/08/2024	SB-23R-0- 0.5 05/22/2025
Inorganics	Total Cyanide	57-12-5	1.0	760.0	530.0	580.0	43.0	140.0	820.0	600.0	1.1
Inorganics	Free Cyanide	57-12-5	1.0								1.3 J
Metals	Lead	7439-92-1	35.80	19.0	48.0	27	37	18.0	24	22	
Metals	Silver	7440-22-4	1.0	0.097 U	0.10 J	0.14 U	0.11 U	0.084 U	0.088 U	0.12 U	
Metals	Arsenic	7440-38-2	9.79	7.0	11.0	9.8	12	11.0	10	11	
Metals	Barium	7440-39-3	20.0	91.0	92.0	75	86	45.0	67	84	
Metals	Cadmium	7440-43-9	0.990	0.240 J	0.53	0.45 J	0.48 J	0.230 J	0.34 J	0.26 J	
Metals	Chromium	7440-47-3	43.40	13.0	32	27	26	10.0	22	16	
Metals	Copper	7440-50-8	31.60	0.840 U	4.4	4.7	27	14.0	3	2.4 J	
Metals	Selenium	7782-49-2	0.720	0.560 U	0.54 J	0.83 U	0.79 J	0.540 J	0.51 U	1.2 J	
Metals	Zinc	7440-66-6	121.0	33000.0	3500	10000	890	740.0	5700	9400	59
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	2.20 U	1.8 U	2.8 U	2.1 U	1.70 U	1.1 U	0.23 U	0.18 U
Metals	Mercury	7439-97-6	0.180	0.034 U	0.042 J	0.057 J	0.06 J	0.023 U	0.06 J	0.065 J	
PCBs	Aroclor 1260	11096-82-5	0.059		0.027 U		0.03 U	0.026 U			
PCBs	Aroclor 1254	11097-69-1	0.053		0.027 U		0.03 U	0.026 U			
PCBs	Aroclor 1268	11100-14-4	NSV		0.02 U		0.023 U	0.020 U			
PCBs	Aroclor 1221	11104-28-2	NSV		0.038 U		0.042 U	0.038 U			
PCBs	Aroclor 1232	11141-16-5	NSV		0.027 U		0.03 U	0.026 U			
PCBs	Aroclor 1248	12672-29-6	0.0081		0.053 J		0.024 U	0.021 U			
PCBs	Aroclor 1016	12674-11-2	0.059		0.032 U		0.035 U	0.031 U			
PCBs	Aroclor 1262	37324-23-5	NSV		0.028 U		0.031 U	0.028 U			
PCBs	Aroclor 1242	53469-21-9	0.059		0.024 U		0.027 U	0.024 U			
PCBs	1,1'-Biphenyl	92-52-4	0.198		0.072 U		0.04 U	0.036 U			
PCBs	Total PCBs (ND=1/2DL)	--	0.0598		0.165 J		0.136 U	0.120 U			

Notes:

Bolded values represent detected results that exceed the ESV

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

Data Qualifier:

J = estimated concentration

U = not detected

Table C-2. Onsite Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	SB-24-0 10/08/2024	SB-25-0 10/08/2024	SB-26-0 10/08/2024	SB-27-0 10/08/2024	SB-27R-0- 0.5 05/23/2025	SB-28-0 10/08/2024	SB-29-0 10/08/2024	SB-30-0 10/09/2024
Inorganics	Total Cyanide	57-12-5	1.0	940.0	860.0	380.0	930.0	60.0	270.0	450.0	320.0
Inorganics	Free Cyanide	57-12-5	1.0					1.9 J			
Metals	Lead	7439-92-1	35.80	22	28	30	26		28	27	23
Metals	Silver	7440-22-4	1.0	0.11 U	0.18 U	0.16 U	0.12 U		0.21 U	0.18 U	0.14 U
Metals	Arsenic	7440-38-2	9.79	7.8	17	12	9.3		8.7	7.3	7
Metals	Barium	7440-39-3	20.0	82	130	90	63		89	73	62
Metals	Cadmium	7440-43-9	0.990	0.31 J	0.52 J	0.48 J	0.33 J		0.42 J	0.5 J	0.43 J
Metals	Chromium	7440-47-3	43.40	16	29	34	26		30	26	19
Metals	Copper	7440-50-8	31.60	0.98 U	2.7 J	12	1.8 J		15	9.4	1.4 J
Metals	Selenium	7782-49-2	0.720	0.65 U	1.1 U	1.2 J	0.87 J		1.2 U	1.8 J	0.81 U
Metals	Zinc	7440-66-6	121.0	24000	16000	2300	7500	2200	2300	4700	22000
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	2.3 U	4.1 U	3.5 U	13 J	0.28 U	3.7 U	1.6 U	2.8 U
Metals	Mercury	7439-97-6	0.180	0.043 J	0.079 J	0.091 J	0.06 J		0.084 J	0.073 J	0.078 J
PCBs	Aroclor 1260	11096-82-5	0.059								
PCBs	Aroclor 1254	11097-69-1	0.053								
PCBs	Aroclor 1268	11100-14-4	NSV								
PCBs	Aroclor 1221	11104-28-2	NSV								
PCBs	Aroclor 1232	11141-16-5	NSV								
PCBs	Aroclor 1248	12672-29-6	0.0081								
PCBs	Aroclor 1016	12674-11-2	0.059								
PCBs	Aroclor 1262	37324-23-5	NSV								
PCBs	Aroclor 1242	53469-21-9	0.059								
PCBs	1,1'-Biphenyl	92-52-4	0.198								
PCBs	Total PCBs (ND=1/2DL)	—	0.0598								

Notes:

Bolded values represent detected results that exceed the ESV

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

Data Qualifier:

J = estimated concentration

U = not detected

Table C-2. Onsite Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	SB-32R-0-									
				SB-31-0 10/09/2024	SB-32-0 10/09/2024	0.5 05/23/2025	SB-33-0 10/09/2024	SB-34-0 10/08/2024	SB-35-0 10/09/2024	SB-36-0 10/09/2024	SB-54-0-0.5 05/20/2025		
Inorganics	Total Cyanide	57-12-5	1.0	690.0	700.0	500.0	390.0	500.0	860.0	700.0	48.0		
Inorganics	Free Cyanide	57-12-5	1.0			1.4	U				2.5		
Metals	Lead	7439-92-1	35.80	23	25		29	28	29	26			
Metals	Silver	7440-22-4	1.0	0.11	U	0.11	U	0.099	U	0.17	U	0.12	U
Metals	Arsenic	7440-38-2	9.79	8.2	7.5		11	10	6.9	8.1			
Metals	Barium	7440-39-3	20.0	66	110		80	69	93	74			
Metals	Cadmium	7440-43-9	0.990	0.35	J	0.31	J	0.39	J	0.52	J	0.43	J
Metals	Chromium	7440-47-3	43.40	22	16		24	28	23	22			
Metals	Copper	7440-50-8	31.60	2.5	J	0.97	U	4	6	1.4	U	1.1	U
Metals	Selenium	7782-49-2	0.720	0.63	U	0.81	J	0.67	J	0.55	U	0.96	U
Metals	Zinc	7440-66-6	121.0	9500	21000	5700	7600	3700	21000	20000		320	
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	2.7	U	2.2	U	4.1	U	1.1	U	6	U
Metals	Mercury	7439-97-6	0.180	0.049	J	0.038	J	0.039	J	0.039	J	0.069	J
PCBs	Aroclor 1260	11096-82-5	0.059										
PCBs	Aroclor 1254	11097-69-1	0.053										
PCBs	Aroclor 1268	11100-14-4	NSV										
PCBs	Aroclor 1221	11104-28-2	NSV										
PCBs	Aroclor 1232	11141-16-5	NSV										
PCBs	Aroclor 1248	12672-29-6	0.0081										
PCBs	Aroclor 1016	12674-11-2	0.059										
PCBs	Aroclor 1262	37324-23-5	NSV										
PCBs	Aroclor 1242	53469-21-9	0.059										
PCBs	1,1'-Biphenyl	92-52-4	0.198										
PCBs	Total PCBs (ND=1/2DL)	—	0.0598										

Notes:

Bolded values represent detected results that exceed the ESV

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

Data Qualifier:

J = estimated concentration

U = not detected

Table C-2. Onsite Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	SB-56-0-0.5 05/21/2025	SB-57-0-0.5 05/20/2025	SB-58-0-0.5 05/22/2025	SB-60-0-0.5 05/20/2025	SB-61-0-0.5 05/20/2025	SB-62-0-0.5 05/20/2025	SB-63-0-0.5 05/21/2025	SB-64-0-0.5 05/21/2025
Inorganics	Total Cyanide	57-12-5	1.0	4.5	1.0 J	0.6 U	1.0 J	0.7 U	0.7 U	0.5 U	0.5 U
Inorganics	Free Cyanide	57-12-5	1.0	1.8 U	1.7 U	1.3 U	1.7 U	1.4 U	1.8	1.4	1.1 U
Metals	Lead	7439-92-1	35.80								
Metals	Silver	7440-22-4	1.0								
Metals	Arsenic	7440-38-2	9.79								
Metals	Barium	7440-39-3	20.0								
Metals	Cadmium	7440-43-9	0.990								
Metals	Chromium	7440-47-3	43.40								
Metals	Copper	7440-50-8	31.60								
Metals	Selenium	7782-49-2	0.720								
Metals	Zinc	7440-66-6	121.0	140	170	82	290	75	85	54	65
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	5.7 U	1.4 J	1.1 U	0.29 U	0.23 U	0.23 U	0.91 U	0.18 U
Metals	Mercury	7439-97-6	0.180								
PCBs	Aroclor 1260	11096-82-5	0.059								
PCBs	Aroclor 1254	11097-69-1	0.053								
PCBs	Aroclor 1268	11100-14-4	NSV								
PCBs	Aroclor 1221	11104-28-2	NSV								
PCBs	Aroclor 1232	11141-16-5	NSV								
PCBs	Aroclor 1248	12672-29-6	0.0081								
PCBs	Aroclor 1016	12674-11-2	0.059								
PCBs	Aroclor 1262	37324-23-5	NSV								
PCBs	Aroclor 1242	53469-21-9	0.059								
PCBs	1,1'-Biphenyl	92-52-4	0.198								
PCBs	Total PCBs (ND=1/2DL)	—	0.0598								

Notes:

Bolded values represent detected results that exceed the ESV

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

Data Qualifier:

J = estimated concentration

U = not detected

Table C-2. Onsite Sediment Sample-by-Sample Screen (mg/kg)

				SB-64-0-0.5		SB-65-0-0.5		SB-66-0-0.5		SB-67-0-0.5		SB-68-0-0.5		SB-69-0-0.5		T1000-C-0.0	T1000-E-0.0		
Chemical Type	Chemical	CAS	ESV	05/22/2025		05/22/2025		05/22/2025		05/21/2025		05/21/2025		05/21/2025		10/03/2024	10/03/2024		
Inorganics	Total Cyanide	57-12-5	1.0	0.6	U	0.5	U	0.6	U	0.9	U	0.5	U	0.7		1.9	29.0		
Inorganics	Free Cyanide	57-12-5	1.0	1.2	U	0.99	U	0.66	U	1.7	U	1.2	J	1.2	U				
Metals	Lead	7439-92-1	35.80													18	30		
Metals	Silver	7440-22-4	1.0													0.085	U	0.38	J
Metals	Arsenic	7440-38-2	9.79													15		9.7	
Metals	Barium	7440-39-3	20.0													72		150	
Metals	Cadmium	7440-43-9	0.990													0.18	J	1	
Metals	Chromium	7440-47-3	43.40													10		12	
Metals	Copper	7440-50-8	31.60													1.9	J	27	
Metals	Selenium	7782-49-2	0.720													0.69	J	1.5	J
Metals	Zinc	7440-66-6	121.0	54		59		56		140		64		90		6600		140	
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	0.21	U	0.89	U	0.19	U	5.4	U	1.8	U	0.19	U	0.18	U	2.2	U
Metals	Mercury	7439-97-6	0.180													0.024	U	0.085	J
PCBs	Aroclor 1260	11096-82-5	0.059													0.027	U	0.033	U
PCBs	Aroclor 1254	11097-69-1	0.053													0.027	U	0.033	U
PCBs	Aroclor 1268	11100-14-4	NSV													0.02	U	0.026	U
PCBs	Aroclor 1221	11104-28-2	NSV													0.038	U	0.048	U
PCBs	Aroclor 1232	11141-16-5	NSV													0.027	U	0.033	U
PCBs	Aroclor 1248	12672-29-6	0.0081													0.022	U	0.027	U
PCBs	Aroclor 1016	12674-11-2	0.059													0.032	U	0.04	U
PCBs	Aroclor 1262	37324-23-5	NSV													0.028	U	0.035	U
PCBs	Aroclor 1242	53469-21-9	0.059													0.024	U	0.03	U
PCBs	1,1'-Biphenyl	92-52-4	0.198													0.036	U	0.093	J
PCBs	Total PCBs (ND=1/2DL)	--	0.0598													0.123	U	0.153	U

Notes:

Bolded values represent detected results that exceed the ESV

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

Data Qualifier:

J = estimated concentration

U = not detected

Table C-2. Onsite Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	T-1000-N20-0-0.5		T1000-P20-0-0.5		T1000-W-0.0	T1125-C-0.0	T1125-E-0.0	T-1125-N20-0-0.5		T1125-P20-0-0.5		T1125-W-0.0
				10/24/2025	10/23/2025	10/24/2025	10/23/2025	10/03/2024	10/03/2024	10/03/2024	10/24/2025	10/23/2025	10/24/2025	10/23/2025	10/03/2024
Inorganics	Total Cyanide	57-12-5	1.0	0.5	U	1.2		370.0	570.0	70.0	0.5	U	23.0		66.0
Inorganics	Free Cyanide	57-12-5	1.0	1	U	1	U				0.98	U	1.1	U	
Metals	Lead	7439-92-1	35.80					18	21	27					18
Metals	Silver	7440-22-4	1.0					0.083	U	0.12	U	0.12	U		0.1
Metals	Arsenic	7440-38-2	9.79					9.3	9.9	13					11
Metals	Barium	7440-39-3	20.0					51	55	69					47
Metals	Cadmium	7440-43-9	0.990					0.31	J	0.26	J	0.32	J		0.2
Metals	Chromium	7440-47-3	43.40					11	14	18					11
Metals	Copper	7440-50-8	31.60					15	3.3	J	26				11
Metals	Selenium	7782-49-2	0.720					0.48	U	0.7	U	0.7	J		0.59
Metals	Zinc	7440-66-6	121.0	88		71		280	4500	630	82		19		660
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0					0.18	U	2.1	U	0.2	U		0.18
Metals	Mercury	7439-97-6	0.180					0.032	J	0.03	J	0.043	J		0.022
PCBs	Aroclor 1260	11096-82-5	0.059					0.029	U	0.034	U	0.03	U		0.026
PCBs	Aroclor 1254	11097-69-1	0.053					0.029	U	0.034	U	0.03	U		0.026
PCBs	Aroclor 1268	11100-14-4	NSV					0.022	U	0.026	U	0.023	U		0.02
PCBs	Aroclor 1221	11104-28-2	NSV					0.041	U	0.049	U	0.043	U		0.037
PCBs	Aroclor 1232	11141-16-5	NSV					0.029	U	0.034	U	0.03	U		0.026
PCBs	Aroclor 1248	12672-29-6	0.0081					0.023	U	0.028	U	0.024	U		0.021
PCBs	Aroclor 1016	12674-11-2	0.059					0.034	U	0.04	U	0.036	U		0.031
PCBs	Aroclor 1262	37324-23-5	NSV					0.03	U	0.036	U	0.032	U		0.027
PCBs	Aroclor 1242	53469-21-9	0.059					0.026	U	0.031	U	0.027	U		0.023
PCBs	1,1'-Biphenyl	92-52-4	0.198					0.038	U	0.044	U	0.04	U		0.036
PCBs	Total PCBs (ND=1/2DL)	—	0.0598					0.132	U	0.156	U	0.138	U		0.119

Notes:

Bolded values represent detected results that exceed the ESV

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

Data Qualifier:

J = estimated concentration

U = not detected

Table C-2. Onsite Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	T125-C-0.0	T125-E-0.0	T125-P20-0-0.5	T125-W-0.0	T250-C-0.0	T250-E-0.0	T-250-N20-0-0.5	T250-P20-0-0.5
				10/03/2024	10/02/2024	10/23/2025	10/02/2024	10/03/2024	10/03/2024	10/24/2025	10/23/2025
Inorganics	Total Cyanide	57-12-5	1.0	780.0	240.0	9.9	610.0	710.0	1400.0	86.0	3.3
Inorganics	Free Cyanide	57-12-5	1.0			1.1	U			1.1	1.1
Metals	Lead	7439-92-1	35.80	46	71		39	42	35		
Metals	Silver	7440-22-4	1.0	0.24	J	1.1	J	0.22	J	0.1	J
Metals	Arsenic	7440-38-2	9.79	12	32		11	9.4	13		
Metals	Barium	7440-39-3	20.0	160	120		130	82	110		
Metals	Cadmium	7440-43-9	0.990	0.67	J	1	J	0.62	0.57	0.5	J
Metals	Chromium	7440-47-3	43.40	42		340		31	28	28	
Metals	Copper	7440-50-8	31.60	4.7		800		28	2.5	J	4.2
Metals	Selenium	7782-49-2	0.720	0.66	U	1.6	J	0.8	J	0.73	J
Metals	Zinc	7440-66-6	121.0	6700	5200	190	3100	5800	4400	2300	82
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	2.1	U	0.97	U	1	U	2.2	U
Metals	Mercury	7439-97-6	0.180	0.072	J	0.04	J	0.044	J	0.064	J
PCBs	Aroclor 1260	11096-82-5	0.059	0.031	U	0.028	U	0.03	U	0.034	U
PCBs	Aroclor 1254	11097-69-1	0.053	0.04	J	0.034	J	0.033	J	0.048	J
PCBs	Aroclor 1268	11100-14-4	NSV	0.024	U	0.022	U	0.023	U	0.026	U
PCBs	Aroclor 1221	11104-28-2	NSV	0.045	U	0.041	U	0.042	U	0.049	U
PCBs	Aroclor 1232	11141-16-5	NSV	0.031	U	0.028	U	0.03	U	0.034	U
PCBs	Aroclor 1248	12672-29-6	0.0081	0.025	U	0.023	U	0.024	U	0.028	U
PCBs	Aroclor 1016	12674-11-2	0.059	0.037	U	0.034	U	0.035	U	0.041	U
PCBs	Aroclor 1262	37324-23-5	NSV	0.033	U	0.03	U	0.031	U	0.036	U
PCBs	Aroclor 1242	53469-21-9	0.059	0.12		0.037	J	0.037	J	0.038	J
PCBs	1,1'-Biphenyl	92-52-4	0.198	0.17	U	0.039	U	0.041	U	0.14	J
PCBs	Total PCBs (ND=1/2DL)	--	0.0598	0.273	J	0.174	J	0.178	J	0.21	J

Notes:

Bolded values represent detected results that exceed the ESV

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

Data Qualifier:

J = estimated concentration

U = not detected

Table C-2. Onsite Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	T250-W-0.0	T375-E-0.0	T-375-N20-0-		T375-P20-0-	T375-W-0.0	T425-N30-0-		T500-E-0.0	T500-P20-0-
				10/03/2024	10/03/2024	0.5	0.5	10/24/2025	10/23/2025	10/03/2024	0.5	10/03/2024	0.5
Inorganics	Total Cyanide	57-12-5	1.0	1300.0	1200.0	0.5	1.5		1300.0	2.9		370.0	39.0
Inorganics	Free Cyanide	57-12-5	1.0			1.1	J	1.1	U	1.1	U		1 U
Metals	Lead	7439-92-1	35.80	62	62				57			54	
Metals	Silver	7440-22-4	1.0	0.3	J	0.33	J		0.22	J		0.3	J
Metals	Arsenic	7440-38-2	9.79	13	14				12			11	
Metals	Barium	7440-39-3	20.0	150	160				150			150	
Metals	Cadmium	7440-43-9	0.990	0.92	0.79	J			0.75	J		0.9	
Metals	Chromium	7440-47-3	43.40	68	98				93			64	
Metals	Copper	7440-50-8	31.60	31	11				12			27	
Metals	Selenium	7782-49-2	0.720	2.1	J	2.3	J		2	J		1.1	J
Metals	Zinc	7440-66-6	121.0	3100	10000	230	91		8200	240		3400	87
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	2.4	U	1.3	U		2.4	U		2.2	U
Metals	Mercury	7439-97-6	0.180	0.067	J	0.077	J		0.081	J		0.083	J
PCBs	Aroclor 1260	11096-82-5	0.059	0.036	U	0.035	U		0.035	U		0.032	U
PCBs	Aroclor 1254	11097-69-1	0.053	0.036	U	0.035	U		0.039	J		0.037	J
PCBs	Aroclor 1268	11100-14-4	NSV	0.028	U	0.027	U		0.026	U		0.024	U
PCBs	Aroclor 1221	11104-28-2	NSV	0.052	U	0.05	U		0.05	U		0.045	U
PCBs	Aroclor 1232	11141-16-5	NSV	0.036	U	0.035	U		0.035	U		0.032	U
PCBs	Aroclor 1248	12672-29-6	0.0081	0.073	J	0.067	J		0.028	U		0.026	U
PCBs	Aroclor 1016	12674-11-2	0.059	0.043	U	0.042	U		0.041	U		0.038	U
PCBs	Aroclor 1262	37324-23-5	NSV	0.038	U	0.037	U		0.036	U		0.033	U
PCBs	Aroclor 1242	53469-21-9	0.059	0.033	U	0.032	U		0.031	U		0.029	U
PCBs	1,1'-Biphenyl	92-52-4	0.198	0.048	U	0.047	U		0.093	U		0.081	U
PCBs	Total PCBs (ND=1/2DL)	--	0.0598	0.224	J	0.214	J		0.18	J		0.167	J

Notes:

Bolded values represent detected results that exceed the ESV

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

Data Qualifier:

J = estimated concentration

U = not detected

Table C-2. Onsite Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	T500-W-0.0		T625-C-0.0		T625-E-0.0		T625-P20-0-0.5		T625-W-0.0		T750-E-0.0		T750-P20-0-0.5		T750-W-0.0	
				10/03/2024	10/03/2024	10/03/2024	10/23/2025	10/03/2024	10/03/2024	10/03/2024	10/23/2025	10/03/2024	10/03/2024						
Inorganics	Total Cyanide	57-12-5	1.0	540.0		160.0		10.0		3.5		740.0		20.0		4.5		39.0	
Inorganics	Free Cyanide	57-12-5	1.0							1	U					1	U		
Metals	Lead	7439-92-1	35.80	44		30		26				40		29				37	
Metals	Silver	7440-22-4	1.0	0.092	U	0.11	J	0.078	U			0.11	J	0.16	J			0.12	J
Metals	Arsenic	7440-38-2	9.79	14		15		11				14		13				12	
Metals	Barium	7440-39-3	20.0	110		100		60				96		85				85	
Metals	Cadmium	7440-43-9	0.990	0.6		0.28	J	0.41	J			0.53	J	0.44	J			0.54	J
Metals	Chromium	7440-47-3	43.40	33		18		17				32		20				24	
Metals	Copper	7440-50-8	31.60	17		3.7		26				11		27				24	
Metals	Selenium	7782-49-2	0.720	0.98	J	0.61	U	0.87	J			0.8	J	0.68	U			1.1	J
Metals	Zinc	7440-66-6	121.0	2600		12000		210		48		3700		420		71		1200	
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	2.2	U	1.9	U	2.4		0.45	U	2.1	U	2.3	U			2.1	U
Metals	Mercury	7439-97-6	0.180	0.078	J	0.037	J	0.083	J			0.068	J	0.056	J			0.059	J
PCBs	Aroclor 1260	11096-82-5	0.059	0.031	U	0.03	U	0.029	U			0.031	U	0.035	U			0.031	U
PCBs	Aroclor 1254	11097-69-1	0.053	0.031	U	0.03	U	0.029	U			0.031	U	0.035	U			0.031	U
PCBs	Aroclor 1268	11100-14-4	NSV	0.023	U	0.023	U	0.022	U			0.024	U	0.027	U			0.024	U
PCBs	Aroclor 1221	11104-28-2	NSV	0.044	U	0.043	U	0.042	U			0.045	U	0.05	U			0.044	U
PCBs	Aroclor 1232	11141-16-5	NSV	0.031	U	0.03	U	0.029	U			0.031	U	0.035	U			0.031	U
PCBs	Aroclor 1248	12672-29-6	0.0081	0.025	U	0.024	U	0.024	U			0.025	U	0.028	U			0.025	U
PCBs	Aroclor 1016	12674-11-2	0.059	0.037	U	0.036	U	0.035	U			0.037	U	0.042	U			0.037	U
PCBs	Aroclor 1262	37324-23-5	NSV	0.032	U	0.032	U	0.031	U			0.033	U	0.037	U			0.033	U
PCBs	Aroclor 1242	53469-21-9	0.059	0.028	U	0.027	U	0.027	U			0.028	U	0.032	U			0.028	U
PCBs	1,1'-Biphenyl	92-52-4	0.198	0.042	U	0.099	U	0.039	U			0.042	U	0.045	U			0.04	U
PCBs	Total PCBs (ND=1/2DL)	--	0.0598	0.141	U	0.138	U	0.134	U			0.143	U	0.161	U			0.142	U

Notes:

Bolded values represent detected results that exceed the ESV

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

Data Qualifier:

J = estimated concentration

U = not detected

Table C-2. Onsite Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	T875-C-0.0		T875-E-0.0		T-875-N20-0-0.5		T875-P20-0-0.5		T875-W-0.0		TO-C-0.0		TO-E-0.0		TO-W-0.0	
				10/03/2024	10/03/2024	10/03/2024	10/03/2024	10/24/2025	10/23/2025	10/03/2024	10/02/2024	10/03/2024	10/02/2024	10/02/2024	10/02/2024	10/02/2024	10/02/2024	10/02/2024	10/02/2024
Inorganics	Total Cyanide	57-12-5	1.0	170.0		1.4		2.1		3.9		23.0		2.3		1.5		2.0	
Inorganics	Free Cyanide	57-12-5	1.0					1	U	0.99	U								
Metals	Lead	7439-92-1	35.80	10		14						32		26		39		27	
Metals	Silver	7440-22-4	1.0	0.086	U	0.08	U					0.093	U	0.25	J	0.1	U	0.27	J
Metals	Arsenic	7440-38-2	9.79	16		9.8						12		13		16		11	
Metals	Barium	7440-39-3	20.0	56		44						68		100		85		93	
Metals	Cadmium	7440-43-9	0.990	0.051	U	0.23	J					0.38	J	0.46	J	0.41	J	0.42	J
Metals	Chromium	7440-47-3	43.40	15		11						18		53		24		94	
Metals	Copper	7440-50-8	31.60	11		15						31		39		30		35	
Metals	Selenium	7782-49-2	0.720	0.53	J	0.51	J					0.54	U	1.2	J	0.83	J	1	J
Metals	Zinc	7440-66-6	121.0	820		75		65		70		430		120		140		150	
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	0.18	U	0.16	U					1	U	0.18	U	1	U	0.88	U
Metals	Mercury	7439-97-6	0.180	0.023	U	0.032	J					0.034	J	0.032	J	0.046	J	0.036	J
PCBs	Aroclor 1260	11096-82-5	0.059	0.025	U	0.026	U					0.03	U	0.028	U	0.03	U	0.026	U
PCBs	Aroclor 1254	11097-69-1	0.053	0.025	U	0.026	U					0.03	U	0.028	U	0.03	U	0.026	U
PCBs	Aroclor 1268	11100-14-4	NSV	0.019	U	0.02	U					0.023	U	0.021	U	0.023	U	0.02	U
PCBs	Aroclor 1221	11104-28-2	NSV	0.036	U	0.037	U					0.042	U	0.04	U	0.043	U	0.038	U
PCBs	Aroclor 1232	11141-16-5	NSV	0.025	U	0.026	U					0.03	U	0.028	U	0.03	U	0.026	U
PCBs	Aroclor 1248	12672-29-6	0.0081	0.02	U	0.021	U					0.024	U	0.023	U	0.024	U	0.021	U
PCBs	Aroclor 1016	12674-11-2	0.059	0.03	U	0.03	U					0.035	U	0.033	U	0.035	U	0.031	U
PCBs	Aroclor 1262	37324-23-5	NSV	0.026	U	0.027	U					0.031	U	0.029	U	0.031	U	0.028	U
PCBs	Aroclor 1242	53469-21-9	0.059	0.023	U	0.023	U					0.027	U	0.045	J	0.027	U	0.026	J
PCBs	1,1'-Biphenyl	92-52-4	0.198	0.034	U	0.033	U					0.039	U	0.038	U	0.042	J	0.035	U
PCBs	Total PCBs (ND=1/2DL)	—	0.0598	0.115	U	0.118	U					0.136	U	0.16	J	0.137	U	0.134	J

Notes:

Bolded values represent detected results that exceed the ESV

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

Data Qualifier:

J = estimated concentration

U = not detected

Table C-3. Downgradient Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	DUP-1 10/21/2024	DUP-1-SED 05/15/2025	DUP-2 10/22/2024	DUP-3 10/22/2024	DUP-4 10/24/2024	DUP-5 10/24/2024
Inorganics	Total Cyanide	57-12-5	1.0	89.0	31.0	3.30	35.0	72.0	57.0
Inorganics	Free Cyanide	57-12-5	1.0		1.70				
Metals	Lead	7439-92-1	35.80	21.0		12.0	18.0	20.0	17.0
Metals	Silver	7440-22-4	1.0	0.10 U		0.096 U	0.084 U	0.110 U	0.075
Metals	Arsenic	7440-38-2	9.8	10.0		14.0	12.0	11.0	11.0
Metals	Barium	7440-39-3	20.0	62.0		47.0	54.0	67.0	55.0
Metals	Cadmium	7440-43-9	0.990	0.320 J		0.075 J	0.150 J	0.260 J	0.140
Metals	Chromium	7440-47-3	43.40	20.0		17.0	14.0	18.0	14.0
Metals	Copper	7440-50-8	31.60	17.0		19.0	10.0	12.0	10.0
Metals	Zinc	7440-66-6	121.0	240.0		79.0	200.0	950.0	380.0
Metals	Selenium	7782-49-2	0.720	0.610 J		0.550 U	0.480 U	1.0 J	0.430
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	0.180 U		0.180 U	0.190 U	0.240 J	0.220
Metals	Mercury	7439-97-6	0.180	0.040 J		0.023 U	0.025 U	0.051 J	0.027

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

Data Qualifier:

J = estimated concentration

U = not detected

Table C-3. Downgradient Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV		DUP-6 10/25/2024	DUP-7 10/28/2024	T2-0-N-0.0 10/28/2024	T2-0-S-0.0 10/28/2024	T2-1000-C-0.0 10/21/2024
Inorganics	Total Cyanide	57-12-5	1.0		170.0	49.0	230.0	7.20	250.0
Inorganics	Free Cyanide	57-12-5	1.0						
Metals	Lead	7439-92-1	35.80		27.0	12.0	18.0	14.0	21.0
Metals	Silver	7440-22-4	1.0	U	0.110	U	0.10	U	0.095
Metals	Arsenic	7440-38-2	9.8		17.0	23.0	17.0	18.0	27.0
Metals	Barium	7440-39-3	20.0		77.0	75.0	70.0	93.0	69.0
Metals	Cadmium	7440-43-9	0.990	J	0.320	J	0.210	J	0.160
Metals	Chromium	7440-47-3	43.40		40.0	13.0	13.0	13.0	12.0
Metals	Copper	7440-50-8	31.60		10.0	16.0	4.80	19.0	6.10
Metals	Zinc	7440-66-6	121.0		690.0	180.0	2100.0	100.0	730.0
Metals	Selenium	7782-49-2	0.720	U	1.40	J	0.50	U	1.10
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	J	0.240	U	1.80	0.20	U
Metals	Mercury	7439-97-6	0.180	U	0.045	J	0.026	U	0.025

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

Data Qualifier:

J = estimated concentration

U = not detected

Table C-3. Downgradient Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	T2-1000-N-0.0 10/21/2024	T2-1000-S-0.0 10/21/2024	T2-100-N-0.0 10/25/2024	T2-100-S-0.0 10/25/2024	T2-1125-N-0.0 10/21/2024	
Inorganics	Total Cyanide	57-12-5	1.0	9.20	80.0	7.70	130.0	33.0	U
Inorganics	Free Cyanide	57-12-5	1.0						
Metals	Lead	7439-92-1	35.80	12.0	20.0	27.0	21.0	24.0	
Metals	Silver	7440-22-4	1.0	0.096 U	0.089 U	0.10 U	0.099 U	0.150 U	U
Metals	Arsenic	7440-38-2	9.8	13.0	8.90	13.0	11.0	13.0	
Metals	Barium	7440-39-3	20.0	67.0	56.0	77.0	65.0	80.0	
Metals	Cadmium	7440-43-9	0.990	0.120 J	0.290 J	0.410 J	0.320 J	0.390 J	J
Metals	Chromium	7440-47-3	43.40	18.0	19.0	25.0	22.0	25.0	
Metals	Copper	7440-50-8	31.60	18.0	13.0	18.0	12.0	16.0	
Metals	Zinc	7440-66-6	121.0	71.0	500.0	1200.0	1000.0	1300.0	
Metals	Selenium	7782-49-2	0.720	0.580 J	0.860 J	1.40 J	1.40 J	1.30 J	J
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	0.190 U	0.180 U	0.180 U	0.220 J	0.250 U	U
Metals	Mercury	7439-97-6	0.180	0.024 J	0.034 J	0.071 J	0.059 J	0.037 U	U

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

Data Qualifier:

J = estimated concentration

U = not detected

Table C-3. Downgradient Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	T2-1125-S-0.0 10/21/2024	T2-1250-N-0.0 10/22/2024	T2-1250-S-0.0 10/21/2024	T2-1375-N-0.0 10/22/2024	T2-1375-S-0 10/22/2024				
Inorganics	Total Cyanide	57-12-5	1.0	49.0	220.0	38.0	U	350.0	21.0			
Inorganics	Free Cyanide	57-12-5	1.0									
Metals	Lead	7439-92-1	35.80	22.0	20.0	22.0		29.0	11.0			
Metals	Silver	7440-22-4	1.0	0.120	U	0.10	U	0.160	U	0.150	U	0.090
Metals	Arsenic	7440-38-2	9.8	13.0	11.0	11.0		14.0	12.0			
Metals	Barium	7440-39-3	20.0	75.0	60.0	68.0		88.0	57.0			
Metals	Cadmium	7440-43-9	0.990	0.340	J	0.250	J	0.410	J	0.430	J	0.071
Metals	Chromium	7440-47-3	43.40	22.0	17.0	22.0		28.0	16.0			
Metals	Copper	7440-50-8	31.60	11.0	8.40	5.50		7.80	18.0			
Metals	Zinc	7440-66-6	121.0	1900.0	1400.0	4300.0		3700.0	150.0			
Metals	Selenium	7782-49-2	0.720	1.0	J	0.970	J	1.40	J	0.850	U	0.520
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	0.240	U	0.210	U	2.80	J	0.260	U	0.180
Metals	Mercury	7439-97-6	0.180	0.034	J	0.030	U	0.039	U	0.052	J	0.023

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

Data Qualifier:

J = estimated concentration

U = not detected

Table C-3. Downgradient Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV		T2-1500-N-0.0 10/22/2024	T2-1500-S-0.0 10/22/2024	T2-1625-N-0.0 10/23/2024	T2-1625-S-0.0 10/22/2024	T2-1750-N-0 10/23/2024
Inorganics	Total Cyanide	57-12-5	1.0		120.0	7.0	220.0	37.0	15.0
Inorganics	Free Cyanide	57-12-5	1.0						
Metals	Lead	7439-92-1	35.80		23.0	10.0	21.0	15.0	21.0
Metals	Silver	7440-22-4	1.0	U	0.091	U	0.120	U	0.093
Metals	Arsenic	7440-38-2	9.8		8.70	11.0	9.90	7.20	11.0
Metals	Barium	7440-39-3	20.0		60.0	93.0	72.0	44.0	68.0
Metals	Cadmium	7440-43-9	0.990	J	0.370	J	0.076	J	0.190
Metals	Chromium	7440-47-3	43.40		21.0	19.0	24.0	15.0	20.0
Metals	Copper	7440-50-8	31.60		9.90	17.0	9.60	7.30	17.0
Metals	Zinc	7440-66-6	121.0		1100.0	80.0	2300.0	1200.0	230.0
Metals	Selenium	7782-49-2	0.720	U	0.550	J	0.430	U	0.730
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	U	0.20	U	0.170	U	0.240
Metals	Mercury	7439-97-6	0.180	U	0.047	J	0.024	U	0.043

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

Data Qualifier:

J = estimated concentration

U = not detected

Table C-3. Downgradient Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	T2-1750-S-0.0 10/23/2024	T2-1820-N-0.0 10/23/2024	T2-1820-S-0.0 10/23/2024	T2-250-N-0.0 10/25/2024	T2-375-C-0.0 10/25/2024
Inorganics	Total Cyanide	57-12-5	1.0	2.20	11.0	1.40	110.0	190.0
Inorganics	Free Cyanide	57-12-5	1.0					
Metals	Lead	7439-92-1	35.80	19.0	16.0	14.0	30.0	18.0
Metals	Silver	7440-22-4	1.0	U 0.130	U 0.120	U 0.084	U 0.120	U 0.093
Metals	Arsenic	7440-38-2	9.8	7.30	7.80	16.0	13.0	12.0
Metals	Barium	7440-39-3	20.0	64.0	64.0	82.0	73.0	65.0
Metals	Cadmium	7440-43-9	0.990	J 0.320	J 0.240	J 0.088	J 0.380	J 0.230
Metals	Chromium	7440-47-3	43.40	20.0	20.0	16.0	24.0	19.0
Metals	Copper	7440-50-8	31.60	18.0	16.0	17.0	3.40	4.20
Metals	Zinc	7440-66-6	121.0	220.0	160.0	150.0	4100.0	2400.0
Metals	Selenium	7782-49-2	0.720	J 0.780	J 0.70	U 0.490	J 1.70	J 0.870
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	J 0.490	J 0.220	U 0.170	U 0.240	U 0.20
Metals	Mercury	7439-97-6	0.180	J 0.034	U 0.025	U 0.023	U 0.049	J 0.032

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

Data Qualifier:

J = estimated concentration

U = not detected

Table C-3. Downgradient Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	T2-375-N-0.0 10/25/2024	T2-375-S-0.0 10/25/2024	T2-500-N-0.0 10/24/2024	T2-500-S-0.0 10/24/2024	T2-500-S-2.0 10/25/2024
Inorganics	Total Cyanide	57-12-5	1.0	57.0	270.0	31.0	43.0	0.620 U
Inorganics	Free Cyanide	57-12-5	1.0					
Metals	Lead	7439-92-1	35.80	18.0	25.0	12.0	19.0	10.0
Metals	Silver	7440-22-4	1.0	0.082 U	0.120 U	0.10 U	0.10 U	0.091 U
Metals	Arsenic	7440-38-2	9.8	9.90	12.0	11.0	15.0	15.0
Metals	Barium	7440-39-3	20.0	58.0	75.0	78.0	67.0	71.0
Metals	Cadmium	7440-43-9	0.990	0.250 J	0.480 J	0.060 J	0.150 J	0.073 J
Metals	Chromium	7440-47-3	43.40	21.0	24.0	18.0	16.0	20.0
Metals	Copper	7440-50-8	31.60	9.70	4.60	15.0	10.0	19.0
Metals	Zinc	7440-66-6	121.0	740.0	4800.0	260.0	680.0	60.0
Metals	Selenium	7782-49-2	0.720	0.760 J	0.880 J	0.580 U	0.860 J	0.530 U
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	0.170 U	0.260 U	0.180 U	0.180 U	0.180 U
Metals	Mercury	7439-97-6	0.180	0.047 J	0.049 J	0.022 U	0.030 J	0.028 U

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

Data Qualifier:

J = estimated concentration

U = not detected

Table C-3. Downgradient Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	T2-625-N-0.0	T2-625-S-0.0	T2-750-N-0.0	T2-750-S-0.0	T2-875-N-0.0	T2-875-S-0.0
				10/24/2024	10/24/2024	10/24/2024	10/24/2024	10/23/2024	10/23/2024
Inorganics	Total Cyanide	57-12-5	1.0	11.0	21.0	50.0	110.0	24.0	160.0
Inorganics	Free Cyanide	57-12-5	1.0						
Metals	Lead	7439-92-1	35.80	12.0	15.0	22.0	19.0	10.0	22.0
Metals	Silver	7440-22-4	1.0	0.094 U	0.098 U	0.086 U	0.10 U	0.093 U	0.120
Metals	Arsenic	7440-38-2	9.8	16.0	9.80	12.0	12.0	13.0	11.0
Metals	Barium	7440-39-3	20.0	53.0	56.0	68.0	68.0	16.0 J	74.0
Metals	Cadmium	7440-43-9	0.990	0.080 J	0.160 J	0.240 J	0.220 J	0.055 U	0.40
Metals	Chromium	7440-47-3	43.40	15.0	15.0	19.0	17.0	7.50	23.0
Metals	Copper	7440-50-8	31.60	20.0	8.60	17.0	12.0	14.0	9.70
Metals	Zinc	7440-66-6	121.0	130.0	1300.0	220.0	470.0	160.0	1300.0
Metals	Selenium	7782-49-2	0.720	0.540 U	0.740 J	0.810 J	1.10 J	0.540 U	0.780
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	0.190 U	0.180 U	0.470 J	0.20 U	0.180 U	0.210
Metals	Mercury	7439-97-6	0.180	0.027 U	0.022 J	0.042 J	0.034 J	0.025 U	0.032

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

Data Qualifier:

J = estimated concentration

U = not detected

Table C-3. Downgradient Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	-	T2-BIKEPATH- SED 05/15/2025	T2-CAMELOT- SED 05/15/2025	T2-CARDINAL- SED 05/15/2025	T2-GLENVIEW- SED 05/15/2025
Inorganics	Total Cyanide	57-12-5	1.0		39.0	6.90	20.0	8.60
Inorganics	Free Cyanide	57-12-5	1.0		1.50	U	1.10	U
Metals	Lead	7439-92-1	35.80				1.0	U
Metals	Silver	7440-22-4	1.0	U				
Metals	Arsenic	7440-38-2	9.8					
Metals	Barium	7440-39-3	20.0					
Metals	Cadmium	7440-43-9	0.990	J				
Metals	Chromium	7440-47-3	43.40					
Metals	Copper	7440-50-8	31.60					
Metals	Zinc	7440-66-6	121.0					
Metals	Selenium	7782-49-2	0.720	J				
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0	U				
Metals	Mercury	7439-97-6	0.180	J				

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

Data Qualifier:

J = estimated concentration

U = not detected

Table C-3. Downgradient Sediment Sample-by-Sample Screen (mg/kg)

Chemical Type	Chemical	CAS	ESV	T2-HERBERT- SED 05/15/2025	T2-NATURE- SED 05/15/2025	T2-SLEEPY HOLLOW-SED 05/15/2025	T2-VERDANT- SED 05/15/2025	TS-250-S- 0.0 10/25/2024
Inorganics	Total Cyanide	57-12-5	1.0	4.20	0.540 U	8.50	9.70	33.0
Inorganics	Free Cyanide	57-12-5	1.0	1.10	U	1.30 J	1.10 U	1.0 U
Metals	Lead	7439-92-1	35.80					19.0
Metals	Silver	7440-22-4	1.0					0.096 U
Metals	Arsenic	7440-38-2	9.8					12.0
Metals	Barium	7440-39-3	20.0					66.0
Metals	Cadmium	7440-43-9	0.990					0.210 J
Metals	Chromium	7440-47-3	43.40					20.0
Metals	Copper	7440-50-8	31.60					20.0
Metals	Zinc	7440-66-6	121.0					230.0
Metals	Selenium	7782-49-2	0.720					0.750 J
Metals	Chromium Hexavalent (VI)	18540-29-9	660.0					0.180 U
Metals	Mercury	7439-97-6	0.180					0.047 J

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

Data Qualifier:

J = estimated concentration

U = not detected

Table C-4. Onsite Surface Water Sample-by-Sample Screen (µg/L)

Chemical Type	Chemical	CAS	ESV	SB-29-SW 10/25/2024	SB-36-SW 10/25/2024	SW-DUP-1 10/07/2024	T375-C-SW 10/07/2024	T500-C-SW 10/07/2024	T750-C-SW 10/07/2024
Inorganics	Free Cyanide	57-12-5	12.0	130.0	130.0	83.0	21.0	94.0	46.0
Inorganics	Total Cyanide	57-12-5	12.0	8100.0	2400.0	4900.0	480.0	2000.0	840.0
Metals	Lead	7439-92-1	7.70	11.0	5.40	J	58.0	10.0	24.0
Metals	Silver	7440-22-4	3.20	10.0	U	10.0	U	10.0	U
Metals	Arsenic	7440-38-2	148.0	4.20	J	4.20	J	51.0	9.0
Metals	Barium	7440-39-3	220.0	88.0	J	43.0	J	150.0	28.0
Metals	Cadmium	7440-43-9	1.4	5.0	U	5.0	U	0.720	J
Metals	Chromium	7440-47-3	42.0	12.0	J	4.70	J	140.0	4.10
Metals	Copper	7440-50-8	16.90	10.0	J	3.90	J	110.0	11.0
Metals	Zinc	7440-66-6	216.0	5500.0	2700.0	28000.0	830.0	69000.0	3200.0
Metals	Selenium	7782-49-2	5.0	20.0	U	20.0	U	17.0	J
Metals	Mercury	7439-97-6	0.00130	0.20	U	0.20	U	0.20	U
Metals	Chromium Hexavalent (VI)	18540-29-9	NSV	20.0	U	20.0	U	20.0	U
PCBs	Aroclor 1260	11096-82-5	NSV	0.099	U	0.098	U	0.330	U
PCBs	Aroclor 1254	11097-69-1	NSV	0.099	U	0.098	U	0.330	U
PCBs	Aroclor 1268	11100-14-4	NSV	0.099	U	0.098	U	0.330	U
PCBs	Aroclor 1221	11104-28-2	NSV	0.099	U	0.098	U	0.330	U
PCBs	Aroclor 1232	11141-16-5	NSV	0.099	U	0.098	U	0.330	U
PCBs	Aroclor 1248	12672-29-6	NSV	0.099	U	0.098	U	0.330	U
PCBs	Aroclor 1016	12674-11-2	NSV	0.099	U	0.098	U	0.330	U
PCBs	Aroclor 1262	37324-23-5	NSV	0.099	U	0.098	U	0.330	U
PCBs	Aroclor 1242	53469-21-9	NSV	0.099	U	0.098	U	0.330	U
PCBs	1,1'-Biphenyl	92-52-4	6.50	1.0	U	0.960	U	0.960	U
PCBs	Total PCBs (ND=1/2DL)	--	0.000120	0.256	U	0.255	U	0.865	U

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

PCB = polychlorinated biphenyl

Data Qualifier:

J = estimated concentration

U = not detected

Table C-5. Onsite Surface Water Sample-by-Sample Screen (mg/L)

Chemical Type	Chemical	CAS	ESV	DUP-1-SW 05/15/2025	T2-0-C-SW 10/28/2024	T2-1820-C-SW 10/28/2024	T2-750-C-SW 10/28/2024	T2-BIKEPATH-SW 05/15/2025
Inorganics	Total Cyanide	57-12-5	12.0	30.0	200.0	440.0	180.0	16.0
Inorganics	Free Cyanide	57-12-5	12.0	6.40	11.0	26.0	13.0	6.20
Metals	Lead	7439-92-1	7.70		10.0 U	10.0 U	10.0 U	
Metals	Silver	7440-22-4	3.20		10.0 U	10.0 U	10.0 U	
Metals	Arsenic	7440-38-2	148.0		15.0 U	15.0 U	15.0 U	
Metals	Barium	7440-39-3	220.0		55.0 J	73.0 J	42.0 J	
Metals	Cadmium	7440-43-9	1.4		5.0 U	5.0 U	5.0 U	
Metals	Chromium	7440-47-3	42.0		10.0 U	3.80 J	0.970 J	
Metals	Copper	7440-50-8	16.90		25.0 U	25.0 U	25.0 U	
Metals	Zinc	7440-66-6	216.0		51.0	50.0 U	130.0	
Metals	Selenium	7782-49-2	5.0		20.0 U	20.0 U	20.0 U	
Metals	Mercury	7439-97-6	0.0013		0.20 U	0.20 U	0.20 U	
Metals	Chromium Hexavalent (VI)	18540-29-9	NSV		20.0 U	20.0 U	20.0 U	

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

Data Qualifier:

J = estimated concentration

U = not detected

Table C-5. Onsite Surface Water Sample-by-Sample Screen (mg/L)

Chemical Type	Chemical	CAS	ESV	T2-CAMELOT-SW 05/15/2025	T2-CARDINAL-SW 05/15/2025	T2-GLENVIEW-SW 05/15/2025	HERBERT-SW 05/15/2025	T2-NATURE-SW 05/15/2025	
Inorganics	Total Cyanide	57-12-5	12.0	34.0	16.0	78.0	23.0	8.80	
Inorganics	Free Cyanide	57-12-5	12.0	7.0	15.0	27.0	6.40	6.0	U
Metals	Lead	7439-92-1	7.70						
Metals	Silver	7440-22-4	3.20						
Metals	Arsenic	7440-38-2	148.0						
Metals	Barium	7440-39-3	220.0						
Metals	Cadmium	7440-43-9	1.4						
Metals	Chromium	7440-47-3	42.0						
Metals	Copper	7440-50-8	16.90						
Metals	Zinc	7440-66-6	216.0						
Metals	Selenium	7782-49-2	5.0						
Metals	Mercury	7439-97-6	0.0013						
Metals	Chromium Hexavalent (VI)	18540-29-9	NSV						

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

Data Qualifier:

J = estimated concentration

U = not detected

Table C-5. Onsite Surface Water Sample-by-Sample Screen (mg/L)

Chemical Type	Chemical	CAS	ESV	T2-SLEEPY HOLLOW-SW 05/15/2025	T2-TURNER- SW 05/15/2025	VERDANT- SW 05/15/2025
Inorganics	Total Cyanide	57-12-5	12.0	47.0	9.70	69.0
Inorganics	Free Cyanide	57-12-5	12.0	20.0	6.0 U	22.0
Metals	Lead	7439-92-1	7.70			
Metals	Silver	7440-22-4	3.20			
Metals	Arsenic	7440-38-2	148.0			
Metals	Barium	7440-39-3	220.0			
Metals	Cadmium	7440-43-9	1.4			
Metals	Chromium	7440-47-3	42.0			
Metals	Copper	7440-50-8	16.90			
Metals	Zinc	7440-66-6	216.0			
Metals	Selenium	7782-49-2	5.0			
Metals	Mercury	7439-97-6	0.0013			
Metals	Chromium Hexavalent (VI)	18540-29-9	NSV			

Notes:

Bolded values represent detected results that exceed the ESV.

DL = detection limit

ESV = ecological screening value

ND = nondetect

NSV = no screening value

Data Qualifier:

J = estimated concentration

U = not detected