> memo

To:	Jeff Tyson, Great Lakes Fisheries Commission
From:	Jeremy Lewandowski, Environmental Consulting & Technology, Inc. (ECT)
CC:	Mike Jury, EGLE-RRD; Jeff Jolly, MDNR Fisheries Division; Tonya Lewandowski, ECT; Marty Boote, ECT
Date:	November 5, 2024
Re:	Sediment Sampling Laboratory Analytical Summary Inner Saginaw Bay Reef Restoration Project, Bay County, Location ID: 09000092 ECT Project No. 230704-0100

This memorandum summarizes laboratory analytical results reported from sediment samples that were collected as part of a sediment sampling investigation that is summarized in a Michigan Department of Environment, Great Lakes, and Energy (EGLE) Interoffice Communication dated September 26, 2024 (Attachment 1).

ECT was provided copies of laboratory analytical reports for sediment samples collected from 21 locations (SI-04 through SI-24), one of which included a porewater sample (SI-14). This memorandum discusses laboratory analytical results for sediment samples collected from locations SI-04 through SI-24. It should be noted that the number of locations differs from those documented in the September 26, 2024 EGLE Interoffice Communication, which documented 24 sediment sample locations (SI-01 through SI-24), three of which included porewater samples (SI-01, SI-02, and SI-14).

The sediment samples were submitted to Fibertec Environmental Services, a Metiri Group Company, for laboratory analysis of the following:

- Metals
  - Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, and Zinc by USEPA Method 0200.2/6020A
  - Mercury by USEPA Method 7471B
- Polychlorinated Biphenyls (PCBs) by USEPA Method 3546/8082A
- Polycyclic Aromatic Hydrocarbons (PAHs) by USEPA Method 3546/8270E (also referred to as Polynuclear Aromatic Hydrocarbons [PNAs])
- Dioxins and Furans by USEPA Method 8290
- General Chemistry
  - Phosphorus by USEPA Method 0365.3 (Modified)
  - Percent Moisture (Water Content) by ASTM D2216-10
  - Percent Solids by ISM02.2
- Particle Size Analysis Grain Size by ASTM D422
- Porewater analysis for 5 Day Biochemical Oxygen Demand (BOD5) by SM 5210 B-2016

The laboratory analytical results were compared to the Aquatic Life and Wildlife Screening Guidelines presented in Table 2 of EGLE Water Resources Division Policy and Procedure Number

WRD-048, dated April 13, 2018 (Table 2 of WRD-048). A discussion of the comparison is presented below. Please note the discussion does not include laboratory results for particle size and percent moisture/solids.

- Metals
  - Mercury and selenium were reported non-detect (analyte was not detected at or above the reporting limit).
  - Concentrations of cadmium were reported above the reporting limit from SI-07, SI-13, and SI-16. None of the concentrations exceeded the Guideline in Table 2 of WRD-048.
  - Concentrations of copper were reported above the reporting limit from SI-05, SI-07, SI-10, SI-13, SI-16, SI-18, and SI-21. None of the concentrations exceeded the Guideline in Table 2 of WRD-048.
  - The concentrations of arsenic, chromium, lead, nickel, and zinc were above the reporting limit for all samples. None of the concentrations exceeded the Guidelines in Table 2 of WRD-048.
- PCBs and PAHs were reported non-detect for all samples.
- Dioxins and Furans
  - The Guideline in Table 2 of WRD-048 is the Toxic 2,3,7,8-TCDD Equivalency (TEQ) calculated as the Isomer Concentration multiplied by the Toxic Equivalency Factor (TEF).
  - The TEQ was reported non-detect from SI-04, SI-06, SI-19, and SI-20.
  - The TEQ was not reported above the Guideline in Table 2 of WRD-048 from all remaining samples.
  - The TEQ was reported at the Guideline in Table 2 of WRD-048 (0.00012 micrograms per kilogram [µg/kg]; or 0.12 nanograms per kilogram [ng/kg]) from SI-10 and SI-11.
- Phosphorus
  - Concentrations of phosphorus were reported above the reporting limit from all samples.
  - In general, concentrations of phosphorus were reported at higher concentrations from sample locations located closer to Spoils Island.
- BOD5 was reported non-detect from SI-14.

Refer to the attached Table 1: Sediment Sample Analytical Results and WRD-048 Aquatic Life and Wildlife Screening Guidelines Comparison.

Results graphically represented within the study area as shown below in Figure 1: Sediment Particle Size Analysis and Figure 2: Dioxins and Furan Concentrations.

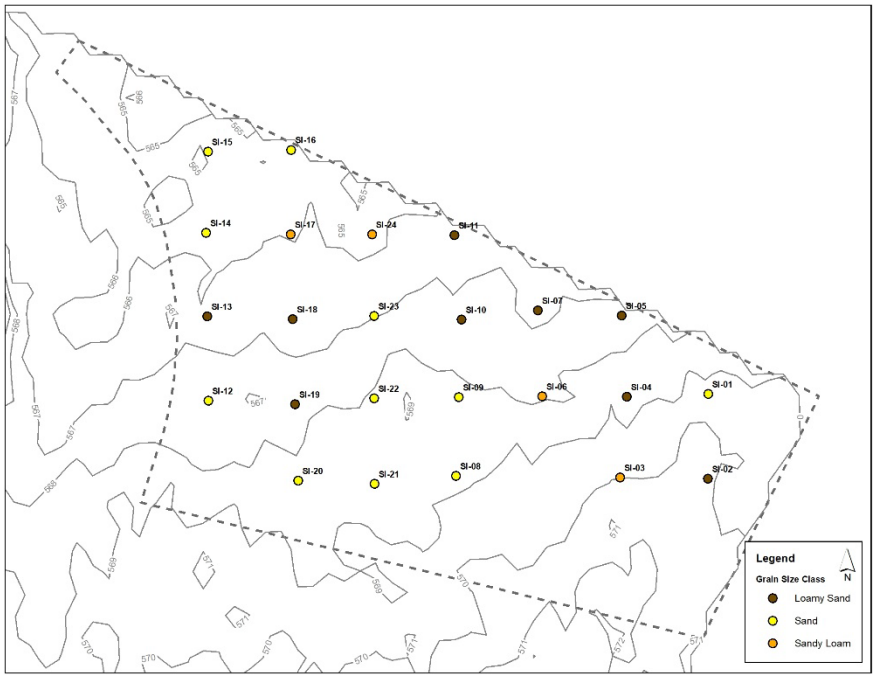

Figure 1: Sediment Particle Size Analysis within Study Area

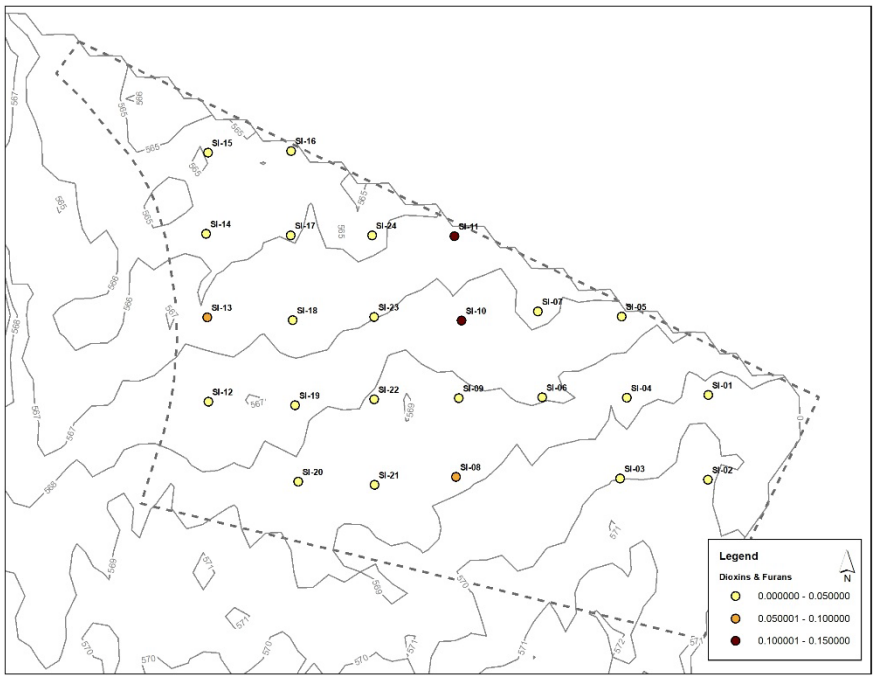

Figure 2: Dioxins and Furan Concentrations within Study Area

Table 1: Sediment Sample Analytical Results and WRD-048 Aquatic Life and Wildlife Screening Guidelines Comparison
Inner Saginaw Bay Reef Restoration Project, Bay County, Location ID: 09000092

Parameter/Analysis	Units	Sample Location											WRD-048 Aquatic Life and Wildlife Screening Guidelines
		SI-04	SI-05	SI-06	SI-07	SI-08	SI-09	SI-DUP-01	SI-10	SI-11	SI-12	SI-13	
		6/4/24							6/6/24				
Sediment Characteristics													
Soil Classification	---	Loamy Sand	Loamy Sand	Sandy Loam	Loamy Sand	Sand	Sand/LmySnd	--	Loamy Sand	Loamy Sand	Sand	Loamy Sand	---
Dioxins and Furans by USEPA Method 8290													
TEQ	ng/kg	ND	0.00048	ND	0.0018	0.095	0.0018	0.056	0.12	0.12	0.0070	0.082	0.12
Metals by USEPA Method 6020A/7471B/0365.3 (Modified)													
Phosphorus	µg/kg	270,000	460,000	250,000	280,000	340,000	200,000	200,000	700,000	560,000	560,000	650,000	---
Arsenic		5,500	4,600	5,100	4,800	7,400	4,700	4,200	4,400	4,300	2,900	3,000	33,000
Cadmium		ND	ND	ND	55	ND	ND	ND	ND	ND	ND	52	4,980
Chromium		4,400	4,400	5,000	5,000	6,200	4,300	4,600	4,200	4,100	3,700	3,700	111,000
Copper		ND	1,500	ND	1,200	ND	ND	ND	1,200	ND	ND	1,200	149,000
Lead		2,000	1,900	1,800	1,900	1,700	1,500	1,800	2,000	1,700	1,400	1,600	128,000
Nickel		1,800	1,900	2,000	1,900	2,200	1,400	1,700	2,000	1,500	1,700	1,700	48,600
Selenium		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,900
Zinc		11,000	14,000	13,000	18,000	14,000	11,000	12,000	13,000	16,000	9,700	13,000	459,000
Mercury		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,060
Polychlorinated Biphenyls (PCBs) by USEPA Method 8082A													
All Constituents	µg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	676
Polynuclear Aromatic Hydrocarbons (PAHs) by USEPA Method 8270E													
All Constituents	µg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Various
5-Day Biochemical Oxygen Demand (BOD5) by SM 5210 B-2016													
BOD	µg/kg	---	---	---	---	---	---	---	---	---	---	---	250

Parameter/Analysis	Units	Sample Location											WRD-048 Aquatic Life and Wildlife Screening Guidelines
		SI-14	SI-15	SI-16	SI-17	SI-18	SI-19	SI-20	SI-21	SI-22	SI-23	SI-24	
		6/6/24						6/7/24					
Sediment Characteristics													
Soil Classification	---	Sand/SndyLm	Sand	Sand	Sandy Loam	Loamy Sand	Loamy Sand	Sand	Sand	Sand	Sand	Sandy Loam	---
Dioxins and Furans by USEPA Method 8290													
TEQ	ng/kg	0.036	0.0011	0.0062	0.00081	0.0029	ND	ND	0.040	0.013	0.021	0.00081	0.12
Metals by USEPA Method 6020A/7471/0365.3 (Modified)													
Phosphorus	µg/kg	490,000	460,000	780,000	870,000	670,000	750,000	750,000	840,000	670,000	640,000	680,000	---
Arsenic		3,000	6,600	2,100	4,600	4,300	5,400	4,700	4,800	4,400	4,600	3,300	33,000
Cadmium		ND	ND	58	ND	ND	ND	ND	ND	ND	ND	ND	4,980
Chromium		3,400	2,700	4,700	3,900	4,400	5,200	4,400	4,400	4,600	4,000	4,700	111,000
Copper		ND	ND	1,300	ND	1,000	ND	ND	1,700	ND	ND	ND	149,000
Lead		1,800	2,300	2,100	1,800	1,700	1,900	1,500	1,600	1,700	1,400	1,400	128,000
Nickel		1,400	1,400	2,100	1,600	2,100	1,900	1,700	2,000	1,700	1,600	1,700	48,600
Selenium		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,900
Zinc		12,000	11,000	15,000	12,000	13,000	13,000	11,000	12,000	12,000	12,000	12,000	459,000
Mercury		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,060
Polychlorinated Biphenyls (PCBs) by USEPA Method 8082A													
Total PCBs	µg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	676
Polynuclear Aromatic Hydrocarbons (PAHs) by USEPA Method 8270E													
All Constituents	µg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Various
5-Day Biochemical Oxygen Demand (BOD5) by SM 5210 B-2016													
BOD	mg/L	ND	---	---	---	---	---	---	---	---	---	---	250

Notes

1) TEQ - Toxic 2,3,7,8-TCDD Equivalency (TEQ) calculated as Isomer Concentration x Toxic Equivalency Factor (TEF).
2) ng/kg - nanograms per kilogram.
3) µg/kg - micrograms per kilogram.
4) mg/L - milligrams per liter.
5) ND - the analyte was not detected at or above the reporting limit.
6) Refer to laboratory analytical reports for applicable data qualifiers.
7) Soil classification for location SI-09 is combination of samples SI-09 GS 0-13" and SI-09 GS 13"-19". Soil classification for location SI-14 is combination of samples SI-14 GS 0-12" and SI-14 GS 12"-17".

ATTACHMENT 1

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

INTEROFFICE COMMUNICATION

TO: Mike Jury, PFAS Specialist, Bay City District Office
Remediation and Redevelopment Division

FROM: Brian Eustice, Geology Specialist, Geological Services Section
Remediation and Redevelopment Division

DATE: September 26, 2024

SUBJECT: Inner Saginaw Bay Reef Restoration Project, Bay County, Location ID: 09000092
GSS Job #1797
Sediment Investigation

This memorandum summarizes the findings of a sediment sampling investigation requested by the Department of Environment, Great Lakes, and Energy (EGLE), Remediation and Redevelopment Division's (RRD's), Bay City District Office for the subject site. RRD's Geological Services Section (GSS) conducted the investigation on June 3-7, 2024. GSS received the final laboratory results on September 17, 2024.

This memorandum includes the following:

- Sample Location Map (Figure 1)
- Sample Location Data (Table 1)
- Sample Analysis Summary Results (Table 2)
- Sediment Core Logs (Appendix A)

BACKGROUND

The work performed by GSS is part of a larger project to explore the feasibility of constructing an artificial reef near Spoils Island in Saginaw Bay to restore reef habitat and enhance fish production.

SEDIMENT SAMPLING

The GSS conducted sediment sampling for chemical characterization and grain size analysis. Staff collected a total of 24 sediment samples plus 1 duplicate sample at predefined locations within the area of interest for chemical analysis (Fig 1). Samples were collected using a ponar dredge sampler to collect sediment from the surface of the lakebed. At each location, sediment from one or more ponar scoops was composited, sifted to remove cobbles and mussel shells, and collected in jars for laboratory analysis. Sample locations were recorded using a Trimble Geo7X handheld global positioning system (Table 1).

The GSS collected sediment cores at each of the 24 sediment sampling locations for classification and grain size analysis. Cores were collected using an SDI VibeCore-D vibracore sediment sampler to advance a 3-inch diameter, 6-foot long polycarbonate tube. At 3 shallower locations (SI-02, SI-03, and SI-04), staff collected cores using a gas-powered post pounder to advance 2-inch diameter, 8-foot long polycarbonate tubes into the lakebed. All sediment cores were advanced toward the target depth of 5 feet below the lakebed; however, due to the coarse grain nature of the sediment, refusal was met at every location with a maximum penetration of 2.4 feet and an average of approximately 1.17 feet into the sediment. Sediment cores were recovered using a tripod-winch system mounted on the front of GSS's survey vessel.

The sediment cores were logged using the Unified Soil Classification System, composited, and placed into 16-ounce soil jars for laboratory submission (Appendix A).

POREWATER SAMPLING

The GSS was able to collect porewater samples at 3 of the 24 sample locations for Biochemical Oxygen Demand analysis. Porewater sampling was attempted at 5 additional locations, but the tight sediment encountered at most locations would not produce porewater. To collect porewater samples, GSS advanced a 1-inch diameter, 2-foot long slotted Geoprobe® screen sealed off at the top with a barbed fitting that was connected to sample tubing and then ran through and out the side of 1-inch diameter Geoprobe drive-rods. The screen, drive-rods, and tubing were advanced into the lakebed using a gas-powered post pounder. The 2-foot long screens were driven until the bottoms met with refusal at each location: 2.2 feet below the lakebed at SI-01, and 2.5 feet below at SI-02 and SI-14. Staff collected porewater from the samplers via a peristaltic pump which pumped until at least 3 system volumes had been purged. At location SI-14, staff used a YSI Pro Plus water quality meter to measure water quality parameters for stabilization and ensure that the porewater sampler screen was isolated from the surface water by measuring and recording parameters (temperature, conductivity, dissolved oxygen, pH, and oxidation reduction potential) of the surface water prior to sampling and of the porewater during purging. The YSI was not used at locations SI-01 and SI-02 due to the equipment malfunctioning.

SAMPLE ANALYSIS

Th GSS submitted sediment and porewater samples chain-of-custody (COC) documentation to Fibertec Environmental Services and analyzed for select metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), dioxins/furans, phosphorus, grain size, and biochemical oxygen demand in accordance with Water Resources Division Policy and WRD-048 “Sediment Testing for Dredging Projects”.

A summary of the analytical results compared to applicable Aquatic Life and Wildlife Screening Guidelines are presented in Table 2.

If you have any questions, contact me at 517-242-1170.

cc/att: Aaron Berndt, EGLE
Jeff Pincumbe, EGLE
Scott Densteadt, EGLE

673542E
351374N

680557E
351374N

SI-15 SI-16

SI-14 SI-17 SI-24 SI-11

SI-13 SI-18 SI-23 SI-10 SI-07 SI-05

SI-12 SI-19 SI-22 SI-09 SI-06 SI-04 SI-01

SI-20 SI-21 SI-08 SI-03 SI-02

673542E
345788N

680557E
345788N

LEGEND

- Area of Interest
- Sample Locations

DATUM - NAD83
PROJECTION: MICHIGAN GEOREF
NORTHING AND EASTING COORDINATES (IN METERS)
ARE IN CORNERS OF MAP

AERIAL PHOTO SOURCE: MISAIL Imagery

0 125 250 500 Meters

0 455 910 1,820 Feet

1:22,000

N
W E
S

Inner Saginaw Bay Reef Restoration Project

LOCATION ID 09000092
HAMPTON TOWNSHIP, BAY COUNTY
T15N R05E

SAMPLE LOCATION MAP

GEOLOGIST Brian E. Geological Services Section	EGLE	CREATION DATE June 2024
Remediation and Redevelopment Division		FIGURE 1

Sample Location	Latitude	Longitude	Northing	Easting	Max_PDOP	Corr_Type	GPS_Date	GNSS_Heigh	Vert_Prec	Horz_Prec
SI-01	43.668707575	-83.786824379	348786.431	678256.223	2.4	L1L2 Postprocessed Carrier Float	6/3/2024	464.060	0.1	0.1
SI-02	43.666168652	-83.786854488	348504.460	678261.352	3.3	L1L2 Postprocessed Carrier Float	6/3/2024	463.936	0.1	0.1
SI-03	43.666221987	-83.790474698	348502.567	677969.397	5.2	L1L2 Postprocessed Carrier Float	6/3/2024	463.795	0.1	0.1
SI-04	43.668640991	-83.790177553	348771.799	677986.158	1.6	L1L2 Postprocessed Carrier Float	6/4/2024	463.802	0.1	0.1
SI-05	43.671064817	-83.790364925	349040.522	677963.854	2.3	L1L2 Postprocessed Carrier Float	6/4/2024	463.581	0.1	0.1
SI-06	43.668670000	-83.793660000	348767.514	677705.390	NA	NA	NA	NA	NA	NA
SI-07	43.671233299	-83.793821133	349051.780	677684.798	4.6	L1L2 Postprocessed Carrier Float	6/4/2024	463.401	0.1	0.1
SI-08	43.666303131	-83.797244366	348496.997	677423.505	2.6	L1L2 Postprocessed Carrier Float	6/4/2024	463.606	0.1	0.1
SI-09	43.668663834	-83.797109230	348759.405	677427.404	4.9	L1 Postprocessed Carrier Float	6/4/2024	465.014	0.6	0.3
SI-10	43.670976807	-83.796973378	349016.516	677431.501	2.6	L1L2 Postprocessed Carrier Float	6/6/2024	463.554	0.1	0.1
SI-11	43.673505530	-83.797241533	349296.714	677402.397	6.6	L1L2 Postprocessed Carrier Float	6/6/2024	463.565	0.1	0.1
SI-12	43.668603034	-83.807434095	348730.502	676595.408	2.9	Postprocessed Code	6/6/2024	463.932	0.1	0.1
SI-13	43.671125591	-83.807454720	349010.548	676586.307	3.6	L1L2 Postprocessed Carrier Float	6/6/2024	463.713	0.1	0.1
SI-14	43.673623760	-83.807481615	349287.872	676576.773	1.9	L1L2 Postprocessed Carrier Float	6/6/2024	463.634	0.1	0.1
SI-15	43.676047238	-83.807384711	349557.169	676577.435	3.1	L1L2 Postprocessed Carrier Float	6/6/2024	463.867	0.1	0.1
SI-16	43.676085770	-83.803953716	349568.797	676853.823	2.8	L1L2 Postprocessed Carrier Float	6/6/2024	463.943	0.1	0.1
SI-17	43.673555482	-83.803993520	349287.763	676858.089	2.2	L1L2 Postprocessed Carrier Float	6/6/2024	463.856	0.1	0.1
SI-18	43.671022537	-83.803927180	349006.662	676870.917	2.0	L1L2 Postprocessed Carrier Float	6/6/2024	463.571	0.1	0.1
SI-19	43.668475885	-83.803861157	348724.038	676883.760	2.7	L1L2 Postprocessed Carrier Float	6/6/2024	466.038	0.1	0.1
SI-20	43.666196618	-83.803743146	348471.215	676900.004	2.0	L1L2 Postprocessed Carrier Float	6/7/2024	463.861	0.1	0.1
SI-21	43.666088977	-83.800606573	348465.994	677153.138	5.9	L1L2 Postprocessed Carrier Float	6/7/2024	464.236	0.1	0.1
SI-22	43.668640375	-83.800589498	348749.322	677146.967	3.3	L1L2 Postprocessed Carrier Float	6/7/2024	463.874	0.1	0.1
SI-23	43.671101813	-83.800567000	349022.674	677141.499	5.4	L1L2 Postprocessed Carrier Float	6/7/2024	463.618	0.1	0.1
SI-24	43.673544295	-83.800636667	349293.723	677128.659	4.3	L1L2 Postprocessed Carrier Float	6/7/2024	463.604	0.1	0.1

Fibertec Environmental Services
Fibertec Project Number A21232/A21292
Report Date: 9/17/2024
Client: EGLE-RRD-BAY CITY
Attention: Mike Jury
Project Name: SAGINAW BAY REEF
Location ID: 09000092
Note: This is not original data. Please refer to PDF/Hardcopy Reports

Analyte	Method	Units	Aquatic Life and Wildlife Screening Guidelines	SI-01	SI-02	SI-03	SI-04	SI-05
METALS								
Arsenic	EPA 6020A	mg/kg	33	4.2	5.2	4.1	5.5	4.6
Cadmium	EPA 6020A	mg/kg	4.98	ND	ND	ND	ND	ND
Chromium	EPA 6020A	mg/kg	111	3.9	4	3.2	4.4	4.4
Copper	EPA 6020A	mg/kg	149	ND	ND	ND	ND	1.5
Lead	EPA 6020A	mg/kg	128	1.6	1.2	1.3	2	1.9
Nickel	EPA 6020A	mg/kg	48.6	1.9	3.3	1.4	1.8 B	1.9 B
Selenium	EPA 6020A	mg/kg	1.9	ND	ND	ND	ND	ND
Zinc	EPA 6020A	mg/kg	459	11	9.6	9.3	11	14
Mercury	EPA 7471B	mg/kg	1.06	ND	ND	ND	ND	ND
PCBs								
Aroclor-1016	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1221	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1232	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1242	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1248	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1254	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1260	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1262	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1268	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
PAHs								
2-Methylnaphthalene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Acenaphthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Acenaphthylene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Anthracene (SIM)	EPA 8270E	µg/kg	845	ND	ND	ND	ND	ND
Benzo(a)anthracene (SIM)	EPA 8270E	µg/kg	1050	ND	ND	ND	ND	ND
Benzo(a)pyrene (SIM)	EPA 8270E	µg/kg	1450	ND	ND	ND	ND	ND
Benzo(b)fluoranthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Benzo(ghi)perylene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Benzo(k)fluoranthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Chrysene (SIM)	EPA 8270E	µg/kg	1290	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Fluoranthene (SIM)	EPA 8270E	µg/kg	2230	ND	ND	ND	ND	ND
Fluorene (SIM)	EPA 8270E	µg/kg	536	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Naphthalene (SIM)	EPA 8270E	µg/kg	561	ND	ND	ND	ND	ND
Phenanthrene (SIM)	EPA 8270E	µg/kg	1170	ND	ND	ND	ND	ND
Pyrene (SIM)	EPA 8270E	µg/kg	1520	ND	ND	ND	ND	ND
DIOXINS & FURANS								
1,2,3,4,6,7,8-HPCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,4,6,7,8-HPCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,4,7,8,9-HPCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,4,7,8-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,4,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,6,7,8-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,6,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8,9-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8,9-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8-PECDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8-PECDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
2,3,4,6,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
2,3,4,7,8-PECDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
2,3,7,8-TCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
2,3,7,8-TCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
OCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
OCDF	EPA 8290	pg/g		ND	ND	ND	ND	1.6 J
TEQ	EPA 8290	NA		ND	ND	ND	ND	0.00048
BIOCHEMICAL OXYGEN DEMAND								
BOD (from porewater)	SM 5210 B-2016	mg/L		ND E	ND E	--	--	--
GENERAL CHEMISTRY								
Percent Moisture (Water Content)	ASTM D2216-10	%		32	22	25	21	21
Phosphorus	EPA 0365.3 (Modified)	mg/kg		340	230	270	270	460
PARTICLE-SIZE ANALYSIS								
Sand	ASTM D422	%		97.9	80.9	77.8	85.4	82.6
Clay	ASTM D422	%		2	9.5	9.5	7.2	6.9
Silt	ASTM D422	%		0.05	9.58	12.78	7.36	10.48
Classification	ASTM D422	NA		Sand	Loamy Sand	Sandy Loam	Loamy Sand	Loamy Sand

Grey indicates contaminant was detected.
ND = Not Detected at or above the reporting limit.
-- = Sample was not collected.
E = Analyte detected at a concentration greater than the calibration range, therefore the result is estimated.
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B = Analyte was detected in the associated method blank.
L- = Recovery in the associated laboratory sample exeeds the lower control limit. Result may be biased low.
* = Duplicate analysis not within control limits.

Fibertec Environmental Services
Fibertec Project Number A21232/A21292
Report Date: 9/17/2024
Client: EGLE-RRD-BAY CITY
Attention: Mike Jury
Project Name: SAGINAW BAY REEF
Location ID: 09000092
Note: This is not original data. Please refer to PDF/Hardcopy Reports

Analyte	Method	Units	Aquatic Life and Wildlife Screening Guidelines	SI-06	SI-DUP-01 (SI-06)	SI-07	SI-08	SI-09	
METALS									
Arsenic	EPA 6020A	mg/kg	33	5.1	4.2	4.8	7.4	4.7	
Cadmium	EPA 6020A	mg/kg	4.98	ND	ND	0.055	ND	ND	
Chromium	EPA 6020A	mg/kg	111	5	4.6	5	6.2	4.3	
Copper	EPA 6020A	mg/kg	149	ND	ND	1.2	ND	ND	
Lead	EPA 6020A	mg/kg	128	1.8	1.8	1.9	1.7	1.5	
Nickel	EPA 6020A	mg/kg	48.6	2 B	1.7	1.9	2.2	1.4	
Selenium	EPA 6020A	mg/kg	1.9	ND	ND	ND	ND	ND	
Zinc	EPA 6020A	mg/kg	459	13	12	18	14	11	
Mercury	EPA 7471B	mg/kg	1.06	ND	ND	ND	ND	ND	
PCBs									
Aroclor-1016	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1221	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1232	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1242	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1248	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1254	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1260	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1262	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1268	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
PAHs									
2-Methylnaphthalene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Acenaphthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Acenaphthylene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Anthracene (SIM)	EPA 8270E	µg/kg	845	ND	ND	ND	ND	ND	
Benzo(a)anthracene (SIM)	EPA 8270E	µg/kg	1050	ND	ND	ND	ND	ND	
Benzo(a)pyrene (SIM)	EPA 8270E	µg/kg	1450	ND	ND	ND	ND	ND	
Benzo(b)fluoranthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Benzo(ghi)perylene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Benzo(k)fluoranthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Chrysene (SIM)	EPA 8270E	µg/kg	1290	ND	ND	ND	ND	ND	
Dibenzo(a,h)anthracene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Fluoranthene (SIM)	EPA 8270E	µg/kg	2230	ND	ND	ND	ND	ND	
Fluorene (SIM)	EPA 8270E	µg/kg	536	ND	ND	ND	ND	ND	
Indeno(1,2,3-cd)pyrene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Naphthalene (SIM)	EPA 8270E	µg/kg	561	ND	ND	ND	ND	ND	
Phenanthrene (SIM)	EPA 8270E	µg/kg	1170	ND	ND	ND	ND	ND	
Pyrene (SIM)	EPA 8270E	µg/kg	1520	ND	ND	ND	ND	ND	
DIOXINS & FURANS									
1,2,3,4,6,7,8-HPCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,4,6,7,8-HPCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,4,7,8,9-HPCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,4,7,8-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,4,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	0.18 J	ND	
1,2,3,6,7,8-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,6,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,7,8,9-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,7,8,9-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,7,8-PECDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,7,8-PECDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
2,3,4,6,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
2,3,4,7,8-PECDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
2,3,7,8-TCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
2,3,7,8-TCDF	EPA 8290	pg/g		ND	0.56 J	ND	0.77 J	ND	
OCDD	EPA 8290	pg/g		ND	ND	6.1 J	ND	6 J	
OCDF	EPA 8290	pg/g		ND	ND	ND	0.68 J	ND	
TEQ	EPA 8290	NA		ND	0.056	0.0018	0.095	0.0018	
BIOCHEMICAL OXYGEN DEMAND									
BOD (from porewater)	SM 5210 B-2016	mg/L		--	--	--	--	--	
GENERAL CHEMISTRY									
Percent Moisture (Water Content)	ASTM D2216-10	%		21	18	19	23	19	
Phosphorus	EPA 0365.3 (Modified)	mg/kg		250	200	280	340	200	
PARTICLE-SIZE ANALYSIS									
Sand	ASTM D422	%		78	--	82.4	89.3	94.3	83.8
Clay	ASTM D422	%		9.7	--	7.1	4.5	5.5	11.8
Silt	ASTM D422	%		12.27	--	10.57	6.26	0.22	4.39
Classification	ASTM D422	NA		Sandy Loam	--	Loamy Sand	Sand	Sand	Loamy San

Grey indicates contaminant was detected.
ND = Not Detected at or above the reporting limit.
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Fibertec Environmental Services
Fibertec Project Number A21232/A21292
Report Date: 9/17/2024
Client: EGLE-RRD-BAY CITY
Attention: Mike Jury
Project Name: SAGINAW BAY REEF
Location ID: 09000092
Note: This is not original data. Please refer to PDF/Hardcopy Reports

Analyte	Method	Units	Aquatic Life and Wildlife Screening Guidelines	SI-10	SI-11	SI-12	SI-13	SI-14	
METALS									
Arsenic	EPA 6020A	mg/kg	33	4.4	4.3	2.9	3	3	
Cadmium	EPA 6020A	mg/kg	4.98	ND	ND	ND	0.052	ND	
Chromium	EPA 6020A	mg/kg	111	4.2	4.1	3.7	3.7	3.4	
Copper	EPA 6020A	mg/kg	149	1.2	ND	ND	1.2	ND	
Lead	EPA 6020A	mg/kg	128	2	1.7	1.4	1.6	1.8	
Nickel	EPA 6020A	mg/kg	48.6	2	1.5	1.7	1.7	1.4	
Selenium	EPA 6020A	mg/kg	1.9	ND	ND	ND	ND	ND	
Zinc	EPA 6020A	mg/kg	459	13	16	9.7	13	12	
Mercury	EPA 7471B	mg/kg	1.06	ND	ND	ND	ND	ND	
PCBs									
Aroclor-1016	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1221	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1232	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1242	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1248	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1254	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1260	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1262	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
Aroclor-1268	EPA 8082A	µg/kg		ND	ND	ND	ND	ND	
PAHs									
2-Methylnaphthalene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Acenaphthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Acenaphthylene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Anthracene (SIM)	EPA 8270E	µg/kg	845	ND	ND	ND	ND	ND	
Benzo(a)anthracene (SIM)	EPA 8270E	µg/kg	1050	ND	ND	ND	ND	ND	
Benzo(a)pyrene (SIM)	EPA 8270E	µg/kg	1450	ND	ND	ND	ND	ND	
Benzo(b)fluoranthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Benzo(ghi)perylene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Benzo(k)fluoranthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Chrysene (SIM)	EPA 8270E	µg/kg	1290	ND	ND	ND	ND	ND	
Dibenzo(a,h)anthracene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Fluoranthene (SIM)	EPA 8270E	µg/kg	2230	ND	ND	ND	ND	ND	
Fluorene (SIM)	EPA 8270E	µg/kg	536	ND	ND	ND	ND	ND	
Indeno(1,2,3-cd)pyrene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND	
Naphthalene (SIM)	EPA 8270E	µg/kg	561	ND	ND	ND	ND	ND	
Phenanthrene (SIM)	EPA 8270E	µg/kg	1170	ND	ND	ND	ND	ND	
Pyrene (SIM)	EPA 8270E	µg/kg	1520	ND	ND	ND	ND	ND	
DIOXINS & FURANS									
1,2,3,4,6,7,8-HPCDD	EPA 8290	pg/g		ND	0.88 J	0.7 J	ND	ND	
1,2,3,4,6,7,8-HPCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,4,7,8,9-HPCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,4,7,8-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,4,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,6,7,8-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,6,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,7,8,9-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,7,8,9-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,7,8-PECDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
1,2,3,7,8-PECDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
2,3,4,6,7,8-HXCDF	EPA 8290	pg/g		0.43 J	ND	ND	ND	ND	
2,3,4,7,8-PECDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
2,3,7,8-TCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
2,3,7,8-TCDF	EPA 8290	pg/g		0.8 J	1.1 J	ND	0.82 J	0.36 J	
OCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND	
OCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND	
TEQ	EPA 8290	NA		0.12	0.12	0.007	0.082	0.036	
BIOCHEMICAL OXYGEN DEMAND									
BOD (from porewater)	SM 5210 B-2016	mg/L		--	--	--	--	ND L-	
GENERAL CHEMISTRY									
Percent Moisture (Water Content)	ASTM D2216-10	%		26	21	18	21	22	
Phosphorus	EPA 0365.3 (Modified)	mg/kg		700	560	560	650	490	
PARTICLE-SIZE ANALYSIS									
Sand	ASTM D422	%		81	84.7	90	86.6	94.9	70.3
Clay	ASTM D422	%		11	10.6	7.9	10.3	5.1	12.7
Silt	ASTM D422	%		7.96	4.69	2.07	3	0.01	16.9
Classification	ASTM D422	NA		Loamy Sand	Loamy Sand	Sand	Loamy Sand	Sand	Sandy Loa

Grey indicates contaminant was detected.
ND = Not Detected at or above the reporting limit.
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Fibertec Environmental Services
Fibertec Project Number A21232/A21292
Report Date: 9/17/2024
Client: EGLE-RRD-BAY CITY
Attention: Mike Jury
Project Name: SAGINAW BAY REEF
Location ID: 09000092
Note: This is not original data. Please refer to PDF/Hardcopy Reports

Analyte	Method	Units	Aquatic Life and Wildlife Screening Guidelines	SI-15	SI-16	SI-17	SI-18	SI-19
METALS								
Arsenic	EPA 6020A	mg/kg	33	6.6	2.1	4.6	4.3	5.4
Cadmium	EPA 6020A	mg/kg	4.98	ND	0.058	ND	ND	ND
Chromium	EPA 6020A	mg/kg	111	2.7	4.7	3.9	4.4	5.2
Copper	EPA 6020A	mg/kg	149	ND	1.3	ND	1	ND
Lead	EPA 6020A	mg/kg	128	2.3	2.1	1.8	1.7	1.9
Nickel	EPA 6020A	mg/kg	48.6	1.4	2.1	1.6	2.1	1.9
Selenium	EPA 6020A	mg/kg	1.9	ND	ND	ND	ND	ND
Zinc	EPA 6020A	mg/kg	459	11	15	12	13	13
Mercury	EPA 7471B	mg/kg	1.06	ND	ND	ND	ND	ND
PCBs								
Aroclor-1016	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1221	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1232	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1242	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1248	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1254	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1260	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1262	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1268	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
PAHs								
2-Methylnaphthalene (SIM)	EPA 8270E	µg/kg		ND	ND	ND G+	ND	ND
Acenaphthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND G+	ND	ND
Acenaphthylene (SIM)	EPA 8270E	µg/kg		ND	ND	ND G+	ND	ND
Anthracene (SIM)	EPA 8270E	µg/kg	845	ND	ND	ND G+	ND	ND
Benzo(a)anthracene (SIM)	EPA 8270E	µg/kg	1050	ND	ND	ND G+	ND	ND
Benzo(a)pyrene (SIM)	EPA 8270E	µg/kg	1450	ND	ND	ND G+	ND	ND
Benzo(b)fluoranthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND G+	ND	ND
Benzo(ghi)perylene (SIM)	EPA 8270E	µg/kg		ND	ND	ND G+	ND	ND
Benzo(k)fluoranthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND G+	ND	ND
Chrysene (SIM)	EPA 8270E	µg/kg	1290	ND	ND	ND G+	ND	ND
Dibenzo(a,h)anthracene (SIM)	EPA 8270E	µg/kg		ND	ND	ND G+	ND	ND
Fluoranthene (SIM)	EPA 8270E	µg/kg	2230	ND	ND	ND G+	ND	ND
Fluorene (SIM)	EPA 8270E	µg/kg	536	ND	ND	ND G+	ND	ND
Indeno(1,2,3-cd)pyrene (SIM)	EPA 8270E	µg/kg		ND	ND	ND G+	ND	ND
Naphthalene (SIM)	EPA 8270E	µg/kg	561	ND	ND	ND G+	ND	ND
Phenanthrene (SIM)	EPA 8270E	µg/kg	1170	ND	ND	ND G+	ND	ND
Pyrene (SIM)	EPA 8270E	µg/kg	1520	ND	ND	ND G+	ND	ND
DIOXINS & FURANS								
1,2,3,4,6,7,8-HPCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,4,6,7,8-HPCDF	EPA 8290	pg/g		ND	ND	ND	0.18 J	ND
1,2,3,4,7,8,9-HPCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,4,7,8-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,4,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,6,7,8-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,6,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8,9-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8,9-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8-PECDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8-PECDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
2,3,4,6,7,8-HXCDF	EPA 8290	pg/g		ND	0.052 J	ND	ND	ND
2,3,4,7,8-PECDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
2,3,7,8-TCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
2,3,7,8-TCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
OCDD	EPA 8290	pg/g		3.5 J	3.3 J	2.7 J	3.5 J	ND
OCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
TEQ	EPA 8290	NA		0.0011	0.0062	0.00081	0.0029	ND
BIOCHEMICAL OXYGEN DEMAND								
BOD (from porewater)	SM 5210 B-2016	mg/L		--	--	--	--	--
GENERAL CHEMISTRY								
Percent Moisture (Water Content)	ASTM D2216-10	%		22	27	21	23	21
Phosphorus	EPA 0365.3 (Modified)	mg/kg		460	780 *	870	670	750
PARTICLE-SIZE ANALYSIS								
Sand	ASTM D422	%		98.2	89.9	80.8	86.5	81.2
Clay	ASTM D422	%		1.8	9.5	12.4	11.1	11.3
Silt	ASTM D422	%		0.02	0.54	6.79	2.44	7.43
Classification	ASTM D422	NA		Sand	Sand	Sandy Loam	Loamy Sand	Loamy Sand

Grey indicates contaminant was detected.
ND = Not Detected at or above the reporting limit.
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Fibertec Environmental Services
Fibertec Project Number A21232/A21292
Report Date: 9/17/2024
Client: EGLE-RRD-BAY CITY
Attention: Mike Jury
Project Name: SAGINAW BAY REEF
Location ID: 09000092
Note: This is not original data. Please refer to PDF/Hardcopy Reports

Analyte	Method	Units	Aquatic Life and Wildlife Screening Guidelines	SI-20	SI-21	SI-22	SI-23	SI-24
METALS								
Arsenic	EPA 6020A	mg/kg	33	4.7	4.8	4.4	4.6	3.3
Cadmium	EPA 6020A	mg/kg	4.98	ND	ND	ND	ND	ND
Chromium	EPA 6020A	mg/kg	111	4.4	4.4	4.6	4	4.7
Copper	EPA 6020A	mg/kg	149	ND	1.7	ND	ND	ND
Lead	EPA 6020A	mg/kg	128	1.5	1.6	1.7	1.4	1.4
Nickel	EPA 6020A	mg/kg	48.6	1.7	2	1.7	1.6	1.7
Selenium	EPA 6020A	mg/kg	1.9	ND	ND	ND	ND	ND
Zinc	EPA 6020A	mg/kg	459	11	12	12	12	12
Mercury	EPA 7471B	mg/kg	1.06	ND	ND	ND	ND	ND
PCBs								
Aroclor-1016	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1221	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1232	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1242	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1248	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1254	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1260	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1262	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
Aroclor-1268	EPA 8082A	µg/kg		ND	ND	ND	ND	ND
PAHs								
2-Methylnaphthalene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Acenaphthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Acenaphthylene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Anthracene (SIM)	EPA 8270E	µg/kg	845	ND	ND	ND	ND	ND
Benzo(a)anthracene (SIM)	EPA 8270E	µg/kg	1050	ND	ND	ND	ND	ND
Benzo(a)pyrene (SIM)	EPA 8270E	µg/kg	1450	ND	ND	ND	ND	ND
Benzo(b)fluoranthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Benzo(ghi)perylene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Benzo(k)fluoranthene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Chrysene (SIM)	EPA 8270E	µg/kg	1290	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Fluoranthene (SIM)	EPA 8270E	µg/kg	2230	ND	ND	ND	ND	ND
Fluorene (SIM)	EPA 8270E	µg/kg	536	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene (SIM)	EPA 8270E	µg/kg		ND	ND	ND	ND	ND
Naphthalene (SIM)	EPA 8270E	µg/kg	561	ND	ND	ND	ND	ND
Phenanthrene (SIM)	EPA 8270E	µg/kg	1170	ND	ND	ND	ND	ND
Pyrene (SIM)	EPA 8270E	µg/kg	1520	ND	ND	ND	ND	ND
DIOXINS & FURANS								
1,2,3,4,6,7,8-HPCDD	EPA 8290	pg/g		ND	0.71 J	ND	ND	ND
1,2,3,4,6,7,8-HPCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,4,7,8,9-HPCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,4,7,8-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,4,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,6,7,8-HXCDD	EPA 8290	pg/g		ND	ND	0.13 J	ND	ND
1,2,3,6,7,8-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8,9-HXCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8,9-HXCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8-PECDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
1,2,3,7,8-PECDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
2,3,4,6,7,8-HXCDF	EPA 8290	pg/g		ND	0.31 J	ND	0.2 J	ND
2,3,4,7,8-PECDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
2,3,7,8-TCDD	EPA 8290	pg/g		ND	ND	ND	ND	ND
2,3,7,8-TCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
OCDD	EPA 8290	pg/g		ND	7.9 J	ND	2.8 J	2.7 J
OCDF	EPA 8290	pg/g		ND	ND	ND	ND	ND
TEQ	EPA 8290	NA		ND	0.04	0.013	0.021	0.00081
BIOCHEMICAL OXYGEN DEMAND								
BOD (from porewater)	SM 5210 B-2016	mg/L		--	--	--	--	--
GENERAL CHEMISTRY								
Percent Moisture (Water Content)	ASTM D2216-10	%		19	24	20	19	22
Phosphorus	EPA 0365.3 (Modified)	mg/kg		750	840	670	640	680
PARTICLE-SIZE ANALYSIS								
Sand	ASTM D422	%		92.9	94.9	89.1	99.9	77.5
Clay	ASTM D422	%		6.7	5	7.1	0.1	13.7
Silt	ASTM D422	%		0.45	0.02	3.81	0	8.85
Classification	ASTM D422	NA		Sand	Sand	Sand	Sand	Sandy Loam

Grey indicates contaminant was detected.
ND = Not Detected at or above the reporting limit.
-- = Sample was not collected.
E = Analyte detected at a concentration greater than the calibration range, therefore the result is estimated.
J = Concentration is estimated.
B = Analyte was detected in the associated method blank.
L- = Recovery in the associated laboratory sample exeeds the lower control limit. Result may be biased low.
* = Duplicate analysis not within control limits.

APPENDIX A

Inner Saginaw Bay Reef Restoration Project, Bay County
Location ID: 09000092

Sediment Core Logs

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-01

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/3/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 0.75 feet in 12 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND with gravel, brown, coarse grain, abundant shells.		0.33/0.75	G	SI-01 (From Ponar) SI-01-GS (Grain Size)	
		E.O.B.				SI-01-PW (Porewater)	

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.668707575
LONGITUDE: -83.786824379
PROJECTION: MiGeoRef (m)
NORTHING: 348786.431
EASTING: 678256.223

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-02

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/3/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Gas powered post pounder with 2" polycarbonate
TOTAL DEPTH: 0.5 feet in 11.5 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SANDY CLAY, brown, stiff, some mussel shells.		0.67/0.5	G	SI-02 (From Ponar) SI-02-GS (Grain Size)	Ponar sample all coarse sand and shells.
		E.O.B.				SI-02-PW (Porewater)	

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.666168652
LONGITUDE: -83.786854488
PROJECTION: MiGeoRef (m)
NORTHING: 348504.460
EASTING: 678261.352

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-03

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/3/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Gas powered post pounder with 2" polycarbonate
TOTAL DEPTH: 2 feet in 12 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				Unable to advance porewater sampling equipment.
		SAND, brown, coarse grain, shells.			G	SI-03 (From Ponar)	
		SANDY CLAY, brown, coarse grain sand, trace to some gravel, hard.		1.2/2		SI-03-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.666221987
LONGITUDE: -83.790474698
PROJECTION: MiGeoRef (m)
NORTHING: 348502.567
EASTING: 677969.397

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-04

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/4/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Gas powered post pounder with 2" polycarbonate
TOTAL DEPTH: 2.4 feet in 12.5 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		CLAY with sand, gray, trace gravel, soft to firm.			G	SI-04 (From Ponar)	Ponar sample all coarse sand and shells.
				2.4/2.4		SI-04-GS (Grain Size)	
		CLAY with sand, gray, trace gravel, hard, dry.					Sediment would not produce porewater
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.668640991
LONGITUDE: -83.790177553
PROJECTION: MiGeoRef (m)
NORTHING: 348771.799
EASTING: 677986.158

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-05

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/4/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1 foot in 14.5 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain, with shells.			G	SI-05 (From Ponar)	
		SANDY CLAY, gray, trace gravel, soft.		0.75/1		SI-05-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.671064817
LONGITUDE: -83.790364925
PROJECTION: MiGeoRef (m)
NORTHING: 349040.522
EASTING: 677963.854

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-06

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/4/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 0.42 feet in 13.9 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SANDY CLAY, gray, trace gravel, dry to moist, hard.		0.42/0.42	G	SI-06/SI-DUP-01	Ponar sample: coarse sand, gravel, and shells.
						SI-06-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.66867
LONGITUDE: -83.79366
PROJECTION: MiGeoRef (m)
NORTHING: 348767.514
EASTING: 677705.390

EGLE

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-07

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/4/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1.42 feet in 15 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SANDY CLAY, gray-brown mottled, trace gravel, dry, hard.			G	SI-07 (From Ponar)	Ponar sample: coarse sand, gravel, and shells.
				0.42/1.42		SI-07-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.671233299
LONGITUDE: -83.793821133
PROJECTION: MiGeoRef (m)
NORTHING: 349051.780
EASTING: 677684.798

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-08

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/4/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1 foot in 13 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain, with shells.			G	SI-08 (from Ponar)	
		SANDY CLAY, gray, hard.		0.75/1		SI-08-GS (Grain Size)	
		E.O.B.					Sediment would not produce porewater

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.666303131
LONGITUDE: -83.797244366
PROJECTION: MiGeoRef (m)
NORTHING: 348496.997
EASTING: 677423.505

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-09

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/4/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1.58 feet in 14 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain, with shells and trace gravel.		1.58/1.58	G	SI-09 (from Ponar)	
						SI-09-GS 0-13"(Grain Size)	
		SANDY CLAY, gray-brown mottled, coarse sand, trace gravel, hard.				SI-09-GS 13-19" (Grain Size)	Sediment would not produce porewater
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.668663834
LONGITUDE: -83.797109230
PROJECTION: MiGeoRef (m)
NORTHING: 348759.405
EASTING: 677427.404

EGLE

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-10

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/6/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 0.92 feet in 14.1 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain, with abundant shells.			G	SI-10 (from Ponar)	
		SANDY CLAY, gray-brown mottled, cohesive, hard.		1.17/0.92		SI-10-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.670976807
LONGITUDE: -83.796973378
PROJECTION: MiGeoRef (m)
NORTHING: 349016.516
EASTING: 677431.501

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-11

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/6/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1.42 feet in 14.5 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				Ponar sample: coarse sand
		SANDY CLAY, gray-brown mottled, trace gravel, large cobble at surface.			G	SI-11 (from Ponar)	
				1.42/1.42		SI-11-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.673505530
LONGITUDE: -83.797241533
PROJECTION: MiGeoRef (m)
NORTHING: 349296.714
EASTING: 677402.397

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-12

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/6/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1.58 feet in 13.8 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain, with shells.			G	SI-12 (from Ponar)	
		SANDY CLAY, gray-brown mottled, hard.		0.92/1.58		SI-12-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.668603034
LONGITUDE: -83.807434095
PROJECTION: MiGeoRef (m)
NORTHING: 348730.502
EASTING: 676595.408

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-13

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/6/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1.25 feet in 15 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		GRAVEL and shells.			G	SI-13 (from Ponar)	Ponar sample: coarse sand, gravel, and shells.
		SANDY CLAY, gray-brown mottled, cohesive, firm.		0.67/1.25		SI-13-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.671125591
LONGITUDE: -83.807454720
PROJECTION: MiGeoRef (m)
NORTHING: 349010.548
EASTING: 676586.307

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-14

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/6/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1.5 feet in 15 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain.			G	SI-14 (from Ponar)	
						SI-14-GS 0-12" (Grain Size)	
		SAND, gray brown, fine grain.		1.42/1.5			
		SANDY CLAY, gray-brown mottled, firm.				SI-14-GS 12-17" (Grain Size	
		E.O.B.				SI-14-PW (Porewater)	

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.673623760
LONGITUDE: -83.807481615
PROJECTION: MiGeoRef (m)
NORTHING: 349287.872
EASTING: 676576.773

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-15

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/6/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1.08 feet in 15.6 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain.			G	SI-15 (from Ponar)	
		SAND, gray brown, fine to medium grain.		1.5/1.08		SI-15-GS (Grain Size)	
		E.O.B.					Sediment would not produce porewater.

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.676047238
LONGITUDE: -83.807384711
PROJECTION: MiGeoRef (m)
NORTHING: 349557.169
EASTING: 676577.435

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-16

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/6/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1.17 feet in 16.8 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain.			G	SI-16 (from Ponar)	
		GRAVELLY CLAY, gray-brown mottled, small gravel, cohesive.		1/1.17		SI-16-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.676085770
LONGITUDE: -83.803953716
PROJECTION: MiGeoRef (m)
NORTHING: 349568.797
EASTING: 676853.823

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-17

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/6/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1.33 feet in 13.5 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain.			G	SI-17 (from Ponar)	
		SANDY CLAY, gray-brown mottled, trace gravel, hard.		1.2/1.33		SI-17-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.673555482
LONGITUDE: -83.803993520
PROJECTION: MiGeoRef (m)
NORTHING: 349287.763
EASTING: 676858.089

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-18

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/6/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 0.83 feet in 15.3 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SANDY CLAY, gray-brown mottled, with gravel, stiff.			G	SI-18 (from Ponar)	Ponar sample: coarse sand
				0.5/0.83		SI-18-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.671022537
LONGITUDE: -83.803927180
PROJECTION: MiGeoRef (m)
NORTHING: 349006.662
EASTING: 676870.917

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-19

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/6/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1.67 feet in 14.4 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain.			G	SI-19 (from Ponar)	
		SANDY CLAY, gray-brown mottled, trace gravel, firm.		1.3/1.67		SI-19-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.668475885
LONGITUDE: -83.803861157
PROJECTION: MiGeoRef (m)
NORTHING: 348724.038
EASTING: 676883.760

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-20

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/7/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 0.75 feet in 13.3 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain, with gravel and shells.			G	SI-20 (from Ponar)	
				0.75/0.75		SI-20-GS (Grain Size)	
		SANDY CLAY, gray-brown mottled, some gravel, firm.					
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.666196618
LONGITUDE: -83.803743146
PROJECTION: MiGeoRef (m)
NORTHING: 348471.215
EASTING: 676900.004

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-21

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/7/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 0.92 feet in 12.6 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain, with gravel and abundant shells.			G	SI-21 (from Ponar)	
				0.75/0.92		SI-21-GS (Grain Size)	
		SANDY CLAY, gray-brown mottled, firm.					
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.666088977
LONGITUDE: -83.800606573
PROJECTION: MiGeoRef (m)
NORTHING: 348465.994
EASTING: 677153.138

EGLE

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-22

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/7/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 0.67 feet in 12.8 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain.			G	SI-22 (from Ponar)	
		SANDY CLAY, gray-brown mottled, trace gravel, dry, hard.		0.7/0.67		SI-22-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.668640375
LONGITUDE: -83.800589498
PROJECTION: MiGeoRef (m)
NORTHING: 348749.322
EASTING: 677146.967

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-23

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/7/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1 foot in 13.9 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SAND, brown, coarse grain, abundant shells.			G	SI-23 (from Ponar)	
		No recovery.		0.25/1		SI-23-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.671101813
LONGITUDE: -83.800567000
PROJECTION: MiGeoRef (m)
NORTHING: 349022.674
EASTING: 677141.499

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: SI-24

SITE: Saginaw Bay Reef Restoration Project

COUNTY: Bay
TOWNSHIP: Hampton
TOWN: 15
RANGE: 5E
SECTION: NA
LOCATION DESCRIPTION: East of Spoils Island

DATE: 6/7/24
DRILLER: M. Priebe
GEOLOGIST: B. Eustice
DRILL METHOD: Vibracore
TOTAL DEPTH: 1 foot in 15.3 feet of water
LOCATION ID# 09000092

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	MEASURED RECOVERY (FT/FT)	SAMPLE TYPE	SAMPLE ID	NOTES
		Lake Bottom	0				
		SANDY CLAY, gray-brown mottled, trace gravel and some shells, dry, hard.			G	SI-24 (from Ponar)	Ponar sample: coarse sand
				0.83/1		SI-24-GS (Grain Size)	
		E.O.B.					

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: NA

LATITUDE: 43.673544295
LONGITUDE: -83.800636667
PROJECTION: MiGeoRef (m)
NORTHING: 349293.723
EASTING: 677128.659

Sample Location	Longitude	Latitude	Easting	Northing	Max_PDOP	Corr_Type	GPS_Date	Feat_Name	Datafile	GNSS_Heigh	Vert_Prec	Horz_Prec	Point_ID
SI-01	-83.786824379	43.668707575	678256.223	348786.431	2.4	L1L2 Postprocessed Carrier Float	6/3/2024	Point_ge	SAGINAW BAY 2024.cor	464.060	0.1	0.1	1
SI-02	-83.786854488	43.666168652	678261.352	348504.460	3.3	L1L2 Postprocessed Carrier Float	6/3/2024	Point_ge	SAGINAW BAY 2024.cor	463.936	0.1	0.1	2
SI-03	-83.790474698	43.666221987	677969.397	348502.567	5.2	L1L2 Postprocessed Carrier Float	6/3/2024	Point_ge	SAGINAW BAY 2024.cor	463.795	0.1	0.1	3
SI-04	-83.790177553	43.668640991	677986.158	348771.799	1.6	L1L2 Postprocessed Carrier Float	6/4/2024	Point_ge	SAGINAW BAY 2024.cor	463.802	0.1	0.1	4
SI-05	-83.790364925	43.671064817	677963.854	349040.522	2.3	L1L2 Postprocessed Carrier Float	6/4/2024	Point_ge	SAGINAW BAY 2024.cor	463.581	0.1	0.1	5
SI-06	-83.793660000	43.668670000	677705.390	348767.514	NA	NA	NA	NA	NA	NA	NA	NA	NA
SI-07	-83.793821133	43.671233299	677684.798	349051.780	4.6	L1L2 Postprocessed Carrier Float	6/4/2024	Point_ge	SAGINAW BAY 2024.cor	463.401	0.1	0.1	6
SI-08	-83.797244366	43.666303131	677423.505	348496.997	2.6	L1L2 Postprocessed Carrier Float	6/4/2024	Point_ge	SAGINAW BAY 2024.cor	463.606	0.1	0.1	7
SI-09	-83.797109230	43.668663834	677427.404	348759.405	4.9	L1 Postprocessed Carrier Float	6/4/2024	Point_ge	SAGINAW BAY 2024.cor	465.014	0.6	0.3	8
SI-10	-83.796973378	43.670976807	677431.501	349016.516	2.6	L1L2 Postprocessed Carrier Float	6/6/2024	Point_ge	SAGINAW BAY 2024.cor	463.554	0.1	0.1	9
SI-11	-83.797241533	43.673505530	677402.397	349296.714	6.6	L1L2 Postprocessed Carrier Float	6/6/2024	Point_ge	SAGINAW BAY 2024.cor	463.565	0.1	0.1	10
SI-12	-83.807434095	43.668603034	676595.408	348730.502	2.9	Postprocessed Code	6/6/2024	Point_ge	SAGINAW BAY 2024.cor	463.932	0.1	0.1	11
SI-13	-83.807454720	43.671125591	676586.307	349010.548	3.6	L1L2 Postprocessed Carrier Float	6/6/2024	Point_ge	SAGINAW BAY 2024.cor	463.713	0.1	0.1	12
SI-14	-83.807481615	43.673623760	676576.773	349287.872	1.9	L1L2 Postprocessed Carrier Float	6/6/2024	Point_ge	SAGINAW BAY 2024.cor	463.634	0.1	0.1	13
SI-15	-83.807384711	43.676047238	676577.435	349557.169	3.1	L1L2 Postprocessed Carrier Float	6/6/2024	Point_ge	SAGINAW BAY 2024.cor	463.867	0.1	0.1	14
SI-16	-83.803953716	43.676085770	676853.823	349568.797	2.8	L1L2 Postprocessed Carrier Float	6/6/2024	Point_ge	SAGINAW BAY 2024.cor	463.943	0.1	0.1	15
SI-17	-83.803993520	43.673555482	676858.089	349287.763	2.2	L1L2 Postprocessed Carrier Float	6/6/2024	Point_ge	SAGINAW BAY 2024.cor	463.856	0.1	0.1	16
SI-18	-83.803927180	43.671022537	676870.917	349006.662	2.0	L1L2 Postprocessed Carrier Float	6/6/2024	Point_ge	SAGINAW BAY 2024.cor	463.571	0.1	0.1	17
SI-19	-83.803861157	43.668475885	676883.760	348724.038	2.7	L1L2 Postprocessed Carrier Float	6/6/2024	Point_ge	SAGINAW BAY 2024.cor	466.038	0.1	0.1	18
SI-20	-83.803743146	43.666196618	676900.004	348471.215	2.0	L1L2 Postprocessed Carrier Float	6/7/2024	Point_ge	SAGINAW BAY 2024.cor	463.861	0.1	0.1	19
SI-21	-83.800606573	43.666088977	677153.138	348465.994	5.9	L1L2 Postprocessed Carrier Float	6/7/2024	Point_ge	SAGINAW BAY 2024.cor	464.236	0.1	0.1	20
SI-22	-83.800589498	43.668640375	677146.967	348749.322	3.3	L1L2 Postprocessed Carrier Float	6/7/2024	Point_ge	SAGINAW BAY 2024.cor	463.874	0.1	0.1	21
SI-23	-83.800567000	43.671101813	677141.499	349022.674	5.4	L1L2 Postprocessed Carrier Float	6/7/2024	Point_ge	SAGINAW BAY 2024.cor	463.618	0.1	0.1	22
SI-24	-83.800636667	43.673544295	677128.659	349293.723	4.3	L1L2 Postprocessed Carrier Float	6/7/2024	Point_ge	SAGINAW BAY 2024.cor	463.604	0.1	0.1	23