Delaware Department of Natural Resources and Environmental Control
Delaware Coastal Management Program

Initial Review: ________
Updated On: ________
Complete: ________
Official Use Only

Coastal Zone Management Act Federal Consistency Form

This document provides the Delaware Coastal Management Program (DCMP) with a Federal Consistency Determination or Certification for activities regulated under the Coastal Zone Management Act of 1972, as amended, and NOAA's Federal Consistency Regulations, 15 C.F.R. Part 930. Federal agencies and other applicants for federal consistency are not required to use this form; it is provided to applicants to facilitate the submission of a Consistency Determination or Consistency Certification. In addition, federal agencies and applicants are only required to provide the information required by NOAA's Federal Consistency Regulations.

Project/Activity Name:	Fenwick Island Channel Dredging Project

I. Federal Agency or Non-Federal Applicant Contact Information:

Contact Name/Title: Patricia Schuchman – Town Manager, Town of Fenwick Island

Federal Agency Contractor Name (if applicable): ____________________

Federal Agency: U.S. Army Corps of Engineers
(either the federal agency proposing an action or the federal agency issuing a federal license/permit or financial assistance to a non-federal applicant)

Mailing Address: 800 Coastal Highway

City: Fenwick Island State: DE Zip Code: 19944

E-mail: pschuchman@fenwickisland.org Telephone #: 302-539-1305

II. Federal Consistency Category:

- (●) Federal Activity or Development Project (15 C.F.R. Part 930, Subpart C)
- ( ) Outer Continental Shelf Activity (15 C.F.R. Part 930, Subpart E)
- ( ) Federal Financial Assistance (15 C.F.R. Part 930, Subpart F)
- ( ) Federal License or Permit Activity (15 C.F.R. Part 930, Subpart D)
- ( ) Federal License or Permit Activity which occurs wholly in another state (interstate consistency activities identified in DCMP's Policy document)

III. Detailed Project Description (attach additional sheets if necessary):

The proposed Project will occur in Lighthouse Cove in Little Assawoman Bay adjacent to the Town of Fenwick Island, Sussex County, Delaware. Little Assawoman Bay is a popular recreational boating area in southern Delaware inland of the Atlantic Ocean. Over recent years, sediment has built-up leading to areas of very shallow water that are causing navigational hazards to both motorized and non-motorized watercraft. As part of the proposed Project, the Town of Fenwick would hydraulically dredge the North and South Channels of Little Assawoman Bay to a depth of -4 feet mean low water (MLW) with an allowable over-dredge tolerance to a depth of -5 feet MLW. The combined channel length is approximately 4,000 linear feet and the channels cover a combined surface area of approximately 4.6 acres. Dredge material will be transported via a pipe to an upland placement area west of the bay. The placement area is a former farm (Thompson Farm) and is currently undeveloped land.

Dredging would begin in October 2023 and last approximately 2 months. Approximately 19,000 cubic yards of material will be dredged. Dredged material will be placed into geotextile dewatering bags at the placement area, and dewatered. The proposed Project includes upland access for construction equipment access and dredged material dewatering. Contractor will modify the grade within the placement area to contain surface water generated from dewatering. Upland staging areas will be restored to pre-construction conditions following construction. See Project Supplement for additional details.

IV. General Analysis of Coastal Effects (attach additional sheets if necessary):

Potential impacts from the proposed Project's dredging and material placement activities are anticipated to be temporary and minimal. Additionally, best management practices (BMPs) would be implemented to avoid or minimize impacts to water quality.

V. Detailed Analysis of Consistency with DCMP Enforceable Policies (attach additional sheets if necessary):

Policy 5.1: Wetlands Management

N/A. The proposed project is not located in a wetland and would not affect any wetlands. Minimum 25 ft buffer zones from upland work areas for sediment dewatering to adjacent wetlands would be established with erosion and sedimentation controls installed in accordance with DNREC requirements.

Policy 5.2: Beach Management

N/A. The proposed project is not located and would not affect public or private beaches.

Policy 5.3: Coastal Waters Management (includes wells, water supply, and stormwater management. Attach additional sheets if necessary)

The proposed Project is consistent with Policy 5.3. Dredged material will be beneficially reused as fill for future property modifications, consistent with Policy 5.3.1.1. Additionally, public recreational purposes will be protected by dredging to reduce navigational constraints, consistent with Policy 5.3.1.3.

Policy 5.4: Subaqueous Land and Coastal Strip Management

The proposed Project is consistent with Policy 5.4. Dredging would be conducted in accordance with Policies 5.4.25.1 to 5.4.25.8. Material would be placed in uplands for reuse.

Policy 5.5: Public Lands Management

N/A. The proposed Project is not located on public lands.

Policy 5.6: Natural Lands Management

The proposed Project is located within the Inland Bays watersheds.

Policy 5.7: Flood Hazard Areas Management

N/A. The proposed Project would not affect flood hazard areas management.

Policy 5.8: Port of Wilmington

N/A. The proposed Project would not affect the Port of Wilmington.

Policy 5.9: Woodlands and Agricultural Lands Management

N/A.The proposed Project is not located within woodlands nor agricultural lands.

Policy 5.10: Historic and Cultural Areas Management

There are no known cultural resources in the area, the project area is used for recreation. A cultural resources measure, as described in the Supplement, would be added to the construction contracts to ensure an unanticipated find would be protected. A Phase 1 investigation of in-water project areas was conducted in accordance with USACE/SHPO requests resulting in a finding of no known or observed resources.

Policy 5.11: Living Resources

There will be no direct project impacts to critical habitat or habitat of special concern because none are present in the immediate project area. The proposed Project area supports EFH for several species, which may be adversely affected during dredging. Juveniles and adults are expected to vacate the area once construction starts. The disturbance of bottom sediments associated with dredging could interfere with feeding, predation, and avoidance patterns. However, adverse impacts are expected to be temporary and highly localized. Some eggs and larvae may be entrained during dredging operations; however, this will be temporary and localized to the area being dredged.

Policy 5.12 Mineral Resources Management

N/A. The proposed Project does not include extraction of mineral resources.

Policy 5.13: State Owned Coastal Recreation and Conservation

N/A. The proposed Project is within state owned lands. Dredging would maintain important recreational areas and would not adversely affect natural, biological, cultural or historic resources.

Policy 5.14: Public Trust Doctrine

The applicant understands and agrees with this Policy.

Policy 5.15: Energy Facilities

N/A. The proposed Project is not an energy facility project.

Policy 5.16: Public Investment

N/A. The Project is not proposing the use of the Delaware's public funds.

Policy 5.17: Recreation and Tourism

The proposed Project would benefit Delaware residents, by providing opportunities for improved navigation and therefore improved recreation within the coastal area.

Policy 5.18: National Defense and Aerospace Facilities

N/A. The proposed Project is not siting national defense or aerospace facilities.

Policy 5.19: Transportation Facilities

N/A. The proposed Project is not a transportation facilities project.

Policy 5.20: Air Quality Management

N/A. The proposed Project does not fall in any sources of air pollution category described in 5.20.2.

Policy 5.21: Water Supply Management

N/A. The proposed Project would not affect water supply.

Policy 5.22: Waste Disposal Management

N/A. The Project is not proposing the construction of on-site wastewater treatment or disposal system, land treatment of wastes, disposal of solid waste, hazardous waste management, clean up of hazardous substances, or underground storage tanks.

Policy 5.23: Development

N/A. The proposed project is a dredging project, not a development project.

Policy 5.24: Pollution Prevention

The proposed Project will employ BMPs to prevent pollution and ensure that the potential for degradation of water quality is monitored. A turbidity monitoring program for decant water from the dewatering geo-bag field is described within the Permit Supplment.

Policy 5.25: Coastal Management Coordination

N/A. The applicant is not a state agency.

VI. JPP and RAS Review (Check all that apply)**:**

Has the project been reviewed in a monthly Joint Permit Processing and/or Regulatory Advisory Service meeting?

☒ JPP ☐ RAS ☐ None

*If yes, provide the date of the meeting(s): 4/21/22

VII. Statement of Certification/Determination and Signature (Check one and sign below)**:**

☐ **FEDERAL AGENCY CONSISTENCY DETERMINATION.** Based upon the information, data, and analysis included herein, the federal agency, or its contracted agent, listed in (I) above, finds that this proposed activity is consistent to the maximum extent practicable with the enforceable policies of the Delaware Coastal Management Program.

OR

☐ **FEDERAL AGENCY NEGATIVE DETERMINATION.** Based upon the information, data, and analysis included herein, the federal agency, or its contracted agent, listed in (I) above, finds that this proposed activity will not have any reasonably foreseeable effects on Delaware's coastal uses or resources (Negative Determination) and is therefore consistent with the enforceable policies of the Delaware Coastal Management Program.

OR

■ **NON-FEDERAL APPLICANT'S CONSISTENCY CERTIFICATION.** Based upon the information, data, and analysis included herein, the non-federal applicant for a federal license or permit, or state or local government agency applying for federal funding, listed in (I) above, finds that this proposed activity complies with the enforceable policies of the Delaware Coastal Management Program and will be conducted in a manner consistent with such program.

Signature:	Wendy Mahaney		
Printed Name:	Wendy Mahaney	Date:	6/22/2023

Pursuant to 15 C.F.R. Part 930, the Delaware Coastal Management Program must provide its concurrence with or objection to this consistency determination or consistency certification in accordance with the deadlines listed below. Concurrence will be presumed if the state's response is not received within the allowable timeframe.

Federal Consistency Review Deadlines:

Federal Activity or Development Project (15 C.F.R. Part 930, Subpart C)	60 days with option to extend an additional 15 days or stay review (15 C.F.R. § 930.41)
Federal License or Permit (15 C.F.R. Part 930, Subpart D)	Six months, with a status letter at three months. The six month review period can be stayed by mutual agreement. (15 C.F.R. § 930.63)
Outer Continental Shelf Activity (15 C.F.R. Part 930, Subpart E)	Six months, with a status letter at three months. If three month status letter not issued, then concurrence presumed. The six month review period can be stayed by mutual agreement. (15 C.F.R. § 930.78)
Federal Financial Assistance to State or Local Governments (15 C.F.R. Part 930, Subpart F)	State Clearinghouse schedule

OFFICIAL USE ONLY:

Reviewed By:	Fed Con ID:	Date Received:
Public notice dates: to	Comments Received: ☐ NO ☐ YES *[attach comments]*	
Decision type: *(objections or conditions attach details)*	_ Decision Date:	

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U.S. Army Corps of Engineers (USACE)
APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT
For use of this form, see 33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 08-31-2023

The public reporting burden for this collection of information, OMB Control Number 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at . Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR APPLICATION TO THE ABOVE EMAIL.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned. System of Record Notice (SORN). The information received is entered into our permit tracking database and a SORN has been completed (SORN #A1145b) and may be accessed at the following website:

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME
First - Patricia Middle - Last - Schuchman
Company - Town of Fenwick Island
E-mail Address - pschuchman@fenwickisland.org

8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Wendy Middle - Mae Last - Mahaney
Company - Anchor QEA, LLC
E-mail Address - wmahaney@anchorqea.com

6. APPLICANT'S ADDRESS:
Address- 800 Coastal Highway
City - Fenwick Island State - DE Zip - 19944 Country - US

9. AGENT'S ADDRESS:
Address- 68 Excelsior Ave, Suite 101
City - Saratoga Springs State - NY Zip - 12866 Country - USA

7. APPLICANT'S PHONE NOs. w/AREA CODE
a. Residence b. Business 302-539-3011 c. Fax

10. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business 518.886.0630 c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Anchor QEA, LLC to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

Patricia Schuchman 6-21-2023
SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Fenwick Island Channel Dredging Project

13. NAME OF WATERBODY, IF KNOWN (if applicable)
Little Assawoman Bay

14. PROJECT STREET ADDRESS (if applicable)
Address
City - Fenwick Island State- DE Zip- 19944

15. LOCATION OF PROJECT
Latitude: °N 38°27'18.66 Longitude: °W 75° 3'34.35

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16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID

Municipality Town of Fenwick Island, DE

Section -

Township -

Range -

17. DIRECTIONS TO THE SITE

The proposed Project is dredging within the southern area of Little Assawoman Bay. Dredged Material will be placed in an upland placement area that can be accessed from US Highway 1 south to west on Lighthouse Rd to north on Bennett Ave, in Selbyville.

18. Nature of Activity (Description of project, include all features)

As part of the proposed Project, the Town of Fenwick would hydraulically dredge two channels (North and South Channels) of Little Assawoman Bay to a depth of -4 feet mean low water (MLW) with an allowable over-dredge tolerance to a depth of -5 feet MLW. The combined channel length is approximately 4,000 linear feet and the channels cover a combined surface area of approximately 4.6 acres. Dredging would begin October 2023 and last approximately 3 months. Approximately 19,000 cubic yards (CY) of material will be dredged. Dredged material will be placed into geotextile dewatering bags (geobags) at the placement area, and dewatered. The dewatering area will be located within uplands and will be surrounded with super silt fencing. Sumps and/or earthen berms will be used to collect generated water which would then be transported back to the bay via pumps. The proposed Project includes upland access for construction equipment access and dredged material dewatering. Contractor will modify the grade within the placement area to contain surface water generated from dewatering. Material will remain on site for beneficial use as fill for future property modifications. Upland staging areas will be restored to pre-construction conditions following construction. See Figure 1 for a project location map and see the Project Supplement for additional details.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

Little Assawoman Bay is a popular recreational boating area in southern Delaware inland of the Atlantic Ocean. The proposed channel locations align with areas of the bay that have been transited by residents for decades. Over recent years, sediment has built-up leading to areas of very shallow water that are causing navigational hazards to both motorized and non-motorized watercraft. The proposed Project is being completed to reduce navigational constraints in the Bay.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

No discharge--material will be placed at an upland facility.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards

Not applicable

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres

or

Linear Feet Not applicable

23. Description of Avoidance, Minimization, and Compensation (see instructions)

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- The project shall use multiple erosion-control features to limit any potential for stormwater runoff, including silt fencing, berms, and mats.
- Construction access shall be by means that avoid or minimize impacts on aquatic sites (e.g., upland access, floating barges).
- Frequent site inspections shall be implemented (by the construction manager).
- Project workers shall not harass any waterfowl or fish in the project area.
- Dewatering material will be managed in geo-bags and decant water will be monitored for turbidity - see Permit Supplement

24. Is Any Portion of the Work Already Complete? ○ Yes ◉ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- Adjoining property owner maps are provided as an appendix to the permit application

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
DNREC	CWA Sec. 401	Appendix L		Pending	
DNREC	CWA Sec. 401	Appendix S		Pending	
DNREC	CZMA Consistency			Pending	

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Patricia Schuchman — 6-21-2023 — Wendy Mahaney — 6/22/2023

SIGNATURE OF APPLICANT — DATE — SIGNATURE OF AGENT — DATE

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The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

ENVIRONMENTAL QUESTIONNAIRE
FOR CORPS OF ENGINEERS PERMIT APPLICATIONS
Philadelphia District, Corps of Engineers
Philadelphia, Pennsylvania 19107
CENAP-OP-R

INTRODUCTION AND INSTRUCTIONS

The District Engineer is required by law to assess the initial, cumulative, and long-term effects of any proposed permit on all aspects of the environment.

To speed the analysis of the probable impact of the proposed work, each applicant is required to submit appropriate environmental data as part of a permit application. We ask that you provide a thorough description of your proposed project and answer each question as it applies to the work and the results of that work. Complete and accurate answers will prevent unnecessary delays in processing your permit application

Parts I and II will be filled out by all applicants. Part I is self-explanatory. In Part II, the Environmental Impact Checklist, you should indicate the impacts of your project on all aspects of the environment that are listed. Use the space under “Qualifying Remarks” to indicate the specific impacts that your project will have. This may include types of plants or animals affected, specific adverse, beneficial, or mitigative effects, changes to existing conditions, etc. Although space for answers has been provided, you may wish to supply additional information on attached pages. If you do not anticipate an impact on a certain item, simply place a check in the “No” column.

Part III will be filled out by all applicants applying for a permit to perform dredging.

Part IV will be filled out by all applicants applying for a permit to perform filling operations. This includes activities such as filling behind bulkheads.

Refer any questions you may have concerning this supplemental form to the Regulatory Branch at (215) 656-6728.

PART I

I. PROJECT DESCRIPTION:

A. General Site Location: Accurately locate the project site with respect to State, county, or other subdivision, and in relation to streams and rivers.

The proposed Project will occur in Little Assawoman Bay adjacent to the Town of Fenwick Island, Sussex County, Delaware.

B. Specific Site Locations: Completely locate the project site with respect to cove, creek, property owner, plot number, etc.

The proposed Project will occur in Lighthouse Cove in Little Assawoman Bay.

C. Description of Proposed Action: Carefully describe the action proposed, including the method of construction, equipment, and materials to be used. Details in your description are important. Attach additional sheets if necessary.

The Town of Fenwick would hydraulically dredge two channels (North and South Channels) of Little Assawoman Bay to a depth of -4 feet mean low water (MLW) with an allowable over-dredge tolerance to a depth of -5 feet MLW. The combined channel length is approximately 4,000 linear feet and the channels cover a combined surface area of approximately 4.6 acres. Approximately 19,000 cubic yards (CY) of material will be dredged. Dredged material will be placed into geotextile dewatering bags (geobags) at the placement area, and dewatered. The dewatering area will be located within uplands and will be surrounded with super silt fencing. Sumps and/or earthen berms will be used to collect generated water which would then be transported back to the bay via pumps. The proposed Project includes upland access for construction equipment access and dredged material dewatering. Contractor will modify the grade within the placement area to contain surface water generated from dewatering. Material will remain on site for beneficial use as fill for future property modifications. Upland staging areas will be restored to pre-construction conditions following construction. See Project Supplement for additional details.

D. Purpose of Proposed Action: Define the purpose of the proposed structure or work. For example, the purpose of bulkheading may be to stabilize an eroding bank; whereas, the purpose for a pier may be for the mooring of a private boat, for access to a public or private facility, for a marina, or for another purpose.

Please see attached Project Supplement. The Proposed Project's purpose is to dredge areas where sediment has built-up leading to areas of very shallow water that are causing navigational hazards to both motorized and non-motorized watercraft.

E. Submit color photographs of the site, with explanations of the views shown (prints only). Photographs help us to better understand your project. The more photographs you provide, the easier it is to understand and process your application.

Please see attached Project Supplement

PART II – ENVIRONMENTAL IMPACT CHECKLIST			
ENVIRONMENTAL IMPACT	**YES**	**NO**	**QUALIFYING REMARKS**
A. Physical Please see attached Permit Supplement			
1. Topography	☐	x	
2. Geological Elements and Leaching	☐	x	
3. Air	☐	x	
4. Transportation	☐	x	
5. Handling of Hazardous Materials	☐	x	
6. Spoil Disposal	☐	x	
7. Sewage and Solid Wastes	☐	x	
8. Water Resources			
a. Water Quality	☐	x	
b. Hydrography, Circulation, Littoral Drift.	☐	x	
c. Ground Water	☐	x	
B. Biological Please see attached Permit Supplement			
1. Vegetation			
a. Terrestrial	☐	x	
b. Aquatic	☐	x	
2. Fish and Wildlife			
a. Mammals	☐	x	
b. Birds	☐	x	
c. Amphibians	☐	x	
d. Reptiles	☐	x	
e. Fish	☐	x	
f. Shellfish	☐	x	
g. Invertebrates	☐	x	
3. Rare or Endangered Species	☐	x	

ENVIRONMENTAL IMPACT	YES	NO	QUALIFYING REMARKS
C. Cultural Please see attached Permit Supplement			
1. Land Use	☐	☒	
2. Population Density and Trends	☐	☒	
3. Regional Development	☐	☒	
4. Historic Places	☐	☒	
5. Archaeological Sites	☐	☒	
6. Aesthetics	☐	☒	
7. Utilities	☐	☒	
8. Transportation Systems	☐	☒	
9. Recreation	☐	☒	
10. Public Health	☐	☒	
D. Other Factors Please see attached Permit Supplement			
1. Secondary Effects	☐	☒	
2. Controversiality	☐	☒	
3. Is significant dredging involved?	☐	☒	
4. Is significant filling involved?	☐	☒	

Part III

<u>Considerations of a Dredging Proposal:</u> **Please see attached Project Supplement**

A. Describe characteristics and locations of the proposed dredged material disposal site. Provide photographs.

The dredge material disposal site is an upland undeveloped former farm in area adjacent to the Bay.

B. Is there a comprehensive plan for disposal sites that takes into account the accumulative effect over time and the decreasing amount of suitable sites for disposal?

Project will provide sediment for reuse at the disposal site.

C. Describe the present land use of the disposal site.

Site is vacant and undeveloped.

D. Describe characteristics of the material to be disposed, including:

1. Physical source of material (i.e. sand, silt, clay, etc.) Give percentages of the various fractions if available.

   Dredge material is approximately 65% sand, 25% silt, and 10% clay.

2. Chemical composition of material: Many areas, especially marinas, highly industrialized areas, etc., have sediments with high concentrations of pollutants (chemicals, organic material, etc.). These materials may be re-suspended or reintroduced into the water and result in serious environmental damage. If your proposed dredging is in an area such as described above, a chemical analysis of the material to be dredged should be provided.

The project area is surrounded by developed residential areas and undisturbed fringe marshes. There are no known point sources (Marinas, industrialized areas) in vicinity to the dredge areas. Sediment sampling was conducted within the channel limits with analysis for Metals, PAHs, Pesticides and PCBs. Resulting data shows the material is suitable for upland placement and use as general fill.

3. Dewatering properties of the material to be disposed.

   Geobags will be used to dewater the dredged materials. The relatively high sand content will facilitate full dewatering of the material within approximately 4 weeks of dredging.

4. Compactability of material and settling rates of material to be disposed.

   N/A - Geobags will be used to dewater the dredged materials.

5. Dredging and disposal schedule to insure that operations do not degrade water quality during times of anadromous fish migration.

   Dredging will take place in the fall outside of fish windows.

E. When the project involves land disposal, discuss the following:

1. Method of disposal to be utilized, i.e., pipeline discharge, barge, hopper (underway or stationary).

   Hydraulic dredging will be performed with material transport via pipeline to the placement area.

2. Describe method of dredged material containment (i.e. embankment, behind bulkhead, etc.)

Dredged material will be placed into geotextile dewatering bags at the placement area, and dewatered. The dewatering area will be located within uplands and will be surrounded with super silt fencing. Sumps and/or earthen berms will be used to collect generated water which would then be transported back to the bay via pumps.

3. What type of leachates will be produced from the spoil material and what is planned for protection of the groundwater?

   Sediment sampling has shown the material is uncontaminated and suitable for the intended use. Generated water from the geobag dewatering process will be collected and transported back to the bay.

4. Methods to insure that spoil water does not adversely affect water quality, both during construction and after completion of the project.

   Sumps and/or earthen berms will be used to collect generated water which would then be transported back to the bay via pumps.

5. Provisions for monitoring during discharge: water quality, sediment transport, and precautions to prevent "short-circuiting" dumping.

   A turbidity monitoring program will be utilized to ensure water quality is not impacted by the dewatering operations. See permit supplement.

F. Consider and discuss the following for water disposal:

1. Describe methods to be used for water disposal, including volumes and site selection.

   N/A

2. Describe the existing water characteristics at the site, including chemical analysis for water quality.

   N/A

G. Discuss the frequency and amount of maintenance dredging which will be required; discuss the resulting impacts.

The naturally occurring channels which have been used for decades have shoaled in slowly over a duration of 40-50 years. It is anticipated that shoaling processes would remain slow and maintenance would not be required for 20 years or more. That maintenance cycle expectation is comparable to other maintained waterways in Delaware's Inland Bays.

H. Alternatives. ***Please see attached Project Supplement***

1. Discuss all alternatives to the project, including the "no action" alternative.

A "no action" alternative would not address the project purpose and need of providing safe navigation within the bay. More expansive areas for dredging (depths, channel widths, channel extents) were considered but the proposed channels represented the minimum extent of dredging needed to facilitate safe navigation in the most shoaled areas of the bay.

2. Discuss alternative types and methods of dredging and disposal, such as pipeline discharge, barging, or hopper method.

Hydraulic dredging is the most feasible option for sediment management at this scale. Mechanical dredging and barging is not feasible due to the draft limitations in the bay.

3. Discuss alternatives to dredging.

4. Discuss alternative areas of sites for spoil disposal.

Other beneficial uses of the dredged material was explored

5. Discuss impact of port docking patterns upon the demand for dredging. Can alternative patterns reduce the amount of dredging required to support port operations?

6. Support alternative means of construction that would prevent or minimize water quality degradation using EPA standards for guidance.

7. State in detail impacts resulting in alternative locations for the proposed project.

Part IV

CONSIDERATIONS OF A FILLING PROPOSAL: ***Not Applicable***

A. Describe in detail the existing characteristics of the area proposed for filling (i.e. aquatic area, marsh, mudflat, swamp, etc.). In your description, be sure to include the types of vegetation present and the types of animals that use the area. Provide photographs.

B. Give the following information in regard to the project size:
   1. Total area to be filled.
   2. Size of underwater area to be filled.
   3. Area of intertidal zone to be filled.
   4. Area of wetlands to be filled.
   5. Proposed height of fill.
   6. Volume of material that will be used in filling.

C. Describe in detail the material to be used as fill including as follows:
   1. Type of fill to be used (sand, stone, rubble, etc.). If the material is a composite (i.e., rubble), list the types of materials it will contain.
   2. Give the specific location of the source of this material.
   3. What types of leachates will be produced from the fill material and what is planned for protection of surface and groundwater?

D. Carefully describe the method of fill, including the following:
   1. Method of fill placement, including equipment used in deposition and grading.
   2. Method of stabilization of banks from erosion, sloughing, wave action, boat wakes, etc.
   3. Method of stabilization of the surface of the fill.

4. Length of time needed for completion of the project. State if filling will be continuous, intermittent, etc.

5. Method of controlling turbidity when filling an underwater area.

E. Purpose of the Project:

1. What is the intended use of the filled area?

2. What structures, if any, will be constructed on the fill?

3. What benefits would you gain from the proposed fill?

F. Alternatives

1. Discuss the “no action” alternative and how this would affect your present and future plans for the development of the area.

2. Discuss alternative locations for the proposed fill.

3. Discuss the use of elevated structures (i.e. causeways, elevated platforms, etc.) in place of the proposed fill.

4. Discuss any other alternatives you have considered prior to formulating the presently submitted proposal.

NOAA Fisheries Greater Atlantic Regional Fisheries Office
Essential Fish Habitat (EFH) Assessment & Fish and Wildlife Coordination Act (FWCA) Consultation Worksheet

August 2021 rev.

Authorities

The Magnuson Stevens Fishery Conservation and Management Act (MSA) requires federal agencies to consult with NOAA Fisheries on any action or proposed action authorized, funded, or undertaken by such agency that may adversely affect essential fish habitat (EFH) identified under the MSA. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in the consultation process.

The Fish and Wildlife Coordination Act (FWCA) requires that all federal agencies consult with NOAA Fisheries when proposed actions might result in modifications to a natural stream or body of water. The FWCA also requires that federal agencies consider the effects that these projects would have on fish and wildlife and must also provide for improvement of these resources. Under the FWCA, we work to protect, conserve and enhance species and habitats for a wide range of aquatic resources such as shellfish, diadromous species, and other commercially and recreationally important species that are not federally managed and do not have designated EFH.

It is important to note that these consultations take place between NOAA Fisheries and federal action agencies. **As a result, EFH assessments, including this worksheet, must be provided to us by the federal agency, not by permit applicants or consultants.**

Use of the Worksheet

This worksheet can serve as an EFH assessment for **Abbreviated EFH Consultations**, and as a means to provide information on potential effects to other NOAA trust resources considered under the FWCA. An abbreviated consultation allows us to determine quickly whether, and to what degree, a federal action may adversely affect EFH. Abbreviated consultation procedures can be used when federal actions do not have the potential to cause substantial adverse effects on EFH and when adverse effects could be alleviated through minor modifications.

The intent of the EFH worksheet is to provide a guide for determining the information needed to fully assess the effects of a proposed action on EFH. In addition, the worksheet may be used as a tool to assist you in developing a more comprehensive EFH assessment for larger projects that may have more substantial adverse effects to EFH. However, for large, complex projects that have the potential for significant adverse effects, an **Expanded EFH Consultation** may be warranted and the use of this worksheet alone is not appropriate as your EFH assessment.

An **adverse effect** is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Consultation under the MSA is not required if there is no adverse effect on EFH or if no EFH has been designated in the project area. However, because the definition of "adverse effect" is very broad, most in-water work will result in some level of adverse effect requiring consultation with us, even if the impact is temporary or the overall result of the project is habitat restoration or enhancement. It is important to remember that an adverse effect determination is a trigger to consult with us. It does not mean that a project cannot proceed as proposed, or that project modifications are necessary. An adverse effect determination under the EFH provisions of the MSA simply means that the effects of the proposed action on EFH must be evaluated to determine if there are ways to avoid, minimize, or offset adverse effects. Additional details on EFH consultations, tools, and resources, including frequently asked questions can be found on our website.

Instructions

This worksheet should be used as your EFH assessment for **Abbreviated EFH Consultations** or as a guide to develop your EFH assessment. It is not appropriate to use this worksheet as your EFH assessment for large, complex projects, or those requiring an Expanded EFH Consultation.

When completed fully and with sufficient information to clearly describe the activities proposed, habitats affected, and project impacts, as well as the measures taken to avoid, minimize or offset any unavoidable adverse effects, this worksheet provides us with required components of an EFH assessment including:

1. A description of the proposed action.
2. An analysis of the potential adverse effects on EFH and the federally managed species.
3. The federal agency's conclusions regarding the effects of the action on EFH.
4. Proposed mitigation, if applicable.

When completing this worksheet and submitting information to us, it is important to ensure that sufficient information is provided to clearly describe the proposed project and the activities proposed. At a minimum, this should include the public notice (if applicable) or project application and project plans showing:

- location map of the project site with area of impact.
- existing and proposed conditions.
- all in-water work and the location of all proposed structures and/or fill.
- all waters of the U.S. on the project site with mean low water (MLW), mean high water (MHW), high tide line (HTL), and water depths clearly marked.
- Habitat Areas of Particular Concern (HAPCs).
- sensitive habitats mapped, including special aquatic sites (submerged aquatic vegetation, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), hard bottom or natural rocky habitat areas, and shellfish beds.
- site photographs, if available.

Your analysis of effects **should focus on impacts that reduce the quality and/or quantity of the habitat or result in conversion to a different habitat type** for all life stages of species with designated EFH within the action area. Simply stating that fish will move away or that the project will only affect a small percentage of the overall population is not a sufficient analysis of the effects of an action on EFH. Also, since the intent of the EFH consultation is to evaluate the direct, indirect, individual and cumulative effects of a particular federal action on EFH and to identify options to avoid, minimize or offset the adverse effects of that action, is it not appropriate to conclude that an impact is minimal just because the area affected is a small percentage of the total area of EFH designated. The focus of the consultation is to reduce impacts resulting from the activities evaluated in the assessment. Similarly, a large area of distribution or range of the fish species is also not appropriate rationale for concluding the impacts of a particular project are minimal.

Use the information on the our EFH consultation website and NOAA's EFH Mapper to complete this worksheet. The mapper is a useful tool for viewing the spatial distribution of designated EFH and HAPCs. Because summer flounder HAPC (defined as: " all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH") does not have region-wide mapping, local sources and on-site surveys may be needed to identify submerged aquatic vegetation beds within the project area. The full designations for each species may be viewed as PDF links provided for each species within the Mapper, or via our website links to the New England Fishery Management Councils Omnibus Habitat Amendment 2 (Omnibus EFH Amendment), the Mid-Atlantic Fishery Management Councils FMPs (MAMFC - Fish Habitat), or the Highly Migratory Species website. Additional information on species specific life histories can be found in the EFH source documents accessible through the Habitat and Ecosystem Services Division website. This information can be useful in evaluating the effects of a proposed action. Habitat and Ecosystem Services Division (HESD) staff have also developed a technical memorandum *Impacts to Marine Fisheries Habitat from Non-fishing Activities in the Northeastern United States,* NOAA Technical Memorandum NMFS-NE-209 to assist in evaluating the effects of non-fishing activities on EFH. If you have questions, please contact the HESD staff member in your area to assist you.

Federal agencies or their non-federal designated lead agency should email the completed worksheet and necessary attachments to the HESD New England (ME, NH, MA, CT, RI) or Mid- Atlantic (NY, NJ, PA, DE, MD, VA) Branch Chief and the regional biologist listed on the Contact Regional Office Staff section on our EFH consultation website and listed below.

We will provide our EFH conservation recommendations under the MSA, and recommendations under the FWCA, as appropriate, within 30 days of receipt of a **complete** EFH assessment for an abbreviated consultation. Please ensure that the EFH worksheet is completed in full and includes detail to minimize delays in completing the consultation. If we are unable to assess potential impacts based on the information provided, we may request additional information necessary to assess the effects of the proposed action on our trust resources before we can begin a consultation. If the worksheet is not completely filled out, it may be returned to you for completion. **The EFH consultation and our response clock does not begin until we have sufficient information upon which to consult**.

If this worksheet is not used, you should include all the information required to complete this worksheet in your EFH assessment. The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. You may need to prepare a more detailed EFH assessment for more substantial or complex projects to fully characterize the effects of the project and the avoidance and minimization of impacts to EFH. The format of the EFH worksheet may not be sufficient to incorporate the extent of detail required for large-scale projects, and a separate EFH assessment may be required.

Regardless of the format, you should include an analysis as outlined in this worksheet for an expanded EFH assessment, along with any additional necessary information including:

- the results of on-site inspections to evaluate habitat and site-specific effects.
- the views of recognized experts on habitat or the species that may be affected.
- a review of pertinent literature and related information.
- an analysis of alternatives that could avoid or minimize adverse effects on EFH.

For these larger scale projects, interagency coordination meetings should be scheduled to discuss the contents of the EFH consultation and the site-specific information that may be needed in order to initiate the consultation.

Please contact our Greater Atlantic Regional Fisheries Office, Protected Resources Division regarding potential impacts to marine mammals or threatened and endangered species and the appropriate consultation procedures.

HESD Contacts*

New England - ME, NH, MA, RI, CT	
Chris Boelke, Branch Chief	christopher.boelke@noaa.gov
Mike Johnson - ME, NH	mike.r.johnson@noaa.gov
Kaitlyn Shaw - ME, NH, MA	kaitlyn.shaw@noaa.gov
Sabrina Pereira -RI, CT	sabrina.pereira@noaa
Mid-Atlantic - NY, NJ, PA, MD, VA	
Karen Greene, Branch Chief	karen.greene@noaa.gov
Jessie Murray - NY, Northern NJ (Monmouth Co. and north)	jessie.murray@noaa.gov
Keith Hanson - NJ (Ocean Co. and south), DE and PA, Mid-Altantic wind	keith.hanson@noaa.gov
Maggie Sager - NJ (Ocean Co. and south), DE and PA	lauren.m.sager@noaa.gov
Jonathan Watson - MD, DC	jonathan.watson@noaa.gov
David O'Brien - VA	david.l.obrien@noaa.gov
Ecosystem Management (Wind/Aquaculture)	
Peter Burns, Branch Chief	peter.burns@noaa.gov
Alison Verkade (NE Wind)	alison.verkade@noaa.gov
Susan Tuxbury (wind coordinator)	susan.tuxbury@noaa.gov

***Please check for the most current staffing list on our contact us page prior to submitting your assessment.**

EFH Assessment Worksheet rev. August 2021

Please read and follow all of the directions provided when filling out this form.

1. General Project Information

Date Submitted: 06/23/2023

Project/Application Number:

Project Name: Fenwick Island Channel Dredging Project

Project Sponsor/Applicant: Town of Fenwick Island, Bill Rymer

Federal Action Agency (or state agency if the federal agency has provided written notice delegating the authority[1]): USACE

Fast-41: Yes ☐ No ☑

Action Agency Contact Name:

Contact Phone:

Contact Email:

Address, City/Town, State:

2. Project Description

[2]Latitude: 38°27'18.66

Longitude: 75° 3'34.35

Body of Water (e.g., HUC 6 name): Little Assawoman Bay

Project Purpose:

Little Assawoman Bay is a popular recreational boating area in southern Delaware inland of the Atlantic Ocean. Over recent years, sediment has built-up leading to areas of very shallow water that are causing navigational hazards to both motorized and non-motorized watercraft. The proposed Project is being completed to reduce navigational constraints in the Bay.

Project Description:

As part of the proposed Project, the Town of Fenwick would hydraulically dredge two channels (North and South Channels) of Little Assawoman Bay to a depth of -4 feet mean low water (MLW) with an allowable over-dredge tolerance to a depth of -5 feet MLW. The combined channel length is approximately 4,000 linear feet and the channels cover a combined surface area of approximately 4.6 acres. Dredging would begin in October 2023 and last approximately 2 months. Approximately 19,000 cubic yards (CY) of material will be dredged. Dredged material will be placed into geotextile dewatering bags (geobags) at the placement area, and dewatered. The dewatering area will be located within uplands and will be surrounded with super silt fencing. Sumps and/or earthen berms will be used to collect generated water which would then be transported back to the bay via pumps. The proposed Project includes upland access for construction equipment access and dredged material dewatering. Contractor will modify the grade within the placement area to contain surface water generated from dewatering. Material will remain on site for beneficial use as fill for future property modifications. Upland staging areas will be restored to pre-construction conditions following construction. See Figure 1 for a project location map and see the Project Supplement for additional details.

Anticipated Duration of In-Water Work including planned Start/End Dates and any seasonal restrictions proposed to be included in the schedule:

Dredging would being October 2023 and last approximately 2 months. This duration considers anticipated timing restrictions for fish and wildlife.

[1] A federal agency may designate a non-Federal representative to conduct an EFH consultation by giving written notice of such designation to NMFS. If a non-federal representative is used, the Federal action agency remains ultimately responsible for compliance with sections 305(b)(2) and 305(b)(4)(B) of the Magnuson-Stevens Act. [2] Provide the decimal, or the degrees, minutes, seconds values for latitude and longitude using the World Geodetic System 1984 (WGS84) and negative degree values where applicable.

3. Site Description

EFH includes the biological, chemical, and physical components of the habitat. This includes the substrate and associated biological resources (e.g., benthic organisms, submerged aquatic vegetation, shellfish beds, salt marsh wetlands), the water column, and prey species.

Is the project in designated EFH[3]?	☑ Yes	☐ No
Is the project in designated HAPC?	☑ Yes	☐ No
Does the project contain any Special Aquatic Sites[4]?	☐ Yes	☑ No
Is this coordination under FWCA only?	☑ Yes	☐ No

Total area of impact to EFH (indicate sq ft or acres): 4.6 acres

Total area of impact to HAPC (indicate sq ft or acres): 4,000 ft

Current range of water depths at MLW	Salinity range (PPT):	Water temperature range (°F):
0.5-3 feet MLW	18 – 35 PPT	65 (average)

[3]Use the tables in Sections 5 and 6 to list species within designated EFH or the type of designated HAPC present. See the worksheet instructions to find out where EFH and HAPC designations can be found. [4] Special aquatic sites (SAS) are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. They include sanctuaries and refuges, wetlands, mudflats, vegetated shallows, coral reefs, and riffle and pool complexes (40 CFR Subpart E). If the project area contains SAS (i.e. sanctuaries and refuges, wetlands, mudflats, vegetated shallows/SAV, coral reefs, and/or riffle and pool complexes, describe the SAS, species or habitat present, and area of impact.

4. Habitat Types

In the table below, select the location and type(s) for each habitat your project overlaps. For each habitat type selected, indicate the total area of expected impacts, then what portion of the total is expected to be temporary (less than 12 months) and what portion is expected to be permanent (habitat conversion), and if the portion of temporary impacts will be actively restored to pre- construction conditions by the project proponent or not. A project may overlap with multiple habitat types.

Habitat Location	Habitat Type	Total impacts ($lf/ft^2/ft^3$)	Temporary impacts ($lf/ft^2/ft^3$)	Permanent impacts ($lf/ft^2/ft^3$)	Restored to pre-existing conditions?*
Estuarine	Substrate (silt/mud)	4,000 ft		4,000	No
Estuarine	Substrate (sand/shell)	4,000 ft		4,000	No
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one

*Restored to pre-existing conditions means that as part of the project, the temporary impacts will be actively restored,such as restoring the project elevations to pre-existing conditions and replanting. It does not include natural restoration or compensatory mitigation.

Submerged Aquatic Vegetation (SAV) Present?:

Yes: ☐ No: ☑

If the project area contains SAV, or has historically contained SAV, list SAV species and provide survey results including plans showing its location, years present and densities if available. Refer to Section 12 below to determine if local SAV mapping resources are available for your project area.

Sediment Characteristics:

The level of detail required is dependent on your project – e.g., a grain size analysis may be necessary for dredging. In addition, if the project area contains rocky/hard bottom habitat [6](pebble, cobble, boulder, bedrock outcrop/ledge) identified as Rocky (coral/rock), Substrate (cobble/gravel), or Substrate (rock) above, describe the composition of the habitat using the following table.

Substrate Type* (grain size)	Present at Site? (Y/N)	Approximate Percentage of Total Substrate on Site
Silt/Mud (<0.063mm)	Yes	14
Sand (0.063-2mm)	Yes	86
Rocky: Pebble/Gravel /Cobble(2-256mm)**	No	
Rocky: Boulder (256-4096mm)**	No	
Rocky: Coral	No	
Bedrock**	No	

[6]The type(s) of rocky habitat will help you determine if the area is cod HAPC.

* Grain sizes are based on Wentworth grain size classification scale for granules, pebbles, cobbles, and boulders.

** Sediment samples with a content of 10% or more of pebble-gravel-cobble and/or boulder in the top layer (6-12 inches) should be delineated and material with epifauna/macroalgae should be differentiated from bare pebble-gravel-cobble and boulder.

If no grain size analysis has been conducted, please provide a general description of the composition of the sediment. If available please attach images of the substrate.

Sand content from samples closest to the proposed channels varies from 68.2% to 92.9% (86.4% average). Fine-grained material (silts and clays) content from samples closest to the proposed channels ranges from 7.1% to 31.8% (13.6% average). Shell fragments were not noted in the available characterization data.

Diadromous Fish (migratory or spawning habitat- identify species under Section 10 below):

Yes: ☐ No: ☐

5. EFH and HAPC Designations

Within the Greater Atlantic Region, EFH has been designated by the New England, Mid-Atlantic, and South Atlantic Fisheries Management Councils and NOAA Fisheries. Use the EFH mapper to determine if EFH may be present in the project area and enter all species and life stages that have designated EFH. Optionally, you may review the EFH text descriptions linked to each species in the EFH mapper and use them to determine if the described habitat is present at your project site. If the habitat characteristics described in the text descriptions do not exist at your site, you may be able to exclude some species or life stages from additional consideration. For example, the water depths at your site are shallower that those described in the text description for a particular species or life stage. We recommend this for larger projects to help you determine what your impacts are.

Species Present	EFH is designated/mapped for:				What is the source of the EFH information included?
	EFH: eggs	EFH: larvae	EFH: juvenile	EFH: adults/ spawning adults	
little skate	☐	☐	☑	☑	EFH Mapper o
Atlantic herring	☐	☐	☑	☑	EFH Mapper o
red hake	☐	☐	☐	☑	EFH Mapper o
monkfish	☑	☑	☐	☐	EFH Mapper o
windowpane flounder	☑	☑	☑	☑	EFH Mapper o
winter skate	☐	☐	☑	☑	EFH Mapper o
witch flounder	☐	☐	☐	☑	EFH Mapper o
clearnose skate	☐	☐	☑	☑	EFH Mapper o
smoothhound shark (Atlantic stock)	☑	☑	☑	☑	EFH Mapper o
long-finned squid	☑	☐	☐	☐	EFH Mapper o
bluefish	☐	☐	☑	☑	EFH Mapper o
Atlantic Butterfish	X	X	X	X	EFH Mapper only
Spiny dogfish			sub-adult female		EFH Mapper only
Scup			X	X	EFH Mapper only
Summer flounder		X	X	X	EFH Mapper only
Black sea bass			X	X	EFH Mapper only

6. Habitat Areas of Particular Concern (HAPCs)

HAPCs are subsets of EFH that are important for long-term productivity of federally managed species. HAPCs merit special consideration based their ecological function (current or historic), sensitivity to human-induced degradation, stresses from development, and/or rarity of the habitat.While many HAPC designations have geographic boundaries, there are also habitat specific HAPC designations for certain species, see note below. Use the EFH mapper to identify HAPCs within your project area. Select all that apply.

☐	Summer flounder: SAV[7]	☐	Alvin & Atlantis Canyons
☐	Sandbar shark	☐	Baltimore Canyon
☐	Sand Tiger Shark (Delaware Bay)	☐	Bear Seamount
☐	Sand Tiger Shark (Plymouth-Duxbury-Kingston Bay)	☐	Heezen Canyon
☐	Inshore 20m Juvenile Cod[8]	☐	Hudson Canyon
☐	Great South Channel Juvenile Cod	☐	Hydrographer Canyon
☐	Northern Edge Juvenile Cod	☐	Jeffreys & Stellwagen
☐	Lydonia Canyon	☐	Lydonia, Gilbert & Oceanographer Canyons
☐	Norfolk Canyon (Mid-Atlantic)	☐	Norfolk Canyon (New England)
☐	Oceanographer Canyon	☐	Retriever Seamount
☐	Veatch Canyon (Mid-Atlantic)	☐	Toms, Middle Toms & Hendrickson Canyons
☐	Veatch Canyon (New England)	☐	Washington Canyon
☐	Cashes Ledge	☐	Wilmington Canyon
☐	Atlantic Salmon		

[7] Summer flounder HAPC is defined as all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH. In locations where native species have been eliminated from an area, then exotic species are included. Use local information to determine the locations of HAPC.

[8] The purpose of this HAPC is to recognize the importance of inshore areas to juvenile Atlantic cod. The coastal areas of the Gulf of Maine and Southern New England contain structurally complex rocky-bottom habitat that supports a wide variety of emergent epifauna and benthic invertebrates. Although this habitat type is not rare in the coastal Gulf of Maine, it provides two key ecological functions for juvenile cod: protection from predation, and readily available prey. See EFH mapper for links to text descriptions for HAPCs.

7. Activity Details

Select all that apply	Project Type/Category
☐	Agriculture
☐	Aquaculture - List species here:
☐	Bank/shoreline stabilization (e.g., living shoreline, groin, breakwater, bulkhead)
☐	Beach renourishment
☑	Dredging/excavation
☐	Energy development/use e.g., hydropower, oil and gas, pipeline, transmission line, tidal or wave power, wind
☐	Fill
☐	Forestry
☐	Infrastructure/transportation (e.g., culvert construction, bridge repair, highway, port, railroad)
☐	Intake/outfall
☐	Military (e.g., acoustic testing, training exercises)
☐	Mining (e.g., sand, gravel)
☐	Overboard dredged material placement
☐	Piers, ramps, floats, and other structures
☐	Restoration or fish/wildlife enhancement (e.g., fish passage, wetlands, mitigation bank/ILF creation)
☐	Survey (e.g., geotechnical, geophysical, habitat, fisheries)
☐	Water quality (e.g., storm water drainage, NPDES, TMDL, wastewater, sediment remediation)
☐	Other:

8. Effects Evaluation

Select all that apply	Potential Stressors Caused by the Activity
☑	Underwater noise
☑	Water quality/turbidity/ contaminant release
☐	Vessel traffic/barge grounding
☐	Impingement/entrainment
☐	Prevent fish passage/spawning
☑	Benthic community disturbance
☐	Impacts to prey species

Select all that apply and if temporary[9] or permanent		Habitat alterations caused by the activity
Temp	Perm	
☐	☑	Water depth change
☐	☐	Tidal flow change
☐	☐	Fill
☐	☐	Habitat type conversion
☐	☐	Other:
☐	☐	Other:

[9] Temporary in this instance means during construction. [10] Entrainment is the voluntary or involuntary movement of aquatic organisms from a water body into a surface diversion or through, under, or around screens and results in the loss of the organisms from the population. Impingement is the involuntary contact and entrapment of aquatic organisms on the surface of intake screens caused when the approach velocity exceeds the swimming capability of the organism.

Details - project impacts and mitigation

Briefly describe how the project would impact each of the habitat types selected above and the amount (i.e., acreage or sf) of each habitat impacted. Include temporary and permanent impact descriptions and direct and indirect impacts. For example, dredging has a direct impact on bottom sediments and associated benthic communities. The turbidity generated can result in a temporary impact to water quality which may have an indirect effect on some species and habitats such as winter flounder eggs, SAV or rocky habitats. The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. Attach supplemental information if necessary.

The Project area contains Essential Fish Habitat (EFH) for both highly migratory and New England/Mid-Atlantic species that may be adversely affected during dredging, though the expected construction window in the winter accommodates many dredging restrictions, such as that of summer flounder, and limits impacts to when aquatic species are not as active as in other seasons. Juveniles and adults are expected to vacate the area once construction starts; however, nearby ponds outside of the placement area will remain and can serve as EFH. The disturbance of bottom sediments associated with dredging could interfere with feeding, predation, and avoidance patterns. However, adverse impacts are expected to be temporary and highly localized. Some eggs and larvae may be entrained during dredging operations; however, this would be temporary and localized to the area being dredged.

What specific measures will be used to avoid and minimize impacts, including project design, turbidity controls, acoustic controls, and time of year restrictions? If impacts cannot be avoided or minimized, why not?

To control turbidity, silt screens and other biodegradable controls will be placed in and along areas where dredging is to occur and will be monitored frequently, per State of Delaware requirements. Dredging during the winter months will also limit disruption to migrating fish and aquatic species that would otherwise be impacted by turbidity impacts. In addition, close construction administration will also be implemented to ensure no negative impacts to adjacent water quality (e.g., daily site inspections by the construction manager).

Is compensatory mitigation proposed? Yes ☐ No ☑

If compensatory mitigation is not proposed, why not? If yes, describe plans for compensatory mitigation (e.g. permittee responsible, mitigation bank, in-lieu fee) and how this will offset impacts to EFH and other aquatic resources. Include a proposed compensatory mitigation and monitoring plan as applicable.

9. Effects of Climate Change

Effects of climate change should be included in the EFH assessment if the effects of climate change may amplify or exacerbate the adverse effects of the proposed action on EFH. Use the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathways (RCP) 8.5/high greenhouse gas emission scenario (IPCC 2014), at a minimum, to evaluate the future effects of climate change on the proposed projections. For sea level rise effects, use the intermediate-high and extreme scenario projections as defined in Sweet et al. (2017). For more information on climate change effects to species and habitats relative to NMFS trust resources, see Guidance for Integrating Climate Change Information in Greater Atlantic Region Habitat Conservation Division Consultation Processes.

1. Could species or habitats be adversely affected by the proposed action due to projected changes in the climate?If yes, please describe how:

No

2. Is the expected lifespan of the action greater than 10 years? If yes, please describe project lifespan:

Unknown; dredging needs will be evaluated on a bi-yearly basis

3. Is climate change currently affecting vulnerable species or habitats, and would the effects of a proposed action be amplified by climate change? If yes, please describe how:

No

4. Do the results of the assessment indicate the effects of the action on habitats and species will be amplified by climate change? If yes, please describe how:

No

5. Can adaptive management strategies (AMS) be integrated into the action to avoid or minimize adverse effects of the proposed action as a result of climate? If yes, please describe how:

No

10. Federal Agency Determination

Federal Action Agency's EFH determination (select one)	
☐	There is no adverse effect[7] on EFH or EFH is not designated at the project site. EFH Consultation is not required. This is a FWCA only request.
☐	The adverse effect[7] on EFH is not substantial. This means that the adverse effects are no more than minimal, temporary, or can be alleviated with minor project modifications or conservation recommendations. This is a request for an abbreviated EFH consultation.
☐	The adverse effect[7] on EFH is substantial. This is a request for an expanded EFH consultation. We will provide more detailed information, including an alternatives analysis and NEPA documents, if applicable.

[7] An adverse effect is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

11. Fish and Wildlife Coordination Act

Under the FWCA, federal agencies are required to consult with us if actions that the authorize, fund, or undertake will result in modifications to a natural stream or body of water. Federal agencies are required to consider the effects these modifications may have on fish and wildlife resources, as well as provide for the improvement of those resources. Under this authority, we consider the effects of actions on NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats, that are not managed under a federal fisheries management plan. Some examples of other NOAA-trust resources are listed below. Some of these species, including diadromous fishes, serve as prey for a number of federally-managed species and are therefore considered a component of EFH pursuant to the MSA. We will be considering the effects of your project on these species and their habitats as part of the EFH/FWCA consultation process and may make recommendations to avoid, minimize or offset and adverse effects concurrently with our EFH conservation recommendations.

Please contact our Greater Atlantic Regional Fisheries Office, Protected Resources Division regarding potential impacts to marine mammals or species listed under the Endangered Species Act and the appropriate consultation procedures.

Fish and Wildlife Coordination Act Resources	
Species known to occur at site (list others that may apply)	**Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.**
alewife	Eggs may be present in the sediment. All fish windows would be adhered to. No permanent impacts.
American eel	
American shad	Eggs may be present in the sediment. All fish windows would be adhered to. No permanent impacts.
Atlantic menhaden	Eggs may be present in the sediment. All fish windows would be adhered to. No permanent impacts.
blue crab	Eggs may be present in the sediment. All fish windows would be adhered to. No permanent impacts.
blue mussel	
blueback herring	Eggs may be present in the sediment. All fish windows would be adhered to. No permanent impacts.
Eastern oyster	
horseshoe crab	
quahog	
soft-shell clams	
striped bass	
other species:	
other species:	
other species:	

12. Useful Links

National Wetland Inventory Maps
EPA's National Estuary Program (NEP)
Northeast Regional Ocean Council (NROC) Data Portal
Mid-Atlantic Regional Council on the Ocean (MARCO) Data Portal

Resources by State

Maine
Maine Office of GIS Data Catalog
Town shellfish information including shellfish conservation area maps
State of Maine Shellfish Sanitation and Management
Eelgrass maps
Casco Bay Estuary Partnership
Maine GIS Stream Habitat Viewer

New Hampshire
NH Statewide GIS Clearinghouse, NH GRANIT
NH Coastal Viewer
State of NH Shellfish Program

Massachusetts
MA DMF Shellfish Sanitation and Management Program
MassGIS Data (Including Eelgrass Maps)
MA DMF Recommended TOY Restrictions Document Massachusetts
Bays National Estuary Program
Buzzards Bay National Estuary Program
Massachusetts Division of Marine Fisheries
Massachusetts Office of Coastal Zone Management

Rhode Island
RI Shellfish and Aquaculture
RI Shellfish Management Plan
RI Eelgrass Maps
Narragansett Bay Estuary Program
Rhode Island Division of Marine Fisheries
Rhode Island Coastal Resources Management Council

Connecticut

CT Bureau of Aquaculture

Natural Shellfish Beds in CT

Eelgrass Maps

Long Island Sound Study

CT GIS Resources

CT DEEP Office of Long Island Sound Programs and Fisheries

CT River Watershed Council

New York

Eelgrass Report

Peconic Estuary Program

NY/NJ Harbor Estuary Program

New York GIS Clearinghouse

New Jersey

Submerged Aquatic Vegetation Mapping

Barnegat Bay Partnership

NJ GeoWeb

NJ DEP Shellfish Maps

Pennsylvania

Delaware River Management Plan

PA DEP Coastal Resources Management Program

PA DEP GIS Mapping Tools

Delaware

Partnership for the Delaware Estuary

Center for Delaware Inland Bays

Delaware FirstMap

Maryland

Submerged Aquatic Vegetation Mapping

MERLIN (Maryland's Environmental Resources and Land Information Network)

Maryland Coastal Atlas

Maryland Coastal Bays Program

Virginia

VMRC Habitat Management Division

Submerged Aquatic Vegetation mapping

EFH Mapper Report

EFH Data Notice

Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional fishery management councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

Greater Atlantic Regional Office
Atlantic Highly Migratory Species Management Division

Query Results

Degrees, Minutes, Seconds: Latitude = 38º 27' 26" N, Longitude = 76º 56' 28" W
Decimal Degrees: Latitude = 38.457, Longitude = -75.059

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

***** W A R N I N G *****

Please note under "Life Stage(s) Found at Location" the category "ALL" indicates that all life stages of that species share the same map and are designated at the queried location.

EFH

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Little Skate	Juvenile Adult	New England	Amendment 2 to the Northeast Skate Complex FMP
		Atlantic Herring	Juvenile Adult	New England	Amendment 3 to the Atlantic Herring FMP
		Red Hake	Adult	New England	Amendment 14 to the Northeast Multispecies FMP
		Monkfish	Eggs/Larvae	New England	Amendment 4 to the Monkfish FMP
		Windowpane Flounder	Adult Larvae Eggs Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
		Winter Skate	Adult Juvenile	New England	Amendment 2 to the Northeast Skate Complex

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
					FMP
		Witch Flounder	Adult	New England	Amendment 14 to the Northeast Multispecies FMP
		Clearnose Skate	Adult Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP
		Smoothhound Shark Complex (Atlantic Stock)	ALL	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Longfin Inshore Squid	Eggs	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11
		Bluefish	Adult Juvenile	Mid-Atlantic	Bluefish
		Atlantic Butterfish	Eggs Larvae Adult Juvenile	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11
		Spiny Dogfish	Sub-Adult Female	Mid-Atlantic	Amendment 3 to the Spiny Dogfish FMP
		Scup	Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Summer Flounder	Larvae Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
		Black Sea Bass	Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass

Salmon EFH

No Pacific Salmon Essential Fish Habitat (EFH) were identified at the report location.

HAPCs

Link	Data Caveats	HAPC Name	Management Council
		Summer Flounder	Mid-Atlantic

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

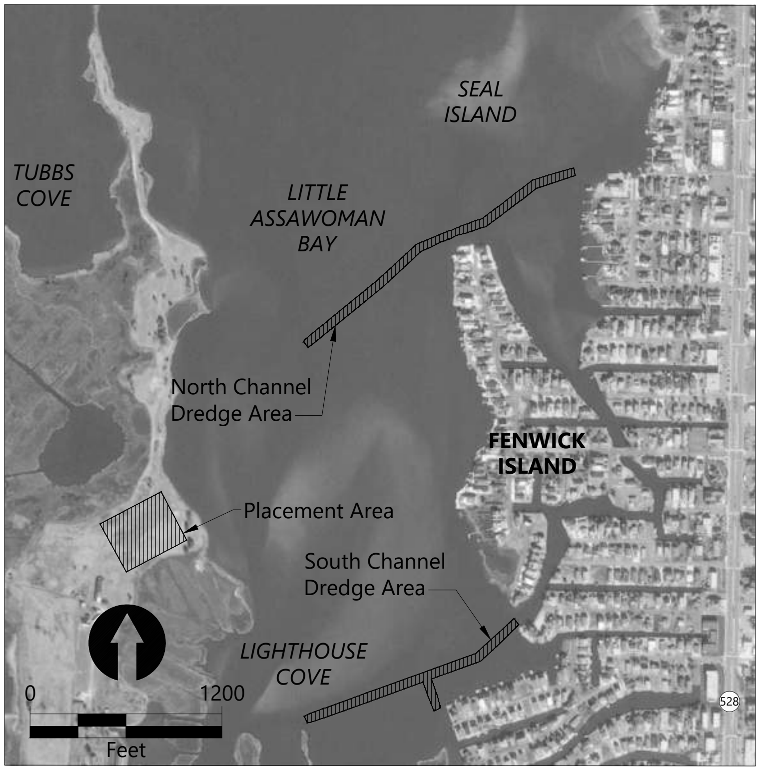
Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data. ****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**
All spatial data is currently available for the Mid-Atlantic and New England councils, **Secretarial EFH,** Bigeye Sand Tiger Shark, Bigeye Sixgill Shark,

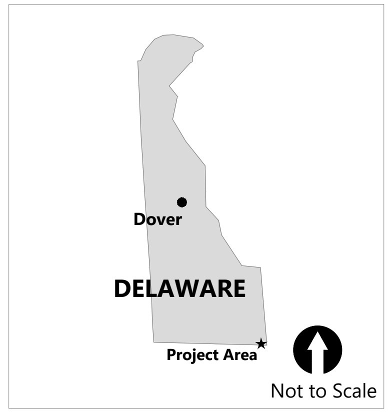
Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data. ****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**
Caribbean Sharpnose Shark, Galapagos Shark, Narrowtooth Shark, Sevengill Shark, Sixgill Shark, Smooth Hammerhead Shark, Smalltail Shark

Permit Drawings

Little Assawoman Bay Dredging Project

TOWN OF FENWICK ISLAND





SHEET LIST	
Figure	Sheet Description
Figure 1	Cover Sheet
Figure 2	General Notes and Legend
Figure 3	Existing Conditions
Figure 4	Dredging Plan - North Channel
Figure 5	Dredging Plan - South Channel
Figure 6	Dredge Cross Sections
Figure 7	Dredge Cross Sections
Figure 8	Dredge Cross Sections
Figure 9	Placement Plan
Figure 10	Placement Cross Sections
Figure 11	Erosion and Sediment Control Plan
Figure 12	Erosion and Sediment Control Details 1 of 2
Figure 13	Erosion and Sediment Control Details 2 of 2

GENERAL NOTES

1. This project includes hydraulic dredging of sediments in Little Assawoman Bay, Fenwick island, Delaware, and associated upland access for construction equipment access and dredged material dewatering.
2. If specifications contradict these drawings, specifications shall govern.
3. Locations displayed for existing conditions such as shorelines, structures, underground utilities, identified trees, and utilities are approximate. contractor shall field verify location of site structures, location of identified trees, shoreline, and other site features prior to construction.
4. The owner's representative shall be notified in writing of any conditions that vary from those shown on the drawings. the contractor's work shall not vary from the drawings without the expressed approval of owner's representative.
5. Details shown are typical; similar details apply to similar conditions unless otherwise noted.
6. These drawings do not include necessary components for construction safety. the contractor is responsible for the safety of site personnel and shall abide by the requirements of the technical specifications and the contractor's health and safety plan (HASP), as appropriate, as well as applicable Occupational Safety and Health Administration (OSHA) regulations.
7. The contractor is responsible for obtaining all utility markouts and forwarding confirmation of notification to the owner's representative. the contractor shall be responsible to obtain any and all necessary permits from the affected utility companies and for scheduling of inspections by utility company personnel, if required, during construction.
8. The contractor shall adequately protect all existing structures and utilities. any damage to existing structures, shorelines, or utilities shall be the sole responsibility of the contractor.
9. Overhead lines are present at the site and they are not shown in their entirety on these drawings. contractor shall field verify and locate all overhead lines present along the work areas.
10. The contractor shall comply with all required permits and other applicable regulatory requirements.
11. The contractor shall be responsible for temporary erosion and sediment control measures during the construction period, as required by the permits, local ordinances, plans, and specifications.
12. The contractor is advised that all local public nuisance laws and noise ordinances shall be observed during the course of construction.
13. The contractor shall furnish, install, and maintain appropriate signage for traffic control and pedestrian safety during construction. maintain open access for all public roadways during performance of the work.
14. The contractor shall maintain a neat and orderly site, yard, and grounds. remove and dispose off site all rubbish, waste materials, litter, and all foreign substances. promptly notify appropriate authorities and owner's representative, and remove petro-chemical spills, stains, and other foreign deposits in accordance with local, state, and federal regulations.

ESTIMATE OF QUANTITIES

PROJECT AREA	REQUIRED DREDGE VOLUME (CY)	ALLOWABLE OVERDREDGE VOLUME (CY)	TOTAL VOLUME (CY)
NORTH CHANNEL	5,597	3,968	9,565
SOUTH CHANNEL	5,483	3,411	8,894
TOTAL	11,080	7,379	18,459

SEQUENCE OF CONSTRUCTION:

Specific activities conducted by the contractor to complete the work include, but are not limited to:

1. Conduct field investigations or evaluations to confirm site conditions.
2. Prepare and submit final work plans and all other pre-construction submittals.
3. Attend a pre-construction meeting with the owner's representative.
4. Mobilize crews, facilities, equipment, and materials required to complete the work.
5. Install and maintain environmental controls.
6. Establish dredged material dewatering area in accordance with these project drawings.
7. Dredge north and south channels to the limits specified on drawings. this work includes, but is not limited to:
   A. Dredge sediments in the sequence identified in the technical specifications
   B. Transport sediments via pipeline to the dredged material dewatering area
   C. Manage and dewater sediments as stated in the specifications.
8. Place aids to navigation buoys within Little Assawoman Bay as shown on these drawings.
9. Restore the upland site, where applicable, to pre-construction conditions in accordance with the technical specifications.

SURVEY NOTES:

1. Horizontal Datum: Delaware State Plane , North American Datum of 1983 (NAD83), U.S. Survey Feet
2. Vertical Datum: Mean Low Water. 0' MLW = -0.87 NAVD88

EXISTING LEGEND:

- -2 Existing Grade
- Parcel
- Limited Wave Action Line
- Flood Zone
- Wetland Waters of United States
- Tidal Wetlands
- Riprap
- Marker

PROPOSED LEGEND:

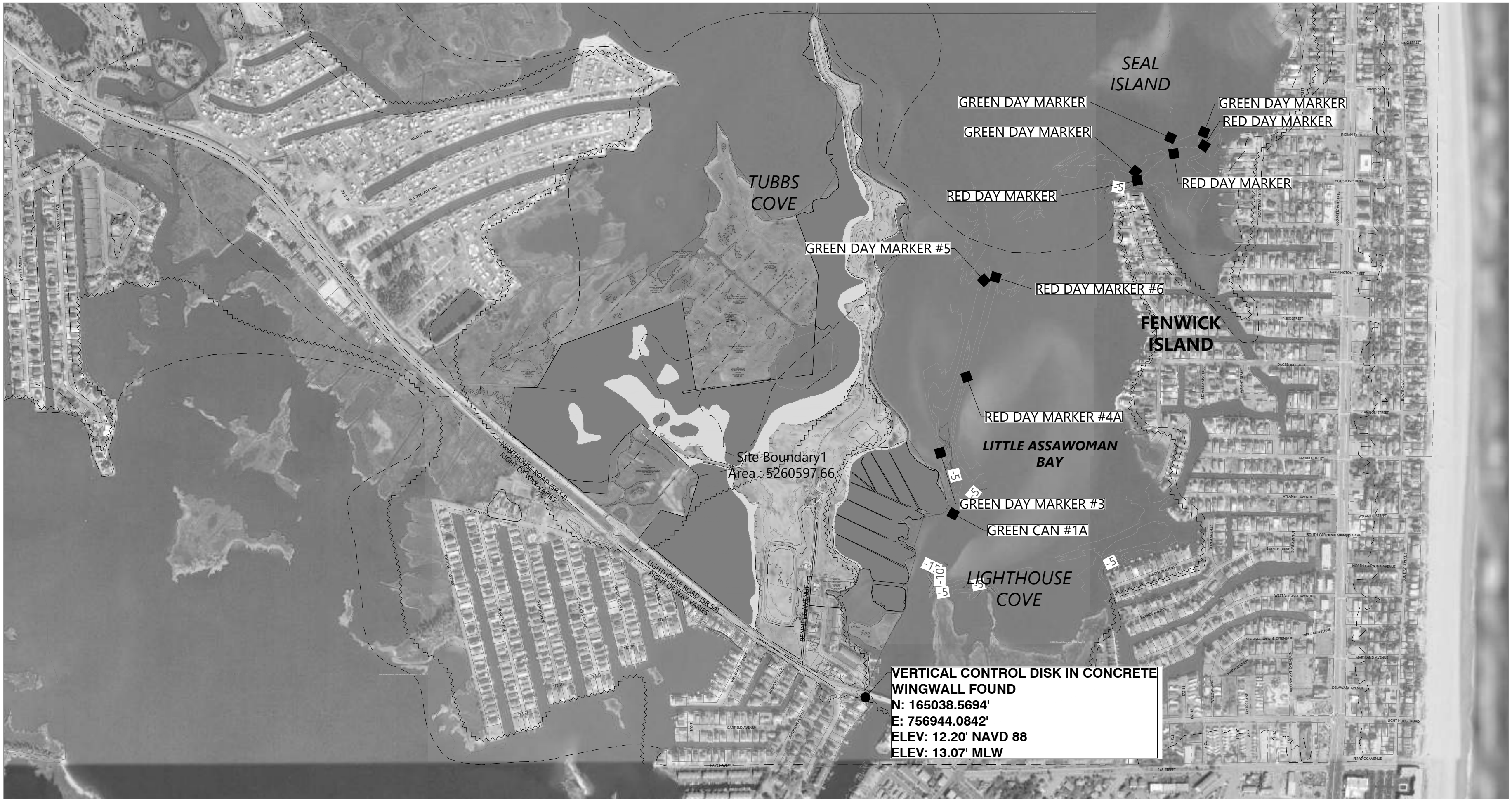
- -3 Existing Grade
- Placement area
- Limits of Disturbance
- Silt Fence
- Stabilized Construction Entrance
- Limit of Required Dredging (Elevation -4.0' MLW)
- Approximate Daylight Extents

Publish Date: 2021/06/10 4:57 PM | User: bhurry
Filepath: K:\Projects\2069-Fenwick\Fenwick\Permit\2069-PL-001-COVER SHEET AND GENERAL NOTES.dwg Figure 2

ANCHOR QEA

Figure 2
General Notes and Legend

Permit Set
Little Assawoman Bay Dredging Project



SOURCE: Bathymetric Survey from Cannon. Upland Survey and Line Work Provided by GMB. Aerial Imagery from Bing Maps.

HORIZONTAL DATUM: Delaware State Plane , NAD83, U.S. Survey Feet.

VERTICAL DATUM: Mean Low Water (MLW).

EXISTING LEGEND:

- -2 Existing Grade
- Parcel
- Limited Wave Action Line
- Flood Zone

0 1200
Feet

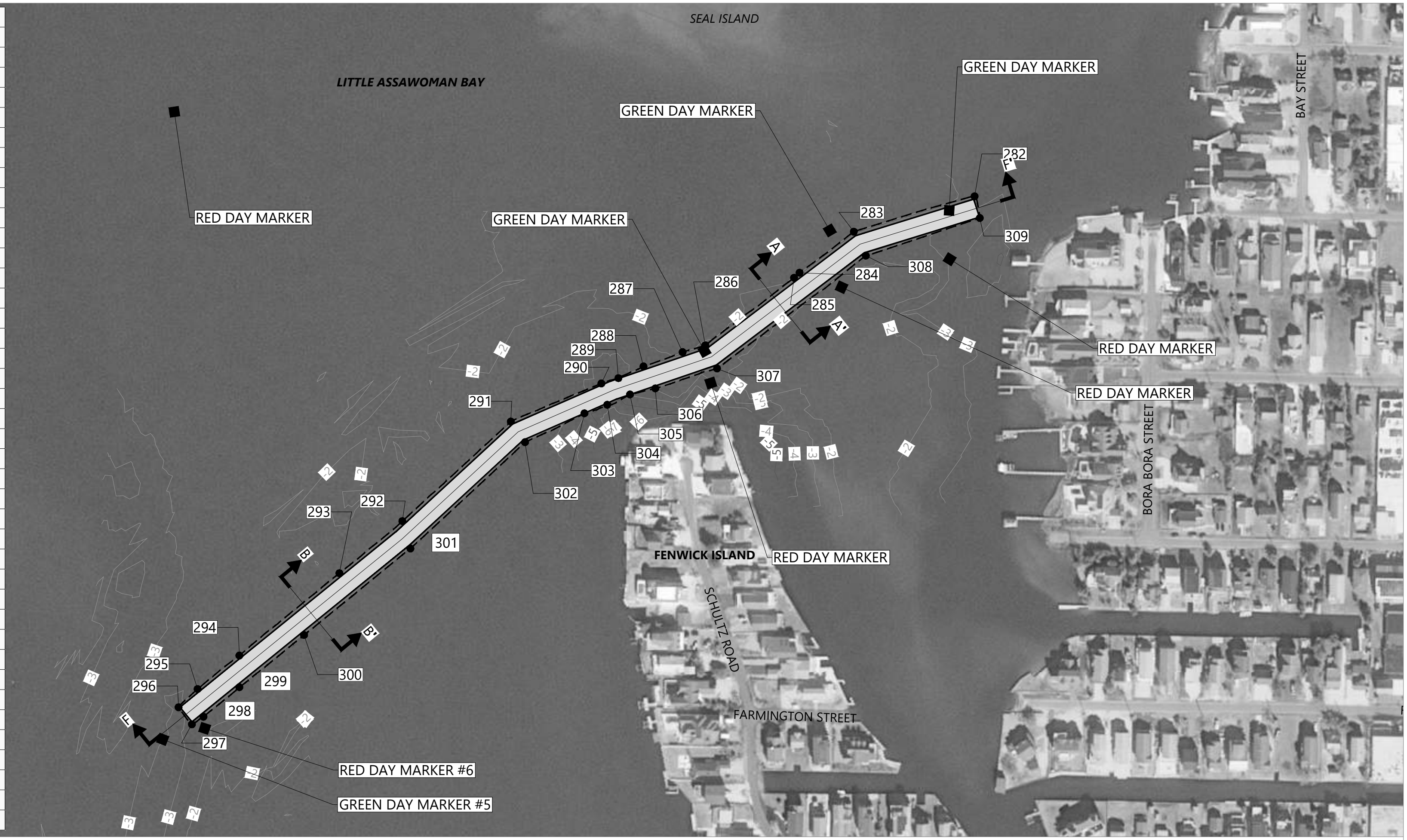
Publish Date: 2021/06/10 4:57 PM | User: bhurry
Filepath: K:\Projects\2069-Fenwick\Fenwick\Permit\2069-PL-002-EXISTING CONDITIONS.dwg Figure 3

ANCHOR QEA

Figure 3
Existing Conditions

Permit Set
Little Assawoman Bay Dredging Project

CONTROL POINTS		
POINT #	NORTHING	EASTING
282	169346.89	759562.81
283	169271.92	759306.83
284	169184.88	759191.63
285	169174.18	759180.22
286	169031.10	758992.10
287	169016.57	758943.78
288	168986.30	758861.03
289	168961.42	758807.81
290	168950.17	758771.71
291	168869.48	758579.85
292	168658.43	758349.93
293	168547.88	758216.50
294	168373.31	758004.50
295	168302.34	757915.88
296	168263.65	757875.60
297	168227.60	757903.87
298	168243.70	757928.46
299	168306.33	758004.58
300	168416.97	758141.50
301	168600.20	758367.02
302	168825.59	758609.85
303	168886.87	758735.83
304	168905.03	758784.20
305	168926.78	758832.42
306	168939.69	758886.04
307	168981.89	759016.92
308	169221.09	759332.24
309	169300.97	759573.73
310	166529.21	759190.72
311	166312.78	758953.11
312	166195.91	758631.05
313	165923.42	757884.42
314	165878.83	757899.78
315	166133.16	758622.71
316	165954.89	758692.05
317	165973.40	758731.82
318	166152.28	758675.35
319	166263.66	758982.10
320	166491.45	759220.39



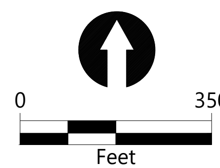
SOURCE: Survey from Cannon. Aerial Imagery from Bing Maps.

HORIZONTAL DATUM: Delaware State Plane , NAD83, U.S. Survey Feet.

VERTICAL DATUM: Mean Low Water (MLW).

LEGEND:

- -3 Existing Grade
- Limit of Required Dredging (Elevation -4.0' MLW)
- Approximate Daylight Extents



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Filepath: K:\Projects\2069-Fenwick\Fenwick\Permit\2069-PL-003-PROPOSED DESIGN.dwg Figure 4

ANCHOR QEA

Figure 4
Dredging Plan - North Channel

Permit Set
Little Assawoman Bay Dredging Project

CONTROL POINTS		
POINT #	NORTHING	EASTING
310	166529.21	759190.72
311	166312.78	758953.11
312	166195.91	758631.05
313	165923.42	757884.42
314	165878.83	757899.78
315	166133.16	758622.71
316	165954.89	758692.05
317	165973.40	758731.82
318	166152.28	758675.35
319	166263.66	758982.10
320	166491.45	759220.39

SOURCE: Survey from Cannon. Aerial Imagery from Bing Maps.

HORIZONTAL DATUM: Delaware State Plane , NAD83, U.S. Survey Feet.

VERTICAL DATUM: Mean Low Water (MLW).

LEGEND:

- Existing Grade
- Limit of Required Dredging (Elevation -4.0' MLW)
- Approximate Daylight Extents

0 350 Feet

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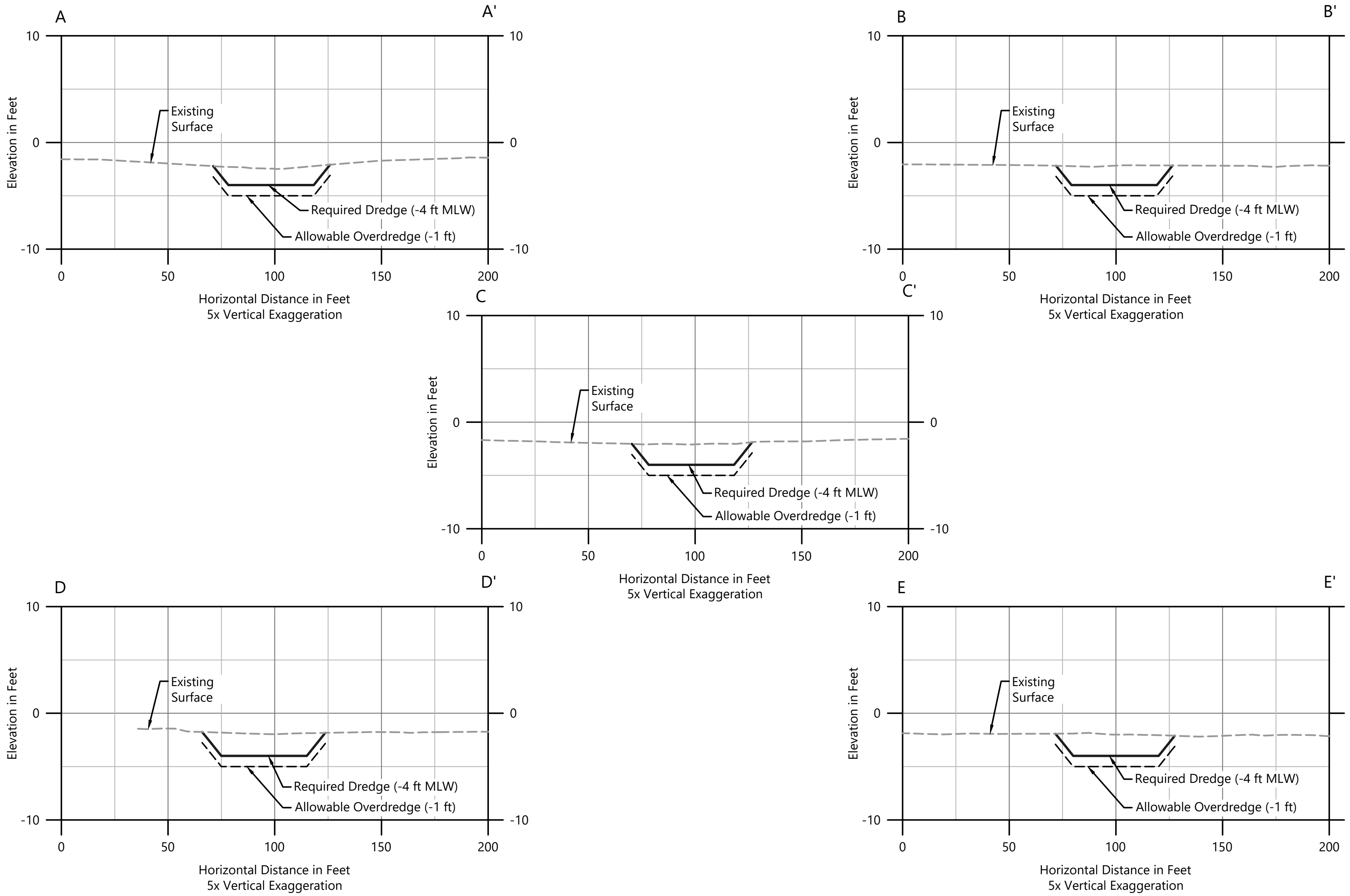
Filepath: K:\Projects\2069-Fenwick\Fenwick\Permit\2069-PL-003-PROPOSED DESIGN.dwg Figure 5

ANCHOR QEA

Figure 5
Dredging Plan - South Channel

Permit Set
Little Assawoman Bay Dredging Project



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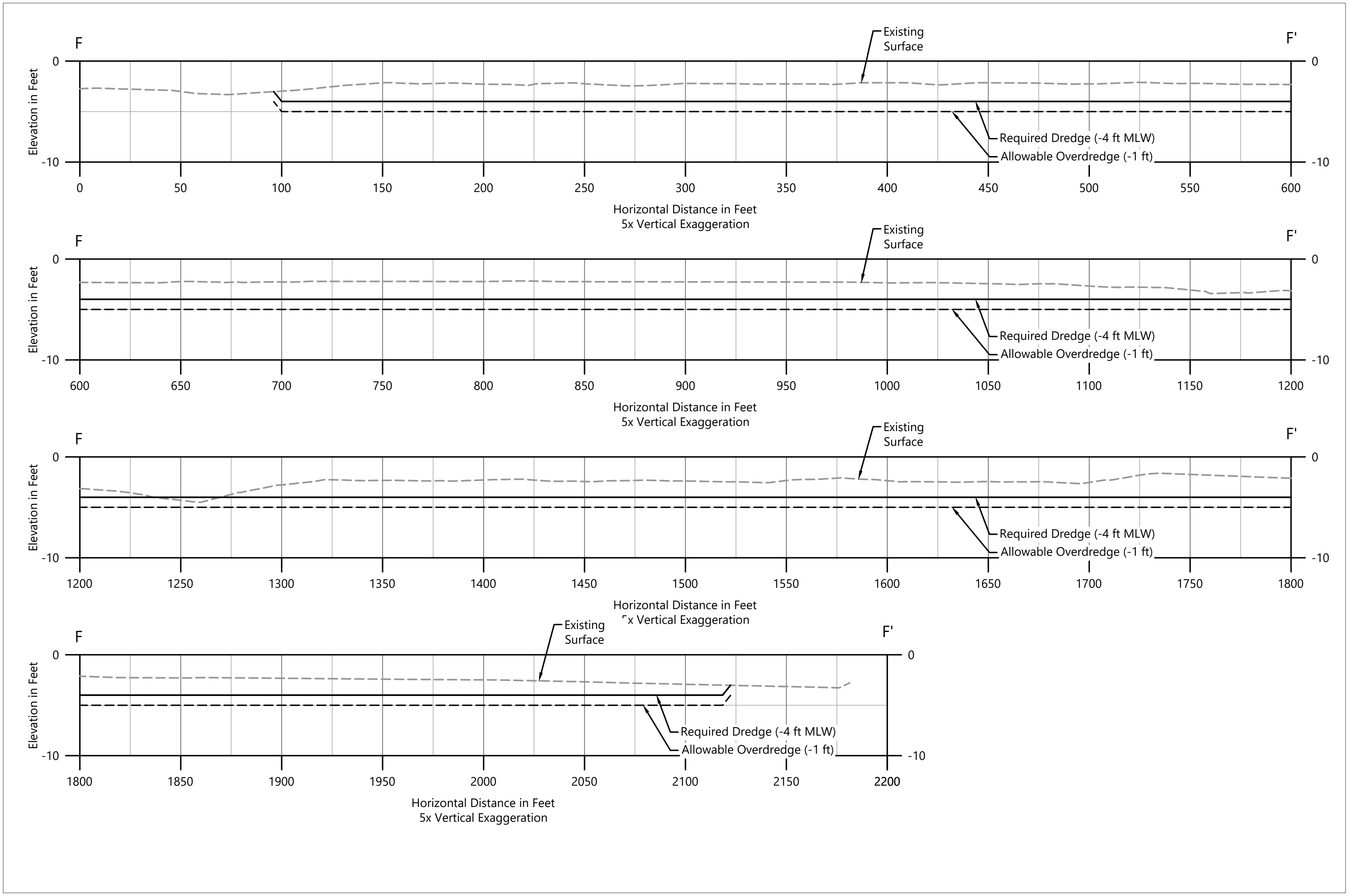
Filepath: K:\Projects\2069-Fenwick\Fenwick\Permit\2069-PL-003-PROPOSED DESIGN.dwg Figure 6

ANCHOR QEA

Figure 6
Dredge Cross Sections

Permit Set
Little Assawoman Bay Dredging Project



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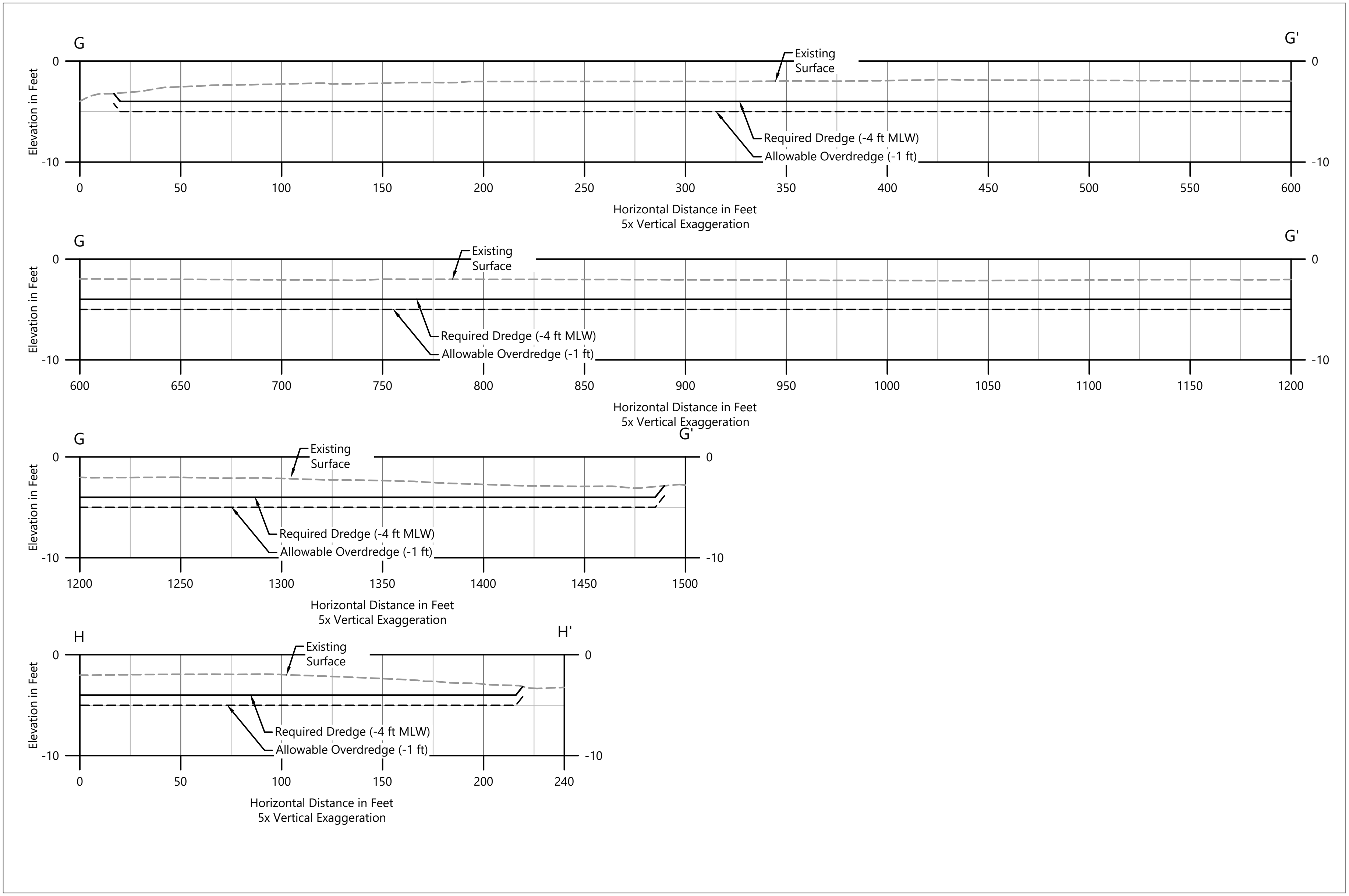
Filepath: K:\Projects\2069-Fenwick\Fenwick\Permit\2069-PL-003-PROPOSED DESIGN.dwg Figure 7

ANCHOR QEA

Figure 7
Dredge Cross Sections

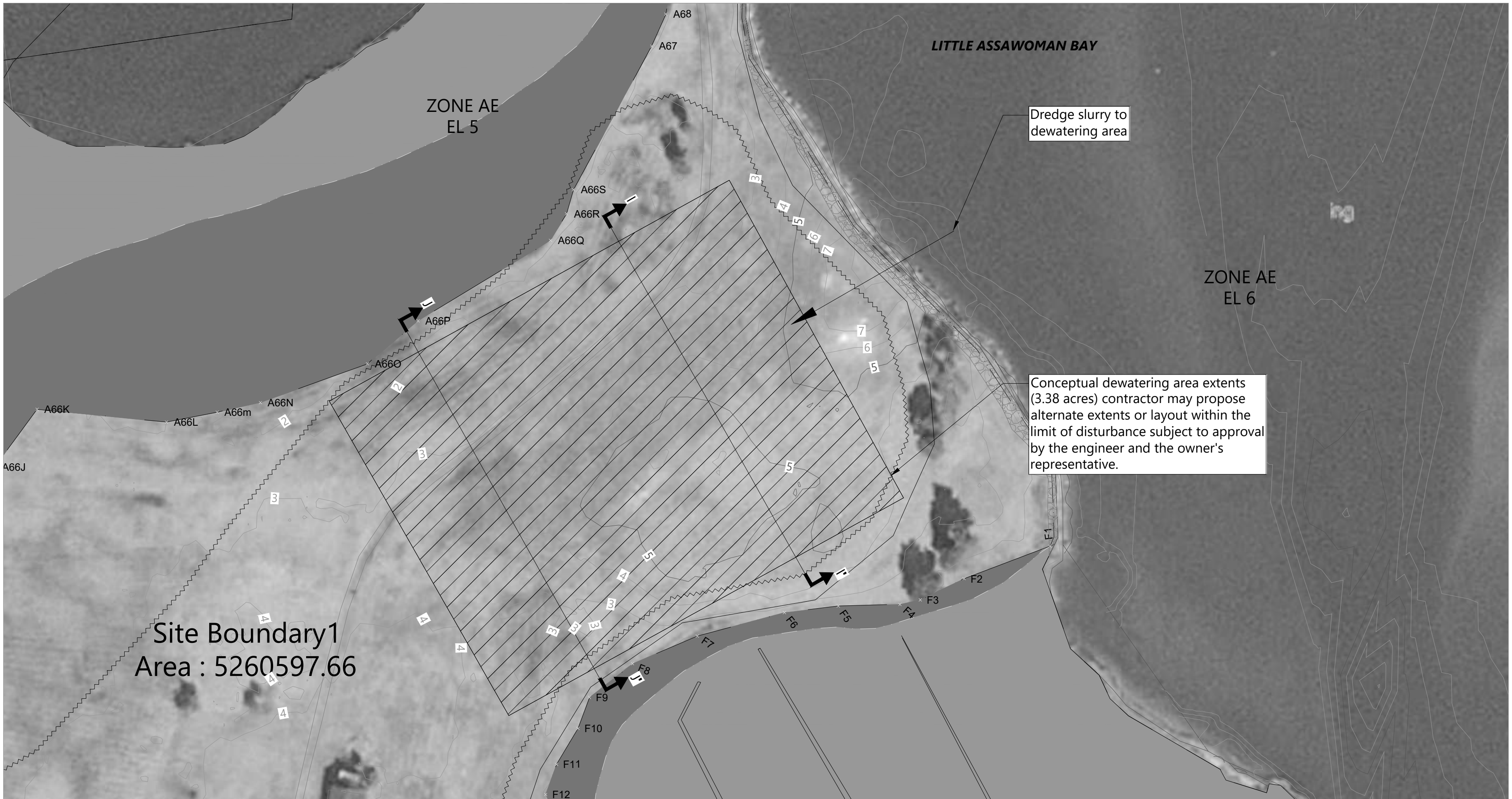
Permit Set
Little Assawoman Bay Dredging Project



ANCHOR QEA

Figure 8
Dredge Cross Sections

Permit Set
Little Assawoman Bay Dredging Project



SOURCE: Survey from Cannon. Aerial Imagery from Bing Maps.

HORIZONTAL DATUM: Delaware State Plane , NAD83, U.S. Survey Feet.

VERTICAL DATUM: Mean Low Water (MLW).

LEGEND:

- Existing Grade
- Placement Area
- Limited Wave Action Line
- Flood Zone

0 150
Feet

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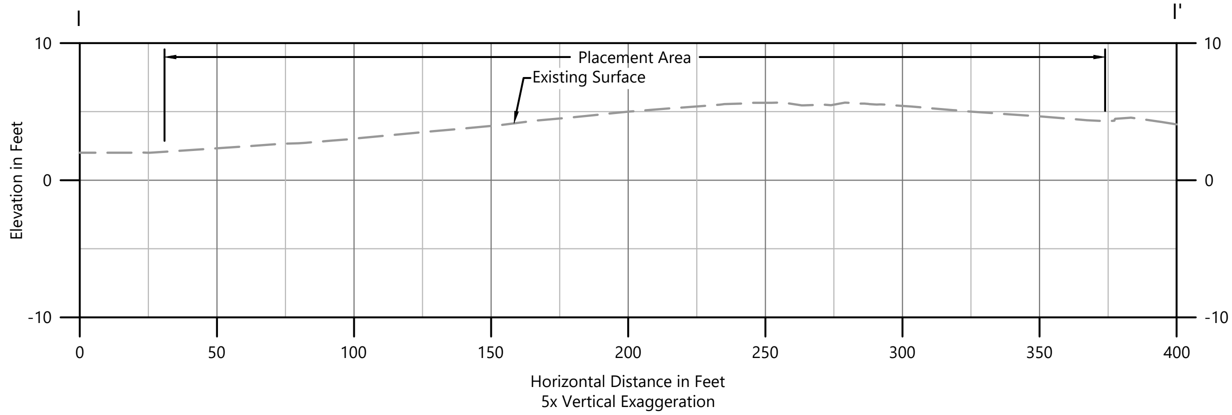
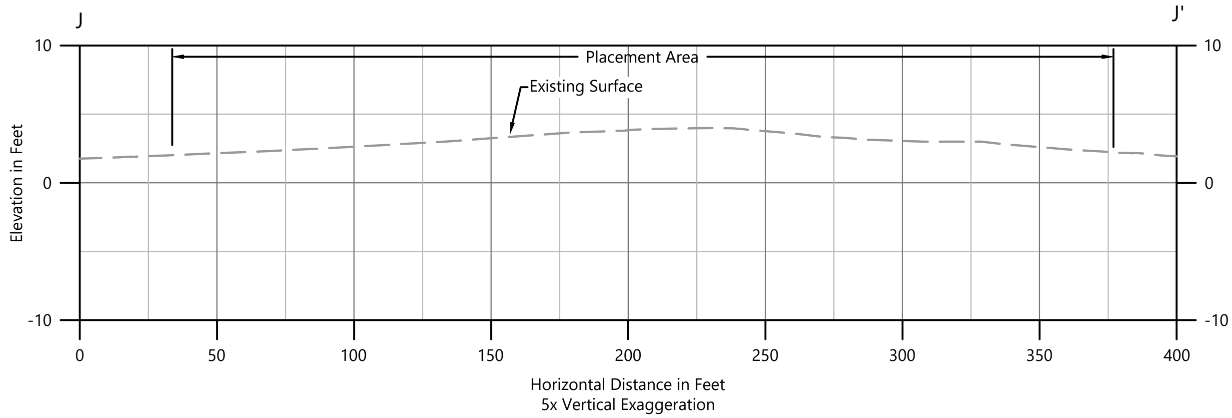
Filepath: K:\Projects\2069-Fenwick\Fenwick\Permit\2069-PL-004-PLACEMENT.dwg Figure 9

ANCHOR QEA

Figure 9
Placement Plan

Permit Set
Little Assawoman Bay Dredging Project





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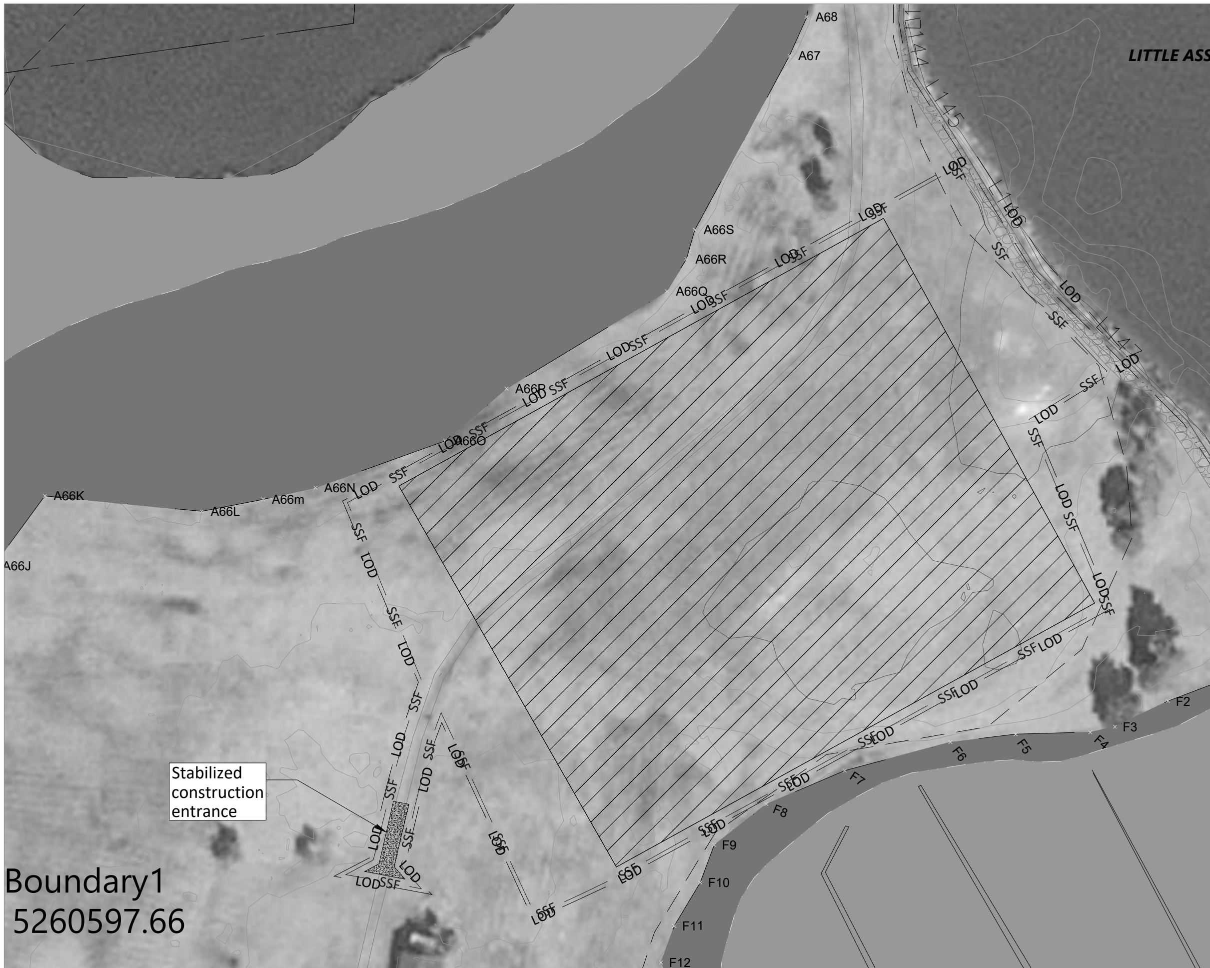
Filepath: K:\Projects\2069-Fenwick\Fenwick\Permit\2069-PL-004-PLACEMENT.dwg Figure 10

ANCHOR QEA

Figure 10
Placement Cross Sections

Permit Set
Little Assawoman Bay Dredging Project



NOTES:

1. Contractor shall establish temporary erosion and sediment controls as necessary to comply with project permits.
2. Methods of perimeter containment for project generated waters must include downgradient super silt fences and temporary earth berms located in accordance with the contractor's work plan. water discharged to surrounding upland areas must be pumped into geotextile dewatering bag or similar secondary control device. see Figures 12 and Figure 13 for temporary erosion and sediment control details.

SOURCE: Survey from Cannon. Aerial Imagery from Bing Maps.

HORIZONTAL DATUM: Delaware State Plane , NAD83, U.S. Survey Feet.

VERTICAL DATUM: Mean Low Water (MLW).

LEGEND:

- Existing Grade
- Placement Area
- Limits of disturbance (LOD)
- Silt fence (SSF)
- Stabilized construction entrance

0 150 Feet

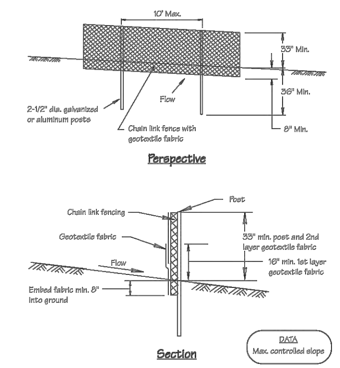
Publish Date: 2021/06/10 5:09 PM | User: bhurry
Filepath: K:\Projects\2069-Fenwick\Fenwick\Permit\2069-PL-005-EROSION AND SEDIMENT CONTROL.dwg Figure 11

ANCHOR QEA

Figure 11
Erosion and Sediment Control Plan

Permit Set
Little Assawoman Bay Dredging Project

Standard Detail & Specifications
Super Silt Fence



Source: Adapted from MD Stds. & Specs. for ESC | Symbol: | Detail No. DE-ESC-3.1.2.3, Sheet 1 of 2, Effective FEB 2019

Standard Detail & Specifications
Super Silt Fence

Construction Notes:

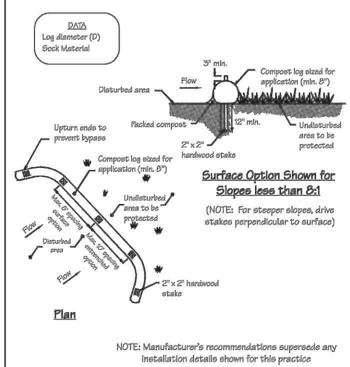
1. The poles do not need to be set in concrete.
2. Chain link fence shall be fastened securely to the fence posts with wire ties or staples.
3. Geotextile fabric shall be fastened securely to the chain link fence with ties spaced every 24" at the top and mid section.
4. Geotextile fabric shall be embedded a minimum of 8" into the ground.
5. When two sections of geotextile fabric adjoin each other, they shall be overlapped by 6" and folded.
6. Maintenance shall be performed as needed and silt buildups removed when "bulges" develop in the silt fence.

Materials:

1. Fencing: Fencing shall be 42 inches in height and constructed in accordance with the latest Delaware Department of Transportation (Del-DOT) Specifications for Chain Link Fencing (Section 727). The Del-DOT specification for a 6 foot fence shall be used, substituting 42 inch fabric and 6 foot length posts.
2. Geosynthetic Fabric: Type GD-I

Source: Adapted from MD Stds. & Specs. for ESC | Symbol: | Detail No. DE-ESC-3.1.2.3, Sheet 2 of 2, Effective FEB 2019

Standard Detail & Specifications
Compost Filter Log



Source: Adapted from MD Stds & Specs for ESC & Filtrexx™ International | Symbol: | Detail No. DE-ESC-3.1.7, Sheet 1 of 2, Effective FEB 2019

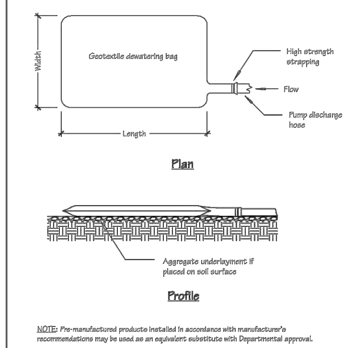
Standard Detail & Specifications
Compost Filter Log

Construction Notes:

1. Prior to installation, clear bedding area of obstructions including rocks or debris larger than 1 inch and fill in any sharp depression areas.
2. If socks are prepared on-site, fill the sock fabric using a pneumatic blower so that the logs are rigid and do not deform. Terminate at the desired length.
3. For trenched applications, excavate 2 to 4 inches below grade along the width and length of the compost filter log.
4. Install the compost filter logs perpendicular to the flow direction and parallel to the slope with the beginning and end of the installation pointing up the slope a minimum of 1 foot elevation difference. On sites where this is not possible, upturn at a minimum length of 10' at a 30 degree angle to prevent runoff bypass.
5. For untrenched applications, blow or hand pack soil, mulch, or compost on the upslope side of the log, filling the bottom void area.
6. Stake the filled log every 10 feet maximum through the center of the sock for trenched applications, or every 8 feet for untrenched. The stake shall be a 2" by 2" hardwood. It should extend 12" below grade and protrude at least 3" above the top of the sock. If located on a slope greater than 8:1, the stake shall be angled downslope at a 45 degree angle to prevent the force of the water from dislodging to log.
7. When the length of the compost filter log needed exceeds the available compost filter sock length, the next sock shall be overlapped a minimum of 12" before being filled, and a stake placed through both socks at the overlap.
8. Remove accumulated sediment when it has reached half of the effective height of the log.
9. Inspect weekly and after rain event. If sock is degrading or the sock is failing, vegetate to secure the compost, replace the log, or reinforce with an additional log. If the log has been crushed due to construction equipment, it can be "fluffed" back to its effective height. If the effective height can no longer be restored, the log shall be replaced or reinforced with an additional compost filter log.

Source: Adapted from MD Stds & Specs for ESC & Filtrexx™ International | Symbol: | Detail No. DE-ESC-3.1.7, Sheet 2 of 2, Effective FEB 2019

Standard Detail & Specifications
Geotextile Dewatering Bag



Source: Adapted from ACF Products, Inc. | Symbol: | Detail No. DE-ESC-3.2.1.2, Sheet 1 of 2, Effective FEB 2019

Standard Detail & Specifications
Geotextile Dewatering Bag

Construction Notes:

1. The dewatering bag should be placed so the incoming water flows into and through the bag, and then flow off the site without creating more erosion. The neck should be tied off tightly to stop the water from flowing out of the bag without going through the walls. The dewatering bag should be placed on a gravel bed to allow water to flow in all directions.
2. The dewatering bag is considered full and should be disposed when it is impractical for the bag to filter the sediment out at a reasonable flow rate. At this point, it should be replaced with a new bag.
3. Disposal may be accomplished as directed by the construction reviewer. If the site allows, the bag may be buried on site and seeded, visible fabric removed and seeded or removed from site to a proper disposal area.

Materials:

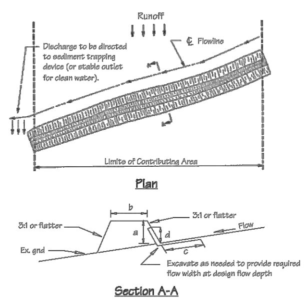
1. The geotextile fabric shall be a Type GD-IV.
2. The dewatering bag shall be sewn with a double needle machine using high strength thread. All structural seams will be sewn with high strength, double stitched "J" type. Seam strength test will have the following minimum average roll values:

Type	TEST METHOD	TEST RESULT
Heavy duty	ASTM D-4884	100 lb / in

3. The dewatering bag shall have an opening large enough to accommodate a four (4) inch discharge hose with attached strap to tie off the hose to prevent the pumped water from escaping from the bag without being filtered.

Source: Adapted from ACF Products, Inc. | Symbol: | Detail No. DE-ESC-3.2.1.2, Sheet 2 of 2, Effective FEB 2019

Standard Detail & Specifications
Temporary Earth Berm



	Type A (5 ac. or less)	Type B (5-10 ac.)
a - BERM HEIGHT	18"	36"
b - BERM TOP WIDTH	24"	36"
c - FLOW WIDTH	4'	6'
d - FLOW DEPTH	8"	15"

Source: Adapted from MD Stds. & Specs. for ESC | Symbol: | Detail No. DE-ESC-3.3.2, Sheet 1 of 2, Effective FEB 2019

Standard Detail & Specifications
Temporary Earth Berm

FLOW CHANNEL STABILIZATION CHART

Stabilization Method	Channel Grade	Type A	Type B
1	0.5-3.0%	Seed with stab. blanket	Seed with stab. blanket
2	3.1-5.0%	Seed with stab. blanket	Seed with stab. blanket; sod; DE #2 stone
3	5.1-8.0%	Seed with stab. blanket; sod; DE #2 stone	Lined R-4 riprap
4	8.1-20%	Lined R-4 riprap	Engineering design

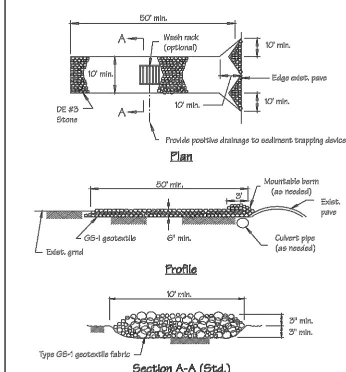
a. Stone to be DE #2 stone in a layer at least 3 inches in thickness and underlain with GS-I geotextile.
b. Riprap to be R-4 in a layer at least 8 inches thickness and underlain with GS-I geotextile.

Construction Notes:

1. All berms shall be compacted by earth-moving equipment.
2. All berms shall have positive drainage to an outlet.
3. Top width may be wider and side slopes may be flatter if desired to facilitate crossing construction traffic.
4. Field location should be adjusted as needed to utilize a stabilized safe outlet.
5. Earth berms shall have an outlet that functions with a minimum of erosion. Runoff shall be conveyed to a sediment trapping device such as a sediment trap or sediment basin where either the berm channel or the drainage area above the berm are not adequately stablized.
6. Stabilization shall be: (a) in accordance with standard specifications for seed and straw mulch or straw mulch if not in seeding season, (b) Flow channel as per the chart above.
7. Inspection and required maintenance shall be provided after each rain event.

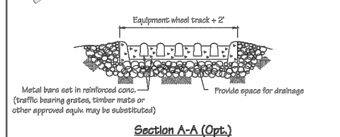
Source: Adapted from MD Stds. & Specs. for ESC | Symbol: | Detail No. DE-ESC-3.3.2, Sheet 2 of 2, Effective FEB 2019

Standard Detail & Specifications
Stabilized Construct. Entrance



Source: Adapted from VA ESC Handbook | Symbol: | Detail No. DE-ESC-3.4.7, Sheet 1 of 2, Effective FEB 2019

Standard Detail & Specifications
Stabilized Construct. Entrance

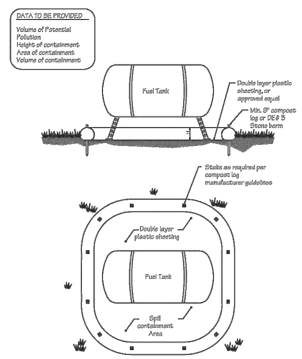


Construction Notes:

1. Stone size - Use DE #3 stone.
2. Length - As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum length would apply).
3. Thickness - Not less than size (6) inches.
4. Width - Ten (10) foot minimum, but not less than the full width at points where ingress or egress occurs.
5. Geotextile - Type GS-I; placed over the entire area prior to placing of stone.
6. Surface Water - All surface water flowing or diverted toward construction entrances shall be piped across the entrance. If piping is impractical, a mountable berm with 5:1 slopes will be permitted.
7. Maintenance - The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.
8. Washing - Vehicle wheels shall be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with stone and which drains into an approved sediment trapping device.
9. Inspection - Periodic inspection and needed maintenance shall be provided after each rain.

Source: Adapted from VA ESC Handbook | Symbol: | Detail No. DE-ESC-3.4.7, Sheet 2 of 2, Effective FEB 2019

Standard Detail & Specifications
Construction Site Waste Mgt & Spill Control



Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.6.1 Sheet 1 of 5 Effective FEB 2019

Standard Detail & Specifications
Construction Site Waste Mgt & Spill Control

Pollution Prevention – Spill Prevention

1. Fueling should only take place in signed designated areas, away from downstream drainage facilities and watercourses.
2. Fueling must be with nozzles equipped with automatic shut-off to control drips. Do not top off.
3. Protect the areas where equipment or vehicles are being repaired, maintained, fueled or parked from storm water run-on and runoff.
4. Use barriers such as berms to prevent storm water run-on and runoff, and to contain spills.
5. Place a "Fueling Area" sign next to each fueling area.
6. Store hazardous materials such as fuel, solvents, oil and chemicals in secondary containment.
7. Inspect vehicles and equipment for leaks on each day of use. Repair fluid and oil leaks immediately.
8. Absorbent spill clean-up materials and spill kits must be available in fueling areas and on fuel trucks.
9. If fueling is to take place at night, make sure the fueling area is sufficiently illuminated.
10. Properly dispose of used oil, fluids, lubricants and spill clean-up materials.

CLEAN UP SPILLS

1. If it is safe to do so, immediately contain and clean up any chemical and/or hazardous material spills.
2. Properly dispose of used oil, fluids, lubricants and spill clean-up materials.
3. Do not bury spills or wash them down with water.

LEAKS AND DRIPS

1. Use drip pans or absorbent pads at all times. Place under and around leaky equipment.
2. Do not allow oil, grease, fuel or chemicals to drip onto the ground.
3. Have spill kits and clean up material on-site.
4. Repair leaky equipment promptly or remove problem vehicles and equipment from the site. Clean up contaminated soil immediately.
5. Store contaminated waste in sealed containers constructed of suitable material. Label these containers properly.
6. Clean up all spills and leaks. Promptly dispose of waste and spent clean up materials.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.6.1 Sheet 2 of 5 Effective FEB 2019

Standard Detail & Specifications
Construction Site Waste Mgt & Spill Control
Notes:

The Construction Site Pollution Prevention Plan should include the following elements:

1. **Material inventory**

   Document the storage and use of the following materials:
   a. Concrete
   b. Detergents
   c. Paints (enamel and latex)
   d. Cleaning solvents
   e. Pesticides
   f. Wood scraps
   g. Fertilizers
   h. Petroleum based products

2. **Good housekeeping practices**
   a. Store only enough product required to do the job.
   b. All materials shall be stored in a neat, orderly manner in their original labeled containers and covered.
   c. Substances shall not be mixed.
   d. When possible, all of a product shall be used up prior to disposal of the container.
   e. Manufacturers' instructions for disposal shall be strictly adhered to.
   f. The site foreman shall designate someone to inspect all BMPs daily.

3. **Waste management practices**
   a. All waste materials shall be collected and stored in securely lidded dumpsters in a location that does not drain to a waterbody.
   b. Waste materials shall be salvaged and/or recycled whenever possible.
   c. The dumpsters shall be emptied a minimum of twice per week, or more if necessary. The licensed trash hauler is responsible for cleaning out dumpsters.

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		DE-ESC-3.6.1 Sheet 3 of 5 Effective FEB 2019

Standard Detail & Specifications
Construction Site Waste Mgt & Spill Control
Notes (cont.)

   d. Trash shall be disposed of in accordance with all applicable Delaware laws.
   e. Trash cans shall be placed at all lunch spots and littering is strictly prohibited. Recycle bins shall be placed near the construction trailer.
   f. If fertilizer bags can not be stored in a weather-proof location, they shall be kept on a pallet and covered with plastic sheeting which is overlapped and anchored.

4. **Equipment maintenance practices**
   a. If possible, equipment should be taken to off-site commercial facilities for washing and maintenance.
   b. If performed on-site, vehicles shall be washed with high-pressure water spray without detergents in an area contained by an impervious berm.
   c. Drip pans shall be used for all equipment maintenance.
   d. Equipment shall be inspected for leaks on a daily basis.
   e. Washout from concrete trucks shall be disposed of in a temporary pit for hardening and proper disposal.
   f. Fuel nozzles shall be equipped with automatic shut-off valves.
   g. All used products such as oil, antifreeze, solvents and tires shall be disposed of in accordance with manufacturers' recommendations and local, state and federal laws and regulations.

5. **Spill prevention practices**
   a. Potential spill areas shall be identified and contained in covered areas with no connection to the storm drain system.
   b. Warning signs shall be posted in hazardous material storage areas.
   c. Preventive maintenance shall be performed on all tanks, valves, pumps, pipes and other equipment as necessary.
   d. Low or non-toxic substances shall be prioritized for use.

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		DE-ESC-3.6.1 Sheet 4 of 5 Effective FEB 2019

Standard Detail & Specifications
Construction Site Waste Mgt & Spill Control
Notes (cont.)

   e. Contact information for reporting spills through the DNREC 24-Hour Toll Free Number shall be prominently posted.

6. **Education**
   a. Best management practices for construction site pollution control shall be a part of regular progress meetings.
   b. Information regarding waste management, equipment maintenance and spill prevention shall be prominently posted in the construction trailer.

CONTACT INFORMATION

DNREC 24-Hour Toll Free Number	**800-662-8802**
DNREC Solid & Hazardous Waste Management Section	**302-739-9403**

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		DE-ESC-3.6.1 Sheet 5 of 5 Effective FEB 2019

Standard Detail & Specifications
Vegetative Stabilization

TEMPORARY SEEDING BY RATES, DEPTHS AND DATES

Mix #	Species[6]	Seeding Rate		Optimum Seeding Dates [1] O = Optimum Planting Period; A = Acceptable Planting Period							Planting Depth[3]
				Coastal Plain			Piedmont			All	
	Certified Seed	lb/Ac[5]	lb/1000 sq.ft.	2/1-4/30	[2] 5/1-8/14	8/15-10/31	3/1-4/30	[2] 5/1-7/31	8/1-10/31	10/31-2/1	
1	Barley	125	4	O	A	O	O	A	O		1-2 inches 2-3" sandy soils
2	Oats	125	4	O	A	A	O	A	A		1-2 inches 2-3" sandy soils
3	Rye	125	4	O	A	O	O	A	O	A	1-2 inches 2-3" sandy soils
4	Perennial Ryegrass	125	4	O	A	O	O	A	O		0.5 inches 1-2" sandy soils
5	Annual Ryegrass	125	4	O	A	O	O	A	O	A	0.5 inches 1-2" sandy soils
6	Winter Wheat	125	4	O	A	O	O	A	O	A	1-2 inches 2-3" sandy soils
7	Foxtail Millet	30 PLS	0.7		O			O			0.5 inches 1-2" sandy soils
8	Pearl Millet	20 PLS	0.5		O			O			0.5 inches 1-2" sandy soils

1. Winter seeding requires 3 tons per acre of straw mulch for proper stabilization.
2. May be planted throughout summer if soil moisture is adequate or seeded area can be irrigated.
3. Applicable on slopes 3:1 or less.
4. Fifty pounds per acre of Annual Lespedeza may be added to 1/2 the seeding rate of any of the above species.
5. Use varieties currently recommended for Delaware. Contact a County Extension Office for information.
6. Warm season grasses such as Millet or Weeping Lovegrass may be used between 5/1 and 8/1 if desired. Seed at 3-5 lbs. per acre. Good on low fertility and acid areas. Seed after frost through summer at a depth of 0.5".

NOTE: Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.4.3 Sheet 1 of 4 Effective FEB 2019

Standard Detail & Specifications
Vegetative Stabilization

PERMANENT SEEDING AND SEEDING DATES

Mix No.	Seeding Mixtures / Certified Seed[3]	Seeding Rate[1]		Optimum Seeding Dates [2] O = Optimum Planting Period A = Acceptable Planting Period							Remarks
				Coastal Plain			Piedmont			All[4]	
	Well Drained Soils	lb/Ac	lb/1000 sq.ft.	2/1-4/30	5/1-8/14	8/15-10/31	3/1-4/30	5/1-7/31	8/1-10/31	10/31-2/1	
1	Tall Fescue Weeping Lovegrass	140 10	3.2 0.23	A	O	A	A	O	A	Add 100 lbs./ac Winter Rye	Good erosion control mix Tolerant of low fertility soils Lovegrass very difficult to mow; Germinates only in hot weather
2	Deertongue Sheep Fescue Common Lespedeza[5] Inoculated	30 30 15	0.69 0.69 0.35	A	O	A	A	O	A	Add 100 lbs./ac Winter Rye	Good erosion control mix Tolerant of low fertility soils Good wildlife cover and food
3	Tall Fescue (Turf-type) or Strong Creeping Red Fescue or Perennial Ryegrass plus Flatpea[5]	50 50 50 15	1.15 1.15 1.15 0.34	O	A	O	O	A	O	Add 100 lbs./ac. Winter Rye	Good erosion control mix Tall Fescue for droughty conditions. Creeping Red Fescue for heavy shade. Flatpea to suppress woody vegetation.
4	Strong Creeping Red Fescue Kentucky Bluegrass Perennial Ryegrass or Redtop plus White Clover[5]	100 70 15 5 3	2.3 1.61 0.35 0.11 0.07	O	A	O	O	A	O	Add 100 lbs./ac. Winter Rye	Suitable waterway mix. Canada Bluegrass more drought tolerant. Use Redtop for increased drought tolerance.
5	Switchgrass[6,7] or Coastal Panicgrass Big Bluestem Little Bluestem Indian Grass	10 10 5 5 5	0.23 0.23 0.11 0.11 0.1		O			O			Native warm-season mixture. Tolerant of low fertility soils. Drought tolerant. Poor shade tolerance. N fertilizer discouraged - weeds
6	Tall Fescue (turf-type) (Blend of 3 cultivars)	150	3.5	O	A	O	O	A	O		Managed filter strip for nutrient uptake.
7	Tall Fescue Ky. Bluegrass (Blend) Perennial Ryegrass	150 20 20	3.5 0.46 0.46	O	A	O	O	A	O		Three cultivars of Kentucky Bluegrass. Traffic tolerant.
8	Big Bluestem[7] Indian Grass[7] Little Bluestem[7] Creeping Red Fescue plus one of: Partridge Pea Bush Clover Wild Indigo Showy Tick-Trefoil	10 10 8 30 5 3 3 2	0.23 0.23 0.18 0.69 0.11 0.07 0.07 0.05	O	A		O	A			All species are native. Indian Grass and Bluestem have fluffy seeds. Plant with a specialized native seed drill. Creeping Red Fescue will provide erosion protection while the warm season grasses get established.

NOTE: Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.4.3 Sheet 2 of 4 Effective FEB 2019

Standard Detail & Specifications
Vegetative Stabilization

PERMANENT SEEDING AND SEEDING DATES (cont.)

Mix No.	Seeding Mixtures / Certified Seed[3]	Seeding Rate[1]		Optimum Seeding Dates [2] O = Optimum Planting Period A = Acceptable Planting Period							Remarks
				Coastal Plain			Piedmont			All[4]	
	Poorly Drained Soils	lb/Ac	lb/1000 sq.ft.	2/1-4/30	5/1-8/14	8/15-10/31	3/1-4/30	5/1-7/31	8/1-10/31	10/31-2/1	
9	Redtop Creeping Bentgrass Sheep Fescue Rough Bluegrass	75 35 30 45	1.72 0.8 0.69 1	O	A	O	O	A	O	Add 100 lbs./ac. Winter Rye	Quick stabilization of disturbed sites and waterways
10	Reed Canarygrass[6]	10	0.23	A		O	A		O		Good erosion control, wildlife cover and wetland revegetation.
	Residential Lawns										
11	Tall Fescue Perennial Ryegrass Kentucky Bluegrass Blend	100 25 30	2.3 0.57 0.69	O	A	O	O	A	O		High value, high maintenance, light traffic, irrigation necessary. Well drained soils, full sun.
12	Tall Fescue Perennial Ryegrass Sheep Fescue	100 25 25	2.3 0.57 0.57	O	A	O	O	A	O		Moderate value, low maintenance, traffic tolerant
13	Creeping Red Fescue Chewings Fescue Rough Bluegrass Kentucky Bluegrass	50 50 20 20	1.15 1.15 0.4 0.4	O	A	O	O	A	O		Shade tolerant, moderate traffic tolerance, moderate maintenance.
14	Creeping Red Fescue Rough Bluegrass or Chewings Fescue	50 90	1.15 2.1	O	A	O	O	A	O		Shade tolerant, moisture tolerant.
15	K-31 Tall Fescue	150	3.5	O	A	O	O	A	O		Monoculture, but performs well alone in lawns. Discouraged.

1. When hydroseeding is the chosen method of application, the total rate of seed should be increased by 25%.
2. Winter seeding requires 3 tons per acre of straw mulch. Planting dates listed above are average for Delaware. These dates may require adjustment to reflect local conditions.
3. All seed shall meet the minimum purity and minimum germination percentages recommended by the Delaware Department of Agriculture. The maximum % of weed seeds shall be in accordance with Section 1, Chapter 24, Title 3 of the Delaware Code.
4. Cool season species may be planted throughout summer if soil moisture is adequate or seeded area can be irrigated.
5. All leguminous seed must be inoculated.
6. Warm season grass mix and Reed Canary Grass cannot be mowed more than 4 times per year.
7. Warm season grasses require a soil temperature of at least 50 degrees in order to germinate, and will remain dormant until then.

NOTE: Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.4.3 Sheet 3 of 4 Effective FEB 2019

Standard Detail & Specifications
Vegetative Stabilization
Construction Notes:

1. Site Preparation
   a. Prior to seeding, install needed erosion and sediment control practices such as diversions, grade stabilization structures, berms, dikes, grassed waterways, and sediment basins.
   b. Final grading and shaping is not necessary for temporary seedings.
2. Seedbed Preparation

   It is important to prepare a good seedbed to insure the success of establishing vegetation. The seedbed should be well prepared, loose, uniform, and free of large clods, rocks, and other objectionable material. The soil surface should not be compacted or crusted.
3. Soil Amendments
   a. Lime - Apply liming materials based on the recommendations of a **soil test** in accordance with the approved nutrient management plan. If a nutrient management plan is not required, apply dolomitic limestone at the rate of 1 to 2 tons per acre. Apply limestone uniformly and incorporate into the top 4 to 6 inches of soil.
   b. Fertilizer - Apply fertilizer based on the recommendations of a **soil test** in accordance with the approved nutrient management plan. If a nutrient management plan is not required, apply a formulation of 10-10-10 at the rate of 600 pounds per acre. Apply fertilizer uniformly and incorporate into the top 4 to 6 inches of soils.
4. Seeding
   a. For **temporary stabilization**, select a mixture from **Sheet 1** . For a **permanent stabilization**, select a mixture from **Sheet 2** or **Sheet 3** depending on the conditions. Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.
   b. Apply seed uniformly with a broadcast seeder, drill, cultipacker seeder or hydroseeder. All seed will be applied at the recommended rate and planting depth.
   c. Seed that has been broadcast should be covered by raking or dragging and then lightly tamped into place using a roller or cultipacker. If hydroseeding is used and the seed and fertilizer is mixed, they will be mixed on site and the seeding shall be done immediately and without interruption.
5. Mulching

   All mulching shall be done in accordance with detail **DE-ESC-3.4.5**.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.4.3 Sheet 4 of 4 Effective FEB 2019

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Filepath: K:\Projects\2069-Fenwick\Fenwick\Permit\2069-PL-005-EROSION AND SEDIMENT CONTROL.dwg Figure 13

ANCHOR QEA

Figure 13
Erosion and Sediment Control Details 2 of 2

Permit Set
Little Assawoman Bay Dredging Project

Sediment Chemistry Analysis

755 Business Center Drive, Suite 220
Horsham, Pennsylvania 19044
267.753.6301

ANCHOR QEA

Memorandum

December 9, 2022

To: Bill Rymer, Town of Fenwick Island

From: Steve Bagnull and David Haury, Anchor QEA

cc: Ram Mohan, PE, PhD, FASCE, Anchor QEA and Tony Pratt, Town of Fenwick Island Consultant

Re: Town of Fenwick Island – Dredging Project Preliminary Sediment Risk Analysis Summary

Anchor QEA has reviewed the results of the chemical analysis completed on two composite sediment samples collected in October 2021 from the proposed dredge material located in navigation channels in the Town of Fenwick Island. Our understanding is that one option for placement of the dredge material is at the site of a proposed residential development. In support of forthcoming conversations with the upland property owner, we have developed this memorandum to provide a preliminary evaluation of the sediment sample data with respect to human and ecological risk. The first step in evaluating whether placement of this material at the site of a proposed residential development would be an issue from a risk perspective is to determine whether there are any human health concerns that could result from long-term exposure to this material by future residents. The State of Delaware (DNREC 2013) has published conservative human health screening levels that can be compared to the results of the chemical analysis of the sediment samples to determine if there are any potential human health issues. These screening values include both cancer and non-cancer endpoints. The results of this human health screening analysis are provided herein. Sediment sample results that are the subject of this analysis are provided as Attachment 1 of this memorandum.

Thallium is the only chemical detected in the composite samples that exceeds its screening value for a non-cancer endpoint. Non-cancer hazards are evaluated on the basis of a reference dose, which is equal to a hazard quotient (HQ) of 1.0. The State of Delaware, however, sets its screening levels equal to a hazard quotient of 0.1 in order to account for exposure to multiple chemicals that together may add up to a total hazard index (HI) of 1.0 or greater. Based on this approach, long-term exposure to thallium by future residents results in a HQ = 0.33, well below a value of 1.0. However, although other metals detected in the sediment samples do not exceed their respective non-cancer screening levels, these results should also be included in the screening to determine if, collectively, long-term exposure to metals by future residents will exceed an HI of 1.0. The results of this more comprehensive screening approach yield a total HI = 0.42, again well below a threshold of 1.0. Other chemical constituents in the composite samples (i.e., PAHs, pesticides, and PCBs) were measured at exceedingly low levels or were non-detect and would not contribute to any risks to human health. It should be noted that a study completed by the State of Delaware on background levels of chemicals in soils throughout the state (DNREC 2012) indicates that thallium is generally at non-detect levels, with detection limits (i.e., 1.1 to 2 parts per million) that exceed the detected thallium concentrations in the two composite samples (0.251 and 0.258 parts per million); it is not unreasonable to conclude based on this that thallium in these two composite samples is at levels consistent with background levels in the state. Finally, it should also be noted that the probability of long-term exposure by future residents to any of the dredge material used as fill at the proposed site is likely very low, given that this fill material will ultimately be covered by hard surfaces, such as roads and driveways, or by topsoil to support lawns, thereby eliminating any exposure to the fill itself. This assumption should be confirmed through continued discussions with the upland property owner.

Given the degree to which a residential development would drastically alter the environment of the site and any exposure patterns by ecological receptors, it is likely that any ecological risk arising from exposure to the dredge material would be negligible. However, the State of Delaware also publishes conservative screening levels for ecological receptors, and for completeness it is important to complete a screening analysis for environmental risk as well. Chromium, mercury, selenium, vanadium, and zinc are the only chemical constituents in the composite samples that exceed their respective screening values for soil. Screening levels for these metals are generally based on potential effects to native and/or agricultural plants and/or soil invertebrates and are considered "no-effect" thresholds, below which no adverse effects are expected. Exceedances of these screening values does not mean that unacceptable exposure is occurring but does point to the need for further evaluation, which considers the nature of exposure and whether these constituents are also present as background levels in soils. First, the nature of the proposed residential development would minimize any exposure to these receptors, similar to the discussion above for human receptors. Second, the aforementioned background soil study completed by the State of Delaware indicates that the concentrations of these metals measured in the composite samples are generally within the range of soil background levels throughout the State. As such, it is likely that any exposure to concentrations in the dredge material that might be slightly higher than background levels would not result in unacceptable risk.

References

DNREC 2012. *Statewide Soil Background Study: Report of Findings.* July 2012.

DNREC 2013. *Hazardous Substance Cleanup Act Screening Level Table Guidance*. January 2013. Updated February 2022.

Attachments

Attachment 1 – Town of Fenwick Island Dredge Area Sediment Data

Attachment 1

Sample Location Figures

CONTROL POINTS		
POINT #	NORTHING	EASTING
282	169346.89	759562.81
283	169271.92	759306.83
284	169184.88	759191.63
285	169174.18	759180.22
286	169031.10	758992.10
287	169016.57	758943.78
288	168986.30	758861.03
289	168961.42	758807.81
290	168950.17	758771.71
291	168869.48	758579.85
292	168658.43	758349.93
293	168547.88	758216.50
294	168373.31	758004.50
295	168302.34	757915.88
296	168263.65	757875.60
297	168227.60	757903.87
298	168243.70	757928.46
299	168306.33	758004.58
300	168416.97	758141.50
301	168600.20	758367.02
302	168825.59	758609.85
303	168886.87	758735.83
304	168905.03	758784.20
305	168926.78	758832.42
306	168939.69	758886.04
307	168981.89	759016.92
308	169221.09	759332.24
309	169300.97	759573.73
310	166529.21	759190.72
311	166312.78	758953.11
312	166195.91	758631.05
313	165923.42	757884.42
314	165878.83	757899.78
315	166133.16	758622.71
316	165954.89	758692.05
317	165973.40	758731.82
318	166152.28	758675.35
319	166263.66	758982.10
320	166491.45	759220.39

LEGEND:

- -3 EXISTING GRADE
- LIMIT OF REQUIRED DREDGING (ELEVATION -4.0' MLW)
- APPROXIMATE DAYLIGHT EXTENTS

NORTH

0 100 200

SCALE IN FEET

NOTES:

1. HORIZONTAL DATUM: DELAWARE STATE PLANE , NORTH AMERICAN DATUM OF 1983 (NAD83), U.S. SURVEY FEET
2. VERTICAL DATUM: MEAN LOW WATER

PLAN INTENDED TO BE VIEWED IN COLOR, ADJACENT BLOCK IS "BLUE"

ONE INCH

AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT-NOT FOR CONSTRUCTION

K:\Projects\2069-Fenwick\Fenwick\Construction Plans\2069-PL-003-PROPOSED DESIGN.dwg C-01

Oct 14, 2021 9:46am bhurry

ANCHOR QEA

REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: I. LASTNAME
DRAWN BY: B. HURRY
CHECKED BY: T. MERRITTS
APPROVED BY: R. MOHAN
SCALE: AS NOTED
DATE: NOVEMBER, 2020

LITTLE ASSAWOMAN BAY DREDGING PROJECT - TOWN OF FENWICK ISLAND

DREDGING PLAN - NORTH CHANNEL

C-01

SHEET # 4 OF 13

CONTROL POINTS		
POINT #	NORTHING	EASTING
310	166529.21	759190.72
311	166312.78	758953.11
312	166195.91	758631.05
313	165923.42	757884.42
314	165878.83	757899.78
315	166133.16	758622.71
316	165954.89	758692.05
317	165973.40	758731.82
318	166152.28	758675.35
319	166263.66	758982.10
320	166491.45	759220.39

LEGEND:

- -3 EXISTING GRADE
- LIMIT OF REQUIRED DREDGING (ELEVATION -4.0' MLW)
- APPROXIMATE DAYLIGHT EXTENTS

NORTH

0 100 200

SCALE IN FEET

NOTES:

1. HORIZONTAL DATUM: DELAWARE STATE PLANE , NORTH AMERICAN DATUM OF 1983 (NAD83), U.S. SURVEY FEET
2. VERTICAL DATUM: MEAN LOW WATER

PLAN INTENDED TO BE VIEWED IN COLOR, ADJACENT BLOCK IS "BLUE"

ONE INCH

AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

DRAFT-NOT FOR CONSTRUCTION

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Oct 14, 2021 9:46am bhurry

ANCHOR QEA

REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: I. LASTNAME
DRAWN BY: B. HURRY
CHECKED BY: T. MERRITTS
APPROVED BY: R. MOHAN
SCALE: AS NOTED
DATE: NOVEMBER, 2020

LITTLE ASSAWOMAN BAY DREDGING PROJECT - TOWN OF FENWICK ISLAND

DREDGING PLAN - SOUTH CHANNEL

C-02

SHEET # 5 OF 13

Sediment Core Logs

ACT Engineers, Inc.
1 Washington Boulevard, Suite 3
Robbinsville, NJ 08691
Telephone No. (609) 918-0200
www.actengineers.com

Log of Soil Boring FI-2021-01 (NORTH)

Project Name:	211008-00 Anchor QEA - Fenwick Island Sed. Sampling	Logged by:	Sean Lynch	Approximate Depth (ft)	3.75'
Project Location:	Little Assawoman Bay	Investigation Method:	VibeCore-Mini	Approximate Surface Elevation (MLLW)	-3.0'
Project Number:	211008-00	Excavation Contractor:	ACT Engineers, Inc.	Date Measured:	10/19/2021

Depth MLLW (FT)	Recovery (ft)	Sample Type	Lab Sample ID	Sample Time	Material Description	Comments
0						
1						
2						
3					Sediment @ -3'	
4	2.5'	Grab	FI-2021-01	10:00	Dark gray silty sand	
5					EOB @ -5.3 MLLW	
6						
7						
8						

ACT ENGINEERS

ACT Engineers, Inc.
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Telephone No. (609) 918-0200
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Log of Soil Boring FI-2021-02 (NORTH)

Project Name:	211008-00 Anchor QEA - Fenwick Island Sed. Sampling	Logged by:	Sean Lynch	Approximate Depth (ft)	4.00
Project Location:	Little Assawoman Bay	Investigation Method:	VibeCore-Mini	Approximate Surface Elevation (MLLW)	-3.0
Project Number:	211008-00	Excavation Contractor:	ACT Engineers, Inc.	Date Measured:	10/19/2021

Depth MLLW (FT)	Recovery (ft)	Sample Type	Lab Sample ID	Sample Time	Material Description	Comments
0						
1						
2						
3					Sediment @ -3.2' MLLW	
4	2'	Grab	FI-2021-02	10:40	Dark gray silty sand	
5					EOB @ -5.2' MLLW	
6						
7						
8						

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Log of Soil Boring FI-2021-03 (NORTH)

Project Name:	211008-00 Anchor QEA - Fenwick Island Sed. Sampling	Logged by:	Sean Lynch	Approximate Depth (ft)	4.00
Project Location:	Little Assawoman Bay	Investigation Method:	VibeCore-Mini	Approximate Surface Elevation (MLLW)	-3.1
Project Number:	211008-00	Excavation Contractor:	ACT Engineers, Inc.	Date Measured:	10/19/2021

Depth MLLW (FT)	Recovery (ft)	Sample Type	Lab Sample ID	Sample Time	Material Description	Comments
0						
1						
2						
3					Sediment @ -3.1' MLLW	
4	2'	Grab	FI-2021-03	11:15	Dark gray silty sand	
5					EOB @ -5.1' MLLW	
6						
7						
8						

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Log of Soil Boring FI-2021-04 (SOUTH)

Project Name:	211008-00 Anchor QEA - Fenwick Island Sed. Sampling	Logged by:	Sean Lynch	Approximate Depth (ft)	4.00
Project Location:	Little Assawoman Bay	Investigation Method:	VibeCore-Mini	Approximate Surface Elevation (MLLW)	-3.2
Project Number:	211008-00	Excavation Contractor:	ACT Engineers, Inc.	Date Measured:	10/19/2021

Depth MLLW (FT)	Recovery (ft)	Sample Type	Lab Sample ID	Sample Time	Material Description	Comments
0–3					Sediment @ -3.2' MLLW	
3–6	3'	Grab	FI-2021-04	11:52	Dark gray silty sand	1 live tagelus clam
6–8					EOB @ -6.2' MLLW	

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Telephone No. (609) 918-0200
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Log of Soil Boring FI-2021-05 (SOUTH)

Project Name:	211008-00 Anchor QEA - Fenwick Island Sed. Sampling	Logged by:	Sean Lynch	Approximate Depth (ft)	4.00
Project Location:	Little Assawoman Bay	Investigation Method:	VibeCore-Mini	Approximate Surface Elevation (MLLW)	-3.2
Project Number:	211008-00	Excavation Contractor:	ACT Engineers, Inc.	Date Measured:	10/19/2021

Depth MLLW (FT)	Recovery (ft)	Sample Type	Lab Sample ID	Sample Time	Material Description	Comments
0–3.2					Sediment @ -3.2' MLLW	
3.2–5.7	2.5'	Grab	FI-2021-05	12:30	Gray silty sand	1 live tagelus clam
5.7					EOB @ -5.7' MLLW	
8						

ACT Engineers, Inc.
1 Washington Boulevard, Suite 3
Robbinsville, NJ 08691
Telephone No. (609) 918-0200
www.actengineers.com

Log of Soil Boring FI-2021-06 (SOUTH)

Project Name:	211008-00 Anchor QEA - Fenwick Island Sed. Sampling	Logged by:	Sean Lynch	Approximate Depth (ft)	4.00
Project Location:	Little Assawoman Bay	Investigation Method:	VibeCore-Mini	Approximate Surface Elevation (MLLW)	-3.3
Project Number:	211008-00	Excavation Contractor:	ACT Engineers, Inc.	Date Measured:	10/19/2021

Depth MLLW (FT)	Recovery (ft)	Sample Type	Lab Sample ID	Sample Time	Material Description	Comments
0–8	2'	Grab	FI-2021-06	12:55	Sediment @ -3.3' MLLW Gray silty sand EOB @ -5.3' MLLW	2 live tagelus clams

Sample Data Tables

Table 1
Town of Fenwick Island Dredge Area Sediment Data

			Task	2021_SedChar	2021_SedChar	2021_SedChar	2021_SedChar	2021_SedChar	2021_SedChar	2021_SedChar	2021_SedChar
			Location ID	FI-2021-01	FI-2021-02	FI-2021-03	FI-2021-04	FI-2021-05	FI-2021-06	FI-2021-NORTH	FI-2021-SOUTH
			Sample ID	FI-2021-01-20211019	FI-2021-02-20211019	FI-2021-03-20211019	FI-2021-04-20211019	FI-2021-05-20211019	FI-2021-06-20211019	FI-2021-NORTH-20211019	FI-2021-SOUTH-20211019
			Sample Date	10/19/2021	10/19/2021	10/19/2021	10/19/2021	10/19/2021	10/19/2021	10/19/2021	10/19/2021
			Depth	0 - 2.3 ft	0 - 2 ft	0 - 2 ft	0 - 3 ft	0 - 2.5 ft	0 - 2 ft		
			Sample Type	N	N	N	N	N	N	N	N
			Matrix	SE	SE	SE	SE	SE	SE	SE	SE
			X	758147.41	758664.14	759240.31	758203.57	758639.37	759031.87	--	--
			Y	168456.48	168877.64	169184.91	166011.34	166169.37	166347.42	--	--
Chemical	DNREC_HSCA_EC_SED_M	DNREC_HSCA_EC_SOIL	DNREC_HSCA_SOIL								
Conventional Parameters (pct)											
Moisture, percent				--	--	--	--	--	--	32.5	37.6
Total organic carbon				--	--	--	--	--	--	0.99	1.24
Total Solids				--	--	--	--	--	--	67.5	62.4
Grain Size (pct)											
Clay				10.8	3.40	11.4	10.4	6.4	22.6	--	--
Cobbles				0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	--	--
Gravel, coarse				0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	--	--
Gravel, fine				0.100 U	0.100 U	0.200	0.100 U	0.900	0.100 U	--	--
Sand, coarse				0.400	0.100	3.20	1.30	3.30	4.60	--	--
Sand, fine				51.3	82.2	41.0	50.5	61.0	47.0	--	--
Sand, medium				3.00	3.00	6.80	4.80	11.6	7.20	--	--
Silt				34.5	11.3	37.4	33.0	16.8	18.6	--	--
Metals (mg/kg)											
Aluminum			51200	--	--	--	--	--	--	6100	7430
Antimony		5	3.1	--	--	--	--	--	--	2.28 U	2.45 U
Arsenic	7.24	10	11	--	--	--	--	--	--	3.63	4.62
Barium		283	1500	--	--	--	--	--	--	12.6	17.1
Beryllium		10	16	--	--	--	--	--	--	0.291 J	0.365 J
Cadmium	0.68	3	7.1	--	--	--	--	--	--	0.151 J	0.115 J
Calcium				--	--	--	--	--	--	1090	10400
Chromium	52.3	0.4	214	--	--	--	--	--	--	14.0	18.8
Cobalt		20	34	--	--	--	--	--	--	3.33	4.27
Copper	18.7	50	310	--	--	--	--	--	--	6.43	6.16
Iron			74767	--	--	--	--	--	--	8540	11900
Lead	30.2	41	400	--	--	--	--	--	--	9.45	5.58
Magnesium				--	--	--	--	--	--	2630	3570
Manganese			2100	--	--	--	--	--	--	71.9	109
Mercury	0.13	0.0005	1.1	--	--	--	--	--	--	0.011	0.010 J
Nickel	15.9	30	150	--	--	--	--	--	--	7.45	10.3
Potassium				--	--	--	--	--	--	1190	1640
Selenium		0.2	39	--	--	--	--	--	--	1.51 J	1.92 J
Silver	0.73	2	39	--	--	--	--	--	--	0.712 U	0.766 U
Sodium				--	--	--	--	--	--	4400	4190
Thallium		1	0.078	--	--	--	--	--	--	0.258 J	0.251 J
Vanadium		2	134	--	--	--	--	--	--	15.3	21.3
Zinc	124	8.5	2300	--	--	--	--	--	--	36.7	32
Polycyclic Aromatic Hydrocarbons (mg/kg)											
Acenaphthene	0.00671	20	360	--	--	--	--	--	--	0.00807	0.000622 J
Acenaphthylene				--	--	--	--	--	--	0.00134 J	0.00112 J
Anthracene	0.0469		1800	--	--	--	--	--	--	0.0145	0.00184
Benzo(a)anthracene	0.0748		1.1	--	--	--	--	--	--	0.0306	0.00405
Benzo(a)pyrene	0.0888		0.24	--	--	--	--	--	--	0.0312	0.00381
Benzo(b)fluoranthene			1.11	--	--	--	--	--	--	0.029	0.00515
Benzo(e)pyrene				--	--	--	--	--	--	0.0193	0.00374
Benzo(g,h,i)perylene				--	--	--	--	--	--	0.0191	0.00421
Benzo(j,k)fluoranthene				--	--	--	--	--	--	0.0258	0.00403
C1-Chrysenes				--	--	--	--	--	--	0.0132	0.00391
C1-Fluoranthenes/Pyrenes				--	--	--	--	--	--	0.0316	0.00668
C1-Fluorenes				--	--	--	--	--	--	0.0028	0.000933 J
C1-Naphthalenes				--	--	--	--	--	--	0.00325	0.000949 J
C1-Phenanthrenes/Anthracenes				--	--	--	--	--	--	0.0189	0.00533
C2-Chrysenes				--	--	--	--	--	--	0.00667	0.00368
C2-Fluorenes				--	--	--	--	--	--	0.00338	0.00254
C2-Naphthalenes				--	--	--	--	--	--	0.00512	0.00572
C2-Phenanthrenes/Anthracenes				--	--	--	--	--	--	0.0112	0.00504
C3-Chrysenes				--	--	--	--	--	--	0.00688	0.00525
C3-Fluorenes				--	--	--	--	--	--	0.00726	0.00532
C3-Naphthalenes				--	--	--	--	--	--	0.00377	0.00245
C3-Phenanthrenes/Anthracenes				--	--	--	--	--	--	0.00687	0.00437
C4-Chrysenes				--	--	--	--	--	--	0.00916	0.00961
C4-Naphthalenes				--	--	--	--	--	--	0.00365	0.0032
C4-Phenanthrenes/Anthracenes				--	--	--	--	--	--	0.00343	0.00296
Chrysene	0.108		110	--	--	--	--	--	--	0.0403	0.0054

Table 1
Town of Fenwick Island Dredge Area Sediment Data

			Task	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**
			Location ID	**FI-2021-01**	**FI-2021-02**	**FI-2021-03**	**FI-2021-04**	**FI-2021-05**	**FI-2021-06**	**FI-2021-NORTH**	**FI-2021-SOUTH**
			Sample ID	**FI-2021-01-20211019**	**FI-2021-02-20211019**	**FI-2021-03-20211019**	**FI-2021-04-20211019**	**FI-2021-05-20211019**	**FI-2021-06-20211019**	**FI-2021-NORTH-20211019**	**FI-2021-SOUTH-20211019**
			Sample Date	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**
			Depth	**0 - 2.3 ft**	**0 - 2 ft**	**0 - 2 ft**	**0 - 3 ft**	**0 - 2.5 ft**	**0 - 2 ft**		
			Sample Type	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**
			Matrix	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**
			X	**758147.41**	**758664.14**	**759240.31**	**758203.57**	**758639.37**	**759031.87**	**--**	**--**
			Y	**168456.48**	**168877.64**	**169184.91**	**166011.34**	**166169.37**	**166347.42**	**--**	**--**
Chemical	**DNREC_HSCA_EC_SED_M**	**DNREC_HSCA_EC_SOIL**	**DNREC_HSCA_SOIL**								
Fluoranthene	0.113		240	--	--	--	--	--	--	**0.0616**	**0.00871**
Fluorene	0.0212	30	240	--	--	--	--	--	--	**0.00761**	**0.000952 J**
Indeno(1,2,3-c,d)pyrene			1.3	--	--	--	--	--	--	**0.019**	**0.00352**
Naphthalene	0.0346		2	--	--	--	--	--	--	**0.0041**	**0.00131 J**
Perylene				--	--	--	--	--	--	**0.0217**	**0.0181**
Phenanthrene	0.0867		180	--	--	--	--	--	--	**0.0447**	**0.0052**
Pyrene	0.153		180	--	--	--	--	--	--	**0.0522**	**0.00872**
Pesticides (mg/kg)											
2,4'-DDD (o,p'-DDD)				--	--	--	--	--	--	0.000147 U	0.000736 U
2,4'-DDE (o,p'-DDE)				--	--	--	--	--	--	0.000147 U	0.000736 U
2,4'-DDT (o,p'-DDT)				--	--	--	--	--	--	0.000147 U	0.000736 U
4,4'-DDD (p,p'-DDD)	0.00122		0.19	--	--	--	--	--	--	**0.000555**	0.000736 U
4,4'-DDE (p,p'-DDE)	0.00207		2	--	--	--	--	--	--	**0.000995**	0.000736 U
4,4'-DDT (p,p'-DDT)	0.00119		1.9	--	--	--	--	--	--	0.000147 U	0.000736 U
Aldrin			0.039	--	--	--	--	--	--	0.000147 U	0.000736 U
Chlordane, alpha- (Chlordane, cis-)				--	--	--	--	--	--	0.000147 U	0.000736 U
Chlordane, beta- (Chlordane, trans-)				--	--	--	--	--	--	0.000147 U	0.000736 U
Dieldrin	0.00072		0.034	--	--	--	--	--	--	0.000147 U	0.000736 U
Endosulfan sulfate				--	--	--	--	--	--	0.000147 U	0.000736 U
Endosulfan, alpha- (I)				--	--	--	--	--	--	0.000147 U	0.000736 U
Endosulfan, beta (II)				--	--	--	--	--	--	0.000147 U	0.000736 U
Endrin	0.00267		1.9	--	--	--	--	--	--	0.000147 U	0.000736 U
Endrin aldehyde				--	--	--	--	--	--	0.000440 U	0.00221 U
Endrin ketone				--	--	--	--	--	--	0.000147 U	0.000736 U
Heptachlor			0.13	--	--	--	--	--	--	0.000147 U	0.000736 U
Heptachlor epoxide	0.0006		0.07	--	--	--	--	--	--	0.000294 U	0.00147 U
Hexachlorobenzene		1000	0.21	--	--	--	--	--	--	0.000294 U	0.00147 U
Hexachlorocyclohexane (BHC), alpha-	1.36		0.086	--	--	--	--	--	--	0.000147 U	0.000736 U
Hexachlorocyclohexane (BHC), beta-			0.3	--	--	--	--	--	--	0.000147 U	0.000736 U
Hexachlorocyclohexane (BHC), delta-				--	--	--	--	--	--	0.000147 U	0.000736 U
Hexachlorocyclohexane (BHC), gamma- (Lindar	0.00032		0.57	--	--	--	--	--	--	0.000147 U	0.000736 U
Methoxychlor	0.0296		32	--	--	--	--	--	--	0.00147 U	0.00736 U
Mirex			0.036	--	--	--	--	--	--	0.000147 U	0.000736 U
Nonachlor, cis-				--	--	--	--	--	--	0.000147 U	0.000736 U
Nonachlor, trans-				--	--	--	--	--	--	0.000147 U	0.000736 U
Oxychlordane				--	--	--	--	--	--	0.000294 U	0.00147 U
Toxaphene	0.536		0.49	--	--	--	--	--	--	0.00737 U	0.0369 U
PCB Congeners (ng/kg)											
PCB-001				--	--	--	--	--	--	282 U	301 U
PCB-002				--	--	--	--	--	--	282 U	301 U
PCB-003				--	--	--	--	--	--	282 U	301 U
PCB-004/010				--	--	--	--	--	--	563 U	601 U
PCB-005				--	--	--	--	--	--	282 U	301 U
PCB-006				--	--	--	--	--	--	282 U	301 U
PCB-007				--	--	--	--	--	--	282 U	301 U
PCB-008				--	--	--	--	--	--	282 U	301 U
PCB-009				--	--	--	--	--	--	282 U	301 U
PCB-011				--	--	--	--	--	--	282 U	301 U
PCB-012				--	--	--	--	--	--	282 U	301 U
PCB-013				--	--	--	--	--	--	563 U	601 U
PCB-014				--	--	--	--	--	--	282 U	301 U
PCB-015				--	--	--	--	--	--	282 U	301 U
PCB-016				--	--	--	--	--	--	282 U	301 U
PCB-017				--	--	--	--	--	--	282 U	301 U
PCB-018				--	--	--	--	--	--	282 U	301 U
PCB-019				--	--	--	--	--	--	282 U	301 U
PCB-020/021				--	--	--	--	--	--	563 U	601 U
PCB-022				--	--	--	--	--	--	282 U	301 U
PCB-023				--	--	--	--	--	--	282 U	301 U
PCB-024				--	--	--	--	--	--	282 U	301 U
PCB-025				--	--	--	--	--	--	282 U	301 U
PCB-026				--	--	--	--	--	--	282 U	301 U
PCB-027				--	--	--	--	--	--	282 U	301 U
PCB-028				--	--	--	--	--	--	282 U	301 U

Table 1
Town of Fenwick Island Dredge Area Sediment Data

			Task	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**
			Location ID	**FI-2021-01**	**FI-2021-02**	**FI-2021-03**	**FI-2021-04**	**FI-2021-05**	**FI-2021-06**	**FI-2021-NORTH**	**FI-2021-SOUTH**
			Sample ID	**FI-2021-01-20211019**	**FI-2021-02-20211019**	**FI-2021-03-20211019**	**FI-2021-04-20211019**	**FI-2021-05-20211019**	**FI-2021-06-20211019**	**FI-2021-NORTH-20211019**	**FI-2021-SOUTH-20211019**
			Sample Date	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**
			Depth	**0 - 2.3 ft**	**0 - 2 ft**	**0 - 2 ft**	**0 - 3 ft**	**0 - 2.5 ft**	**0 - 2 ft**		
			Sample Type	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**
			Matrix	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**
			X	**758147.41**	**758664.14**	**759240.31**	**758203.57**	**758639.37**	**759031.87**	**--**	**--**
			Y	**168456.48**	**168877.64**	**169184.91**	**166011.34**	**166169.37**	**166347.42**	**--**	**--**
Chemical	**DNREC_HSCA_EC_SED_M**	**DNREC_HSCA_EC_SOIL**	**DNREC_HSCA_SOIL**								
PCB-029				--	--	--	--	--	--	282 U	301 U
PCB-030				--	--	--	--	--	--	282 U	301 U
PCB-031				--	--	--	--	--	--	282 U	301 U
PCB-032				--	--	--	--	--	--	282 U	301 U
PCB-033				--	--	--	--	--	--	282 U	301 U
PCB-034				--	--	--	--	--	--	282 U	301 U
PCB-035				--	--	--	--	--	--	282 U	301 U
PCB-036				--	--	--	--	--	--	282 U	301 U
PCB-037				--	--	--	--	--	--	282 U	301 U
PCB-038				--	--	--	--	--	--	282 U	301 U
PCB-039				--	--	--	--	--	--	282 U	301 U
PCB-040				--	--	--	--	--	--	282 U	301 U
PCB-041				--	--	--	--	--	--	282 U	301 U
PCB-042				--	--	--	--	--	--	282 U	301 U
PCB-043				--	--	--	--	--	--	282 U	301 U
PCB-044				--	--	--	--	--	--	282 U	301 U
PCB-045				--	--	--	--	--	--	282 U	301 U
PCB-046/073				--	--	--	--	--	--	563 U	601 U
PCB-047				--	--	--	--	--	--	282 U	301 U
PCB-048				--	--	--	--	--	--	282 U	301 U
PCB-049				--	--	--	--	--	--	282 U	301 U
PCB-050				--	--	--	--	--	--	282 U	301 U
PCB-051				--	--	--	--	--	--	282 U	301 U
PCB-052				--	--	--	--	--	--	282 U	301 U
PCB-053				--	--	--	--	--	--	282 U	301 U
PCB-054				--	--	--	--	--	--	282 U	301 U
PCB-055				--	--	--	--	--	--	282 U	301 U
PCB-056				--	--	--	--	--	--	282 U	301 U
PCB-057				--	--	--	--	--	--	282 U	301 U
PCB-058/067				--	--	--	--	--	--	563 U	601 U
PCB-059				--	--	--	--	--	--	282 U	301 U
PCB-060				--	--	--	--	--	--	282 U	301 U
PCB-061				--	--	--	--	--	--	282 U	301 U
PCB-062/065/075				--	--	--	--	--	--	845 U	902 U
PCB-063				--	--	--	--	--	--	282 U	301 U
PCB-064/068				--	--	--	--	--	--	563 U	601 U
PCB-066				--	--	--	--	--	--	282 U	301 U
PCB-069				--	--	--	--	--	--	282 U	301 U
PCB-070				--	--	--	--	--	--	282 U	301 U
PCB-071				--	--	--	--	--	--	282 U	301 U
PCB-072				--	--	--	--	--	--	282 U	301 U
PCB-074				--	--	--	--	--	--	282 U	301 U
PCB-076				--	--	--	--	--	--	282 U	301 U
PCB-077				--	--	--	--	--	--	282 U	301 U
PCB-078				--	--	--	--	--	--	282 U	301 U
PCB-079				--	--	--	--	--	--	282 U	301 U
PCB-080				--	--	--	--	--	--	282 U	301 U
PCB-081				--	--	--	--	--	--	282 U	301 U
PCB-082				--	--	--	--	--	--	282 U	301 U
PCB-083/112/125				--	--	--	--	--	--	845 U	902 U
PCB-084/089				--	--	--	--	--	--	563 U	601 U
PCB-085				--	--	--	--	--	--	282 U	301 U
PCB-086/109				--	--	--	--	--	--	563 U	601 U
PCB-087/111				--	--	--	--	--	--	563 U	601 U
PCB-088/095/121				--	--	--	--	--	--	845 U	902 U
PCB-090/101				--	--	--	--	--	--	563 U	601 U
PCB-091				--	--	--	--	--	--	282 U	301 U
PCB-092				--	--	--	--	--	--	282 U	301 U
PCB-093				--	--	--	--	--	--	282 U	301 U
PCB-094				--	--	--	--	--	--	282 U	301 U
PCB-096				--	--	--	--	--	--	282 U	301 U
PCB-097				--	--	--	--	--	--	282 U	301 U
PCB-098				--	--	--	--	--	--	282 U	301 U
PCB-099				--	--	--	--	--	--	282 U	301 U

Table 1
Town of Fenwick Island Dredge Area Sediment Data

			Task	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**
			Location ID	**FI-2021-01**	**FI-2021-02**	**FI-2021-03**	**FI-2021-04**	**FI-2021-05**	**FI-2021-06**	**FI-2021-NORTH**	**FI-2021-SOUTH**
			Sample ID	**FI-2021-01-20211019**	**FI-2021-02-20211019**	**FI-2021-03-20211019**	**FI-2021-04-20211019**	**FI-2021-05-20211019**	**FI-2021-06-20211019**	**FI-2021-NORTH-20211019**	**FI-2021-SOUTH-20211019**
			Sample Date	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**
			Depth	**0 - 2.3 ft**	**0 - 2 ft**	**0 - 2 ft**	**0 - 3 ft**	**0 - 2.5 ft**	**0 - 2 ft**		
			Sample Type	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**
			Matrix	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**
			X	**758147.41**	**758664.14**	**759240.31**	**758203.57**	**758639.37**	**759031.87**	**--**	**--**
			Y	**168456.48**	**168877.64**	**169184.91**	**166011.34**	**166169.37**	**166347.42**	**--**	**--**
Chemical	**DNREC_HSCA_EC_SED_M**	**DNREC_HSCA_EC_SOIL**	**DNREC_HSCA_SOIL**								
PCB-100				--	--	--	--	--	--	282 U	301 U
PCB-102				--	--	--	--	--	--	282 U	301 U
PCB-103				--	--	--	--	--	--	282 U	301 U
PCB-104				--	--	--	--	--	--	282 U	301 U
PCB-105			120000	--	--	--	--	--	--	282 U	301 U
PCB-106				--	--	--	--	--	--	282 U	301 U
PCB-107/123				--	--	--	--	--	--	563 U	601 U
PCB-108				--	--	--	--	--	--	282 U	301 U
PCB-110				--	--	--	--	--	--	282 U	301 U
PCB-113				--	--	--	--	--	--	282 U	301 U
PCB-114			120000	--	--	--	--	--	--	282 U	301 U
PCB-115				--	--	--	--	--	--	282 U	301 U
PCB-116				--	--	--	--	--	--	282 U	301 U
PCB-117				--	--	--	--	--	--	282 U	301 U
PCB-118			120000	--	--	--	--	--	--	282 U	301 U
PCB-119				--	--	--	--	--	--	282 U	301 U
PCB-120				--	--	--	--	--	--	282 U	301 U
PCB-122				--	--	--	--	--	--	282 U	301 U
PCB-124				--	--	--	--	--	--	282 U	301 U
PCB-126			36	--	--	--	--	--	--	282 U	301 U
PCB-127				--	--	--	--	--	--	282 U	301 U
PCB-128				--	--	--	--	--	--	282 U	301 U
PCB-129/158				--	--	--	--	--	--	563 U	601 U
PCB-130/164				--	--	--	--	--	--	563 U	601 U
PCB-131				--	--	--	--	--	--	282 U	301 U
PCB-132				--	--	--	--	--	--	282 U	301 U
PCB-133				--	--	--	--	--	--	282 U	301 U
PCB-134				--	--	--	--	--	--	282 U	301 U
PCB-135				--	--	--	--	--	--	282 U	301 U
PCB-136				--	--	--	--	--	--	282 U	301 U
PCB-137				--	--	--	--	--	--	282 U	301 U
PCB-138				--	--	--	--	--	--	282 U	301 U
PCB-139/143				--	--	--	--	--	--	563 U	601 U
PCB-140				--	--	--	--	--	--	282 U	301 U
PCB-141				--	--	--	--	--	--	282 U	301 U
PCB-142				--	--	--	--	--	--	282 U	301 U
PCB-144				--	--	--	--	--	--	282 U	301 U
PCB-145				--	--	--	--	--	--	282 U	301 U
PCB-146				--	--	--	--	--	--	282 U	301 U
PCB-147/149				--	--	--	--	--	--	563 U	601 U
PCB-148				--	--	--	--	--	--	282 U	301 U
PCB-150				--	--	--	--	--	--	282 U	301 U
PCB-151				--	--	--	--	--	--	282 U	301 U
PCB-152				--	--	--	--	--	--	282 U	301 U
PCB-153				--	--	--	--	--	--	282 U	301 U
PCB-154				--	--	--	--	--	--	282 U	301 U
PCB-155				--	--	--	--	--	--	282 U	301 U
PCB-156			120000	--	--	--	--	--	--	282 U	301 U
PCB-157			120000	--	--	--	--	--	--	282 U	301 U
PCB-159				--	--	--	--	--	--	282 U	301 U
PCB-160/163				--	--	--	--	--	--	563 U	601 U
PCB-161				--	--	--	--	--	--	282 U	301 U
PCB-162				--	--	--	--	--	--	282 U	301 U
PCB-165				--	--	--	--	--	--	282 U	301 U
PCB-166				--	--	--	--	--	--	282 U	301 U
PCB-167			120000	--	--	--	--	--	--	282 U	301 U
PCB-168				--	--	--	--	--	--	282 U	301 U
PCB-169			120	--	--	--	--	--	--	282 U	301 U
PCB-170				--	--	--	--	--	--	282 U	301 U
PCB-171				--	--	--	--	--	--	282 U	301 U
PCB-172				--	--	--	--	--	--	282 U	301 U
PCB-173				--	--	--	--	--	--	282 U	301 U
PCB-174				--	--	--	--	--	--	282 U	301 U
PCB-175/182				--	--	--	--	--	--	563 U	601 U

Table 1
Town of Fenwick Island Dredge Area Sediment Data

			Task	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**	**2021_SedChar**
			Location ID	**FI-2021-01**	**FI-2021-02**	**FI-2021-03**	**FI-2021-04**	**FI-2021-05**	**FI-2021-06**	**FI-2021-NORTH**	**FI-2021-SOUTH**
			Sample ID	**FI-2021-01-20211019**	**FI-2021-02-20211019**	**FI-2021-03-20211019**	**FI-2021-04-20211019**	**FI-2021-05-20211019**	**FI-2021-06-20211019**	**FI-2021-NORTH-20211019**	**FI-2021-SOUTH-20211019**
			Sample Date	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**	**10/19/2021**
			Depth	**0 - 2.3 ft**	**0 - 2 ft**	**0 - 2 ft**	**0 - 3 ft**	**0 - 2.5 ft**	**0 - 2 ft**		
			Sample Type	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**
			Matrix	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**	**SE**
			X	**758147.41**	**758664.14**	**759240.31**	**758203.57**	**758639.37**	**759031.87**	--	--
			Y	**168456.48**	**168877.64**	**169184.91**	**166011.34**	**166169.37**	**166347.42**	--	--
Chemical	**DNREC_HSCA_EC_SED_M**	**DNREC_HSCA_EC_SOIL**	**DNREC_HSCA_SOIL**								
PCB-176				--	--	--	--	--	--	282 U	301 U
PCB-177				--	--	--	--	--	--	282 U	301 U
PCB-178				--	--	--	--	--	--	282 U	301 U
PCB-179				--	--	--	--	--	--	282 U	301 U
PCB-180				--	--	--	--	--	--	282 U	301 U
PCB-181				--	--	--	--	--	--	282 U	301 U
PCB-183				--	--	--	--	--	--	282 U	301 U
PCB-184				--	--	--	--	--	--	282 U	301 U
PCB-185				--	--	--	--	--	--	282 U	301 U
PCB-186				--	--	--	--	--	--	282 U	301 U
PCB-187				--	--	--	--	--	--	282 U	301 U
PCB-188				--	--	--	--	--	--	282 U	301 U
PCB-189			130000	--	--	--	--	--	--	282 U	301 U
PCB-190				--	--	--	--	--	--	282 U	301 U
PCB-191				--	--	--	--	--	--	282 U	301 U
PCB-192				--	--	--	--	--	--	282 U	301 U
PCB-193				--	--	--	--	--	--	282 U	301 U
PCB-194				--	--	--	--	--	--	282 U	301 U
PCB-195				--	--	--	--	--	--	282 U	301 U
PCB-196				--	--	--	--	--	--	282 U	301 U
PCB-197				--	--	--	--	--	--	282 U	301 U
PCB-198				--	--	--	--	--	--	282 U	301 U
PCB-199				--	--	--	--	--	--	282 U	301 U
PCB-200/204				--	--	--	--	--	--	563 U	601 U
PCB-201				--	--	--	--	--	--	282 U	301 U
PCB-202				--	--	--	--	--	--	282 U	301 U
PCB-203				--	--	--	--	--	--	282 U	301 U
PCB-205				--	--	--	--	--	--	282 U	301 U
PCB-206				--	--	--	--	--	--	282 U	301 U
PCB-207				--	--	--	--	--	--	282 U	301 U
PCB-208				--	--	--	--	--	--	282 U	301 U
PCB-209				--	--	--	--	--	--	282 U	301 U
Total PCB Congener (U = 0)	40000	40000000		--	--	--	--	--	--	845 U	902 U

Notes:

Detected concentration is greater than DNREC_HSCA_EC_SED_M screening level (2021 Delaware DNREC HSCA Screening Levels for Ecological Sediment in Marine Water)

Detected concentration is greater than DNREC_HSCA_EC_SOIL screening level (2021 Delaware DNREC HSCA Screening Levels for Ecological Surface Soil)

Detected concentration is greater than DNREC_HSCA_SOIL screening level (2021 Delaware DNREC HSCA Screening Levels for Soil)

Bold: Detected result

J: Estimated value

U: Compound analyzed for, but not detected above detection limit

Total PCB Congener (U = 0): Total PCB congeners where nondetected results are replaced with zero. If all results are nondetects, the maximum nondetected value is reported as the total.

Laboratory Report

ALPHA ANALYTICAL

ANALYTICAL REPORT

Lab Number:	L2157780
Client:	Anchor QEA, LLC 176 Prospect Park West Seattle, WA 98101
ATTN:	Steve Bagnull
Phone:	(267) 751-4116
Project Name:	LITTLE ASSAWOMAN BAY, FENWICK
Project Number:	192069-01.01
Report Date:	01/11/22

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2157780-01	FI-2021-01-20211019	SEDIMENT	LITTLE ASSAWOMAN BAY	10/19/21 10:00	10/21/21
L2157780-02	FI-2021-02-20211019	SEDIMENT	LITTLE ASSAWOMAN BAY	10/19/21 10:40	10/21/21
L2157780-03	FI-2021-03-20211019	SEDIMENT	LITTLE ASSAWOMAN BAY	10/19/21 11:15	10/21/21
L2157780-04	FI-2021-04-20211019	SEDIMENT	LITTLE ASSAWOMAN BAY	10/19/21 11:52	10/21/21
L2157780-05	FI-2021-05-20211019	SEDIMENT	LITTLE ASSAWOMAN BAY	10/19/21 12:30	10/21/21
L2157780-06	FI-2021-06-20211019	SEDIMENT	LITTLE ASSAWOMAN BAY	10/19/21 12:55	10/21/21
L2157780-07	FI-2021-NORTH-20211019	SEDIMENT	LITTLE ASSAWOMAN BAY	10/19/21 11:20	10/21/21
L2157780-08	FI-2021-SOUTH-20211019	SEDIMENT	LITTLE ASSAWOMAN BAY	10/19/21 13:00	10/21/21

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Case Narrative (continued)

Report Submission

January 11, 2022; This is a final report.

December 28, 2021: This is a preliminary report.

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Sample Receipt

L2157780: The samples were frozen upon receipt in order to arrest the holding time.

L2157780-01: The sample identified as "FI-2021-01" on the chain of custody was identified as "FI-2021-F1" on the container label. At the client's request, the sample is reported as "FI-2021-01".

L2157780-07: The collection date and time on the chain of custody was 19-OCT-21 11:20; however, the collection date/time on the container label was 19-OCT-21 10:00. At the client's request, the collection date/time is reported as 19-OCT-21 11:20.

L2157780-08: The collection date and time on the chain of custody was 19-OCT-21 13:00; however, the collection date/time on the container label was 19-OCT-21 11:52. At the client's request, the collection date/time is reported as 19-OCT-21 13:00.

Pesticides

L2157780-08D: The sample has elevated detection limits due to the dilution required by the sample matrix.

WG1580105-2/-3: The surrogate recovery is outside the individual acceptance criteria for tetrachloro-meta-xylene (195% and 186%), but within the overall method allowances.

Total Organic Carbon

WG1587625-1: The required batch QC was prepared; however, the native sample required a different reporting method; therefore, the associated QC results could not be reported.

Grain Size Analysis

Project Name:	LITTLE ASSAWOMAN BAY, FENWICK	**Lab Number:**	L2157780
Project Number:	192069-01.01	**Report Date:**	01/11/22

Case Narrative (continued)

The WG1583676-1 Laboratory Duplicate RPD for % coarse sand (67%), performed on L2157780-01, is outside the acceptance criteria. The elevated RPD has been attributed to the non-homogeneous nature of the native sample.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: [signature] Elizabeth Porta

Title: Technical Director/Representative Date: 01/11/22

ORGANICS

SEMIVOLATILES

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-07
Client ID: FI-2021-NORTH-20211019
Sample Location: LITTLE ASSAWOMAN BAY

Date Collected: 10/19/21 11:20
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 1,8270D-SIM(M)
Analytical Date: 12/14/21 12:24
Analyst: CC
Percent Solids: 68%

Extraction Method: ALPHA OP-013
Extraction Date: 12/07/21 16:24
Cleanup Method: EPA 3611B
Cleanup Date: 12/11/21

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs - Mansfield Lab						
Naphthalene	4.10		ug/kg	1.47	0.422	1
C1-Naphthalenes	3.25		ug/kg	1.47	0.422	1
C2-Naphthalenes	5.12		ug/kg	1.47	0.422	1
C3-Naphthalenes	3.77		ug/kg	1.47	0.422	1
C4-Naphthalenes	3.65		ug/kg	1.47	0.422	1
Acenaphthylene	1.34	J	ug/kg	1.47	0.280	1
Acenaphthene	8.07		ug/kg	1.47	0.259	1
Fluorene	7.61		ug/kg	1.47	0.392	1
C1-Fluorenes	2.80		ug/kg	1.47	0.392	1
C2-Fluorenes	3.38		ug/kg	1.47	0.392	1
C3-Fluorenes	7.26		ug/kg	1.47	0.392	1
Phenanthrene	44.7		ug/kg	1.47	0.487	1
C1-Phenanthrenes/Anthracenes	18.9		ug/kg	1.47	0.487	1
C2-Phenanthrenes/Anthracenes	11.2		ug/kg	1.47	0.487	1
C3-Phenanthrenes/Anthracenes	6.87		ug/kg	1.47	0.487	1
C4-Phenanthrenes/Anthracenes	3.43		ug/kg	1.47	0.487	1
Anthracene	14.5		ug/kg	1.47	0.303	1
Fluoranthene	61.6		ug/kg	1.47	0.467	1
Pyrene	52.2		ug/kg	1.47	0.386	1
C1-Fluoranthenes/Pyrenes	31.6		ug/kg	1.47	0.386	1
Benz(a)anthracene	30.6		ug/kg	1.47	0.300	1
Chrysene	40.3		ug/kg	1.47	0.297	1
C1-Chrysenes	13.2		ug/kg	1.47	0.297	1
C2-Chrysenes	6.67		ug/kg	1.47	0.297	1
C3-Chrysenes	6.88		ug/kg	1.47	0.297	1
C4-Chrysenes	9.16		ug/kg	1.47	0.297	1
Benzo(b)fluoranthene	29.0		ug/kg	1.47	0.382	1
Benzo(j)+(k)fluoranthene	25.8		ug/kg	1.47	0.292	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-07
Client ID: FI-2021-NORTH-20211019
Sample Location: LITTLE ASSAWOMAN BAY
Date Collected: 10/19/21 11:20
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs - Mansfield Lab						
Benzo(e)pyrene	19.3		ug/kg	1.47	0.303	1
Benzo(a)pyrene	31.2		ug/kg	1.47	0.420	1
Perylene	21.7		ug/kg	1.47	0.284	1
Indeno(1,2,3-cd)pyrene	19.0		ug/kg	1.47	0.399	1
Dibenz(a,h)+(a,c)anthracene	5.38		ug/kg	1.47	0.397	1
Benzo(g,h,i)perylene	19.1		ug/kg	1.47	0.390	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Naphthalene-d8	72		50-130
Phenanthrene-d10	92		50-130
Benzo(a)pyrene-d12	107		50-130

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780

Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-08
Client ID: FI-2021-SOUTH-20211019
Sample Location: LITTLE ASSAWOMAN BAY

Date Collected: 10/19/21 13:00
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 1,8270D-SIM(M)
Analytical Date: 12/16/21 09:22
Analyst: CC
Percent Solids: 62%

Extraction Method: ALPHA OP-013
Extraction Date: 12/07/21 16:24
Cleanup Method: EPA 3611B
Cleanup Date: 12/11/21

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs - Mansfield Lab						
Naphthalene	1.31	J	ug/kg	1.56	0.447	1
C1-Naphthalenes	0.949	J	ug/kg	1.56	0.447	1
C2-Naphthalenes	5.72		ug/kg	1.56	0.447	1
C3-Naphthalenes	2.45		ug/kg	1.56	0.447	1
C4-Naphthalenes	3.20		ug/kg	1.56	0.447	1
Acenaphthylene	1.12	J	ug/kg	1.56	0.297	1
Acenaphthene	0.622	J	ug/kg	1.56	0.274	1
Fluorene	0.952	J	ug/kg	1.56	0.415	1
C1-Fluorenes	0.933	J	ug/kg	1.56	0.415	1
C2-Fluorenes	2.54		ug/kg	1.56	0.415	1
C3-Fluorenes	5.32		ug/kg	1.56	0.415	1
Phenanthrene	5.20		ug/kg	1.56	0.516	1
C1-Phenanthrenes/Anthracenes	5.33		ug/kg	1.56	0.516	1
C2-Phenanthrenes/Anthracenes	5.04		ug/kg	1.56	0.516	1
C3-Phenanthrenes/Anthracenes	4.37		ug/kg	1.56	0.516	1
C4-Phenanthrenes/Anthracenes	2.96		ug/kg	1.56	0.516	1
Anthracene	1.84		ug/kg	1.56	0.321	1
Fluoranthene	8.71		ug/kg	1.56	0.495	1
Pyrene	8.72		ug/kg	1.56	0.409	1
C1-Fluoranthenes/Pyrenes	6.68		ug/kg	1.56	0.409	1
Benz(a)anthracene	4.05		ug/kg	1.56	0.317	1
Chrysene	5.40		ug/kg	1.56	0.315	1
C1-Chrysenes	3.91		ug/kg	1.56	0.315	1
C2-Chrysenes	3.68		ug/kg	1.56	0.315	1
C3-Chrysenes	5.25		ug/kg	1.56	0.315	1
C4-Chrysenes	9.61		ug/kg	1.56	0.315	1
Benzo(b)fluoranthene	5.15		ug/kg	1.56	0.405	1
Benzo(j)+(k)fluoranthene	4.03		ug/kg	1.56	0.309	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-08
Date Collected: 10/19/21 13:00
Client ID: FI-2021-SOUTH-20211019
Date Received: 10/21/21
Sample Location: LITTLE ASSAWOMAN BAY
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs - Mansfield Lab						
Benzo(e)pyrene	3.74		ug/kg	1.56	0.321	1
Benzo(a)pyrene	3.81		ug/kg	1.56	0.444	1
Perylene	18.1		ug/kg	1.56	0.300	1
Indeno(1,2,3-cd)pyrene	3.52		ug/kg	1.56	0.422	1
Dibenz(a,h)+(a,c)anthracene	1.06	J	ug/kg	1.56	0.420	1
Benzo(g,h,i)perylene	4.21		ug/kg	1.56	0.414	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Naphthalene-d8	67		50-130
Phenanthrene-d10	87		50-130
Benzo(a)pyrene-d12	100		50-130

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D-SIM(M)
Analytical Date: 12/14/21 06:28
Analyst: CC

Extraction Method: ALPHA OP-013
Extraction Date: 12/07/21 16:24
Cleanup Method: EPA 3611B
Cleanup Date: 12/11/21

Parameter	Result	Qualifier	Units	RL	MDL
PAHs - Mansfield Lab for sample(s): 07-08 Batch: WG1580280-1					
Naphthalene	ND		ug/kg	1.00	0.287
C1-Naphthalenes	ND		ug/kg	1.00	0.287
C2-Naphthalenes	ND		ug/kg	1.00	0.287
C3-Naphthalenes	ND		ug/kg	1.00	0.287
C4-Naphthalenes	ND		ug/kg	1.00	0.287
Acenaphthylene	ND		ug/kg	1.00	0.191
Acenaphthene	ND		ug/kg	1.00	0.176
Fluorene	ND		ug/kg	1.00	0.267
C1-Fluorenes	ND		ug/kg	1.00	0.267
C2-Fluorenes	ND		ug/kg	1.00	0.267
C3-Fluorenes	ND		ug/kg	1.00	0.267
Phenanthrene	ND		ug/kg	1.00	0.331
C1-Phenanthrenes/Anthracenes	ND		ug/kg	1.00	0.331
C2-Phenanthrenes/Anthracenes	ND		ug/kg	1.00	0.331
C3-Phenanthrenes/Anthracenes	ND		ug/kg	1.00	0.331
C4-Phenanthrenes/Anthracenes	ND		ug/kg	1.00	0.331
Anthracene	ND		ug/kg	1.00	0.206
Fluoranthene	ND		ug/kg	1.00	0.318
Pyrene	ND		ug/kg	1.00	0.263
C1-Fluoranthenes/Pyrenes	ND		ug/kg	1.00	0.263
Benz(a)anthracene	ND		ug/kg	1.00	0.204
Chrysene	ND		ug/kg	1.00	0.202
C1-Chrysenes	ND		ug/kg	1.00	0.202
C2-Chrysenes	ND		ug/kg	1.00	0.202
C3-Chrysenes	ND		ug/kg	1.00	0.202
C4-Chrysenes	ND		ug/kg	1.00	0.202
Benzo(b)fluoranthene	ND		ug/kg	1.00	0.260
Benzo(j)+(k)fluoranthene	ND		ug/kg	1.00	0.198
Benzo(e)pyrene	ND		ug/kg	1.00	0.206

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01
Lab Number: L2157780
Report Date: 01/11/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8270D-SIM(M)
Analytical Date: 12/14/21 06:28
Analyst: CC

Extraction Method: ALPHA OP-013
Extraction Date: 12/07/21 16:24
Cleanup Method: EPA 3611B
Cleanup Date: 12/11/21

Parameter	Result	Qualifier	Units	RL	MDL
PAHs - Mansfield Lab for sample(s): 07-08 Batch: WG1580280-1					
Benzo(a)pyrene	ND		ug/kg	1.00	0.285
Perylene	ND		ug/kg	1.00	0.193
Indeno(1,2,3-cd)pyrene	ND		ug/kg	1.00	0.271
Dibenz(a,h)+(a,c)anthracene	ND		ug/kg	1.00	0.270
Benzo(g,h,i)perylene	ND		ug/kg	1.00	0.266

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Naphthalene-d8	71		50-130
Phenanthrene-d10	92		50-130
Benzo(a)pyrene-d12	106		50-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PAHs - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580280-2 WG1580280-3								
Naphthalene	76		82		50-130	8		30
Acenaphthylene	81		86		50-130	6		30
Acenaphthene	80		87		50-130	8		30
Fluorene	82		86		50-130	5		30
Phenanthrene	86		90		50-130	5		30
Anthracene	89		93		50-130	4		30
Fluoranthene	79		84		50-130	6		30
Pyrene	82		86		50-130	5		30
Benz(a)anthracene	87		92		50-130	6		30
Chrysene	83		86		50-130	4		30
Benzo(b)fluoranthene	98		103		50-130	5		30
Benzo(j)+(k)fluoranthene	89		93		50-130	4		30
Benzo(a)pyrene	106		111		50-130	5		30
Indeno(1,2,3-cd)pyrene	93		98		50-130	5		30
Dibenz(a,h)+(a,c)anthracene	105		111		50-130	6		30
Benzo(g,h,i)perylene	106		111		50-130	5		30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Naphthalene-d8	81		84		50-130
Phenanthrene-d10	95		97		50-130
Benzo(a)pyrene-d12	111		114		50-130

PCBS

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-07
Client ID: FI-2021-NORTH-20211019
Sample Location: LITTLE ASSAWOMAN BAY

Date Collected: 10/19/21 11:20
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 12/10/21 18:11
Analyst: CC
Percent Solids: 68%

Extraction Method: EPA 3570
Extraction Date: 12/07/21 14:11
Cleanup Method: EPA 3630
Cleanup Date: 12/09/21

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl1-BZ#1-Cal/RTW	ND		ug/kg	0.282	0.141	1
Cl1-BZ#2	ND		ug/kg	0.282	0.141	1
Cl1-BZ#3	ND		ug/kg	0.282	0.141	1
Cl2-BZ#4/#10	ND		ug/kg	0.563	0.282	1
Cl2-BZ#9	ND		ug/kg	0.282	0.141	1
Cl2-BZ#7	ND		ug/kg	0.282	0.141	1
Cl2-BZ#6	ND		ug/kg	0.282	0.141	1
Cl2-BZ#5	ND		ug/kg	0.282	0.141	1
Cl2-BZ#8	ND		ug/kg	0.282	0.141	1
Cl3-BZ#19	ND		ug/kg	0.282	0.141	1
Cl2-BZ#14	ND		ug/kg	0.282	0.141	1
Cl3-BZ#30	ND		ug/kg	0.282	0.141	1
Cl3-BZ#18	ND		ug/kg	0.282	0.141	1
Cl2-BZ#11	ND		ug/kg	0.282	0.141	1
Cl3-BZ#17	ND		ug/kg	0.282	0.141	1
Cl2-BZ#12	ND		ug/kg	0.282	0.141	1
Cl3-BZ#27	ND		ug/kg	0.282	0.141	1
Cl2-BZ#13	ND		ug/kg	0.563	0.282	1
Cl3-BZ#24	ND		ug/kg	0.282	0.141	1
Cl3-BZ#16	ND		ug/kg	0.282	0.141	1
Cl3-BZ#32	ND		ug/kg	0.282	0.141	1
Cl2-BZ#15	ND		ug/kg	0.282	0.141	1
Cl3-BZ#34	ND		ug/kg	0.282	0.141	1
Cl3-BZ#23	ND		ug/kg	0.282	0.141	1
Cl4-BZ#54	ND		ug/kg	0.282	0.141	1
Cl3-BZ#29-Cal	ND		ug/kg	0.282	0.141	1
Cl4-BZ#50-Cal	ND		ug/kg	0.282	0.141	1
Cl3-BZ#26	ND		ug/kg	0.282	0.141	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-07
Client ID: FI-2021-NORTH-20211019
Sample Location: LITTLE ASSAWOMAN BAY
Date Collected: 10/19/21 11:20
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl3-BZ#25	ND		ug/kg	0.282	0.141	1
Cl4-BZ#53	ND		ug/kg	0.282	0.141	1
Cl3-BZ#-31	ND		ug/kg	0.282	0.141	1
Cl3-BZ#28	ND		ug/kg	0.282	0.141	1
Cl3-BZ#33	ND		ug/kg	0.282	0.141	1
Cl4-BZ#51	ND		ug/kg	0.282	0.141	1
Cl3-BZ#21/#20	ND		ug/kg	0.563	0.282	1
Cl4-BZ#45	ND		ug/kg	0.282	0.141	1
Cl3-BZ#22	ND		ug/kg	0.282	0.141	1
Cl4-BZ#73/#46	ND		ug/kg	0.563	0.282	1
Cl4-BZ#69	ND		ug/kg	0.282	0.141	1
Cl4-BZ#43	ND		ug/kg	0.282	0.141	1
Cl3-BZ#36	ND		ug/kg	0.282	0.141	1
Cl4-BZ#52	ND		ug/kg	0.282	0.141	1
Cl4-BZ#48	ND		ug/kg	0.282	0.141	1
Cl4-BZ#49	ND		ug/kg	0.282	0.141	1
Cl5-BZ#104	ND		ug/kg	0.282	0.141	1
Cl4-BZ#47	ND		ug/kg	0.282	0.141	1
Cl4-BZ#65/#75/#62	ND		ug/kg	0.845	0.422	1
Cl3-BZ#39	ND		ug/kg	0.282	0.141	1
Cl3-BZ#38	ND		ug/kg	0.282	0.141	1
Cl4-BZ#44	ND		ug/kg	0.282	0.141	1
Cl4-BZ#59	ND		ug/kg	0.282	0.141	1
Cl4-BZ#42	ND		ug/kg	0.282	0.141	1
Cl4-BZ#71	ND		ug/kg	0.282	0.141	1
Cl3-BZ#35	ND		ug/kg	0.282	0.141	1
Cl4-BZ#41	ND		ug/kg	0.282	0.141	1
Cl4-BZ#72	ND		ug/kg	0.282	0.141	1
Cl5-BZ#96	ND		ug/kg	0.282	0.141	1
Cl5-BZ#103	ND		ug/kg	0.282	0.141	1
Cl4-BZ#68/#64	ND		ug/kg	0.563	0.282	1
Cl4-BZ#40	ND		ug/kg	0.282	0.141	1
Cl3-BZ#37	ND		ug/kg	0.282	0.141	1
Cl5-BZ#100	ND		ug/kg	0.282	0.141	1
Cl5-BZ#94	ND		ug/kg	0.282	0.141	1
Cl4-BZ#57	ND		ug/kg	0.282	0.141	1
Cl4-BZ#67/#58	ND		ug/kg	0.563	0.282	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-07 Date Collected: 10/19/21 11:20
Client ID: FI-2021-NORTH-20211019 Date Received: 10/21/21
Sample Location: LITTLE ASSAWOMAN BAY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl5-BZ#102	ND		ug/kg	0.282	0.141	1
Cl4-BZ#61	ND		ug/kg	0.282	0.141	1
Cl5-BZ#98	ND		ug/kg	0.282	0.141	1
Cl4-BZ#76	ND		ug/kg	0.282	0.141	1
Cl5-BZ#93	ND		ug/kg	0.282	0.141	1
Cl4-BZ#63	ND		ug/kg	0.282	0.141	1
Cl5-BZ#121/#95/#88	ND		ug/kg	0.845	0.422	1
Cl4-BZ#74	ND		ug/kg	0.282	0.141	1
Cl6-BZ#155	ND		ug/kg	0.282	0.141	1
Cl4-BZ#70	ND		ug/kg	0.282	0.141	1
Cl5-BZ#91	ND		ug/kg	0.282	0.141	1
Cl4-BZ#66	ND		ug/kg	0.282	0.141	1
Cl4-BZ#80	ND		ug/kg	0.282	0.141	1
Cl4-BZ#55	ND		ug/kg	0.282	0.141	1
Cl5-BZ#92	ND		ug/kg	0.282	0.141	1
Cl5-BZ#89/#84	ND		ug/kg	0.563	0.282	1
Cl5-BZ#101/#90	ND		ug/kg	0.563	0.282	1
Cl4-BZ#56	ND		ug/kg	0.282	0.141	1
Cl5-BZ#113	ND		ug/kg	0.282	0.141	1
Cl5-BZ#99	ND		ug/kg	0.282	0.141	1
Cl6-BZ#150	ND		ug/kg	0.282	0.141	1
Cl4-BZ#60	ND		ug/kg	0.282	0.141	1
Cl6-BZ#152	ND		ug/kg	0.282	0.141	1
Cl5-BZ#119	ND		ug/kg	0.282	0.141	1
Cl5-BZ#83/#125/#112	ND		ug/kg	0.845	0.422	1
Cl5-BZ#86/#109	ND		ug/kg	0.563	0.282	1
Cl6-BZ#145	ND		ug/kg	0.282	0.141	1
Cl5-BZ#97	ND		ug/kg	0.282	0.141	1
Cl6-BZ#148	ND		ug/kg	0.282	0.141	1
Cl4-BZ#79	ND		ug/kg	0.282	0.141	1
Cl5-BZ#116	ND		ug/kg	0.282	0.141	1
Cl6-BZ#154-Cal	ND		ug/kg	0.282	0.141	1
Cl4-BZ#78	ND		ug/kg	0.282	0.141	1
Cl5-BZ#87/#111	ND		ug/kg	0.563	0.282	1
Cl6-BZ#136	ND		ug/kg	0.282	0.141	1
Cl5-BZ#117	ND		ug/kg	0.282	0.141	1
Cl5-BZ#115	ND		ug/kg	0.282	0.141	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-07 Date Collected: 10/19/21 11:20
Client ID: FI-2021-NORTH-20211019 Date Received: 10/21/21
Sample Location: LITTLE ASSAWOMAN BAY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl5-BZ#85	ND		ug/kg	0.282	0.141	1
Cl5-BZ#120	ND		ug/kg	0.282	0.141	1
Cl5-BZ#110	ND		ug/kg	0.282	0.141	1
Cl4-BZ#81	ND		ug/kg	0.282	0.141	1
Cl6-BZ#151	ND		ug/kg	0.282	0.141	1
Cl6-BZ#135	ND		ug/kg	0.282	0.141	1
Cl5-BZ#82	ND		ug/kg	0.282	0.141	1
Cl6-BZ#144	ND		ug/kg	0.282	0.141	1
Cl6-BZ#147/#149	ND		ug/kg	0.563	0.282	1
Cl4-BZ#77	ND		ug/kg	0.282	0.141	1
Cl6-BZ#143/#139	ND		ug/kg	0.563	0.282	1
Cl5-BZ#124	ND		ug/kg	0.282	0.141	1
Cl6-BZ#140	ND		ug/kg	0.282	0.141	1
Cl5-BZ#108	ND		ug/kg	0.282	0.141	1
Cl5-BZ#107/#123	ND		ug/kg	0.563	0.282	1
Cl7-BZ#188-Cal/RTW	ND		ug/kg	0.282	0.141	1
Cl6-BZ#134	ND		ug/kg	0.282	0.141	1
Cl5-BZ#106	ND		ug/kg	0.282	0.141	1
Cl6-BZ#133	ND		ug/kg	0.282	0.141	1
Cl6-BZ#142	ND		ug/kg	0.282	0.141	1
Cl5-BZ#118	ND		ug/kg	0.282	0.141	1
Cl6-BZ#131	ND		ug/kg	0.282	0.141	1
Cl7-BZ#184	ND		ug/kg	0.282	0.141	1
Cl6-BZ#165	ND		ug/kg	0.282	0.141	1
Cl6-BZ#146	ND		ug/kg	0.282	0.141	1
Cl6-BZ#161	ND		ug/kg	0.282	0.141	1
Cl5-BZ#122	ND		ug/kg	0.282	0.141	1
Cl6-BZ#168	ND		ug/kg	0.282	0.141	1
Cl5-BZ#114	ND		ug/kg	0.282	0.141	1
Cl6-BZ#153	ND		ug/kg	0.282	0.141	1
Cl6-BZ#132	ND		ug/kg	0.282	0.141	1
Cl7-BZ#179	ND		ug/kg	0.282	0.141	1
Cl6-BZ#141	ND		ug/kg	0.282	0.141	1
Cl7-BZ#176	ND		ug/kg	0.282	0.141	1
Cl5-BZ#105	ND		ug/kg	0.282	0.141	1
Cl6-BZ#137	ND		ug/kg	0.282	0.141	1
Cl5-BZ#127	ND		ug/kg	0.282	0.141	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780

Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID:	L2157780-07	Date Collected:	10/19/21 11:20
Client ID:	FI-2021-NORTH-20211019	Date Received:	10/21/21
Sample Location:	LITTLE ASSAWOMAN BAY	Field Prep:	Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl7-BZ#186	ND		ug/kg	0.282	0.141	1
Cl6-BZ#130/#164	ND		ug/kg	0.563	0.282	1
Cl7-BZ#178	ND		ug/kg	0.282	0.141	1
Cl6-BZ#138	ND		ug/kg	0.282	0.141	1
Cl6-BZ#163/#160	ND		ug/kg	0.563	0.282	1
Cl6-BZ#129/#158	ND		ug/kg	0.563	0.282	1
Cl7-BZ#182/#175	ND		ug/kg	0.563	0.282	1
Cl7-BZ#187	ND		ug/kg	0.282	0.141	1
Cl7-BZ#183	ND		ug/kg	0.282	0.141	1
Cl6-BZ#166	ND		ug/kg	0.282	0.141	1
Cl6-BZ#159	ND		ug/kg	0.282	0.141	1
Cl5-BZ#126	ND		ug/kg	0.282	0.141	1
Cl7-BZ#185	ND		ug/kg	0.282	0.141	1
Cl6-BZ#162	ND		ug/kg	0.282	0.141	1
Cl7-BZ#174	ND		ug/kg	0.282	0.141	1
Cl6-BZ#128	ND		ug/kg	0.282	0.141	1
Cl8-BZ#202	ND		ug/kg	0.282	0.141	1
Cl6-BZ#167	ND		ug/kg	0.282	0.141	1
Cl7-BZ#181	ND		ug/kg	0.282	0.141	1
Cl7-BZ#177	ND		ug/kg	0.282	0.141	1
Cl8-BZ#204/#200-CAL	ND		ug/kg	0.563	0.282	1
Cl7-BZ#171	ND		ug/kg	0.282	0.141	1
Cl7-BZ#173	ND		ug/kg	0.282	0.141	1
Cl8-BZ#197	ND		ug/kg	0.282	0.141	1
Cl7-BZ#172	ND		ug/kg	0.282	0.141	1
Cl7-BZ#192	ND		ug/kg	0.282	0.141	1
Cl6-BZ#156	ND		ug/kg	0.282	0.141	1
Cl6-BZ#157	ND		ug/kg	0.282	0.141	1
Cl7-BZ#180	ND		ug/kg	0.282	0.141	1
Cl7-BZ#193	ND		ug/kg	0.282	0.141	1
Cl8-BZ#199	ND		ug/kg	0.282	0.141	1
Cl7-BZ#191	ND		ug/kg	0.282	0.141	1
Cl8-BZ#198	ND		ug/kg	0.282	0.141	1
Cl8-BZ#201	ND		ug/kg	0.282	0.141	1
Cl7-BZ#170	ND		ug/kg	0.282	0.141	1
Cl7-BZ#190	ND		ug/kg	0.282	0.141	1
Cl8-BZ#196	ND		ug/kg	0.282	0.141	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-07
Client ID: FI-2021-NORTH-20211019
Sample Location: LITTLE ASSAWOMAN BAY
Date Collected: 10/19/21 11:20
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl8-BZ#203	ND		ug/kg	0.282	0.141	1
Cl6-BZ#169	ND		ug/kg	0.282	0.141	1
Cl9-BZ#208	ND		ug/kg	0.282	0.141	1
Cl9-BZ#207	ND		ug/kg	0.282	0.141	1
Cl7-BZ#189	ND		ug/kg	0.282	0.141	1
Cl8-BZ#195	ND		ug/kg	0.282	0.141	1
Cl8-BZ#194	ND		ug/kg	0.282	0.141	1
Cl8-BZ#205	ND		ug/kg	0.282	0.141	1
Cl9-BZ#206-Cal/RTW	ND		ug/kg	0.282	0.141	1
Cl10-BZ#209-Cal/RTW	ND		ug/kg	0.282	0.141	1
Monochlorobiphenyls	ND		ug/kg	0.282	0.141	1
Dichlorobiphenyls	ND		ug/kg	0.282	0.141	1
Trichlorobiphenyls	ND		ug/kg	0.282	0.141	1
Tetrachlorobiphenyls	ND		ug/kg	0.282	0.141	1
Pentachlorobiphenyls	ND		ug/kg	0.282	0.141	1
Hexachlorobiphenyls	ND		ug/kg	0.282	0.141	1
Heptachlorobiphenyls	ND		ug/kg	0.282	0.141	1
Octachlorobiphenyls	ND		ug/kg	0.282	0.141	1
Nonachlorobiphenyls	ND		ug/kg	0.282	0.141	1
Decachlorobiphenyl	ND		ug/kg	0.282	0.141	1
Total PCB	ND		ug/kg	0.282	NA	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Cl3-BZ#19-C13 (surr)	67		50-125
Cl8-BZ#202-C13 (surr)	75		50-125

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-08
Client ID: FI-2021-SOUTH-20211019
Sample Location: LITTLE ASSAWOMAN BAY
Date Collected: 10/19/21 13:00
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 12/10/21 19:26
Analyst: CC
Percent Solids: 62%

Extraction Method: EPA 3570
Extraction Date: 12/07/21 14:11
Cleanup Method: EPA 3630
Cleanup Date: 12/09/21

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl1-BZ#1-Cal/RTW	ND		ug/kg	0.301	0.150	1
Cl1-BZ#2	ND		ug/kg	0.301	0.150	1
Cl1-BZ#3	ND		ug/kg	0.301	0.150	1
Cl2-BZ#4/#10	ND		ug/kg	0.601	0.301	1
Cl2-BZ#9	ND		ug/kg	0.301	0.150	1
Cl2-BZ#7	ND		ug/kg	0.301	0.150	1
Cl2-BZ#6	ND		ug/kg	0.301	0.150	1
Cl2-BZ#5	ND		ug/kg	0.301	0.150	1
Cl2-BZ#8	ND		ug/kg	0.301	0.150	1
Cl3-BZ#19	ND		ug/kg	0.301	0.150	1
Cl2-BZ#14	ND		ug/kg	0.301	0.150	1
Cl3-BZ#30	ND		ug/kg	0.301	0.150	1
Cl3-BZ#18	ND		ug/kg	0.301	0.150	1
Cl2-BZ#11	ND		ug/kg	0.301	0.150	1
Cl3-BZ#17	ND		ug/kg	0.301	0.150	1
Cl2-BZ#12	ND		ug/kg	0.301	0.150	1
Cl3-BZ#27	ND		ug/kg	0.301	0.150	1
Cl2-BZ#13	ND		ug/kg	0.601	0.301	1
Cl3-BZ#24	ND		ug/kg	0.301	0.150	1
Cl3-BZ#16	ND		ug/kg	0.301	0.150	1
Cl3-BZ#32	ND		ug/kg	0.301	0.150	1
Cl2-BZ#15	ND		ug/kg	0.301	0.150	1
Cl3-BZ#34	ND		ug/kg	0.301	0.150	1
Cl3-BZ#23	ND		ug/kg	0.301	0.150	1
Cl4-BZ#54	ND		ug/kg	0.301	0.150	1
Cl3-BZ#29-Cal	ND		ug/kg	0.301	0.150	1
Cl4-BZ#50-Cal	ND		ug/kg	0.301	0.150	1
Cl3-BZ#26	ND		ug/kg	0.301	0.150	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-08
Client ID: FI-2021-SOUTH-20211019
Sample Location: LITTLE ASSAWOMAN BAY
Date Collected: 10/19/21 13:00
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl3-BZ#25	ND		ug/kg	0.301	0.150	1
Cl4-BZ#53	ND		ug/kg	0.301	0.150	1
Cl3-BZ#-31	ND		ug/kg	0.301	0.150	1
Cl3-BZ#28	ND		ug/kg	0.301	0.150	1
Cl3-BZ#33	ND		ug/kg	0.301	0.150	1
Cl4-BZ#51	ND		ug/kg	0.301	0.150	1
Cl3-BZ#21/#20	ND		ug/kg	0.601	0.301	1
Cl4-BZ#45	ND		ug/kg	0.301	0.150	1
Cl3-BZ#22	ND		ug/kg	0.301	0.150	1
Cl4-BZ#73/#46	ND		ug/kg	0.601	0.301	1
Cl4-BZ#69	ND		ug/kg	0.301	0.150	1
Cl4-BZ#43	ND		ug/kg	0.301	0.150	1
Cl3-BZ#36	ND		ug/kg	0.301	0.150	1
Cl4-BZ#52	ND		ug/kg	0.301	0.150	1
Cl4-BZ#48	ND		ug/kg	0.301	0.150	1
Cl4-BZ#49	ND		ug/kg	0.301	0.150	1
Cl5-BZ#104	ND		ug/kg	0.301	0.150	1
Cl4-BZ#47	ND		ug/kg	0.301	0.150	1
Cl4-BZ#65/#75/#62	ND		ug/kg	0.902	0.451	1
Cl3-BZ#39	ND		ug/kg	0.301	0.150	1
Cl3-BZ#38	ND		ug/kg	0.301	0.150	1
Cl4-BZ#44	ND		ug/kg	0.301	0.150	1
Cl4-BZ#59	ND		ug/kg	0.301	0.150	1
Cl4-BZ#42	ND		ug/kg	0.301	0.150	1
Cl4-BZ#71	ND		ug/kg	0.301	0.150	1
Cl3-BZ#35	ND		ug/kg	0.301	0.150	1
Cl4-BZ#41	ND		ug/kg	0.301	0.150	1
Cl4-BZ#72	ND		ug/kg	0.301	0.150	1
Cl5-BZ#96	ND		ug/kg	0.301	0.150	1
Cl5-BZ#103	ND		ug/kg	0.301	0.150	1
Cl4-BZ#68/#64	ND		ug/kg	0.601	0.301	1
Cl4-BZ#40	ND		ug/kg	0.301	0.150	1
Cl3-BZ#37	ND		ug/kg	0.301	0.150	1
Cl5-BZ#100	ND		ug/kg	0.301	0.150	1
Cl5-BZ#94	ND		ug/kg	0.301	0.150	1
Cl4-BZ#57	ND		ug/kg	0.301	0.150	1
Cl4-BZ#67/#58	ND		ug/kg	0.601	0.301	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-08 Date Collected: 10/19/21 13:00
Client ID: FI-2021-SOUTH-20211019 Date Received: 10/21/21
Sample Location: LITTLE ASSAWOMAN BAY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl5-BZ#102	ND		ug/kg	0.301	0.150	1
Cl4-BZ#61	ND		ug/kg	0.301	0.150	1
Cl5-BZ#98	ND		ug/kg	0.301	0.150	1
Cl4-BZ#76	ND		ug/kg	0.301	0.150	1
Cl5-BZ#93	ND		ug/kg	0.301	0.150	1
Cl4-BZ#63	ND		ug/kg	0.301	0.150	1
Cl5-BZ#121/#95/#88	ND		ug/kg	0.902	0.451	1
Cl4-BZ#74	ND		ug/kg	0.301	0.150	1
Cl6-BZ#155	ND		ug/kg	0.301	0.150	1
Cl4-BZ#70	ND		ug/kg	0.301	0.150	1
Cl5-BZ#91	ND		ug/kg	0.301	0.150	1
Cl4-BZ#66	ND		ug/kg	0.301	0.150	1
Cl4-BZ#80	ND		ug/kg	0.301	0.150	1
Cl4-BZ#55	ND		ug/kg	0.301	0.150	1
Cl5-BZ#92	ND		ug/kg	0.301	0.150	1
Cl5-BZ#89/#84	ND		ug/kg	0.601	0.301	1
Cl5-BZ#101/#90	ND		ug/kg	0.601	0.301	1
Cl4-BZ#56	ND		ug/kg	0.301	0.150	1
Cl5-BZ#113	ND		ug/kg	0.301	0.150	1
Cl5-BZ#99	ND		ug/kg	0.301	0.150	1
Cl6-BZ#150	ND		ug/kg	0.301	0.150	1
Cl4-BZ#60	ND		ug/kg	0.301	0.150	1
Cl6-BZ#152	ND		ug/kg	0.301	0.150	1
Cl5-BZ#119	ND		ug/kg	0.301	0.150	1
Cl5-BZ#83/#125/#112	ND		ug/kg	0.902	0.451	1
Cl5-BZ#86/#109	ND		ug/kg	0.601	0.301	1
Cl6-BZ#145	ND		ug/kg	0.301	0.150	1
Cl5-BZ#97	ND		ug/kg	0.301	0.150	1
Cl6-BZ#148	ND		ug/kg	0.301	0.150	1
Cl4-BZ#79	ND		ug/kg	0.301	0.150	1
Cl5-BZ#116	ND		ug/kg	0.301	0.150	1
Cl6-BZ#154-Cal	ND		ug/kg	0.301	0.150	1
Cl4-BZ#78	ND		ug/kg	0.301	0.150	1
Cl5-BZ#87/#111	ND		ug/kg	0.601	0.301	1
Cl6-BZ#136	ND		ug/kg	0.301	0.150	1
Cl5-BZ#117	ND		ug/kg	0.301	0.150	1
Cl5-BZ#115	ND		ug/kg	0.301	0.150	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-08 Date Collected: 10/19/21 13:00
Client ID: FI-2021-SOUTH-20211019 Date Received: 10/21/21
Sample Location: LITTLE ASSAWOMAN BAY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl5-BZ#85	ND		ug/kg	0.301	0.150	1
Cl5-BZ#120	ND		ug/kg	0.301	0.150	1
Cl5-BZ#110	ND		ug/kg	0.301	0.150	1
Cl4-BZ#81	ND		ug/kg	0.301	0.150	1
Cl6-BZ#151	ND		ug/kg	0.301	0.150	1
Cl6-BZ#135	ND		ug/kg	0.301	0.150	1
Cl5-BZ#82	ND		ug/kg	0.301	0.150	1
Cl6-BZ#144	ND		ug/kg	0.301	0.150	1
Cl6-BZ#147/#149	ND		ug/kg	0.601	0.301	1
Cl4-BZ#77	ND		ug/kg	0.301	0.150	1
Cl6-BZ#143/#139	ND		ug/kg	0.601	0.301	1
Cl5-BZ#124	ND		ug/kg	0.301	0.150	1
Cl6-BZ#140	ND		ug/kg	0.301	0.150	1
Cl5-BZ#108	ND		ug/kg	0.301	0.150	1
Cl5-BZ#107/#123	ND		ug/kg	0.601	0.301	1
Cl7-BZ#188-Cal/RTW	ND		ug/kg	0.301	0.150	1
Cl6-BZ#134	ND		ug/kg	0.301	0.150	1
Cl5-BZ#106	ND		ug/kg	0.301	0.150	1
Cl6-BZ#133	ND		ug/kg	0.301	0.150	1
Cl6-BZ#142	ND		ug/kg	0.301	0.150	1
Cl5-BZ#118	ND		ug/kg	0.301	0.150	1
Cl6-BZ#131	ND		ug/kg	0.301	0.150	1
Cl7-BZ#184	ND		ug/kg	0.301	0.150	1
Cl6-BZ#165	ND		ug/kg	0.301	0.150	1
Cl6-BZ#146	ND		ug/kg	0.301	0.150	1
Cl6-BZ#161	ND		ug/kg	0.301	0.150	1
Cl5-BZ#122	ND		ug/kg	0.301	0.150	1
Cl6-BZ#168	ND		ug/kg	0.301	0.150	1
Cl5-BZ#114	ND		ug/kg	0.301	0.150	1
Cl6-BZ#153	ND		ug/kg	0.301	0.150	1
Cl6-BZ#132	ND		ug/kg	0.301	0.150	1
Cl7-BZ#179	ND		ug/kg	0.301	0.150	1
Cl6-BZ#141	ND		ug/kg	0.301	0.150	1
Cl7-BZ#176	ND		ug/kg	0.301	0.150	1
Cl5-BZ#105	ND		ug/kg	0.301	0.150	1
Cl6-BZ#137	ND		ug/kg	0.301	0.150	1
Cl5-BZ#127	ND		ug/kg	0.301	0.150	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-08 Date Collected: 10/19/21 13:00
Client ID: FI-2021-SOUTH-20211019 Date Received: 10/21/21
Sample Location: LITTLE ASSAWOMAN BAY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl7-BZ#186	ND		ug/kg	0.301	0.150	1
Cl6-BZ#130/#164	ND		ug/kg	0.601	0.301	1
Cl7-BZ#178	ND		ug/kg	0.301	0.150	1
Cl6-BZ#138	ND		ug/kg	0.301	0.150	1
Cl6-BZ#163/#160	ND		ug/kg	0.601	0.301	1
Cl6-BZ#129/#158	ND		ug/kg	0.601	0.301	1
Cl7-BZ#182/#175	ND		ug/kg	0.601	0.301	1
Cl7-BZ#187	ND		ug/kg	0.301	0.150	1
Cl7-BZ#183	ND		ug/kg	0.301	0.150	1
Cl6-BZ#166	ND		ug/kg	0.301	0.150	1
Cl6-BZ#159	ND		ug/kg	0.301	0.150	1
Cl5-BZ#126	ND		ug/kg	0.301	0.150	1
Cl7-BZ#185	ND		ug/kg	0.301	0.150	1
Cl6-BZ#162	ND		ug/kg	0.301	0.150	1
Cl7-BZ#174	ND		ug/kg	0.301	0.150	1
Cl6-BZ#128	ND		ug/kg	0.301	0.150	1
Cl8-BZ#202	ND		ug/kg	0.301	0.150	1
Cl6-BZ#167	ND		ug/kg	0.301	0.150	1
Cl7-BZ#181	ND		ug/kg	0.301	0.150	1
Cl7-BZ#177	ND		ug/kg	0.301	0.150	1
Cl8-BZ#204/#200-CAL	ND		ug/kg	0.601	0.301	1
Cl7-BZ#171	ND		ug/kg	0.301	0.150	1
Cl7-BZ#173	ND		ug/kg	0.301	0.150	1
Cl8-BZ#197	ND		ug/kg	0.301	0.150	1
Cl7-BZ#172	ND		ug/kg	0.301	0.150	1
Cl7-BZ#192	ND		ug/kg	0.301	0.150	1
Cl6-BZ#156	ND		ug/kg	0.301	0.150	1
Cl6-BZ#157	ND		ug/kg	0.301	0.150	1
Cl7-BZ#180	ND		ug/kg	0.301	0.150	1
Cl7-BZ#193	ND		ug/kg	0.301	0.150	1
Cl8-BZ#199	ND		ug/kg	0.301	0.150	1
Cl7-BZ#191	ND		ug/kg	0.301	0.150	1
Cl8-BZ#198	ND		ug/kg	0.301	0.150	1
Cl8-BZ#201	ND		ug/kg	0.301	0.150	1
Cl7-BZ#170	ND		ug/kg	0.301	0.150	1
Cl7-BZ#190	ND		ug/kg	0.301	0.150	1
Cl8-BZ#196	ND		ug/kg	0.301	0.150	1

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-08
Client ID: FI-2021-SOUTH-20211019
Sample Location: LITTLE ASSAWOMAN BAY
Date Collected: 10/19/21 13:00
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PCB Congeners/Homologs - Mansfield Lab						
Cl8-BZ#203	ND		ug/kg	0.301	0.150	1
Cl6-BZ#169	ND		ug/kg	0.301	0.150	1
Cl9-BZ#208	ND		ug/kg	0.301	0.150	1
Cl9-BZ#207	ND		ug/kg	0.301	0.150	1
Cl7-BZ#189	ND		ug/kg	0.301	0.150	1
Cl8-BZ#195	ND		ug/kg	0.301	0.150	1
Cl8-BZ#194	ND		ug/kg	0.301	0.150	1
Cl8-BZ#205	ND		ug/kg	0.301	0.150	1
Cl9-BZ#206-Cal/RTW	ND		ug/kg	0.301	0.150	1
Cl10-BZ#209-Cal/RTW	ND		ug/kg	0.301	0.150	1
Monochlorobiphenyls	ND		ug/kg	0.301	0.150	1
Dichlorobiphenyls	ND		ug/kg	0.301	0.150	1
Trichlorobiphenyls	ND		ug/kg	0.301	0.150	1
Tetrachlorobiphenyls	ND		ug/kg	0.301	0.150	1
Pentachlorobiphenyls	ND		ug/kg	0.301	0.150	1
Hexachlorobiphenyls	ND		ug/kg	0.301	0.150	1
Heptachlorobiphenyls	ND		ug/kg	0.301	0.150	1
Octachlorobiphenyls	ND		ug/kg	0.301	0.150	1
Nonachlorobiphenyls	ND		ug/kg	0.301	0.150	1
Decachlorobiphenyl	ND		ug/kg	0.301	0.150	1
Total PCB	ND		ug/kg	0.301	NA	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Cl3-BZ#19-C13 (surr)	63		50-125
Cl8-BZ#202-C13 (surr)	73		50-125

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01
Lab Number: L2157780
Report Date: 01/11/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 12/10/21 14:26
Analyst: MJS

Extraction Method: EPA 3570
Extraction Date: 12/07/21 14:11
Cleanup Method: EPA 3630
Cleanup Date: 12/09/21

Parameter	Result	Qualifier	Units	RL	MDL
PCB Congeners/Homologs - Mansfield Lab for sample(s): 07-08 Batch: WG1580108-1					
Cl1-BZ#1-Cal/RTW	ND		ug/kg	0.200	0.100
Cl1-BZ#2	ND		ug/kg	0.200	0.100
Cl1-BZ#3	ND		ug/kg	0.200	0.100
Cl2-BZ#4/#10	ND		ug/kg	0.400	0.200
Cl2-BZ#9	ND		ug/kg	0.200	0.100
Cl2-BZ#7	ND		ug/kg	0.200	0.100
Cl2-BZ#6	ND		ug/kg	0.200	0.100
Cl2-BZ#5	ND		ug/kg	0.200	0.100
Cl2-BZ#8	ND		ug/kg	0.200	0.100
Cl3-BZ#19	ND		ug/kg	0.200	0.100
Cl2-BZ#14	ND		ug/kg	0.200	0.100
Cl3-BZ#30	ND		ug/kg	0.200	0.100
Cl3-BZ#18	ND		ug/kg	0.200	0.100
Cl2-BZ#11	ND		ug/kg	0.200	0.100
Cl3-BZ#17	ND		ug/kg	0.200	0.100
Cl2-BZ#12	ND		ug/kg	0.200	0.100
Cl3-BZ#27	ND		ug/kg	0.200	0.100
Cl2-BZ#13	ND		ug/kg	0.400	0.200
Cl3-BZ#24	ND		ug/kg	0.200	0.100
Cl3-BZ#16	ND		ug/kg	0.200	0.100
Cl3-BZ#32	ND		ug/kg	0.200	0.100
Cl2-BZ#15	ND		ug/kg	0.200	0.100
Cl3-BZ#34	ND		ug/kg	0.200	0.100
Cl3-BZ#23	ND		ug/kg	0.200	0.100
Cl4-BZ#54	ND		ug/kg	0.200	0.100
Cl3-BZ#29-Cal	ND		ug/kg	0.200	0.100
Cl4-BZ#50-Cal	ND		ug/kg	0.200	0.100
Cl3-BZ#26	ND		ug/kg	0.200	0.100
Cl3-BZ#25	ND		ug/kg	0.200	0.100

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 12/10/21 14:26
Analyst: MJS

Extraction Method: EPA 3570
Extraction Date: 12/07/21 14:11
Cleanup Method: EPA 3630
Cleanup Date: 12/09/21

Parameter	Result	Qualifier	Units	RL	MDL
PCB Congeners/Homologs - Mansfield Lab for sample(s): 07-08 Batch: WG1580108-1					
Cl4-BZ#53	ND		ug/kg	0.200	0.100
Cl3-BZ#-31	ND		ug/kg	0.200	0.100
Cl3-BZ#28	ND		ug/kg	0.200	0.100
Cl3-BZ#33	ND		ug/kg	0.200	0.100
Cl4-BZ#51	ND		ug/kg	0.200	0.100
Cl3-BZ#21/#20	ND		ug/kg	0.400	0.200
Cl4-BZ#45	ND		ug/kg	0.200	0.100
Cl3-BZ#22	ND		ug/kg	0.200	0.100
Cl4-BZ#73/#46	ND		ug/kg	0.400	0.200
Cl4-BZ#69	ND		ug/kg	0.200	0.100
Cl4-BZ#43	ND		ug/kg	0.200	0.100
Cl3-BZ#36	ND		ug/kg	0.200	0.100
Cl4-BZ#52	ND		ug/kg	0.200	0.100
Cl4-BZ#48	ND		ug/kg	0.200	0.100
Cl4-BZ#49	ND		ug/kg	0.200	0.100
Cl5-BZ#104	ND		ug/kg	0.200	0.100
Cl4-BZ#47	ND		ug/kg	0.200	0.100
Cl4-BZ#65/#75/#62	ND		ug/kg	0.600	0.300
Cl3-BZ#39	ND		ug/kg	0.200	0.100
Cl3-BZ#38	ND		ug/kg	0.200	0.100
Cl4-BZ#44	ND		ug/kg	0.200	0.100
Cl4-BZ#59	ND		ug/kg	0.200	0.100
Cl4-BZ#42	ND		ug/kg	0.200	0.100
Cl4-BZ#71	ND		ug/kg	0.200	0.100
Cl3-BZ#35	ND		ug/kg	0.200	0.100
Cl4-BZ#41	ND		ug/kg	0.200	0.100
Cl4-BZ#72	ND		ug/kg	0.200	0.100
Cl5-BZ#96	ND		ug/kg	0.200	0.100
Cl5-BZ#103	ND		ug/kg	0.200	0.100

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 12/10/21 14:26
Analyst: MJS

Extraction Method: EPA 3570
Extraction Date: 12/07/21 14:11
Cleanup Method: EPA 3630
Cleanup Date: 12/09/21

Parameter	Result	Qualifier	Units	RL	MDL
PCB Congeners/Homologs - Mansfield Lab for sample(s): 07-08 Batch: WG1580108-1					
Cl4-BZ#68/#64	ND		ug/kg	0.400	0.200
Cl4-BZ#40	ND		ug/kg	0.200	0.100
Cl3-BZ#37	ND		ug/kg	0.200	0.100
Cl5-BZ#100	ND		ug/kg	0.200	0.100
Cl5-BZ#94	ND		ug/kg	0.200	0.100
Cl4-BZ#57	ND		ug/kg	0.200	0.100
Cl4-BZ#67/#58	ND		ug/kg	0.400	0.200
Cl5-BZ#102	ND		ug/kg	0.200	0.100
Cl4-BZ#61	ND		ug/kg	0.200	0.100
Cl5-BZ#98	ND		ug/kg	0.200	0.100
Cl4-BZ#76	ND		ug/kg	0.200	0.100
Cl5-BZ#93	ND		ug/kg	0.200	0.100
Cl4-BZ#63	ND		ug/kg	0.200	0.100
Cl5-BZ#121/#95/#88	ND		ug/kg	0.600	0.300
Cl4-BZ#74	ND		ug/kg	0.200	0.100
Cl6-BZ#155	ND		ug/kg	0.200	0.100
Cl4-BZ#70	ND		ug/kg	0.200	0.100
Cl5-BZ#91	ND		ug/kg	0.200	0.100
Cl4-BZ#66	ND		ug/kg	0.200	0.100
Cl4-BZ#80	ND		ug/kg	0.200	0.100
Cl4-BZ#55	ND		ug/kg	0.200	0.100
Cl5-BZ#92	ND		ug/kg	0.200	0.100
Cl5-BZ#89/#84	ND		ug/kg	0.400	0.200
Cl5-BZ#101/#90	ND		ug/kg	0.400	0.200
Cl4-BZ#56	ND		ug/kg	0.200	0.100
Cl5-BZ#113	ND		ug/kg	0.200	0.100
Cl5-BZ#99	ND		ug/kg	0.200	0.100
Cl6-BZ#150	ND		ug/kg	0.200	0.100
Cl4-BZ#60	ND		ug/kg	0.200	0.100

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01
Lab Number: L2157780
Report Date: 01/11/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 12/10/21 14:26
Analyst: MJS

Extraction Method: EPA 3570
Extraction Date: 12/07/21 14:11
Cleanup Method: EPA 3630
Cleanup Date: 12/09/21

Parameter	Result	Qualifier	Units	RL	MDL
PCB Congeners/Homologs - Mansfield Lab for sample(s): 07-08 Batch: WG1580108-1					
Cl6-BZ#152	ND		ug/kg	0.200	0.100
Cl5-BZ#119	ND		ug/kg	0.200	0.100
Cl5-BZ#83/#125/#112	ND		ug/kg	0.600	0.300
Cl5-BZ#86/#109	ND		ug/kg	0.400	0.200
Cl6-BZ#145	ND		ug/kg	0.200	0.100
Cl5-BZ#97	ND		ug/kg	0.200	0.100
Cl6-BZ#148	ND		ug/kg	0.200	0.100
Cl4-BZ#79	ND		ug/kg	0.200	0.100
Cl5-BZ#116	ND		ug/kg	0.200	0.100
Cl6-BZ#154-Cal	ND		ug/kg	0.200	0.100
Cl4-BZ#78	ND		ug/kg	0.200	0.100
Cl5-BZ#87/#111	ND		ug/kg	0.400	0.200
Cl6-BZ#136	ND		ug/kg	0.200	0.100
Cl5-BZ#117	ND		ug/kg	0.200	0.100
Cl5-BZ#115	ND		ug/kg	0.200	0.100
Cl5-BZ#85	ND		ug/kg	0.200	0.100
Cl5-BZ#120	ND		ug/kg	0.200	0.100
Cl5-BZ#110	ND		ug/kg	0.200	0.100
Cl4-BZ#81	ND		ug/kg	0.200	0.100
Cl6-BZ#151	ND		ug/kg	0.200	0.100
Cl6-BZ#135	ND		ug/kg	0.200	0.100
Cl5-BZ#82	ND		ug/kg	0.200	0.100
Cl6-BZ#144	ND		ug/kg	0.200	0.100
Cl6-BZ#147/#149	ND		ug/kg	0.400	0.200
Cl4-BZ#77	ND		ug/kg	0.200	0.100
Cl6-BZ#143/#139	ND		ug/kg	0.400	0.200
Cl5-BZ#124	ND		ug/kg	0.200	0.100
Cl6-BZ#140	ND		ug/kg	0.200	0.100
Cl5-BZ#108	ND		ug/kg	0.200	0.100

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 12/10/21 14:26
Analyst: MJS

Extraction Method: EPA 3570
Extraction Date: 12/07/21 14:11
Cleanup Method: EPA 3630
Cleanup Date: 12/09/21

Parameter	Result	Qualifier	Units	RL	MDL
PCB Congeners/Homologs - Mansfield Lab for sample(s): 07-08 Batch: WG1580108-1					
Cl5-BZ#107/#123	ND		ug/kg	0.400	0.200
Cl7-BZ#188-Cal/RTW	ND		ug/kg	0.200	0.100
Cl6-BZ#134	ND		ug/kg	0.200	0.100
Cl5-BZ#106	ND		ug/kg	0.200	0.100
Cl6-BZ#133	ND		ug/kg	0.200	0.100
Cl6-BZ#142	ND		ug/kg	0.200	0.100
Cl5-BZ#118	ND		ug/kg	0.200	0.100
Cl6-BZ#131	ND		ug/kg	0.200	0.100
Cl7-BZ#184	ND		ug/kg	0.200	0.100
Cl6-BZ#165	ND		ug/kg	0.200	0.100
Cl6-BZ#146	ND		ug/kg	0.200	0.100
Cl6-BZ#161	ND		ug/kg	0.200	0.100
Cl5-BZ#122	ND		ug/kg	0.200	0.100
Cl6-BZ#168	ND		ug/kg	0.200	0.100
Cl5-BZ#114	ND		ug/kg	0.200	0.100
Cl6-BZ#153	ND		ug/kg	0.200	0.100
Cl6-BZ#132	ND		ug/kg	0.200	0.100
Cl7-BZ#179	ND		ug/kg	0.200	0.100
Cl6-BZ#141	ND		ug/kg	0.200	0.100
Cl7-BZ#176	ND		ug/kg	0.200	0.100
Cl5-BZ#105	ND		ug/kg	0.200	0.100
Cl6-BZ#137	ND		ug/kg	0.200	0.100
Cl5-BZ#127	ND		ug/kg	0.200	0.100
Cl7-BZ#186	ND		ug/kg	0.200	0.100
Cl6-BZ#130/#164	ND		ug/kg	0.400	0.200
Cl7-BZ#178	ND		ug/kg	0.200	0.100
Cl6-BZ#138	ND		ug/kg	0.200	0.100
Cl6-BZ#163/#160	ND		ug/kg	0.400	0.200
Cl6-BZ#129/#158	ND		ug/kg	0.400	0.200

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 12/10/21 14:26
Analyst: MJS

Extraction Method: EPA 3570
Extraction Date: 12/07/21 14:11
Cleanup Method: EPA 3630
Cleanup Date: 12/09/21

Parameter	Result	Qualifier	Units	RL	MDL
PCB Congeners/Homologs - Mansfield Lab for sample(s): 07-08 Batch: WG1580108-1					
Cl7-BZ#182/#175	ND		ug/kg	0.400	0.200
Cl7-BZ#187	ND		ug/kg	0.200	0.100
Cl7-BZ#183	ND		ug/kg	0.200	0.100
Cl6-BZ#166	ND		ug/kg	0.200	0.100
Cl6-BZ#159	ND		ug/kg	0.200	0.100
Cl5-BZ#126	ND		ug/kg	0.200	0.100
Cl7-BZ#185	ND		ug/kg	0.200	0.100
Cl6-BZ#162	ND		ug/kg	0.200	0.100
Cl7-BZ#174	ND		ug/kg	0.200	0.100
Cl6-BZ#128	ND		ug/kg	0.200	0.100
Cl8-BZ#202	ND		ug/kg	0.200	0.100
Cl6-BZ#167	ND		ug/kg	0.200	0.100
Cl7-BZ#181	ND		ug/kg	0.200	0.100
Cl7-BZ#177	ND		ug/kg	0.200	0.100
Cl8-BZ#204/#200-CAL	ND		ug/kg	0.400	0.200
Cl7-BZ#171	ND		ug/kg	0.200	0.100
Cl7-BZ#173	ND		ug/kg	0.200	0.100
Cl8-BZ#197	ND		ug/kg	0.200	0.100
Cl7-BZ#172	ND		ug/kg	0.200	0.100
Cl7-BZ#192	ND		ug/kg	0.200	0.100
Cl6-BZ#156	ND		ug/kg	0.200	0.100
Cl6-BZ#157	ND		ug/kg	0.200	0.100
Cl7-BZ#180	ND		ug/kg	0.200	0.100
Cl7-BZ#193	ND		ug/kg	0.200	0.100
Cl8-BZ#199	ND		ug/kg	0.200	0.100
Cl7-BZ#191	ND		ug/kg	0.200	0.100
Cl8-BZ#198	ND		ug/kg	0.200	0.100
Cl8-BZ#201	ND		ug/kg	0.200	0.100
Cl7-BZ#170	ND		ug/kg	0.200	0.100

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 12/10/21 14:26
Analyst: MJS

Extraction Method: EPA 3570
Extraction Date: 12/07/21 14:11
Cleanup Method: EPA 3630
Cleanup Date: 12/09/21

Parameter	Result	Qualifier	Units	RL	MDL
PCB Congeners/Homologs - Mansfield Lab for sample(s): 07-08 Batch: WG1580108-1					
Cl7-BZ#190	ND		ug/kg	0.200	0.100
Cl8-BZ#196	ND		ug/kg	0.200	0.100
Cl8-BZ#203	ND		ug/kg	0.200	0.100
Cl6-BZ#169	ND		ug/kg	0.200	0.100
Cl9-BZ#208	ND		ug/kg	0.200	0.100
Cl9-BZ#207	ND		ug/kg	0.200	0.100
Cl7-BZ#189	ND		ug/kg	0.200	0.100
Cl8-BZ#195	ND		ug/kg	0.200	0.100
Cl8-BZ#194	ND		ug/kg	0.200	0.100
Cl8-BZ#205	ND		ug/kg	0.200	0.100
Cl9-BZ#206-Cal/RTW	ND		ug/kg	0.200	0.100
Cl10-BZ#209-Cal/RTW	ND		ug/kg	0.200	0.100
Monochlorobiphenyls	ND		ug/kg	0.200	0.100
Dichlorobiphenyls	ND		ug/kg	0.200	0.100
Trichlorobiphenyls	ND		ug/kg	0.200	0.100
Tetrachlorobiphenyls	ND		ug/kg	0.200	0.100
Pentachlorobiphenyls	ND		ug/kg	0.200	0.100
Hexachlorobiphenyls	ND		ug/kg	0.200	0.100
Heptachlorobiphenyls	ND		ug/kg	0.200	0.100
Octachlorobiphenyls	ND		ug/kg	0.200	0.100
Nonachlorobiphenyls	ND		ug/kg	0.200	0.100
Decachlorobiphenyl	ND		ug/kg	0.200	0.100
Total PCB	ND		ug/kg	0.200	NA

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Cl3-BZ#19-C13 (surr)	85		50-125
Cl8-BZ#202-C13 (surr)	91		50-125

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Number: L2157780
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PCB Congeners/Homologs - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580108-2 WG1580108-3								
Cl1-BZ#1	83		78		40-140	6		30
Cl1-BZ#2	84		80		40-140	5		30
Cl1-BZ#3	82		78		40-140	5		30
Cl2-BZ#4/#10	78		75		40-140	4		30
Cl2-BZ#9	86		81		40-140	6		30
Cl2-BZ#7	84		80		40-140	5		30
Cl2-BZ#6	92		88		40-140	4		30
Cl2-BZ#5	87		84		40-140	4		30
Cl2-BZ#8	83		80		40-140	4		30
Cl3-BZ#19	80		77		40-140	4		30
Cl2-BZ#14	86		83		40-140	4		30
Cl3-BZ#30	88		84		40-140	5		30
Cl3-BZ#18	87		84		40-140	4		30
Cl2-BZ#11	80		78		40-140	3		30
Cl3-BZ#17	81		79		40-140	3		30
Cl2-BZ#12	87		85		40-140	2		30
Cl3-BZ#27	83		81		40-140	2		30
Cl2-BZ#13	86		84		40-140	2		30
Cl3-BZ#24	82		80		40-140	2		30
Cl3-BZ#16	84		82		40-140	2		30
Cl3-BZ#32	85		82		40-140	4		30
Cl2-BZ#15	74		70		40-140	6		30
Cl3-BZ#34	83		81		40-140	2		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PCB Congeners/Homologs - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580108-2 WG1580108-3								
Cl3-BZ#23	87		85		40-140	2		30
Cl4-BZ#54	78		76		40-140	3		30
Cl3-BZ#29-Cal	86		85		40-140	1		30
Cl4-BZ#50-Cal	80		78		40-140	3		30
Cl3-BZ#26	87		85		40-140	2		30
Cl3-BZ#25	88		86		40-140	2		30
Cl4-BZ#53	90		89		40-140	1		30
Cl3-BZ#-31	96		94		40-140	2		30
Cl3-BZ#28	89		85		40-140	5		30
Cl3-BZ#33	79		77		40-140	3		30
Cl4-BZ#51	84		82		40-140	2		30
Cl3-BZ#21/#20	93		90		40-140	3		30
Cl4-BZ#45	90		88		40-140	2		30
Cl3-BZ#22	90		89		40-140	1		30
Cl4-BZ#73/#46	88		86		40-140	2		30
Cl4-BZ#69	94		93		40-140	1		30
Cl4-BZ#43	89		88		40-140	1		30
Cl3-BZ#36	104		102		40-140	2		30
Cl4-BZ#52	85		84		40-140	1		30
Cl4-BZ#48	90		97		40-140	7		30
Cl4-BZ#49	89		92		40-140	3		30
Cl5-BZ#104	86		88		40-140	2		30
Cl4-BZ#47	92		93		40-140	1		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK

Project Number: 192069-01.01

Lab Number: L2157780

Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PCB Congeners/Homologs - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580108-2 WG1580108-3								
Cl4-BZ#65/#75/#62	89		88		40-140	1		30
Cl3-BZ#39	88		87		40-140	1		30
Cl3-BZ#38	87		86		40-140	1		30
Cl4-BZ#44	93		93		40-140	0		30
Cl4-BZ#59	91		91		40-140	0		30
Cl4-BZ#42	93		92		40-140	1		30
Cl4-BZ#71	92		93		40-140	1		30
Cl3-BZ#35	95		96		40-140	1		30
Cl4-BZ#41	87		87		40-140	0		30
Cl4-BZ#72	107		107		40-140	0		30
Cl5-BZ#96	87		86		40-140	1		30
Cl5-BZ#103	93		91		40-140	2		30
Cl4-BZ#68/#64	94		94		40-140	0		30
Cl4-BZ#40	93		90		40-140	3		30
Cl3-BZ#37	92		91		40-140	1		30
Cl5-BZ#100	90		89		40-140	1		30
Cl5-BZ#94	90		88		40-140	2		30
Cl4-BZ#57	91		91		40-140	0		30
Cl4-BZ#67/#58	94		94		40-140	0		30
Cl5-BZ#102	86		86		40-140	0		30
Cl4-BZ#61	89		89		40-140	0		30
Cl5-BZ#98	97		98		40-140	1		30
Cl4-BZ#76	91		92		40-140	1		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PCB Congeners/Homologs - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580108-2 WG1580108-3								
Cl5-BZ#93	84		88		40-140	5		30
Cl4-BZ#63	96		94		40-140	2		30
Cl5-BZ#121/#95/#88	97		95		40-140	2		30
Cl4-BZ#74	98		97		40-140	1		30
Cl6-BZ#155	92		90		40-140	2		30
Cl4-BZ#70	94		95		40-140	1		30
Cl5-BZ#91	92		92		40-140	0		30
Cl4-BZ#66	93		95		40-140	2		30
Cl4-BZ#80	99		100		40-140	1		30
Cl4-BZ#55	101		101		40-140	0		30
Cl5-BZ#92	92		92		40-140	0		30
Cl5-BZ#89/#84	99		96		40-140	3		30
Cl5-BZ#101/#90	94		96		40-140	2		30
Cl4-BZ#56	88		87		40-140	1		30
Cl5-BZ#113	95		99		40-140	4		30
Cl5-BZ#99	98		98		40-140	0		30
Cl6-BZ#150	91		91		40-140	0		30
Cl4-BZ#60	93		92		40-140	1		30
Cl6-BZ#152	103		103		40-140	0		30
Cl5-BZ#119	93		96		40-140	3		30
Cl5-BZ#83/#125/#112	96		97		40-140	1		30
Cl5-BZ#86/#109	92		92		40-140	0		30
Cl6-BZ#145	86		84		40-140	2		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PCB Congeners/Homologs - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580108-2 WG1580108-3								
Cl5-BZ#97	92		93		40-140	1		30
Cl6-BZ#148	95		96		40-140	1		30
Cl4-BZ#79	107		101		40-140	6		30
Cl5-BZ#116	106		110		40-140	4		30
Cl6-BZ#154-Cal	94		93		40-140	1		30
Cl4-BZ#78	93		97		40-140	4		30
Cl5-BZ#87/#111	96		96		40-140	0		30
Cl6-BZ#136	90		90		40-140	0		30
Cl5-BZ#117	87		89		40-140	2		30
Cl5-BZ#115	96		97		40-140	1		30
Cl5-BZ#85	93		98		40-140	5		30
Cl5-BZ#120	99		95		40-140	4		30
Cl5-BZ#110	97		96		40-140	1		30
Cl4-BZ#81	103		104		40-140	1		30
Cl6-BZ#151	85		82		40-140	4		30
Cl6-BZ#135	76		75		40-140	1		30
Cl5-BZ#82	78		77		40-140	1		30
Cl6-BZ#144	75		74		40-140	1		30
Cl6-BZ#147/#149	82		83		40-140	1		30
Cl4-BZ#77	89		85		40-140	5		30
Cl6-BZ#143/#139	77		77		40-140	0		30
Cl5-BZ#124	86		84		40-140	2		30
Cl6-BZ#140	79		76		40-140	4		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01
Lab Number: L2157780
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PCB Congeners/Homologs - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580108-2 WG1580108-3								
Cl5-BZ#108	97		98		40-140	1		30
Cl5-BZ#107/#123	86		84		40-140	2		30
Cl7-BZ#188-Cal/RTW	85		81		40-140	5		30
Cl6-BZ#134	85		86		40-140	1		30
Cl5-BZ#106	82		80		40-140	2		30
Cl6-BZ#133	78		76		40-140	3		30
Cl6-BZ#142	90		89		40-140	1		30
Cl5-BZ#118	80		77		40-140	4		30
Cl6-BZ#131	83		80		40-140	4		30
Cl7-BZ#184	72		71		40-140	1		30
Cl6-BZ#165	85		82		40-140	4		30
Cl6-BZ#146	81		79		40-140	3		30
Cl6-BZ#161	80		77		40-140	4		30
Cl5-BZ#122	88		83		40-140	6		30
Cl6-BZ#168	110		108		40-140	2		30
Cl5-BZ#114	81		78		40-140	4		30
Cl6-BZ#153	64		62		40-140	3		30
Cl6-BZ#132	87		83		40-140	5		30
Cl7-BZ#179	80		81		40-140	1		30
Cl6-BZ#141	92		90		40-140	2		30
Cl7-BZ#176	82		83		40-140	1		30
Cl5-BZ#105	91		87		40-140	4		30
Cl6-BZ#137	92		90		40-140	2		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PCB Congeners/Homologs - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580108-2 WG1580108-3								
Cl5-BZ#127	86		82		40-140	5		30
Cl7-BZ#186	80		79		40-140	1		30
Cl6-BZ#130/#164	89		87		40-140	2		30
Cl7-BZ#178	83		82		40-140	1		30
Cl6-BZ#138	88		98		40-140	11		30
Cl6-BZ#163/#160	93		86		40-140	8		30
Cl6-BZ#129/#158	87		86		40-140	1		30
Cl7-BZ#182/#175	86		83		40-140	4		30
Cl7-BZ#187	84		84		40-140	0		30
Cl7-BZ#183	90		88		40-140	2		30
Cl6-BZ#166	101		102		40-140	1		30
Cl6-BZ#159	102		101		40-140	1		30
Cl5-BZ#126	86		87		40-140	1		30
Cl7-BZ#185	86		86		40-140	0		30
Cl6-BZ#162	96		94		40-140	2		30
Cl7-BZ#174	83		80		40-140	4		30
Cl6-BZ#128	83		84		40-140	1		30
Cl8-BZ#202	79		79		40-140	0		30
Cl6-BZ#167	91		90		40-140	1		30
Cl7-BZ#181	80		80		40-140	0		30
Cl7-BZ#177	87		85		40-140	2		30
Cl8-BZ#204/#200-CAL	88		85		40-140	3		30
Cl7-BZ#171	87		90		40-140	3		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01
Lab Number: L2157780
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PCB Congeners/Homologs - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580108-2 WG1580108-3								
Cl7-BZ#173	80		78		40-140	3		30
Cl8-BZ#197	79		79		40-140	0		30
Cl7-BZ#172	92		87		40-140	6		30
Cl7-BZ#192	92		89		40-140	3		30
Cl6-BZ#156	89		87		40-140	2		30
Cl6-BZ#157	80		77		40-140	4		30
Cl7-BZ#180	76		69		40-140	10		30
Cl7-BZ#193	77		75		40-140	3		30
Cl8-BZ#199	78		79		40-140	1		30
Cl7-BZ#191	84		83		40-140	1		30
Cl8-BZ#198	90		88		40-140	2		30
Cl8-BZ#201	96		95		40-140	1		30
Cl7-BZ#170	82		78		40-140	5		30
Cl7-BZ#190	94		92		40-140	2		30
Cl8-BZ#196	91		89		40-140	2		30
Cl8-BZ#203	82		80		40-140	2		30
Cl6-BZ#169	91		88		40-140	3		30
Cl9-BZ#208	100		96		40-140	4		30
Cl9-BZ#207	89		89		40-140	0		30
Cl7-BZ#189	99		98		40-140	1		30
Cl8-BZ#195	83		82		40-140	1		30
Cl8-BZ#194	96		92		40-140	4		30
Cl8-BZ#205	97		93		40-140	4		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PCB Congeners/Homologs - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580108-2 WG1580108-3								
Cl9-BZ#206-Cal/RTW	88		85		40-140	3		30
Cl10-BZ#209-Cal/RTW	85		79		40-140	7		30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Cl3-BZ#19-C13 (surr)	79		77		50-125
Cl8-BZ#202-C13 (surr)	88		85		50-125

PESTICIDES

Project Name:	LITTLE ASSAWOMAN BAY, FENWICK	**Lab Number:**	L2157780
Project Number:	192069-01.01	**Report Date:**	01/11/22

SAMPLE RESULTS

Lab ID:	L2157780-07	Date Collected:	10/19/21 11:20
Client ID:	FI-2021-NORTH-20211019	Date Received:	10/21/21
Sample Location:	LITTLE ASSAWOMAN BAY	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Sediment	Extraction Method:	EPA 3570
Analytical Method:	1,8081B	Extraction Date:	12/07/21 10:41
Analytical Date:	01/10/22 18:52	Cleanup Method:	EPA 3630
Analyst:	DP	Cleanup Date:	12/10/21
Percent Solids:	68%		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Organochlorine Pesticides by GC - Mansfield Lab							
alpha-BHC	ND		ug/kg	0.147	0.147	1	A
Hexachlorobenzene	ND		ug/kg	0.294	0.294	1	A
beta-BHC	ND		ug/kg	0.147	0.147	1	A
gamma-BHC	ND		ug/kg	0.147	0.147	1	A
delta-BHC	ND		ug/kg	0.147	0.147	1	A
Heptachlor	ND		ug/kg	0.147	0.147	1	A
Aldrin	ND		ug/kg	0.147	0.147	1	A
Heptachlor epoxide (B)	ND		ug/kg	0.294	0.294	1	B
Oxychlordane	ND		ug/kg	0.294	0.294	1	B
gamma-Chlordane	ND		ug/kg	0.147	0.147	1	A
2,4'-DDE	ND		ug/kg	0.147	0.147	1	A
Endosulfan I	ND		ug/kg	0.147	0.147	1	A
alpha-Chlordane	ND		ug/kg	0.147	0.147	1	A
trans-Nonachlor	ND		ug/kg	0.147	0.147	1	A
4,4'-DDE	0.995		ug/kg	0.147	0.147	1	B
Dieldrin	ND		ug/kg	0.147	0.147	1	A
2,4'-DDD	ND		ug/kg	0.147	0.147	1	A
Endrin	ND		ug/kg	0.147	0.147	1	A
Endosulfan II	ND		ug/kg	0.147	0.147	1	A
4,4'-DDD	0.555		ug/kg	0.147	0.147	1	B
2,4'-DDT	ND		ug/kg	0.147	0.147	1	A
cis-Nonachlor	ND		ug/kg	0.147	0.147	1	A
Endrin aldehyde	ND		ug/kg	0.440	0.440	1	A
Endosulfan sulfate	ND		ug/kg	0.147	0.147	1	A
4,4'-DDT	ND		ug/kg	0.147	0.147	1	B
Endrin ketone	ND		ug/kg	0.147	0.147	1	A
Methoxychlor	ND		ug/kg	1.47	1.47	1	A
Mirex	ND		ug/kg	0.147	0.147	1	A

Project Name:	LITTLE ASSAWOMAN BAY, FENWICK	**Lab Number:**	L2157780
Project Number:	192069-01.01	**Report Date:**	01/11/22

SAMPLE RESULTS

Lab ID:	L2157780-07	Date Collected:	10/19/21 11:20
Client ID:	FI-2021-NORTH-20211019	Date Received:	10/21/21
Sample Location:	LITTLE ASSAWOMAN BAY	Field Prep:	Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Organochlorine Pesticides by GC - Mansfield Lab							
Toxaphene	ND		ug/kg	7.37	7.37	1	A
Chlordane	ND		ug/kg	7.37	7.37	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	68		30-150	A
DCB - Surrogate	66		30-150	A
TMX - Surrogate	139		30-150	B
DCB - Surrogate	56		30-150	B

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-08 D
Client ID: FI-2021-SOUTH-20211019
Sample Location: LITTLE ASSAWOMAN BAY

Date Collected: 10/19/21 13:00
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 1,8081B
Analytical Date: 01/11/22 13:19
Analyst: DP
Percent Solids: 62%

Extraction Method: EPA 3570
Extraction Date: 12/07/21 10:41
Cleanup Method: EPA 3630
Cleanup Date: 12/10/21

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Organochlorine Pesticides by GC - Mansfield Lab							
alpha-BHC	ND		ug/kg	0.736	0.736	5	A
Hexachlorobenzene	ND		ug/kg	1.47	1.47	5	A
beta-BHC	ND		ug/kg	0.736	0.736	5	A
gamma-BHC	ND		ug/kg	0.736	0.736	5	A
delta-BHC	ND		ug/kg	0.736	0.736	5	A
Heptachlor	ND		ug/kg	0.736	0.736	5	A
Aldrin	ND		ug/kg	0.736	0.736	5	A
Heptachlor epoxide (B)	ND		ug/kg	1.47	1.47	5	B
Oxychlordane	ND		ug/kg	1.47	1.47	5	B
gamma-Chlordane	ND		ug/kg	0.736	0.736	5	A
2,4'-DDE	ND		ug/kg	0.736	0.736	5	A
Endosulfan I	ND		ug/kg	0.736	0.736	5	B
alpha-Chlordane	ND		ug/kg	0.736	0.736	5	B
trans-Nonachlor	ND		ug/kg	0.736	0.736	5	A
4,4'-DDE	ND		ug/kg	0.736	0.736	5	A
Dieldrin	ND		ug/kg	0.736	0.736	5	A
2,4'-DDD	ND		ug/kg	0.736	0.736	5	A
Endrin	ND		ug/kg	0.736	0.736	5	A
Endosulfan II	ND		ug/kg	0.736	0.736	5	A
4,4'-DDD	ND		ug/kg	0.736	0.736	5	A
2,4'-DDT	ND		ug/kg	0.736	0.736	5	A
cis-Nonachlor	ND		ug/kg	0.736	0.736	5	A
Endrin aldehyde	ND		ug/kg	2.21	2.21	5	A
Endosulfan sulfate	ND		ug/kg	0.736	0.736	5	A
4,4'-DDT	ND		ug/kg	0.736	0.736	5	A
Endrin ketone	ND		ug/kg	0.736	0.736	5	A
Methoxychlor	ND		ug/kg	7.36	7.36	5	A
Mirex	ND		ug/kg	0.736	0.736	5	A

Project Name:	LITTLE ASSAWOMAN BAY, FENWICK	**Lab Number:**	L2157780
Project Number:	192069-01.01	**Report Date:**	01/11/22

SAMPLE RESULTS

Lab ID:	L2157780-08 D	Date Collected:	10/19/21 13:00
Client ID:	FI-2021-SOUTH-20211019	Date Received:	10/21/21
Sample Location:	LITTLE ASSAWOMAN BAY	Field Prep:	Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Organochlorine Pesticides by GC - Mansfield Lab							
Toxaphene	ND		ug/kg	36.9	36.9	5	A
Chlordane	ND		ug/kg	36.9	36.9	5	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	80		30-150	A
DCB - Surrogate	84		30-150	A
TMX - Surrogate	98		30-150	B
DCB - Surrogate	66		30-150	B

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01
Lab Number: L2157780
Report Date: 01/11/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8081B
Analytical Date: 01/10/22 17:11
Analyst: DP

Extraction Method: EPA 3570
Extraction Date: 12/07/21 10:41
Cleanup Method: EPA 3630
Cleanup Date: 12/10/21

Parameter	Result	Qualifier	Units	RL	MDL	Column
Organochlorine Pesticides by GC - Mansfield Lab for sample(s): 07-08 Batch: WG1580105-1						
alpha-BHC	ND		ug/kg	0.100	0.100	A
Hexachlorobenzene	ND		ug/kg	0.200	0.200	A
beta-BHC	ND		ug/kg	0.100	0.100	A
gamma-BHC	ND		ug/kg	0.100	0.100	A
delta-BHC	ND		ug/kg	0.100	0.100	A
Heptachlor	ND		ug/kg	0.100	0.100	A
Aldrin	ND		ug/kg	0.100	0.100	A
gamma-Chlordane	ND		ug/kg	0.100	0.100	A
2,4'-DDE	ND		ug/kg	0.100	0.100	A
Endosulfan I	ND		ug/kg	0.100	0.100	A
alpha-Chlordane	ND		ug/kg	0.100	0.100	A
trans-Nonachlor	ND		ug/kg	0.100	0.100	A
4,4'-DDE	ND		ug/kg	0.100	0.100	A
Dieldrin	ND		ug/kg	0.100	0.100	A
2,4'-DDD	ND		ug/kg	0.100	0.100	A
Endrin	ND		ug/kg	0.100	0.100	A
Endosulfan II	ND		ug/kg	0.100	0.100	A
4,4'-DDD	ND		ug/kg	0.100	0.100	A
2,4'-DDT	ND		ug/kg	0.100	0.100	A
cis-Nonachlor	ND		ug/kg	0.100	0.100	A
Endrin aldehyde	ND		ug/kg	0.300	0.300	A
Endosulfan sulfate	ND		ug/kg	0.100	0.100	A
4,4'-DDT	ND		ug/kg	0.100	0.100	A
Endrin ketone	ND		ug/kg	0.100	0.100	A
Methoxychlor	ND		ug/kg	1.00	1.00	A
Mirex	ND		ug/kg	0.100	0.100	A
Toxaphene	ND		ug/kg	5.02	5.02	A
Chlordane	ND		ug/kg	5.02	5.02	A
Heptachlor epoxide (B)	ND		ug/kg	0.200	0.200	B

Project Name:	LITTLE ASSAWOMAN BAY, FENWICK	**Lab Number:**	L2157780
Project Number:	192069-01.01	**Report Date:**	01/11/22

Method Blank Analysis
Batch Quality Control

Analytical Method:	1,8081B	Extraction Method:	EPA 3570
Analytical Date:	01/10/22 17:11	Extraction Date:	12/07/21 10:41
Analyst:	DP	Cleanup Method:	EPA 3630
		Cleanup Date:	12/10/21

Parameter	Result	Qualifier	Units	RL	MDL	Column
Organochlorine Pesticides by GC - Mansfield Lab for sample(s): 07-08 Batch: WG1580105-1						
Oxychlordane	ND		ug/kg	0.200	0.200	B

Surrogate	%Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	61		30-150	A
DCB - Surrogate	65		30-150	A
TMX - Surrogate	117		30-150	B
DCB - Surrogate	63		30-150	B

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580105-2 WG1580105-3									
alpha-BHC	68		73		40-140	7		50	A
Hexachlorobenzene	64		65		40-140	2		50	A
beta-BHC	64		63		40-140	2		50	A
gamma-BHC	70		72		40-140	3		50	A
delta-BHC	54		59		40-140	9		50	A
Heptachlor	64		65		40-140	2		50	A
Aldrin	69		70		40-140	1		50	A
gamma-Chlordane	69		70		40-140	1		50	A
2,4'-DDE	63		65		40-140	3		50	A
Endosulfan I	66		69		40-140	4		50	A
alpha-Chlordane	68		69		40-140	1		50	A
trans-Nonachlor	67		68		40-140	1		50	A
4,4'-DDE	72		74		40-140	3		50	A
Dieldrin	75		78		40-140	4		50	A
2,4'-DDD	70		71		40-140	1		50	A
Endrin	66		69		40-140	4		50	A
Endosulfan II	66		70		40-140	6		50	A
4,4'-DDD	70		74		40-140	6		50	A
2,4'-DDT	74		78		40-140	5		50	A
cis-Nonachlor	68		70		40-140	3		50	A
Endrin aldehyde	53		60		40-140	12		50	A
Endosulfan sulfate	68		74		40-140	8		50	A
4,4'-DDT	72		75		40-140	4		50	A

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01
Lab Number: L2157780
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580105-2 WG1580105-3									
Endrin ketone	80		88		40-140	10		50	A
Methoxychlor	65		72		40-140	10		50	A
Mirex	57		58		40-140	2		50	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
TMX - Surrogate	67		67		30-150	A
DCB - Surrogate	64		66		30-150	A
TMX - Surrogate	**195**	Q	**186**	Q	30-150	B
DCB - Surrogate	60		59		30-150	B

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Number: L2157780
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 07-08 Batch: WG1580105-2 WG1580105-3									
Heptachlor epoxide (B)	63		62		40-140	3		50	B
Oxychlordane	67		66		40-140	3		50	B

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
TMX - Surrogate	67		67		30-150	A
DCB - Surrogate	64		66		30-150	A
TMX - Surrogate	**195**	Q	**186**	Q	30-150	B
DCB - Surrogate	60		59		30-150	B

METALS

Project Name:	LITTLE ASSAWOMAN BAY, FENWICK	**Lab Number:**	L2157780
Project Number:	192069-01.01	**Report Date:**	01/11/22

SAMPLE RESULTS

Lab ID:	L2157780-07	Date Collected:	10/19/21 11:20
Client ID:	FI-2021-NORTH-20211019	Date Received:	10/21/21
Sample Location:	LITTLE ASSAWOMAN BAY	Field Prep:	Not Specified

Sample Depth:
Matrix: Sediment
Percent Solids: 68%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	6100		mg/kg	142	21.1	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Antimony, Total	ND		mg/kg	2.28	0.192	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Arsenic, Total	3.63		mg/kg	0.712	0.094	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Barium, Total	12.6		mg/kg	4.27	0.301	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Beryllium, Total	0.291	J	mg/kg	0.427	0.124	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Cadmium, Total	0.151	J	mg/kg	0.285	0.038	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Calcium, Total	1090		mg/kg	712	86.6	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Chromium, Total	14.0		mg/kg	2.85	0.667	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Cobalt, Total	3.33		mg/kg	0.712	0.076	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Copper, Total	6.43		mg/kg	2.85	0.276	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Iron, Total	8540		mg/kg	285	29.3	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Lead, Total	9.45		mg/kg	0.855	0.208	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Magnesium, Total	2630		mg/kg	142	17.5	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Manganese, Total	71.9		mg/kg	2.85	0.632	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Mercury, Total	0.011		mg/kg	0.004	0.0005	1	12/18/21 11:37	12/23/21 13:05	EPA 7474	1,7474	ML
Nickel, Total	7.45		mg/kg	1.42	0.381	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Potassium, Total	1190		mg/kg	142	22.6	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Selenium, Total	1.51	J	mg/kg	2.85	1.08	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Silver, Total	ND		mg/kg	0.712	0.070	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Sodium, Total	4400		mg/kg	214	16.7	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Thallium, Total	0.258	J	mg/kg	1.14	0.074	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Vanadium, Total	15.3		mg/kg	1.42	0.540	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD
Zinc, Total	36.7		mg/kg	14.2	3.70	10	12/22/21 23:35	12/23/21 11:53	EPA 3050B	1,6020B	CD

Project Name:	LITTLE ASSAWOMAN BAY, FENWICK	**Lab Number:**	L2157780
Project Number:	192069-01.01	**Report Date:**	01/11/22

SAMPLE RESULTS

Lab ID:	L2157780-08	Date Collected:	10/19/21 13:00
Client ID:	FI-2021-SOUTH-20211019	Date Received:	10/21/21
Sample Location:	LITTLE ASSAWOMAN BAY	Field Prep:	Not Specified

Sample Depth:
Matrix: Sediment
Percent Solids: 62%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	7430		mg/kg	153	22.7	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Antimony, Total	ND		mg/kg	2.45	0.207	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Arsenic, Total	4.62		mg/kg	0.766	0.101	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Barium, Total	17.1		mg/kg	4.60	0.324	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Beryllium, Total	0.365	J	mg/kg	0.460	0.134	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Cadmium, Total	0.115	J	mg/kg	0.306	0.041	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Calcium, Total	10400		mg/kg	766	93.2	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Chromium, Total	18.8		mg/kg	3.06	0.717	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Cobalt, Total	4.27		mg/kg	0.766	0.082	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Copper, Total	6.16		mg/kg	3.06	0.297	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Iron, Total	11900		mg/kg	306	31.6	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Lead, Total	5.58		mg/kg	0.920	0.224	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Magnesium, Total	3570		mg/kg	153	18.9	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Manganese, Total	109		mg/kg	3.06	0.680	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Mercury, Total	0.010	J	mg/kg	0.018	0.002	5	12/18/21 11:37	12/23/21 13:07	EPA 7474	1,7474	ML
Nickel, Total	10.3		mg/kg	1.53	0.410	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Potassium, Total	1640		mg/kg	153	24.3	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Selenium, Total	1.92	J	mg/kg	3.06	1.16	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Silver, Total	ND		mg/kg	0.766	0.075	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Sodium, Total	4190		mg/kg	230	18.0	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Thallium, Total	0.251	J	mg/kg	1.23	0.079	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Vanadium, Total	21.3		mg/kg	1.53	0.581	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD
Zinc, Total	32.0		mg/kg	15.3	3.98	10	12/22/21 23:35	12/23/21 11:58	EPA 3050B	1,6020B	CD

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 07-08 Batch: WG1584297-1										
Mercury, Total	ND		mg/kg	0.013	0.002	5	12/18/21 11:37	12/23/21 11:55	1,7474	ML

Prep Information

Digestion Method: EPA 7474

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 07-08 Batch: WG1586843-1										
Aluminum, Total	ND		mg/kg	100	14.8	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Antimony, Total	ND		mg/kg	1.60	0.135	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Arsenic, Total	ND		mg/kg	0.500	0.066	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Barium, Total	ND		mg/kg	3.00	0.211	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Beryllium, Total	ND		mg/kg	0.300	0.087	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Cadmium, Total	ND		mg/kg	0.200	0.026	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Calcium, Total	ND		mg/kg	500	60.8	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Chromium, Total	ND		mg/kg	2.00	0.468	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Cobalt, Total	ND		mg/kg	0.500	0.053	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Copper, Total	ND		mg/kg	2.00	0.194	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Iron, Total	ND		mg/kg	200	20.6	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Lead, Total	ND		mg/kg	0.600	0.146	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Magnesium, Total	ND		mg/kg	100	12.3	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Manganese, Total	ND		mg/kg	2.00	0.444	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Nickel, Total	ND		mg/kg	1.00	0.267	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Potassium, Total	ND		mg/kg	100	15.9	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Selenium, Total	ND		mg/kg	2.00	0.756	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Silver, Total	ND		mg/kg	0.500	0.049	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Sodium, Total	ND		mg/kg	150	11.7	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Thallium, Total	0.052	J	mg/kg	0.800	0.052	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Vanadium, Total	ND		mg/kg	1.00	0.379	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD
Zinc, Total	ND		mg/kg	10.0	2.60	10	12/22/21 23:35	12/23/21 11:19	1,6020B	CD

Project Name: LITTLE ASSAWOMAN BAY, FENWICK **Lab Number:** L2157780
Project Number: 192069-01.01 **Report Date:** 01/11/22

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 3050B

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 07-08 Batch: WG1584297-2 SRM Lot Number: D113-540								
Mercury, Total	127		-		60-140	-		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01
Lab Number: L2157780
Report Date: 01/11/22

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 07-08 Batch: WG1586843-2 SRM Lot Number: D113-540					
Aluminum, Total	76	-	51-149	-	20
Antimony, Total	154	-	20-250	-	20
Arsenic, Total	106	-	70-130	-	20
Barium, Total	98	-	75-125	-	20
Beryllium, Total	111	-	75-125	-	20
Cadmium, Total	109	-	75-125	-	20
Calcium, Total	102	-	73-128	-	20
Chromium, Total	103	-	70-130	-	20
Cobalt, Total	107	-	75-125	-	20
Copper, Total	102	-	75-125	-	20
Iron, Total	94	-	36-164	-	20
Lead, Total	99	-	72-128	-	20
Magnesium, Total	97	-	63-138	-	20
Manganese, Total	103	-	77-123	-	20
Nickel, Total	106	-	70-130	-	20
Potassium, Total	92	-	59-141	-	20
Selenium, Total	105	-	66-134	-	20
Silver, Total	106	-	70-131	-	20
Sodium, Total	103	-	35-164	-	20
Thallium, Total	108	-	70-130	-	20
Vanadium, Total	98	-	74-126	-	20

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 07-08 Batch: WG1586843-2 SRM Lot Number: D113-540					
Zinc, Total	103	-	70-130	-	20

Matrix Spike Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK

Project Number: 192069-01.01

Lab Number: L2157780

Report Date: 01/11/22

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 07-08 QC Batch ID: WG1584297-3 WG1584297-4 QC Sample: L2157854-06 Client ID: MS Sample												
Mercury, Total	0.456	1.47	2.47	**137**	Q	2.43	**130**	Q	80-120	2		20

Matrix Spike Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Number: L2157780
Report Date: 01/11/22

Parameter	Native Sample	MS Added	MS Found	MS %Recovery		MSD Found	MSD %Recovery		Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 07-08 QC Batch ID: WG1586843-3 WG1586843-4 QC Sample: L2157854-06 Client ID: MS Sample											
Aluminum, Total	12800	325	13800	**308**	Q	13400	**177**	Q	75-125	3	20
Antimony, Total	0.793J	81.2	74.0	91		76.2	90		75-125	3	20
Arsenic, Total	21.2	19.5	39.4	93		41.2	98		75-125	4	20
Barium, Total	35.1	325	369	103		384	103		75-125	4	20
Beryllium, Total	0.955	8.12	9.56	106		9.88	105		75-125	3	20
Cadmium, Total	0.414	8.6	9.08	101		9.40	100		75-125	3	20
Calcium, Total	3650	1620	5860	**136**	Q	6510	**168**	Q	75-125	11	20
Chromium, Total	39.4	32.5	71.7	99		70.8	92		75-125	1	20
Cobalt, Total	10.1	81.2	89.9	98		91.6	96		75-125	2	20
Copper, Total	57.5	40.6	90.5	81		90.2	77		75-125	0	20
Iron, Total	36400	162	36300	**0**	Q	35000	**0**	Q	75-125	4	20
Lead, Total	45.2	86	127	95		132	96		75-125	4	20
Magnesium, Total	7830	1620	9780	120		9240	83		75-125	6	20
Manganese, Total	420	81.2	508	108		492	85		75-125	3	20
Nickel, Total	25.4	81.2	105	98		107	96		75-125	2	20
Potassium, Total	3000	1620	4810	112		4700	100		75-125	2	20
Selenium, Total	4.20	19.5	23.2	98		24.4	99		75-125	5	20
Silver, Total	0.666J	48.7	50.8	104		53.4	105		75-125	5	20
Sodium, Total	8760	1620	11300	**156**	Q	10800	120		75-125	5	20
Thallium, Total	0.521J	19.5	20.2	104		20.6	101		75-125	2	20
Vanadium, Total	38.9	81.2	123	104		121	97		75-125	2	20

Matrix Spike Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Number: L2157780
Report Date: 01/11/22

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 07-08 QC Batch ID: WG1586843-3 WG1586843-4 QC Sample: L2157854-06 Client ID: MS Sample									
Zinc, Total	129	81.2	197	84	199	82	75-125	1	20

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Serial Dilution Analysis
Batch Quality Control

Lab Number: L2157780
Report Date: 01/11/22

Parameter	Native Sample	Serial Dilution	Units	% D	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 07-08 QC Batch ID: WG1586843-6 QC Sample: L2157854-06 Client ID: DUP Sample						
Aluminum, Total	12800	13000	mg/kg	2		20
Iron, Total	36400	37200	mg/kg	2		20
Lead, Total	45.2	45.1	mg/kg	0		20
Magnesium, Total	7830	7790	mg/kg	1		20
Manganese, Total	420	428	mg/kg	2		20
Sodium, Total	8760	8870	mg/kg	1		20

INORGANICS
&
MISCELLANEOUS

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Number: L2157780
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-01
Client ID: FI-2021-01-20211019
Sample Location: LITTLE ASSAWOMAN BAY

Date Collected: 10/19/21 10:00
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Gravel	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Gravel	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Sand	0.400		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Medium Sand	3.00		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Sand	51.3		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Silt Fine	34.5		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Clay Fine	10.8		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Number: L2157780
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-02
Client ID: FI-2021-02-20211019
Sample Location: LITTLE ASSAWOMAN BAY

Date Collected: 10/19/21 10:40
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Gravel	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Gravel	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Sand	0.100		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Medium Sand	3.00		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Sand	82.2		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Silt Fine	11.3		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Clay Fine	3.40		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-03
Client ID: FI-2021-03-20211019
Sample Location: LITTLE ASSAWOMAN BAY
Date Collected: 10/19/21 11:15
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Gravel	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Gravel	0.200		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Sand	3.20		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Medium Sand	6.80		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Sand	41.0		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Silt Fine	37.4		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Clay Fine	11.4		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-04
Client ID: FI-2021-04-20211019
Sample Location: LITTLE ASSAWOMAN BAY
Date Collected: 10/19/21 11:52
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Gravel	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Gravel	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Sand	1.30		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Medium Sand	4.80		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Sand	50.5		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Silt Fine	33.0		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Clay Fine	10.4		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Number: L2157780
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-05
Client ID: FI-2021-05-20211019
Sample Location: LITTLE ASSAWOMAN BAY

Date Collected: 10/19/21 12:30
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Gravel	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Gravel	0.900		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Sand	3.30		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Medium Sand	11.6		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Sand	61.0		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Silt Fine	16.8		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Clay Fine	6.40		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Number: L2157780
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-06
Client ID: FI-2021-06-20211019
Sample Location: LITTLE ASSAWOMAN BAY

Date Collected: 10/19/21 12:55
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Gravel	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Gravel	ND		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Coarse Sand	4.60		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Medium Sand	7.20		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Fine Sand	47.0		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Silt Fine	18.6		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM
% Clay Fine	22.6		%	0.100	NA	1	-	12/15/21 11:43	12,D6913/D7928	CM

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Number: L2157780
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-07
Client ID: FI-2021-NORTH-20211019
Sample Location: LITTLE ASSAWOMAN BAY

Date Collected: 10/19/21 11:20
Date Received: 10/21/21
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon (Rep1)	1.06		%	0.010	0.010	1	-	12/22/21 17:32	1,9060A	SP
Total Organic Carbon (Rep2)	0.917		%	0.010	0.010	1	-	12/22/21 17:32	1,9060A	SP
Total Organic Carbon (Average)	0.990		%	0.010	0.010	1	-	12/22/21 17:32	1,9060A	SP
General Chemistry - Mansfield Lab										
Solids, Total	67.5		%	0.100	0.100	1	-	12/15/21 12:13	121,2540G	AE
Moisture	32.5		%	0.100	0.100	1	-	12/15/21 12:13	121,2540G	AE

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

SAMPLE RESULTS

Lab ID: L2157780-08
Date Collected: 10/19/21 13:00
Client ID: FI-2021-SOUTH-20211019
Date Received: 10/21/21
Sample Location: LITTLE ASSAWOMAN BAY
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon (Rep1)	1.29		%	0.010	0.010	1	-	12/22/21 17:32	1,9060A	SP
Total Organic Carbon (Rep2)	1.19		%	0.010	0.010	1	-	12/22/21 17:32	1,9060A	SP
Total Organic Carbon (Average)	1.24		%	0.010	0.010	1	-	12/22/21 17:32	1,9060A	SP
General Chemistry - Mansfield Lab										
Solids, Total	62.4		%	0.100	0.100	1	-	12/15/21 12:13	121,2540G	AE
Moisture	37.6		%	0.100	0.100	1	-	12/15/21 12:13	121,2540G	AE

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Lab Number: L2157780
Project Number: 192069-01.01
Report Date: 01/11/22

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab for sample(s): 07-08 Batch: WG1587625-1										
Total Organic Carbon (Rep1)	ND		%	0.010	0.010	1	-	12/22/21 17:32	1,9060A	SP
Total Organic Carbon (Rep2)	ND		%	0.010	0.010	1	-	12/22/21 17:32	1,9060A	SP
Total Organic Carbon (Average)	ND		%	0.010	0.010	1	-	12/22/21 17:32	1,9060A	SP

Lab Control Sample Analysis
Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Number: L2157780
Report Date: 01/11/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Organic Carbon - Mansfield Lab Associated sample(s): 07-08 Batch: WG1587625-2								
Total Organic Carbon (Rep1)	104		-		75-125	-		25
Total Organic Carbon (Rep2)	105		-		75-125	-		25
Total Organic Carbon (Average)	104		-		75-125	-		25

Lab Duplicate Analysis

Batch Quality Control

Project Name: LITTLE ASSAWOMAN BAY, FENWICK
Project Number: 192069-01.01

Lab Number: L2157780
Report Date: 01/11/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Mansfield Lab Associated sample(s): 07-08 QC Batch ID: WG1583558-1 QC Sample: L2163455-01 Client ID: DUP Sample						
Solids, Total	53.9	53.1	%	1		10
Grain Size Analysis - Mansfield Lab Associated sample(s): 01-06 QC Batch ID: WG1583676-1 QC Sample: L2157780-01 Client ID: FI-2021-01-20211019						
Cobbles	ND	ND	%	NC		20
% Coarse Gravel	ND	ND	%	NC		20
% Fine Gravel	ND	ND	%	NC		20
% Coarse Sand	0.400	0.800	%	**67**	Q	20
% Medium Sand	3.00	3.20	%	6		20
% Fine Sand	51.3	49.5	%	4		20
% Silt Fine	34.5	35.6	%	3		20
% Clay Fine	10.8	10.9	%	1		20

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2157780-01A	Plastic 8oz unpreserved for Grain Size	A	NA		5.3	Y	Absent		A2-HYDRO-CGRAVEL(),A2-HYDRO-FSAND(),A2-HYDRO-CFINE(),A2-HYDRO-MSAND(),A2-HYDRO-CSAND(),A2-HYDRO-SFINE(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()
L2157780-02A	Plastic 8oz unpreserved for Grain Size	A	NA		5.3	Y	Absent		A2-HYDRO-CFINE(),A2-HYDRO-FSAND(),A2-HYDRO-CGRAVEL(),A2-HYDRO-MSAND(),A2-HYDRO-CSAND(),A2-HYDRO-SFINE(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()
L2157780-03A	Plastic 8oz unpreserved for Grain Size	A	NA		5.3	Y	Absent		A2-HYDRO-CGRAVEL(),A2-HYDRO-CFINE(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-CSAND(),A2-HYDRO-SFINE(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()
L2157780-04A	Plastic 8oz unpreserved for Grain Size	A	NA		5.3	Y	Absent		A2-HYDRO-CGRAVEL(),A2-HYDRO-FSAND(),A2-HYDRO-CFINE(),A2-HYDRO-MSAND(),A2-HYDRO-CSAND(),A2-HYDRO-SFINE(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()
L2157780-05A	Plastic 8oz unpreserved for Grain Size	A	NA		5.3	Y	Absent		A2-HYDRO-CGRAVEL(),A2-HYDRO-CFINE(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-SFINE(),A2-HYDRO-CSAND(),A2-HYDRO-FGRAVEL(),A2-HYDRO-COBBLES()
L2157780-06A	Plastic 8oz unpreserved for Grain Size	A	NA		5.3	Y	Absent		A2-HYDRO-FSAND(),A2-HYDRO-CGRAVEL(),A2-HYDRO-CFINE(),A2-HYDRO-MSAND(),A2-HYDRO-SFINE(),A2-HYDRO-CSAND(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()

*Values in parentheses indicate holding time in days

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2157780-07A	Glass 250ml/8oz unpreserved	A	NA		5.3	Y	Absent		A2-FE-6020T(180),A2-PB-6020T(180),A2-MOISTURE-2540(7),A2-BA-6020T(180),A2-NI-6020T(180),A2-SB-6020T(180),A2-PEST-8081(14),A2-ZN-6020T(180),A2-HG-7474T(28),A2-ALKPAH(14),A2-K-6020T(180),A2-TS(7),A2-CR-6020T(180),A2-TL-6020T(180),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-V-6020T(180),A2-HGPREP-AF(28),A2-CD-6020T(180),A2-PREP-3050:2T(180),A2-MG-6020T(180),A2-TOC-9060-2REPS(28),A2-SE-6020T(180),A2-AG-6020T(180),A2-CA-6020T(180),A2-PREP-3050:1T(180),A2-NA-6020T(180),A2-PCB209-C/H-8270(14),A2-CU-6020T(180),A2-AL-6020T(180)
L2157780-08A	Glass 250ml/8oz unpreserved	A	NA		5.3	Y	Absent		A2-FE-6020T(180),A2-PB-6020T(180),A2-MOISTURE-2540(7),A2-NI-6020T(180),A2-ZN-6020T(180),A2-PEST-8081(14),A2-BA-6020T(180),A2-SB-6020T(180),A2-HG-7474T(28),A2-ALKPAH(14),A2-K-6020T(180),A2-CR-6020T(180),A2-TL-6020T(180),A2-TS(7),A2-MN-6020T(180),A2-AS-6020T(180),A2-CO-6020T(180),A2-CD-6020T(180),A2-BE-6020T(180),A2-V-6020T(180),A2-HGPREP-AF(28),A2-SE-6020T(180),A2-MG-6020T(180),A2-PREP-3050:2T(180),A2-TOC-9060-2REPS(28),A2-PREP-3050:1T(180),A2-PCB209-C/H-8270(14),A2-NA-6020T(180),A2-AL-6020T(180),A2-CU-6020T(180),A2-AG-6020T(180),A2-CA-6020T(180)

*Values in parentheses indicate holding time in days

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name:	LITTLE ASSAWOMAN BAY, FENWICK	**Lab Number:**	L2157780
Project Number:	192069-01.01	**Report Date:**	01/11/22

Data Qualifiers

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Report Format: *DU Report with 'J' Qualifiers*

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - VI, 2018.

12 Annual Book of ASTM Standards. (American Society for Testing and Materials) ASTM International.

105 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IIIA, 1997 in conjunction with NOAA Technical Memorandum NMFS-NWFSC-59: Extraction, Cleanup and GC/MS Analysis of Sediments and Tissues for Organic Contaminants, March 2004 and the Determination of Pesticides and PCBs in Water and Oil/Sediment by GC/MS: Method 680, EPA 01A0005295, November 1985.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

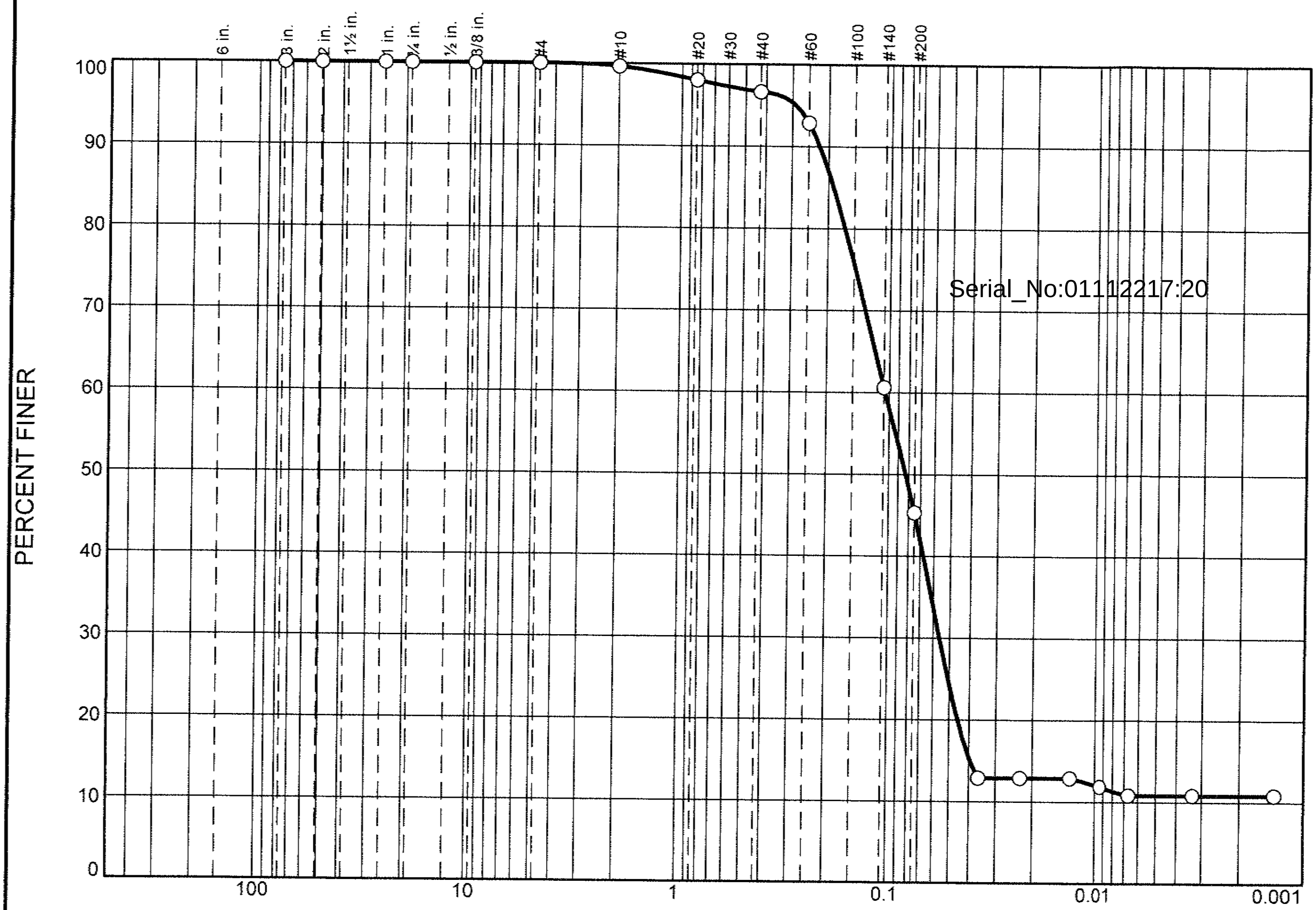
Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

ASTM D6913/D7928

GRAIN SIZE ANALYSIS

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.4	3.0	51.3	34.5	10.8

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.1891	0.1045	0.0829	0.0560	0.0396			

Material Description	USCS	AASHTO
○		

Project No. **Client:**
Project:

○ **Source of Sample:** FI-2021-01-20211019 **Sample Number:** L2157780-01

Remarks:

Alpha Analytical

Mansfield, MA

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

12/21/2021

Location: FI-2021-01-20211019

Sample Number: L2157780-01

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 50.05
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Serial_No:01112217:20

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
50.05	0.00	3	0.00	0.00	100.0
		2	0.00	0.00	100.0
		1	0.00	0.00	100.0
		.75	0.00	0.00	100.0
		.375	0.00	0.00	100.0
		#4	0.00	0.00	100.0
		#10	0.18	0.00	99.6
		#20	0.80	0.00	98.0
		#40	0.70	0.00	96.6
		#60	1.90	0.00	92.8
		#140	16.14	0.00	60.6
		#200	7.66	0.00	45.3

Hydrometer Test Data

Hydrometer test uses material passing #200
Percent passing #200 based upon complete sample = 45.3
Weight of hydrometer sample =35.03
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = 0
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 151H
Hydrometer effective depth equation: L = 16.294964 - 0.2645 x Rm

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0362	12.9
5.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0229	12.9
15.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0132	12.9
30.00	21.7	1.0055	1.0057	0.0134	5.5	14.8	0.0094	11.9
60.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0067	10.8
240.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0033	10.8
1440.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0014	10.8

Fractional Components

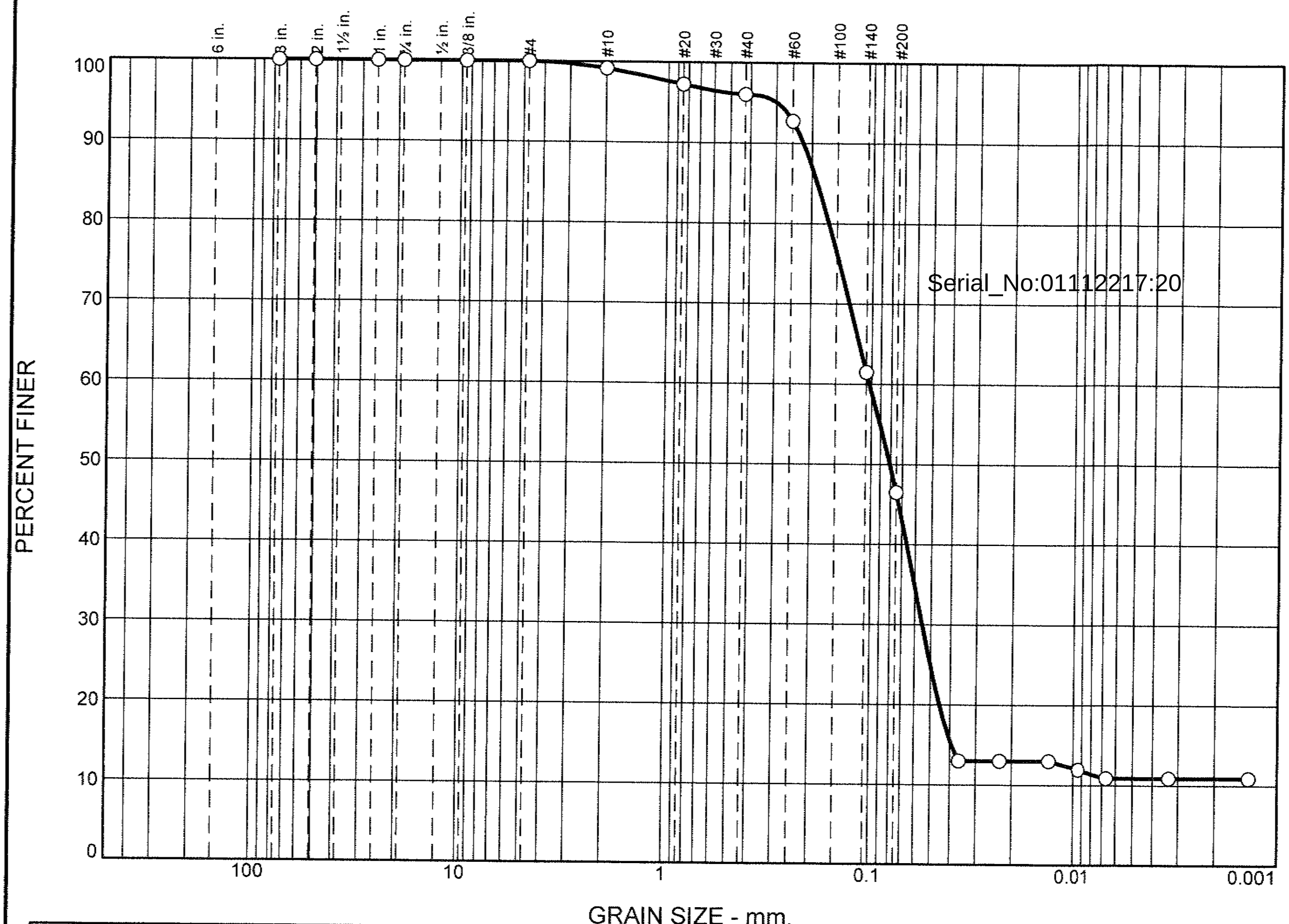
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.4	3.0	51.3	54.7	34.5	10.8	45.3

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.0396	0.0455	0.0560	0.0676	0.0829	0.1045	0.1657	0.1891	0.2215	0.2891

Fineness Modulus
0.33

Alpha Analytical

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.8	3.2	49.5	35.6	10.9

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.1880	0.1023	0.0808	0.0552	0.0394			

	Material Description	USCS	AASHTO
○			

Project No. **Client:**

Project:

○ **Source of Sample:** FI-2021-01-20211019 **Sample Number:** WG1583676-1

Remarks:

Alpha Analytical

Mansfield, MA

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

12/21/2021

Location: FI-2021-01-20211019

Sample Number: WG1583676-1

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 50.70
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Serial_No:01112217:20

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
50.70	0.00	3	0.00	0.00	100.0
		2	0.00	0.00	100.0
		1	0.00	0.00	100.0
		.75	0.00	0.00	100.0
		.375	0.00	0.00	100.0
		#4	0.00	0.00	100.0
		#10	0.43	0.00	99.2
		#20	0.97	0.00	97.2
		#40	0.61	0.00	96.0
		#60	1.66	0.00	92.8
		#140	15.86	0.00	61.5
		#200	7.60	0.00	46.5

Hydrometer Test Data

Hydrometer test uses material passing #200
Percent passing #200 based upon complete sample = 46.5
Weight of hydrometer sample =35.71
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = 0
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 151H
Hydrometer effective depth equation: L = 16.294964 - 0.2645 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0362	13.0
5.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0229	13.0
15.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0132	13.0
30.00	21.7	1.0055	1.0057	0.0134	5.5	14.8	0.0094	11.9
60.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0067	10.9
240.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0033	10.9
1440.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0014	10.9

Fractional Components

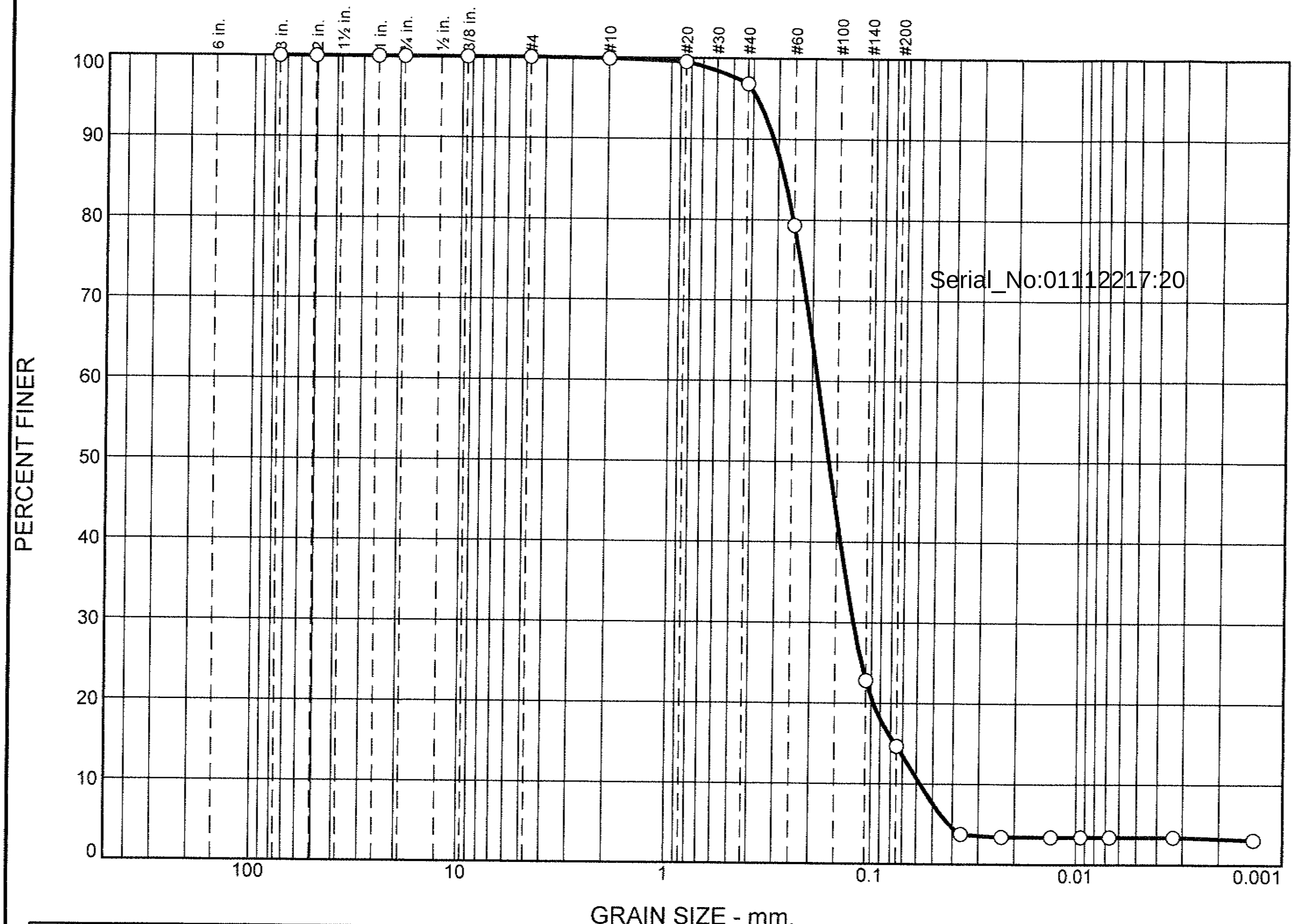
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.8	3.2	49.5	53.5	35.6	10.9	46.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.0394	0.0451	0.0552	0.0662	0.0808	0.1023	0.1643	0.1880	0.2212	0.2972

Fineness Modulus
0.35

Alpha Analytical

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.1	3.0	82.2	11.3	3.4

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.2797	0.1877	0.1643	0.1227	0.0765	0.0577	1.39	3.25

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** FI-2021-02-20211019 **Sample Number:** L2157780-02

Remarks:

Alpha Analytical

Mansfield, MA

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

12/21/2021

Location: FI-2021-02-20211019

Sample Number: L2157780-02

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 122.15
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Serial_No:01112217:20

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
122.15	0.00	3	0.00	0.00	100.0
		2	0.00	0.00	100.0
		1	0.00	0.00	100.0
		.75	0.00	0.00	100.0
		.375	0.00	0.00	100.0
		#4	0.00	0.00	100.0
		#10	0.11	0.00	99.9
		#20	0.47	0.00	99.5
		#40	3.26	0.00	96.9
		#60	21.41	0.00	79.3
		#140	69.01	0.00	22.8
		#200	9.96	0.00	14.7

Hydrometer Test Data

Hydrometer test uses material passing #200
Percent passing #200 based upon complete sample = 14.7
Weight of hydrometer sample =35.98
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = 0
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 151H
Hydrometer effective depth equation: L = 16.294964 - 0.2645 x **Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.7	1.0055	1.0057	0.0134	5.5	14.8	0.0364	3.7
5.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0231	3.4
15.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0133	3.4
30.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0094	3.4
60.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0067	3.4
240.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0033	3.4
1440.00	21.7	1.0045	1.0047	0.0134	4.5	15.1	0.0014	3.1

Fractional Components

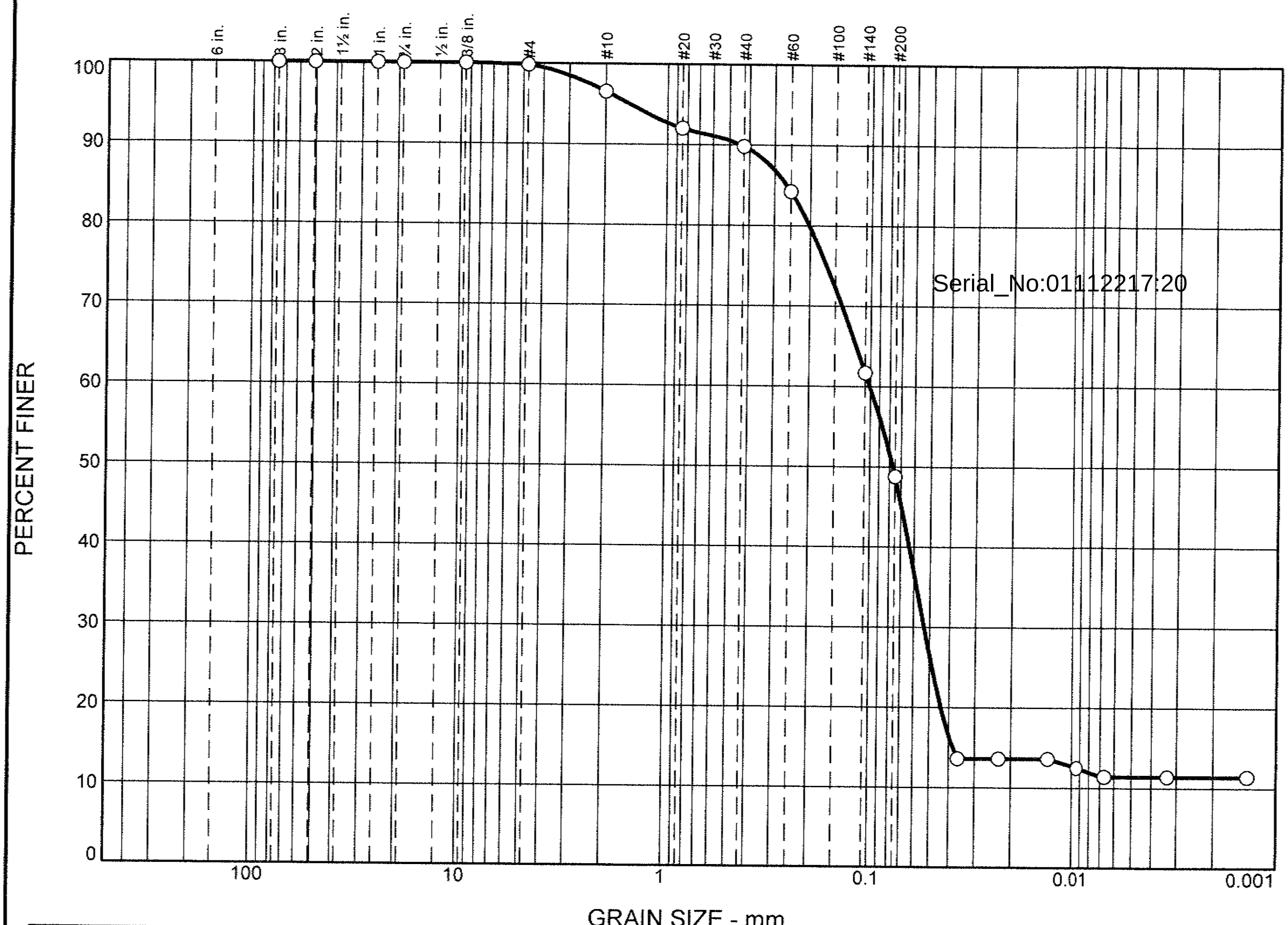
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.1	3.0	82.2	85.3	11.3	3.4	14.7

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0417	0.0577	0.0765	0.0975	0.1227	0.1433	0.1643	0.1877	0.2530	0.2797	0.3177	0.3825

Fineness Modulus	C_u	C_c
0.71	3.25	1.39

Alpha Analytical

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.2	3.2	6.8	41.0	37.4	11.4

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.2623	0.1006	0.0770	0.0533	0.0383			

	Material Description	USCS	AASHTO
○			

Project No. **Client:**
Project:

○ **Source of Sample:** FI-2021-03-20211019 **Sample Number:** L2157780-03

Remarks:

Alpha Analytical

Mansfield, MA

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

12/21/2021

Location: FI-2021-03-20211019

Sample Number: L2157780-03

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 94.85
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Serial_No:01112217:20

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
94.85	0.00	3	0.00	0.00	100.0
		2	0.00	0.00	100.0
		1	0.00	0.00	100.0
		.75	0.00	0.00	100.0
		.375	0.00	0.00	100.0
		#4	0.18	0.00	99.8
		#10	3.08	0.00	96.6
		#20	4.31	0.00	92.0
		#40	2.08	0.00	89.8
		#60	5.32	0.00	84.2
		#140	21.37	0.00	61.7
		#200	12.24	0.00	48.8

Hydrometer Test Data

Hydrometer test uses material passing #200
Percent passing #200 based upon complete sample = 48.8
Weight of hydrometer sample =35.77
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = 0
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 151H
Hydrometer effective depth equation: L = 16.294964 - 0.2645 x Rm

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0362	13.6
5.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0229	13.6
15.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0132	13.6
30.00	21.7	1.0055	1.0057	0.0134	5.5	14.8	0.0094	12.5
60.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0067	11.4
240.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0033	11.4
1440.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0014	11.4

Fractional Components

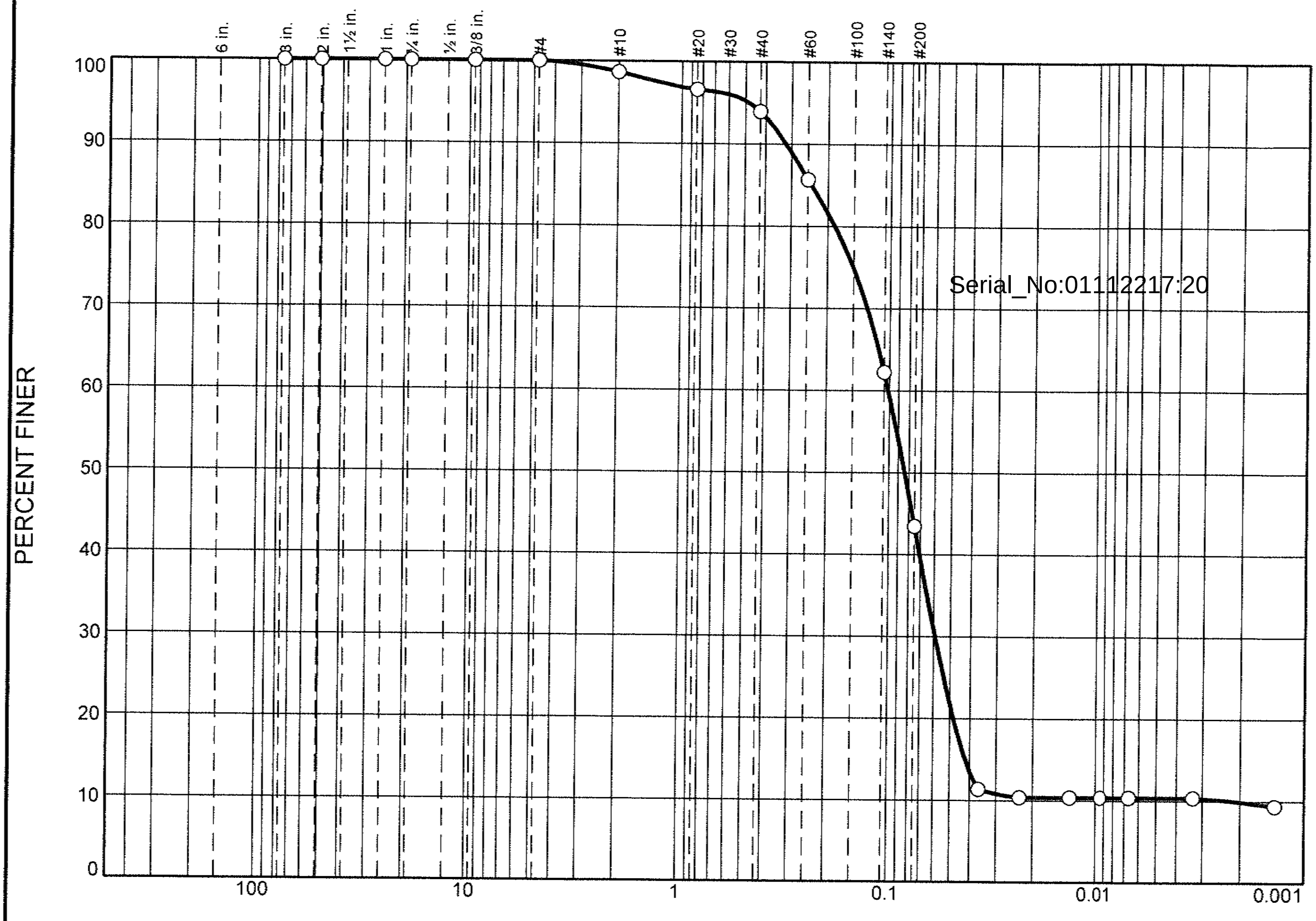
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.2	0.2	3.2	6.8	41.0	51.0	37.4	11.4	48.8

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.0383	0.0438	0.0533	0.0634	0.0770	0.1006	0.2024	0.2623	0.4394	1.5297

Fineness Modulus
0.59

Alpha Analytical

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	1.3	4.8	50.5	33.0	10.4

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.2405	0.1012	0.0840	0.0591	0.0421	0.0022	15.94	46.69

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** FI-2021-04-20211019 **Sample Number:** L2157780-04

Remarks:

Alpha Analytical

Mansfield, MA

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

12/21/2021

Location: FI-2021-04-20211019

Sample Number: L2157780-04

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 93.24
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Serial_No:01112217:20

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
93.24	0.00	3	0.00	0.00	100.0
		2	0.00	0.00	100.0
		1	0.00	0.00	100.0
		.75	0.00	0.00	100.0
		.375	0.00	0.00	100.0
		#4	0.00	0.00	100.0
		#10	1.25	0.00	98.7
		#20	1.93	0.00	96.6
		#40	2.47	0.00	93.9
		#60	7.69	0.00	85.7
		#140	21.86	0.00	62.2
		#200	17.53	0.00	43.4

Hydrometer Test Data

Hydrometer test uses material passing #200
Percent passing #200 based upon complete sample = 43.4
Weight of hydrometer sample =35.06
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = 0
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 151H
Hydrometer effective depth equation: L = 16.294964 - 0.2645 x Rm

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.7	1.0055	1.0057	0.0134	5.5	14.8	0.0364	11.4
5.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0231	10.4
15.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0133	10.4
30.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0094	10.4
60.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0067	10.4
240.00	21.7	1.0050	1.0052	0.0134	5.0	15.0	0.0033	10.4
1440.00	21.7	1.0045	1.0047	0.0134	4.5	15.1	0.0014	9.4

Fractional Components

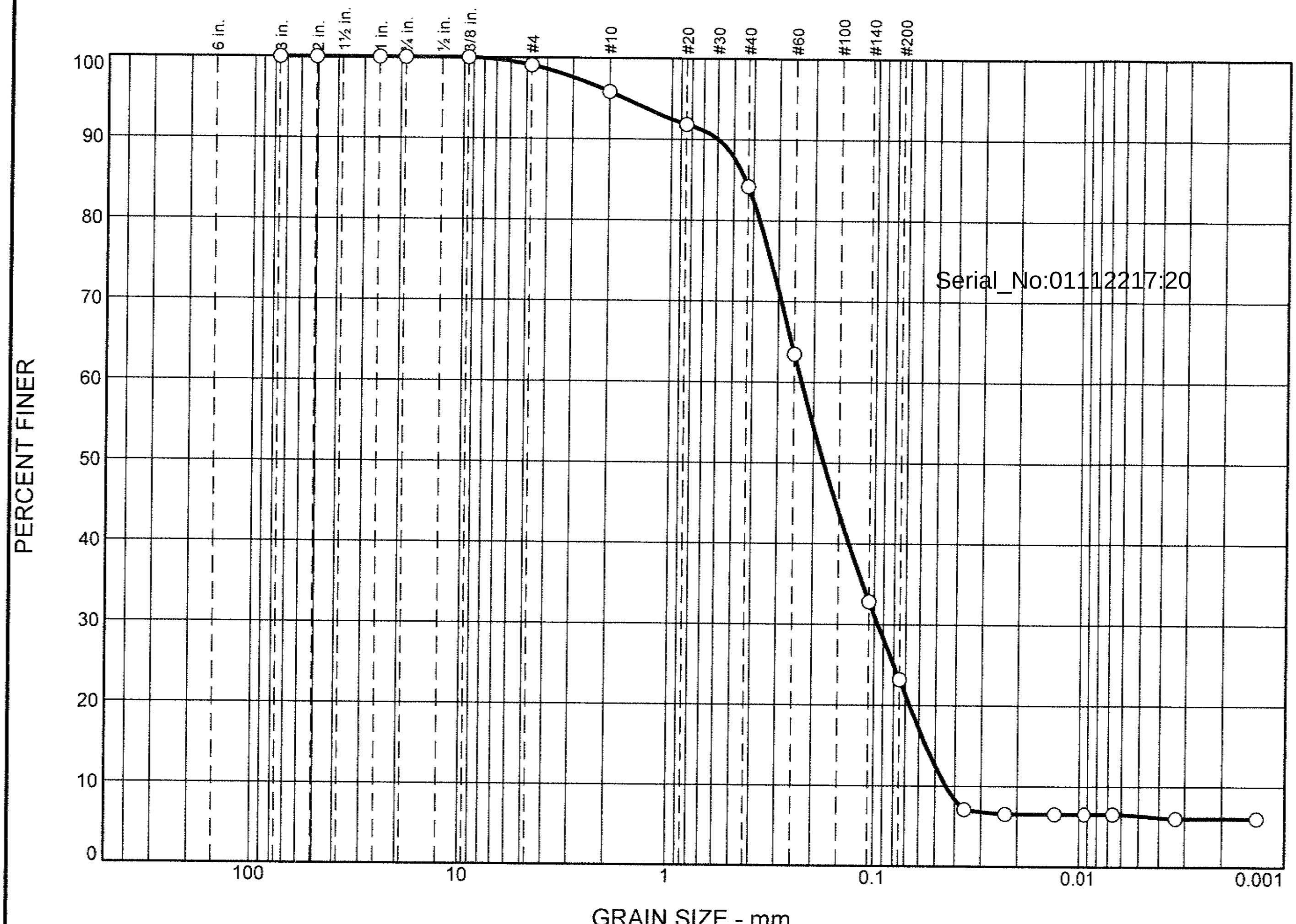
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	1.3	4.8	50.5	56.6	33.0	10.4	43.4

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
	0.0022	0.0421	0.0481	0.0591	0.0707	0.0840	0.1012	0.1853	0.2405	0.3195	0.4811

Fineness Modulus	C_u	C_c
0.44	46.69	15.94

Alpha Analytical

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.9	3.3	11.6	61.0	16.8	6.4

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.4381	0.2300	0.1781	0.0960	0.0555	0.0444	0.90	5.18

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** FI-2021-05-20211019 **Sample Number:** L2157780-05

Remarks:

Alpha Analytical

Mansfield, MA

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

12/21/2021

Location: FI-2021-05-20211019

Sample Number: L2157780-05

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 118.18
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Serial_No:01112217:20

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
118.18	0.00	3	0.00	0.00	100.0
		2	0.00	0.00	100.0
		1	0.00	0.00	100.0
		.75	0.00	0.00	100.0
		.375	0.00	0.00	100.0
		#4	1.10	0.00	99.1
		#10	3.82	0.00	95.8
		#20	4.74	0.00	91.8
		#40	9.01	0.00	84.2
		#60	24.48	0.00	63.5
		#140	36.23	0.00	32.8
		#200	11.40	0.00	23.2

Hydrometer Test Data

Hydrometer test uses material passing #200
Percent passing #200 based upon complete sample = 23.2
Weight of hydrometer sample =35.34
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = 0
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 151H
Hydrometer effective depth equation: L = 16.294964 - 0.2645 x Rm

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.7	1.0065	1.0067	0.0134	6.5	14.6	0.0361	7.1
5.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0229	6.5
15.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0132	6.5
30.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0094	6.5
60.00	21.7	1.0060	1.0062	0.0134	6.0	14.7	0.0066	6.5
240.00	21.7	1.0055	1.0057	0.0134	5.5	14.8	0.0033	6.0
1440.00	21.7	1.0055	1.0057	0.0134	5.5	14.8	0.0014	6.0

Fractional Components

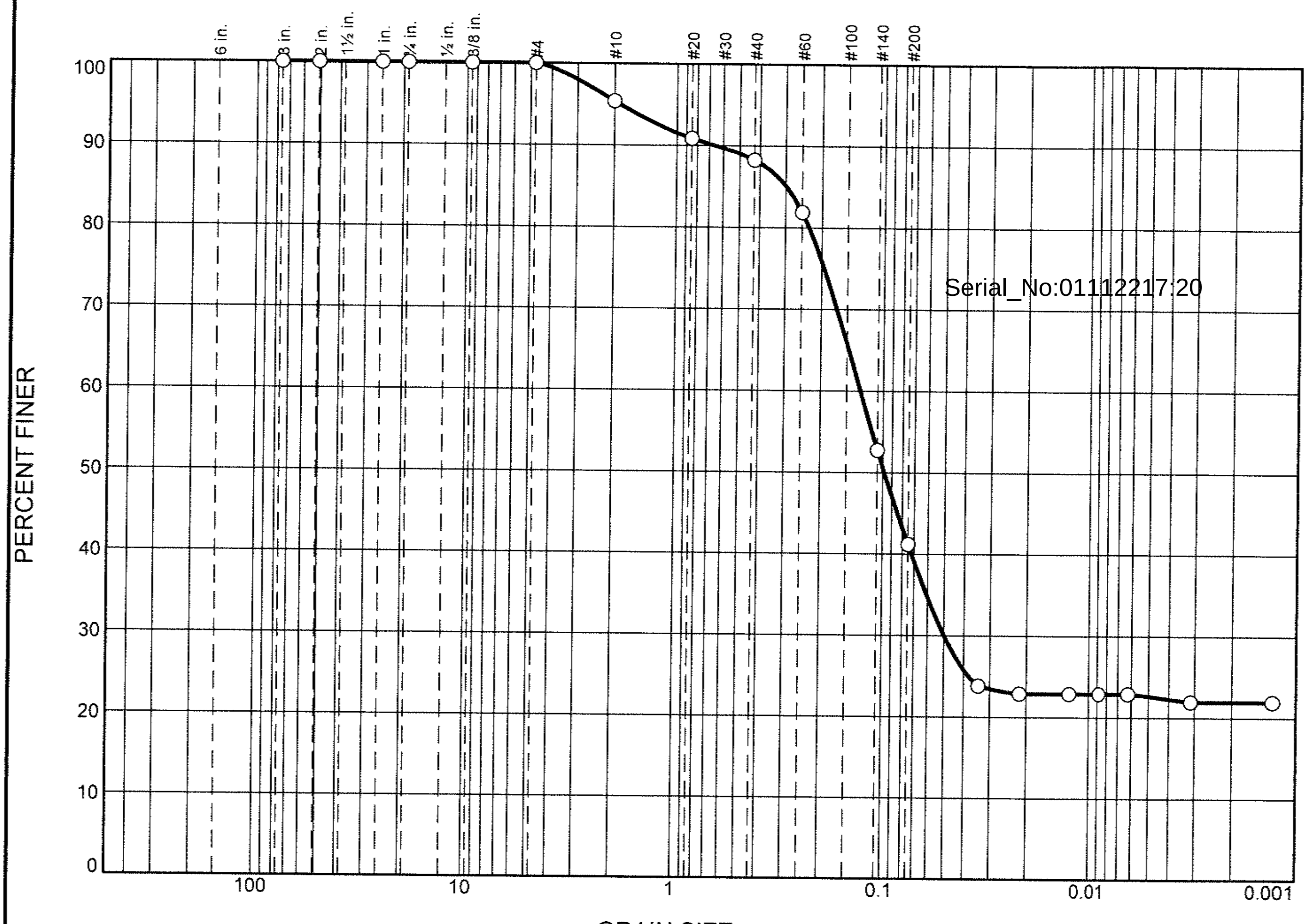
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.9	0.9	3.3	11.6	61.0	75.9	16.8	6.4	23.2

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
	0.0444	0.0555	0.0669	0.0960	0.1337	0.1781	0.2300	0.3725	0.4381	0.5954	1.6886

Fineness Modulus	C_u	C_c
1.06	5.18	0.90

Alpha Analytical

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	4.6	7.2	47.0	18.6	22.6

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.2976	0.1287	0.0981	0.0499				

	Material Description	USCS	AASHTO
○			

Project No. **Client:**

Project:

○ **Source of Sample:** FI-2021-06-20211019 **Sample Number:** L2157780-06

Remarks:

Alpha Analytical

Mansfield, MA

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

12/21/2021

Location: FI-2021-06-20211019

Sample Number: L2157780-06

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 106.86
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Serial_No:01112217:20

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
106.86	0.00	3	0.00	0.00	100.0
		2	0.00	0.00	100.0
		1	0.00	0.00	100.0
		.75	0.00	0.00	100.0
		.375	0.00	0.00	100.0
		#4	0.00	0.00	100.0
		#10	4.91	0.00	95.4
		#20	4.87	0.00	90.8
		#40	2.79	0.00	88.2
		#60	6.79	0.00	81.9
		#140	31.14	0.00	52.7
		#200	12.32	0.00	41.2

Hydrometer Test Data

Hydrometer test uses material passing #200
Percent passing #200 based upon complete sample = 41.2
Weight of hydrometer sample =35.31
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = 0
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 151H
Hydrometer effective depth equation: L = 16.294964 - 0.2645 x Rm

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.7	1.0125	1.0127	0.0134	12.5	13.0	0.0341	23.8
5.00	21.7	1.0120	1.0122	0.0134	12.0	13.1	0.0216	22.9
15.00	21.7	1.0120	1.0122	0.0134	12.0	13.1	0.0125	22.9
30.00	21.7	1.0120	1.0122	0.0134	12.0	13.1	0.0088	22.9
60.00	21.7	1.0120	1.0122	0.0134	12.0	13.1	0.0062	22.9
240.00	21.7	1.0115	1.0117	0.0134	11.5	13.3	0.0031	21.9
1440.00	21.7	1.0115	1.0117	0.0134	11.5	13.3	0.0013	21.9

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	4.6	7.2	47.0	58.8	18.6	22.6	41.2

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0499	0.0721	0.0981	0.1287	0.2310	0.2976	0.6579	1.8779

Fineness Modulus
0.71

Alpha Analytical

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL

WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 10/21/21

ALPHA Job #: L2157780

Client Information

Client: Anchor QEA, LLC
Address: 755 Business Center Drive Suite 200
Horsham, PA 19044
Phone: 267 751 4116
Fax:
Email: slagnull@anchorqea.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Little Assawoman Bay, Fenwick
Project Location: Little Assawoman Bay
Project #: 192069-01.01
Project Manager: Michael Countess
ALPHA Quote #: 36716

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due: Time:

Report Information - Data Deliverables

☐ FAX ☒ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program	Criteria
Delaware	

Other Project Specific Requirements/Comments/Detection Limits:

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Moisture & TS Calc	Alkylated PAHs EPA 8270D-SIM(M)	Pesticides EPA 8081A	TOC	PCBs EPA 8270D-SIM/680(M)	TAL Metals List	Grain Size	Total Solids SM2540			Sample Specific Comments	Total # Bottles
57780-01	FJ-2021-01	10/19/21	1000	Sed	SL							X	X				
-02	-02	↓	1040	↓	SL							X	X				
-03	-03		1115		SL							X	X				
-04	-04		1152		SL							X	X				
-05	-05		1230		SL							X	X				
-06	-06		1255		SL							X	X				
-07	-North		1120		SL	X	X	X	X	X	X	X					
-08	-South	↓	1300	↓	SL	X	X	X	X	X	X	X					

SAMPLE HANDLING
Filtration ________
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

Container Type
Preservative

Relinquished By:	Date/Time	Received By:	Date/Time
Sean Lynch	10/20	Fedex	
		[illegible] AAL	10/21/21 1025

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 14-OCT-07)

SHPO Review Documentation

SHPO Phase 1 Investigation Review Letter

Phase 1 Site Investigation Results Report

Phase 1B Site Investigation Results Report

SHPO Phase 1 Investigation Review Letter

DELAWARE HISTORICAL & CULTURAL AFFAIRS

Delaware Division of Historical & Cultural Affairs
29 N. State St., Dover, Delaware 19901
Tel. (302) 736-7400 | Fax. (302) 739-5660
history.delaware.gov

April 20, 2022

Ms. Lena DeSantis
Anchor Qea
123 Tice Boulevard #205
Woodcliff Lake, NY 07677

RE: CENAP-OPR-2021-576-85, Fenwick Island Channel Dredging SX
SHPO Project Review # 2021.10.27.02

Dear Ms. DeSantis,

This Office is in receipt of *Executive Summary Phase IB Underwater Archaeological Project Fenwick Island Channel Dredging Project*, completed by Dolan Research for Anchor QEA LLC. The management summary follows additional Phase IB testing completed within the Little Assawoman Bay prior to proposed dredging of the Fenwick Island Channel.

The initial Phase IB investigations identified a high-intensity limited duration magnetic signature (Target SM1) within the area of potential effect (APE) in Little Assawoman Bay. Additional Phase IB investigations were conducted at this location at the recommendation of Dolan Research. A combination of magnetic remote sensing data and probes were used to further delineate Target SM1. A single hard contact was recorded at one probe location approximately 7.1' below the water line. Additional probing was done in the immediate vicinity, but no additional contact was made. Target SM1 is likely a single object vertically oriented and is not indicative of an archaeological site. Dolan Research and Anchor QEA do not recommend further underwater investigations for the purposed of this undertaking.

We find that no further underwater survey is needed for the proposed work within the Fenwick Island Channel. It is our understanding from our meeting on October 29, 2021 that potential locations for dredged material placement are still being considered. We ask to be kept informed as plans develop, as terrestrial archaeological survey may be required. We look forward to receiving the finalized version of the report. If you have any questions I can be reached at (302) 736-7431 or sarah.carr@delaware.gov.

Sincerely,

Sarah Carr
Cultural Preservation Specialist

cc: Gwen Davis, DE SHPO
Nikki Minnichbach, USACE
Michael D. Yost, USACE
Steve Bagnull, Anchor QEA
Bill Rymer, Town of Fenwick

Phase 1 Site Investigation Results Report

PHASE I UNDERWATER ARCHAEOLOGICAL INVESTIGATIONS FENWICK ISLAND CHANNEL DREDGING PROJECT LITTLE ASSAWOMAN BAY, FENWICK ISLAND, SUSSEX COUNTY, DELAWARE

DRAFT REPORT

Submitted to:
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January 2022

ABSTRACT

In conjunction with the Fenwick Island Channel Dredging Project, Phase I Underwater Archaeological Investigations were conducted to assess the potential presence or absence of potential submerged cultural resources within the Project's Area of Potential Effect (APE). The Town of Fenwick Island, Sussex County, Delaware is pursuing the completion of a hydraulic dredging project to address the navigational hazards in two navigational channels (North and South) in Little Assawoman Bay. The North and South Channel Survey areas combined extend for approximately 4,000 linear feet in the bay.

This Phase I underwater archaeological project was conducted to identify, through background research and magnetic and acoustic remote sensing field methods, the presence or absence of submerged cultural resource targets within the APE in Little Assawoman Bay that may represent significant archeological resources potentially eligible for the National Register of Historic Places.

One magnetic target (SM1) generated an intense dipolar signature that was identified on several overlapping survey lanes in the South Channel Survey Area and is suggestive of potential submerged cultural resource. Additional Phase IB-level underwater archaeological investigations or avoidance of that location is recommended.

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1.0 INTRODUCTION

Phase I Underwater Archaeological Investigations were completed in Little Assawoman Bay, Sussex County, Delaware as part of the Fenwick Island Channel Dredging Project. Little Assawoman Bay is a popular recreational boating area in southern Delaware inland from the Atlantic Ocean. Over recent years, sediment has built-up in the vicinity of the Town of Fenwick Island, leading to areas of very shallow water that are causing navigational hazards to both motorized and non-motorized watercraft. The Town of Fenwick Island, Sussex County, Delaware is pursuing the completion of a hydraulic dredging project to address the navigational hazards. As part of the proposed Project, the Town of Fenwick would hydraulically dredge two channels (North and South Channels) of Little Assawoman Bay to a depth of -4 feet mean low water (MLW) with an allowable over-dredge tolerance to a depth of -5 feet MLW. The combined channel length is approximately 4,000 linear feet, and the channels cover a combined surface area of approximately 4.6 acres. Figures 1 and 2 depict the general project area and proposed channels, respectively.

The U.S. Army Corps of Engineers, Philadelphia District and the Delaware Historic Preservation Office has indicated that the proposed project has the potential to impact submerged cultural resources. A Phase I Underwater Archaeological Project was conducted to address requirements contained in Section 106 of the National Historic Preservation Act of 1966 (as amended PL 89-665), the Abandoned Shipwreck Act of 1987, and the Advisory Council of Historic Preservation revised 36 CFR 800 Regulations. The planned investigations were conducted in compliance with Delaware statues and regulations. The project will result in a professional report that details the results of the study and conforms to the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (Federal Register 1983) and Guidelines for Architectural and Archaeological Surveys in Delaware (1993).

Phase I underwater archaeological investigations were designed to identify, through background research and magnetic and acoustic remote sensing field methods, the presence or absence of submerged cultural resource targets within the Area of Potential Effect (APE) in Little Assawoman Bay that may represent significant archeological resources potentially eligible for the National Register of Historic Places (NRHP). The goal of this underwater project is to provide recommendations that will allow implementation of the project while minimizing the effect on significant cultural resources.

Previous to fieldwork activities, limited documentary research was undertaken to determine the likelihood and nature of potentially significant submerged archaeological and historical resources within the APE. Historical data were integrated with Delaware state preservation plans established in the Delaware Comprehensive Historic Preservation Plan (Ames, *et. al*. 1989). Of particular relevance to the current study is the recently developed historic archaeological context on the Maritime Theme in Delaware with the Sub-Theme Shipwrecks, Coastal Zone (Koski-Karell 1995).

Gathered documentary data were used to provide a framework for identifying historic and prehistoric archaeological resources that may have been deposited within the APE, and to determine the extent of subsequent activities that may have removed or disturbed such material. Background research on the historic period established a generalized context for ultimate evaluation of any historic submerged sites that might be identified.

Fieldwork investigations were completed in Little Assawoman Bay, on 11 November 2021. The project goal was to identify remote sensing targets of potential historical significance from gathered remote sensing data. After target signature analysis, recommendations were compiled for the need of additional archaeological investigation at each individual target location.

Analysis of fieldwork data confirmed the presence of numerous small magnetic anomalies typically associated with single source, debris-related objects. None of these single-source targets are suggestive of potentially significant submerged cultural resources. However, one magnetic target (SM1) generated an intense dipolar signature that was identified on several overlapping survey lanes and is suggestive of potential submerged cultural resource and additional underwater archaeological investigations or avoidance of that location is recommended.

2.0 PROJECT LOCATION AND DESCRIPTION

The APE was comprised of two navigational channels (North and South) in Little Assawoman Bay. Combined the two channel survey areas are approximately 4,000 linear feet long or 4.6 acres in size. Little Assawoman Bay is a tidal body of water approximately three miles long in Sussex County, Delaware and is a popular recreational boating area. It is connected from Assawoman Bay to the south by a narrow canal known locally as the Fenwick Island Cut and is connected to Indian River Bay and Indian River Inlet to the north by the 3.25-mile-long Assawoman Canal. It is separated from the Atlantic Ocean by the Fenwick Island barrier spit.

Both channel survey areas follow corridors this are 50 feet wide and extend from the southwest to the northeast. The North Channel Survey Area is approximately 2,200 feet long, while the South Channel Survey Area is approximately 1,800 feet long including a short extension channel to the south from the center portion of the survey area. Water depths in Little Assawoman Bay were very shallow across both channel survey areas; generally varying between two and five feet deep, mean low water.

The locations of the North and South Channel Survey Areas are presented in Figure 2.

3.0 HISTORICAL BACKGROUND

3.1 Methodology

A generalized historical overview of activity in and around lower Delaware waters in Sussex County was conducted. Both primary and secondary source material were consulted to provide data on local and regional historical developments. Research was conducted at national and local venues. Repositories in Washington D.C.; Alexandria, Virginia; Dover, Delaware; and Philadelphia, Pennsylvania, were visited by project personnel while compiling information for inclusion in the historical background.

Historical research was designed to determine the potential presence of submerged cultural resources in Little Assawoman Bay. The background research included a records check for known sites and National Register properties within the project vicinity, and review of state archaeological site files in Delaware, as well as an examination of prior technical reports and preservation planning tools. Additionally, the background research portion of the project includes the development of generalized prehistoric overview for the region.

A prehistoric overview was included to supplement the historical background research and to evaluate the potential presence and corresponding significance of unrecorded inundated terrestrial sites near the two channel survey areas. Environmental parameters affecting settlement patterns in the project vicinity were identified and used to establish a probability for locating inundated terrestrial archaeological resources.

Background research on the historic period established a generalized context for ultimate evaluation of historic submerged sites identified. Submerged historic resources were considered with reference to the Delaware Comprehensive Historic Preservation Plan (Ames et. al. 1989) and the ongoing state preservation planning process.

3.2 Prehistoric Synopsis

For the purposes of completing a prehistoric overview of the project areas, various publications by Jay Custer of the University of Delaware's Center for Archaeological Research (1984, 1989) have provided a suitable general context.

The prehistory of the Delaware River Valley is divided into chronological time periods. Each period groups similar sets of cultural adaptations to environmental, and inferred social stresses as interpreted from archaeological data. Cultural adaptations including, settlement/subsistence patterns, resource utilization and exchange/trade networks, change through time and often by region. Symptoms of cultural adaptations are manifest as artifacts, food debris, burials, and features. Periods, therefore, are further divided into complexes that specifically describe adaptations through time or between physiographic zones.

Several specific historical Maritime themes of Delaware Bay are discussed in detail in the following sections. There are four cultural periods generally recognized by Custer (1984) for the Delaware River Valley; Paleo-Indian (c. 14,000 B.P. - 8,500 B.P.), Archaic (c. 8,500 B.P. - 5,000 B.P.), Woodland I (c. 5,000 B.P. - A.D. 1,000), and Woodland II (c. A.D. 1,000 - A.D 1,600). Each period corresponds to environmental episodes that were marked by broad climatic changes, thereby affecting the productivity and distribution of environmental resources available to people over time.

The Paleo-Indian Period corresponds to three environmental episodes. The Late Glacial Episode (c. 17,000 B.P. - 8,000 B.P.) marks the end of the Pleistocene. Glacial waters melting from the Laurentinde Ice Sheet poured into the Delaware River Valley creating a rive channel that extended 50 kilometers beyond the present mouth of the Delaware River Bay (Custer 1984). Changing salinity levels caused by rapid sea level rises made unstable conditions for estuary species. Fluctuations in precipitation and air temperature encouraged a mosaic development of plant and animal communities ranging from tundra to grassland to deciduous forest. The transition between the ends of the PreBoreal/Boreal Episode (8,000 B.P. - 6,500 B.P.) is noted for the growth of closed Boreal forests and a decline in grasslands. The spread of coniferous forests at this time would have forced browsing game to fresh water sources. Rapid sea level rise continued, meaning impoverished estuarine resources (Custer 1984).

Paleo-Indians were hunter/gatherers who traveled in flexible small bands. As a highly mobile people focused primarily on hunting, their technology is characterized by large fluted bifaces, knives, and projectile points. Few if any plant processing tools are associated with Paleo-Indian sites. Given the importance of high quality crystalline for the manufacturing of multipurpose biface tools, Paleo-Indian settlement systems often were centered on quarry sites. Types of sites associated with Paleo-Indian settlement/subsistence systems include: quarry, quarry reduction, base camp, base camp maintenance stations, outlying hunting stations, and isolated point finds. Except for quarry sites, Paleo-Indian sites are typically found near poorly drained sinkholes, swampy settings, headlands overlooking ancestral confluences of major drainages, and within the mid-peninsular divide (Custer 1984).

The Archaic Period (c. 8,500 B.P. - 5,000 B.P.) is associated with the Atlantic Environmental Episode. Mesil forest growth responded to general warming trends and increased precipitation. Rapid sea level rise caused poor estuary stability. Increased seasonality led to the development of a variety of resources exploited during the Archaic Period. There is an associated decrease in the importance of high quality lithic material and an increase in tool types including plant-processing tools. The settlement system was serial as people moved from area to area as resources were needed or depleted. Archaic sites include macroband base camps, microband base camps, and procurement sites. It is probable that fusion and fission of social groups occurred as resources were exploited. Macroband base camps could reach 20 - 30 nuclear families at one time. Interior swamps, floodplains of major drainages, and medium range terraces were the most likely archaic site locations. Custer speculates that, "from the town of New Castle south, similar sites probably existed but are now inundated by sea level rise and are now buried below fairly recent sediments or have been destroyed by dredging" (Custer 1984, 71). Paleo-Indian and Archaic Sites often coincide in the same areas.

The Woodland I Period (c. 5,000 B.P. - A.D. 1,000) is associated with two environmental episodes; Sub-Boreal and Sub-Atlantic. Early in the Sub-Boreal Episode a marked dry and warm period occurred that eventually was ameliorated by wetter and cooler conditions during the Sub-Atlantic Episode. The mid-post glacial xerothermic caused shrinkage in available standing water sources. Coincidentally, sea level rises slowed causing stable environments for shellfish bed development. Hydrological fluctuations allowed anadromous fish greater inland penetration. Cultural adaptations vary widely throughout the Woodland I period, but in general people adopted a semi-sedentary lifestyle characterized by extensive trade networks, mortuary practices, and population growth. Ceramics, storage features, and caches were developed indicating periodic surplus. Pithouse features reflect longer site usage compared to archaic site use. Tool kits show an increase in the variety of ground stone tools reflecting the increased importance of plant food processing. Adzes, celts, gouges, and axes may have been used for canoe manufacturing. Exotic material used in the manufacturing of tools added to graves infers the possibility of ranked society (Custer 1984).

Woodland I sites include macroband base camps, microband base, procurement sites, and cemeteries. Macroband base camps were marked by a decrease in the variety of site locations. They were generally located near interior swamps and stream confluences along interior drainages. Woodland I sites tend to follow the interface between freshwater and saltwater up major drainages. By the end of the Woodland I Period environments were less circumscribed. Plant and animal communities expanded as the climate became more wet and cool. Sea level rises dramatically slowed allowing the expansion of productive estuaries. Large groups seemed to have fissioned, extensive trade networks collapsed and cemetery use was abandoned (Custer 1984).

The Woodland II Period (c. A.D. 1,000 - A.D. 1,600) is associated with historic environments. This period is characterized by a breakdown in extensive trade networks but increased sedentism. Use of grave goods made from exotic material ends but a development of ossuaries, or secondary reburial sites, grows. Some agriculture as a secondary subsistence strategy to hunting and gathering is noted. Shell beds, near Woodland I period shell beds, are located on the outer coast. Ceramics, storage features, and pithouse features are regularly associated with macroband base camps. Triangular projectile points are exclusively manufactured, possible due to the development of the bow and arrow. Large sites are often located in marginally productive environmental zones, including the floodplains of major drainages. A noticeable divergence in adaptations occurs between the upper and lower Delaware River Valley. While people on the lower Delaware River Valley became more sedentary, people from the upper portions of the valley adopted a semi-sedentary lifestyle. The people from the upper valley reverted to settlement systems used during the Woodland I period. When Europeans arrived in the Delaware Valley in the 17th century, they encountered Native Americans who for the most part were semi-sedentary.

Features characteristic of the inception of the Woodland Period include: the introduction of ceramic technology, the onset of elaborate burial mound construction, the participation in exchange networks that transport materials, as well as artifacts, across large areas, and evidence indicating the domestication of plant foods. In contrast to the mobile lifestyle of the Paleo and Archaic, Woodland lifestyles were more sedentary and focused on productive estuaries. Custer mentioned that Early Woodland people in the region often established their base camps along brackish rivers. Small bands would then seasonally migrate from these basecamps to bayside marshes. By the late Woodland period, there is evidence of a further sedentary lifestyle with an increasing reliance on agriculture. Woodland sites have been identified on both the coastal marshes and in the mid-drainage areas in the region.

3.3 Maritime Historical Context of the Lower Delaware Bay Region

Historic activity in Delaware Bay dates to 1609 when Henry Hudson first discovered the bay while surveying the northeast coast of North America for the Dutch East India Company. Hudson noted the entrance of Delaware Bay, but did not explore up into the upper bay and river. His observations of Delaware Bay were recorded and eventually stimulated a significant interest in additional exploration, trade, and colonization of the region. In 1614 the State General of Holland granted the merchants of Amsterdam and Hoorn exclusive privileges to trade between 40 and 45 degrees of latitude in an area identified as the territory "New Netherland." The first Dutch explorers came to Delaware Bay from New Amsterdam (New York City) in October 1614. By decree from The Hague, October 11, 1614, the owners of five Dutch ships were authorized to establish the United Company of Merchants with the exclusive rights to explore the area between New France in the north and Virginia to the south. Captain Cornelius Hendrickson then became one of the first to explore the bay aboard the Onrust (Restless). Captain Hendrickson produced the first chart of Delaware Bay and River in 1615. Included in a brief report submitted to the Dutch merchants, Hendrickson claimed to have found "certain lands, a bay and three rivers situated between 38 degrees and 40 degrees" (Weslager 1961, 45). Soon the Dutch merchants set up trading stations and settlements at various locations along the banks of Delaware Bay and River. In 1623, the Dutch East India Company constructed the first of several fortifications on the east shore of the bay.

Swedish explorers were also active in the Delaware Bay region. In 1629 the Swedish West Indian Company purchased from the Indians a two-mile wide tract of land on the west side of the bay which extended 32 miles from Cape Henlopen north to a location above present Bowers Beach, Delaware. Although the purchase was ratified in 1630, it was not until Peter Minuit arrived with an expedition in 1638 that the Swedish attempted to settle the region (Hazard 1850). The Swedes eventually settled further upriver at a more suitable landing site on the west shore, near present Wilmington, Delaware.

For the next three decades the Swedes and Dutch co-existed in the Delaware Valley until 1664 when the British, under the command of Sir Robert Carr, assumed command of the region. When King Charles II made a grant of lands in the Delaware Valley to his brother James, Duke of York, the Duke sent a flotilla of warships under Carr's direction to subjugate the Dutch and Swedes and institute British control in the area. After several years of limited interest on the part of the Duke of York, King Charles II deeded a substantial portion of the territory to William Penn in 1682. Penn subsequently established an English colony, Pennsylvania, on the Delaware River with Philadelphia as its capital (Weslager 1961).

In 1684, Penn also acquired the "three lower counties" (present-day Delaware) from the Duke of York to add to his Pennsylvania holdings. With Penn's involvement the colonization process and economic growth in Delaware became tied more closely to Philadelphia and Pennsylvania. Throughout the colonial period, settlement in the lower Delaware Valley consolidated in regions where solid banks came to the Delaware's edge; for most of the waterfront was marshland and unhealthy for habitation. New Castle, and Wilmington, Delaware, Burlington, and Bordentown, New Jersey, and Philadelphia, Pennsylvania developed at locations of this type. In the lower portion of the Delaware Valley, population centers were, again, on high land. The high land was often some distance up a creek navigable only by shallow-draft vessels. Dover, Delaware, and Salem, New Jersey, were examples of this. Some towns, which appeared during the colonial period, developed because they were stopping points along the 60-mile stretch of river on the much-traveled route from New York to Baltimore. This applies to Trenton and Bordentown, New Jersey, near the northeast bend of the river, and to New Castle and Wilmington, Delaware, near the southwest bend. Philadelphia, in the middle of this line of travel, was not merely a stop on the line but developed into a trade and travel center itself (Tyler 1955).

Wheat, rye, barley and tobacco were the principle colonial products of Delaware Valley inhabitants. After being hauled by wagon to mills established along the banks of the Schuylkill River, Brandywine Creek, and other swift-water tributaries of the Delaware, the flour was placed aboard shallops and taken up the Delaware River to Philadelphia for consumption or further shipment. For the duration of the colonial period, the Delaware Valley region remained predominantly agricultural. The agricultural landscape that developed in response emphasized the importance of river and coastal transportation routes over roads. The system of agricultural production and transportation routes facilitated the rise of Philadelphia as one of the most important ports in the British Empire at the onset of the Revolutionary War.

The Revolutionary War disrupted the economic development of the region, as the British blockaded shipping and conducted raids along the shores of Delaware Bay (DeCunzo and Catts 1990). Following the conclusion of the war, Delaware Valley merchants, now freed from the restrictions of the Navigation Acts, again prospered. Philadelphia became the most active port in North America, with its ships reaching new markets in the East Indies and across the world. By 1800 there were 40 Philadelphia vessels in the China trade, about as many more trading in South America, and a considerable number still trading in Europe. The War of 1812 caused a second disruption to the social and economic life of Delaware Valley residents, but shortly thereafter, local inhabitants began to focus again on industry and agriculture.

A water link between Delaware Bay and Chesapeake Bay was forged when the Chesapeake and Delaware Canal was opened in 1829. Traffic across the peninsula between the two bays was so heavy that it supported the canal, a previously constructed turnpike, and within a few years, the New Castle and Frenchtown Railroad, one of the first railroads in America (Tyler 1955). Manufacturing came to the upper Delaware Valley in the first half of the 19th century. By 1850 Wilmington had became a leading manufacturer of railroad cars, heavy machinery, gunpowder, textiles, flour, and iron ships (Weslager and Heite 1988).

There was little or no industrial development along the shores of lower Delaware Bay. The slow-moving tidal tributaries lacked the force to power a large industrial plant. The tidal rivers themselves were too shallow for most sea-going vessels to navigate. In addition to farming, fishing and oystering became major industries of lower Delaware Bay during the 19th century. For nearly a century after the Civil War, oystering was the primary industry in many towns along the lower estuary in both New Jersey and Delaware (Weslager and Heite 1988). Fishing industries processing sturgeon and menhaden caught in Delaware Bay also peaked during the second half of the 19th century.

The introduction of steam technology had a dramatic effect on industries throughout the Delaware Valley. Regional companies became leaders in the production of steam engines for railroad locomotives and steamships. Several local companies also made railroad cars and car wheels, before expanding into the production of iron-hulled steamships. Delaware River shipyards gained an international reputation for producing quality iron-hulled steam vessels. Coal fuel was needed to power steam engines. Extensive anthracite coal reserves along the Lehigh and Schuylkill rivers were developed. Coal became a leading export for Delaware River ports during the 19th and 20th centuries. Related industries of iron and steel, initially founded in the Delaware Valley since the colonial period, expanded after the 19th century.

The large chemical industry of the Delaware Estuary began with the development of several small tanneries in and around New Castle County, Delaware, during the 19th century. Native black oak trees provided tanbark and local livestock production provided skins for the tanners. By the middle of the 19th century, Wilmington became a major producer of leather merchandise. Experiments were conducted in the tanning process that would revolutionize the leather making process. Prosperity gained from gunpowder production during the Civil War, allowed the local DuPont Company to expand over the next 30 years into one of the world's largest producer of chemicals and munitions. Petroleum-related industries and refineries were also established shortly after the discovery of oil in central and northwestern Pennsylvania in the 19th century. Philadelphia refineries are among the oldest in the world still producing refined oil products (Weslager and Heite 1988).

3.3.1 Overview of the Colonial Maritime History of Sussex County, Delaware

While the initial colonization of the Sussex County was a short-lived whale-fishing camp established by the West India Company at Zwaanenael, now Lewes in 1631, the origins of present-day Lewes (historically known as Lewestown) as a merchant port date to the late 17th century. At this time the territory of present-day Delaware then known as the "three lower counties" was part of Pennsylvania and under the control of William Penn. Penn acquired these lands from the Duke of York in 1684. By the turn of the 17th century, shipbuilding had become a small, but growing industry in Lewestown (Pusey 1903:20-21; Brittingham 1998:12; Cohen 2004:116).

After Penn's arrival a number of immigrants from Scotland and Ireland, who belonged to the religious sect known as the "Independents" settled in Lewestown. The first courthouse was built in 1682. In 1725, the community consisted of 58 families. The first church (Presbyterian) was erected in 1728 and around 1740, Lewestown had a formal courthouse erected, being the seat of government for Sussex County until 1791. By virtue of the King's authority and later by express grant by the heirs of William Penn the tract of sandy level land and marsh lying between Lewestown and the Delaware Bay was established as a public commons for the people's benefit (Pusey 1903:21-23; Lewes Historical Society 1985:122-123; Brittingham 1998:12; Cohen 2004:115).

Historically, Delaware Bay afforded the most ideal place of refuge within the 300 hundred miles extending from New York to the Chesapeake. It is of local tradition that the earliest lighthouse on Cape Henlopen was a crude whale oil light first erected around 1725. It was built to warn incoming mariners of their approach to the Hen and Chickens Shoals, located just off the Cape, and to guide their way into the shelter of the Bay. A more formal lighthouse was constructed in 1765, by the British government on the Atlantic side of the Cape (Pusey 1903:30-31; Cohen 2004:118). The 87-foot-tall Fenwick Island Lighthouse was opened in 1858 to assist mariners entering Delaware Bay to avoid the treacherous Fenwick Shoals which are located six miles off the coast of Fenwick

Island. The lighthouse remained in continuous operation for nearly 120 years until 1978 when it was decommissioned by the U.S. Coast Guard. It was listed in the NRHP in 1979 (Delaware Historical and Cultural Affairs, 2014).

During the Colonial period and into the 19th century, Lewestown was home to the pilots that shipmasters relied upon to assist with navigating around the hazards of the Delaware Bay and River. Many of these Pilots lived within Lewestown, but as early as 1756, it appears as though some families associated with this trade established their own community, "Pilot-Town," located immediately to the south of Lewestown. Being the first port upon entering the Bay, sailing ships regularly stopped at Lewestown for pilots and provisions (Lewes Historical Society 1985:123; Knopp 1996:1-2).

The earliest Lewestown pilots made use of two-masted schooners owned by small groups or clans and consisting of about eight pilots each. There was strong competition between the groups each trying to be the first to reach an incoming ship in hopes to land the job of piloting the vessel up the Delaware to northern ports. Some started apprenticeship as early as 15 years of age learning the navigation of the Delaware Bay and River from other experienced Pilots. An apprentice was required to have six years of training before he was issued a license. A formal Pilots Association, established to better regulate the trade, was not formed until 1896 (Cullen 1956:37; Knopp 1996:5; Cohen 2004:129).

The first detailed chart of the Delaware Bay and River was drafted in 1756 by Joshua Fisher, a native of Lewestown. The documentary evidence is conflicting as to Fisher's occupation, but it is more than likely that he was associated with the pilot industry to have had the knowledge to create the chart (Lewes Historical Society 1981:61; 1985:176). The chart was published by an Act of Parliament and was signed by 22 licensed Pilots and 20 Masters, vouching for its authenticity. Fisher's chart indicates that the area today known as Lewes Beach was an ideal spot for anchoring vessels. Soundings were taken throughout the Bay at low tide and indicated on the map in fathoms. The water depth near Lewes Beach at this time was 18 feet. The chart shows that the main ship channel was located roughly four miles off the coast of Lewestown. The westernmost channel, indicated as being "used only by Shallops," is shown as commencing at the mouth of Lewes Creek. Historically Lewes Creek and the Broad Kill River came to a confluence before emptying into the Bay near the northwestern terminus of present-day Beach Plum Island. Present-day Cape Henlopen is labeled "Cape James" (Fisher 1756).

Throughout the remainder of the Colonial period, Lewestown's economy appears to have been closely tied to its maritime industries. The town remained the seat of county government beyond the Revolutionary War and shipbuilding appears to have continued on a small scale. The town was undoubtedly an important port throughout this period for supplying ships with pilots and other provisions. The port was also likely of local importance to the colonists of Sussex County for trading and shipping agricultural and other goods overseas and to the Wilmington and Philadelphia regions.

Over the years, the mouth of Lewes Creek became filled with sandbars and was virtually impassable at low tide. This is likely to have been a re-occurring problem throughout the 19th century and into the 20th century. In 1937, present-day Roosevelt Inlet was constructed to assist with alleviating this issue. The new inlet was constructed roughly two miles to the southeast of the original inlet. Shortly thereafter, Lewes Creek was deepened through dredging and the waterway became known as the Lewes-Rehoboth Canal (Cullen 1956:38).

3.3.2 Overview of Local Navigational Improvements –Canals and Inlets

Little Assawoman Bay is located approximately midway between Indian River Inlet to the north (via the Assawoman Canal and Indian River) and Ocean City Inlet to the south (via Assawoman Bay). The Assawoman Canal links Indian River Bay with the Little Assawoman Bay to the south. The canal is bordered by Bethany Beach and South Bethany to the east and Ocean View to the west. Because of the canal, Fenwick Island is detached from the Delaware mainland.

First proposed in 1884, the Assawoman Canal was constructed by the U.S. Army Corps of Engineers in 1891 for the purpose of transporting local goods by boat without having to travel into the Atlantic Ocean. The canal initially was part of the federal Inter Coastal Waterway (ICW). System. However, the canal fell into disrepair and was not dredged from the 1950s until 2006. By the early 2000s, reportedly it was not deep enough to accommodate the boat traffic (typically small fishing boats and recreation vessels) that once passed through the waterway when it was part of the ICW. From 2006 to 2010, the state undertook a dredging project that restored the canal to navigability for small boats, with a channel width of 35 feet and a depth of three feet. Presently, Assawoman Canal is part of Holts Landing State Park, Millville Delaware (Delaware Department of Natural Resources and Environmental Control, 2016).

Indian River empties into the Atlantic Ocean via the Indian River Inlet, located in Delaware Seashore State Park. Historically, the inlet has opened and closed naturally following coastal storms and migrated north over the years. During the late 19th and early 20th centuries, the federal government studied various options to stabilize the inlet. The present inlet was not opened until November 1928. The first bridge over the canal was opened in 1933 and eventually jetties were built on either side of the inlet to prevent shoaling and protect the bridges (Horowitz, 2020).

The south end of Little Assawoman Bay ends at Fenwick Island Cut which provides nautical access for mariners to Assawoman Bay and the Ocean City Inlet at the south. The inlet was initially opened in the aftermath of a devastating hurricane that hit the Mid-Atlantic Region on 18 August 1933. Shortly thereafter, U.S. Army Engineers took steps to make the new inlet permanent along with creating a new harbor for the town of Ocean City, Maryland. The inlet eventually helped to establish Ocean City as an important Mid-Atlantic fishing port that allows a large network and commercial and recreational vessels to access the fishing grounds of the Atlantic Ocean (The Dispatch, 2013).

4.0 POTENTIAL SUBMERGED CULTURAL RESOURCE TYPES

This chapter addresses in board terms the potential for submerged cultural resources within the APE.

4.1 National Register of Historic Places Nomination Process

The information generated by these investigations was considered in terms of the criteria for evaluation outlined by the U.S. Department of the Interior, National Register Program. Nautical vessels and shipwreck sites, generally excepting reconstructions and reproductions, are considered historic if they are eligible for listing in the NRHP at a local, regional, national, or international level of significance. To be eligible for the NRHP, a vessel or site "must be significant in American history, architecture, archaeology, engineering, or culture, and possess integrity of location, design, setting, materials, workmanship, feeling, and association." To be considered significant the vessel or site must meet one or more of four National Register criteria:

A. Association with events that have made a significant contribution to the broad patterns of our history;

B. Association with the lives of persons significant in our past;

C. Embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction;

D. Sites that have yielded, or may be likely to yield, information important in prehistory or history.

National Register of Historic Places Bulletin 20 clarifies the National Register process for shipwrecks and other submerged cultural resources. Shipwrecks must meet at least one of the above criteria and retain integrity of location, design, settings, materials, workmanship, feelings and association. Determining the significance of a historic vessel depends on establishing whether the vessel is:

1. the sole, best, or a good representative of a specific vessel type; or

2. is associated with a significant designer or builder; or

3. was involved in important maritime trade, naval recreational, government, or commercial activities.

Properties which qualify for the National Register, must have significance in one or more "Areas of Significance" that are listed in National Register Bulletin 16A. Although 29 specific categories are listed, only some are relevant to the submerged cultural resources in Little Assawoman Bay. Architecture, commerce, engineering, industry, invention, maritime history, and transportation are potentially applicable data categories for the type of submerged cultural resources that may be expected in the project areas.

Historic records indicate the presence of no documented shipwreck sites within the Little Assawoman Bay APE. In addition, there are no wreck sites listed in any of shipwreck and obstruction data bases maintained by the National Oceanic and Atmospheric Administration (NOAA), including their Automated Wreck and Obstruction Information System (AWOIS).

4.2 Anticipated Property Types

Since the waters of Little Assawoman Bay are extremely shallow and relatively isolated from deeper, more navigable channels, the type of potential submerged cultural resources is limited to very shallow draft vessels. Typically, shallow draft vessels being used in this waterway would include motorized and non-motorized vessels. Motorized vessels might include recreational craft, fishing boats, small work boats and construction barges. Non-motorized craft might include various types of canoes, kayaks, and row boats.

5.0 FIELDWORK INVESTIGATIONS

A comprehensive remote sensing survey was conducted in Little Assawoman Bay during the high tide cycle on the morning of 11 November 2021. The remote sensing survey simultaneously collected magnetic and acoustic (side-scan-sonar) data. The purpose of the survey was to locate, identify, and preliminarily assess the significance of potential submerged cultural resources that might be impacted by channel dredging activities. The underwater survey was designed to generate sufficient magnetic and acoustic remote sensing data to identify anomalies caused by submerged cultural resources. Analysis of the remote sensing data aimed to isolate targets of potential historical significance that might require further investigation or avoidance.

5.1 Summary of Equipment and Methods

Sonar and magnetic survey operations were conducted simultaneously from a 22-foot-long fiberglass survey vessel. Both sensors were towed from the survey vessel. Sonar data were gathered with a *Marine Sonic HDS* two channel digital side scan sonar unit with a dual frequency 600/1200kHz side scan sensor. The sonar sensor was towed just below the water surface from the bow of the survey vessel and operated at a range of 50 feet in either channel which provided significantly overlapping acoustic coverage of the two survey areas. *Marine Sonic* data acquisition software was used to merge the acoustic data with real-time positioning data.

Magnetic data were collected with a *Geometrics 881* cesium marine magnetometer, capable of +/- 1/10 gamma resolution. A 10 Hz sampling rate by the magnetometer's towed sensor, coupled with a three-knot vessel speed generated a magnetic sample every 0.5 feet. The magnetometer sensor was towed with a float 40 feet aft of the port side of the survey vessel to provide optimal conditions for collecting magnetic data in a shallow water environment.

Hypack, a laptop PC-based software package in conjunction with a Differential Global Positioning System (DGPS) onboard the survey vessel provided positioning accuracy for the survey area of +/- 1.97 feet. The computer converted positioning data from the DGPS to Delaware State Plane Coordinates (feet) in real time. These X,Y coordinates were used to guide the survey vessel precisely along predetermined survey lines that had been established at 25-foot offsets in the two channel project survey areas. All magnetometer and side scan sonar offsets were established in *Hypack*. While surveying, vessel positions were continually updated on the computer monitor to assist the vessel operator, and the processed X,Y data were continually logged on computer disk for post-processing and plotting (Figures 3 & 4).
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All survey data and findings will be presented in Delaware State Plane coordinates, in feet.

5.2 Data Products - Magnetometer

The magnetometer collected data on the ambient magnetic field strength by measuring the variation in cesium electron energy states. As the sensor passed over objects containing ferrous metal, a fluctuation in the earth's magnetic field was recorded. The fluctuation was measured in gammas and is proportional to the amount of ferrous metal contained in the sensed object and the distance from the sensor.

Magnetic data were edited for detailed analysis of all anomalies. During the editing process background noise spikes were removed and a magnetic contour map was created with 5- gamma intervals for the two survey areas. Magnetic data editing consisted of using *Hypack's* single beam editing program to review raw data (of individual survey lines) and to delete any artificially induced noise or data spikes. Once all survey lines for the project areas were edited, the edited data were converted to an XYZ file also using *Hypack* (easting, and northing coordinates, and magnetometer data – measured in gammas). Next, the XYZ files were imported into a Triangular Irregular Network (TIN) modeling program in *Hypack*, that was used to contour the data in 5-gamma intervals (Figures 5 - 7).

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5.3 Data Products - Side Scan Sonar

The side scan sonar derives its information from reflected acoustic energy. Side looking sonar, which transmits and receives swept high frequency bandwidth signals from transducers mounted on a sensor that is towed from a survey vessel. Two sets of transducers mounted in an array along both sides of the tow fish generate the short duration acoustic pulses required for high resolution images. The pulses are emitted in a thin, fan-shaped pattern that spreads downward to either side of the tow fish in a plane perpendicular to its path. As the fish is towed along the survey track line this acoustic beam sequentially scans the bottom from a point beneath the fish outward to each side of the track line.

Acoustic energy reflected from any bottom discontinuities (exposed pipelines, rocks, or other obstructions) is received by the set of transducers, amplified and transmitted to the survey vessel via a tow cable. The digital output from state of the art units is essentially analogous to a high angle oblique photograph provided detailed representations of bottom features and characteristics. Sonar allows display of positive relief (features extending above the bottom) and negative relief (such as depressions) in either light or dark opposing contrast modes on a video monitor. Examination of the images thus allows a determination of significant features and objects present on the bottom within a survey area.

Raw sonar records were inspected for potential man-made features and obstructions present on the bottom surface. Sonar data were saved in separate files for each survey lane. Individual acoustic data files were initially examined using SeaScan™ acoustic data review software to identify any unnatural or man-made features in the records. Once identified, acoustic features were described using visible length, width, and height from the bottom surface. Acoustic targets are normally defined according to their spatial extent, configuration, location and environmental context. As a last step, edited acoustic data were merged into geo-referenced sonar mosaics that were overlaid onto aerial photographs of the project areas (Figures 8 & 9).

5.4 Evaluation of Remote Sensing Targets

Target signatures were evaluated using the NRHP criteria as a basis for the assessment. For example, although an historic object might produce a remote sensing target signature, it is unlikely that a single object (such as a historic anchor or cannon ball) has the potential to meet the criteria for nomination to the NRHP.

Target assessment was based primarily on the nature and characteristics of the acoustic and magnetic signatures. Shipwrecks – large or small – often have distinctive acoustic signatures, which are characterized by geometrical features typically found only in a floating craft. Most geometrical features identified on the bottom (in open water) are manmade objects. Often an acoustic signature will have an associated magnetic signature. Generally, if the acoustic signature demonstrates geometric forms or intersecting lines with some relief above the bottom surface and have a magnetic signature of any sort; it can be categorized as a potentially significant target. Often, modern debris near docks, bridges, or an anchorage is easily identified solely based on the characteristics of its acoustic signature. However, it is more common to find material partially exposed. Frequently, these objects produce a record that obviously indicates a man-made object, but the object is impossible to identify or date. Also in making an archaeological assessment of any sonar target, the history and modern use of the waterway must be taken into consideration. Naturally, historically active areas tend to have greater potential for submerged cultural resources. The assessment process prioritizes targets for further underwater archaeological investigations.

Magnetic target signatures alone are more difficult to assess. Without any supporting acoustic records, the type of the bottom sediments and the water currents become more important to the assessment process. A small, single-source magnetic signature has the least potential to be a significant cultural resource. Although it might represent a single historic object, this type of signature has limited potential to meet NRHP criteria.

A more complex magnetic anomaly, represented by a broad monopolar or dipolar type signature, has a greater potential to be a significant cultural resource, depending on bottom type. Shipwrecks that occur in regions with hard bottoms, with little migrating sand, tend to remain exposed and are often visible on sonar records. A magnetic anomaly that is identified in a hard bottom area and has no associated acoustic signature frequently can be discounted as being a historic shipwreck. Most likely, such an anomaly is modern debris, such as wire rope, chain, or other ferrous material.

Soft migrating sand or mud can bury large wrecks, leaving little or no indication of their presence on the bottom surface (via sonar data). The types of magnetic signatures that a boat or ship might produce are infinite, because of the large number of variables including location, position, chemical environment, other metals, vessel type, cargo, sea state, etc. These variables are what determine the characteristics of every magnetic target signature. Since shipwrecks occur in a dynamic environment, many of the variables are subject to constant change. Thus, in making an assessment of a magnetic anomalies potential to represent a significant cultural resource, investigators must be circumspect in their predictions.

Broad, multi-component signatures (again, depending on bottom characteristics and other factors) often have the greatest potential to represent a shipwreck. On the other hand, high-intensity, multi-component, magnetic signatures (without an accompanying acoustic signature) in areas of relatively high velocity currents can be discounted as a historic resource. Eddies created by the high-velocity currents almost always keep some portion of a wreck exposed. Generally, wire rope or some other low-profile ferrous debris produces this type of signature in these circumstances. Many types of magnetic anomalies display characteristics that are not easily interpreted. The only definitive method of determining the nature of the object creating these anomalies is by physical examination.

Typically, target locations with suspect cultural resource images on the sonar records coupled with associated and appropriate magnetic signatures will be classified as high probability targets.

5.5 Remote Sensing Findings

After all the remote sensing data sets were processed, reviewed, and cross-referenced a total of 20 remote sensing target locations (eight magnetic and 12 acoustic) were identified in the two channel survey areas. However, all but one of these targets were small, isolated, single-source objects that have no potential historical significance.

Magnetometer data featured numerous isolated anomalies that were likely generated by small ferrous source objects, likely suspect crab traps, and other miscellaneous discorded debris. These targets were identified on single lanes confirming the isolated nature of these signatures. These single-source targets were found in both the North Channel and South Channel Survey Areas and generally featured low- to moderate-intensity but very brief magnetic signatures with limited signature duration. Three magnetic anomalies were identified in the North Channel Survey Area and five were identified in the South Channel Area. All but one of these magnetic targets were dismissed as debris related. See Tables 1 and 2 for a complete description of all magnetic anomalies.

Additionally, there were no potentially significant targets identified on the side scan sonar records in either survey area. Several small partially buried square features (suspect crab traps) were found in both survey areas; five in the North Channel Survey Area and two in the South Channel Survey Area. Otherwise, the bay bottom was generally featureless except for the presence of submerged aquatic vegetation across portions of both survey areas.

No additional archaeological investigations are recommended for these 19 target locations.

One magnetic target (**SM1**) identified in the South Channel Survey Area was distinctive due to the intensity of the anomaly's signature. Although limited in size/duration, this anomaly generated a dipolar signature that had a maximum intensity of over 2,400 gammas, despite only extending for approximately 20-22 feet. The signature from this target was identified on overlapping and perpendicular lanes that were completed to cover both the South Channel Survey Area and the small southern extension, near the middle of the South Channel Survey Area.

This target signature is suggestive of a relatively compact object that has significant and concentrated ferrous mass. While this signature is not typical of known submerged cultural resources, the size of the anomaly indicates the presence of an object with a significant ferrous component (Figure 7). Since the source of the target is buried (no associated sonar signature), the identification of the target source was not possible with remote sensing data. Additional investigations to identify this target or avoidance is recommended at this location.

In summary, inspection of the remote sensing data from the two channel survey areas identified one potentially significant target that is suggestive of an historically significant submerged cultural resource, Target SM1. Additional Phase IB-level underwater archaeological investigations are recommended to identify this magnetic anomaly if avoidance is not feasible. The other 19 remote sensing targets did not generate remote sensing signature types suggestive of potentially significant submerged cultural resources and no additional underwater archaeological investigations are recommended at those 19 locations.

Table 1 Magnetic Targets in the Assawoman Bay North Channel Survey Area (3)

Coordinates (X,Y) are expressed in the Delaware State Plane Coordinate System, NAD83, feet.

Target	X	Y	Signature	Amplitude (nT)	Duration (ft)	Assoc. Sonar Targets	Identification	Recommendation
NM1	757983	168316	positive monopole	86	10	--	Small positive monopole signature near the southwestern end of survey area that extended over 10 feet; single source object, only identified in a single lane.	No additional investigations (NAI) are recommended
NM2	758052	168326	positive monopole	64	9	--	Small positive monopole signature near the southwestern end of survey area that extended over 9 feet; single source object, only identified in a single lane.	NAI
NM3	758551	168816	negative monopole	22	7	--	Small negative monopole signature in the middle portion of the survey area that extended over 7 feet; single source object, only identified in a single lane.	NAI

Table 2 Magnetic Targets in the Assawoman Bay South Channel Survey Area (10)

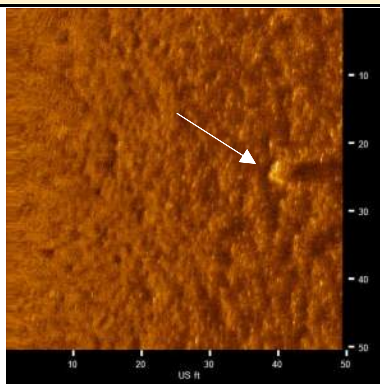
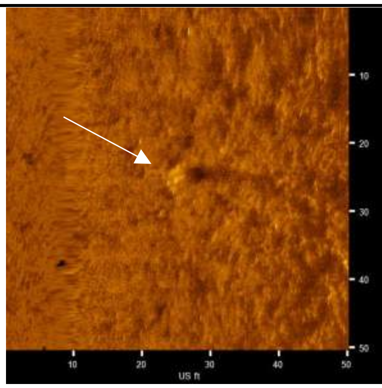
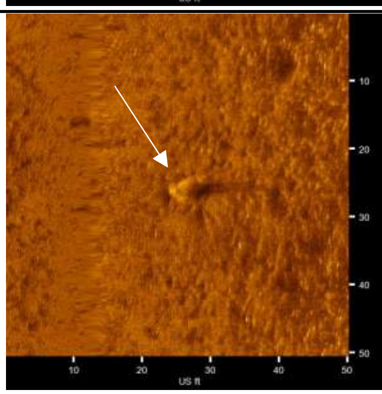
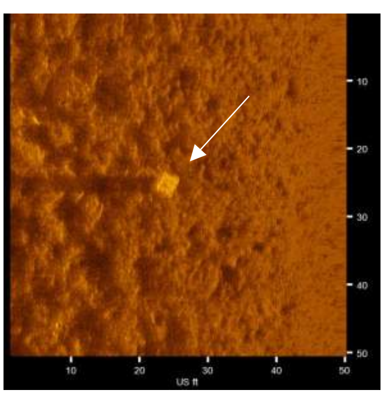
Coordinates (X,Y) are expressed in the Delaware State Plane Coordinate System, NAD83, feet. The one (1) potentially significant magnetic target is shaded.

Target	X	Y	Signature	Amplitude (nT)	Duration (ft)	Assoc. Sonar Targets	Identification	Recommendation
SM1	758667	166154	dipole	2,480	28	--	A very high intensity dipole signature that was identified in several overlapping survey lanes in the approximate center of the survey area. The target was in waters adjacent to the small southern extension of the survey area. The intense signature extended over 28 feet, and water depth at this location was less than 4 feet. This target signature is suggestive of a relatively compact object that has significant and concentrated ferrous mass. While this signature is not typical of known submerged cultural resources, the size of the anomaly indicates the presence of an object with a significant ferrous component.	Additional investigations or avoidance are recommended.
SM2	758707	166107	dipole	48	12	--	Small dipole signature that was identified only in the outside survey lane of the short southern extension of the southern channel area, the signature extended over 12 feet; single source object, only identified in a single lane.	NAI

Target	X	Y	Signature	Amplitude (nT)	Duration (ft)	Assoc. Sonar Targets	Identification	Recommendation
SM3	758603	166125	negative monopole	28	9	--	Small negative monopole signature in the middle portion of the survey area that extended over 9 feet; single source object, only identified in a single lane.	NAI
SM4	758684	165942	positive monopole	24	7	--	Small positive monopole signature in the short southern extension of the southern channel area; signature extended for just 7 feet; single source object, only identified in a single lane.	NAI
SM5	758284	166088	negative monopole	33	9	--	Small negative monopole signature in the western portion of the survey area that extended over 9 feet; single source object, only identified in a single lane.	NAI
SM6	758205	166057	dipole	116	10	--	A dipole signature that was identified only in the outside survey lane in the western portion of the survey area; signature extended for only 10 feet; single source object, only identified in a single lane.	NAI
SM7	758073	165972	positive monopole	20	8	--	Small positive monopole signature near the west end of the survey area; the signature extended for only 8 feet; single source object, only identified in a single lane.	NAI
SM8	758046	165988	positive monopole	128	9	--	A positive monopole signature near the west end of the survey area; the signature extended for only 9 feet; single source object, only identified in a single lane.	NAI
SM9	758275	166009	negative monopole	10	7	--	Small negative monopole signature near the west end of the survey area; the signature extended for only 7 feet; single source object, only identified in a single lane.	NAI
SM10	759219	166559	negative monopole	64	13	--	A negative monopole signature near the east end of the survey area; the signature extended for 13 feet; single source object, only identified in a single lane.	NAI

Table 3 Sonar Targets in the Assawoman Bay North Channel Survey Area (5)

Coordinates (X,Y) are expressed in the Delaware State Plane Coordinate System, NAD83, feet.

Target Image	Target Info	Characteristics
	NS1 • Click Position 38° 27.77554' N 075° 03.56701' W (WGS84) (X) 758452.67 (Y) 168783.61 (Projected Coordinates) • Map Projection: DE83F • Acoustic Source File: F:\Sonar Data\Assawoman Bay\20211111\2021NOV11_0002.sds • Line Name: 2021NOV11_0002	Dimensions and attributes • Target Width: 2.26 US ft • Target Height: 0.68 US ft • Target Length: 2.36 US ft • Mag Anomaly: • Description: Small square object (suspect crab trap)
	NS2 • Click Position 38° 27.73582' N 075° 03.61647' W (WGS84) (X) 758217.54 (Y) 168541.64 (Projected Coordinates) • Map Projection: DE83F • Acoustic Source File: F:\Sonar Data\Assawoman Bay\20211111\2021NOV11_0002.sds • Line Name: 2021NOV11_0002	Dimensions and attributes • Target Width: 2.25 US ft • Target Height: 0.44 US ft • Target Length: 2.69 US ft • Mag Anomaly: • Description: Small square object (suspect crab trap)
	NS3 • Click Position 38° 27.71627' N 075° 03.64527' W (WGS84) (X) 758080.54 (Y) 168422.44 (Projected Coordinates) • Map Projection: DE83F • Acoustic Source File: F:\Sonar Data\Assawoman Bay\20211111\2021NOV11_0002.sds • Line Name: 2021NOV11_0002	Dimensions and attributes • Target Width: 1.66 US ft • Target Height: 1.12 US ft • Target Length: 3.12 US ft • Mag Anomaly: • Description: Small oblong feature
	NS4 • Click Position 38° 27.70577' N 075° 03.64910' W (WGS84) (X) 758062.54 (Y) 168358.60 (Projected Coordinates) • Map Projection: DE83F • Acoustic Source File: F:\Sonar Data\Assawoman Bay\20211111\2021NOV11_0002.sds • Line Name: 2021NOV11_0002	Dimensions and attributes • Target Width: 2.53 US ft • Target Height: 1.39 US ft • Target Length: 2.62 US ft • Mag Anomaly: No • Description: Small square feature (suspect crab trap)

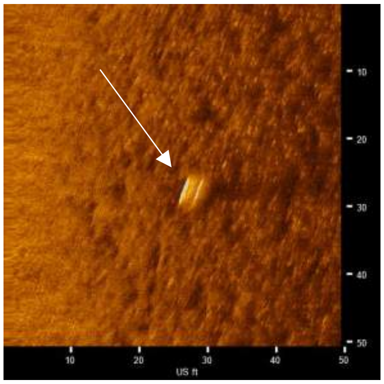
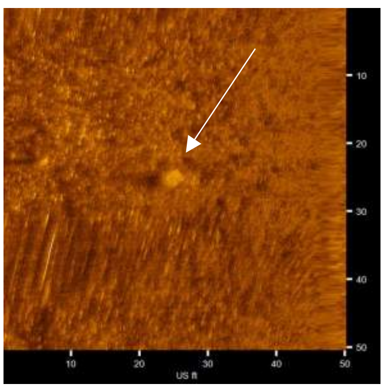
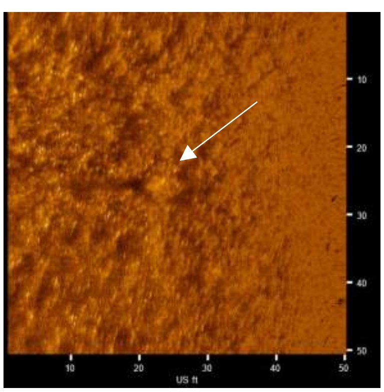
Target Image	Target Info	Characteristics
	NS5 • Click Position 38° 27.74329' N 075° 03.57213' W (WGS84) (X) 758428.96 (Y) 168587.78 (Projected Coordinates) • Map Projection: DE83F • Acoustic Source File: F:\Sonar Data\Assawoman Bay\20211111\2021NOV11_0010.sds • Line Name: 2021NOV11_0010	Dimensions and attributes • Target Width: 2.22 US ft • Target Height: 0.75 US ft • Target Length: 3.76 US ft • Mag Anomaly: No • Description: Small rectangular feature, partially buried

Table 4 Sonar Targets in the Assawoman Bay South Channel Survey Area (2)

Coordinates (X,Y) are expressed in the Delaware State Plane Coordinate System, NAD83, feet.

Target Image	Target Info	Characteristics
	SS1 • Click Position 38° 27.33466' N 075° 03.58251' W (WGS84) (X) 758389.05 (Y) 166107.29 (Projected Coordinates) • Map Projection: DE83F • Acoustic Source File: F:\Sonar Data\Assawoman Bay\20211111\2021NOV11_0014.sds • Line Name: 2021NOV11_0014	Dimensions and attributes • Target Width: 2.29 US ft • Target Height: 0.83 US ft • Target Length: 3.21 US ft • Mag Anomaly: No • Description: Small square feature (suspect crab trap)
	SS2 • Click Position 38° 27.34807' N 075° 03.55791' W (WGS84) (X) 758506.14 (Y) 166189.14 (Projected Coordinates) • Map Projection: DE83F • Acoustic Source File: F:\Sonar Data\Assawoman Bay\20211111\2021NOV11_0018.sds • Line Name: 2021NOV11_0018	Dimensions and attributes • Target Width: 1.37 US ft • Target Height: 0.25 US ft • Target Length: 3.30 US ft • Mag Anomaly: No • Description: Small oblong feature , partially buried.

6.0 CONCLUSIONS AND RECOMMENDATIONS

A Phase I Underwater Archaeological Project was completed in Little Assawoman Bay, Sussex County, Delaware as part of the Fenwick Island Channel Dredging Project. The Town of Fenwick Island, Delaware is pursuing the completion of a hydraulic dredging project to address the navigational hazards in the bay. As part of the proposed Project the Town of Fenwick would hydraulically dredge two channels (North and South Channels) of Little Assawoman Bay to a depth of -4 feet MLW with an allowable over-dredge tolerance to a depth of -5 feet MLW. The combined channel length is approximately 4,000 linear feet, and the channels cover a combined surface area of approximately 4.6 acres. The underwater APE includes all the locations in Little Assawoman Bay where bottom impacts associated with the dredging project are expected to occur.

The underwater archaeological investigations included limited background maritime historical research, magnetic, and acoustic, remote sensing, and report preparation. The goal of the underwater work was to determine the presence or absence of potential submerged cultural resource sites that might be affected by the proposed dredging activities. Magnetic and acoustic data were collected to identify and assess remote sensing targets that may have an association with submerged cultural resources.

The comprehensive remote sensing survey resulted in the identification of 20 remote sensing targets in the two channel survey areas. However, all but one of those targets were dismissed as small single source, debris-related anomalies. One magnetic target (SM1) generated an intense magnetic signature and was considered to a potentially significant target.

This target signature is suggestive of a relatively compact object that has significant and concentrated ferrous mass. While this signature is not typical of known submerged cultural resources, the size of the anomaly indicates the presence of an object with a significant ferrous component that is buried in the bottom sediment. Avoidance or additional Phase IB level underwater archaeological investigations to identify the exact location, depth, and nature of the target are recommended at Target SM1. A 75-foot diameter buffer around the center of the anomaly is recommended if avoidance is an option.

SM1 Target Information (coordinates are Delaware State Plane, feet):

Location
X 758,667
Y 166,154

38˚ 27.342286' **N**
75˚ 03.524041' **W**

Characteristics
- Dipole signature with a maximum amplitude of 2,480 gammas; anomaly duration was approximately 20-22 feet.
- No associated sonar signature – indicating the source of this anomaly is buried in bottom sediments

Additionally, remote sensing records did not reveal the presence of any potential inundated prehistoric archaeological sites within the two channel survey areas.

Remote sensing survey results completely fulfilled the project research design, and no problems were encountered with the fieldwork methodology. This project is also consistent with the stated goals and priorities of the Delaware Plan.

Note: All underwater survey field notes, magnetometer and sonar records, are stored at the offices of Dolan Research, 30 Paper Mill Road, Newtown Square, Pennsylvania, 19073.

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FIGURES

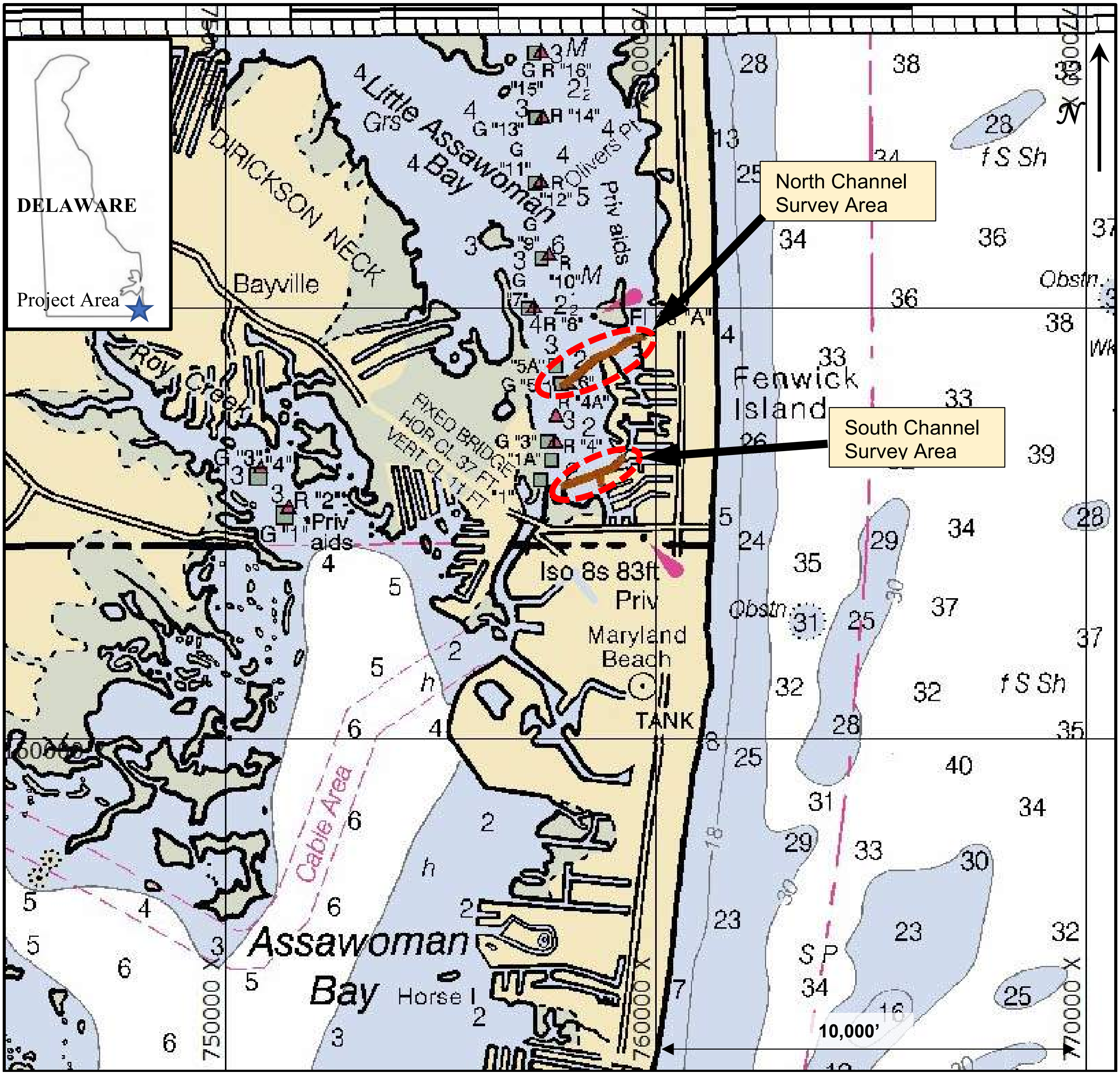

Figure 1. Project Location Map – Little Assawoman Bay North and South Channel Survey Areas

Notes: 1) Background Map is NOAA Chart #12211
2) Background Grid = Delaware State Plane System, NAD83

Figure 2. Project Site Map - Little Assawoman Bay North and South Channel Survey Areas

Notes: 1) North Channel and South Channel Survey Areas are outlined. South Channel Area has a short southern extension
2) Background Grid = Delaware State Plane System, NAD83

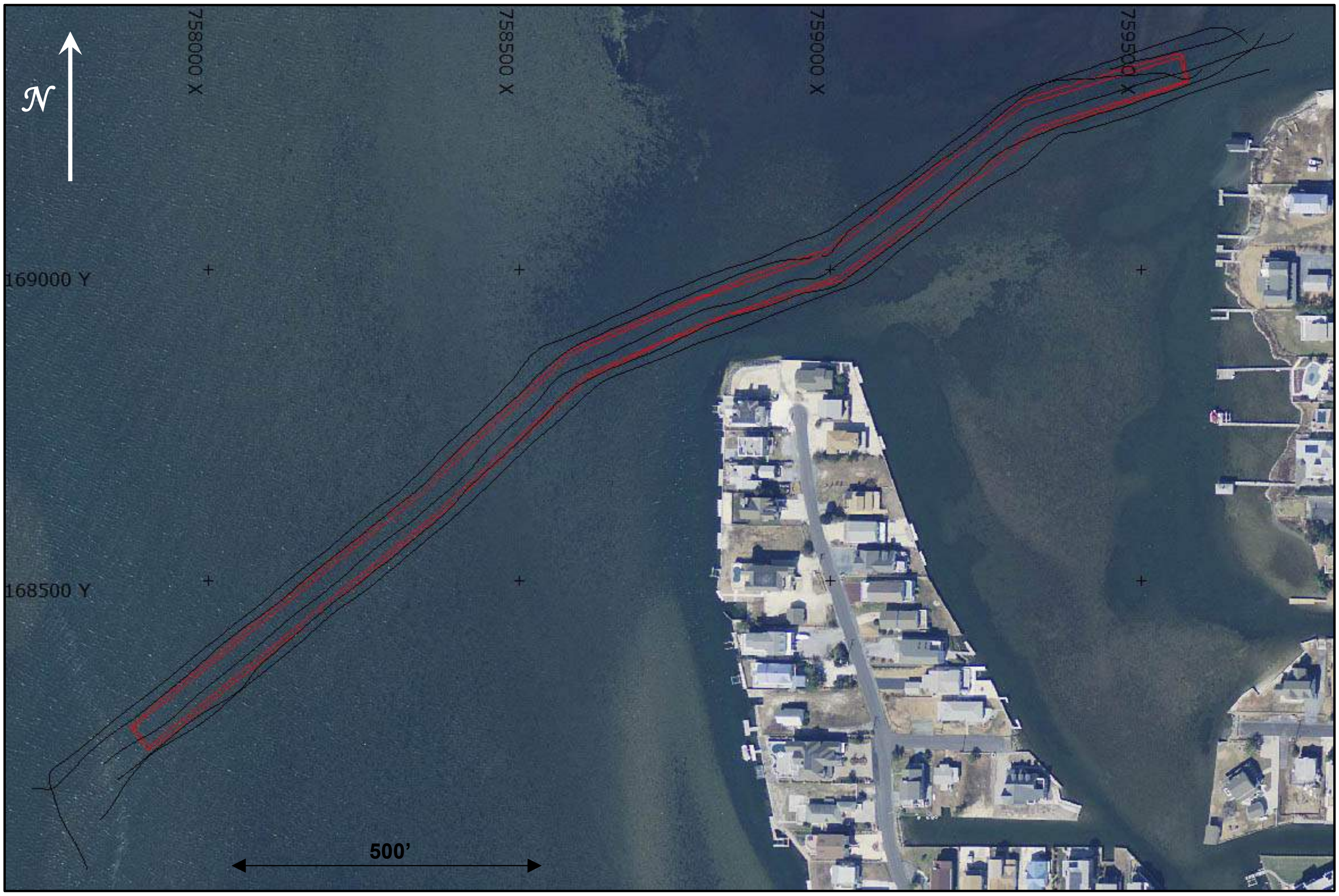

Figure 3. Survey Track Plots – North Channel Survey Area

Notes:

1) Track lines are black
2) Lane spacing was 25 feet
3) APE is depicted in red
4) Background Grid = Delaware State Plane System, NAD83

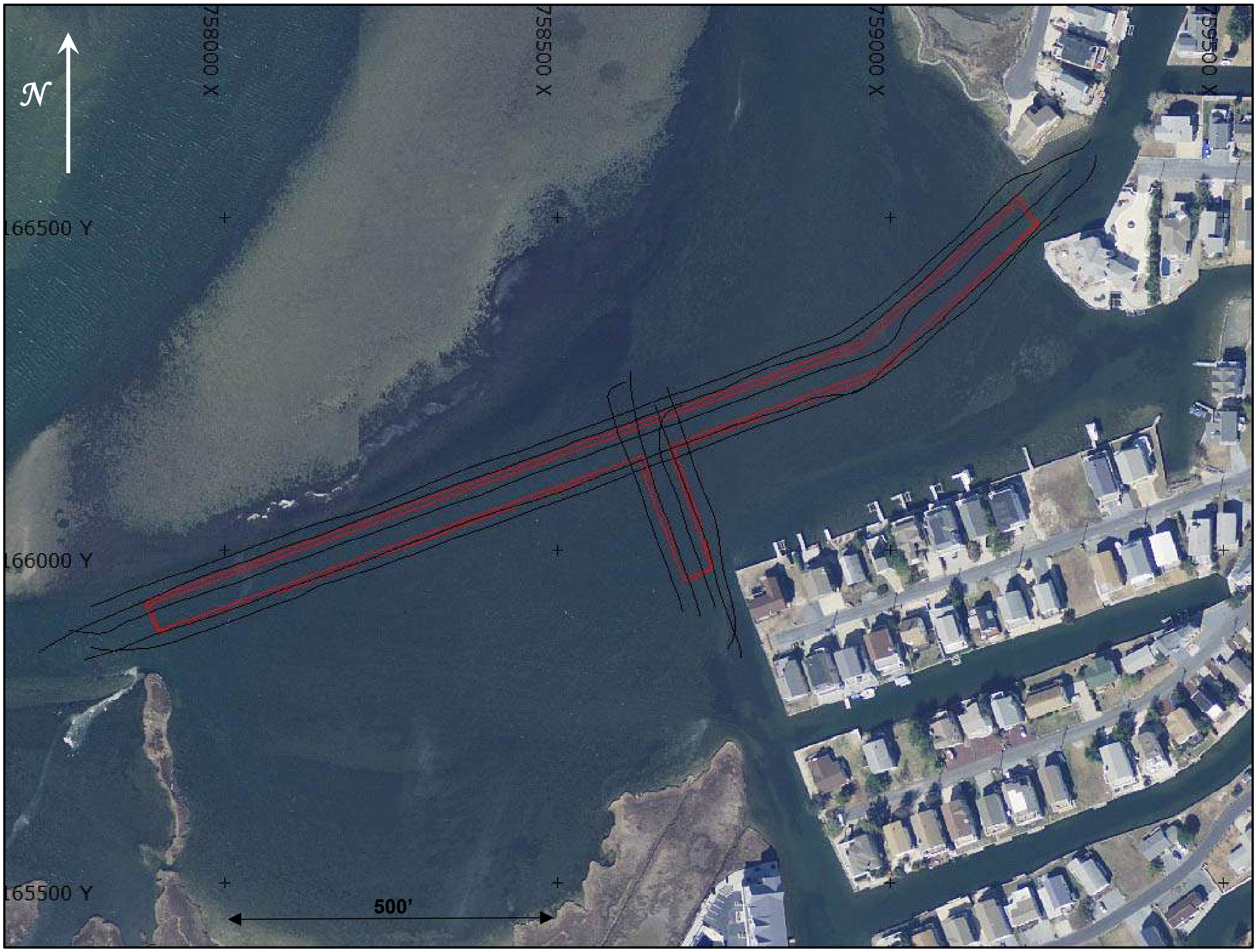

Figure 4. Survey Track Plots – South Channel Survey Area

Notes:

1) Track lines are black
2) Lane spacing was 25 feet
3) APE is depicted in red
4) Background Grid = Delaware State Plane System, NAD83

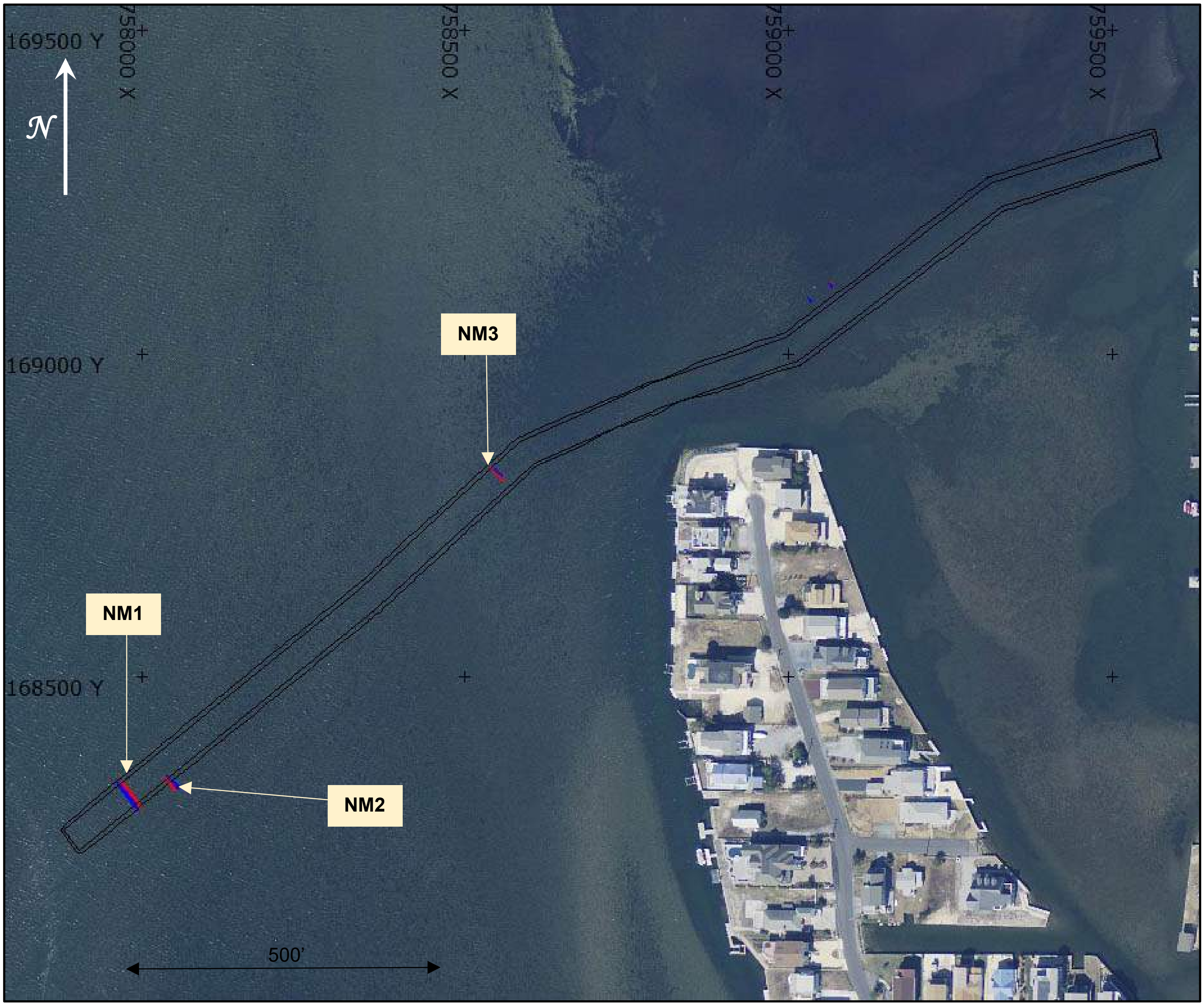

Figure 5. North Channel Survey Area - Magnetic Contour and Target Map

Notes:
1) Contour Interval is 5 gammas
2) Magnetic data are reduced to pole: all positive readings are depicted as red and negative readings as blue
3) Three (3) magnetic anomalies were identified – listed in Table 1.
4) Background Grid = Delaware State Plane System, NAD83

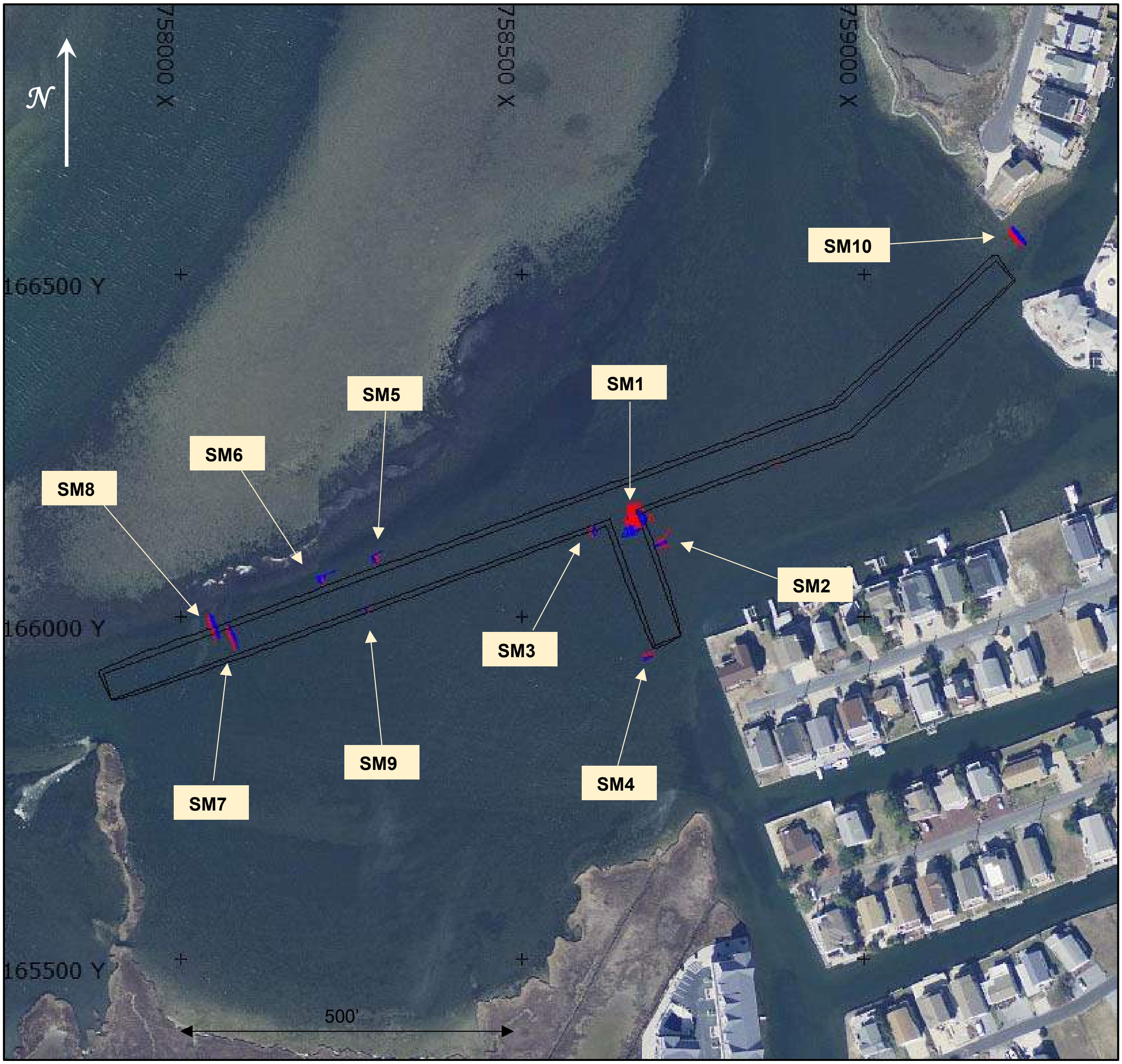

Figure 6. South Channel Survey Area - Magnetic Contour and Target Map

Notes:
1) Contour Interval is 5 gammas
2) Magnetic data are reduced to pole: all positive readings are depicted as red and negative readings as blue
3) Ten (10) magnetic anomalies were identified – listed in Table 2
4) Background Grid = Delaware State Plane System, NAD83

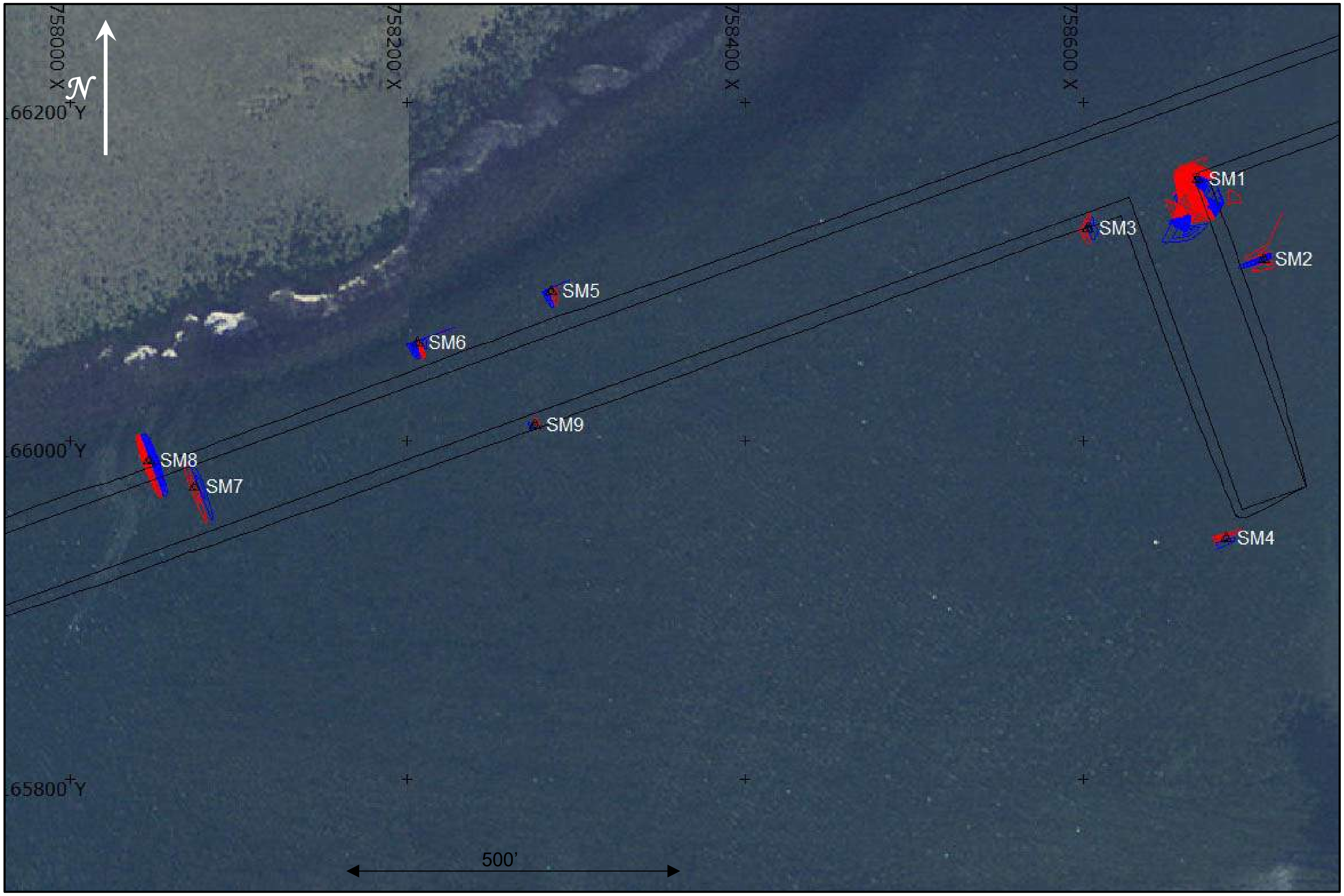

Figure 7. Detail of West Side of South Channel Survey Area - Magnetic Contour and Target Map

Notes:

1) Contour Interval is 5 gammas
2) Magnetic data are reduced to pole: all positive readings are depicted as red and negative readings as blue
3) Nine (9) magnetic anomalies were identified at the west side of this survey area
4) Background Grid = Delaware State Plane System, NAD83

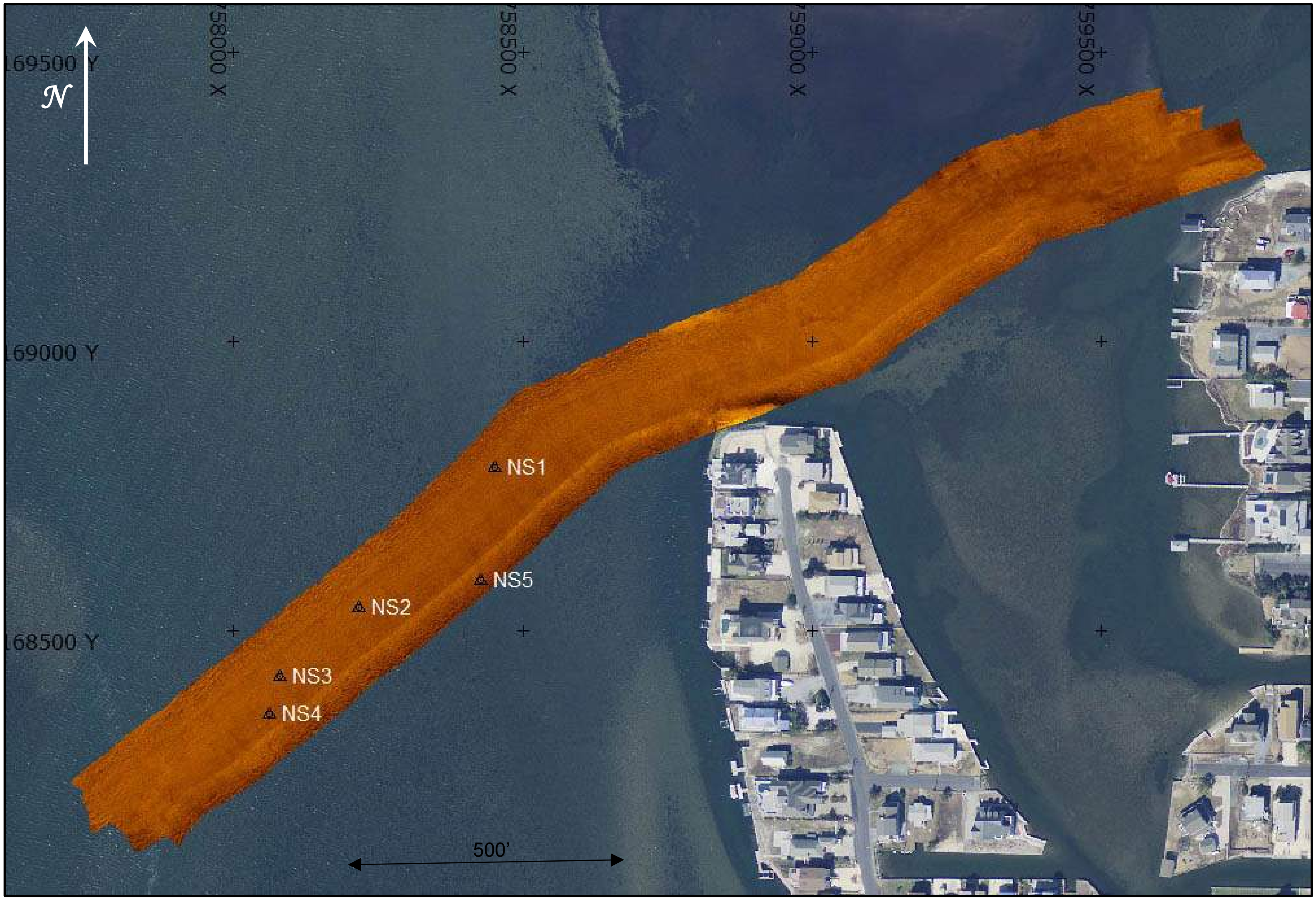

Figure 8. North Channel Survey Area – Sonar Mosaic and Target Map

Notes:
1) Sonar Data collected with a dual 600/1200 kHz sensor, using a range of 50’ per channel
2) Five (5) sonar feature was identified in North Channel Survey Area. Sonar features are listed in Table 3
3) Background Grid = Delaware State Plane System, NAD83

Figure 9. South Channel Survey Area – Sonar Mosaic and Target Map

Notes:
1) Sonar Data collected with a dual 600/1200 kHz sensor, using a range of 50' per channel
2) Two (2) sonar feature was identified in South Channel Survey Area. Sonar features are listed in Table 4
3) Background Grid = Delaware State Plane System, NAD83

Figure 10. North Channel Survey Area – Magnetic Contours Overlaid on Sonar Mosaic

Notes:
1) Contour Interval is 5 gammas
2) Sonar Data collected with a dual 600/1200 kHz sensor, using a range of 50' per channel
3) Background Grid = Delaware State Plane System, NAD83

Figure 11. South Channel Survey Area – Magnetic Contours Overlaid on Sonar Mosaic

Notes:
1) Contour Interval is 5 gammas
2) Sonar Data collected with a dual 600/1200 kHz sensor, using a range of 80' per channel
3) Background Grid = Delaware State Plane System, NAD83

APPENDIX

QUALIFICATIONS OF THE PRINCIPAL INVESTIGATOR

J. Lee Cox, Jr., owner of Dolan Research, Inc. served as the Principal Investigator. He directed the underwater archaeological investigation. Mr. Cox received a MA from East Carolina University in Maritime Research/Underwater Archaeology and a BA from Duke University in Archaeology. He meets or exceeds the standards for a principal investigator in archaeology as set forth in the Secretary of the Interior's Professional Qualifications Standards (36 CRF Part 61). He has been involved with over 150 different underwater archaeological projects over the last 32 years in 22 different states, Bermuda, Puerto Rico, Trinidad and Tobago, and Canada. He has authored over 100 reports and published seven articles and one book in conjunction with professional experience. He is a member of the Register of Professional Archaeologists (RPA).

Phase 1B Site Investigation Results Report

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DOLAN RESEARCH INC.

Steven Bagnull
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February 21, 2022

Re: Executive Summary
Phase IB Underwater Archaeological Project
Fenwick Island Channel Dredging Project
Little Assawoman Bay
Fenwick Island, Sussex County, Delaware

Dear Mr. Bagnull:

This letter is to confirm the successful completion of all fieldwork for the Phase IB Underwater Archaeological Investigation of Magnetic Target SM1 that was identified in the South Channel Project Area during the Phase I remote sensing survey in Little Assawoman Bay that was conducted in November 2021. As described in the Executive Summary of the Phase I survey, Target SM1 generated a high-intensity (2,400 gamma), yet limited duration (less than 20 feet) magnetic signature that was identified at a location in Little Assawoman Bay that was approximately 2.8 feet deep at the time of the survey. Due to the intense nature of the signature, additional Phase IB investigations or avoidance were recommended at Target SM1. Since the target was located within the proposed dredge footprint and avoidance was not an option, these Phase IB investigations were conducted.

The goals of the investigation were to:

1) reacquire and redefine the extent of Target SM1
2) use hydraulic probes to locate and identify the configuration and depth of the target source
3) define the limits of the site with exact coordinates for the boundaries of the target source, if possible; and
4) provide an assessment of the potential significance, or lack thereof, for the target source.

The Phase IB fieldwork was completed by a three-man crew on 16 February 2022. The fieldwork operations were carried out from a 22-foot fiberglass survey vessel suitable for shoal water operations. A *Geometrics*, G-881, cesium magnetometer, capable of +/- 1/10 gamma resolution, was used to collect magnetic remote sensing data. All positioning data were obtained by using a laptop PC-based software *(Hypack)* package in conjunction with a *Hemisphere* Differential Global Positioning System (DGPS) onboard the survey vessel. Positioning data from the DGPS were converted by the computer to Delaware (NAD 83 X,Y) state plane coordinates in real time. Offsets from the DGPA antennae to the probe location(s) on the survey vessel were entered into *Hypack*.

After the target location was re-acquired a marker buoy was deployed and a series of systematic probes were conducted across a grid in the vicinity of the buoy. All testing of the sub-bottom at the location of Target SM1 was accomplished with a hydraulic pump outfitted with a 10-foot-long water induction probe and a 12-foot-long steel-tipped ferrous probe outfitted with a "T"-handle. All probe locations and results were then recorded and plotted out in *Hypack.*

Findings

Magnetic Target SM1 generated an intense but very limited-duration magnetic signature. Detailed analysis of the magnetic data at this location site confirmed the presence of a 2,300+ gamma, monopolar signature with a maximum dispersion of less than 18 feet. One mitigating circumstance for the extreme amplitude of the signature was the very shallow water at the target location; ensuring that the magnetometer sensor passed within feet of the target source. All indications from the field data are that the anomaly was generated by a single-source, isolated object. Water depth at the target location at the time of our investigation was recorded at 2.8 feet.

After placing a marker buoy at the center of the anomaly, a systematic series of probes (both hydraulic and hand-held) were taken to locate and potentially identify the source of the magnetic anomaly. Probing at this location in Little Assawoman Bay confirmed the presence of a loosely packed sand/silt mix to a sub-bottom depth of approximately three (3) feet below the bottom surface. At that sub-bottom depth there was a layer of more consolidated mad/clay mix that appeared to be interspersed with shell. Below that lens was a softer mud layer that rested over another hard strata of consolidated mud/clay mix that was approximately seven feet below the bottom surface.

A single, hard contact was recorded at one probe location (marked with a red circle in Figure 1). This contact was determined to be 7.1’ below the surface of the water (since water depth was 2.8’, the contact was 4.3’ below the existing bottom surface). After registering the contact with the object, the probe appeared to slip/slide past and below the object and proceeded down to the lower consolidated mud/clay strata, described previously. The contact was not re-acquired during subsequent probes in the vicinity of the original contact suggesting that the contact is linear in nature and likely oriented in a semi-vertical or upright direction in the sub bottom. A single object, possibly a section of discarded pipe or large section of rebar was the likely source of the magnetic anomaly at Target SM1.

The probing grid was expanded to comprehensively search the entire target area. All totaled, more than 48 probes were taken across an area that was 35 feet squared, in size. As stated previously, no additional sub-bottom contacts were recorded in the search area.

Location of the probing contact at Target SM1 (coordinates are Delaware State Plane, feet):

Location
X 758,668
Y 166,146

38˚ 27.340557’ **N**
75˚ 03.523853’ **W**

The target source is not indicative of any known cultural resource types and no additional underwater archaeological investigations are recommended at Target SM1. A complete description of the Phase IB Investigations will be included as an Appendix in a revised edition of the Phase I Underwater Archaeological Report.

Sincerely,

J. Lee Cox, Jr.
Director

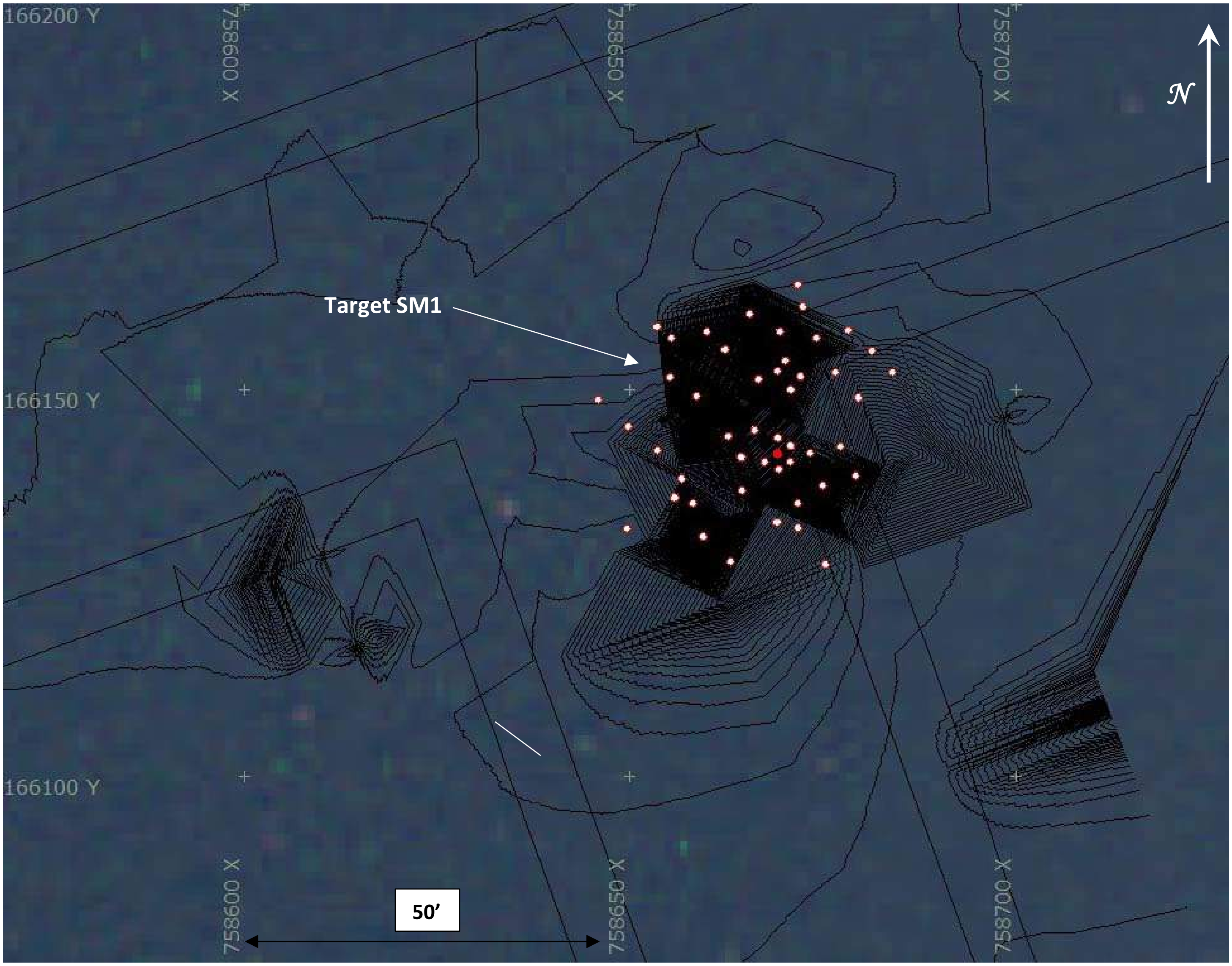

Figure 1. Probe Locations overlaid on Magnetic Contours at Target SM1

Notes: 1) Circles = Probe Locations
2) Red circle = contact.
3) Background Grid = Delaware State Plane Coordinates, feet.

Plate 1. Marker Buoy Deployed at Target Site Prior to Probing

Note: Cinder block anchor for buoy is visible on bottom behind the boat's stern - confirming the shallow water conditions on site.

Plate 2. Hydraulic and Handheld Probing Operations