

**FINAL** Sampling and Analysis Plan for the Nordic Aquafarms Pipeline Corridor Dredging, Belfast and Northport, ME, File Number NAE-2019-01481

1. **Project Description:** Nordic Aquafarms, Inc. (“Nordic”) is proposing to construct a large, land-based salmon farm in Belfast, ME. The facility would use saltwater drawn from Penobscot Bay along with freshwater drawn from on-site wells and from the City of Belfast. Following treatment, water used in the farm would be discharged back into Penobscot Bay. The project design includes a pair of 30 inch intake pipes and a single 36 inch discharge pipe. The proposed pipeline corridor would exit the eastern side of the farm site and cross approximately 850 ft of intertidal mudflat just north of the discharge from the Little River (Figure 1). The pipeline corridor would extend an additional 5,550 ft in the subtidal upper Penobscot Bay. The pipeline would be fully buried for the 850 ft intertidal portion of the corridor and the first 1,850 ft of the subtidal corridor, and partially buried for 400 ft as it transitions to being anchored directly on the bottom for the last 3,300 ft of corridor in deeper waters.

A conceptual cross section of a fully buried portion of the pipeline is shown in Figure 1. Mechanical dredging is proposed to remove the existing sediment to create the trench where the pipes will be laid. The dredged material is proposed to be temporarily sidecast, and then mechanically placed as cover material once the pipes are installed. Any material remaining in the sidecast pile once the original elevation is achieved over the pipe trench is proposed to be dredged, transported to shore by barge, and offloaded for upland disposal. A total of approximately 36,000 cubic yards of sediment is anticipated to require removal for trench construction, and Nordic proposes to replace as much of that material as possible once the pipeline is installed, minimizing the amount of material requiring upland disposal.

A sampling and analysis plan (SAP) is generally prepared to determine the suitability of dredged material from a proposed project for beneficial use or disposal at an in-water site. The Nordic project does not propose in-water disposal for the dredged sediment, only temporary sidecasting immediately adjacent to the pipeline corridor before the material is used as backfill within the original dredge footprint. However, given the amount of material to be dredged (36,000 cubic yards), the large project footprint (extending over 3,000 ft in the intertidal and subtidal), and the documented mercury contamination in surficial sediments throughout upper Penobscot Bay, characterization of the proposed dredged material is required under section 404 of the Clean Water Act to identify any special handling conditions that would be necessary to minimize potential impacts to the water column and benthic community. All sampling and analysis activities described in this plan shall follow the requirements set forth in the “Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters” (RIM) dated May 6, 2004.

2. **Conceptual Site Model:** NAE reviewed data already collected as part of the design of the aquafarm, adjacent land-use information, previous sampling and testing performed in support of dredging the Federal navigation channels in Searsport and Belfast, and the data collected as part of the Penobscot River Mercury Study to develop a conceptual site model (CSM) for the proposed dredging of the Nordic project. This CSM was used to understand the dynamics of the system and to identify potential sources of contamination, site-specific contaminants of concern, exposure pathways, and biological receptors in order to inform this sampling and analysis plan.

The proposed Nordic pipeline corridor is located on the western shore of the upper portion of Penobscot Bay just south of Belfast Harbor (Figure 2). The pipeline corridor crosses a large tidal flat that forms the delta at the mouth of Little River which discharges just to the south. From the edge of the tidal flat, the pipeline corridor follows the nearly uniformly sloping bathymetry to the east. Depths at mean lower low water (MLLW) reach -34 ft where the pipeline will begin to transition from full burial, -38 ft where the pipeline will be fully exposed on the seafloor (terminus of any required dredging), and -54 ft at the end of the pipeline corridor.

Hydraulic influences in the vicinity of the pipeline corridor include the nearly 11 ft tidal range, discharge from the Penobscot River approximately 10 miles to the northeast of the corridor, and limited discharge from the reservoir/Little River just to the south. At its location in the upper reaches of the bay, the pipeline corridor is out of the influence of long-period ocean swell, but the wide expanse of the upper portions of Penobscot Bay provides enough fetch (up to 8 miles) for the generation of short-period, wind-driven waves.

The absence of long-period waves coupled with the tidal flat and gently sloped bathymetry indicate the corridor is subject more to depositional than erosive forces. This is also supported by the investigations already performed by Nordic. Cores collected along the pipeline corridor generally revealed a layer of soft, high-water content sediment less than a foot in thickness with a significant fine-grained fraction indicative of more recent deposition (Figure 3). This surficial layer was underlain by a uniform silty clay considered to be a Pleistocene marine mud or glaciomarine sediment. The distinctive pock mark features found in Penobscot Bay are not present along the pipeline corridor, beginning just east of the terminus of the proposed pipeline.

With limited sources of sediment input, the deposition rate within Penobscot Bay is considered to be relatively low. This is supported by the long maintenance dredging cycle for the constructed channels in nearby Belfast and Searsport Harbors and by data collected as part of the Penobscot River Mercury Study as described below.

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There are one documented and multiple potential sources of sediment contamination for the upper portion of Penobscot Bay where the pipeline corridor would be located. The documented source is the now-closed HoltraChem plant approximately 25 miles upriver in Orrington, Maine which released significant quantities of mercury into the Penobscot River, contaminating sediments of the river and bay. Other potential sources in the area include the port facilities, urban development, and industrial discharges (Figure 2).

The Penobscot River Mercury Study (PRMS) has involved multiple phases of sediment and biota sampling in the lower Penobscot River as well as in Penobscot Bay (PRMS 2008, 2013). Conducted as a remedial investigation, sediment cores were sectioned into very thin (1-2 cm) layers for analysis of mercury concentrations in surficial sediments, to not only characterize contaminant distribution and availability for biota uptake, but also to aid in source identification and natural rates of burial and mixing. Representative mercury concentrations of surficial sediment are presented for coring locations in upper Penobscot Bay in the vicinity of the Nordic pipeline corridor in Figure 3. The study concluded that releases of mercury from the HoltraChem plant from 1967 through the early 1970's was the primary source of the sediment contamination. This sediment contamination along with elevated tissue concentrations of mercury has led to closure of portions of the Penobscot River and upper Penobscot Bay to shellfishing and lobster/crab fishing (PRMS 2013).

The high vertical resolution analysis of the distribution of mercury concentrations in sediment cores as part of the PRMS provided a very clear understanding of the sediment contamination in the upper portions of the bay. Depth profiles of mercury concentrations in the sediment from the PRMS are presented on a map of the upper bay in Figure 4. All locations in this area revealed peak concentrations within the upper foot of sediment, and decreased significantly by 2 ft into the sediment to concentrations assumed representative of native sediment outside of anthropogenic influences.

For the two stations closest to the Nordic pipeline corridor (ES7 and ES8 in Figure 4), peak concentrations of total mercury in the upper foot of sediment were approximately 500 ng/g, approaching or exceeding the target remediation goal for surficial sediments (450 ng/g total mercury) defined in the PRMS. Sedimentation rates in this area were estimated at 2 to 3 mm/year based on radiological dating, making the burial depth of peak concentrations consistent with the peak releases of mercury in the late 1960's and early 1970's (PRMS 2013).

Water quality in much of Penobscot Bay is classified as SB, including the vicinity of the Nordic pipeline corridor. Class SB waters are designated for primary and secondary contact recreational activities; shellfish harvesting for controlled relay and depuration; and habitat for marine fish and wildlife. Class SB waters are

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deemed suitable for aquacultural uses, navigation, and industrial cooling, but areas of upper Penobscot Bay have been closed to shellfishing (Figure 2).

Based on the review of available data, the surficial sediment was given a moderate to high risk ranking according to the matrix below (adapted from USACE 2018); there are documented elevated mercury concentrations in this portion of Penobscot Bay from a known source as well as other potential sources of contamination. The underlying sediment (assumed native material) was given a low-moderate risk ranking given its expected isolation from the sources of contamination and the background mercury concentrations documented in the PRMS profiles.

<b>Rank</b>	<b>Guidelines</b>
Low	Few or no sources of contamination. Data available to verify no significant potential for adverse biological effects.
Low-Moderate	Few or no sources of contamination but existing data is insufficient to confirm ranking.
Moderate	Contamination sources exist within the vicinity of the project with the potential to produce chemical concentrations that may cause adverse biological effects.
High	Known sources of contamination within the project area and historical data exists that has previously failed biological testing.

Based on the understanding of the sediment regime developed in the CSM, the sampling program has been designed to characterize the sediments that will be disturbed along the pipeline corridor with the objective of assessing potential impacts to the benthic community or water column during the dredge-sidecast-return process. Smaller construction projects that utilize temporary, adjacent displacement of sediment while the construction takes place can often support the assumption of limited potential for environmental impacts given the similarity of the disturbed and adjacent sediment. However, based on the results of the PRMS, it is assumed that is not the case along the pipeline corridor, with 10-fold differences in mercury concentrations expected over several inches of depth within the sediment.

It should be noted that the sampling program described below has not been designed with the remedial investigation objectives of the PRMS, e.g. precisely defining the burial depth of the peak mercury concentration and the expected time of its deposition. Rather, this sampling program used the findings of the PRMS as a conceptual basis of contaminant distribution and has been designed to conservatively define the depth transition from overlying, more recently deposited surficial sediment to the underlying native material that can be used to evaluate the dredged material and dewatering discharge. Further, as other potential sources of sediment contamination were identified for this area (beyond

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the mercury that was the focus of the PRMS), the sampling program includes additional analyses as part of the characterization.

3. **Sample Collection:** Sediment cores and water samples will be collected at 11 locations set along the centerline of the pipeline corridor as shown in Figure 6 and with the locations presented in Table 1 with the following requirements:

- All core samples shall be collected to the proposed dredge depth, or a minimum of 3 ft below any apparent surficial sediment layer.
- Upon collection all cores shall be measured and maintained in an upright position for a minimum of 15 minutes to allow any fine-grained material to settle. After a core has settled it shall be re-measured before any overlying water is drained. All cores shall be split lengthwise, photographed with a stadia rod for scale, and described in accordance with ASTM D 2488 (Standard Practice for Description and Identification of Soils).
- Water samples shall be collected using a non-contaminating pump or discrete water sampler for the elutriate testing. Given the proximity of the stations, all water for the elutriate testing can be collected from Station NAE6. As the water depth at this station is less than -30 ft MLLW the applicant shall collect the entire sample from the mid-depth range of the water column.
- Vessel positioning shall be achieved using a Global Positioning System (GPS) that has been calibrated on site using a known reference point. The required horizontal accuracy at each sample location shall be 10 feet or less. Water depths at each location are to be determined with an accuracy of  $\pm 0.1$  foot (relative to MLLW). All sample data including date, time, latitude, longitude, GPS accuracy, measured water depth, tidal correction, core penetration and recovery shall be recorded in a sampling log (Figure 7 or equivalent) and provided to NAE with the Applicant's core descriptions and photographs. All coordinate data shall be reported in geographic NAD 83 decimal degree format. All depth data shall be reported in tenths of feet.

Once cores have been fully logged and photographed, they can be sectioned into a minimum of three separate samples for laboratory analyses for each core as follows:

- **Surficial Layer** - Any surficial sediment layer (generally described as a "wet, soft, silty brown mud" in the Normandeau core logs provided by Ransom Consulting LLC that typically ranged in thickness from 7 to 10 inches for cores collected along the pipeline corridor) should be sampled as a separate unit. If no definable surficial layer is present, the upper 1 ft should be sampled.
- **Transition Layer** - This layer is intended to capture the transition between surficial sediment and the underlying native material. It is generally expected to be the 1 ft layer beneath the surficial layer, but it can be

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increased in length if there is identifiable mixing of surficial sediment beyond 1 ft.

- Deeper Layer – A consistent underlying unit described as a firm, dark brown clay with silt was identified in most of the Normandeau core logs along the pipeline corridor provided by Ransom Consulting LLC. The remaining core material from this deeper layer can be composited into a single sample.
- Additional Sampling – Any distinct layer of material beneath the surficial layer with apparent anthropogenic influence (staining, oily, odiferous) should be noted and sampled as a separate unit regardless of the depth within the core.

All sediment and water samples held for testing shall be stored in accordance with the requirements in Table 2 (from Table 8-2 in "Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual" (Green Book) dated February 1991). Sample chain of custody forms shall be maintained by the Applicant and submitted to NAE with the data package described in Section 5 of this SAP.

4. **Sample Analysis:** All sediment and water samples from the dredge area shall undergo physical, chemical, and elutriate analysis as specified in Table 1 and described in the sections below. All laboratories used for this project shall have an approved Laboratory Quality Assurance Plan (LQAP) on file with NAE. Any data produced by a lab without an approved LQAP will not be accepted. The RIM, a list of laboratories with approved LQAPs, and the reporting format and requirements for electronic submission of data are available for download through the NAE website: <http://www.nae.usace.army.mil/Missions/Regulatory/Dredged-Material-Program/>.

Grain Size and Bulk Sediment Chemistry: All sediment samples from the proposed dredge footprint shall undergo physical testing and chemical analysis as specified in Table 1. Testing parameters, analytical methods, and reporting limits to be used are outlined in Table 3. The listed analytical methods are recommended but can be replaced by other methods that will provide the required reporting limits. Additional guidance on the physical and chemical analysis of sediments can be found in chapter 5 of the RIM.

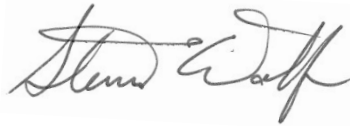
Elutriate Chemistry: Elutriate samples shall be prepared from the dredge area sediment and water samples as specified in Table 1. The elutriate samples shall undergo chemical analysis according to the testing parameters, analytical methods, and reporting limits outlined in Table 4. The listed analytical methods are recommended but can be replaced by other methods that will give the required reporting limits. Additional guidance can be found in Section 6.1 of the RIM and Section 9.4 of the Green Book.

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5. **Reporting Requirements:** All sediment testing data is required to be submitted electronically in the electronic data deliverable (EDD) format available on the NAE website (<http://www.nae.usace.army.mil/Missions/Disposal-Area-Monitoring-System-DAMOS/Electronic-Data-Deliverables.aspx>). Hard copy data submission is also required but may be substituted with a printer friendly, easy-to-read format (e.g., PDF, MS Word). Any analytes not detected shall be reported as half the method detection limit (MDL) and qualified with a “U”. RIM quality control summary tables are required to be submitted with each project dataset. These tables are found in Appendix II of the RIM.

6. **Contact Information:** Questions about this plan should be directed to Steven Wolf (phone: 978-318-8241 office; 978-201-1928 mobile; e-mail: [steven.wolf@usace.army.mil](mailto:steven.wolf@usace.army.mil)).

Prepared by:



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DAMOS Program Manager  
Environmental Resources Section

**7. References:**

PRMS 2008, 2013. Penobscot River Mercury Study, Phase 1 and Phase 2 Reports. <https://www.penobscotmercurystudy.com/>

USEPA/USACE 1998. Evaluation of Dredged Material Proposed for Discharge in Water of the U.S. – Testing Manual. Environmental Protection Agency, Office of Water and Department of the Army, United States Army Corps of Engineers. Washington, D.C.

USEPA/USACE 2004. Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters. U.S. EPA Region 1, Boston, MA/U.S. Army Corps of Engineers, New England District, Concord, MA.

USACE 2018. Dredged Material Evaluation and Disposal Procedures, User Manual. Dredged Material Management Program, U.S. Army Corps of Engineers, Seattle District.



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**TABLE 1: SAMPLE LOCATIONS AND REQUIRED LABORATORY ANALYSES**

<b>Core Location Name</b>	<b>Station Location (all are along centerline)</b>	<b>Layer</b>	<b>grain size</b>	<b>% moisture</b>	<b>TOC</b>	<b>mercury</b>	<b>metals</b>	<b>PAHs</b>	<b>PCBs</b>	<b>Pesticides</b>	<b>Elutriate</b>
<b>NAE1</b>	6+50	surface	√	√	√	√	√	√	√	√	√
		transition	√	√	√	√	√	√	√	√	
		deep	√	√	√	√	√	√	√	√	
<b>NAE2</b>	8+00	surface	√	√		√					
		transition	√	√		√					
		deep	√	√		√					
<b>NAE3</b>	10+00	surface	√	√	√	√	√	√	√	√	√
		transition	√	√	√	√	√	√	√	√	
		deep	√	√	√	√	√	√	√	√	
<b>NAE4</b>	12+00	surface	√	√		√					
		transition	√	√		√					
		deep	√	√		√					
<b>NAE5</b>	14+00	surface	√	√		√					
		transition	√	√		√					
		deep	√	√		√					
<b>NAE6</b>	16+50	surface	√	√	√	√	√	√	√	√	√
		transition	√	√	√	√	√	√	√	√	
		deep	√	√	√	√	√	√	√	√	
<b>NAE7</b>	20+00	surface	√	√		√					
		transition	√	√		√					
		deep	√	√		√					
<b>NAE8</b>	24+00	surface	√	√		√					
		transition	√	√		√					
		deep	√	√		√					
<b>NAE9</b>	28+00	surface	√	√	√	√	√	√	√	√	√
		transition	√	√	√	√	√	√	√	√	
		deep	√	√	√	√	√	√	√	√	
<b>NAE10</b>	32+00	surface	√	√		√					
		transition	√	√		√					
		deep	√	√		√					
<b>NAE11</b>	36+00	surface	√	√		√					
		transition	√	√		√					
		deep	√	√		√					

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**TABLE 2: RECOMMENDED PROCEDURES FOR SAMPLE COLLECTION, PRESERVATION, AND STORAGE**

<u>Analyses</u>	<u>Collection Method</u>	<u>Sample Volume</u>	<u>Container</u>	<u>Preservation Technique</u>	<u>Storage Conditions</u>	<u>Holding Time<sup>d</sup></u>
<b>Sediment</b>						
<b>Chemical/Physical Analyses</b>						
Metals	Grab/corer	200 mL	Precleaned polyethylene jar <sup>c</sup>	Dry ice <sup>c</sup>	≤ 20° C <sup>c</sup>	Hg - 30 days Others - 6 Months <sup>d</sup>
Organic Compounds	Grab/corer	475 mL	Solvent-rinsed glass jar with Teflon lid <sup>c</sup>	Dry ice <sup>c</sup>	≤ 20° C/dark <sup>d</sup>	10 days <sup>d</sup>
Particle Size	Grab/corer	75 mL	Whirl-pac bag <sup>c</sup>	Dry ice <sup>c</sup>	≤ 20° C <sup>c</sup>	Undetermined
Total Organic Carbon	Grab/corer	3 L	Heat treated glass vial with Teflon lined lid <sup>c</sup>	Dry ice or freezer storage for extended storages; otherwise refrigerate	≤ 20° C <sup>c</sup>	Undetermined
Sediment From Which Elutriate is Prepared	Grab/corer	Dependant on tests performed	Glass with Teflon lined lid	Completely fill and Refrigerate	≤ 4° C/dark/airtight	Undetermined
<b>Water and Elutriate</b>						
<b>Chemical/Physical Analyses</b>						
Metals	Discrete sampler or pump	1 L	Acid-rinsed polyethylene or glass jar	pH <2 with HNO <sub>3</sub> <sup>d</sup>	4° C 2° C <sup>d</sup>	Hg - 28 days Others - 6 Months <sup>h</sup>
Organics	Discrete sampler or pump	4 L	Amber glass bottle <sup>d</sup>	Airtight seal; refrigerate	4° C 2° C <sup>d</sup>	5 days <sup>d</sup>

<sup>b</sup> These holding times are for sediment, water, and tissue based on guidance that is sometimes administrative rather than technical in nature. There are no promulgated, scientifically based holding time criteria for sediments, tissues, or elutriates. References should be consulted if holding times for sample extracts are desired. Holding times are from the time of sample collection.

<sup>c</sup> NOAA (1989).

<sup>d</sup> Tetra Tech (1986a)

<sup>h</sup> Plumb (1981).

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**TABLE 3: BULK SEDIMENT TESTING PARAMETERS**

<u>Parameter</u>	<u>Analytical Method</u>	<u>Reporting Limit (mg/kg)</u>	
<b>Metals</b>			
Arsenic	6010B, 6020, 7060, 7061	0.4	
Cadmium	6010B, 6020, 7130, 7131	0.07	
Chromium	6010B, 6020, 7190, 7191	0.5	
Copper	6010B, 6020, 7210	0.5	
Lead	6010B, 6020, 7420, 7421	0.5	
Mercury	7471	0.02	
Nickel	6010B, 6020, 7520	0.5	
Zinc	6010B, 6020, 7950	1.0	
<b>PCBs (total by NOAA summation of congeners)</b>			
See next page	8082A	0.001	
<b>Pesticides</b>			
Aldrin	NOAA (1993), 8081B Heptachlor epoxide	0.001	
cis- & trans-Chlordane	Hexachlorobenzene		
4,4'-DDT, DDD, DDE	Lindane		
Dieldrin	Methoxychlor		
α & β Endosulfan	cis- & trans-Nonachlor		
Endrin	Oxychlordane		
Heptachlor	Toxaphene		
			0.025
<b>Polycyclic Aromatic Hydrocarbons (PAHs)</b>			
Acenaphthene	8270C-SIM Chrysene		0.01
Acenaphthylene	Dibenzo(a,h)anthracene		
Anthracene	Fluoranthene		
Benzo(a)anthracene	Fluorene		
Benzo(a)pyrene	Indeno(1, 2, 3-cd)pyrene		
Benzo(b)fluoranthene	Naphthalene		
Benzo(k)fluoranthene	Phenanthrene		
Benzo(g, h, i)perylene	Pyrene		
		0.1%	
Total Organic Carbon	Plumb (1981), APHA (1995)	0.1%	
Percent Moisture	Plumb (1981), EPA (1992), PSEP (1986)	1.0%	
Grain Size	Wet Sieve (#4, 10, 40, 200)		

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**TABLE 3: BULK SEDIMENT TESTING PARAMETERS (CONTINUED)**

PCB CONGENERS

Analytical Method: NOAA (1993), 8082A

Reporting Limit: 1 ppb

Congeners:

8*	2,4' diCB
18*	2,2',5 triCB
28*	2,4,4' triCB
44*	2,2',3,5' tetraCB
49	2,2',4',5 tetraCB
52*	2,2',5,5' tetraCB
66*	2,3',4,4' tetraCB
87	2,2',3,4,5' pentaCB
101*	2,2',4,5,5' pentaCB
105*	2,3,3',4,4' pentaCB
118*	2,3',4,4',5 pentaCB
128*	2,3,3',4,4' hexaCB
138*	2,2',3,4,4',5' hexaCB
153*	2,2',4,4',5,5' hexaCB
170*	2,2',3,3',4,4',5 heptaCB
180*	2,2',3,4,4',5,5' heptaCB
183	2,2',3,4,4',5',6 heptaCB
184	2,2',3,4,4',6,6' heptaCB
187*	2,2',3,4',5,5',6 heptaCB
195*	2,2',3,3',4,4',5,6 octaCB
206*	2,2',3,3',4,4',5,5',6 nonaCB
209*	2,2',3,3',4,4',5,5',6,6' decaCB

\* denotes a congener to be used in estimating Total PCB. To calculate Total PCB, sum the concentrations of all eighteen congeners marked with a "\*" and multiply by 2.

The specified methods are recommendations only. Other acceptable methodologies capable of meeting the Reporting Limits can be used. Sample preparation methodologies (e.g. extraction and cleanup) and sample size may need to be modified to achieve the required Reporting Limits.

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**TABLE 4: ELUTRIATE TESTING PARAMETERS**

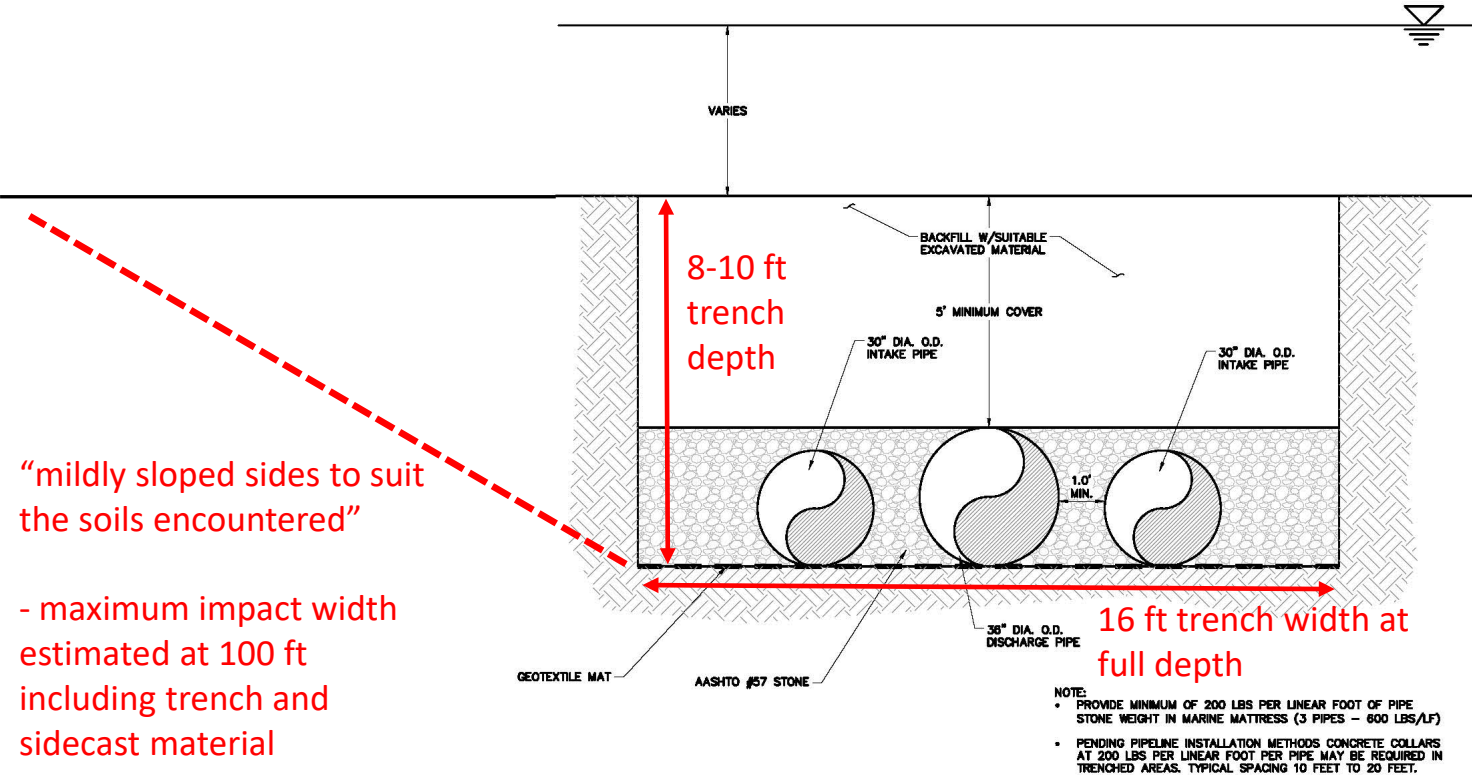
<u>Parameter</u>	<u>Recommended Analytical Method</u>	<u>Reporting Limit (µg/l)</u>
<b>Metals</b>		
Arsenic	200.9, 1632	1.0
Cadmium	200.9, 1637	1.0
Chromium (VI)	218.6, 1636	1.0
Copper	200.9, 1639, 1640	0.6
Lead	200.9, 1639, 1640	1.0
Mercury	245.7, 1631	0.4
Nickel	200.9, 1639, 1640	1.0
Selenium	200.9, 1639	1.0
Silver	200.9	0.5
Zinc	200.9, 1639	1.0
PCBs (total, by either of these methods)	3510B, 8080A, NYSDEC	0.006
Pentachlorophenol	3501B, 8270C	2.60
Pesticides	3510B, 8080A	
Aldrin		0.26
Chlordane		0.02
Chloropyrifos		0.002
Dieldrin		0.14
4, 4'-DDT		0.03
α & β Endosulfan		0.007
Endrin		0.007
Heptachlor		0.01
Heptachlor epoxide		0.01
Lindane		0.26
Toxaphene		0.04

Reference:

NYSDEC. 1991. Analytical Method for the Determination of PCB Congeners by Fused Silica Capillary Column Gas Chromatography with Electron Capture Detector. NYSDEC #91-11.

# Figure 1 – Proposed Intake/Discharge Pipeline Route for Nordic Aquafarms, Inc.

(from information provided by Ransom Consulting, LLC)



“mildly sloped sides to suit the soils encountered”

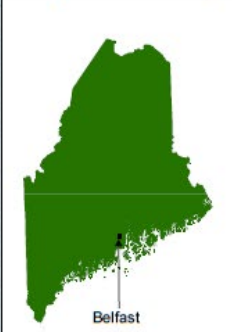
- maximum impact width estimated at 100 ft including trench and sidecast material

## INTERTIDAL & SURF ZONES (STATIONS 5+00 TO 32+00)

1 CS501

NOT TO SCALE

CONCEPTUAL NOT FOR CONSTRUCTION



### Legend

- Site Boundary
- Ocean Pipelines

- Notes
1. Data Source: USGS National Map Seamless Server, 24K
  2. USGS Quad 7.5 Minute Searsport & Belfast 1976 (revised 1979)
  3. Latitude: 44° 23' 43" N  
Longitude: 68° 59' 39" W  
UTM Northing: 4615777 mN  
UTM Easting: 900444 mE

Scale and Orientation

0 1,000 2,000

1 inch = 2,000 feet

### Prepared For

Nordic Aquafarms, Inc.  
159 High Street  
Belfast, Maine

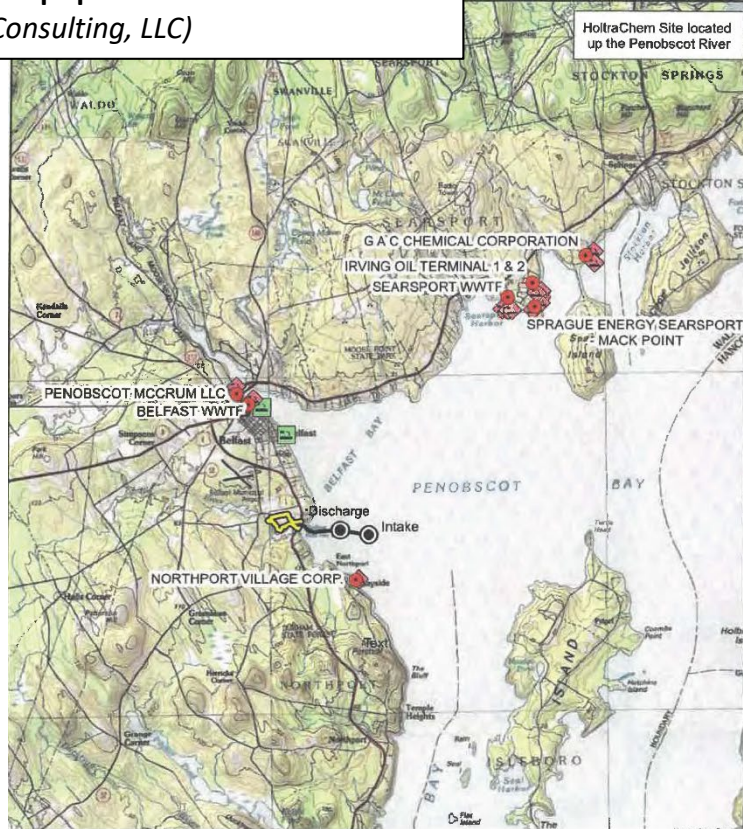
### Site Address

Proposed Aquaculture Facility  
285 Northport Avenue  
Belfast, Maine

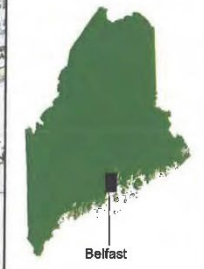
171.05027 Apr 2019

### Site Location Map

Figure 2 – Wastewater outfalls and surficial total mercury concentrations in the vicinity of the proposed Nordic Aquafarms pipeline route (from information provided by Ransom Consulting, LLC)



**RANSOM**  
Consulting Engineers and Scientists  
Regional Locator Map



**Legend**

- Site Boundary
- Nordic Ocean Pipelines
- Waste Water Treatment Facilities
- Waste Water Outfalls
- Combined Sewer Overflows

**Notes**

- Data Sources: Maine DEP GIS Unit; USGS National Map Seamless Server, 24K
- USGS Quad: 7.5 Minute Searsport & Belfast 1976 (revised 1979)
- Latitude: 44° 23' 43" N  
Longitude: 68° 59' 39" W  
UTM Northing: 4915777 mN  
UTM Easting: 500444 mE

**Scale and Orientation**

0 5,500 11,000  
1 inch = 12,000 feet

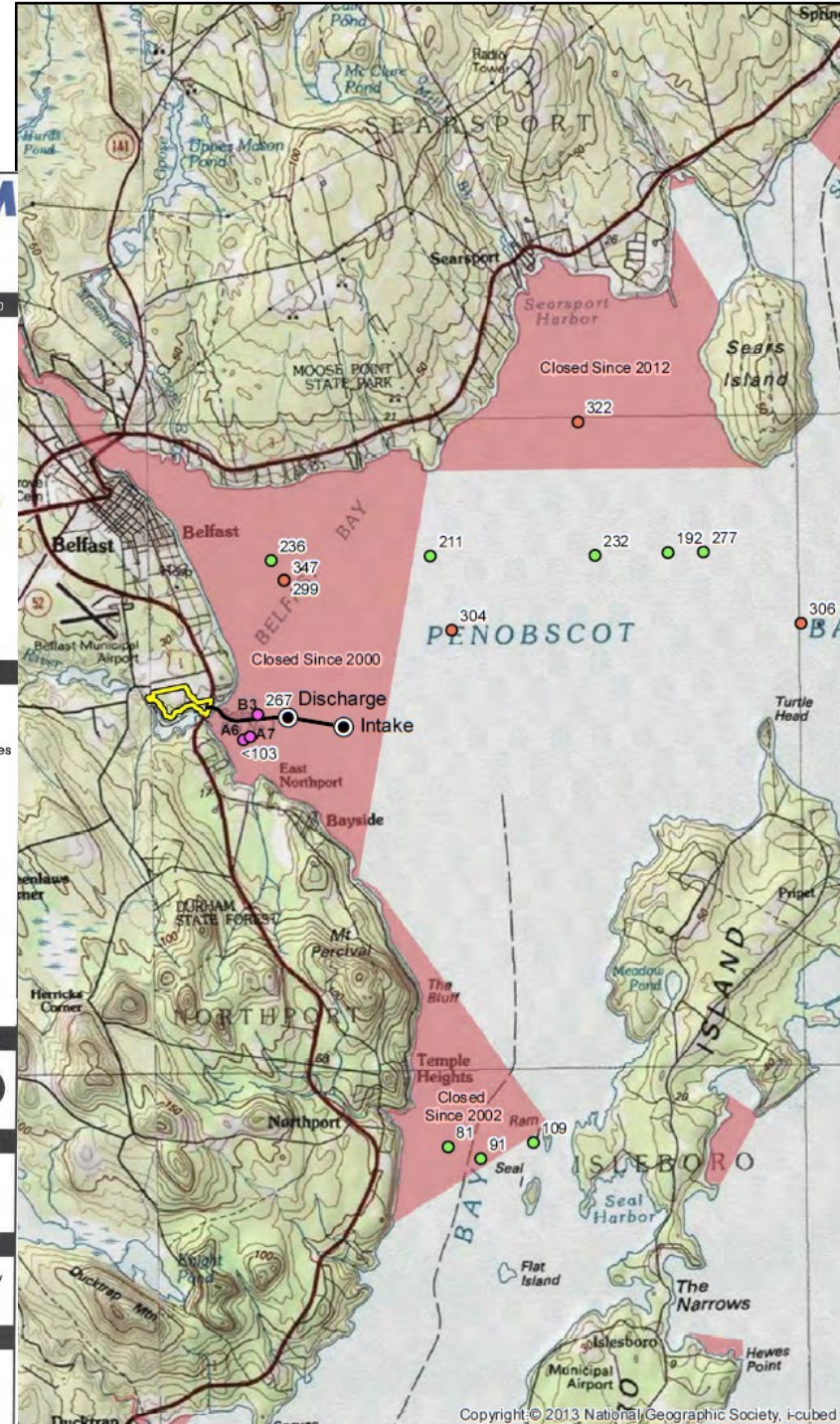
**Prepared For**  
Nordic Aquafarms, Inc.  
159 High Street  
Belfast, Maine

**Site Address**  
Proposed Aquaculture Facility  
285 Northport Avenue  
Belfast, Maine

**Potential Contaminant Sources to NW Penobscot Bay**  
171.05027 | Mar 2020

**Waste Water Outfalls**

Facility Name	MEPDES ID	Outfall Name	Outfall ID
BELFAST WWTF	ME0101532	FRONT STREET	001
BELFAST WWTF	ME0101532	FRONT STREET	001
G A C CHEMICAL CORPORATION	ME0001830	MINOR OUTFALL	002
G A C CHEMICAL CORPORATION	ME0001830	MINOR OUTFALL	004
IRVING OIL TERMINAL 1	ME0002461	MINOR OUTFALL	001
IRVING OIL TERMINAL 1	ME0002461	MINOR OUTFALL	002
IRVING OIL TERMINAL 1	ME0002461	HYDROSTATIC WATER	003
IRVING OIL TERMINAL 2	ME0021181	MINOR OUTFALL	001
IRVING OIL TERMINAL 2	ME0021181	HYDROSTATIC WATER	002
NORTHPORT VILLAGE CORP.	ME0100901	MINOR OUTFALL	001
PENOBSCOT MCCRUM LLC	ME0023043	MINOR OUTFALL	001
SEARSPORT WWTF	ME0101966	MINOR OUTFALL	001
SPRAGUE ENERGY SEARSPORT - MACK POINT	ME0002208	MINOR OUTFALL	003
SPRAGUE ENERGY SEARSPORT - MACK POINT	ME0002208	MINOR OUTFALL	001
SPRAGUE ENERGY SEARSPORT - MACK POINT	ME0002208	MINOR OUTFALL	008
SPRAGUE ENERGY SEARSPORT - MACK POINT	ME0002208	MINOR OUTFALL	002
SPRAGUE ENERGY SEARSPORT - MACK POINT	ME0002208	MINOR OUTFALL	004



**RANSOM**  
Consulting Engineers and Scientists  
Legend & Notes

**Legend & Notes**

- Site Boundary
- Nordic Ocean Pipelines
- 2007 Sample Location  
THg ng/g d.w. 0-3 cm
- 2009 Sample Location  
THg ng/g d.w. 0-3 cm
- 2018 Sample Location  
THg ng/g d.w.  
B3 = 0-6.42 ft  
A6/A7 = 2 core comp.  
= 0-3.75 ft
- Closed Shellfishing Grounds (2/28/2020)

**Notes**

- Data Sources: Penobscot River Mercury Study (April 2013); Nordic Aquafarms SLODA permit (May 2019); Maine Dept. of Marine Resources
- USGS Quad: 7.5 Minute Searsport & Belfast 1976 (revised 1979), from USGS National Map Seamless Server
- Latitude: 44° 23' 43" N  
Longitude: 68° 59' 39" W  
UTM Northing: 4915777 mN  
UTM Easting: 500444 mE

**Scale and Orientation**

0 3,600 7,200  
1 inch = 7,000 feet

**Prepared For**  
Nordic Aquafarms, Inc.  
159 High Street  
Belfast, Maine

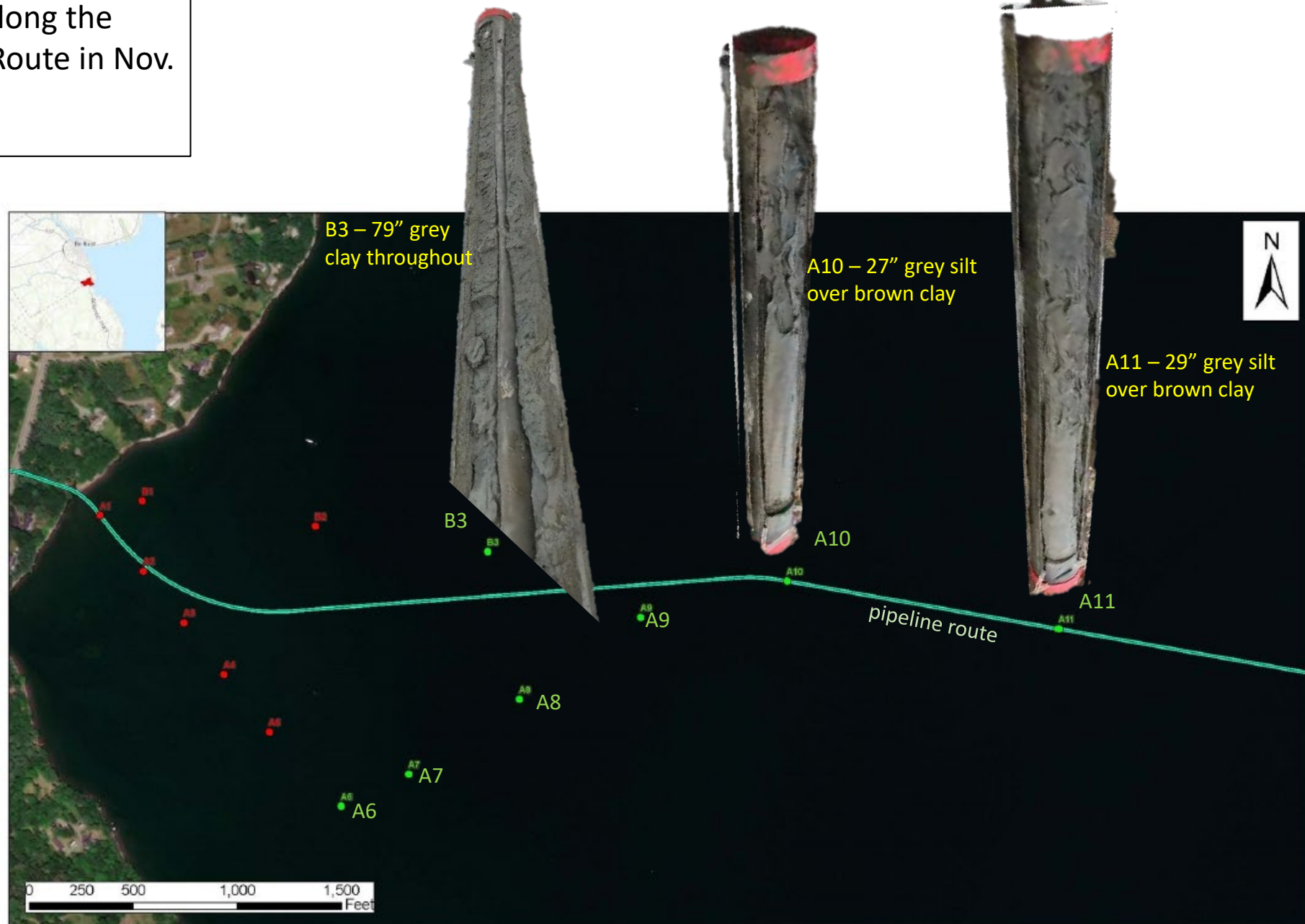
**Site Address**  
Proposed Aquaculture Facility  
285 Northport Avenue  
Belfast, Maine

171.05027 | Mar 2020

Offshore Sediment - Total Mercury

Sampling and Analysis Plan for the Proposed Nordic Aquafarms NAE-2019-01481 Draft 01JUN2020

Figure 3 – Example Cores Collected along the Proposed Intake/Discharge Pipeline Route in Nov. 2018  
 (from information provided by Ransom Consulting, LLC)



Sampling and Analysis Plan for the Proposed Nordic Aquafarms NAE-2019-01481 Draft 01JUN2020

**Nordic Aquafarms  
 Belfast, Maine  
 Sediment Sample Locations**

- Sediment Location Sampled
- Sediment Location Not Sampled
- Current Pipeline Route



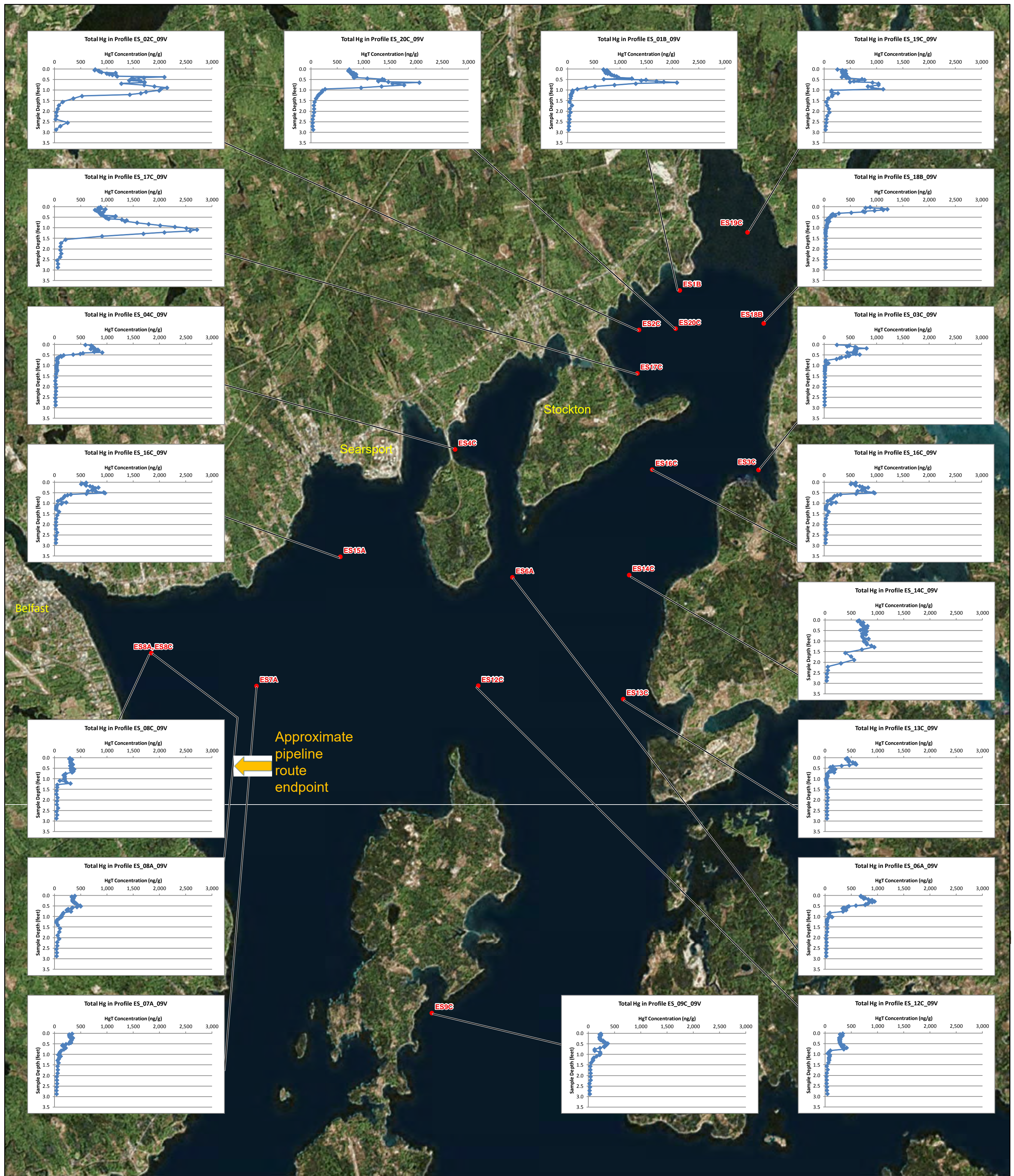


Figure 4 – Total mercury concentrations in surficial sediment of upper Penobscot Bay  
 (from information provided in the 2013 Penobscot River Mercury Study)

Sampling and Analysis Plan for the Proposed Nordic Aquafarms NAE-2019-01481 27MAY2020

DRAFT

M:\Projects\Searsport\Figures\Searsport\_SamplingSites.pdf  
 M:\Projects\Searsport\MXD\Searsport\_SamplingSites.mxd  
 August 21, 2014 DWN: PDM CHKD: BRB

0 5,000 Feet



FIGURE 1

Figure 5 – Conceptual site model of potential sources of sediment contamination, exposure pathways, and receptors

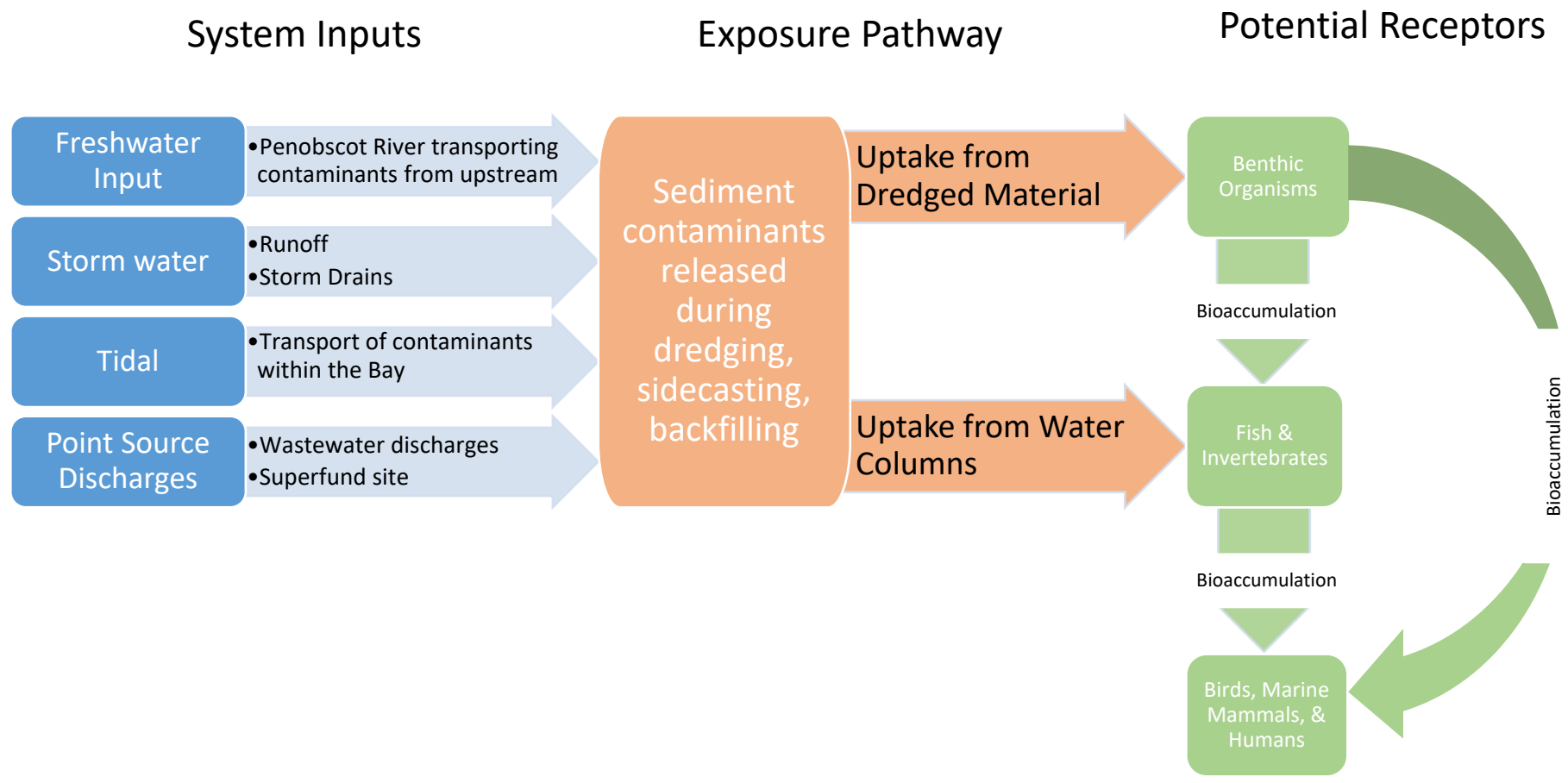
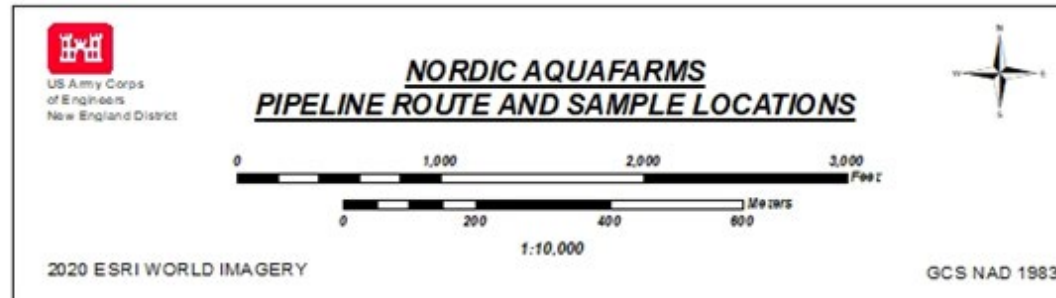


Figure 6 – Sediment sampling locations along the pipeline corridor

(NAE specified locations using pipeline route provided by Ransom Consulting, LLC)



Sampling and Analysis Plan for the Proposed Nordic Aquafarms NAE-2019-01481 Draft 01JUN2020

**FIGURE 7: EXAMPLE CORE LOG DATA SHEET**

PROJECT: \_\_\_\_\_ DATE: \_\_\_\_\_

SAMPLING PERSONNEL: \_\_\_\_\_

SEA STATE: \_\_\_\_\_ WEATHER CODE: \_\_\_\_\_

LOCATION METHOD: \_\_\_\_\_

SAMPLE ID: \_\_\_\_\_ SAMPLER TYPE: \_\_\_\_\_

TIME: \_\_\_\_\_

SOUNDING: \_\_\_\_\_ CORRECTED DEPTH: \_\_\_\_\_

COORDINATES: N \_\_\_\_\_ E \_\_\_\_\_

PENETRATION/RECOVERY: \_\_\_\_\_ NO. OF ATTEMPTS: \_\_\_\_\_

MATERIAL DESCRIPTION: \_\_\_\_\_

CORE PHOTO:	NOTES:
<p><i>Insert core photograph with scale</i></p>	<p><i>Insert field notes and ASTM description of core</i></p>