

August 29, 2024

Indian River Inlet Sampling and Analysis Plan – 3 Shoal Locations

Anchor QEA, Inc. (Anchor QEA) has prepared this sampling and analysis plan to support the Delaware Department of Natural Resources and Environmental Control (DNREC) with sediment sampling and reporting services associated with the Indian River Inlet shoal dredging and beneficial use project. Anchor QEA understand that DNREC and the U.S. Army Corps of Engineers (USACE) desires to obtain a better understanding of the nature and type of sediments present at three shoals proximate to the Indian River Inlet to evaluate beneficial use applications in the vicinity of the project area. The locations of the proposed shoal sampling areas are shown on Figures 1 and 4.

Scope of Services

Anchor QEA will collect sediment cores and grab samples to support DNREC's efforts to permit sediment dredging in the Indian River Inlet Flood Shoal, Middle Island Shoal, and Burton Island Shoal and beneficial reuse of the dredged material as fill at the beach at Northside Indian River Inlet.

1. Sediment Sampling and Data Analysis – Indian River Inlet Flood Shoal

Sediment core and grab sample locations from USACE's 2013 dredging project in the Indian River Inlet following Hurricane Sandy will be replicated and three additional cores will be collected to generate composite samples for analytical testing. The scope of the sediment sampling and data analysis activities for the Indian River Inlet Flood Shoal is outlined below:

- Six (6) sediment cores (3-inch diameter) will be collected to the proposed dredge depth of -24 ft North American Vertical Datum 1988 (NAVD88). The bottom 2 inches from 3 sediment cores will be composited into one sample. The remaining upper sediment interval from the same 3 sediment cores will be composited into another sample. The compositing scheme will be repeated for the other 3 cores as detailed in Table 1.
- Five (5) grab samples will be collected from the sediment surface using a Ponar grab sampler (or similar equipment). One composite sample will be collected from the five grab samples.
- Proposed sediment core and grab locations are summarized in Table 1 and are shown on Figures 2 and 3. Existing bathymetry and core sample cross-sections are shown on Figures 2 and 3.
- Each sample (five [5] total) will be analyzed for the following items:
 - Grain size via ASTM International (ASTM) D422 Standard Test Method for Particle-Size Analysis
 - Polyaromatic hydrocarbons (PAHs) and alkylated PAH homologs via United States Environmental Protection Agency (USEPA) Method 8270E SIM

- Target Compound List (TCL) organochloride (OC) pesticides via USEPA Method 8081A
 - Polychlorinated biphenyls (PCBs_ via USEPA Method 680
 - Target Analyte List (TAL) metals via USEPA Method 6020B
 - Mercury via USEPA Method 7471B
 - Total Kjeldahl Nitrogen (TKN) Method 351.2
 - Ammonia nitrogen via Method 4500 NHS C-2011
 - Nitrate and nitrite via Method EPA 300.0 R2.1
 - Total nitrogen
 - Total phosphorus via Method 365.1
 - Dioxins/furans via USEPA Method 1613B
 - Total organic carbon (TOC) via the Llyod Kahn Method
 - Total solids
 - Percent moisture
- Each sample collected for grain size analysis will be analyzed on a 15-day turnaround time (TAT).
 - Each sample collected for chemical analysis will be analyzed on a 10-day TAT.
 - Quality assurance/quality control (QA/QC) samples (i.e., field duplicates, blind duplicates, matrix spile [MS], matrix spike duplicate [MSD] matrix, etc.) will not be collected or analyzed.
 - Due to deeper water depths and targeted sediment core depths, Anchor QEA will use subcontractor labor, vessels, and equipment to complete sediment core and grab samples. Anchor QEA staff will process all samples collected.

Table 1
Indian River Inlet Flood Shoal Sediment Core and Grab Sample Locations

Core/Grab Sample ID	Northing DE State Plane NAD83 (US feet)	Easting DE State Plane NAD83 (US feet)	Composite Sample ID
Core_1	221309.00	753626.00	IRI-1-Top IRI-2-Bottom
Core_2	221396.00	754203.00	
Core_19	221162.69	753785.78	
Core_3	221481.00	754802.00	IRI-3-Top IRI-4-Bottom
Core_20	221162.69	754473.73	
Core_21	221134.57	755097.86	
Grab_1	221270.95	754804.84	IRI-5
Grab_2	221256.66	753824.39	
Grab_3	221277.54	755555.90	
Grab_4	221527.54	754825.19	
Grab_5	220969.21	754795.83	

Driving Directions for Indian River Inlet Flood Shoal

Indian River Inlet – From Dover, Delaware, take DE-1 South approximately 50 miles to the Indian River Inlet. Sampling area located within inlet proximate to southern shoreline.

2. Sediment Sampling and Data Analysis – Middle Island Shoal and Burton Island Shoal

The scope of the sediment sampling and data analysis activities for the Middle Island Shoal and Burton Island Shoal (shown in Figure 4) is outlined below:

- Fifteen (15) sediment cores (3-inch diameter) will be collected to a depth of -12 ft North American Vertical Datum 1988 (NAVD88). Nine (9) sediment cores will be collected in the Middle Island Shoal and six (6) sediment cores will be collected from the Burton Island Shoal. Sediment from three (3) cores will be composited into one sample. The compositing scheme is detailed in Table 2.
- Proposed sediment core locations are summarized in Table 2 and are shown on Figures 5 and 6. Approximated existing surface elevations and core sample cross-sections are also shown on Figures 5 and 6.
- Each sample (five [5] total) will be analyzed for the following items:
 - Grain size via ASTM International (ASTM) D422 Standard Test Method for Particle-Size Analysis
 - Polyaromatic hydrocarbons (PAHs) and alkylated PAH homologs via United States Environmental Protection Agency (USEPA) Method 8270E SIM
 - Target Compound List (TCL) organochloride (OC) pesticides via USEPA Method 8081A
 - Polychlorinated biphenyls (PCBs_ via USEPA Method 680
 - Target Analyte List (TAL) metals via USEPA Method 6020B
 - Mercury via USEPA Method 7471B
 - Total Kjeldahl Nitrogen (TKN) Method 351.2
 - Ammonia nitrogen via Method 4500 NHS C-2011
 - Nitrate and nitrite via Method EPA 300.0 R2.1
 - Total nitrogen
 - Total phosphorus via Method 365.1
 - Dioxins/furans via USEPA Method 1613B
 - Total organic carbon (TOC) via the Llyod Kahn Method
 - Total solids
 - Percent moisture
- Each sample collected for grain size analysis will be analyzed on a 15-day turnaround time (TAT).
- Each sample collected for chemical analysis will be analyzed on a 10-day TAT.

- Quality assurance/quality control (QA/QC) samples (i.e., field duplicates, blind duplicates, matrix spile [MS], matrix spike duplicate [MSD] matrix, etc.) will not be collected or analyzed.
- Due to deeper water depths and targeted sediment core depths, Anchor QEA will use subcontractor labor, vessels, and equipment to complete sediment core and grab samples. Anchor QEA staff will process all samples collected.

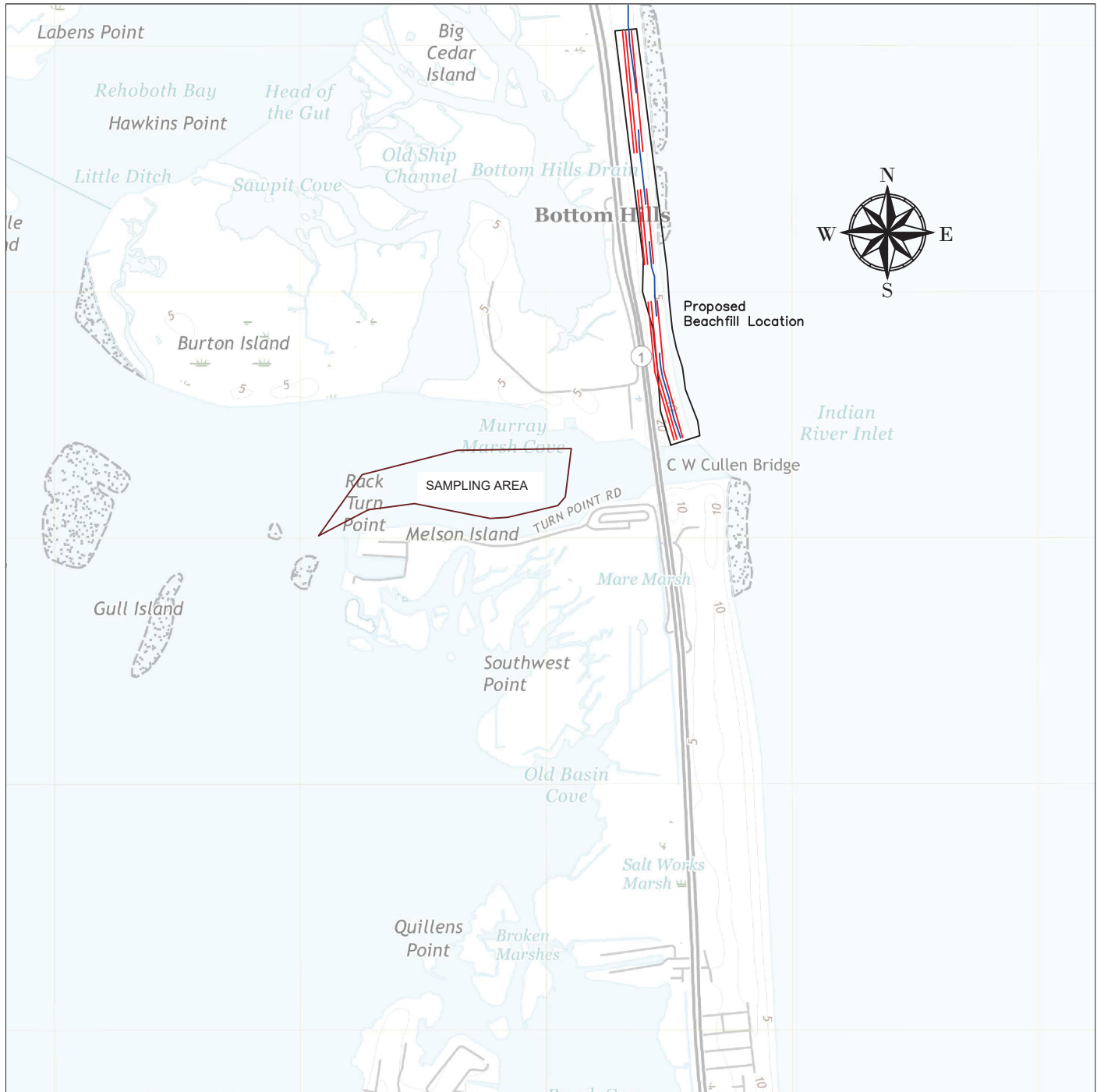
Table 2
Middle Island Shoal and Burton Island Shoal Sediment Core and Grab Sample Locations

Core/Grab Sample ID	Northing DE State Plane NAD83 (US feet)	Easting DE State Plane NAD83 (US feet)	Composite Sample ID
Core_4	224776.96	748133.90	MS-1
Core_5	224908.04	747863.34	
Core_6	225067.53	747536.29	
Core_7	223987.94	747866.03	MIS-2
Core_8	224166.41	747488.42	
Core_9	224365.77	747169.34	
Core_10	222970.23	747711.78	MIS-3
Core_11	223257.32	747193.27	
Core_12	223536.42	746858.24	
Core_13	221768.03	750794.60	BIS-1
Core_14	221361.33	750284.07	
Core_15	221855.80	749553.27	
Core_16	222836.85	749770.52	BIS-2
Core_17	222900.46	749337.89	
Core_18	223466.65	749513.39	

Driving Directions for Middle Island Shoal and Burton Island Shoal

Massey’s Landing – From Dover, Delaware, take DE-1 South approximately 30 miles. Turn right onto 258/Hudon Road and continue 7.5 miles to DE-5 S. Take DE-5 S 4 miles to DE 23 S/ Long Neck Rd for 5.5 miles to the site.

Indian River Flood Shoal SEDIMENT SAMPLING PLANS



Scale: 1" = 2000'	Date: 12/12/2023
Designed by:	J. Faries, P.E.
Drawn by:	J. Faries, P.E.
Checked by:	J. French, P.E.
Sheet No.	FIGURE 1

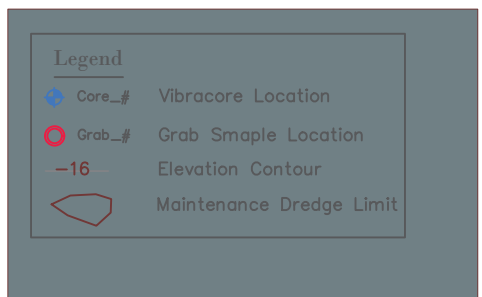
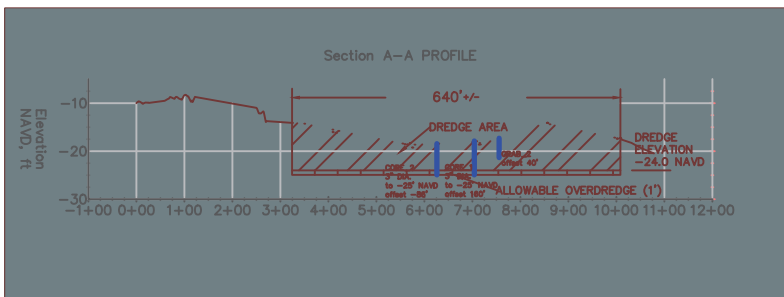
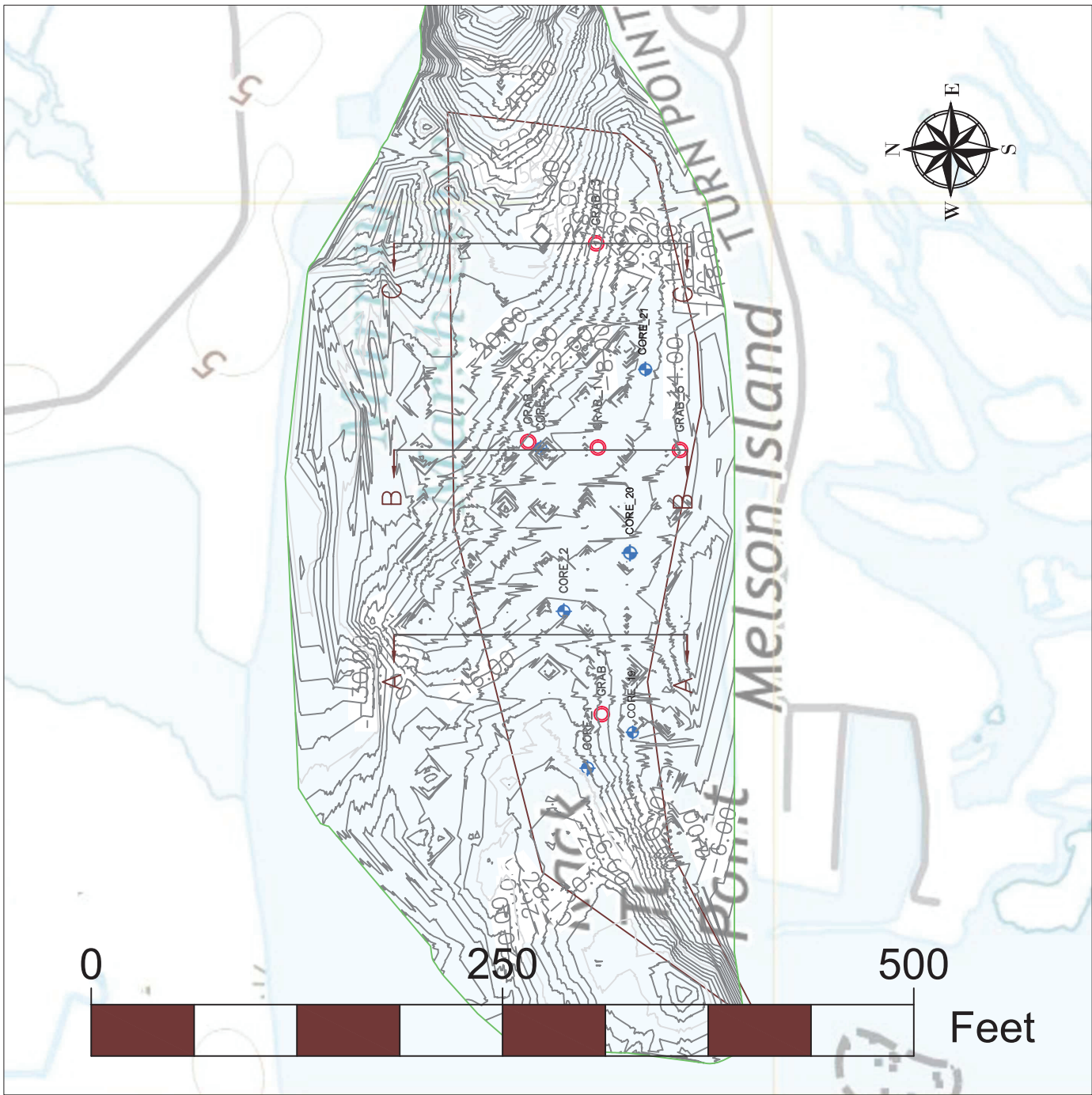
Indian River Flood Shoal
SEDIMENT SAMPLING PLANS
 COASTAL
 SUSSEX COUNTY, DELAWARE



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Sheet No. FIGURE 2

Indian River Flood Shoal
SEDIMENT SAMPLING PLANS
 COASTAL
 SUSSEX COUNTY, DELAWARE

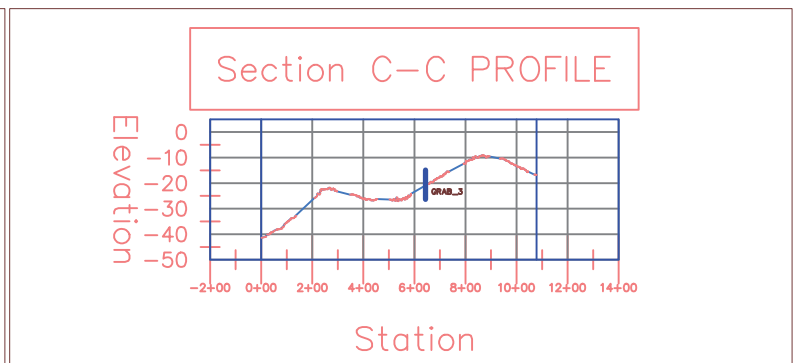
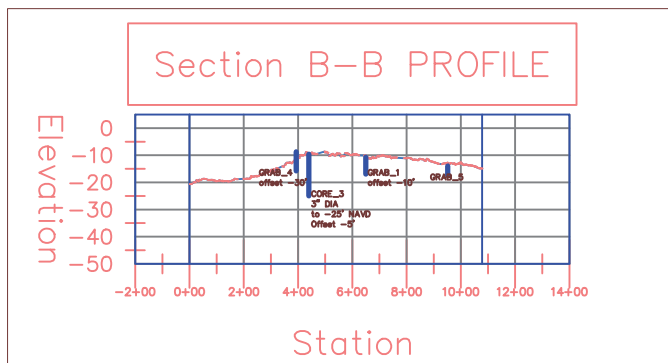
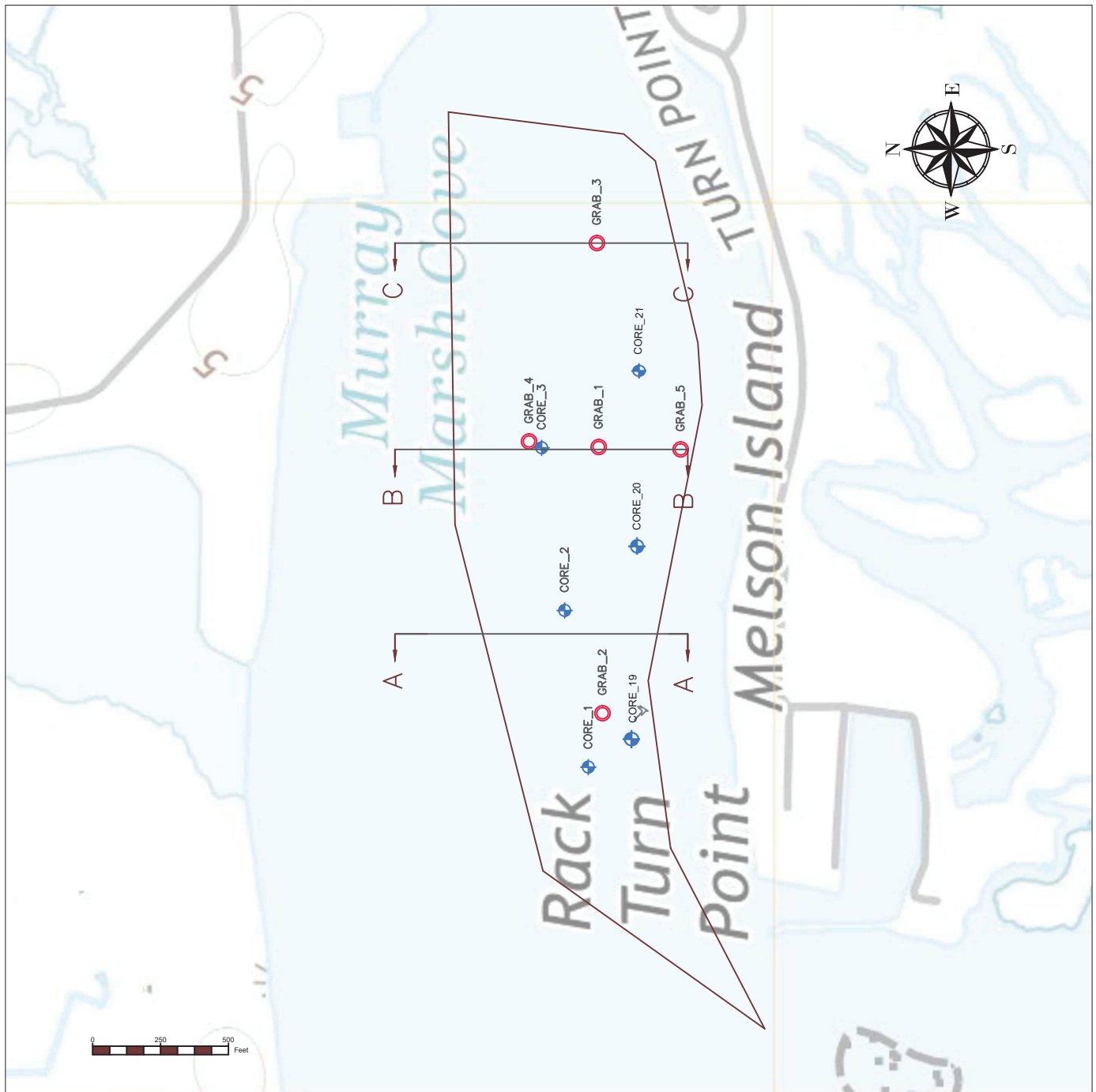


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Sheet No. FIGURE 3

Indian River Flood Shoal
SEDIMENT SAMPLING PLANS
 COASTAL
 SUSSEX COUNTY, DELAWARE



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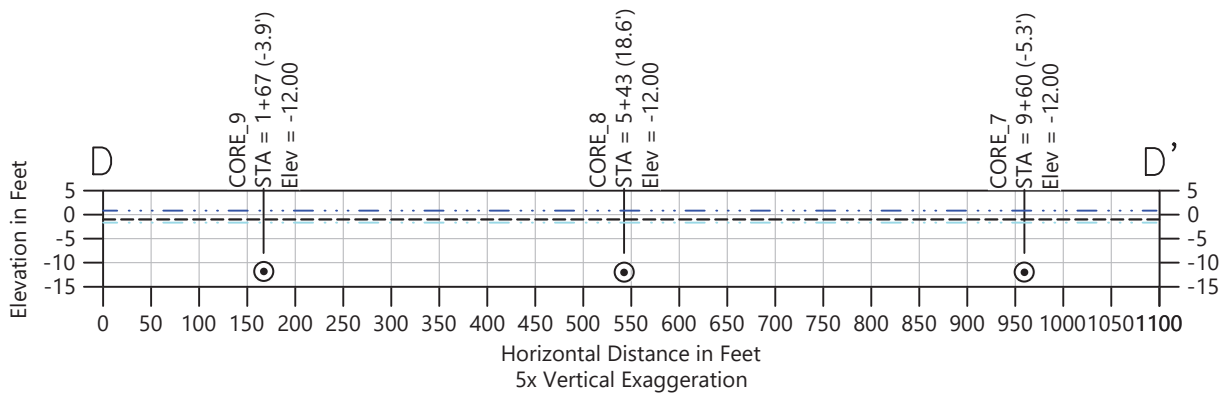
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HORIZONTAL DATUM: Delaware State Plane,
 North American Datum of 1983 (NAD83), U.S.
 Survey Feet
VERTICAL DATUM: North American Vertical
 Datum of 1988 (NAVD88)



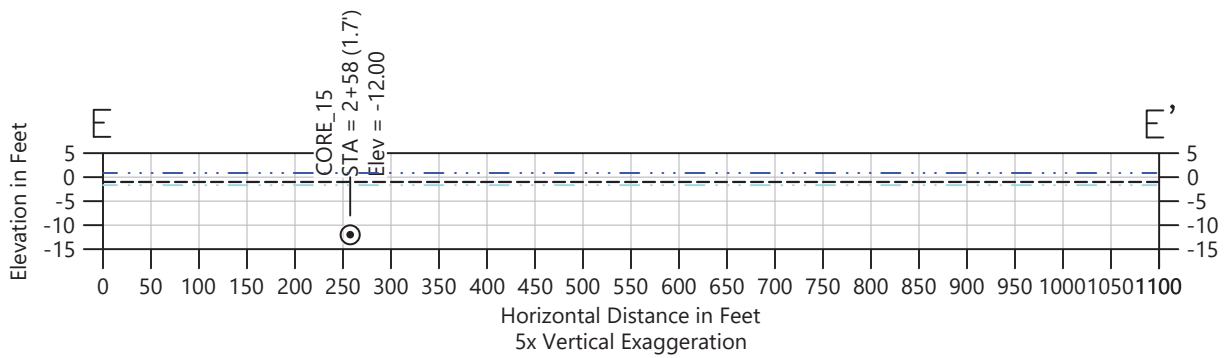


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HORIZONTAL DATUM: Delaware State Plane, North American Datum of 1983 (NAD83), U.S. Survey Feet
VERTICAL DATUM: North American Vertical Datum of 1988 (NAVD88)

LEGEND:

- Proposed Core Location
- · · · — Mean High Water (+0.85 ft NAVD88)
- · · · — Mean Low water (-1.67 ft NAVD88)
- — — Approximate Existing Mudline





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HORIZONTAL DATUM: Delaware State Plane,
 North American Datum of 1983 (NAD83), U.S.
 Survey Feet
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