WETLANDS AND SUBAQUEOUS LANDS SECTION PERMIT APPLICATION FORM

For Subaqueous Lands, Wetlands, Marina and 401 Water Quality Certification Projects

State of Delaware
Department of Natural Resources and Environmental Control
Division of Water

Wetlands and Subaqueous Lands Section

APPLICATION FOR APPROVAL OF
SUBAQUEOUS LANDS, WETLANDS, MARINA
AND WATER QUALITY CERTIFICATION PROJECTS

Last Revised on: November 15, 2012

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

Application Instructions:

1. Complete each section of this basic application and appropriate appendix as thoroughly and accurately as possible. Incomplete or inaccurate applications will be returned. For projects involving docks, piers or wetland walkways, please refer to the Guidance Document for Boat Docking Facilities and Wetland Walkways.

2. All applications must be accompanied by scaled site plans and cross-section plans that show the location and design details of the proposed project. Full construction plans should be submitted for major projects.

3. All applications must have an original signature page and proof of ownership or permitted land use agreement.

4. Submit an original and two (2) additional completed copies of the application (total of 3) with the appropriate application fee* to:

DNREC
Wetlands and Subaqueous Lands Section
89 Kings Highway
Dover, Delaware 19901

*Application fees are non-refundable regardless of the Permit decision or application status.

5. No construction may begin at the project site before written approval has been received from this office.

Additional Information:

1. Tax Parcel Information:	New Castle County	(302) 395-5400
	Kent County	(302) 736-2010
	Sussex County	(302) 855-7878
2. Recorder of Deeds:	New Castle County	(302) 571-7550
	Kent County	(302) 744-2314
	Sussex County	(302) 855-7785

3. A separate application and approval may be required through the Army Corps of Engineers. Applicants are strongly urged to contact the Corps for a determination of their permitting requirements. The contact number for the Regulator of the Day is (215) 656-6728. http://www.nap.usace.army.mil/Missions/Regulatory.aspx

4. **For questions about this application or program contact the Wetlands and Subaqueous Lands Section at (302)739-9943.** Office hours are Monday through Friday, 8:00 AM to 4:30 PM except State Holidays. http://www.dnrec.delaware.gov/wr/Services/Pages/WetlandsAndSubaqueousLands.aspx

APPLICANT'S REVIEW BEFORE MAILING

DID YOU COMPLETE THE FOLLOWING?

X	Yes	BASIC APPLICATION
X	Yes	APPENDICES
X	Yes	VICINITY MAP See Figure 1
X	Yes	PLAN VIEW See Figure 2
N/A	Yes	ELEVATION OR SECTION VIEW
X	Yes	SIGNATURE PAGE (Page 3) with Agent Authorization if appropriate
X	Yes	COPY OF PROPERTY DEED & SURVEY See Attachment B
X	Yes	THREE (3) COMPLETE COPIES
X	Yes	LIST OF ADJACENT PROPERTY OWNERS See Attachment D (As per item #14A & B of this basic application form)
N/A	Yes	APPROPRIATE APPLICATION FEE (Checks should be made payable to the State of Delaware)

Mail 3 complete copies of the application, with drawings to:

Department of Natural Resources and Environmental Control
Wetlands and Subaqueous Lands Section
89 Kings Highway
Dover, DE 19901

BEFORE SIGNING AND MAILING YOUR APPLICATION, PLEASE READ THE FOLLOWING:

The Department requests that the contractor or party who will perform the construction of your proposed project, if other than the applicant, sign the application signature page along with the applicant in the spaces provided. When the application is signed by the contractor as well as the applicant, the Department will issue the Permit to both parties. For Leases, the contractor will receive a separate construction authorization that will make them subject to all of the terms and conditions of the Lease relating to construction. This will allow more fair and consistent enforcement of the conditions of the Permit or Lease by ensuring the proper liability of the Contractor.

If you have not yet chosen a contractor by the time of application, you may wish to do so prior to submitting the application for processing. If you choose to submit your application without the signature of your contractor, you will be held solely responsible for all of the terms and conditions relating to construction and which require that the permitted structure or activity be installed or conducted in accordance with the approved plans and permit conditions.

Section 1: Applicant Identification

1. Applicant's Name: Sharon Lynn
   Mailing Address: City of Rehoboth
   229 Rehoboth Ave. PO Box 1163
   Rehoboth Beach, DE 19971
   Telephone#: 302-227-4641
   Fax #: 302-227-4643
   E-mail: slynn@cityofrehoboth.com

2. Consultant's Name: Sean Snow
   Mailing Address: 16701 Melford Blvd. Suite 330
   Bowie, MD 20715
   Company Name: GHD Inc.
   Telephone#: 240-206-6841
   Fax #: 240-206-6811
   E-mail: sean.snow@ghd.com

3. Contractor's Name: TBD
   Mailing Address: _____
   Company Name: _____
   Telephone #: _____
   Fax #: _____
   E-mail: _____

Section 2: Project Description

4. Check those that apply:
   ☑ New Project/addition to existing project? ☐ Repair/Replace existing structure? (If checked, must answer #16)

5. Project Purpose (Attach additional sheets as necessary):
   Proposed work as described in Section 4.5 of the EIS. (Attachment C)

6. Check each Appendix that is enclosed with this application:

	A. Boat Docking Facilities		G. Bulkheads		N. Preliminary Marina Checklist
	B. Boat Ramps		H. Fill		O. Marinas
	C. Road Crossings		I. Rip-Rap		P. Stormwater Management
	D. Channel Modifications/Dams		J. Vegetative Stabilization		Q. Ponds and Impoundments
✓	E. Utility Crossings		K. Jetties,Groins,Breakwaters		R. Maintenance Dredging
✓	F. Intake or Outfall Structures		M. Projects in Wetlands	✓	S. New Dredging

Section 3: Project Location

7. Project Site Address: 38 Henlopen Ave
   Rehoboth Beach, DE 19971
   County: ☐N.C. ☐Kent ☑Sussex
   Site owner name (if different from applicant: _____
   Address of site owner _____

8. Driving directions: See attached directions map (Figure 3)
   (Attach a location road map with the site indicated on the map).

9. Tax Parcel Number: 334-14.09-215.00 Subdivision Name: N/A

WSLS Use Only: **Permit #s:** _____ _____ _____ _____

Type **SP** ☐ **SL** ☐ **SU** ☐ **WE** ☐ **WQ** ☐ **LA** ☐ **SA** ☐ **MP** ☐ **WA** ☐

Corps Permit: SPGP 18 ☐ **20** ☐ **Nationwide Permit #:** _____ **Individual Permit #**_____
Received Date: _____ **Project Scientist:** _____
Fee Received? Yes ☐ **No** ☐ **Amt: $**_____ **Receipt #:** _____
Public Notice #: _____ **Public Notice Dates: ON** _____ **OFF**_____

Section 3: Project Location (Continued)

10. Name of waterbody at Project Location: Atlantic Ocean waterbody is a Tributary to: N/A

11. Is the waterbody: ☑ Tidal ☐ Non-tidal

12. Is the project: ☑ On public subaqueous lands? ☐ On private subaqueous lands?*
☐ In State regulated wetlands? ☐ In federally regulated wetlands?

*If the project is on private subaqueous lands, indicate the name of the subaqueous lands owner:
State of Delaware
(Written permission of the private subaqueous lands owner must be included with this application).

13. Present Zoning: ☐ Agricultural ☐ Residential ☐ Commercial ☐ Industrial ☑ Other (State Lands)

Section 4: Miscellaneous

14. A. List the name and complete mailing address of the immediately adjoining property owners on all sides of the project. (Attach additional sheets as necessary):
See attached adjacent property list (Attachment D)

B. For wetlands and marina projects, list the name and complete mailing address of each property owner within a 1000 foot radius of the project. (Attach additional sheets as necessary)
N/A

15. Indicate the names of all representatives from DNREC and the Army Corps of Engineers who you have discussed the project with:
See attached contact list (Attachment A)

A. Have you had a State Jurisdictional Determination performed on the property? ☑ Yes ☐ No
B. Has the project been reviewed in a monthly Joint Permit Processing Meeting? ☑ Yes ☐ No
If yes, what was the date of the meeting? June 18, 2015

16. If there is any existing fill or structures in subaqueous lands at the project site, were the structures constructed or fill placed prior to 1969? ☐ Yes ☐ No If no, provide a copy of any prior and/or current authorization(s) for projects at this site. If a copy is not available, provide the permit or lease number(s) if known.

17. Have you applied for or obtained a federal permit for the project from the Army Corps of Engineers?
☐ None ☑ Pending ☐ Issued ☐ Denied Date: 5/9/16
Type of permit: Individual Federal Permit or ID #: N/A

18. Have you applied for permits from other Sections within DNREC?
☐ None ☑ Pending ☐ Issued ☐ Denied Date: April 2010 Permit or ID #: _____
Type of permit (circle all that apply): Septic Well NPDES Storm Water

Section 5: Signature Page

19. Agent Authorization:

If you elect to complete this agent authorization section, all future correspondence to the Department may be signed by the duly authorized agent. In addition, the agent will become the primary point of contact for all correspondence from the Department.

I do not wish to authorize an agent to act on my behalf. ☐

I wish to authorize an agent as indicated below. ☒

I, Sharon Lynn, hereby designate and authorize Sean Snow
Name of Applicant — Name of Agent

to act on my behalf in the processing of this application and to furnish any information that is requested by the Department.

Authorized Agent's Name: Sean Snow
Mailing Address: 16701 Melford Blvd., Suite 330, Bowie, MD 20715
Telephone #: 240-206-6841
Fax #: 240-206-6811
E-mail: sean.snow@ghd.com

20. Agent Signature

I hereby certify that the information on this form and on the attached plans is true and accurate to the best of my knowledge, I further understand that the Department may request information in addition to that set forth herein if deemed necessary to appropriately consider this application.

Agent's Signature — Date: 6/6/16

21. Applicant's Signature:

I hereby certify that the information on this form and on the attached plans is true and accurate to the best of my knowledge and that I am required to inform the Department of any changes or updates to the information provided in this application. I further understand that the Department may request information in addition to that set forth herein if deemed necessary to appropriately consider this application. I grant permission to authorized Department representatives to enter upon the premises for inspection purposes during working hours.

Applicant's Signature — Date: 06/06/16

Print Name: SHARON LYNN

22. Contractor's Signature:

I hereby certify that the information on this form and on the attached plans is true and accurate to the best of my knowledge, and that I am required to inform the Department of any changes or updates to the information provided in this application. I further understand that the Department may request information in addition to that set forth herein if deemed necessary to appropriately consider this application.

Contractor Name — Date

Utility Crossings

Please respond to each question. Questions left blank may result in the application being returned as incomplete. In addition, the answers to all of the questions in this Appendix must correspond accurately to the information on the plan and section view drawings for the project.

1. Please indicate the total number of subaqueous lands crossings associated with the project here: _____1_____ Complete a separate Appendix E for each crossing.

2. The information below is for Crossing # _1_____.

General Information

3. What type of utility is being installed and what is its diameter?
   _____ wastewater pipeline_____ inches _____ electric line _____ inches
   _____ water line _____ inches _____ TV/cable _____ inches
   _____ gas line _____ inches _____ fiber optic cable _____ inches
   __X__ other (describe) _24" HDPE Wastewater Treated Effluent Force Main Pipe_____ _____ inches

4. What is the total length of the crossing relative to: Assuming entire ocean is considered subaqueous
   MHW _5630_____ ft. MLW_____5740_____ ft. OHW _5640_ ft.

5. What is the total area of impact for the crossing relative to: Assuming entire ocean is considered subaqueous
   MHW __225200_____ sq. ft. MLW ___218800_____sqft. OHW 225600 sq. ft.

6. What is the method of installation for the crossing:
   ___X___ directional bore ___X trench _____blasting _____plow

   If another method of installation will be utilized, please describe here:
   Horizontal Directional Drill (HDD) approximately 3,000 LF. Open-cut trench excavation approximately 3,000 LF starting from HDD ocean exit pit to diffuser assembly. Total outfall length of approximately 6,150 LF (including diffuser)

7. Briefly outline the construction sequence for placement of the structure:

   Both operations described above will start at the same time. It is anticipated that the HDD and open-cut trench will be constructed simultaneously and end at their connection point.

8. Will dredging, excavating, or filling be required? ___X___ Yes _____ No

If "yes", complete the appropriate dredging appendix and/or fill appendix and include them with your application. See Appendix S – New Dredging

9. Will there be any permanent towers, poles, platforms or other structures (excluding submarine cables) on subaqueous land or in wetlands? _____ Yes ___X___ No

If "yes", give the number of structures, and provide a description, including square footage and material (the location of all structures must be shown on the plans or the application cannot be processed).

10. At what depth will the subaqueous crossing be placed below the bottom of the waterbody? _____ ft.
    At what height will an aerial crossing be above MHW? _____Feet

    The HDD will reach depths between 10 to 65 feet below the seafloor. The open-cut trench will be 10-15 feet below the sea floor.

11. Is the crossing in, on, over or under public (undeeded) or private subaqueous lands?
    ___X___Public _____Private
    If private, who is/are the property holder(s)? _____
    Provide a copy of any deed, ROW or easement granting access if the private property owner is other than the applicant.

    See attached lease.

12. Is the crossing adjacent to subaqueous lands on State-owned property? ___X___ Yes _____No
    If so, which State agency is the owner? DNREC Division of Parks and Recreation (Deauville Lot)

    Is the crossing within a DelDOT right of way? _____ Yes ___X___No

13. Please include evidence of written permission from the private land owner above (if other than the applicant).

    See attached Lease, Temporary Use Agreement, and Easement

INTAKE OR OUTFALL STRUCTURES

Please make sure answers to all of the questions in this appendix correspond to information on the application drawings.

1. How many feet will the intake or outfall structure(s) be placed channelward of the:

   Tidal waters: mean high water line? 5,445 ft.
   mean low water line? 5,285 ft.

   Non-tidal waters: ordinary high water line? _____ ft.

2. What type of material(s) will be used to construct the intake or outfall structure(s)?

The outfall pipe and diffuser assembly will be constructed of High-Density Polyethylene (HDPE)

3. What is the appropriate median stream flow rate at the:

Project not located in a stream

   intake site _____ cfs outfall site _____ cfs unknown _____

4. What will be the daily rate of withdrawal at the intake site? N/A gpd

5. What will be the intake velocity? N/A fps

6. What will be the mesh size of the screen used on the intake structure? N/A
   _____ inches _____ other (explain)

7. What will be the daily rate of return at the outfall site? N/A gpd

8. Have you applied for the National Pollutant Discharge Elimination System (NPDES) permit for this project?
   X Yes _____ No If your answer is "No", contact the Surface Water Discharges Section, DNREC.

9. Will a splash apron be employed at the outfall site? _____ Yes X No
   If your answer is "Yes" complete Appendix I.
   If your answer is "No", explain your proposed method of preventing erosion.
   Outfall will utilize a diffuser assembly that will release effluent into the water column, thus no erosion is anticipated.

10. How far will any associated structures for support or erosion control (e.g. wing walls, pile, bents, splash aprons, etc.) extend channelward of the:
    Outfall is in the ocean so it will not be extending into any channels. As stated above, the outfall will be 6,000 LF from shore.

    Tidal waters: mean high water line? _____ ft.mean low water line? _____ ft.
    Non-tidal waters: ordinary high water line? _____ ft.

11. How many square feet of any associated structures for support or erosion control will be located:
    Channelward of mean high water? ___N/A____ sq. ft. In vegetated wetlands? _____0____ sq. ft.

12. Is there any dredging or fill associated with this project? ____X___Yes _____No
    If yes, please complete the appropriate appendix.

NEW DREDGING PROJECTS

Please make sure that answers to all of the questions in this appendix correspond to the information on the application drawings.

CLASSIFICATION OF CREEK TO BE DREDGED (for projects in the Inland Bays only) **N/A**

1. How is the creek classified according to the State dredging program's classification system? Is it open to dredging, open to dredging but requiring further study, or restricted due to environmental sensitivity? See example "Classification System" on page S-8 of this application. For further explanation, refer to Section 2.0 of the "Goals and Objectives - Creek Evaluation Dredging Criteria" dated April, 1986.

    a. **Step One:** If the creek to be dredged is "restricted", an application cannot be accepted.

    b. **Step Two:** If the creek is "open" to dredging, the applicable parts of this application must be completed.

    c. **Step Three:** If the creek is "open" to dredging but requiring further analysis, submit information request as part of procedure outlined on page 4 and further explained in Section 2.4 of the Dredging Study.

2. SITE LOCATION OF DREDGING PROJECT

    a. Locate the project site with respect to the county, creek, tributary (enclose 8 ½" x 11" map).

3. DESCRIPTION OF DREDGING PROJECT

    a. Describe the proposed project including the equipment to be used, quantity of material to be dredged, extent of the area to be dredged, place and method of disposal, etc. Detail is important.

4. PURPOSE OF PROPOSED DREDGING PROJECT

    a. Define the purpose and need of the proposed dredging project. Who will benefit?

    b. Submit color photos of site and bordering upland with explanation of the views shown (prints only).

5. How often will maintenance dredging be required? _____

ENVIRONMENTAL CONSIDERATIONS OF THE DREDGING PROJECT

A sediment analysis must be performed in accordance with the attached sampling plan.

6. CHARACTERIZE THE SUBSTRATE TO BE DREDGED

   a. What is the chemical composition of the material to be dredged? Does the substrate contain more pollutants relative to known clean bay sediments of similar composition? Attach Lab Reports and Analyses

      See attached geotechnical soil boring evaluation including chemical and sediment analysis reports.

   b. What is the physical composition of the substrate? State percent of sand, gravel, mud, silt. Does it contain shell fragments?

      Substrate composition varies throughout the length of the outfall. However, the majority of the substrate being dredged is comprised of fine to medium sand with some silts and clays as well.

7. CHARACTERIZE THE UNDERLYING SUBSTRATE TO BE EXPOSED BY THE PROJECT

   a. Is the underlying substrate (material at proposed dredging depth) of similar physical composition and chemical quality as material to be dredged? _____ Yes _____ No

      Typically, the underlying substrate will be of similar physical composition and chemical quality as the material being dredged, but occasionally the underlying substrate will be comprised of finer silts and clays as opposed to the fine to medium sand being excavated.

   c. Project the expected turbidity levels and area of effect (extent of plume) based on the percent of silt, sand, and gravel in the dredged material.

      It is estimated that the extents of the sediment plume could range from 10 to 300 mg/L at a distance of 1,000 feet from the point of excavation (Nightingale and Simenstad 2001). All suspended solids concentration levels are below those shown to have adversse effect on fish (580 mg/L for the most sensitive species, but 1,000 mg/L is more typical)(Burton 1993).

8. CHARACTERIZE THE BIOLOGICAL COMMUNITY IN THE AREA TO BE DREDGED

   a. Characterize how the area is utilized by shellfish and finfish.

      Surveys of shellfish near the area found the presence of the Atlantic surf clam but in relatively low densities compared to other areas surveyed off the coast. Finfish found along the Delaware Atlantic coast are primarily seasonal migrants that are typically sparse in the winter months. Primary species include the clearnose skate, bay anchovy, summer flounder, and black sea bass. See EIS Section 8 for additional information

b. What are the major benthic (bottom dwelling) species found at the area to be dredged?

Based on a 2001 study, the project area contains bivalves such as Ensis directus and Tellina agills, as well as mossuscs, oligochaete worms, and polychaete worms (Scott 2001) See EIS Section 8 for additional information

c. Characterize the subaquatic vegetation and other vegetation at or near the project site.

Previous studies of the Atlantic Ocean in the vicinity of the outfall do not mention any SAV off of the coast of Delaware (Maurer, et al. 1976)(USACE 2002) This, there is not expected to be any SAV on the ocean floor in the project area. See EIS Section 8 for additional information.

9. CHARACTERIZE THE EXISTING WATER QUALITY

a. Determine the classification of the stream according to state water quality criteria. Will the dredging project cause violations of the water quality criteria? Will designated water uses be affected?

N/A

b. Determine levels of dissolved oxygen (D.O.) in and around the project area. Measure D.O. at the water/substrate interface during worst case conditions (i.e. summer morning).

As an example, 8.63 mg/l (8/23/1999 @ 12:00 noon) and 7.25 mg/l (7/25/2006 @ 9:00 AM) per Appendix K of EIS. DO levels recorded during recent vibracoring ranged from 10.9 to 12.2 mg/L on 3/22/2016.

10. IMPACT TO THE BOTTOM CONTOURS OF THE BAY OR CREEK

a. What is proposed dredging depth in relation to surrounding bathymetry? Provide map showing surrounding depths.

7 to 10 FT (See attached Figure 4 – Ocean Outfall with Contours)

b. Will the project change flow or circulation patterns in the bay or creek? Will shoaling patterns be altered?

N/A

c. Describe the impact to sediment transportation along the shoreline and the potential for depriving adjacent shorelines of sediment?

There will be no impact to sediment transportation along the shoreline and/or the potential for depriving adjacent shorelines of sediment. There is the potential for the sediment plume caused by dredging to reach the shore, but concentrations should be low enough to cause little to no effect to sediment volumes along the shore.

11. IMPACT TO SURROUNDING LANDS

a. What is the proximity of the dredging project to the nearest creek bank or banks? What are the existing land uses along this bank(s)? What is the shoreline composition (wetland, vegetated bank, rip-rap, bulkhead eroding bank)?

No creeks are in the project vicinity. Dredging will begin 3,000 LF feet from the City of Rehoboth Beach. The shore is currently a sand recreational beach with a vegetated dune behind it that will not be affected.

12. What measures will be taken during the dredging operation to minimize environmental impact?

The primary measure to avoid and minimize impacts during dredging on environmental resources is to observe windows for sensitive resources. The proposed construction schedule is October 2017 to April 2018. The time of year that dredging will be occurring will conform with the Delaware Division of Fish and Wildlife, Wildlife Species Conservation and Research Program recommended restrictions for protection of marine resources in the Atlantic Ocean. See attached letter outlining the federally protected threatened or endangered species and recommended restrictions.

CONSIDERATIONS FOR DISPOSAL OF DREDGED MATERIALS

13. What are your plans for disposing of dredged material (i.e., upland disposal, wetland creation, island creation, etc.)? What alternatives have you considered?

The dredged material is proposed for use as backfill within the open-cut trench excavation for the outfall pipe. A total of approximately 31,000 CY is proposed for excavation. Approximately 15,000 CY is proposed for reuse as backfill in the trench. Approximately 16,000 CY will be remaining to be placed aside. Two alternatives that were also discussed are: 1. Transport material to an approved disposal site (aquatic or land based) 2. Use for beach restoration. The beach restoration option has been determined as being not feasible and/or cost effective due to the minimal amount of material available.

14. When do you plan to conduct your dredging/disposal operation (approximate dates of operation)?

The proposed construction schedule is October 2017 to April 2018.

15. Describe the characteristics and location of the proposed dredged material disposal site? What is the present use of the disposal site? Describe pipeline route if applicable.

N/A - Excavated material is proposed for use as backfill or will be cast aside. A dredged material disposal site is not proposed for this project.

16. CHARACTERISTICS OF THE DREDGED MATERIAL

a. Based on sediment analysis required or other known factors, does the material contain any contaminants?

No contaminants were identified during the geotech investigation. Refer to the attached chemical analysis summary table and associated vibracore report, chemical analysis, soil boring logs, desktop geotech study, and site characterization report.

b. What is the bulking factor of the material (e.g., how much will material increase in volume during dredging and disposal operation based on material composition, material water holding capacity and dredging method)?

The material has been classified as silty sand, poorly graded sand with silt and some clay. The bulking factor for sand is 1. Silt materials have a bulking factor of 1.9.

c. What is the settling rate of the dredged material?

Per the geotech investigation (soil borings and vibracores), the proposed excavated material is mainly characterized by silty fine to medium sand and soft to firm fat clay. Refer to attached Vibracore report dated May 3, 2016. The sandy material will settle almost instantaneously

d. What is the mounding ability of the material being disposed of?

The sandy material will tend to mound.

17. CONSIDERATIONS FOR HABITAT DEVELOPMENT

d. Does similar habitat already exist in the area proposed for development?

There are no areas proposed for habitat development.

e. What is the depth of water at mean low water (for water disposal for marsh or island creation)?

N/A

f. What is the salinity of water at the proposed site of development?

N/A

g. What is the salinity of water from which material is being dredged?

30 and 31 practical salinity units (PSU) were estimated in the EIS. Refer to Section 5.6 of the EIS for additional information. In additon, recent water column testing undertaken during the geotech investigation, resulted in a salinity concentration of approxiamtely 42.1 to 42.5 mS/cm. Refer to attached Vibracore report dated May 3, 2016.

h. Is the composition of the dredged material similar to the substrate at the site of habitat development?

N/A

f. What are the biological characteristics of the site proposed for development? Are there oyster bars, spawning grounds, submerged aquatic vegetation, or other fragile ecosystems which require temporary or permanent protection? These sites should be avoided for habitat development.

N/A

i. What are the wind and current conditions at the site? Do they change seasonally?

N/A

j. Will habitat development interfere with any existing commercial or recreational activities?

N/A

k. Is there enough material to achieve desired elevations? Is the potential site of development large enough to accommodate the dredged material?

N/A

j. Who is the owner of the site proposed for development? Who will maintain the new habitat?

N/A

k. What types of wildlife are to be attracted to the site? Will the food and habitat needs be met?

N/A

l. What measures will be taken to reduce potential environmental impact?

N/A

18. CONSIDERATIONS FOR UPLAND DISPOSAL

a. What is the distance from the dredging operation to the proposed site of disposal?

N/A

b. What method of disposal is to be utilized (i.e., pipeline discharge, barge, hopper, etc.)?

N/A – The material is not proposed for disposal

c. Describe the proposed method of containment for the dredged material.

Excavated material is proposed to be utilized as backfill on top of the installed outfall pipe within the trench excavation adnt the remaining to be cast aside to avoid high TSS values associated with complete water column removal of the material.

d. How much acreage is required for the quantity of material being disposed of?

N/A

e. Provide an engineering drawing of the proposed disposal facility.

N/A

f. What measures will be taken to reduce potential environmental impact?

N/A

g. What is estimated life of the dredge spoil disposal site?

N/A

19. If required, has an Erosion and Sediment Control Plan been approved by the designated plan approval agency for the project? An Erosion and Sediment Control Plan is required for any project disturbing more than 5,000 square feet of uplands. Final approved plans must be received by this office prior to permit issuance.

____ Yes ___X___ No ____ Not required

20. SAMPLING PLAN FOR NEW DREDGING PROJECTS

1. Physical and Chemical Analysis of Sediment

Refer to the attached vibracore report and soil boring logs

a. Particle size distribution and percent solids analysis on core samples taken to depth of proposed dredging. Percentage sand, silt and clay should be given based on:
sand: Greater than or equal to 0.0625mm
silt: Less than 0.0635mm but greater then 0.0039mm
clay: Less than 0.0039mm

b. Bulk sediment analysis (mg/lg) core samples taken to depth of proposed dredging for parameters as determined by the Department.

c. Elutriate analysis (mg/l) on core samples taken to depth of proposal dredging for parameters as determined by the Department. Dredge site water should be used for the dilution water.

d. Surface water analysis (mg/l) on one composite sample from the dredging area for parameters as determined by the Department.

2. Biological Sampling

e. Benthic Invertebrate survey based on minimum of three surface grab samples or benthic dredge. Organisms should be identified to genus-level species where possible.

Benthic sampling will be performed prior to construction, and following the completion of the project. No sampling has been conducted to date. Refer to Section 8.3 of the EIS for additional information.

f. Description of emergent and submerged vegetation in or adjacent to the proposed dredging area.

There is no record of SAV near the areas proposed for trench excavation. Refer to Section 8.3.3 of the EIS.

Important Notes:

The number of samples is dependent on size of area to be dredged and suspected pollution level. As a general rule, a minimum of three sampling stations should be established.

If sediment contaminants are shown to exist at levels of concern by the above analyses, a bioassay may be required. Suspected contaminated sediment proposed for upland disposal should be subjected to an EP Toxicity analysis.

Please be advised that all dredging in the Inland Bays must be undertaken between September 1 and December 31 in order to protect summer and winter flounder and other aquatic species. Dredging in other Delaware waters may also be subject to certain time of year restrictions in order to protect fish and wildlife. Contact DNREC for more specific information regarding the restrictions that may apply within your project area.

References

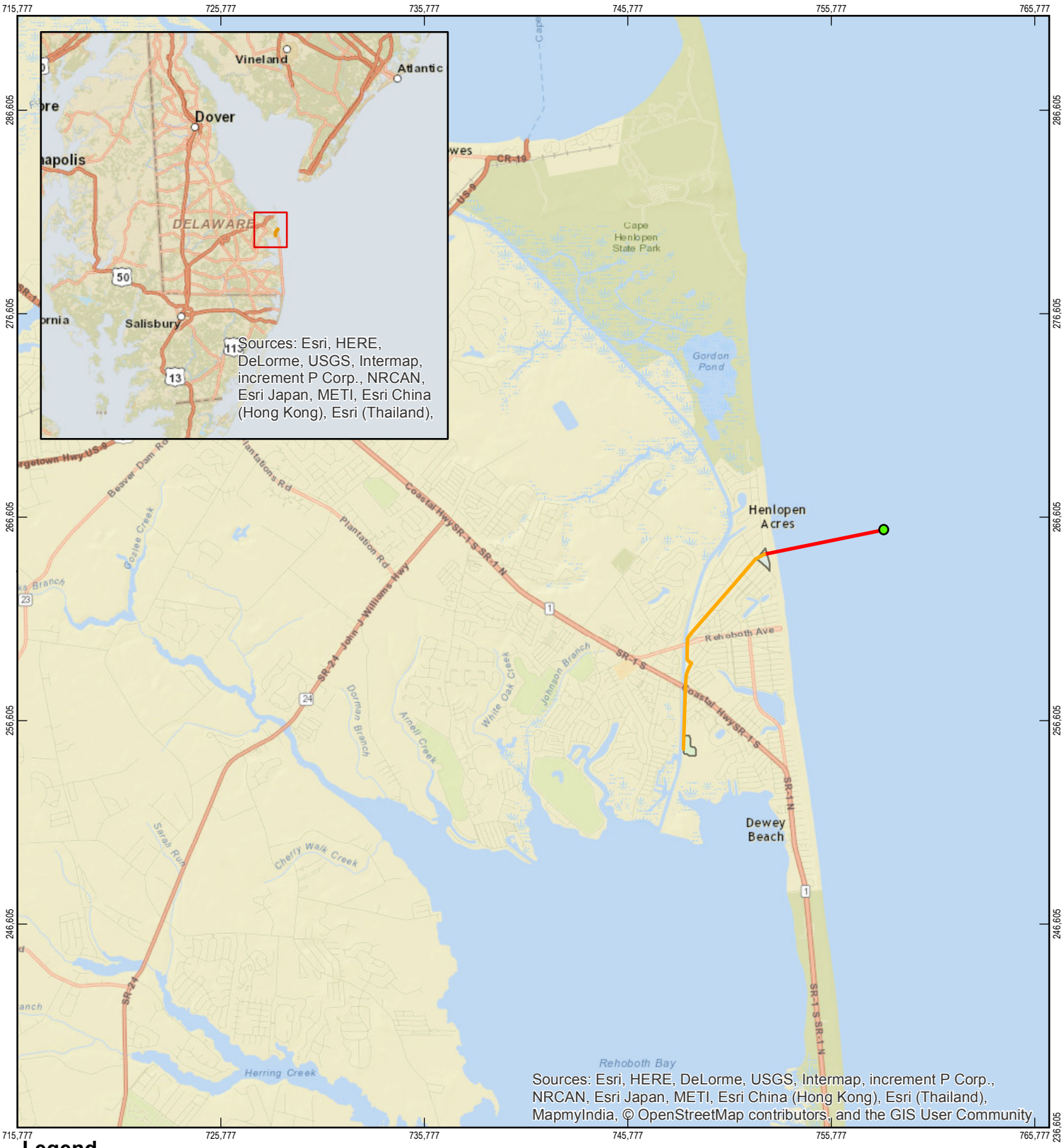
Burton, W.H. 1993. Effects of bucket dredging on water quality in the Delaware River and the potential for effects on fisheries resources. Versar, Inc., 9200 Rumsey Road, Columbia, Maryland 21045.

Maurer, D., Tinsman, J. C., Leathem, W., & Kinner, P. (1976). Baseline studies of Delaware ocean outfall sites. Marine Pollution Bulletin, 7(2), 31-34.

Nightingale, B., and C. Simenstad. 2001. White Paper: Dredging A viti vi ties. Marine Issues. Submitted to Washington Department ofFish and Wildlife; Washington Department of Ecology; Washington Department of Transportation. 119 pp.

Scott, L. C. (2001). An evaluation and comparison of benthic community assemblages within potential sand borrow sites for the Rehoboth Beach and Dewey Beach storm damage reduction project. Philadelphia, PA: USACE.

USACE. (2002). Final Environmental Assessment (EA) for Alternative Sand Sources and Stormwater Outfall Extensions for the Rehoboth Beach and Dewey Beach Storm Damage Reduction Project. Philadelphia, PA: Philadelphia District, U.S. Army Corps of Engineers.



Legend

- Ocean Outfall
- Force Main
- Proposed Outfall Pipe
- Directional Drilling Staging Area
- Rehoboth Beach WWTP

Paper Size ANSI A

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Miles

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Delaware FIPS 0700 Feet

N

GHD
CLIENTS | PEOPLE | PERFORMANCE

City of Rehoboth Beach
Ocean Outfall Project

Vicinity Map

Job Number	86-14327
Revision	A
Date	Feb 01, 2016

Figure 1

16701 Melford Blvd Ste 330 Bowie MD 20715 USA T 240 206 6810 F 240 206 6811 E bowmail@ghd.com W www.ghd.com

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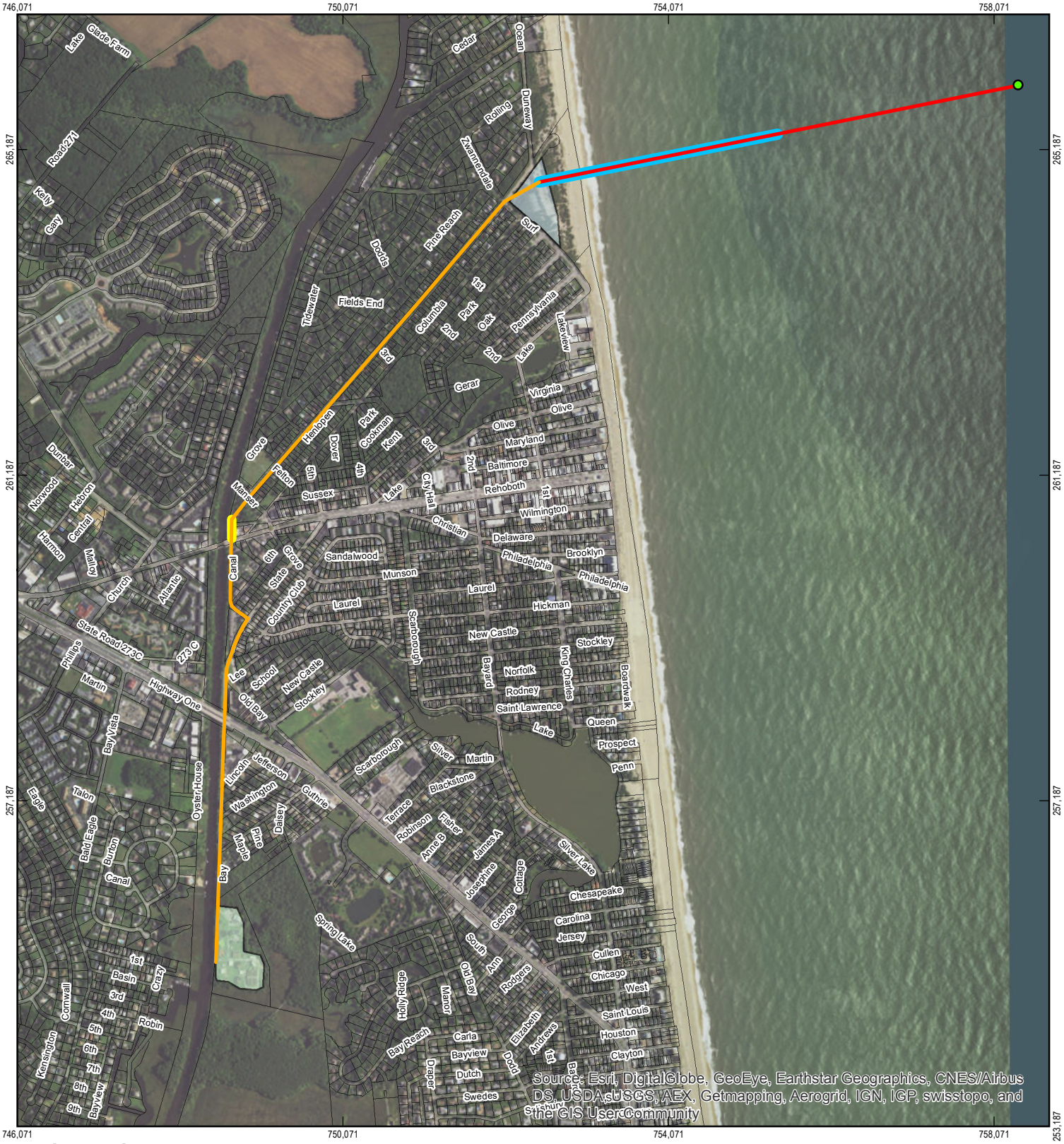

Legend

- Ocean Outfall
- Ocean Outfall Pipe
- Force Main
- Force Main Jack and Bore
- Outfall Pipe HDD Portion (Minimum)
- Directional Drilling Staging Area
- Rehoboth Beach WWTP

Paper Size ANSI A

0 0.0475 0.095 0.19 0.285 0.38

Miles

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Delaware FIPS 0700 Feet

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City of Rehoboth Beach
Ocean Outfall Project

Plan View

Job Number	86-14327
Revision	A
Date	Feb 01, 2016

Figure 2

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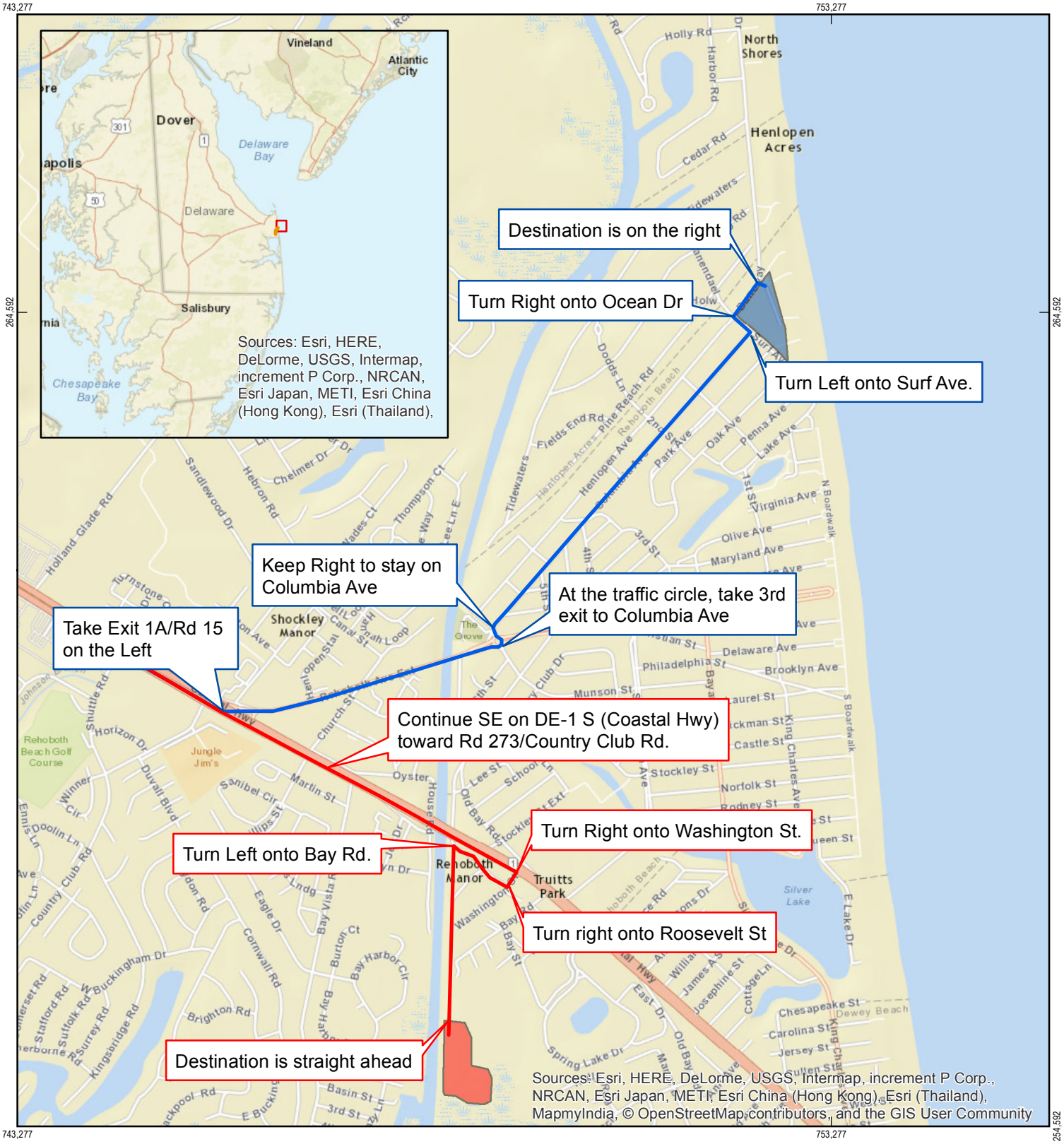

Legend

- Directions to RBWWTP
- Directions to Staging Area
- Rehoboth Beach WWTP
- Directional Drilling Staging Area

Paper Size ANSI A

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Miles

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Delaware FIPS 0700 Feet

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City of Rehoboth Beach
Effluent Pump Station, Forcemain, and Ocean Outfall Project

Directions Map

Job Number 86-18693
Revision A
Date May 20, 2016

Figure 3

16701 Melford Blvd Ste 330 Bowie MD 20715 USA T 240 206 6810 F 240 206 6811 E bowmail@ghd.com W www.ghd.com

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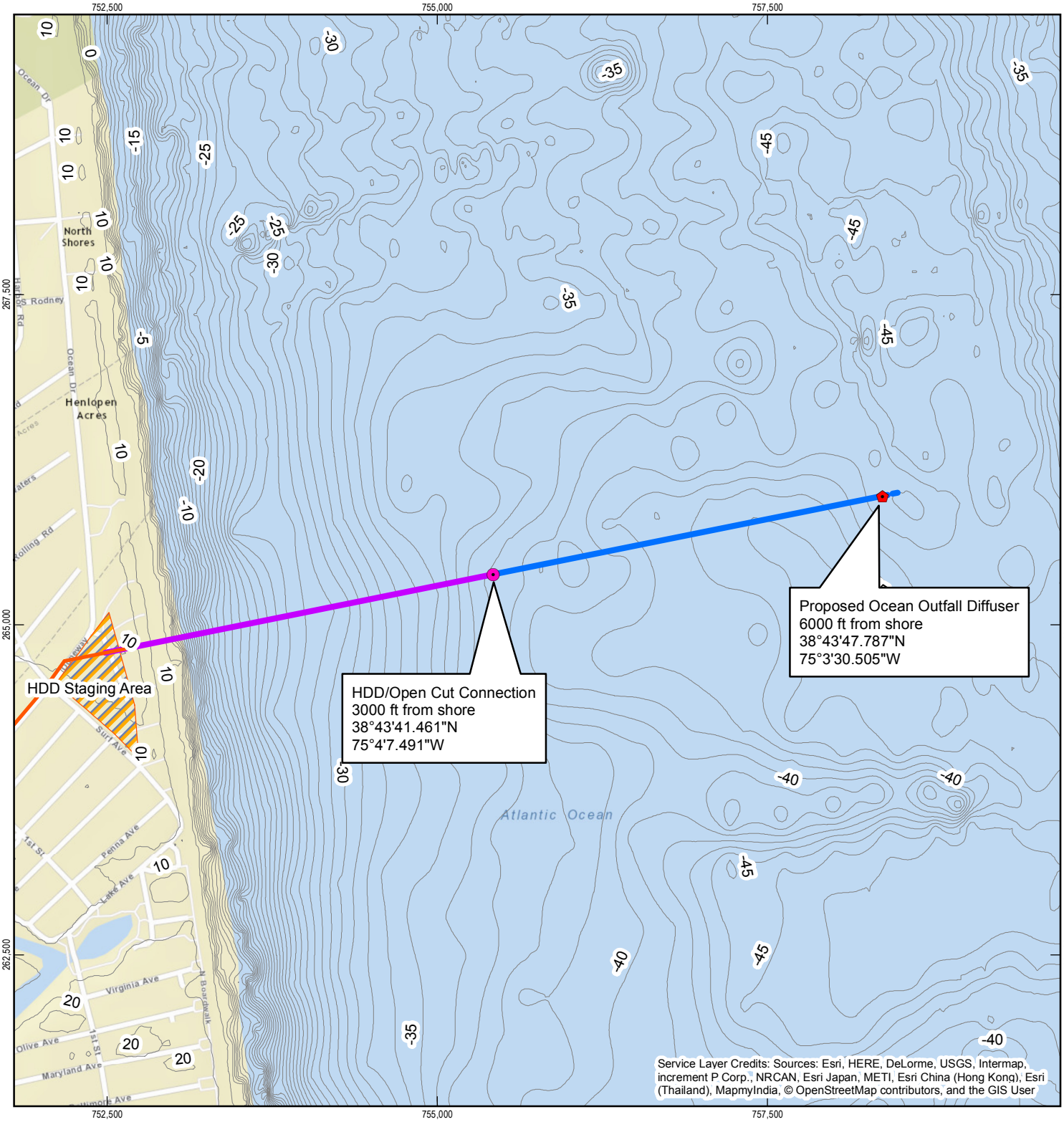

Legend

- Directional Drilling Staging Area
- Outfall Open Cut
- Proposed Force Main
- HDD to Open Cut Connection
- Outfall HDD
- Proposed Ocean Outfall Diffuser

Paper Size ANSI A
1:12,500
0 200 400 800 1,200 1,600
Feet
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Delaware FIPS 0700 Feet

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City of Rehoboth Beach
Ocean Outfall Project

Ocean Outfall with Contours

Job Number	86-18693
Revision	A
Date	Jun 15, 2016

Figure 4

16701 Melford Blvd Ste 330 Bowie MD 20715 USA T 240 206 6810 F 240 206 6811 E bowmail@ghd.com W www.ghd.com

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Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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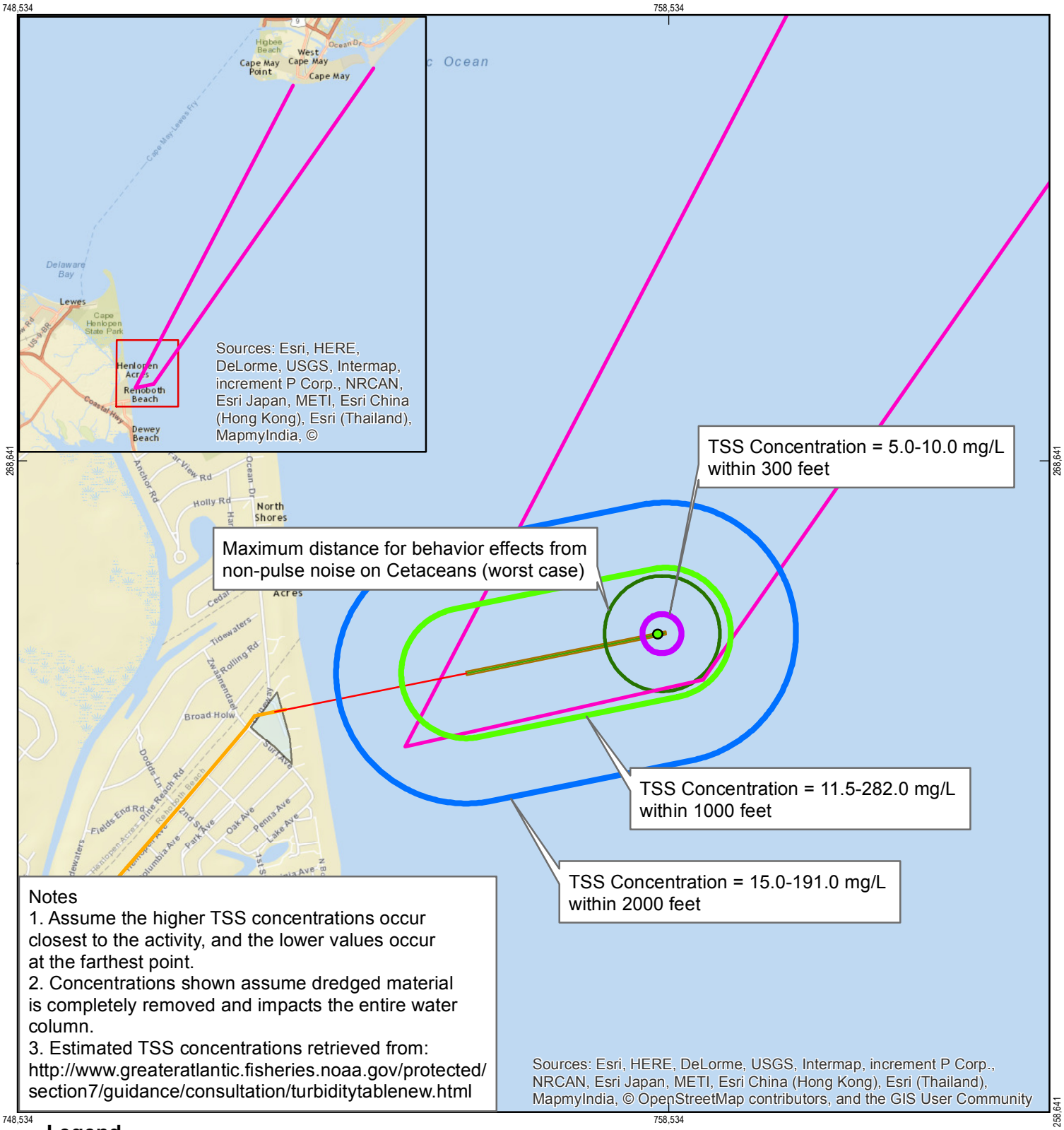

Notes
1. Assume the higher TSS concentrations occur closest to the activity, and the lower values occur at the farthest point.
2. Concentrations shown assume dredged material is completely removed and impacts the entire water column.
3. Estimated TSS concentrations retrieved from: http://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/consultation/turbiditytablenew.html

Legend

- Force Main
- HDD Staging Area
- Outfall HDD
- Outfall Open Cut
- Ocean Outfall
- Project Footprint
- Vessel Travel Extents
- Extent of Noise

Extents of Plume due to:

- Cutterhead Dredge
- Mechanical Clamshell Dredging
- Pile Driving

Paper Size ANSI A
0 0.050.1 0.2 0.3 0.4
Miles
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Delaware FIPS 0700 Feet

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City of Rehoboth Beach
Ocean Outfall Project
Action Area Map

Job Number 86-18693
Revision A
Date Jun 15, 2016

Figure 5

16701 Melford Blvd Ste 330 Bowie MD 20715 USA T 240 206 6810 F 240 206 6811 E bowmail@ghd.com W www.ghd.com

G:\86\18693\GIS\- Figures - Permitting\ESA\Action Area Map.mxd

Created by:scsnow

Attachment A – DNREC and USACE Contact List

DNREC and USACE Contact List

DNREC	Phone Number
Arndt, Tricia – DNREC	302-739-9283
Arvay, Bonnie – DNREC	302-739-9283
Ashby, Bryan - DNREC	302-739-9946
Bailey, Matthew – DNREC	302-735-8677
Brundage, John - USACE	302-736-9763
Chaconas, James - DNREC	302-739-9943
Fleming, Kate - DNREC	302-735-8658
Greer, Randall - DNREC	302-739-9921
Hall, Jim - DNREC	302-739-9186
Hummel, Tony - DNREC	302-739-9946
Lukezic, Craig - DNREC	302-736-7407
Luoma, Jennifer – DNREC	302-739-9921
McCarthy, John - DNREC	302-739-9188
Moerschel, Susan - DNREC	302-739-9240
Pope, Greg – DNREC	302-739-9941
Robert, Nicole – USACE	410-962-5173
Schneider, John – DNREC	302-739-9237
Smailer, Steven - DNREC	302-739-9943
Stewart, Elena – DNREC	302-739-9935
Vickers, Charles (Ron) – DNREC	302-739-9237
Watson, Jessica - DNREC	302-856-2105
Yost, Michael – USACE	302-736-9763

Attachment B – Deauville Beach Lease Agreement

State of Delaware
Department of Natural Resources and Environmental Control
Delaware Division of Parks and Recreation
89 Kings Highway
Dover, Delaware 19901

October 23, 2013

Gregory J. Ferrese
City Manager
City of Rehoboth Beach
229 Rehoboth Avenue
Rehoboth Beach, Delaware 19971

RE: Deauville Beach Lease

Dear Greg:

Enclosed find two partially executed copies of an Agreement of Lease for Public Lands known as Deauville Beach. Please have these signed, notarized and returned to me with a check for $2,500.00 made out to the Division of Parks and Recreation.

The Division would like to thank you, Mayor Cooper and the City Commissioners for working with us to continue our long-standing relationship at Deauville Beach. We feel the residents of Rehoboth Beach and the public in general are well-served by the City's management of this area.

If you have any questions, please feel free to contact me at 302-739-9235.

Sincerely,

Ron Vickers

Ron Vickers, Manager
Land Preservation Office

Enclosures

RECEIVED

OCT 2 3 2013

CITY MANAGER'S OFFICE

AGREEMENT OF LEASE
for
PUBLIC LANDS
known as
DEAUVILLE BEACH

BETWEEN
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
AND
CITY OF REHOBOTH BEACH

WHEREAS, there are Public Lands identified on the State of Delaware Public Lands Survey of 1977 as 2-NA, 2-NB and 2-NC located within the municipal boundary of Rehoboth Beach, Delaware and more commonly known as and herein referred to as Deauville Beach; and

WHEREAS, the supervision and control of public lands was transferred from the State Highway Department to the Department of Natural Resources and Environmental Control (hereinafter "Department") by means of 7 Del. Code, Chapter 45; and

WHEREAS, the Division of Parks and Recreation (hereinafter "Division") within the Department is responsible for the administration of Public Lands since 1980; and

WHEREAS, the Department and the City of Rehoboth Beach (hereinafter "City") entered into a ten (10) year Agreement of Lease beginning June 23, 1975 for the management of the Public Lands in Rehoboth Beach known as Deauville Beach and such Agreement of Lease was extended for an additional ten (10) years on May 1, 1985 and expired on April 30, 1995; and

WHEREAS, the Department and the City entered into a five (5) year Agreement of Lease beginning May 1, 1995 that expired on April 30, 2000; and

WHEREAS, by mutual acknowledgement of the Department, the Division and the City, the City continues to manage Deauville Beach under the terms of the last Agreement of Lease until present day; and

WHEREAS, the State of Delaware, Department of Natural Resources and Environmental Control, acting by and through the Division of Parks and Recreation, and the City of Rehoboth Beach, Delaware desire to continue their cooperative relationship and to enter into a new Agreement of Lease for the Public Lands known as Deauville Beach.

NOW THEREFORE, for and in consideration of the sum of One Dollar ($1.00) and other good and valuable considerations and pursuant to the mutual covenants, terms,

conditions, and restrictions contained herein, the State of Delaware, Department of Natural Resources and Environmental Control, Division of Parks and Recreation and the City of Rehoboth Beach, Delaware enter into this Agreement of Lease.

WITNESSETH that the Parties hereto agree as follows:

1. Leased Premises. Division hereby leases to City and City hereby leases from Division all that certain tract, piece and parcel of land located in Lewes and Rehoboth Hundred, Sussex County and State of Delaware, identified in the Sussex County Assessment Office as Parcel Number 3-34-14.09-215 and identified on the Public Lands Survey of 1977 as Public Lands Parcels 2-NA, 2-NB and 2-NC, containing 21.56 acres more or less as represented in Exhibit A ("Property").

2. Term. The Term of this Lease shall be for a period of ten (10) years commencing on July 1, 2013 and terminating on June 30, 2023.

3. Administrative Fee. The City shall pay an administrative fee of Two Thousand Five Hundred Dollars ($2,500.00) for the term of the lease, due upon execution of the lease.

4. Conditions of the Property. The Property is leased in its as-is condition. The Department and the Division have no obligation whatsoever to make any improvements or alterations thereto.

5. Use of Property. The City agrees that the Property shall be used as a public outdoor recreation area for such uses as including, but not limited to, a swimming beach, a volleyball area, a tennis area, and public parking for the Property. This public outdoor recreation area is subject to the provisions of Section 6(f) of the federal Land and Water Conservation Fund Act of 1964, as amended from time to time. All non-recreational use of the Property is subject to the same provisions.

6. Management and Maintenance. The City agrees to be responsible for all aspects of public land management including, but not limited to, enforcement, trash removal, and resolution of inappropriate use of the Property by neighbors and visitors. Division shall have no obligation to repair or to maintain the Property whatsoever or to make any replacements thereto. The City shall make all repairs and replacements and perform all maintenance in and to the Property as may be necessary or desirable to keep the Property in good order as a public outdoor recreation area.

7. Revenues. The City agrees that all revenues generated by use of the Property shall be used for the operation and maintenance of recreational services on the Property. Any excess revenues generated at the Property shall be used solely for park and recreation purposes in the City of Rehoboth Beach.

8. Compliance with Laws. The City agrees to comply with all laws, lawful orders, rules, regulations, licenses, and permits issued by any governmental authority that pertain to or affect the Property.

9. Indemnification. The City agrees to hold harmless, indemnify and defend the Department and its Secretary, the Division and its Director, and their employees, agents, contractors, personal representatives, successors, and assigns (collectively "Indemnified Parties") from and against all liabilities, penalties, costs, losses, damages, expenses, causes of action, claims, demands, or judgments, including, without limitation, reasonable attorneys' fees, arising from or in any way connected with injury to or death of any person or physical damage to any property, resulting from any act, omission, condition, or other matter related to or occurring on or about the Property, regardless of cause, unless due to the negligence or willful misconduct of any of the Indemnified Parties.

10. Insurance. The City shall maintain comprehensive general public liability insurance which shall include coverage for assumed or contractual liability under this Lease.

11. Property Improvements. No new above-ground utilities and no new facility development, including alterations, additions or improvements to existing facilities, shall commence on the Property without prior written approval from the Division. All costs for any approved work shall be at the City's expense unless the Division or a third party consents to share a portion of such costs.

12. Loss and Damage to the City's Property. The City shall be solely responsible for any and all injury, loss or damage to the City's personnel, equipment or personal property or to equipment and personal property of the City's agents, employees, invitees, or licensees that may be placed on or used at the Property.

13. Assignment and Subletting. The City shall not assign or transfer this Lease or any estate or interest granted herein. The City shall not sublet any part of the Property nor allow anyone to come in, with, through, or under the City.

14. Termination. Either Party hereto may terminate this Lease prior to its expiration date only with good and reasonable cause and only by means of a written notice as provided for herein. Such notice shall be given at least sixty (60) calendar days prior to termination.

15. Notices. All notices, demands and requests for communications which may be or are required to be given shall be in writing and shall be deemed to have been given only if delivered personally, mailed by certified or registered mail, return receipt requested, or delivered by overnight courier, addressed to the Parties at the addresses stated herein or to such other address as a Party may furnish in the foregoing manner. Notices shall be addressed:

If to Division: Delaware Division of Parks and Recreation
89 Kings Highway
Dover, Delaware 19901
Attention: Director

If to City: City of Rehoboth Beach
229 Rehoboth Avenue
Rehoboth Beach, Delaware 19971
Attention: City Manager

16. Modification. This Agreement of Lease contains the entire agreement between the Parties and cannot be modified except by an instrument signed by the Parties. This Agreement of Lease shall bind the Parties and their respective successors and assigns.

[End of text; signatures on following page.]

IN WITNESS WHEREOF, the Parties to this Agreement of Lease have set their hands and seals this _____ day of _____, 2013.

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

Witness

BY: _____
COLLIN P. O'MARA, SECRETARY

DIVISION OF PARKS AND RECREATION

Witness

BY: _____
CHARLES A. SALKIN, DIRECTOR

CITY OF REHOBOTH BEACH

_____
Witness

BY: _____
SAMUEL R. COOPER, MAYOR

_____
Witness

BY: _____
SECRETARY, COMMISSIONERS OF REHOBOTH BEACH

STATE OF DELAWARE)
) SS.
COUNTY OF KENT)

BE IT REMEMBERED, That on this 22nd day of October, 2013, personally appeared before me, the Subscriber, a Notary Public in and for the State and County aforesaid, COLLIN P. O'MARA, Secretary of the Department of Natural Resources and Environmental Control of the State of Delaware, Party of the First Part, known personally to be such, and acknowledged this Agreement to be his act and deed and the act and deed of said Department.

GIVEN under my Hand and Seal of Office, the day and year aforesaid.

NOTARY PUBLIC

STATE OF DELAWARE)
) SS.
COUNTY OF KENT)

BE IT REMEMBERED, That on this 22nd day of October, 2013, personally appeared before me, the Subscriber, a Notary Public in and for the State and County aforesaid, CHARLES A. SALKIN, Director of the Division of Parks and Recreation, the State of Delaware, Party of the First Part, known personally to be such, and acknowledged this Agreement to be his act and deed and the act and deed of said Division.

GIVEN under my Hand and Seal of Office, the day and year aforesaid.

CHARLES R. VICKERS
NOTARY PUBLIC
STATE OF DELAWARE
My Commission expires at end of government service

STATE OF DELAWARE)
) SS.
COUNTY OF SUSSEX)

BE IT REMEMBERED, That on this 4th day of November, 2013, personally appeared before me, the Subscriber, a Notary Public in and for the State and County aforesaid, SAMUEL R. COOPER, Mayor of Rehoboth Beach, Delaware, Party of the Second Part, known personally to be such, and acknowledged this Agreement to be his act and deed and the act and deed of said city.

GIVEN under my Hand and Seal of Office, the day and year aforesaid.

Barbara L Bunting
NOTARY PUBLIC

BARBARA L. BUNTING
NOTARY PUBLIC
STATE OF DELAWARE

STATE OF DELAWARE)
) SS.
COUNTY OF SUSSEX)

BE IT REMEMBERED, That on this 4th day of November, 2013, personally appeared before me, the Subscriber, a Notary Public in and for the State and County aforesaid, LORRAINE A. ZELLERS, Secretary of the Commissioners of Rehoboth Beach, Delaware, Party of the Second Part, known personally to be such, and acknowledged this Agreement to be his act and deed and the act and deed of said city.

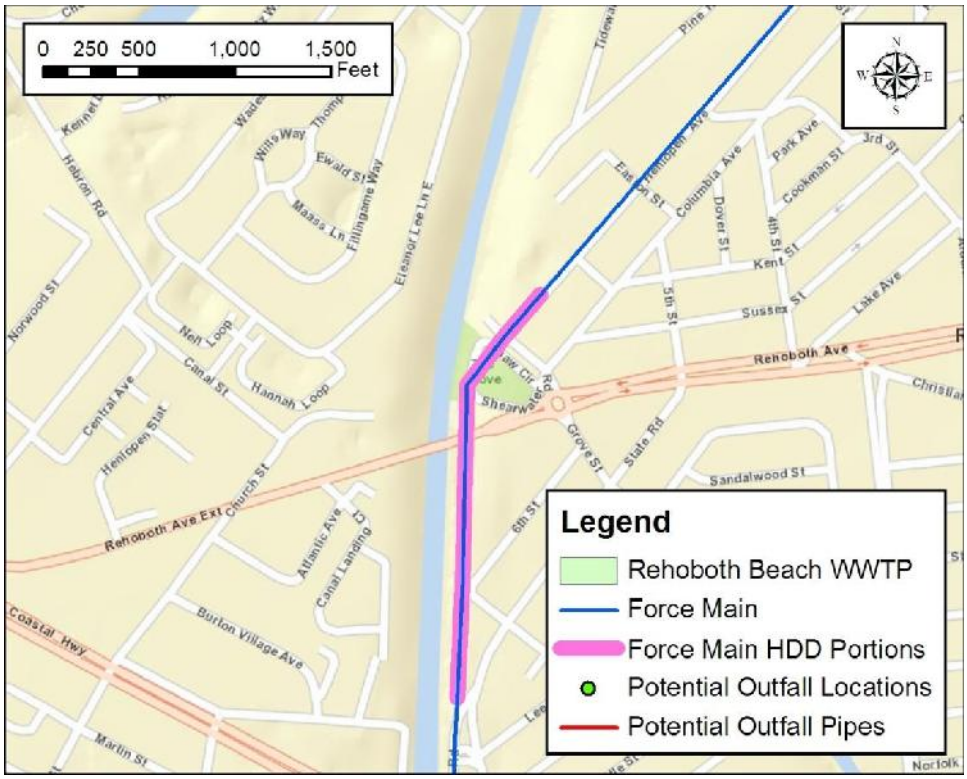
GIVEN under my Hand and Seal of Office, the day and year aforesaid.

Barbara L Bunting
NOTARY PUBLIC

BARBARA L. BUNTING
NOTARY PUBLIC
STATE OF DELAWARE
My commission expires Aug. 17, 2014

Attachment C – EIS Section 4.5

Figure 4-3 HDD Portion of the Proposed Effluent Force Main



4.5 Ocean Outfall

4.5.1 Location

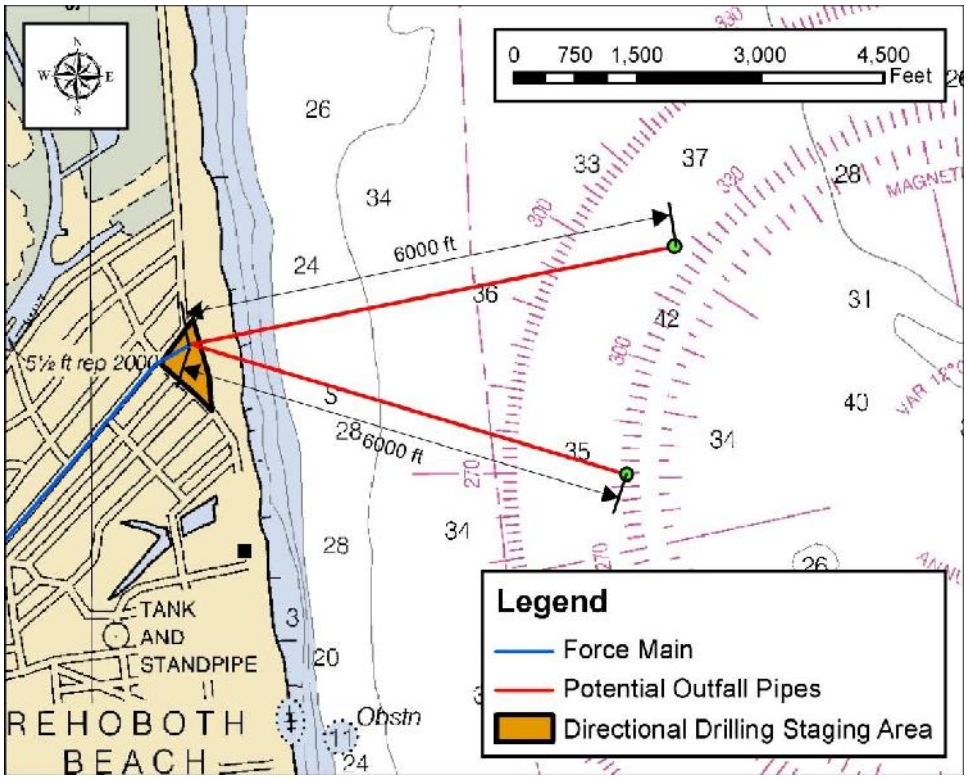
The Effluent Disposal Study (Stearns & Wheler 2005) identified the general location for the proposed ocean outfall. Two specific locations within this general area are investigated in this report as potential outfall locations. At either location, an outfall pipe will would extend 6,000 linear feet (1,830 meters) east from the termination of the land-based forcemain within Deauville Beach parking area. The ocean outfall pipe would terminate with a diffuser pipe at a water depth of approximately 40 feet (12 meters). The specific locations that were evaluated for the ocean outfall are detailed in Table 4-2 and shown in Figure 4-4. Figure 4-5 provides a broader perspective of the outfall location and shows that the outfall in relation to the Hen and Chicken Shoals.

Table 4-2 Proposed Ocean Outfall Locations

Location	Coordinates	Perpendicular distance from shore
North Location	N 38° 43.787’, W 75° 03.505’	5,430 ft (1,660 m)

Location	Coordinates	Perpendicular distance from shore
South Location	N 38° 43.333', W 75° 03.631'	4,430 ft (1,350 m)

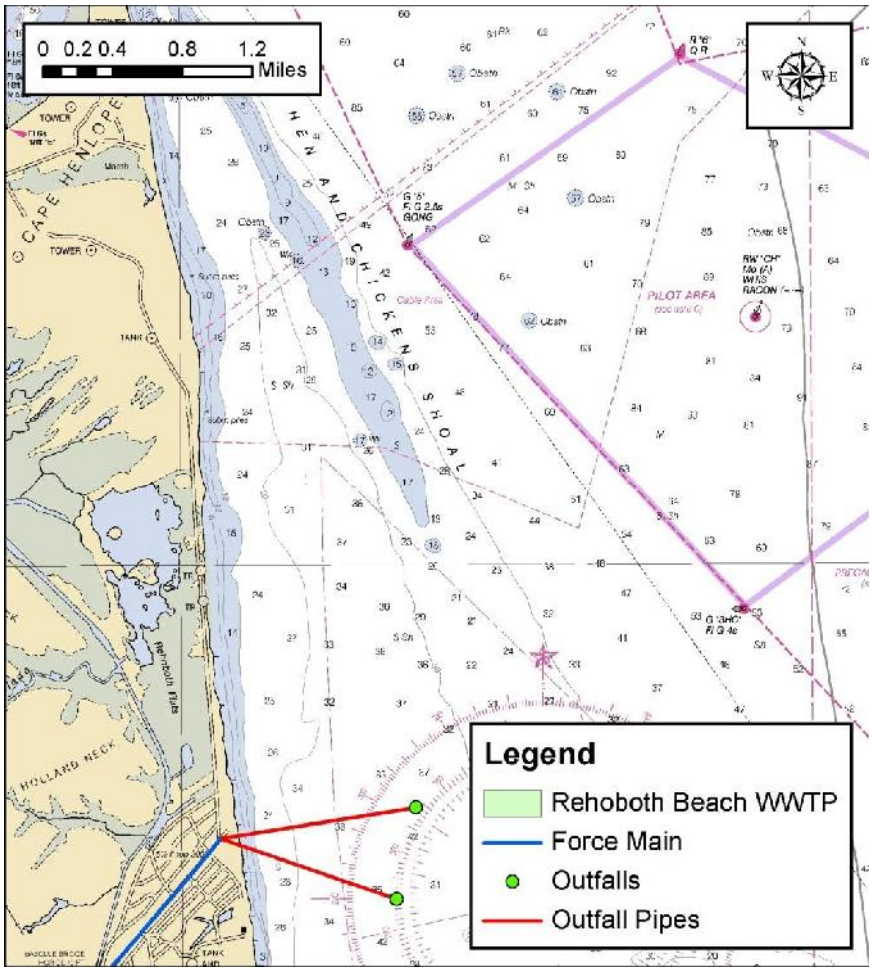
Figure 4-4 Proposed Ocean Outfall Locations



The proposed location is based on preliminary modeling performed for the 2005 Effluent Disposal Study by Lawler, Matusky & Skelly Engineers, (included in (Appendix D)), which shows that adequate dilution will occur at 5,430 linear feet (1,830 meters) from shore. The proposed location to exit the beach area was chosen because it offers a convenient area for staging the construction and because the routing of the force main from the RBWWTP to this point was relatively straightforward. Alignments to the south of the City would be more difficult. Also, outfall locations to the north are limited by the presence of Cape Henlopen Park and to the south by the boardwalk and the congested city area.

The Deauville Beach access parking lot located at the intersection of Henlopen Ave and Duneway provides adequate space for construction and should minimize disruption to local businesses and residences.

Figure 4-5 Location of Hen and Chicken Shoals



4.5.2 Outfall Pipe

Based on the conceptual design, the outfall will be a 24 inch diameter pipe extending 6,000 linear feet (1,830 meters) from the Deauville Beach access parking lot to a diffuser. Figure 4-6 shows a profile of the ocean outfall pipe. The details of the profile will vary depending on the construction technique utilized as explained in Section 4.5.4.

Figure 4-6 Ocean Outfall Profile (Not to scale)

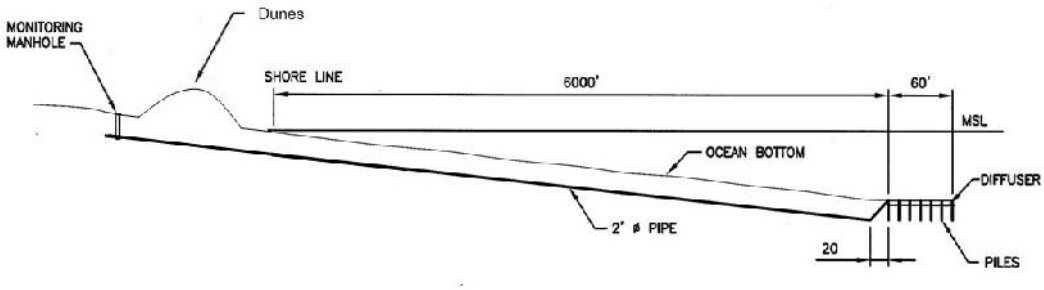
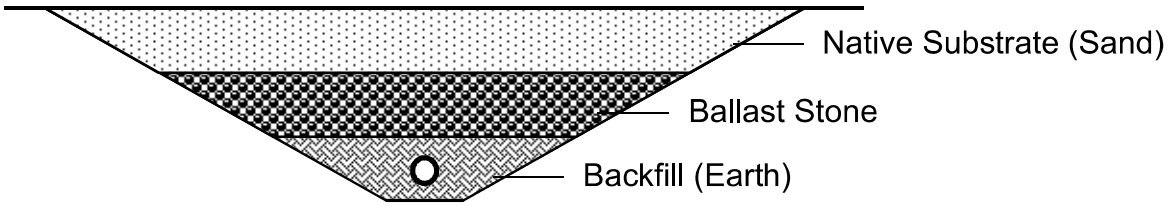


Figure 4-7 presents a cross-section for the ocean outfall pipe for the section installed by excavation. The following criteria were used to develop the cross-section:

- Pipe trench has a slope of 1.5:1.
- Trench bottom will be 1 foot (0.3 meter) wider on each side than the pipe diameter.
- The sandy soil in the excavated trench will provide the pipe bedding.
- The pipe will be anchored in the trench with concrete collars.
- 2.5 feet (0.8 meters) of backfill will be laid over the pipe.
- 4 feet (1.2 meters) of ballast rock will be laid over top of the backfill to help keep the pipe submerged and to protect it from scour.

Figure 4-7 Typical Ocean Outfall Cross Section



4.5.3 Diffuser

A preliminary design for a diffuser was developed for the outfall in the "Rehoboth Beach Wastewater Treatment Plant Effluent Disposal Study" (Stearns & Wheler 2005), based on generally accepted best practices for diffuser design. The basic design criteria utilized within the 2005 report were as follows:

- Selection of a Y-Type diffuser to accommodate expected widely varying flows
- Froude number greater than one (1) to ensure adequate mixing
- Nozzle exit velocity greater than three (3) feet per second (0.9 meters per second) to avoid sedimentation

- Nozzle exit velocity less than 10 feet per second (3 meters per second) to avoid excessive head loss
- Riser spacing between eight (8) to 15 feet (2.4 to 4.6 meters)
- Riser spacing ratio (diffuser length / distance between risers) greater than four (4)
- Between 10 and 15 feet (3 to 4.6 meters) of diffuser length per mgd of flow

A sensitivity analysis was performed on the 2005 diffuser design to determine the effect that several design parameters had on the dilution achieved (Stearns & Wheler 2005).

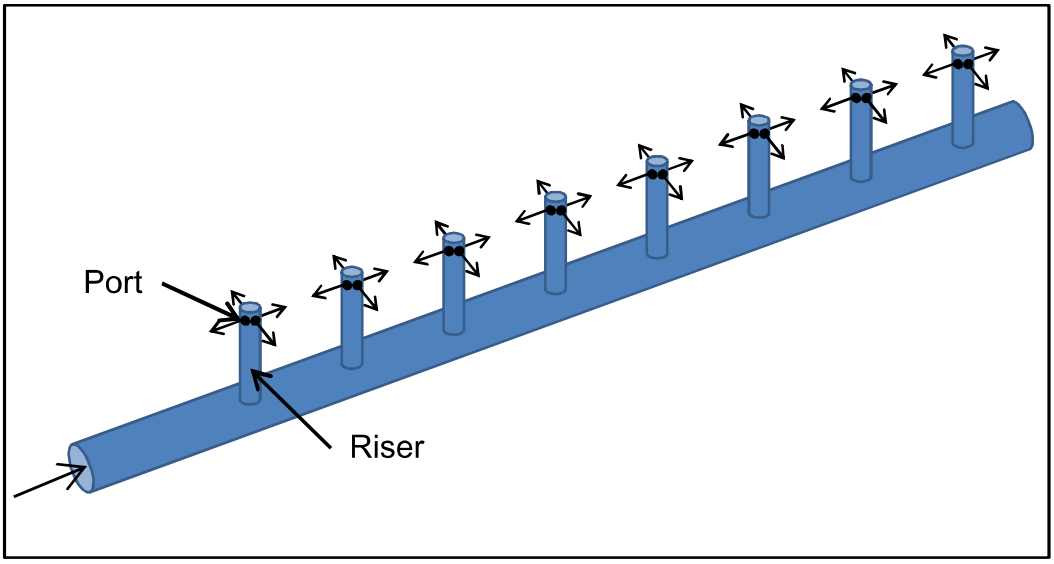
Recently collected field data and preliminary modeling of the effluent plume indicate that a Y-type diffuser may not provide the most effective mixing of the effluent with ocean water (see Chapter 6 of this report). Because of the predominately linear, north/south current flows at the location of the diffuser, a Y-type configuration presents the potential for the two independent plumes to combine and thereby decrease the dilution.The diffuser design is being optimized as part of the modeling effort to characterize the near-field and far-field dilution. Several alternative designs are being considered, but it is anticipated that a straight line linear diffuser will provide the most effective mixing.

Table 4-3 summarizes the characteristics of the preliminary diffuser design. A schematic representation of the diffuser is shown in Figure 4-8. The outfall and diffuser structure with be clearly indicated on all nautical charts of the area and fisherman and other water-related businesses will be notified to avoid this area.

Table 4-3 Preliminary Diffuser Design for Rehoboth Beach Outfall

Parameter	Value
Diffuser length	120 ft (37 m)
Distance from shore	5,430 ft (1,830 m)
Port height from seabed	1.5 ft (0.5 m)
Port diameter	3 inches (0.075 m)
Number of risers	8
Number of ports per riser	4
Total number of openings (ports)	32
Alignment of ports	Horizontal

Figure 4-8 Example Diffuser Schematic Diagram (not to scale)



4.5.4 Construction Methods

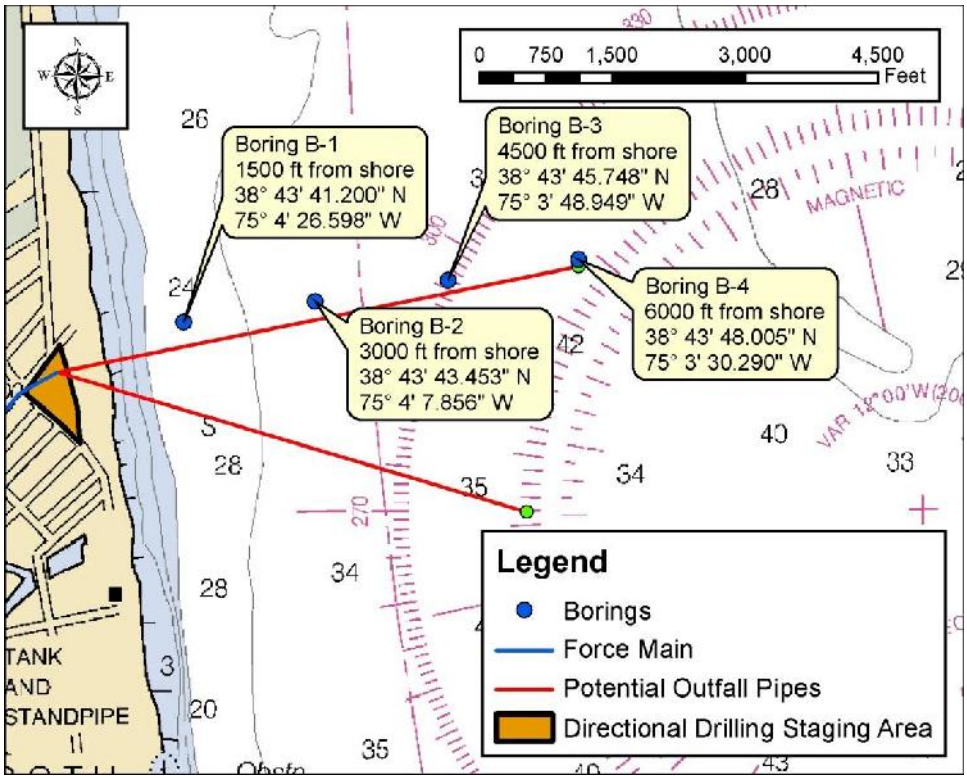
Two construction techniques will be utilized for construction of the outfall. They include:

- Horizontal Directional Drill (HDD)
- Excavate and backfill

The concept on which the EIS is based includes a combination of HDD and excavation. HDD would be used to install the outfall from the shore location in the parking lot area west of the dunes as far east towards the diffuser as is technically feasible. Meetings with several contractors with expertise in marine construction and large directional drill projects have concluded that it would push the limits of current experience to directionally drill a 24-inch pipe the entire 6,000 feet (1,830 meters). To help determine the maximum feasible length of HDD, soil borings were taken at four locations along the northern potential outfall pipe alignment, as shown in Figure 4-9. Boring logs are included in (Appendix H).

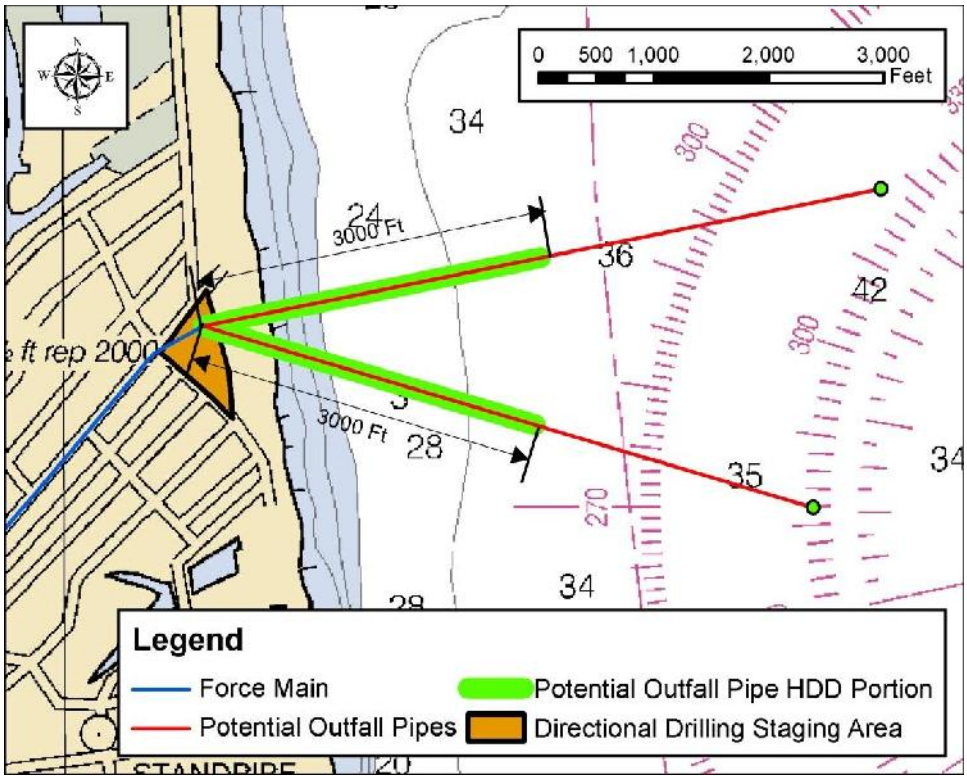
The borings indicate that the soils were generally comprised of fine to medium sand with some course sand and trace silt. Some thin layers containing soft to medium stiff clay were found near the surface. No rocks or hard gravel layers were found that could cause problems for HDD.

Figure 4-9 Marine Borings



In order to be conservative with respect to expectation for HDD, it is proposed that the pipe be installed by HDD to a point approximately 3,000 feet (915 meters) from the staging area, as shown in Figure 4-10. This would, at a minimum, avoid impacts associated with construction through the dune area, beach and surf zone. However, upon review of the obtained boring data, a contractor familiar with this type of construction has indicated that it is highly probable that the HDD portion of the outfall installation could extend beyond the 3,000 feet (915 meters) (Mears Group, Inc 2011a).

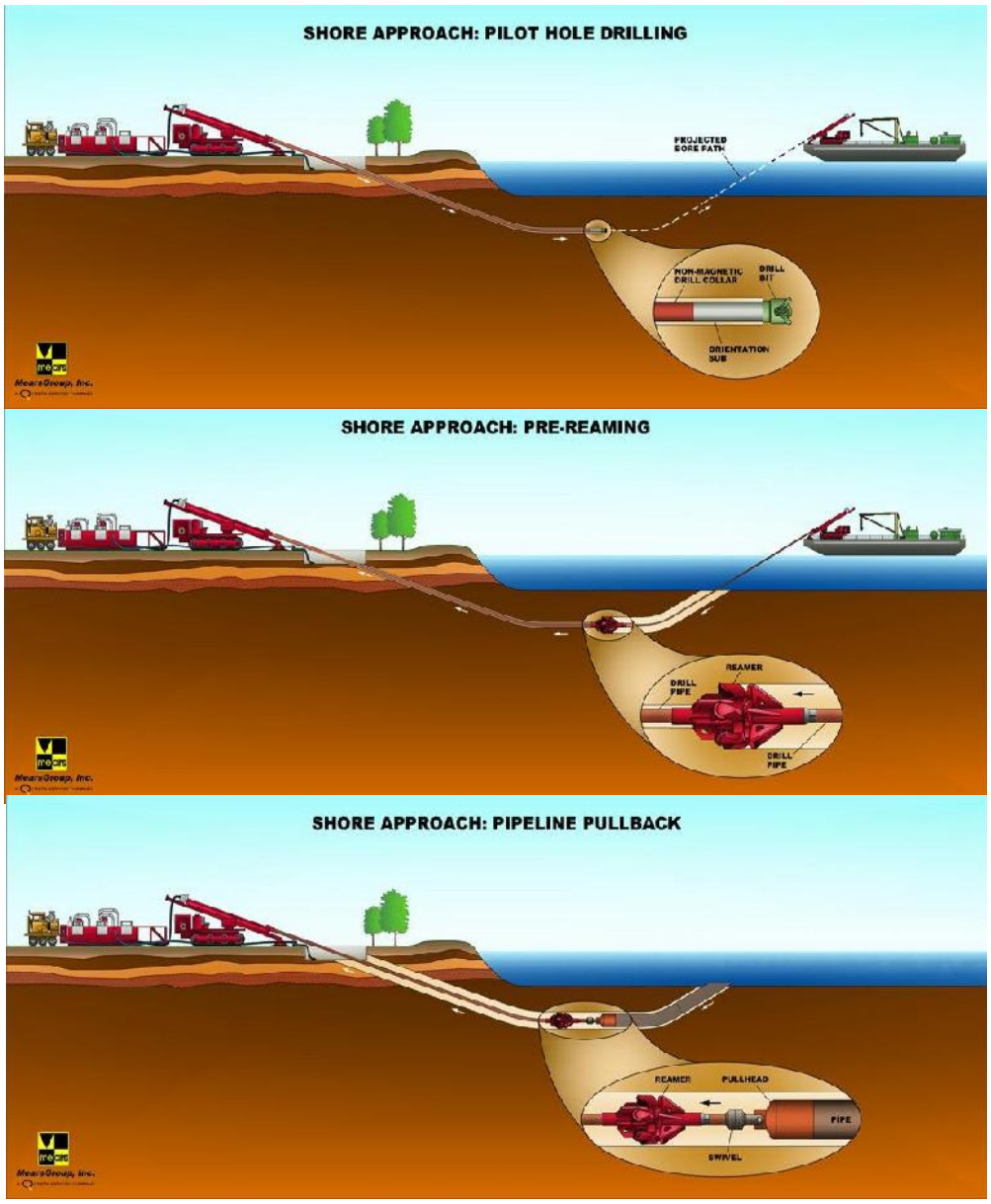
Figure 4-10 HDD Portion of the Proposed Outfall Pipe Alternatives



Initially, the drill pit is established in the parking lot area and the drilling rig and associated equipment mobilized to the site. A jack-up (lift) barge, stabilized by anchor, is mobilized to the offshore location to serve as the platform for the offshore drilling rig.

The directional drilling operation involves several steps as shown in Figure 4-11. First, a pilot hole is drilled from the shore. The progress and alignment of the pilot hole is closely monitored using various electronic survey tools. Then, the pilot hole is successively reamed to a larger diameter until the installation diameter is reached. The reaming operation alternates between the shore and the barge by pulling the boring machine east and west. Installation of a 24-inch pipe would require a bored diameter of approximately 32 inches. Finally, the pipeline, staged on land, is pulled from the offshore platform through the borehole. As the pullback progresses, successive lengths of pipe are fused together on the landside. Ideally, at least 2,000 foot (610 meter) lengths of pipe can be fused prior to installation and stored. This is because the pullback operation is intended to be a continuous 24/7 operation. It is proposed to temporarily store pre-fused lengths of pipe along Henlopen Avenue or along Route 1A. Time required for mobilization, completing the pilot hole and back reaming can take approximately three (3) months. The final installation of the pipe only requires several days of continuous effort. It is possible that the impact to Henlopen Ave can be constrained to these several days of construction if alternate sites for storing lengths of pre-fused pipe can be found.

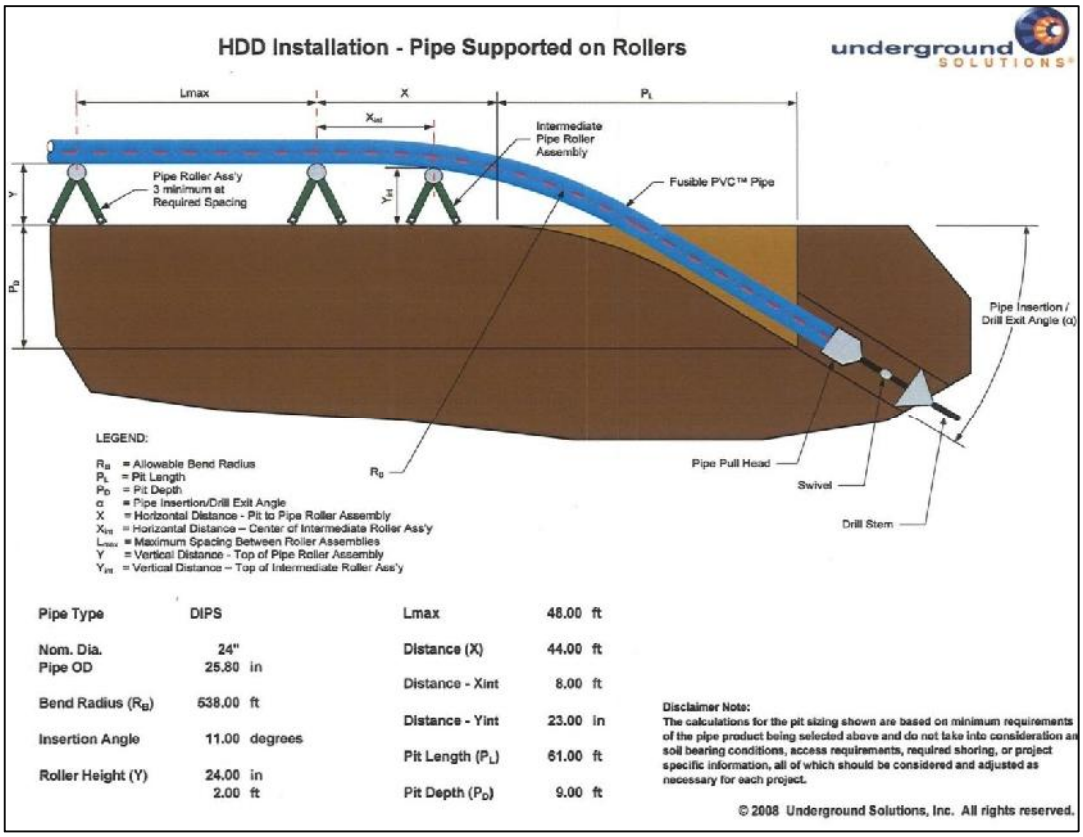
Figure 4-11 Mears Group's Horizontal Directional Drilling (HDD) process (Mears Group, Inc 2011)



Note: Pipe will be pulled from ocean side with pipe stored on land

Thus, there will be two work sites required: one on land for the HDD equipment and one offshore for the marine operations and pulling the pipe through the bore hole (see Figure 4-12). It may be possible to pull the pipe from the shore but that would require floating the pipe out behind a barge to steady the pipe. This is considered risky and highly weather dependent since there is very little tolerance when pulling the pipe for the pipe to become misaligned. Currents and foul weather could hamper this type of installation.

Figure 4-12 Typical pipe mobilization for pull through bore hole



The land site would be the parking lot area as previously described and shown in Figure 4-13. Typically an area 150 feet by 150 feet (46 meters by 46 meters) is required to set up the equipment, which includes the drill rig, mud recycling system, tanker truck, power unit and a small control shed (see Figure 4-14 and Figure 4-15). Potable water from a fire hydrant or some type of water storage facility is required. The drill pit itself is only approximately six (6) feet (1.8 meters) wide by 60 feet (18 meters) long by six (6) feet (1.8 meters) deep.

The shaded area in Figure 4-13 shows the area where the drill pit or pipe insertion pit would be located. The bend radius required to move the pipe from its storage point to the insertion pit is critical. With the proposed pipe size, the bend radius must be a minimum of 538 feet (164 meters). With the given alignment of Henlopen Avenue and the drill pit, the maximum bend radius available is 775 feet (236 meters) as shown in Figure 4-13 (Underground Solutions, Inc 2011).

Figure 4-13 Directional Drilling Staging Area (Underground Solutions, Inc 2011)

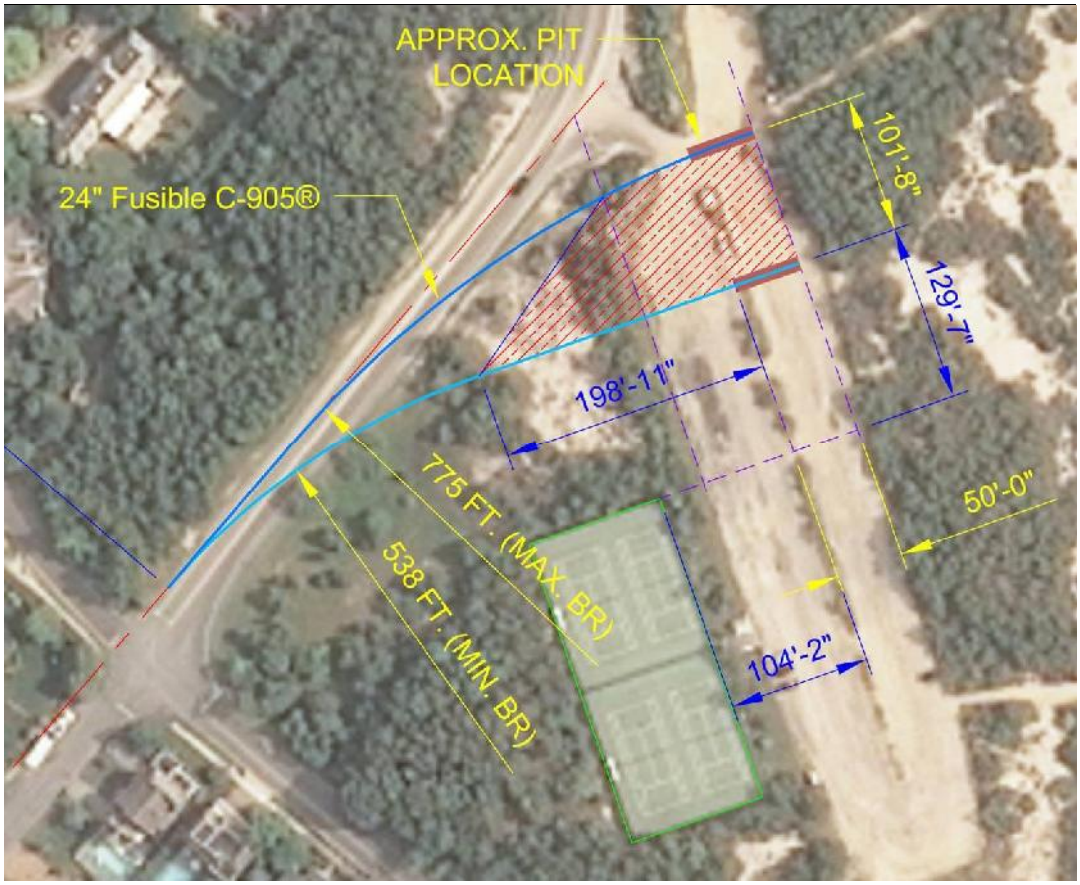


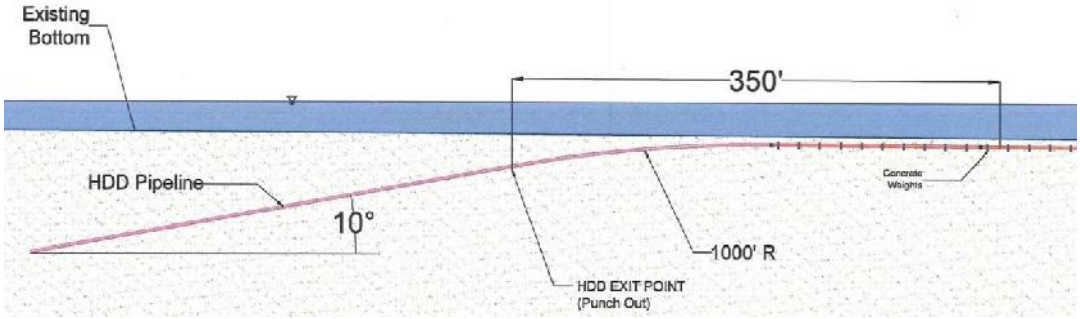
Figure 4-14 Typical HDD drill site

Figure 4-15 HDD drill rig

On the marine side, a jack-up barge would be positioned with a drill rig mounted on board that is capable of pulling the 24-inch pipe from the shore through the hole. Other equipment required includes that for the trench excavation and piling driving operation and a barge tender.

At the mid-point of the outfall installation (approximately 3,000 feet (914 meters) offshore) the outfall would reach the surface of the seabed as shown in Figure 4-16. A pit of several hundred feet in length is required to curve the pipe so that it is parallel to the ocean floor. It is expected that an 11.25° bend will be used to reach horizontal

Figure 4-16 HDD Exit Pit and Trench



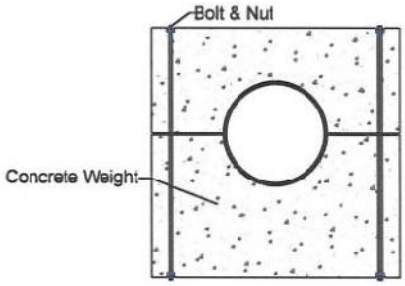
The remaining 3,000 feet (910 meters) of the outfall pipe would be constructed using mechanical dredging and backfill techniques. Hydraulic dredging will not be used. Most likely a bucket type or clamshell excavator

would be required since it is best suited for detailed excavation. See Section 4.5.5 for a description of dredging techniques.

The trench will be excavated to a depth of 8 feet (2.4 meters) with a base of 4 feet (1.2 meters) and side slope of 3:1. A total of approximately 38,000 cubic yards of material will be moved and side cast next to the excavation area. As the excavation progresses, the pipe will be laid in the trench with the trench excavation leading the pipe by about 500 feet (152 meters). Once the entire pipe is laid in the trench, the backfill operation will commence. Hopper barges will carry the backfill ballast to the trench and the appropriately graded material will be placed by the hopper dredge. Hydrographic surveys will be performed during this operation to ensure the required coverage is provided.

The fusible PVC will be fabricated on land in 150 foot (46 meter) segments with flanged ends. A total of ten (10) concrete collars will be placed on each pipe segment at 15 foot (4.6 meter) increments to weight the pipe (see Figure 4-17). As each pipe segment is lowered to the trench, the flanged connections will be bolted by divers. The last 150 feet (46 meters) of pipe will transition from the trench to approximately 1.5 feet (0.5 meters) above the seabed for connection to the diffuser.

Figure 4-17 Typical Concrete Weight Cross Section



The pipe material will be high-density polyethylene (HDPE) or fusible polyvinyl chloride (PVC). These materials offer superior corrosion resistance. The pipe materials are buoyant and thus must be flooded and anchored during installation. Concrete collars will be installed on the pipe as it is installed to sink the pipe and anchor it into the trench. As construction progresses, sections of the pipe must be fused together. Extended lengths of pipe will be fused prior to installation and stored in order to minimize downtime during construction by either the HDD or excavation method.

As shown in Figure 4-18, the diffuser will be installed on pilings to ensure that it is anchored and the diffuser ports are not buried. Concrete collars will be placed on the pipe with piles driven through sleeves in the concrete weights to stabilize the diffuser. A section of the concrete collar is shown in Figure 4-19. The diffuser ports will be duck bill check valves. Installation of the diffuser can proceed concurrently with the outfall pipe.

Figure 4-18 Diffuser profile

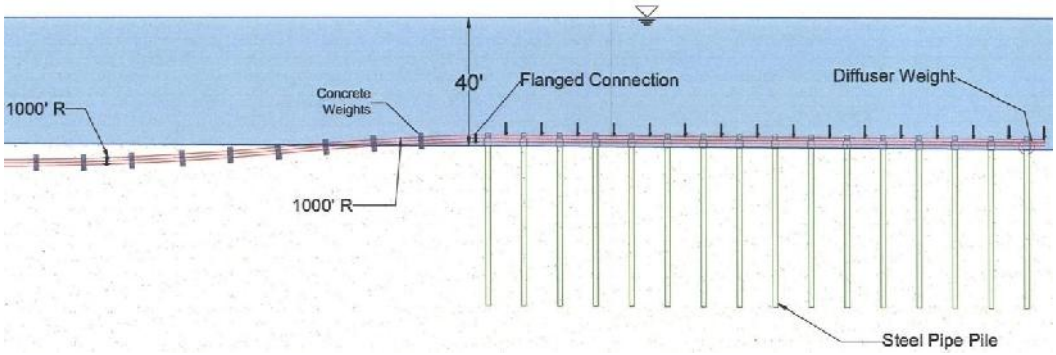
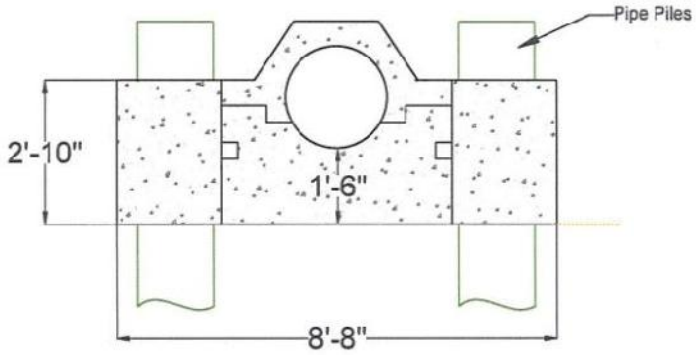


Figure 4-19 Diffuser Concrete Weight Connection



4.5.5 Dredging Techniques

4.5.5.1 Backhoe/Bucket/Clamshell Dredger

A backhoe dredger is typically mounted on a floating barge or jack-up platform and the dredged material loaded onto hopper barges for transport and deposition at the relocation site (Figure 4-20). With an appropriate number of hopper barges in support, continuous dredging is maintained.

The main advantage of the backhoe dredger is the ability to dredge a wide range of materials, including those that contain debris or (for large machines) boulders and to excavate smaller, defined areas such as a trench. Difficult materials, such as stiff clays and weak, weathered or fractured rocks, can be dredged by the larger dredgers.

As discussed in section 4.5.4, the soil borings taken at the locations shown in Figure 4-9 indicate that the soil contains trace clays and fine silts in some of the surface layers. The clamshell dredge will suspend some of the fine sediments and cause some temporary localized turbidity. The sediments will settle quickly and are not expected to create turbidity visible from the surface.

Figure 4-20 Clamshell dredge

4.5.5.2 Cutter Suction Dredger (CSD)

A cutter suction dredger (CSD) is a stationary hydraulic dredger. Stationary hydraulic dredgers are characterized by the diameter of the discharge pipeline and the mechanical power installed in the dredger. A CSD is shown in Figure 4-21.

CSDs operate by swinging about a central "working spud" using anchors and winches leading from the lower end of the ladder to anchors. By winching on alternate sides the dredger clears an arc(s) of cut, and then moves forward by pushing against the working spud using a spud carriage.

Medium to larger size dredgers typically work 24 hours per day /7 days per week using multiple crews. The noise and vibrations of a cutter suction dredger are such that crews cannot be accommodated on board and will come ashore at the end of each shift.

The cutter head is an assembly of cutting teeth on a rotary frame. The cutter head "basket" encloses the intake of the suction line. The cutter head rotates around the axis of the suction pipe, enabling the teeth on the cutter head to excavate material from the seabed. The cutting action of the cutter head dislodges the bed material. A mixture of material and water is drawn through the cutter head into the suction line.

While the dredge will cause some local turbidity, the turbidity will typically be in close proximity to the seabed rather than being released at the surface and falling through the entire water column.

The discharge line from the CSD delivers the fluidized material to the disposal area. Typically, discharge pipelines will be fitted with buoyancy sleeves or installed on pontoons floating aft of the dredger. Site

constraints may dictate that it is necessary for sections of the pipeline to be submerged e.g. to allow vessel traffic to pass unimpeded or to protect the pipeline from the influences of waves and currents.

As stated previously, it is not likely that a CSD will be used for the dredging operation.

Figure 4-21 Cutter Suction dredge

Attachment D – Adjacent Property Owners

Adjacent Property Owners

District-Map-Parcel:	Owner(S) Names	Property Address	Billing Address
334-14.05-120.00	Henlopen, Acres Property Owners Corp	Henlopen Acres, Part of Blk.W-Duneway	PO Box 322 Rehoboth Beach, DE 19971
334-14.09-115.00	Matan, Therese J & One Henlopen LLC	Reh Bch Cp Mtg Assn Surf Ave	4021 Glenridge St Kensington, MD 20895
334-14.09-116.01	Warren, Katherine Norton	SW/Surf Ave 55' SE Of Henlopen	6301 Broad Branch Rd. Chevy Chase, MD 20815
334-14.09-116.02	Triumph Capital , Investments LLLP	SE Corner Surf Ave & Henlopen Ave	6817 Sorrel St Mclean, VA 22101
334-14.09-117.00	Sommer, Michael S & Barbara J Trustees	Surf Ave Lot 51 & P/O Lot 52	51 Surf Ave Rehoboth Beach, DE 19971
334-14.09-164.00	Bacchieri, Gregg & Stacey Bacchieri Trustees	SW/Surf Ave Lot A	102 Ironstone Ln Kennett Square, PA 19348
334-14.09-164.01	Bacchieri, Gregg & Stacey Bacchieri Trustees	SE Corner Surf Ave & Columbia Ave	102 Ironstone Ln Kennett Square, PA 19348
334-14.09-165.00	Fitz, Michael T & Michelle K Bingaman Trustee	Surf Ave Lot 48	42260 Green Meadow Ln Leesburg, VA 20176
334-14.09-166.00	Brown, David B & Gweneth B	Surf Ave Lot 47 W/Imp	2506 Willard St Wilmington, DE 19806
334-14.09-189.00	Fischer, L Richard	Surf Ave Lot 46 & P/O Lot 45 Park Ave	3606 Newark St NW Washington, DC 20016
334-14.09-190.00	Fischer, Kristen Nickole & Ryan Thomas Fischer & Justin Douglas Fischer	Surf Ave P/O Lots 2 44 & 45	3606 Newark St NW Washington, DC 20016
334-14.09-191.00	Nash, Bernard & Phyllis	Cor. Surf Ave. & Oak Ave. Lot 43 &	10771 Mcgregor Dr Columbia, MD 21044
334-14.09-26.00	Shedletsky, John J & Andrea L	Henlopen Acres Lot 4 Blk V	200 Salmons Hollow Rd Brewster, NY 10509
334-14.09-26.01	Beacon Hill, Realty LLC	Henlopen Acres Lot 5 Blk V	1508 Applecroft Ln Cockeysville, MD 21030

District-Map-Parcel:	Owner(S) Names	Property Address	Billing Address
334-14.09-27.00	Smith, Charles R & Carol V	S/S Pine Reach E P/O Lots 2 & 3	4625 Holly Rd Rockville, MD 20853
334-14.09-28.00	Lingo, Bryce M	Henlopen Acres Blk V Lot 1 1/2 & W	PO Box 12 Rehoboth Beach, DE 19971
334-14.09-29.00	Fennell, Stephen A & Barbara C Smith	Henlopen Acres Lot 1 Blk V	7213 Pomander Ln Chevy Chase, MD 20815
334-14.09-215.00	Delaware, State of	Cor. of Surf Ave & Henlopen Ave 21.27	PO Box 778 Dover, DE 19903
334-14.10-1.00	Worth , Alexander A & Robert F Worth & John H Worth & Eleanor M Worth	Surf Ave Lots 41 & 42 Reh Bch Cp Mtg	1220 Park Ave New York, NY 10128
334-14.10-2.00	39 Surf Inc	Surf Ave Lots 39 & 40 Reh Bch Cp Mtg	7013 Wood Thrush Dr Lanham, MD 20706
334-14.18-131.00	Rehoboth, Town of S C Marvel	W Side Atlantic Beach Front	City Mgr Rehoboth Beach, DE 19971

Attachment E – Delegated Agency Review Letters
(For informational purposes only)

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF FISH & WILDLIFE
89 Kings Highway
Dover, Delaware 19901

OFFICE OF THE DIRECTOR

Phone: (302) 739-9910
Fax: (302) 739-6157

October 12, 2015

Sean Snow
GHD Inc.
16701 Melford Boulevard, Suite 330
Bowie, Maryland 20715

Re: GHD 2015 Rehoboth Outfall

Thank you for contacting the Delaware Division of Fish and Wildlife Species Conservation and Research Program (SCRP) about information on rare, threatened and endangered species, unique natural communities, and other significant natural resources as they relate to the above referenced project. For information regarding project activities, the GHD review request directed SCRP to the Final Environmental Impact Statement (EIS): http://www.dnrec.delaware.gov/wr/Services/Pages/Financial-Assistance-Branch-proposed-Rehoboth-ocean-outfall.aspx. SCRP understands that significant project components have been updated from the Final EIS or are yet to be determined. We appreciate the opportunity to provide input early on in the process, recognizing that we will have an opportunity to review the project again once the scope of work is clarified. In our October 7, 2015 phone call, we identified a number of project components we look forward to hearing more about:

- A plan for disposal of dredge material that includes details about dredge material deposition activities (e.g. how and where the material will be offloaded) and specific site locations that are being considered for dredge material deposition.

- Details regarding the pipe lay down including laydown site location, time of year, duration of lay down activities and site utilization, and methods employed to offload and distribute materials and equipment. These details will provide SCRP the opportunity to better assess potential impacts to dunes and associated vegetation.

Additionally, if other project activities are updated and/or altered, please contact us again so that we may have an opportunity to complete a thorough review on those components.

Comments regarding Terrestrial Project Components

Piping Plover
The federally listed piping plover (*Charadrius melodus*) has been observed migrating through and roosting on the beach within the proposed work area. In order to minimize the chance that piping

plovers will be impacted by this project SCRP recommends that work/staging on the beach be avoided from March 15th through June 15th and then from August 1st through September 15th. If work during these times cannot be avoided, for further guidance please contact Matthew Bailey at (302) 735-8677, or at, matthew.bailey@state.de.us.

Impacts to Dunes and Associated Vegetation
There appears to be discrepancies between pipe laydown locations presented at the Joint Permit Processing meeting on June 18, 2015 and the laydown locations published in the Final EIS. As mentioned above, it is unclear how the pipe that will be laid down on the beach will be delivered to the site. It is also unclear where said pipe will be laid down (e.g. open beach, dune slope, etc.). Once these details are worked out SCRP requests the opportunity to comment on the updated plans.

There are historical records of rare Lepidopteran species (i.e. butterflies and moths) having been observed in the vicinity of the dunes associated with this project, although no known recent surveys have been conducted to determine that said species are still extant at the site. SCRP recommends that disturbance to the dunes be kept to an absolute minimum. For example, there is a vehicular access to the beach on the north side of the Deauville parking lot. SCRP suggests that this access should be used to the greatest extent possible to move equipment on and off the beach and for a lay down location for pipes.

Seals
Several species of seals (harbor, gray, harp, hooded) are known annual migrants to Delaware's waters, typically during the cooler months (November through April). Although the majority of seals that occur in Delaware are juveniles, adult harp seals have been observed hauling out on Delaware's Atlantic Coast beaches in recent years. If construction activities on the beach are to be conducted during the winter months, the applicant should be cognizant that seals may be encountered. Marine mammals are federally protected by the Marine Mammal Protection Act. As such, if a seal is observed hauled out on the beaches any time during the project period, work should stop immediately and the Marine Education, Research & Rehabilitation Institute should be notified immediately for guidance (302-644-2678).

Osprey
There is an osprey (*Pandion haliaetus*) nest on a cell phone tower to the east of Route 1 as it crosses over the Lewes/Rehoboth Canal. Although this species migrates south in the winter, it does exhibit nest site fidelity, returning to the same nest site year after year. Osprey nests are federally protected when containing eggs and young. This species typically migrates to Delaware in mid-March and returns south in late fall. Working within 500 feet of a nest during nesting, and before young have fledged, could impact this species. SCRP recommends that work not occur within 500 feet of this nest from March 1st through August 31st. If you require further guidance, please contact Kate Fleming at (302) 735-8658, or at kate.fleming@state.de.us.

Fisheries/Water Quality
Because the directional drilling will be conducted at the edge of the canal, we recommend a frac-out contingency plan be in place prior to the start of project activities. The contingency plan should include the following:

1) A provision to contain materials released,
2) A clean-up protocol, and

3) Arrangements for an experienced representative (drilling crew or consultant) to watch the site at all times so that the operation can be shut down immediately in the event a frac-out occurs.

Comments Regarding Atlantic Ocean Components

Atlantic Sturgeon
This area of the Delaware's Atlantic coast is utilized by the federally endangered Atlantic sturgeon (*Acipenser oxyrinchus*). Telemetry data show a strong seasonal pattern of arrival and departure of Atlantic Sturgeon along Delaware's coast, with marine-phase Atlantic Sturgeon returning to Delaware's coastal waters in mid-late March through mid-May and departing between early September and mid-December (Dr. Dewayne Fox personal communication). During the warmer months, these animals will either return to Delaware River to spawn (mature adults), occupy river/upper estuary foraging areas (primarily sub-adults), or remain in the lower estuary mouth/Cape Henlopen region, including the coastal habitats of Delaware's Atlantic Coast. Large numbers of adult Atlantic sturgeon are known to consistently occupy habitats in and around the proposed outfall location for prolonged periods of time between May and October. During the period mid-December through mid-March telemetry arrays have detected few, if any, telemetered Atlantic Sturgeon in Delaware's coastal region and this would be the best time to conduct trenching activities to avoid impacts to this species.

Note that because these sturgeons are federally protected under the U.S. Endangered Species Act, if this project requires a federal permit, a Section 7 consultation by the federal agency responsible for permitting the action may be required.

Sea turtles and Marine Mammals
The status of sea turtle and marine mammal populations are currently not monitored within state waters. As such our Division does not have GIS data or maps depicting the distribution of these species in relation to the project area. However, there is enough evidence from satellite tracked individuals, aerial surveys, incidental capture, and sightings to confirm that the Atlantic coast of the U.S., including Delaware, is a migratory pathway for many sea turtle species, including loggerhead, Kemp's Ridley, green and leatherback sea turtles. These sea turtles migrate northward from southern wintering areas and enter estuaries along the coast to forage, including Delaware Bay and the Inland Bays. The timing and route of this migration has been documented via satellite tracked individuals and occurs from early spring to late fall. Additionally, aerial surveys and sightings confirm the occurrence of cetaceans along Delaware's Atlantic coast; bottlenose dolphins (*Tursiops truncatus*) occur daily during the warmer months often occurring just outside the surf zone, large whales such as humpback and fin whales have been sighted just offshore during spring and fall migratory periods and have come as far inshore as the mouth of Delaware Bay and Indian River Inlet. Finally, several species of seals (harbor, gray, harp, hooded) are known annual migrants to Delaware's waters, typically during the cooler months (November through April).

In-water installation of the pipeline is not likely to impact these species provided installation methods do not include the use of equipment that emits pressure waves and sound bursts that can affect the acoustic ability or injure the hearing organs of these species. If a hopper dredge is used for any phase of the project, there is a potential to impact sea turtles as the mortality of sea turtles in hopper dredging operations is well documented. However, not much information exists in regards to sea turtle interactions with cutter dredges. For that reason, it would be best to conduct in-water work during a time of year when these species are less likely to be present (winter months).

Sharks
The Delaware Bay and its nearby coastal waters are used extensively by sandbar (*Carcharhinus plumbeus*) and sand tiger (*Carcharias taurus*) sharks, which are listed as a NOAA Species of Concern. Delaware's coastal waters provide important summer habitat to juvenile sand tigers from June to October and migratory habitat as they move to and from overwinter grounds in the spring and fall/early winter. Extensive utilization of the Delaware coast by large juvenile and adult sand tigers regardless of size or sex has also been documented in the summer and fall. Delaware Bay also serves as one of the largest nursery habitats for young-of-year and juvenile sandbar sharks along the Atlantic coast. Like sand tigers, juvenile sandbar sharks have been documented in Delaware's coastal waters as they migrate to and from their wintering grounds in the south, typically in the spring and fall. These species do not overwinter in Delaware's coastal waters. As such, to avoid impacts to important shark species, winter (December-March) may be the best time to conduct this work.

Long term impacts to the benthos
As mentioned above, the habitat where the outfall is proposed is ideal for Atlantic sturgeon. As benthic feeders, the potential degradation of benthic habitats associated with the outfall discharge is of utmost concern. Benthic sampling surrounding the proposed outfall location has not yet taken place, but according to the Final EIS and more recent communications, plans are in place to do so before and after construction. SCRP recommends implementing a statistically valid benthic sampling design to assess the composition of benthic communities surrounding the outfall. It would be best if sampling is conducted both prior to construction as well as on an annual basis following construction to allow for long-term monitoring (e.g. 10 years), as degradation may not be detectable within the first few years after the structure has been put in place. Additionally, samples should be taken across seasons to account for seasonal variation.

State Natural Heritage Site
Because federally listed species are present, this project is within a State Natural Heritage Site. State Natural Heritage Sites and Delaware National Estuarine Research Reserves are identified as "Designated Critical Resource Waters" by the Army Corps of Engineers (ACOE), and as such are subject to the restrictions and limitations imposed through Nationwide Permit General Condition No. 22. A copy of this letter shall be included in any permit application or pre-construction notification submitted to the Army Corps of Engineers for activities on this property.

If you propose to use Nationwide Permit No. 3, 13, 18, 29, 39 or 42 the State of Delaware has denied 401 Water Quality Certification (WQC) and Coastal Zone Federal Consistency Concurrence (CZM) for these Nationwide Permits in Designated Critical Resource Waters. In order to use any of these six Nationwide Permits at this site you must apply for a project-specific Water Quality Certification (WQC) and Coastal Consistency Determination (CZM) from the appropriate offices at DNREC. To obtain the application materials and for all information regarding WQC, contact DNREC's Wetlands and Subaqueous Lands Section at (302) 739-9943. For information pertaining to CZM, contact DNREC's Coastal Programs at (302) 739-9283.

If you propose to use Nationwide Permit No. 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, or 44, this Designated Critical Resource Water designation may require you to obtain authorization through some other nationwide or general permit, or an individual permit from the Army Corps of Engineers. You should review the Nationwide Permit General Conditions and Regional Conditions for Delaware (see, in particular, Nationwide Permit General Condition No. 19) to determine what notification requirements or restrictions might be applicable for your activity. Please contact the Army Corps of Engineers at (215)

656-6728 if you have questions or require additional information regarding the Nationwide Permit Program.

We are continually updating our records on Delaware's rare, threatened and endangered species, unique natural communities and other significant natural resources. If the start of the project is delayed more than a year past the date of this letter, please contact us again for the latest information.

Please feel free to contact me with any questions or if you require additional information.

Sincerely,

Katherine M Fleming

Kate Fleming
Wildlife Biologist/Environmental Review Coordinator
(302) 735-8658; fax: (302) 653-3431; Kate.Fleming@state.de.us

(See invoice on next page)

INVOICE - PAYMENT DUE

It is our policy to charge a fee for this environmental review service. This letter constitutes an invoice for $280.00 ($35.00/hour for a minimum of one hour). Please make your check payable to "Delaware Division of Fish and Wildlife" and submit to:

DE Division of Fish and Wildlife
89 Kings Hwy.
Dover, DE 19901
ATTN: Pamela Severson

In order for us to properly process your payment, you must reference "GHD 2015 Rehoboth Outfall**" on your check.**

cc: Pamela Severson, Fish and Wildlife Coordination/Accounting; Code to 72900

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF FISH & WILDLIFE
89 Kings Highway
Dover, Delaware 19901

OFFICE OF THE DIRECTOR

Phone: (302) 739-9910
Fax: (302) 739-6157

April 18, 2016

Brandon Gott
GHD
16701 Medford Blvd, Suite 330
Bowie, MD 20715

Re: Rehoboth Outfall

Dear Mr. Gott:

Thank you for contacting the Species Conservation and Research Program (SCRP) about information on rare, threatened and endangered species, unique natural communities, and other significant natural resources as they relate to the proposed Rehoboth Outfall project.

Brandon Gott from the GHD consulting firm contacted Matthew Bailey, wildlife biologist from SCRP, regarding time of year restrictions contained in a comment letter issued by SCRP in October 2015. The letter recommended that work be avoided on the beach from March 15 through June 15 in order to minimize disturbance to Piping Plover (*Charadrius melodus*). Brandon stated that some of the proposed work on the beach might not be completed until April 1.

After the discussing with Brandon the details of the work involved, Matthew offers the following recommendations:

- If work (including staging) on the beach portion of the project cannot be completed by March 15, a manager for the project should contact Matthew at the contact points listed below. This contact should be made as early as possible once it is determined that work may continue beyond March 15.
- If Matthew determines that the nature of the work left to be completed has the potential to disturb Piping Plovers, he may recommend that a biologist familiar with Piping Plover identification should be present while work is being conducted after March 15.
- If the biologist observes Piping Plovers in the work area, work should cease until the plovers leave or until Matthew can be contacted for further guidance.

Additionally, Brandon requested comments on a proposed vault facility that will house valves supporting the functions of the outfall pipe. SCRP requests that project managers contact SCRP botanist Bill McAvoy (302) 735-8668 regarding minimization of disturbance to plants and habitat and use of appropriate plant species during restoration of the vault site.

A review of our database indicates that there are currently no records of state-rare or federally listed plants, animals or natural communities at this project site. As a result, at present, this project does <u>not</u> lie within a State Natural Heritage Site, <u>nor</u> does it lie within a Delaware National Estuarine Research Reserve which are two criteria used to identify "Designated Critical Resource Waters" in the Army Corps of Engineers (ACOE) Nationwide Permit General Condition No. 22. A copy of this letter shall be included in any permit application or pre-construction notification submitted to the Army Corps of Engineers for activities on this property

We are continually updating our records on Delaware's rare, threatened and endangered species, unique natural communities and other significant natural resources. If the start of the project is delayed more than a year past the date of this letter, please contact us again for the latest information.

Feel free to get in touch with me if you have any questions or require additional information.

Sincerely,

Matthew Bailey

Matthew Bailey
Biologist/Environmental Review Coordinator
(302) 735-8677
(302) 653-3431 fax
Matthew.bailey@state.de.us

INVOICE - PAYMENT DUE

It is our policy to charge a fee for this environmental review service. This letter constitutes an invoice for $70.00 ($35.00/hour for a minimum of one hour). Please make your check payable to "Delaware Division of Fish and Wildlife" and submit to:

DE Division of Fish and Wildlife
89 Kings Hwy.
Dover, DE 19901
ATTN: Pamela Severson

In order for us to properly process your payment, you must reference "GHD 2016 Rehoboth Beach Outfall Piping Plover Addendum" on your check.

cc: Pamela Severson, Fish and Wildlife Coordination/Accounting; Code to 72900

State of Delaware
Historical and Cultural Affairs

21 The Green
Dover, DE 19901-3611

Phone: (302) 736.7400 Fax: (302) 739.5660

May 2, 2016 Review Code: 2015.08.20.03

Sean Snow
Engineer
GHD
16701 Medford Boulevard, Suite 330
Bowie, MD, 20715

Project: Rehoboth Beach Main Force Line Project, City of Rehoboth Beach, Sussex County, Delaware.

Dear Mr. Snow:

The staff of the State Historic Preservation Office has reviewed the abbreviated letter report *Phase 1 Archaeological Survey of the Rehoboth Beach Main Force Line Project, Sussex County, Delaware*, which was submitted regarding the above cited project. As we understand it, there are no archaeological sites within the project corridor that can be impacted by this undertaking. The archaeological testing documented disturbances from the canal construction and maintenance activity in Grove Park. Also, testing in the Duneway Drive portion demonstrated disturbances resulting from beach reconstruction projects.

As the project will be subterranean in nature, it should not affect any of the potentially historic structures along Henlopen Avenue. Based on this review, we have made the determination that no known historic properties, eligible for or listed in the National Register of Historic Places, will be affected by this project. This concludes our consultation on this project.

If there are any questions, please call (302) 736-7407, or e-mail craig.lukezic@state.de.us.

Sincerely,

Craig Lukezic
Archaeologist

cc: Gwen Davis, Deputy State Historic Preservation Officer
John McCarthy, DNREC

SAVING DELAWARE HISTORY

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

RECEIVED
GHD, Inc.
SEP 03 2015

September 1, 2015

GHD Inc.
16701 Melford Boulevard,
Suite 330
Bowie, MD 20715

RE: Rehoboth Beach Ocean Outfall Project City of Rehoboth Beach

Dear Sean Snow:

This responds to your letter, received August 18, 2015, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened within the above referenced project area. We have reviewed the information you enclosed and are providing comments in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

Except for occasional transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the project impact area. Therefore, no Biological Assessment or further Section 7 Consultation with the U.S. Fish and Wildlife Service is required. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to federally protected threatened or endangered species under our jurisdiction. For information on the presence of other rare species, you should contact Kate Fleming of the Delaware Division of Fish and Wildlife, Wildlife Species Conservation and Research Program at (302) 735-8658. You may also obtain information on how to make such a request by visiting the Program website at www.dnrec.state.de.us/nhp.

The bald eagle is a federally protected species under the Bald and Golden Eagle Protection Act (BGEPA). Please review the Service's National Bald Eagle Management Guidelines to assess whether impacts from your project's activities are likely to impact bald eagles. The link to this guidance can be found at: *http://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf*. If your project cannot avoid disturbance, you may apply for a permit that authorizes take of bald eagles where take to be authorized is associated with otherwise lawful activities.

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Please contact the Chesapeake Bay Ecological Services Field Office at 410-573-4534 for further information and assistance with the BGEPA permitting process.

An additional concern of the Service is wetlands protection. The Service's wetlands policy has the interim goal of no overall net loss of Delaware Bay's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if construction in wetlands is proposed, the U.S. Army Corps of Engineers, Philadelphia District should be contacted for permit requirements. They can be reached at (215) 656-6728.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interest in these resources. If you have any questions or need further assistance, please contact Trevor Clark at (410) 573-4527.

Sincerely,

G. La Rouche

Genevieve LaRouche
Supervisor

September 10, 2015

TO: Sean Snow
GHD, Inc.
16701 Melford Boulevard, Suite 330
Bowie, MD 20715

SUBJECT: Rehoboth Beach Ocean Outfall Project PCN,
City of Rehoboth Beach, DE

__X__ Michelle Magliocca
(Reviewing Biologist)

We have reviewed the information provided to us regarding the above subject project. We offer the following preliminary comments pursuant to the Endangered Species Act, the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act:

Endangered Species Act

Threatened or endangered species under the jurisdiction of NOAA Fisheries may occur within the project area. As a result, further consultation with the Protected Resources Division may be required. Please contact Daniel Marrone (daniel.marrone@noaa.gov) for more information.

Fish and Wildlife Coordination Act

Delaware coastal waters provide habitat for a wide variety of NOAA trust resources. Efforts should be made to avoid and minimize adverse effects to the aquatic environment. Compensatory mitigation should be provided for all unavoidable impacts.

Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat

Essential Fish Habitat (EFH) has been designated within the project area. Further EFH consultation by the federal action agency may be required as part of the federal permit process. For a listing of EFH and further information, please go to our website at: http://www.greateratlantic.fisheries.noaa.gov/habitat/. If you wish to discuss this further, please call 410-573-4559 or e-mail michelle.magliocca@noaa.gov.

Attachment F – Endangered Species Act Consultation Request to NOAA

(For informational purposes only)

NOAA'S National Marine Fisheries Service
Protected Resources Division
55 Great Republic Drive
Gloucester, MA 01930

Attn: Mrs. Kimberly Damon-Randall

Re: Endangered Species Act Consultation for the Rehoboth Beach Ocean Outfall Project, Rehoboth Beach, Delaware

Dear Mrs. Damon-Randall,

We are permitting the proposed project as described below. This letter is to request Endangered Species Act (ESA) concurrence from your office for the Rehoboth Beach Ocean Outfall Project. We have made the determination that the proposed activity may affect, but is not likely to adversely affect, any species listed as threatened or endangered by the National Marine Fisheries Service (NMFS) under the ESA of 1973, as amended. Our supporting analysis is provided below.

Proposed Project

The Rehoboth Beach Wastewater Treatment Plant (RBWWTP) currently discharges its treated effluent to the Lewes and Rehoboth Canal, a tributary to Rehoboth Bay. In 1996, Rehoboth Bay was listed as a "water quality limited" water body by the Delaware Department of Natural Resources and Environmental Control (DNREC). Thus a consent order was issued to the City of Rehoboth Beach to find another disposal method to eliminate discharge to Rehoboth Bay. Several alternatives were evaluated in the Environmental Impact Statement (EIS) dated December 2012, and following the DNREC Record of Decision (ROD) in January 2015, an ocean outfall was deemed the best option for the City. The ROD and EIS can be found at the following website: http://www.dnrec.delaware.gov/wr/Services/Pages/Financial-Assistance-Branch-proposed-Rehoboth-ocean-outfall.aspx.

The Rehoboth Beach Ocean Outfall project consists of a 24-inch outfall pipe extending 6,000 linear feet (LF) east from the termination of the land-based force main within the Deauville Beach parking area. The purpose of installing this force main and ocean outfall is to discharge treated wastewater effluent from the Rehoboth Beach Waste Water Treatment Plant (RBWWTP) to the diffuser. The outfall pipe will be split into two installation methods, horizontal directional drill (HDD) and open-cut trench. In order to be conservative with respect to the expectations of HDD, it is anticipated that the outfall pipe be installed a minimum of 3,000 LF offshore. At that point, the outfall pipe will be installed via open-cut trench excavation, approximately 3,000 LF, and terminate with a diffuser assembly at a water depth of approximately 40 feet. The proposed diffuser location is based on ocean circulation and plume dispersion modelling (Refer to Section 6 of the EIS), which shows the adequate dilution will occur at 5,430 LF from shore. Excavation will be accomplished by dredging, either by mechanical means (clamshell bucket) or hydraulic (cutter head). The diffuser assembly will utilize multiple risers with discharge ports and duckbill valves to diffuse the treated effluent into the surrounding waters. Approximate coordinates for the project footprint are provided below, and create a footprint area of less than 7 acres. Please note that this does not include full extents of action area such as sediment plume, noise extents, and vessel traffic. For full action area extents, see attached figure.

Latitude	Longitude
38° 43' 41.695" N	75° 4' 07.554" W
38° 43' 41.190" N	75° 4' 07.423" W
38° 43' 47.734" N	75° 3' 28.861" W
38° 43' 47.219" N	75° 3' 28.740" W

Construction of the ocean outfall is anticipated to begin in October 2017 and continue until April 2018. Construction of the outfall would avoid the timeframe from May 1 through October 1. Performing work

from October through April will reduce the risk of impacts to local marine species since the area is less populated during this period.

Dredging
As mentioned above, excavation via mechanical or hydraulic dredging will be required for the length of the outfall between the HDD portion and the diffuser assembly. This excavation portion to be dredged is anticipated to be 3,000 LF or less depending on how far the pipe can be safely horizontally directionally drilled. Based on preliminary estimates, the trench will be approximately 15 feet deep with a top width of approximately 50 feet and a side slope of 3:1. The total amount of excavated material is approximately 43,000 cubic yards, with 26,000 cubic yards proposed for re-use as backfill once the pipe is in place. Excavated material re-use alternatives were evaluated and cast aside was determined to be the most feasible and cost-effective option. The other options that were considered include transportation of material to an approved disposal site (aquatic or land based) and beach restoration. Open-cut trench excavation activities are anticipated to take approximately three months, and will be performed during the winter months to limit the likelihood of marine life being present in the action area. The exact duration will be highly dependent on the weather during construction.

Two options are being considered for excavation of the open-cut trench. One is a mechanical dredge, such as a clamshell bucket. Injury to large marine species such as whales, turtles, and sturgeon is unlikely due to its slow speed and the species' ability to move out of the way. Although it is unlikely that species in the area will come into direct with the clamshell dredge, this particular dredging technique has the potential to create Total Suspended Solids (TSS) plumes as discussed further in this letter. Large plumes of high TSS has shown to have impacts on marine life. Another challenge to using a clamshell bucket is that the daily productivity rate is relatively low, approximately 60 to 80 LF per day depending on weather. Since the project is being conducted during the winter months when the weather is harsh and unpredictable, the number of days that work can be done will be limited. This puts the project on a tight schedule to complete this work before Rehoboth Beach's busy season from May through October.

Another option that is being considered for dredging the trench is a hydraulic cutterhead dredge. The cutterhead dredge is comprised of a barge hull with a controllable rotating cutter device surrounding the intake of the suction pipe (Taylor, 1990). By combining the mechanical cutting action with the hydraulic suction, the hydraulic cutterhead has the capability of dredging a wide range of material, including clay, silt, sand, and gravel. A benefit to using the cutterhead dredge is that the production rate will be much higher compared to the mechanical clamshell bucket. Hydraulic cutterhead dredges have shown to have higher impacts to species compared to a clamshell bucket, however it is unlikely that direct entrainment will occur due to the projects small footprint, the mobility of marine species, and the abundance of space surrounding the project for them to escape to. Previous studies have shown that sub-adult and adult sturgeon, which may be present, would have to be within 1 meter of the cutterhead suction pipe to be entrained (Clarke 2011). Both sturgeon and sea turtles are mobile enough to escape this suction and get to a safer area. Hydraulic cutterhead dredges work at a much faster rate than mechanical clamshell dredges. For this project where the window of opportunity to perform work is limited, a hydraulic cutterhead dredge would help avoid the seasonal constraints and periods with significantly more marine species in the area.

Pile Driving and Potential Noise Impacts
Pile driving will be required for the support piles at the outfall diffuser assembly. There will be 12 piles in total, 12- to 14-inch in diameter. Assuming no major subsurface obstructions are encountered, each pile would be driven to refusal with a vibratory pile driver for two to three minutes, followed by an additional 30 seconds to two minutes of impact driving at a hammer impact rate of 45 blows per minute, or 23 to 90 impacts per pile. Coordination will be done with the Contractor to reduce underwater noise impacts to species by the use of various noise reducing techniques including reducing the time the activities occur, using vibratory hammers where applicable instead of impact hammers (10 to 20 dB reduction), using cushion blocks if an impact hammer is required (4-26 dB reduction depending on material), installing bubble curtains (5 dB reduction), and utilizing a "soft start" to minimize initial effects and give any present species time to vacate the area before higher energies are used (ICF Jones & Stokes, p.4-16). Pile

installation will proceed fairly quickly given the expected subsurface conditions. Pile driving is anticipated to be completed within 4 to 5 days, weather conditions permitting.

To provide more detail in regards to the anticipated sound attenuation rates associated with pile driving, the following tables were developed using the NOAA provided Simple Attenuation Formula (SAF) developer retrieved from http://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/consultation/index.html. These tables show the results of four other projects that utilized similar pile driving techniques to this project and are used to estimate the conditions for this project.

Table 1: Proxy Projects for Estimating Underwater Noise

Project Location	Water Depth (m)	Pile Size (inches)	Pile Type	Hammer Type	Attenuation rate (dB/10m)
Not Available	15	14"	Steel Pipe	Cushioned Impact	5
Richmond, CA - San Francisco Bay	20	14"	Steel Pipe	Cushioned Impact	5
San Rafael, CA - San Francisco Bay	>15	14"	Steel Pipe	Cushioned Impact	2
San Rafael, CA - San Francisco Bay	>15	14"	Steel Pipe	Vibratory	2

Table 2: Proxy-Based Estimates for Underwater Noise

Type of Pile	Hammer Type	Estimated Peak Noise Level (dB_{Peak})	Estimated Pressure Level (dB_{RMS})	Estimated Single Strike Sound Exposure Level (dB_{sSEL})
14" Steel Pipe	Cushioned Impact	189	173	163
14" Steel Pipe	Cushioned Impact	188	173	158
14" Steel Pipe	Cushioned Impact	185	169	159
14" Steel Pipe	Vibratory	186	170	160

Table 3: Estimated Distances to Sturgeon/Salmon Injury and Behavioral Thresholds

Type of Pile	Hammer Type	Distance (m) to 206dB_{Peak} (injury)	Distance (m) to sSEL of 150 dB (surrogate for 187 dBcSEL injury)	Distance (m) to Behavioral Disturbance Threshold (150 dB_{RMS})
14" Steel Pipe	Cushioned Impact	NA	36.0	56.0
14" Steel Pipe	Cushioned Impact	NA	26.0	56.0
14" Steel Pipe	Cushioned Impact	NA	65.0	115.0
14" Steel Pipe	Vibratory	NA	70.0	120.0

Marine species, such as sturgeon and salmon would need to be within 230 and 390 feet from the pile driving location for injury and behavioral disturbance, respectively. As the pile driving will only be required along the short stretch of the diffuser, this impact area is relatively small. It is likely that fish species would be able to escape to areas close by with more tolerable noise levels before suffering any injury. The use of a “soft-start” will also reduce impacts and give them more time to exit the area.

Table 4: Estimated Distances to Sea Turtle Injury and Behavioral Thresholds

Type Pile	Hammer Type	Distance (m) to 180 dB RMS (injury)	Distance (m) to 166 dBRMS (behavior)
14" Steel Pipe	Cushioned Impact	NA	24.0
14" Steel Pipe	Cushioned Impact	NA	24.0
14" Steel Pipe	Cushioned Impact	NA	35.0
14" Steel Pipe	Vibratory	NA	40.0

For behavioral disturbance, sea turtles would need to be within 130 feet from the pile driving location. As the pile driving will only be required along the short stretch of the diffuser, this impact area is relatively small. It is likely that sea turtles would be able to escape to areas close by with more tolerable noise levels. A “soft-start” will also give them more time to exit the area.

Table 5: Estimated Distances to Cetacean Injury and Behavioral Thresholds

Type Pile	Hammer Type	Distance (m) to 180 dB RMS (injury)	Distance (m) to 160 dB RMS (behavior for impulsive noise)	Distance (m) to 120 dB RMS (behavior for non-pulse noise)
14" Steel Pipe	Cushioned Impact	NA	36.0	NA
14" Steel Pipe	Cushioned Impact	NA	36.0	NA
14" Steel Pipe	Cushioned Impact	NA	65.0	NA
14" Steel Pipe	Vibratory	NA	NA	270.0

Cetaceans, such as whales and dolphins, are significantly more affected by vibratory pile driving as opposed to cushioned impact hammer type. It is unlikely that cetaceans will be present during construction, but if they are spotted in the action area during pile driving, cushioned impact will be utilized in lieu of vibratory if possible. If vibratory pile driving must be used, and cetaceans are in the area, they would still need to be within 885 feet from the pile driving location to experience only behavioral disturbance. As the pile driving will only be required along the short stretch of the diffuser, this impact area is relatively small. Since they are highly mobile, it is likely that cetaceans would be able to escape to areas close by with more tolerable noise levels. A “soft-start” will also give them more time to exit the area.

As mentioned above, mitigation techniques will be implemented during pile driving to reduce the noise in the action area. Since this project will be performed during the winter months, there will be fewer marine species present during pile driving. Also, based on the tables above, the species that are present would need to be very close to the project site. With such a small footprint, and abundant area surrounding the action area, the species would have plenty of space to disperse in order to avoid areas with intolerable noise. The use of a “soft-start” as mentioned above would give fish additional time to vacate the action

area prior to exposure to harmful sound levels, thus further reducing the potential exposure risk. Based on the best possible information available, it is not anticipated that noise will not have a significant effect on any species in the area during construction.

Sediment Plume

Both the installation of piles and dredging activities in the action area will disturb ocean floor sediment and cause an increase in turbidity within the surrounding area based on background levels of 5.0-10.0 mg/L. It is anticipated that pile driving activities will produce total suspended solids concentrations of between 5.0-10.0 mg/l within 300 feet of the pile driving (FHWA 2012), mechanical dredging activities will create concentrations between 15.0 to 191.0 mg/l at around 2,000 feet from the source (USACE 2001), and cutterhead dredging will create concentrations between 11.5 to 282.0 mg/L within a 1,000 foot radius of the location of the cutterhead dredge (Nightingale and Simenstad 2001). It should also be noted that these TSS concentration values, retrieved from NOAA's Section 7 Guidance websites (http://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/consultation/turbiditytable.html), are based on projects that included transporting dredged material through the water column for removal. Should cast-aside be approved for the Ocean Outfall project, dredged material will only be moved 10 to 20 feet in the water column (from the seafloor), thus reducing the TSS impacts within the remaining 20 to 30 feet before the water surface. All suspended solids concentration levels are below those shown to have adverse effect on fish (580 mg/L for the most sensitive species, but 1,000 mg/L is more typical) (Burton 1993). Adverse effects to species due to increased suspended solids in the area are unlikely as the work will be performed during the months where fewer species are present, and the concentrations are not high enough to pose a threat to those species that may be present. As discussed in further detail below and in the EIS, Atlantic sturgeons are a federally endangered species that may be in the area during construction. Although there have been no directed studies on the effects of temporary suspended solids on Atlantic sturgeon, sturgeon juveniles and adults are often documented in turbid waters and are not known to be influenced by high TSS (Dadswell 1984). In addition, limited information is available on the effects of increased turbidity on sea turtles and marine mammals (whales). Due to their ability to breathe air, sea turtles and marine mammals are not subject to the same potential respirator effects from high turbidity as fish are. TSS plumes are most likely to affect these species if it causes a barrier to normal migratory behaviors or if the higher levels affects nearby pray. As sturgeon, sea turtles, and whales are highly mobile, they will likely be able to avoid any sediment plumes, with undetectable changes of movement and relocate to find alternative sources of pray nearby. Based on the best available information, the effects of suspended sediment resulting from both pile driving and dredging on species in the action area will be insignificant and discountable.

NPDES

The Rehoboth Beach WWTP currently receives wastewater from the City of Rehoboth and surrounding areas of Henlopen Acres and Dewey Beach and discharges the treated effluent to the Lewes-Rehoboth Canal. The original treatment plant was completed in 1989 and was upgraded in two phases, in 1994 and 1997, to reduce the nitrogen and phosphorus discharge as required. Minor upgrades were also implemented at the plant in 2002 to improve grit removal.

The Rehoboth Beach WWTP is an advanced secondary treatment plant that produces an effluent of higher quality than that of a typical secondary treatment plant. It is currently meeting and achieving higher levels of treatment than required by the current existing permit limits with effluent concentrations and loading well below the permitted amounts. The design capacity of the plant is considered adequate, and there are no plans to expand the capacity either now or in the future.

Post construction, treated effluent from the Rehoboth Beach WWTP will be diffused into the water 6000 LF offshore. This effluent will have been treated through ENR treatment as described above and modelling predicts rapid dilution to background levels. The plume of effluent, to a point of 1:10,000 dilutions, is only expected to extend 1,000 ft south of the diffuser assembly.

The Rehoboth Beach WWTP will be permitted through the NPDES in two phases. The first phase is to allow the plant to continue to discharge into the Lewes and Rehoboth Canal during construction. The second phase will take effect once the ocean outfall is complete, and will permit the plant to discharge

through the diffuser in the Atlantic Ocean. The Rehoboth Beach WWTP currently meets and will continue to meet NPDES regulations set forth for this particular treatment facility. Refer to Section 5 of the EIS for further detailed information on anticipated effluent characteristics and potential impacts. Effluent discharge is anticipated to have no significant impacts.

Project Vessels

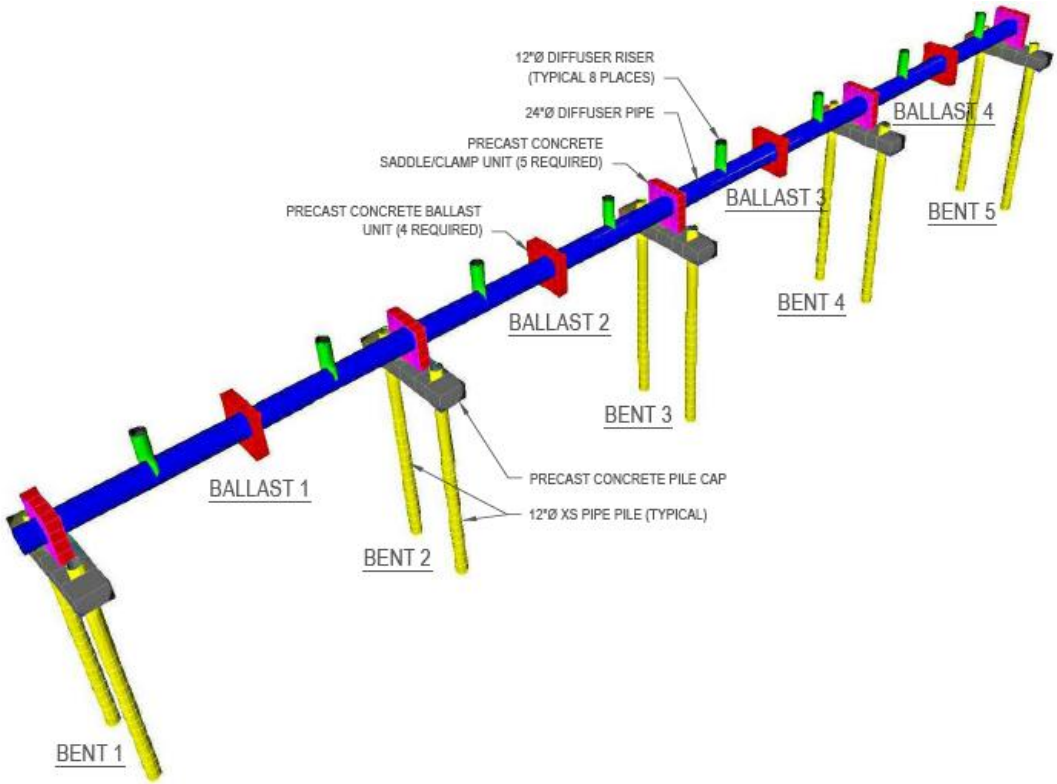
Large whales and turtles are vulnerable to injury and mortality from ship strikes due to propeller wounds or blunt trauma. Reports on show that little to no lethal or serious injuries to whales occur at speeds below ten knots, and few collisions occur at speeds below 6 knots (Laist et al. 2001). Little is known in regards to the correlation between vessel type/speed and turtle injury or mortality, but it is assumed that lower speeds pose less risk since the turtles would have more time to maneuver away from the vessel path.

Barges and small boats will be required for the construction of the ocean outfall. The barges will be shallow draft types and will operate at speeds less than 10 knots to reduce the risk of injury to larger species in the area. In addition, a lookout will be present at all times to identify any issues or obstructions that may warrant the stoppage of the vessel or project. This includes the presence of species such as whales and sea turtles.

The barges and boats are expected to remain within a close range to the project footprint with the exception of the trips to and from shore. During this trip, vessels will take a direct route between the project area and the docking location (likely Cape May located 16 miles North-East of the project area across the inlet of Delaware Bay). Weather permitting, the barge will remain at the project location, and will only return to shore for emergencies or if it is no longer required at the project site. Each day, smaller vessels will transport employees to and from the barge. This will reduce the risk of the barge coming into contact with larger marine species.

In-Water Structures

The permanent structure that will remain in-water post construction will be the diffuser assembly. At the end of the ocean outfall pipe, there will be a 125 foot long diffuser assembly with ten (10) 12” diameter diffuser risers placed in 12 foot increments. The diffuser risers will extend approximately three (3) feet. In addition to the diffuser risers, concrete ballasts saddleclamps, and pillow blocks will be exposed. Below is an illustration showing the design of the diffuser assembly:



Description of the Action Area
The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50CFR Section 402.02) (i.e., where listed species may experience effects (contact with disposed material, loss of habitat, increased turbidity and noise, increased vessel traffic) resulting from the action). For this project, the action area includes the exit pit of the horizontal directional drill, the footprint of the open-cut trench excavation area, extents of suspended solids plume caused by pile driving and excavation activities, vessel travel routes, and the extents of increased noise levels caused by pile driving. See attached figure for estimated extents of the action area. This area is expected to encompass all of the effects of the proposed project.

Based on the best available bathymetric data and surveys performed in the area, the seafloor depth at the action area is expected to be approximately 40 feet (12 m). This will vary slightly throughout the action area, but in general the ocean floor is relatively constant. This depth may also vary slightly based on tides, but this is not a significant change compared to the overall depth at this location. Previous surveys have shown that the action area substrate is sandy with some silt. Refer to the attached soil borings, vibracore and marine survey report for more details.

Aquatic Biota Habitat
Minor short term impacts to benthic biota are expected for the trenched portion of the ocean outfall pipe due to excavation and backfill operations. Benthic communities in the disturbed area will initially decline, but resettling and recolonization will occur rapidly. Benthic biota sampling would be done before and after construction to determine what effect, if any, construction had on the benthic community. Refer to Section 1.9 of the EIS for additional information on the biological environment within the project area.

Ocean salinity near the ocean floor, where the outfall is proposed to be built, typically varies between 30 and 31 practical salinity units (psu). Closer to the surface, salinity is significantly lower, dropping to as low as 20 psu at multiple sample locations multiple times throughout the year.

Land Based Activities

The only land based activities that will occur during this project are the stockpile/staging area, entry pit for the HDD portion of the outfall and the pipe laydown areas along the beach and/or roads. The HDD staging area is located within the Deauville Beach parking lot and sand dunes west of the beach. Terrestrial species identified for this area, as discussed in the letter received from Delaware Division of Fish & Wildlife dated October 12, 2015, include the federally listed piping plover, which has been observed as migrating through and roosting along the beach area. Work/staging is recommended to avoid the beach from March 15th through June 15th and August 1st through September 15th. It is anticipated that construction of the outfall would avoid this timeframe however if construction activities extend into these timeframes, the extents and impacts of these activities will be minor and are not anticipated to effect surrounding species.

Two pipe string laydown options will be implored along the beach and Ocean Drive. Prior to the installation of the directional drill portion of the outfall, a pipe string will be prepared prior to the pipe being pulled into the bore hole. Locations for the pipe string include north along the beach or north along Ocean Drive. The pipe string will be supported by rollers positioned every 50 feet. Dune impacts will be minor. Beach access for construction vehicles, if needed, will be via an existing vehicle beach access path located on the north side of the Deauville Beach parking area. Dune restoration and re-vegetation will be implemented as required.

NMFS Listed Species (and Critical Habitat) in the Action Area

Based on the endangered species maps and information provided by NOAA's Protected Resource Division, an email from a NOAA affiliate dated October 1, 2015 (see attached), the EIS, and the review letter from the Delaware Division of Fish & Wildlife (see attached), the following species have been found within the project action area.

1. *Cetaceans (Whales)*

Six species of endangered large whales occur seasonally off the Mid-Atlantic coast of the U.S. including North Atlantic right whale (Eubalaena glacialis), fin whales (Balaenoptera physalus, sei whales (Balaenoptera borealis), humpback whales (Megaptera novaeangliae), sperm whales (Physeter microcephalus), and blue whales (Balaenoptera musculus). Although all six of these species occur near the project location, only three – right, humpback, and fin whales – are likely to occur in the action area. Sperm, blue, and sei whales are typically found in waters much further offshore and are not expected to be anywhere near the action area.

North Atlantic right whales (eubalaena glacialis) inhibit much of the east coast of the United States, mainly between 20° and 60° latitude, and inhibit the action area seasonally. During winter, right whales are typically found in lower latitudes and coastal waters where calving takes place. The majority of the western North Atlantic population range from wintering and calving areas in coastal waters off the southeastern United States to summer feeding and nursery grounds in New England waters and north to the Bay of Fundy and Scotian Shelf where right whales forage on extremely dense patches of zooplankton, primarily copepods. Two critical habitats were designated for right whales including a stretch from Cape Canaveral, FL to Cape Fear, NC and from Cape Cod, MA to northern Main. Right whales would typically use the area surrounding the project for migration between critical areas. Other major habitats or congregation areas include the coastal waters of the southeastern United States, the Great South Channel, Georges Bank/Gulf of Maine, Cape Cod, the Bay of Fundy, and the Scotian Shelf (Waring et al. 2014). The action area is not located within any of these areas. Due to the lack of concentrations of copepods in the action area, feeding by right whales is likely to be rare in the action area.Based on this best available information, it is expected that during construction, the majority of North Atlantic right whales will inhabit the southern designated critical area for wintering and calving, and will not be present within the action area.

Humpback whales (megaptera novaeangliae) are highly mobile, and have been known to migrate large distances from their feeding grounds in the winter to their calving grounds in the summer. During the winter, most humpback whales migrate to the West Indies for mating and calving. These whales will migrate along the coast of the United States to their feeding grounds located in higher latitudes such as

the Gulf of Maine where they feed on herring, sand lance, and other small fish (Waring et al. 2014). It is unlikely that humpback whales will be present in the action area as the project will be conducted during the winter when these whales will likely be calving in the subtropical waters. It is only expected that humpback whales could be in the action area between April and November. This would create an overlap with construction of only a month. Based on the best available information, it is expected that during construction, it is unlikely that any humpback whales will be present.

Fin whale (balaenoptera physalus) are similar to humpback whales in that they will spend their calving period in subtropical and tropical areas during the winter, and migrate north to the cold waters during the summer. It is thought that some calving takes place between October and January in the mid-Atlantic region (Hain et al. 1992); however, it is unknown where calving, mating, and wintering occurs for most of the population. Fin whales are very migratory and move seasonally in and out of feeding areas in the north. Their overall migration pattern is extremely complex, and thus, specific routes have not been documented (Clark 1995). It is unlikely, but possible that fin whales will be present in the action area during construction.

All listed species of whales have the possibility of being present in the waters off of Rehoboth Beach. Whales typically only use this area for migratory purposes, and are usually seen during the spring and fall each year (March-May and September-November), but could potentially be in the action area during construction. As this project will be performed during the winter, it is unlikely that any whales will be present. If whales are present during construction, they are known to be highly mobile, and could likely vacate the area before any injury is sustained.

2. Sturgeon

Atlantic sturgeons (acipenser exyrinchus oxyrinchus) originating from the New York Bight, Chesapeake Bay, South Atlantic and Carolina DPSs are listed as endangered, while those from the Gulf of Maine DPS are listed as threatened. Sturgeons are anadromous, meaning the adults will spawn in freshwater in the spring and early summer, and migrate into estuarine and marine waters where they spend a majority of their lives. Since sturgeon spawn in freshwater rivers, there is no risk of eggs or juveniles being present within the action area. Juveniles will typically reside in estuarine waters for months to years before making their way to the ocean. Subadults and adults spend most of their lives in coastal waters and estuaries at depths of 10-50 meters, but will go to depths of 160 feet with gravel or sand bottoms. As the project is located within an area similar to these conditions, it is likely that Atlantic sturgeon could be present during construction. However, sturgeons are very mobile, and would likely be able to remove themselves from the action area. As mentioned above, mitigation techniques are being implemented to help protect these species from any harm. A “soft start” during pile driving will give sturgeon a chance to vacate the area prior to noise levels reaching a harmful level. Although it is possible that Atlantic sturgeon will be present in the action area during construction, it is unlikely that any will be harmed.

Shortnose sturgeons are almost exclusively found in bays and rivers extending landward from the Atlantic Ocean. Although these sturgeons are found within Delaware Bay, it would be unlikely to find one off the coast of Rehoboth Beach in the action area as they typically remain in rivers and bays. Shortnose sturgeons are not anticipated to be in the action area at any point.

3. Sea Turtles

Loggerhead (caretta caretta). Kemp’s ridley (lepidochelys kempii), letherback (dermochelys coriacea), and green sea turtles (chelonian mydas) could all be found within the project area. Although each species has slightly different mating and migratory cycles, they are typically very similar. Sea turtles normally do not nest in waters as far north as Rehoboth Beach. Any sea turtles found in the project action area would be migrating through and possibly foraging. Sea turtles would most likely be present in the project area from May to November. The presence of a sea turtle in this area outside of that window is considered extremely unlikely. Since the project is anticipated to stretch from October to March, the only overlap would be 1-2 months. Since it is weather depending, it is not yet known whether dredging or pile driving will be performed during this period. If these activities occur, precautionary methods, as

described in this letter, will be implemented to reduce the risk of impact. If any sea turtles are found in the project area during construction, they are likely opportunistically foraging as they migrate to overwinter in southern waters. The following table describes the foraging behavior for all species and life stages that could be present:

Species	Life Stage	Diet	Feeding Area
Loggerhead	Pelagic and Benthic Juveniles	Omnivorous	Bottom and surface
	Sub-adults	Benthic Invertebrates	Along coast
	Adults	Benthic Invertebrates	Along coast
Green	Juveniles	Omnivorous	Along coast and in protected bays and lagoons
	Adults	Herbivorous	Nearshore areas
Kemp's Ridley	Juveniles	Benthic invertebrates	Protected coastal areas
Leatherback	Juveniles	Soft bodied organisms (jellyfish)	Offshore oceanic or coastal neritic areas
	Adults	Soft bodied organisms (jellyfish)	Offshore oceanic or coastal neritic areas

Mitigation

In order to reduce any potential impacts to local and migratory species in the project action areas, the following mitigation techniques will be implemented as necessary and appropriate:

1. Timeline - It is anticipated that construction will be approximately 5 months and begin in October. The HDD portion of the outfall is anticipated to be approximately 3 months and the marine open-cut trench and diffuser installation will be 2 months, although these two portions may overlap. It appears that most species are present in this action area during the summer months, so avoiding this time will limit the chance of causing harm to any species listed as threatened or endangered by NMFS. The ocean outfall construction is anticipated to be completed from October to March.

2. Benthic Resources - Benthic resources are known to be within the project area. To avoid disruption of these resources, the outfall will be installed using HDD for at least the first 3000 LF, and open cut trenched the remaining 3000 LF. This will limit the amount of dredging required. Since this is a pipe installment, the footprint will be linear and small (50' wide trench). This will limit the area of impact for benthic resources.

3. Structures - Ultimately, the outfall pipe will be completely covered with only the diffuser assembly protruding from the ocean floor. Once construction is complete, and sediment is returned, there will be no new structures present at this location.

4. Pile Driving – It is anticipated that pile driving will occur for the diffuser support piles. These piles will be of 12-14 inches in diameter. Noise mitigation techniques that will reduce the noise level will be used when possible. This includes limiting the time the activities occur, using vibratory

hammers instead of impact hammers, using cushion blocks if an impact hammer is required, bubble curtains, and/or utilizing a "soft start". Requirements will be coordinated with the Contractor to assure these techniques are used.

5. Vessel Operations – Barges/vessels will be required for the dredging and outfall pipe installment processes. To avoid conflict with species such as turtles, whales, and other large species, a shallow draft barge/vessel will be used in order to maximize the distance between the vessel and the ocean floor. This will allow for maximum zone of passage. Barges/Vessels will operate at speeds of less than 10 knots, and will be prepared to reduce speed or halt if there is a whale or sea turtle present in the area. Additionally, barge/vessel-based observers would be stationed onboard during construction activities to identify any whale or turtle in the vessel's navigation path or project area. Prior to construction each day, the waterway in the vicinity of the project area will be visually inspected and/or inspected using an underwater camera, sonar, or other equipment to determine if any listed species are within the project area or surrounding waters.

Conclusions

Based on the above analysis that all effects of the proposed action will be insignificant and/or discountable, we have determined that the Rehoboth Beach Ocean Outfall Project is not likely to adversely affect any listed species or critical habitat under NMFS's jurisdiction. We certify that we have used the best scientific and commercial data available to complete this analysis. We request your concurrence with this determination.

Sincerely,

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