



February 27, 2017

DNREC, Division of Watershed Stewardship
Watershed Assessment & Management Section
100 West Water Street
Suite 10B
Dover, DE 19904

Attn: John Schneider

Re: Ocean Outfall Project Benthic Sampling Plan
City of Rehoboth Beach
GHD No. 8618693

Dear Mr. Schneider:

Per our conference call on February 14, 2017, and additions to the February 22, 2017 draft plan requested by the Department, which were included verbatim, following is the final version of the benthic sampling plan.

Background

The City of Rehoboth Beach is required, under the terms of a consent order from the Delaware Department of Natural Resources, to eliminate the discharge of treated effluent from the Rehoboth Beach Wastewater Treatment Plant into the Lewes-Rehoboth Canal. To meet the requirements of the ROD, an ocean outfall has been proposed to convey the treatment effluent. The outfall will consist of a 24-inch pipe and diffuser located approximately 1.8 km (6000 feet) offshore in 12 m of water. The preliminary plan is to utilize horizontal directional drilling to install at least 900 m of pipe and to excavate the remaining length of the outfall to the diffuser assembly. Benthic monitoring is required prior to the construction of the outfall and for a period of 3 years following construction and after the start of effluent release. The purpose of the monitoring is to gather information on the potential effects of the construction and operation of the proposed diffuser effluent discharge.

Objectives

The objectives of the benthic monitoring are the following:

1. To establish pre-construction and pre-operation condition of the benthic communities within the open trench construction area and the outfall diffuser area.
2. To assess and monitor impacts and recovery of the benthic community within the open trench construction area.
3. To monitor and assess any effects on the benthic community related to the operation of the outfall diffuser.

Sampling Design

The benthic monitoring will consist of two components. The first component is designed to assess the impacts to the benthic community from the excavation and installation of the outfall pipe. This first component will also monitor recovery of the benthic community following construction. The second component is designed to monitor the benthic communities in proximity to the diffuser to assess the effects if any, from the operation of the outfall. Each component will include collection of sediment samples for analysis of both physical and chemical sediment quality and benthic community structure and composition.

Component 1 – Assessment of Open Trench Cut Construction Area

To assess the open trench construction area, sampling is proposed along transects perpendicular to the route of the excavated trench within Plot 1 as shown on Figure 01. Three transects will be established at approximately 200 m intervals along the route. At each transect four sampling stations will be established, two north and two south of the construction trench, as shown on Figure 1. This sample design will allow for assessment of nearfield (100 m) and farfield (600 m) impacts from the construction of the pipe. Sampling is proposed to take place in the Spring (April-May) and in Summer (August-September) seasons to account for typically increased activity of the benthos during recruitment and growth. If benthic communities are observed as returning to pre-impact conditions in Plot 1 prior to the three year monitoring period, it is proposed that sampling be discontinued. The City will submit the raw data and the analysis that demonstrates the recovery of the construction area at least 60 calendar days before the next scheduled sampling event and seek the Department's concurrence to discontinue sampling.

Component 2 - Assessment of Effluent Outfall Operation

For the assessment of the effluent outfall, sampling is proposed within two (2) 600-meter diameter circular plots, Plots 2 and 3, as shown on Figure 01 attached. Plot 2 will encompass the diffuser with radial distances of 100 m (nearfield) and 300 m (farfield) from the outfall. Within both the nearfield and farfield sampling areas, 6 sampling sites are proposed, for a total of 12 sites within Plot 2 as shown on Figure 01. A reference area (Plot 3) of similar size (600 m diameter) and equivalent depth as the effluent outfall area will be established north of the outfall, with 6 sampling sites, for a total of 18 sampling sites for the effluent outfall component of the benthic monitoring. Because the underlying sediment quality and benthic habitat may be patchy and variable across seasons and years, sampling stations will be selected randomly for each sample event within Plot 3 and within each of the two zones of Plot 2. Random sample location will provide more representative samples and more robust basis for statistical comparisons. Sampling will take place in Spring and Summer before construction of the outfall and for three years after.

Proposed sampling locations can be viewed on Figure 01.

Sampling Methods

Samples will be collected with a Ted Young-modified van Veen grab (440 cm² surface area) to a depth of 10 cm in the sediment. At each site, two samples will be collected, one for benthic macroinvertebrates and one for analysis of sediment characteristics (grain size, nitrogen, and organic carbon content). The first sample will be

sieved through a 0.5-mm screen in the field, and the organisms retained on the sieve will be transferred to labeled jars, preserved with 10% buffered formaldehyde, and stored in the laboratory until analysis.

The second sample for sediment testing will be subsampled by removing the top 2 cm of sediment and placing the sediment in labeled plastic bags kept on ice while onboard and subsequently frozen in the laboratory pending analysis. For each area and time period, surface and bottom water temperature, salinity, dissolved oxygen, pH, and turbidity will be measured using a multiparameter water quality sonde.

Laboratory Methods

Organisms will be sorted from sediment residue and identified to the lowest practicable taxonomic level in the laboratory. Taxa will be identified to species whenever possible and counted. Species-specific biomass (ash-free dry weight) will be calculated by drying the organisms to a constant weight at 60° C and ashing in a muffle furnace at 500° C for four hours. Sediments will be analyzed for grain size following the Wentworth grade scale for particles >64 microns (percent gravel, very coarse, coarse, medium, fine, and very fine sand), and for percent silt-clay by wet-sieving, following methodology in Folk (1974). Carbon and nitrogen content of dried sediments will be determined by combustion at high temperature in a carbon analyzer followed by thermal conductivity detection of the N₂ and CO₂ produced.

Data Analysis and Report

For each sampling event, an analysis of the data will be completed comparing the benthic community sampling data and sediment testing data to pre-construction data and previous sampling events conducted post-construction throughout the 3-year monitoring program. For the pipe construction area, the analysis will include an assessment of effects due to construction if any, and an analysis of trends in recovery. For the outfall, the analysis will include a comparison of each sampling event data to pre-construction data and to reference area data. These comparisons will assess the effects of the outfall and its effluent discharges on the benthic community. The raw data will be submitted to the Department in an electronic format mutually agreeable to the City and the Department.

If you should have any questions, please feel free to contact me at (240) 260-6841.

Sincerely,

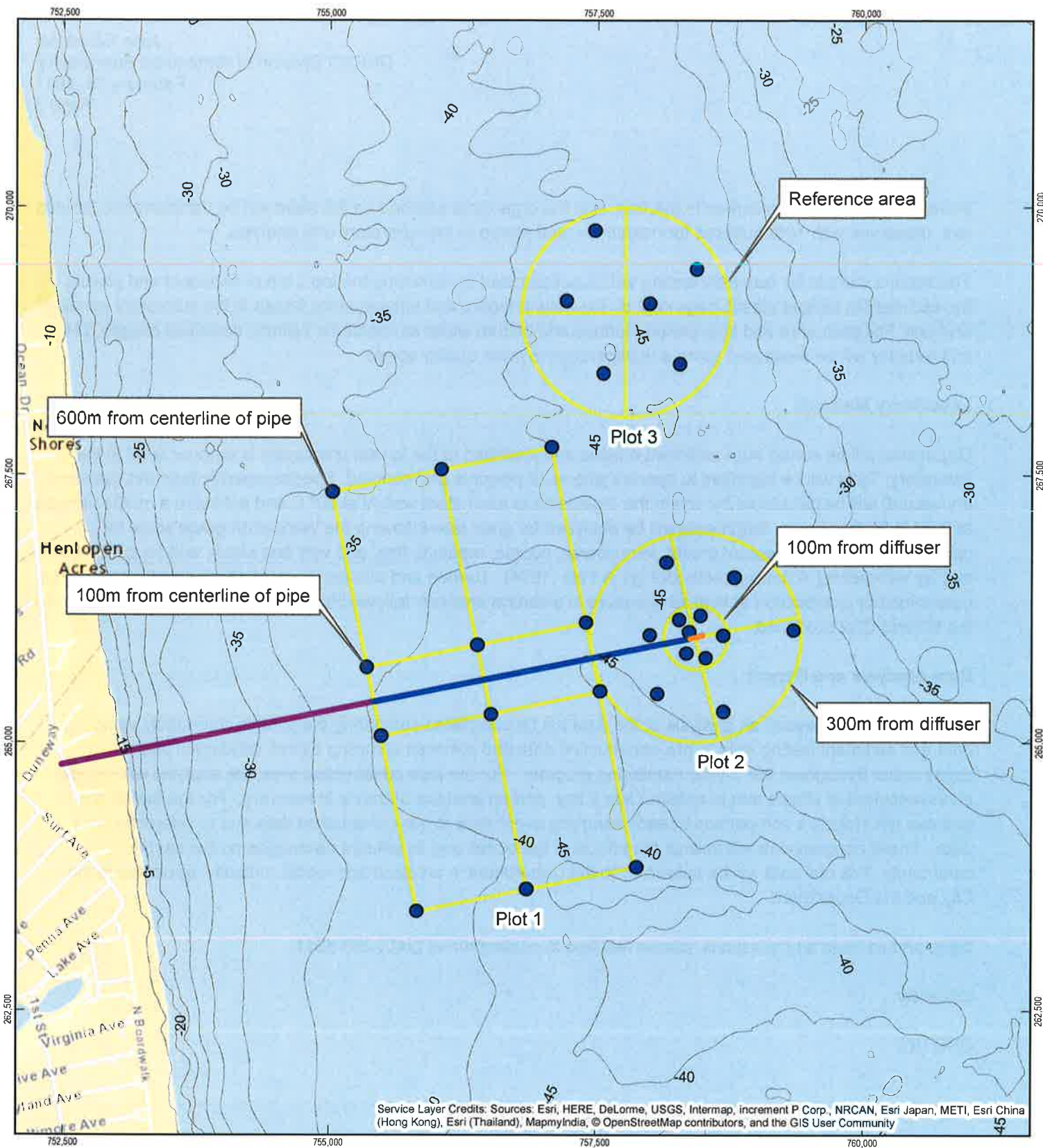
GHD INC



Sean Snow
Project Engineer

SCS/ts

Attachment: Figure 1 – Ocean Outfall Benthic Sampling Stations



Legend

-  Diffuser
-  Outfall HDD
-  Benthic Sampling Stations
-  Outfall Open Cut
-  Benthic Sampling Area



City of Rehoboth Beach
Ocean Outfall Project
Ocean Outfall Benthic
Sampling Stations

Job Number 86-18693
Revision A
Date Feb 22, 2017

Figure 01