TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC

NORTHEAST SUPPLY ENHANCEMENT PROJECT

COMPLIANCE STATEMENT

APPENDIX G. MATERIALS MANAGEMENT PLAN

NOVEMBER 2026

This page intentionally left blank.

Draft Materials Management Plan

Williams/Transcontinental Gas Pipe Line Company, LLC
Northeast Supply Enhancement (NESE) Project

26-Inch Madison Loop
Milepost 8.57 to Milepost 12.00
Old Bridge Township & Borough of Sayreville
Middlesex County, New Jersey

May 2018

Prepared by:
Williams/Transcontinental Gas Pipe Line Company, LLC
2800 Post Oak Boulevard
Houston, Texas 77056

MATERIALS MANAGEMENT PLAN
NORTHEAST SUPPLY ENHANCEMENT (NESE) PROJECT
26-INCH MADISON LOOP - LINEAR CONSTRUCTION PROJECT (LCP)
OLD BRIDGE TOWNSHIP & BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

TABLE OF CONTENTS

1.0 INTRODUCTION

2.0 PROJECT DESCRIPTION

3.0 PRE-CONSTRUCTION INVESTIGATION
- 3.1 Pipeline Corridor Limited Environmental Site Assessment
- 3.2 Known Contaminated Sites Identified within Close Proximity
- 3.3 Geotechnical Investigation Data for NESE Madison Loop
- 3.4 Previous Groundwater Monitoring Results – Lower New York Bay Expansion Project
- 3.5 Compressor Station 207 Phase II Environmental Site Assessment - 2016
- 3.6 Proposed Additional Pre-Construction Investigation

4.0 HEALTH AND SAFETY PLAN REQUIREMENTS

5.0 MATERIALS MANAGEMENT
- 5.1 Management of Excavated Soil/Unsuitable Backfill (General)
  - *5.1.1 Excavated Material Management - Tract Nos. NJ-MI-1, -2 & -39*
  - *5.1.2 Excavated Material Management - Tract No. NJ-MI-3*
  - *5.1.3 Excavated Material Management - Tract No. NJ-MI-4*
  - *5.1.4 Excavated Material Management - Tract Nos. NJ-MI-5, -8 & -9*
  - *5.1.5 Excavated Material Management - Tract No. NJ-MI-12*
  - *5.1.6 Excavated Material Management - Tract Nos. NJ-MI-13 & -15*
  - *5.1.7 Excavated Material Management - Tract No. NJ-MI-16*
  - *5.1.8 Excavated Material Management - Tract Nos. NJ-MI-17 & -17.001*
  - *5.1.9 Excavated Material Management - Tract Nos. NJ-MI-18, -19, -21 & -27*
  - *5.1.10 Excavated Material Management - Tract No. NJ-MI-32*
  - *5.1.11 Excavated Material Management - Tract Nos. NJ-MI-33 & -34*
  - *5.1.12 Excavated Material Management - Tract No. NJ-MI-37*
- 5.2 Construction Dewatering/Water Management
  - *5.2.1 Water Management - Tract Nos. NJ-MI-1, 2 & -39*
  - *5.2.2 Water Management - Tract No. NJ-MI-3*
  - *5.2.3 Water Management - Tract No. NJ-MI-4*
  - *5.2.4 Water Management - Tract Nos. NJ-MI-5, -8 & -9*
  - *5.2.5 Water Management - Tract No. NJ-MI-12*

5.2.6 Water Management - Tract Nos. NJ-MI-13 & -15
5.2.7 Water Management - Tract No. NJ-MI-16
5.2.8 Water Management - Tract Nos. NJ-MI-17 & -17.001
5.2.9 Water Management - Tract Nos. NJ-MI-18, -19, -21 & -27
5.2.10 Water Management - Tract No. NJ-MI-32
5.2.11 Water Management - Tract Nos. NJ-MI-33 & -34
5.2.12 Water Management - Tract No. NJ-MI-37
5.3 Management of Horizontal Directional Drilling (HDD) Fluids/Cuttings
5.4 Management of Conventional Bore Cuttings
5.5 Field Evaluations of Excavated Material, Groundwater, HDD and Bore Cuttings
5.6 Disposal Documentation and Backfill Material Requirements

6.0 REPORTING AND DOCUMENTATION

ATTACHED FIGURES

Figure 1 Project Location - USGS Quad
Figure 2 Project Location - Aerial View
Figure 3A Proposed Pipeline Route (1 of 3)
Figure 3B Proposed Pipeline Route (2 of 3)
Figure 3C Proposed Pipeline Route (3 of 3)
Figure 4 NJDEP Known Contaminated Sites

ATTACHED TABLES

Table 1 2018 Construction Line List Summary - Property Parcels
Table 2 2018 Construction Line List Summary - Road Crossings
Table 3 List of Known Contaminated Sites within Close Proximity to Proposed Alignment

APPENDICES

Appendix A FERC Aerial Route Maps (Plan Sheets 1 through 3)
Appendix B EDR DataMap Corridor Study Executive Summary
Appendix C Geotechnical Investigation Data
Appendix D 42-Inch Lower New York Bay Lateral Replacements - 2017 Construction Groundwater Monitoring Data (to be inserted)
Appendix E Compressor Station 207 Phase II Site Assessment 2016 SI Results
Appendix F Pre-Construction Environmental Sampling Results (to be obtained)
Appendix G Construction Dewatering Assessment Technical Reports
Appendix H Environmental Health and Safety Contact List
Appendix I NJPDES and/or MCUA Authorizations to Discharge (to be obtained)
Appendix J Clean Fill Certification Template

1.0 INTRODUCTION

This Materials Management Plan (MMP) has been prepared by Transcontinental Gas Pipe line Company, LLC (Transco) for construction of the proposed 26-inch Madison Loop Pipeline located in Middlesex County, New Jersey. Specifically, this MMP has been prepared to address planned pipeline construction activities that will include excavation, directional drilling and conventional bore activities to be performed during the construction of the proposed 26-inch Madison Loop portion of the Northeast Supply Enhancement (NESE) Project (herein referred to as Project). This document contains project specific information for construction activities associated with this Project only and has been developed in accordance with the guidelines set forth in the New Jersey Department of Environmental Protection (NJDEP) Linear Construction Project Technical Guidance (LCPTG), dated January 2012. The purpose of this MMP is to provide general procedures and site-specific requirements for addressing and minimizing worker exposure and the handling of encountered excavation materials and backfill during the planned construction activities.

Figure 1 illustrates the approximate location of the proposed pipeline construction area on a U.S.G.S. topographic quadrangle map. **Figure 2** shows the approximate location of the Madison Loop pipeline on an aerial photograph derived from Google Maps.

2.0 PROJECT DESCRIPTION

Transcontinental Gas Pipe Line Company, LLC (Transco), a subsidiary of Williams, owns and operates a natural gas pipeline system that transports natural gas to the market areas of the northeastern United States. Transco filed an application for a Certificate of Public Convenience and Necessity (Certificate) with the Federal Energy Regulatory Commission (FERC) to construct facilities on its existing natural gas transmission system. The application was filed on March 27, 2017 and assigned docket number CP17-101 by FERC. The Project will provide 400,000 dekatherms per day (dth/d) of incremental firm transportation service from Transco's existing Station 195 in York County, Pennsylvania to Transco's offshore Rockaway Transfer Point in New York State waters. In New Jersey, the proposed project consists of 3.43 miles of onshore pipe in Middlesex County, New Jersey (the Madison Loop); 0.16 miles of onshore pipe and 5.95 miles of offshore pipe in Middlesex and Monmouth Counties, New Jersey (Raritan Bay Loop). Construction is scheduled to begin in the first quarter of 2019 in order to meet a target in-service date in the fourth quarter of 2019.

The proposed 26-inch Madison Loop is a 3.43 mile-long new pipeline that will begin on the Transco Lower Bay Loop "C" pipeline at milepost M.P. 8.57 in Old Bridge Township and terminate at M.P. 12.00 in the Borough of Sayreville. The FERC alignment sheets (Sheets 1 through 18) showing the details of the proposed pipeline construction are provided under separate cover. The FERC Aerial Route Maps are included herein as **Appendix A** provided on Plan Sheets 1 through 3. **Figures 3A, 3B and 3C** provide an overview of the 26-inch Madison Loop Proposed pipeline alignment route at a reduced scale. **Table 1** presents a summary of the construction line list detailing the property tracts to be impacted during pipeline construction and anticipated materials to be managed for each parcel. **Table 2** provides a summary of the five (5) road crossings where either HDD or conventional bores will be performed.

Activities associated with the construction of the 26-inch Madison Loop pipeline will include the following:

- Site preparation including marking the corridor, and installation of erosion & sediment control measures prior to earth disturbance;
- Clearing and grading;
- Preparation of temporary work space/contractor yards;

- Excavation/trenching and temporary shoring during pipeline placement pipeline installation;

- Completion of horizontal directional drilling (HDD) to facilitate pipeline placement along three (3) HDD segments (refer to **Figures 3A, 3B and 3C**);

- Completion of conventional bores at three (3) road crossings;

- Excavation and temporary shoring of entry and exit pits for HDD and conventional bores;

- Open-cut trench excavation;

- Pipe preparation including but not limited to bending, welding, assembling, testing, placement and backfilling of approximately 3.43 miles of 26-inch coated steel pipe;

- Begins at Transco's existing 200-D55 mainline valve site and ties-in with Transco's existing Lower Bay Loop "C" at M.P. 8.57; and continues to the Raritan Bay Loop Tie-in location at M.P. 12.00;

- Site restoration and cleanup.

3.0 PRE-CONSTRUCTION INVESTIGATION

Pre-construction investigation activities included a review of available environmental data records to identify potential contaminated properties, a review of available geotechnical information, and review of available groundwater monitoring data from the previous Lower New York Bay Lateral Expansion (LNYBLE) Pipeline Replacements Construction project; to aid in the development of this materials management plan and to identify potential data gaps that may require additional pre-construction investigation environmental sampling.

3.1 Pipeline Corridor Limited Environmental Site Assessment

A pipeline corridor study was completed to identify Federal and State-listed spill sites or waste disposal sites utilizing Environmental Data Resources, Inc. (EDR), a commercial database search service. As part of this database search, a radius map report was generated to identify agency listed sites of potential environmental concern within the proposed pipeline corridor. The search area of the EDR DataMap Corridor Study was based on a two-mile radius extending from the centerline of the proposed pipeline route. The results of the EDR DataMap Corridor study are presented in **Appendix B**. In addition, EDR performed as well record search for the proposed pipeline corridor. The EDR Well Search results are included in **Appendix B**. Additional records were also identified using the New Jersey Open Public Records Act Database (NJDEP 2016) and New Jersey Department of Environmental Protection (NJDEP) GeoWeb Database (NJDEP 2017).

3.2 Known Contaminated Sites Identified within Close Proximity

The EDR DataMap Corridor Study (**Appendix B**) for the NESE 26-inch Madison Loop Project identified five (5) active and two (2) inactive sites with confirmed contamination within a 0.25 mile of the proposed pipeline alignment. The New Jersey Open Public Records Act database identified the E.I. DuPont Denemours and Company property, located at 250 Cheesequake Road in Sayreville, New Jersey as a potential contamination source site (Program Interest No. 008222). In addition, the NJDEP GeoWeb site lists mapped areas of *Historic Fill* that lie within the project corridor study area. **Figure 4** illustrates the NJDEP known contaminated sites in the vicinity of the Project. **Table 3** presents a list of the identified sites.

A brief discussion of each known contaminated site in the vicinity of the Project follows.

Reclamation Technologies Inc.

The NJDEP database search of known contaminated sites identified an active site remediation program for Reclamation Technologies Inc. (SRP) ID 129931 located at 3200 Bordentown Avenue, Old Bridge, New Jersey. The Reclamation Technologies, Inc. site is located approximately 0.15 miles west of the western most starting point of the Project alignment of M.P. 8.57 (refer to **Figure 4**). The SRP case tracking tool indicates the Site to be in multi-phase remedial action, with discharges to both groundwater and soil. Since the Project alignment is upgradient of the Reclamation Technologies Inc. property, it is unlikely that any contamination associated with this site would be present in the soil or groundwater in the vicinity of the Project facilities.

E.I DuPont Denemours and Company Site (Classification Exception Area)

The E.I DuPont Denemours and Company Site is located at 250 Cheesequake Road in Sayreville, New Jersey approximately 1.2 miles northwest of the proposed Project alignment, and outside of the EDR Search radius corridor study. However, the E.I DuPont site has an active Classification Exception Area (CEA) and Well Restriction Area (WRA) on file with the NJDEP that extends into the Project Area corridor from approximately Milepost (M.P.) 9.20 to M.P. 10.31 (refer to **Figure 4**). Groundwater contamination associated with this CEA includes volatile organic compounds (VOCs) and metals and represents the potential for groundwater and soil impacts, if disturbed.

Road Department Garage Area 3-1

The New Jersey Open Public Records Act database identified the Middlesex County Road Department Garage Area 3-1 is located along Route 9 North in Old Bridge Township, New Jersey, less than 0.1 mile north of M.P. 9.50 of the Madison Loop proposed Project alignment (**Figure 4**). The site had 2 leaking fuel tanks removed on October 13, 1993; one 1,000 gallon leaded gasoline tank and one 4,000 gallon unleaded gasoline tank. The New Jersey Brownfields database indicates that the property was assigned to the Brownfields program on August 31, 1994, as a known source and release of groundwater contamination (New Jersey State 2015).

Global Sanitary Landfill

The EPA National Priorities List (NPL) database indicates that the Global Sanitary Landfill located along Ernst Road in Old Bridge Township, New Jersey, is less than 0.1 mile south of M.P. 10.13 to M.P. 10.38 of the proposed Project (**Figure 4**). This site has a historical record of groundwater, soil, sediment and surface water contamination. The Global Sanitary Landfill is a 57.5 acre area that was used for solid waste disposal from 1968 to 1984 by the Global Landfill Reclaiming Corporation. Operations ceased in

1984 after a landfill side-slope failure destroyed several acres of adjacent wetlands. In 1989, the site was placed on the EPA NPL due to the presence of contaminated leachate and the discovery of buried drums containing hazardous waste in a portion of the landfill. The EPA issued a Record of Decision (ROD) which included remedial action objectives for addressing contaminant migration (VOC and semi-volatile organic compounds (SVOC), pesticides and metals) emanating from the landfill into groundwater, surface water, sediment and soil. The remedy selected in the ROD contained several components, including placement of a CEA, which also acts as a WRA, for both the upper and lower water-bearing zones in the areas where contaminants were detected and five-year reviews of the site to determine whether additional action is required to protect groundwater quality. The CEA has a groundwater restriction depth from ground surface to 25 feet below ground in the upper water-bearing zone; and from ground surface to 150 feet below ground in the lower water-bearing zone, depending on contamination depth.

The first five-year review was completed in 2015 and determined that the remedy is currently protective of human health and the environment because all human and ecological exposure routes have been addressed. However, in order for the remedy to be protective in the long-term, trends from additional rounds of data collection will continue to be evaluated to ensure that groundwater contamination in the lower water-bearing zone is responding to natural attenuation, as expected after the completion of the landfill cap construction. The CEA and WRA are located less than 100 feet south of the proposed Project alignment.

Morgan Ordnance Depot

The New Jersey Open Public Records Act database indicates that the Morgan Ordnance Depot site (New Jersey Environmental Management System Site Identification Number 80914) is located on Ernst Road (between Route 35 and Cheesequake Road) in Sayreville, New Jersey, approximately 0.3 mile north of M.P. 11.10 of the Project (refer to **Figure 4**). As of December 17, 1995, the site is listed as a U.S. Army Corps of Engineers (USACE) Formerly Used Defense Site (FUDS) with confirmed contamination. The USACE FUDS Geographic Information System public database indicates that the site contamination area includes a portion of the Project alignment starting at approximately Route 9 to the Raritan Bay Shoreline. On October 4, 1918, there was an explosion at the T.A. Gillespie Company Shell Loading Plant (also known as the Morgan Ordnance Depot), which was a World War I ammunition supply plant. Nearly a century later, explosive debris continues to surface regularly across a 1.2-mile radius.

Morgan Fire House

The New Jersey Open Public Records Act database indicates that the Morgan Fire House property is located at Route 35 and Old Spye Road in Sayreville, New Jersey, which is less than 0.1 mile south of M.P. 12.0 of the Madison Loop (refer to **Figure 4**). The site is on both the NJDEP Active Sites with Contamination List and the NJDEP Closed sites with Remediated Contamination Site List. The site is included on the Known Contaminated Sites List, but is classified as no further action (restricted use) with an active deed notice and engineering controls in the NJDEP post-remediation group. Contamination at this site was attributed to a leaking 550 gallon underground storage tank (UST) that contained diesel fuel (#2-D). The site is approximately 150 feet south of the Project facilities, and the specifics of the active deed notice and engineering controls are unknown. However, since no further action is required for this site, it is unlikely that significant contamination associated with this site would be present within soils encountered in the proposed Project alignment.

1788 Route 35 in Sayreville, New Jersey

The New Jersey Open public Records Act database indicates that the property located at 1788 Route 35 North in South Amboy, New Jersey, is located less than 0.1 mile northeast of M.P. 12.0 of the Madison loop (refer to **Figure 4**). This property has been and currently is the location of a gas station and is listed on the UST Active Remediation List. This site contains an active CEA and WRA in effect from October 2015 to October 2026, which extends within 200 feet northeast of the Madison Loop and 165 feet north of the Raritan Bay Loop. Since neither the Madison Loop nor the Raritan Bay Loop alignments are situated within the CEA and WRA, it is unlikely that any contamination associated with this site would be present in the soil or groundwater in the vicinity of the Project facilities.

Historic Fill

NJDEP Historic Fill Maps identify areas of Historic Fill overlying natural surficial geologic deposits in three (3) areas along the proposed 26-inch Project pipeline alignment (refer to **Figure 4**). Historic Fill is a non-indigenous material placed on a site in order to raise the topographic elevation of the site. Constituents of potential concern typically associated with Historic Fill include, but are not limited to, SVOCs and metals in excess of the NJDEP Soil Remediation Standards. NJDEP mapping shows Historic Fill present between approximately mileposts M.P. 10.24 to M.P. 10.34 in the vicinity of the Global Landfill; M.P. 11.17 to M.P. 11.25 in the vicinity of the Garden State Parkway Conventional Bore; and M.P. 11.62 to M.P. 11.78 which should not be disturbed as a HDD segment is planned through this portion of the proposed alignment (**Figure 4**).

Placement of the Historic Fill within the Project area coincides with construction and filling of the Global Landfill, and construction of the Garden State Parkway and other roadways. Based on the history of the industrialization and development within the vicinity of the proposed Project alignment, there is the possibility that unmapped areas of Historic Fill could be encountered during pipeline construction. Mapped Historic Fill areas shown on the NJDEP Historic Fill Maps are typically greater than 5 acres.

3.3 Geotechnical Investigation Data for NESE Madison Loop

Pre-construction geotechnical investigations have been completed for the Project and other previously completed pipeline construction efforts in the vicinity of the proposed Project pipeline facilities. Subsurface information obtained through these studies has been reviewed and used to aid in evaluating materials to be managed during construction. Pertinent subsurface geotechnical information has been included in **Appendix C** and was excerpted from the following available Geotechnical Investigation Reports:

- Geotechnical Investigation Report for Northeast Supply Enhancement Madison Loop - Garden State Parkway Crossing, Middlesex County, New Jersey, AECOM, February, 2018.

- Summary of Findings Geotechnical Investigation for Northeast Supply Enhancement - Madison Loop, Middlesex County, New Jersey, AECOM, October 13, 2017.

- Geotechnical Investigation Report for New York Bay Expansion-Compressor Station 207, Middlesex County, New Jersey AECOM, January 23, 2017.

- Geotechnical Investigation-Proposed Stream Crossing for LNYB Lateral Replacements, Middlesex County, New Jersey, AECOM, July 5, 2016.

- Geotechnical Investigation-Proposed Pipeline Crossing, Morgan Replacement-Crossway Creek Crossing, Middlesex County, New Jersey, URS Corporation, October 10, 2006.

3.4 Previous Groundwater Monitoring Results – Lower New York Bay Expansion Project

In 2017, Transco completed pipeline replacement construction activities at three (3) segments of the LNYBLE 42-inch "C" Loop Lateral pipeline in the vicinity of the Global Sanitary landfill. Water derived during well-point dewatering and excavation dewatering was discharged to ground under NJDEP's BGR General Discharge Permit (NJPDES Permit No. NJ0155438) after passing through a dewatering structure and/or filter bag as detailed in the soil erosion and sediment control (SESC) plan. In accordance with permit discharge monitoring requirements, sampling of the discharge occurred at a minimum frequency of one sample per month per outfall, as warranted. The discharge samples were analyzed by a New Jersey certified laboratory for those parameters listed in the Authorization to Discharge. Both pre-construction water quality data and discharge monitoring results for the 2017 LNYBLE Replacement Construction project are provided herein as **Appendix D**.

3.5 Compressor Station 207 Phase II Environmental Site Assessment – 2016

In 2016, Transco completed site assessment activities to evaluate environmental conditions of adjacent property under consideration for purchase and/or use during future construction of the Compressor Station 207 facility, which included extensive site investigation (SI) soil sampling and groundwater sampling on adjacent property parcels. Specifically, Transco's SI sampling activities were completed on property parcels located in Old Bridge Township that included Block 5001, Lot 13.14 (Parcel A), Lot 13.16 (Parcel B) and Lot 13.17 (Parcel C). The results of the Compressor Station 207 Phase II Site Assessment 2016 SI sampling completed on the adjacent property are provided on figures and summary tables provided herein as **Appendix E**. Within the adjacent property footprint, the proposed Project alignment and right-of-way primarily traverses the southern boundary of Parcel A property (Lot 13.14) from west to east, then crosses the narrow Parcel C property (Lot 13.17) and into the northeast corner of Parcel C (Lot 13.16).

Within soil samples collected from the Lot 13.14 (Parcel A), exceedances of the NJDEP Soil Remediation Standards (SRS) for metals and chlordane (pesticides) were detected. Although most of the soil exceedances were for default impact to groundwater screening levels, a few soil samples had measured concentrations (cobalt, copper, arsenic, vanadium and nickel) above Direct Contact SRS. Parcel A had a number of areas with asphalt, foundry slag, and debris observed at ground surface during the site investigation program.

Within Lot 13.16 (Parcel B) and Lot 13.17 (Parcel C), significant amounts of soil with asphalt debris were observed during the site investigation and multiple SI samples exhibited concentrations of carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs) above NJDEP Direct Contact SRS. Said cPAHs were measured above NJDEP SRS in samples collected from borings advanced in the observed "mounds" as well as from surface and near-surface soils present on these two parcels.

Groundwater sampling results for the wells located relatively closest in proximity to the proposed Project alignment identified exceedances of NJDEP Class IIA Ground Water Quality Standards (GWQS) for several metals including: aluminum, arsenic, beryllium, chromium, iron, lead and manganese; however, depths to groundwater were observed to be greater than 20 feet in these monitoring wells.

3.6 Proposed Additional Pre-Construction Investigation

Transco is currently evaluating the need for additional pre-construction investigation sampling to be completed prior to pipeline construction. Any additional environmental sampling results will be included in the final MMP as **Appendix F**. Two (2) Construction Dewatering Assessment Technical Reports have been prepared in support of obtaining NJDEP water allocation permits for temporary dewatering planned for pipeline construction along proposed Project alignment segments through Old Bridge Township and Borough of Sayreville. These dewatering assessment technical reports were used to estimate dewatering requirements anticipated during construction and are provided herein as **Appendix G**.

4.0 HEALTH AND SAFETY PLAN REQUIREMENTS

Prior to commencement of any intrusive or excavation activities for the Project, a site-specific health and safety plan (HASP) will be prepared by Transco or its contractors in accordance with the OSHA requirements outlined in 29 CFR 1910 and 29 CFR 1926. Transco personnel, Transco oversight personnel and Transco's construction contractor will follow site-specific HASPs for all proposed intrusive work.

Transco and/or its Contractor (if applicable) shall prepare a HASP that specifically addresses potential worker exposure to potential compounds of concern (COCs) that may be encountered at the work location. Additionally, the Contractor shall handle all regulated material in a manner that protects site personnel, the public, and the environment in accordance with all applicable federal, state and local laws and regulations.

Portions of the Project area generally lie within mapped or documented historic fill areas of New Jersey, as such, Transco will conservatively use COCs generally found in historic fill, as well as historical and/or current data available for each property, as a basis for the initial HASP. All HASPs will be prepared and signed by a qualified safety professional. Any site-specific HASP will include the following.

- Description of the Work Activities
- Hazard Assessment
- Summary of Training Requirements
- Description of Monitoring Equipment
- Directions to Hospital
- Air Monitoring Action Levels
- Personnel Protective Equipment
- Decontamination Procedures
- Contingency Procedures

All HASPs will include a provision for the upgrading of personal protective equipment (PPE) should onsite conditions warrant. Daily job safety analyses (JSA) meetings shall be performed before the start of each work shift to address specific health and safety concerns for the project. A list of the key environmental health and safety contacts for this project is provided in **Appendix H**.

5.0 MATERIALS MANAGEMENT

Proper handling of encountered materials (excavated soil, water, HDD fluids and conventional bore cuttings) and details of how materials generated during construction of the Project will be managed, are further described below.

5.1 Management of Excavated Soil/Unsuitable Backfill (General)

During the planned pipeline construction excavation activities described in **Section 2.0**, excavated material will be allowed to drain of any free liquid over the excavation and will be field screened by Transco (as described in **Section 5.5)**. If deemed suitable for use as backfill, the material will be staged directly adjacent to the ditch or staged at designated stockpile areas within the approved workspace. Excavated material that has been determined to be unsuitable for use as pipeline backfill will either be direct loaded into roll-off containers/triaxle dump trucks or staged on two layers of 6-mil plastic sheeting at a designated stockpile area within the approved workspace. Suitability for use as pipeline backfill will be based on 1.) Satisfactory physical and engineering properties (i.e. particle size less than 4-inches, compactability, free of debris and vegetation, moisture content, etc.); and 2.) Environmental field screening (refer to **Section 5.5**) or available pre-construction environmental sampling results. Any temporary stockpile of excavated material determined to be of concern, must remain covered with 6-mil poly sheeting or tarps while stockpiling activities are not being performed. Transco's Contractor will maintain and inspect all stockpile areas daily. All stockpiles containing material determined to be unsuitable for use as backfill will be surrounded and secured with orange safety fence at the end of each day. Soil erosion and sediment control features must be in place and maintained for stockpiled material, including soils staged along the ditch.

Any excavated material from the planned excavation that is determined to be unsuitable for use as backfill based on field screening observations (refer to **Section 5.5** below) will be characterized and disposed of properly, at a permitted, Transco-approved, off-site disposal facility. Detailed records of excavated material management for the Project will be maintained including areas where excess materials were generated, stockpiled and disposed. Copies of all waste characterization data and final disposal documentation will be maintained in the project files.

Pre-construction environmental samples may be completed prior to pipeline construction in an effort to identify subsurface conditions to be encountered and aid in the evaluation of material handling and disposal considerations. However, pre-construction environmental samples may not be sufficient alone for waste characterization. Representative waste characterization sampling will be required of any material deemed unsuitable for use as backfill and being considered for offsite disposal. Transco will conduct waste characterization sampling based on the sampling protocol and laboratory analyses required by the approved waste disposal facility. Waste characterization samples will be collected in-situ (i.e. pothole sampling) or from excavated soil stockpiles, or from roll-off containers located within Transco's temporary workspace. Additionally, the Contractor will prepare a project specific Waste Management Plan (WMP) for any waste stream to be managed for off-site disposal. The WMP will identify specific waste transporters and disposal facilities, as applicable, for each waste stream and will be approved by a Company environmental representative.

Any discovery of unknown environmental condition (i.e. buried waste, drums, tanks, free-product, etc.) must be reported to Transco immediately and Transco's ***Unanticipated Discovery of Contamination Plan (UDCP)*** should be implemented.

Excavated material will be managed in accordance with approved site-specific requirements for each property (if any identified) and/or Best Management Practices (BMPs). Details of how excavated material will be managed at each property are further described below.

5.1.1 Excavated Material Management – Tract Nos. NJ-MI-1, -2 & -39

Tract Numbers NJ-MI-1, -2 & -39 are Transco-owned property parcels including Tax Identification (ID) Nos. 1215_5001_13.18, 1215_5001_13.14 and 1219_539_99.111 (refer to **Table 1)**. These Tracts are depicted on the FERC Alignment Sheets 1, 2 and 14 of 18, respectively. As shown on the alignment sheets, open-cut trench excavation is planned for these parcels to facilitate pipeline installation. Based on a review of available information, there are no known environmental concerns for these property parcels and no impacted material is expected to be generated as part of pipeline construction. However, areas of miscellaneous fill/soil piles with potentially elevated metal and/or PAH concentrations may be encountered during pipeline construction (refer to the Compressor Station 207 Phase II Site Assessment SI sampling results **Appendix E**). Accordingly encountered conditions and excavated soils will be monitored during any excavation activities and applicable MMP procedures implemented as needed to ensure that material generated during excavation is properly managed (refer to **Section 5.1**).

5.1.2 Excavated Material Management – Tract No. NJ-MI-3

The Tract No. NJ-MI-3 property parcel is Tax Identification (ID) No. 1215_5001_13.17 and is depicted on Alignment Sheets 2, 15 and 16 of 18 (refer to **Table 1)**. As shown on the alignment sheets, open-cut trench excavation is planned for this parcel to facilitate pipeline installation and a major portion of the property will be used for access road and additional temporary workspace. Based on a review of available information, there are no known environmental concerns for this property parcel and no impacted material is expected to be generated as part of pipeline construction. However, areas of miscellaneous fill/soil piles with potentially elevated metal and/or PAH concentrations may be encountered during pipeline construction (refer to the Compressor Station 207 Phase II Site Assessment SI sampling results in **Appendix E**). Accordingly encountered conditions and excavated soils will be monitored during any excavation activities and applicable MMP procedures implemented as needed to ensure that material generated during excavation is properly managed (refer to **Section 5.1**).

5.1.3 Excavated Material Management – Tract No. NJ-MI-4

The Tract No NJ-MI-4 property parcel is Tax Identification (ID) No. 1215_5001_13.16 and is depicted on FERC Alignment Sheets 2 and 15 of 18 (refer to **Table 1**). As shown on the alignment sheets, open-cut trench excavation is planned for this parcel to create an HDD exit pit and allow for advancement of an HDD segment. Also, a major portion of the property will be used for access road and additional temporary workspace. Based on a review of available information, there are no known environmental concerns for this property parcel and no impacted material is expected to be generated as part of pipeline construction. However, areas of miscellaneous fill/soil piles with potentially elevated metal and/or PAH concentrations may be encountered during pipeline construction (refer to Compressor Station 207 Phase II Site Assessment SI sampling results in **Appendix E**). Accordingly encountered conditions and excavated soils will be monitored during any excavation activities and applicable MMP procedures implemented as needed to ensure that material generated during excavation is properly managed (refer to **Section 5.1**).

5.1.4 Excavated Material Management – Tract Nos. NJ-MI-5, -8 & -9

The Tract Numbers NJ-MI-5, -8 and -9 property parcels include Tax Identification (ID) Nos. 1215_5000_4_QFARM, 1215_5000_18_QFARM and 1215_5000_23_QFARM; and are depicted on FERC Alignment Sheets 2, 3, 4 and 15 of 18 (refer to **Table 1**). As shown on the alignment sheets, open-cut trench excavation and HDD are planned for these parcels to facilitate pipeline installation, including a HDD entry pit and a HDD exit pit to allow for HDD segment advancement. Based on a review of available information,

there are no known environmental concerns for these property parcels and no impacted material is expected to be generated as part of pipeline construction. However, due to the recorded E.I DuPont Denemours and Company CEA that extends onto this property, all excavation activities will be field screened as described in **Section 5.5.** Encountered conditions will be monitored during any excavation activities and applicable MMP procedures implemented as needed (refer to **Section 5.1**).

5.1.5 Excavated Material Management – Tract No. NJ-MI-12

The Tract No. NJ-MI-12 property parcel is Tax Identification (ID) No. 1215_4185_10 and is depicted on FERC Alignment Sheets 5, 6 and 7 of 18 (refer to **Table 1**). As shown on the alignment sheets, open-cut trench excavation and HDD are planned for this parcel to facilitate pipeline installation. Based on a review of available information, there are no known environmental concerns for this property parcel and no impacted material is expected to be generated as part of pipeline construction. However, due to the recorded E.I DuPont Denemours and Company CEA that extends onto this property, and close proximity to the Global Sanitary Landfill, all excavation activities will be field screened as described in **Section 5.5.** Encountered conditions will be monitored during any excavation activities and applicable MMP procedures implemented as needed (refer to **Section 5.1**).

5.1.6 Excavated Material Management – Tract No. NJ-MI-13 & -15

The NJ-MI-13 & -15 property parcels include Tax Identification (ID) Nos. 1215_4185_12.11 and 1215_4185_12.12 and are depicted on the FERC Alignment Sheet 6 of 18 (refer to **Table 1**). As shown on the alignment sheet, open-cut trench excavation and HDD are planned for these parcels to facilitate pipeline installation. Based on a review of available information, there are no known environmental concerns for these property parcels and no impacted material is expected to be generated as part of pipeline construction. However, due to the recorded E.I DuPont Denemours and Company CEA that extends onto this property, all excavation activities will be field screened as described in **Section 5.5.** Encountered conditions will be monitored during any excavation activities and applicable MMP procedures implemented as needed (refer to **Section 5.1**).

5.1.7 Excavated Material Management – Tract No. NJ-MI-16

The NJ-MI-16 property parcel is Tax Identification (ID) No. 1215_4185_4.11 and is depicted on the FERC Alignment Sheets 17 and 18 of 18 (refer to **Table 1**). As shown on the alignment sheets this property will be used for a temporary access road with no planned pipeline excavation. Based on a review of available information, there are no known environmental concerns for this property parcel and no impacted material is expected to be generated as part of pipeline construction. Encountered conditions will be monitored during any excavation activities and applicable MMP procedures implemented as needed.

5.1.8 Excavated Material Management – Tract No. NJ-MI-17 & 17.001

The Tract No. NJ-MI-17 & -17.001 property parcels include Tax Identification (ID) Nos. 1215_4185_28.11 and 1215_4185_28.12 and are depicted on the FERC Alignment Sheets 7, 8 and 17 of 18 (refer to **Table 1**). As shown on the alignment sheets, open-cut trench excavation is planned for these parcels to facilitate pipeline installation. Also, a major portion of the Tract No. NJ-MI-17 and 17.001 property parcels will be used for a temporary access road. Based on a review of available information, there are no known environmental concerns for these property parcels and no impacted material is expected to be generated as part of pipeline construction. However, due to the recorded E.I DuPont Denemours and Company CEA that extends onto this property, proximity to the Global Landfill and a mapped Historic Fill area; all excavation activities will be field screened as described in **Section 5.5.** Encountered conditions will be monitored during any excavation activities and applicable MMP procedures implemented as needed (refer to **Section 5.1**).

5.1.9 Excavated Material Management – Tract Nos. NJ-MI-18, -19, -21 & -27

The Tract Numbers NJ-MI-18, -19, -21 & -27 property parcels include Tax Identification (ID) Nos. 1219_449.08_103, 1219_449_12, 1219_449_13.01, and 1219_449_10.03; and are depicted on the FERC Alignment Sheets 8, 9, 10 and 11 of 18 (refer to **Table 1**). As shown on the alignment sheets, open-cut trench excavation is planned for these parcels to facilitate pipeline installation. Based on a review of available information, there are no known environmental concerns for these property parcels and no impacted material is expected to be generated as part of pipeline construction. However, due to the proximity to a mapped Historic Fill area (Garden State Parkway conventional bore); all excavation activities will be field screened as described in **Section 5.5.** Encountered conditions will be monitored during any excavation activities and applicable MMP procedures implemented as needed (refer to **Section 5.1**).

5.1.10 Excavated Material Management – Tract No. NJ-MI-32

The Tract No. NJ-MI-32 property parcel is Tax Identification (ID) No. 1219_451_1.08 and is depicted on FERC Alignment Sheets 11 and 12 of 18 (refer to **Table 1**). As shown on the alignment sheets, open-cut trench excavation is planned for this parcel to facilitate pipeline installation. Based on a review of available information, there are no known environmental concerns for these property parcels and no impacted material is expected to be generated as part of pipeline construction. However, due to the proximity to a mapped Historic Fill area (Garden State Parkway conventional bore); all excavation activities will be field screened as described in **Section 5.5.** Encountered conditions will be monitored during any excavation activities and applicable MMP procedures implemented as needed (refer to **Section 5.1**).

5.1.11 Excavated Material Management – Tract Nos. NJ-MI-33 & -34

The Tract Numbers NJ-MI-33 & -34 property parcels include Tax Identification (ID) Nos. 1219_451_1.09 and 1219_454_1; and are depicted on FERC Alignment Sheets 12 and 13 of 18 (refer to **Table 1)**. As shown on the alignment sheets, open-cut trench excavation and HDD are planned for these parcels to facilitate pipeline installation, including an HDD entry pit to allow for HDD segment advancement. Based on a review of available information, there are no known environmental concerns for these property parcels and no impacted material is expected to be generated as part of pipeline construction. Encountered conditions will be monitored during any excavation activities and applicable MMP procedures implemented as needed (refer to **Section 5.1**).

5.1.12 Excavated Material Management – Tract No. NJ-MI-37

The Tract No. NJ-MI-37 property parcel is Tax Identification (ID) No. 1219_538_9.02.27 and is depicted on the FERC Alignment Sheets 13 & 14 of 18 (refer to **Table 1)**. As shown on the alignment sheets, open-cut trench excavation and HDD are planned for these parcels to facilitate pipeline installation, including an HDD exit pit to allow for HDD segment advancement. Based on a review of available information, there are no known environmental concerns for this property parcel and no impacted material is expected to be generated as part of pipeline construction. Encountered conditions will be monitored during any excavation activities and applicable MMP procedures implemented as needed (refer to **Section 5.1**).

5.2 Construction Dewatering/Water Management

Based on regional land use of the area where construction activities are planned and available historical data, groundwater encountered within planned excavations through known contaminated areas may potentially be contaminated and will need to be assessed during pre-construction sampling or through field screening and sampling (if required) during construction dewatering. Water derived from dewatering of planned excavations will be managed in order of preference as follows:

- Discharge to upland ground surface through sediment control devices in accordance with approved ***Soil Erosion Sediment Control (SESC) Plan*** requirements and authorization to discharge under general permit;

- Authorization to discharge under a general permit or individual permits;

- Discharge to a sanitary sewer with proper municipality pre-approvals inplace;

- Off-site disposal at a permitted facility.

Measures will be taken to properly collect and dispose of potentially contaminated groundwater as further described below.

During all excavation activities, Transco's inspectors will make initial and routine periodic assessments to determine the presence/absence of free product and/or potential groundwater contamination. Although measurable free product is not anticipated, in the event free product or any potential contaminant is observed, discharge will be ceased and this condition will be managed through the placement of absorbents and/or booms, or other appropriate measures. A product recovery vacuum truck will be employed if warranted. Any recovered product will be disposed of at a permitted off-site facility. If no recoverable free product is observed but it is determined that water quality is not suitable for discharge, dewatering may commence to the appropriate container or tank truck. Any temporary tank containers will have secondary containment (overflow/spill guards).

Contractor will provide hoses, pumps, vacuum trucks, tanks, vehicles, equipment and personnel to containerize or dispose of any collected dewatering fluids. Additional tanks will be provided as needed. Any temporary tank containers will have secondary containment. If tank containers are situated in an unsecure area, all tanks will be fitted with valve locks. Transco will sample all containerized fluids to evaluate disposal options. Additionally, the Contractor will prepare a project specific Waste Management Plan (WMP) for any waste stream to be managed for off-site disposal. The WMP will

identify specific waste transporters and disposal facilities, as applicable, for each waste stream and will be approved by a Company environmental representative.

For any construction dewatering, Transco will evaluate permitting options and implement proper procedures to satisfy the specific permit requirements. For any discharge to a sanitary sewer, Transco will obtain an authorization to discharge approval from the applicable entity. Copies on any Authorizations to Discharge under a permit and/or Temporary Discharge Approvals to sanitary sewers will be included in **Appendix I**.

An initial determination of whether dewatering is likely or unlikely during pipeline construction for each specific property parcel is based on the Construction Dewatering Assessment Technical Reports prepared for the proposed Madison Loop pipeline alignments through Old Bridge Township and the Borough of Sayreville (refer to **Appendix G**).

5.2.1 Water Management – Tract No. NJ-MI-1, -2 & -39

Based on a review of available information, there are no known environmental concerns for the Transco-owned property parcels (Tract Nos. NJ-MI-1, -2 & -39) and no impacted groundwater is expected to be generated as part of pipeline construction. However, if groundwater is encountered, water quality conditions will be evaluated during any dewatering activities and applicable MMP procedures implemented as needed. Based on a review of the Construction Dewatering Assessment Technical Report, dewatering is likely required for Tract Nos. NJ-MI-1 & -2; however, it is unlikely that dewatering will be required for Tract No. NJ-MI-39 (refer to **Appendix G**).

5.2.2 Water Management – Tract No. NJ-MI-3.

Based on a review of available information, there are no known environmental concerns for the Tract No. NJ-MI-3 property parcel and no impacted groundwater is expected to be generated as part of pipeline construction. Based on a review of the Construction Dewatering Assessment Technical Report, it is unlikely that dewatering will be required for the Tract No. NJ-MI-3 property (refer to **Appendix G**). However, if groundwater is encountered, water quality conditions will be evaluated during any dewatering activities and applicable MMP procedures implemented as needed.

5.2.3 Water Management – Tract No. NJ-MI-4

Based on a review of available information, there are no known environmental concerns for the Tract No. NJ-MI-4 property parcel and no impacted groundwater is expected to be generated as part of pipeline construction. Based on a review of the Construction Dewatering Assessment Technical Report, it is unlikely that dewatering will be required for the Tract No. NJ-MI-4 property (refer to **Appendix G**). However, if groundwater is encountered, water quality conditions will be evaluated during any dewatering activities and applicable MMP procedures implemented as needed.

5.2.4 Water Management – Tract Nos. NJ-MI-5, -8 & -9

Based on a review of available information, there are no known environmental concerns for the Tract Numbers NJ-MI-5, -8 & -9 property parcels and no impacted groundwater is expected to be generated as part of pipeline construction. Based on a review of the Construction Dewatering Assessment Technical Report, it is unlikely that dewatering will be required for the Tract No. NJ-MI-5, -8 or-9 property parcels (refer to **Appendix G**). However, if groundwater is encountered, water quality conditions will be evaluated during any dewatering activities and applicable MMP procedures implemented as needed. It should be noted that the recorded E.I. DuPont Denemours and Company CEA extends onto these parcels (**Figure 4**).

5.2.5 Water Management - Tract No. NJ-MI-12

Based on a review of available information, there are no known environmental concerns for the NJ-MI-12 property parcel and no impacted material is expected to be generated as part of pipeline construction. However, due to the recorded E.I DuPont Denemours and Company CEA that extends onto this property, and close proximity to the Global Sanitary Landfill, groundwater may be impacted with dissolved metals (i.e., zinc & nickel). If groundwater is encountered and dewatering is required; containment, treatment prior to discharge, or offsite disposal may be required. Water collection, treatment, discharge and disposal options are currently being evaluated. Based on a review of the Construction Dewatering Assessment Technical Report, it is likely that dewatering will be required for the Tract No. NJ-MI-12 property (refer to **Appendix G**).

5.2.6 Water Management – Tract Nos. NJ-MI-13 & -15

Based on a review of available information, there are no known environmental concerns for the Tract No. NJ-MI-13 & -15 property parcels and no impacted groundwater is expected to be generated as part of pipeline construction. However, based on the recorded E.I. DuPont Denemours and Company CEA that extends onto this property, water collection and disposal options will be evaluated and implemented as needed. Based on a review of the Construction Dewatering Assessment Technical Report, dewatering is possibly required for Tract No. NJ-MI-15; however, it is unlikely that dewatering will be required for Tract No. NJ-MI-13 (refer to **Appendix G**).

5.2.7 Water Management – Tract No. NJ-MI-16.

Based on a review of available information, there are no known environmental concerns for the Tract No. NJ-MI-16 property parcel and no impacted groundwater is expected to be generated as part of pipeline construction. The NJ-MI-16 property is to be used for an access road only and no dewatering is expected to be required. However, if groundwater is encountered, water quality conditions will be evaluated during any dewatering activities and applicable MMP procedures implemented as needed.

5.2.8 Water Management – Tract Nos. NJ-MI-17 & -17.001.

Based on a review of available information, there are no known environmental concerns for the Tract Numbers NJ-MI-17 & -17.001 property parcels and no impacted material is expected to be generated as part of pipeline construction. However, due to the recorded E.I DuPont Denemours and Company CEA that extends onto this property, and close proximity to the Global Sanitary Landfill, and mapped Historic Fill in the area; groundwater may be impacted. If groundwater is encountered and dewatering is required; containment, treatment prior to discharge, or offsite disposal may be required. Water collection, treatment, discharge and disposal options are currently being evaluated. Based on a review of the Construction Dewatering Assessment Technical Report, dewatering is likely required for Tract No. NJ-MI-17; however, it is unlikely that dewatering will be required for Tract No. NJ-MI-17.001 (refer to **Appendix G**).

5.2.9 Water Management – Tract Nos. NJ-MI-18, -19, -21 & -27

Based on a review of available information, there are no known environmental concerns for the Tract Numbers NJ-MI-18, -19, -21 & -27 property parcels and no impacted material is expected to be generated as part of pipeline construction. However, due to the presence of mapped Historic Fill (Garden State Parkway bore) groundwater may be impacted. If groundwater is encountered and dewatering is required; containment, treatment prior to discharge, or offsite disposal may be required. Water collection, treatment, discharge and disposal options are currently being evaluated. Based on a review of the Construction Dewatering Assessment Technical Report, dewatering is likely required for Tract Nos. NJ-MI-19, -21 & -27; however, it is unlikely that dewatering will be required for Tract No. NJ-MI-18 (refer to **Appendix G**).

5.2.10 Water Management – Tract No. NJ-MI-32

Based on a review of available information, there are no known environmental concerns for the Tract No. NJ-MI-32 property parcel and no impacted material is expected to be generated as part of pipeline construction. However, due to the presence of mapped Historic Fill in the area (Garden State Parkway bore), groundwater may be impacted. If groundwater is encountered and dewatering is required; containment, treatment prior to discharge, or offsite disposal may be required. Water collection, treatment, discharge and disposal options are currently being evaluated. Based on a review of the Construction Dewatering Assessment Technical Report, dewatering is likely required for Tract No. NJ-MI-32 (refer to **Appendix G**).

5.2.11 Water Management – Tract Nos. NJ-MI-33 & -34

Based on a review of available information, there are no known environmental concerns for the Tract Nos. NJ-MI-33 & -34 property parcels and no impacted groundwater is expected to be generated as part of pipeline construction. However, if groundwater is encountered, water quality conditions will be evaluated during any dewatering activities and applicable MMP procedures implemented as needed. Based on a review of the Construction Dewatering Assessment Technical Report, dewatering is likely required for Tract Nos. NJ-MI-33 & -34 property parcels (refer to **Appendix G**).

5.2.12 Water Management – Tract No. NJ-MI-37

Based on a review of available information, there are no known environmental concerns for the Tract No. NJ-MI-37 property parcel and no impacted groundwater is expected to be generated as part of pipeline construction. Based on a review of the Construction Dewatering Assessment Technical Report, it is unlikely that dewatering will be required for Tract No. NJ-MI-37 (refer to **Appendix G**). However, if groundwater is encountered, water quality conditions will be evaluated during any dewatering activities and applicable MMP procedures implemented as needed.

5.3 Management of Horizontal Directional Drilling (HDD) Fluids/Cuttings

The HDD operations planned on this Project will generate combined drilling mud and soil cuttings (HDD fluids) in the form of "slurry". These "slurry" materials will be collected at both the entry and exit pits utilizing submersible pumps and transferred directly to storage tanks for temporary storage within designated workspace areas. The containerized HDD fluids will be characterized by Contractor for proper transport and off-site disposal via tanker truck or other appropriate container. Copies of all analytical testing and disposal documentation will be maintained and included in the final documentation for this project. "*Transcontinental Gas Pipe Line Company, LLC*" will be identified as the generator of all construction derived waste that is managed for offsite disposal. Transco will pre-approve any disposal facility and will review and sign ALL profiles, manifests and shipping documents.

During HDD activities, visual inspection of the alignment in conjunction with monitoring the volume of the fluids produced versus returned will be accomplished in an effort to identify any inadvertent return of HDD fluids to the land surface. In the event that an inadvertent return occurs, HDD operations will temporarily cease while measures to mitigate the return are employed. These measures will at a minimum include; notification to construction supervision, surrounding the area with the approved sediment barrier, collection of fluids that have accumulated at the land surface, containerizing the fluids, and characterization for proper disposal. HDD fluids collected during an inadvertent return event will not be co-mingled with HDD fluids generated and collected at the entry or exit pits until waste characterization has been completed. The ground surface at the inadvertent return location will be restored to pre-existing grade and condition. Monitoring and mitigation of any inadvertent fluid returns during HDD operations will be completed in accordance with the ***Onshore Directional Drill Contingency Plan***.

Contractor is responsible for management of all excavated materials at the HDD entry and exit points in accordance with **Section 5.1**; as well as all HDD fluids, cuttings and any wastes generated during any HDD activity.

Additionally, the Contractor will prepare a project specific Waste Management Plan (WMP) for any waste stream to be managed for off-site disposal. The WMP will identify specific waste transporters and disposal facilities, as applicable, for each waste stream and will be approved by a Company environmental representative.

5.4 Management of Conventional Bore Cuttings

During the planned pipeline construction, conventional bore activities at road crossings (refer to **Table 2**) as described in **Section 2.0** will generate soil cuttings and water in each bore pit. The material (cuttings and water) generated during the advancement of the bore will be monitored for each property where a conventional bore is performed. Cutting materials generated from the bore will be field screened within the bore pit for potential contamination as described in **Section 5.5.**

Bore cuttings will be allowed to drain of any free liquid within the bore pit and will be field screened by Transco prior to stockpiling adjacent to the bore pit or transferring to a designated stockpile area or container. The Contractor will place any cuttings suspected to be contaminated directly into the appropriate containers for disposal or staged on and covered with plastic within a designated area of the temporary workspace approved by a Transco representative. Bore cuttings will be managed similar to excavated material as described in **Section 5.1**. The stockpiled/containerized wastes will be characterized by Transco for proper handling and offsite disposal considerations. *"Transcontinental Gas Pipe Line Company, LLC"* will be identified as the generator of all conventional bore derived waste that is managed for offsite disposal. Additionally, the Contractor will prepare a project specific Waste Management Plan (WMP) for any waste stream to be managed for off-site disposal. The WMP will identify specific waste transporters and disposal facilities, as applicable, for each waste stream and will be approved by a Company environmental representative. Copies of all waste characterization sample laboratory analytical results and disposal documentation for any bore cuttings will be maintained and included in the final documentation provided for this project (**Section 6.0**).

If groundwater is encountered during advancement of the conventional bore, it may be necessary to collect water at both the entry and exit pits. Water will be collected utilizing submersible pumps and managed in accordance with the procedures outlined in **Section 5.2**.

5.5 Field Evaluations of Excavated Material, Groundwater and HDD/Bore Cuttings

The following field guidance is provided for identification of potential buried waste and/or soil and groundwater contamination during the Project for the planned pipeline excavations described in **Section 2.0,** including open cut pipeline installation, HDD entry and exit pits, and conventional bores. The expected visual and olfactory signs and photoionization detector (PID) readings which may indicate the presence of obvious waste, soil or groundwater contamination are discussed below.

Visual

- The soil may have an oily or tar-like appearance and may exhibit an oily sheen on the surface.
- Debris and waste may be present in the form of bags of plastic, paper, metals, etc.
- Water may exhibit an oil sheen, or petroleum hydrocarbons may be visible as tar balls or free product floating on the surface.
- The presence of drums or other waste containers including tanks.
- The presence of flowing petroleum product or sludge.

Olfactory

- The soil or water may have a sulfur (rotten egg), petroleum or chemical odor.
- A petroleum odor will likely be coupled with an oily or tar-like appearance. Soils or water with a chemical odor may not exhibit any visual signs of contamination.

PID Readings

- All soil, debris, waste and water encountered during pipeline excavation will be field screened for volatile organic vapors using a PID.
- PID readings will be recorded for each type of excavated material encountered and used in conjunction with visual and olfactory observations to make determinations with regard to proper management of excavated material.

If field observations (visual/olfactory) and elevated PID readings indicate that obvious waste materials or contamination appear to be present, or heavy staining is present in the excavated material from the planned excavations, the soils/materials will be required to be handled as impacted/unsuitable and will be managed as described above.

If encountered soil is deemed suitable as pipeline backfill based on field observations (visual/olfactory) and PID readings, the excavated material will be temporarily placed adjacent to the trench during excavation or in a designated stockpile area in the approved workspace.

5.6 Disposal Documentation and Backfill Material Requirements

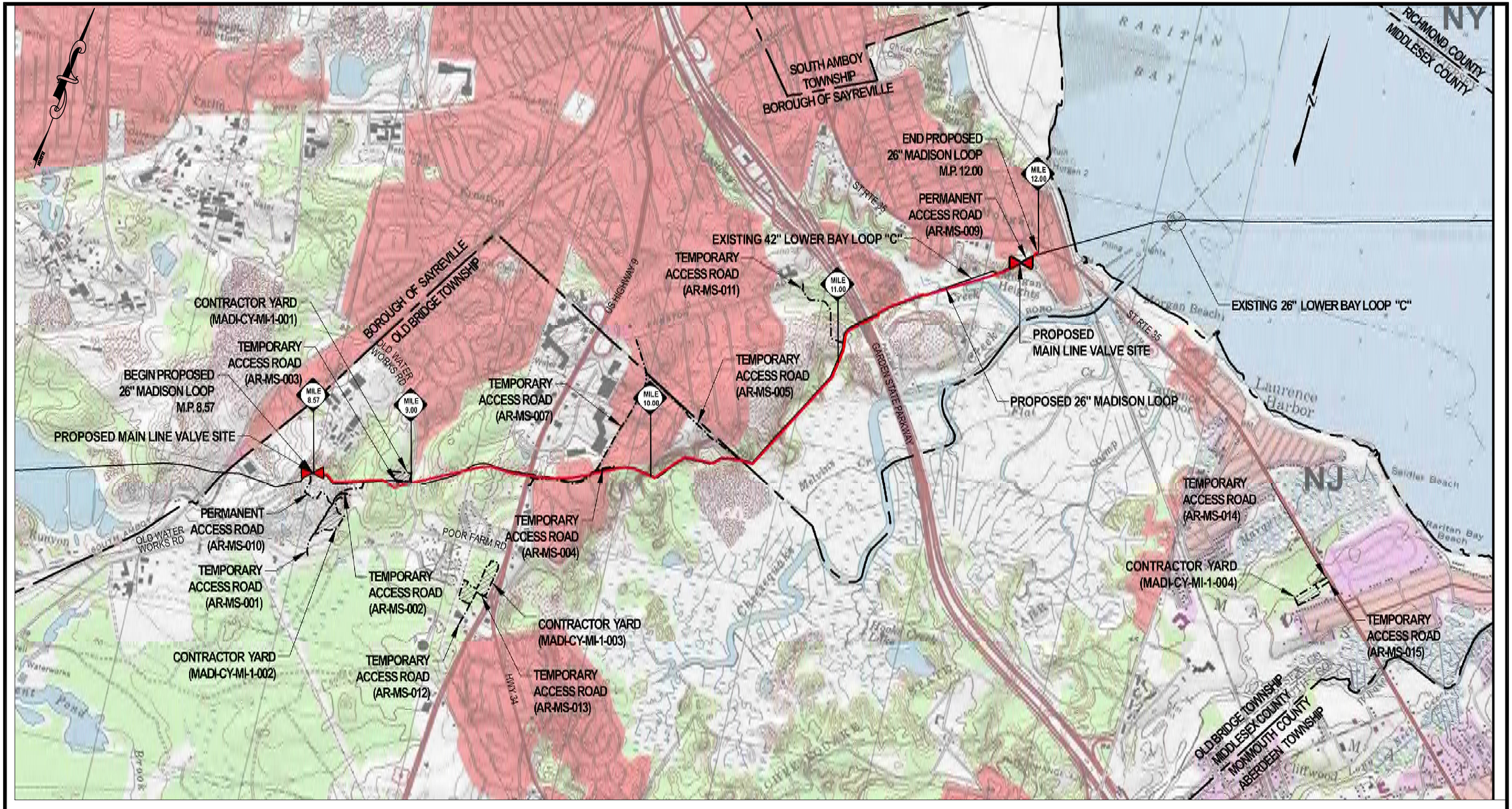
Transportation and disposal of any waste material generated during the planned excavation activities will be managed as described above and will be accomplished utilizing only approved licensed and permitted waste haulers and disposal facilities All federal, state, and local rules and regulations will be adhered to including county solid waste flow control rules. **TBD** will be responsible for obtaining all waste acceptance and approvals for disposal. For the planned excavation, HDD and conventional bore activities, *"Transcontinental Gas Pipe Line Company, LLC"* will be identified as the generator of all construction derived waste that is managed for offsite disposal.

Transco will be responsible for performing any required waste characterization sampling. **TBD** is also responsible for obtaining all the required paperwork for shipment of this waste material including bill-of-lading, manifest, etc. **TBD** is responsible for the accurate completion of all shipping documentation and ensuring that all disposal information is provided for the final summary report.

Certified clean fill will be required for backfill supplied for any excavation where unsuitable material was removed. Transco must pre-approve any imported backfill material and will review ALL clean fill certification documents including laboratory analytical data packages and clean fill certification letters to be provided by the supplier. A copy of a clean fill certification template is provided in **Appendix J.**

6.0 REPORTING AND DOCUMENTATION

Following completion of this linear construction project, a *Final Linear Construction Report* and *Final Report Form* will be prepared and submitted to the NJDEP by the assigned Licensed Site Remediation Professional **(**LSRP**)**. The *Final Linear Construction Report* will include, among other things, a summary of the materials management activities, waste characterization sampling results and all associated disposal and backfill documentation.



2000' 0 2000'

SCALE IN FEET

LEGEND

- PROPOSED 26" MADISON LOOP
- EXISTING PIPELINE
- ACCESS ROADS
- COUNTY/TOWNSHIP BOUNDARY
- CONTRACTOR YARD

SOURCE:
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
TOPOGRAPHICAL PROJECT LOCATION MAP, NORTHEAST SUPPLY ENHANCEMENT PROJECT, PROPOSED 26" MADISON LOOP, M.P. 8.57 TO M.P. 12.00, MIDDLESEX COUNTY, NEW JERSEY - DRAWING NO. F-TM-MADI-D-01, SHEET 1 OF 1, DATED 5/10/18.

GROUND WATER INVESTIGATIONS HYDROGEOLOGY, P.C.

Montgomery, New York

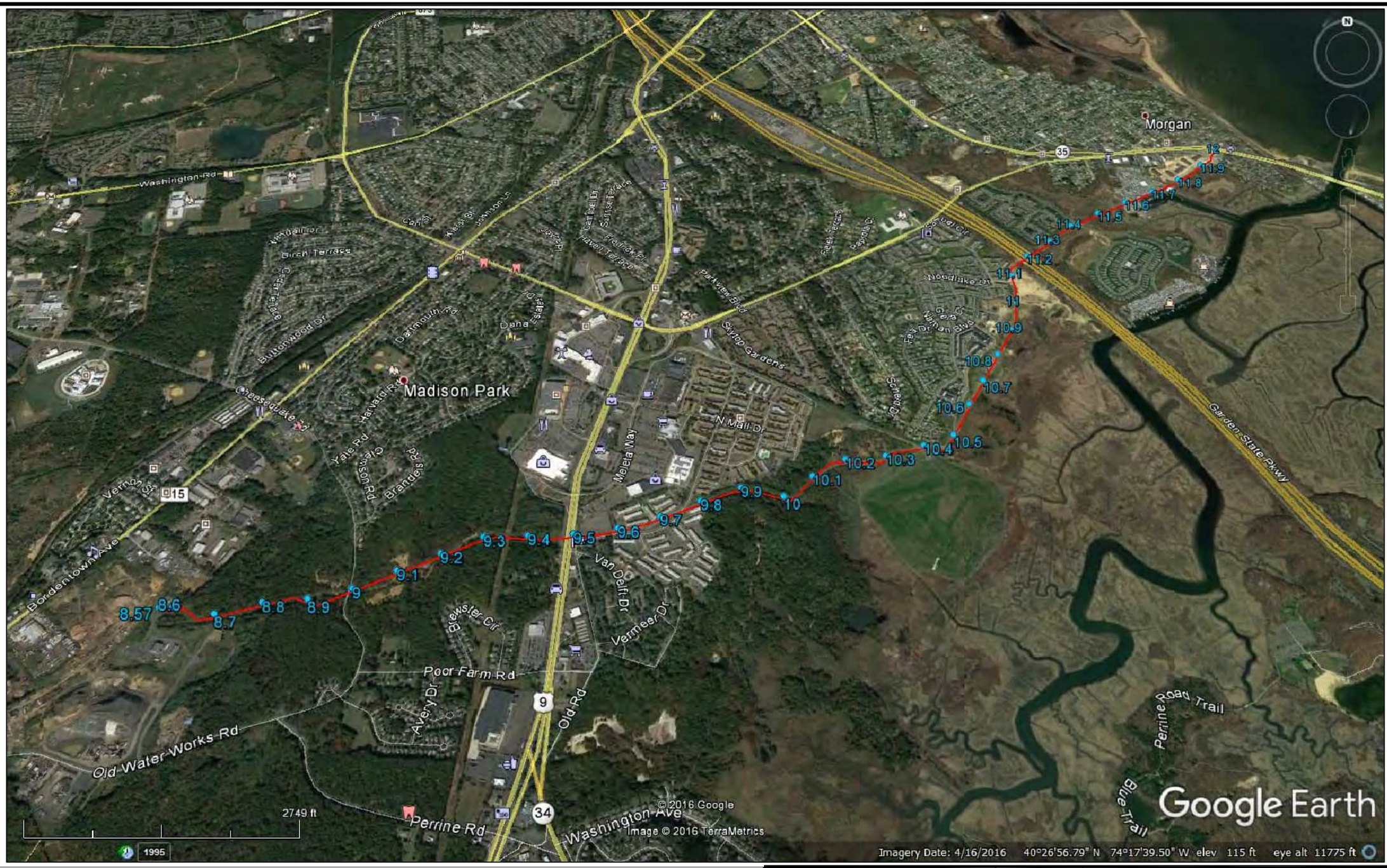
Project No.	596-17-00
Scale:	1"=2000'
Date:	5/10/18
Designed By:	LFC
Checked By:	LFC
Drawn By:	KAH

FIGURE 1

PROJECT LOCATION USGS QUAD

TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26-INCH MADISON LOOP
MIDDLESEX COUNTY, NEW JERSEY

S:\Projects\01-Transco\596-17-00\(Transco NESE-Madison Loop Oversight)\Madison Loop MMP (November 2017)\May 2018 Revisions\Figure-01.dwg LAST REV: 5/9/18



SOURCE:
GOOGLE EARTH

LEGEND:

APPROXIMATE ALIGNMENT OF PROPOSED 26" PIPELINE - MADISON LOOP

8.57 APPROXIMATE PIPELINE MILEPOST

GROUND WATER INVESTIGATIONS, INC.
Montgomery, New York

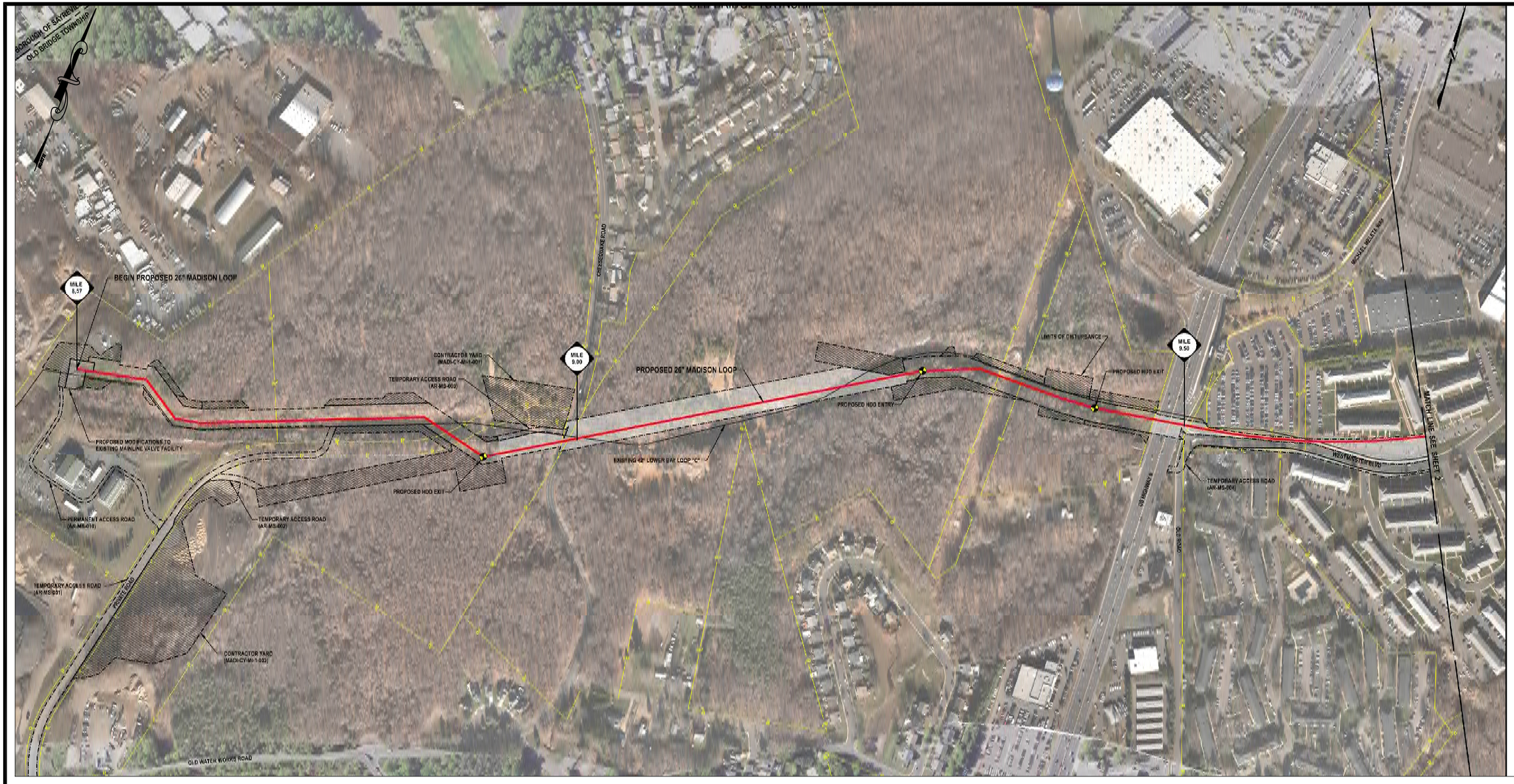
Project No.	596-17-00
Scale:	AS SHOWN
Date:	1/27/17
Designed By:	LFC
Checked By:	LFC
Drawn By:	KAH

FIGURE 2

PROJECT LOCATION AERIAL VIEW

TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26-INCH MADISON LOOP
MIDDLESEX COUNTY, NEW JERSEY

S:\Projects\01-Transco\596-17-00(Transco NESE-Madison Loop Oversight)\Figure-02.dwg LAST REV: 11/30/17



LEGEND

- PROPOSED 26" MADISON LOOP
- EXISTING PIPELINES
- LIMITS OF DISTURBANCE
- TOWNSHIP BOUNDARY
- PROPERTY LINE
- ADDITIONAL TEMPORARY WORKSPACE (A.T.W.S.)
- HDD FOOT TRAFFIC

SOURCE:
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
FERC AERIAL ROUTE MAP, NORTHEAST SUPPLY ENHANCEMENT PROJECT, PROPOSED 26" MADISON LOOP, M.P. 8.57 TO M.P. 12.00, MIDDLESEX COUNTY, NEW JERSEY - DRAWING NO. F-AM-MADI-D-01, SHEET 1 OF 6, DATED 5/10/18.

GROUND WATER INVESTIGATIONS HYDROGEOLOGY, P.C.

Montgomery, New York

Project No.	596-17-00
Scale:	1"=400'
Date:	11/21/17
Designed By:	LFC
Checked By:	LFC
Drawn By:	KAH

FIGURE 3A

PROPOSED PIPELINE ROUTE (1 OF 3)

TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26-INCH MADISON LOOP
MIDDLESEX COUNTY, NEW JERSEY

S:\Projects\01-Transco\596-17-00\(Transco NESE-Madison Loop Oversight)\Madison Loop MMP (November 2017)\May 2018 Revisions\Figure-03A.dwg LAST REV: 5/9/18



400' 0 400'

SCALE IN FEET

LEGEND

- PROPOSED 26" MADISON LOOP
- EXISTING PIPELINES
- LIMITS OF DISTURBANCE
- TOWNSHIP BOUNDARY
- PROPERTY LINE
- ADDITIONAL TEMPORARY WORKSPACE (A.T.W.S.)
- HDD FOOT TRAFFIC

SOURCE:
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
FERC AERIAL ROUTE MAP, NORTHEAST SUPPLY ENHANCEMENT PROJECT, PROPOSED 26" MADISON LOOP, M.P. 8.57 TO M.P. 12.00, MIDDLESEX COUNTY, NEW JERSEY - DRAWING NO. F-AM-MADI-D-01, SHEET 2 OF 6, DATED 5/10/18.

GROUND WATER INVESTIGATIONS HYDROGEOLOGY, P.C.

Montgomery, New York

Project No.	596-17-00
Scale:	1"=400'
Date:	11/21/17
Designed By:	LFC
Checked By:	LFC
Drawn By:	KAH

FIGURE 3B

PROPOSED PIPELINE ROUTE (2 OF 3)

TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26-INCH MADISON LOOP
MIDDLESEX COUNTY, NEW JERSEY

S:\Projects\01-Transco\596-17-00(Transco NESE-Madison Loop Oversight)\Madison Loop MMP (November 2017)\May 2018 Revisions\Figure-03B.dwg LAST REV: 5/9/18



400' 0 400'

SCALE IN FEET

LEGEND

- PROPOSED 26" MADISON LOOP
- EXISTING PIPELINES
- LIMITS OF DISTURBANCE
- TOWNSHIP BOUNDARY
- PROPERTY LINE
- ADDITIONAL TEMPORARY WORKSPACE (A.T.W.S.)
- HDD FOOT TRAFFIC

SOURCE:
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
FERC AERIAL ROUTE MAP, NORTHEAST SUPPLY ENHANCEMENT PROJECT, PROPOSED 26" MADISON LOOP, M.P. 8.57 TO M.P. 12.00, MIDDLESEX COUNTY, NEW JERSEY - DRAWING NO. F-AM-MADI-D-01, SHEET 3 OF 6, DATED 5/10/18.

GROUND WATER INVESTIGATIONS HYDROGEOLOGY, P.C.

Montgomery, New York

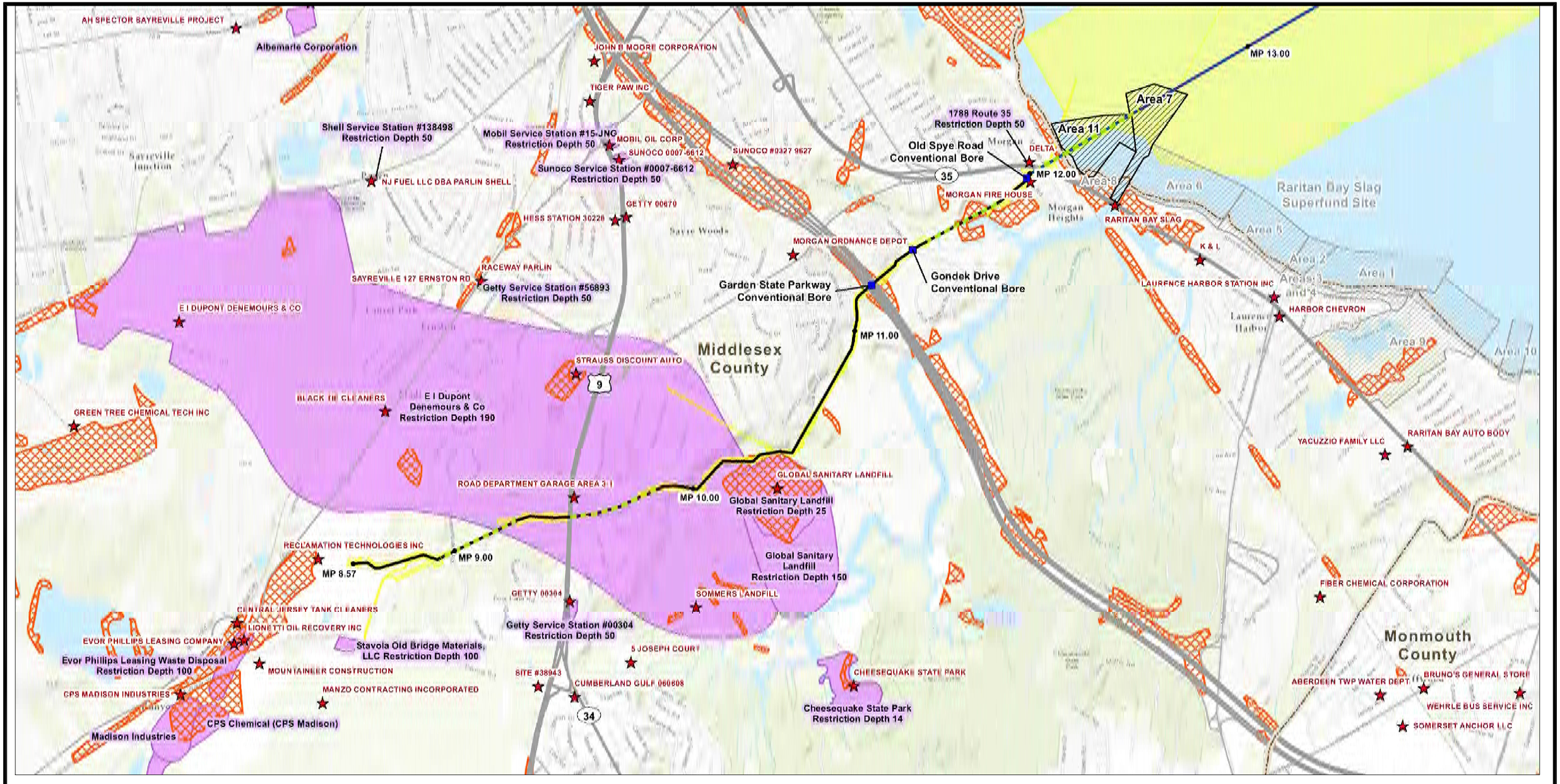
Project No.	596-17-00
Scale:	1"=400'
Date:	11/21/17
Designed By:	LFC
Checked By:	LFC
Drawn By:	KAH

FIGURE 3C

PROPOSED PIPELINE ROUTE (3 OF 3)

TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26-INCH MADISON LOOP
MIDDLESEX COUNTY, NEW JERSEY

S:\Projects\01-Transco\596-17-00(Transco NESE-Madison Loop Oversight)\Madison Loop MMP (November 2017)\May 2018 Revisions\Figure-03C.dwg LAST REV: 5/9/18



Legend

- Milepost
- Approximate Conventional Boring Location
- Madison Loop (Proposed)
- Raritan Bay Loop
- Approximate HDD Segment
- County Boundary
- Major and Secondary Roads
- Local Road
- Construction Workspace
- NJDEP Known Contaminated Site
- NJDEP Groundwater Contamination Classification Exception Area (CEA)
- Historic Fill Area (>5 acres, as of Jan 2018)
- Raritan Bay Slag Superfund Site

NJDEP = New Jersey Department of Environmental Protection

0 0.25 0.5 Miles



SOURCE:
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC NJDEP KNOWN CONTAMINATED SITES, NORTHEAST SUPPLY ENHANCEMENT PROJECT, NEW JERSEY-FIGURE 2A-5, SHEET 1 OF 1, DATED 4/19/17.

2000' 0 2000'
SCALE IN FEET

GROUND WATER INVESTIGATIONS, INC.
Montgomery, New York

Project No.	596-17-00
Scale:	1"=2000'
Date:	11/30/17
Designed By:	LFC
Checked By:	LFC
Drawn By:	KAH

FIGURE 4

NJDEP KNOWN CONTAMINATED SITES

TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26-INCH MADISON LOOP
MIDDLESEX COUNTY, NEW JERSEY

S:\Projects\01-Transco\596-17-00(Transco NESE-Madison Loop Oversight)\Figure-04.dwg LAST REV: 11/30/17

ATTACHED TABLES

TABLE 1

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
NORTHEAST SUPPLY ENHANCEMENT (NESE) PROJECT
26-INCH MADISON LOOP LINEAR CONSTRUCTION PROJECT (LCP)
OLD BRIDGE TOWNSHIP AND BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

2018 CONSTRUCTION LINE LIST SUMMARY - PROPERTY PARCELS

Tract No.	*Tax ID No.*	*Alignment Sheet Reference*	*Pre-Construction Environmental Sampling Proposed*	*Anticipated Types of Materials to be Generated*
NJ-MI-1	1215_5001_13.18	1 of 18	X	E/W
NJ-MI-2	1215_5001_13.14	1 & 2 of 18	X	E/W
NJ-MI-3	1215_5001_13.17	2, 15 & 16 of 18	-	E
NJ-MI-4	1215_5001_13.16	2 & 15 of 18	-	E/HDD
NJ-MI-5	1215_5000_4_QFARM	2, 3 & 4 of 18	-	E/HDD
NJ-MI-8	1215_5000_18_QFARM	4 of 18	-	E
NJ-MI-9	1215_5000_23_QFARM	4 of 18	-	E/HDD
NJ-MI-10	1215_4185_9.11	4 & 5 of 18	X	None
NJ-MI-12	1215_4185_10	5, 6 & 7 of 18	-	E/W/HDD
NJ-MI-13	1215_4185_12.11	6 of 18	-	None
NJ-MI-15	1215_4185_12.12	6 of 18	-	E/W/HDD
NJ-MI-16	1215_4185_4.11	17 & 18 of 18	-	None*
NJ-MI-17	1215_4185_28.11	7, 8 & 17 of 18	X	E/W
NJ-MI-17.001	1215_4185_28.12	17 of 18	-	None*
NJ-MI-18	1219_449.08_103	8 of 18	-	E
NJ-MI-19	1219_449_12	8 of 18	X	E/W
NJ-MI-21	1219_449_13.01	8, 9 & 10 of 18	X	E/W
NJ-MI-27	1219_449_10.03	10 & 11 of 18	X	E/W/B
NJ-MI-32	1219_451_1.08	11 & 12 of 18	X	E/W/B
NJ-MI-33	1219_451_1.09	12 of 18	-	E/W/B
NJ-MI-34	1219_454_1	12 & 13 of 18	-	E/W/HDD
NJ-MI-35	1219_538_13	13 of 18	-	None
NJ-MI-37	1219_538_9.02, 27	13 & 14 of 18	X	E/HDD
NJ-MI-39	1219_538_99.111	14 of 18	-	E

Notes:

E - Excavated materials derived from pipeline trench and HDD pit or Conventional Bore pit excavations.

W - Water derived from construction dewatering of pipeline excavations.

HDD - Horizontal Directional Drilling Fluids/Cuttings collected at HDD entry or exit pits.

B - Conventional Bore Cuttings collected in Bore pit.

* - Access Road Only.

TABLE 2

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
NORTHEAST SUPPLY ENHANCEMENT (NESE) PROJECT
26-INCH MADISON LOOP LINEAR CONSTRUCTION PROJECT (LCP)
OLD BRIDGE TOWNSHIP AND BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

2018 CONSTRUCTION LINE LIST SUMMARY - ROAD CROSSINGS

Tract No.	*Crossing/Driveway Entrance*	*Alignment Sheet Reference*	*Type of Crossing*	*Stakeholder*	*Anticipated Types of Material to be Generated*
NJ-MI-001.000.RD	Cheesequake Road	2 of 18	Road Crossing-HDD	Township of Old Bridge	None
NJ-MI-002.000.RD	US Highway 9	4 of 18	Road Crossing-HDD	NJDOT	None
NJ-MI-003.000.RD	Garden State Parkway	11 of 18	Road Crossing-Bore	NJTA	E/W/B
NJ-MI-004 & -005.000.RD	Gondek Drive	12 of 18	Road Crossing-Bore	Borough of Sayreville	E/W/B
NJ-MI-006.000.RD	Old Spye Road	14 of 18	Road Crossing-Bore	Borough of Sayreville	E/W/B

NOTES:

E - Excavated Materials

W - Water Derived from Construction Dewatering

B - Conventional Bore Cuttings

TABLE 3

NORTHEAST SUPPLY ENHANCEMENT (NESE) PROJECT
26-INCH MADISON LOOP LINEAR CONSTRUCTION PROJECT (LCP)
OLD BRIDGE TOWNSHIP AND BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

LIST OF KNOWN CONTAMINATED SITES WITHIN CLOSE PROXIMITY TO PROPOSED ALIGNMENT

Site Name	*Municipality*	*Source*	*Distance from Pipeline (in miles)*	*Direction from Pipeline*	*Position of Pipeline Relative to Identified Site*	*Approximate Milepost (M.P.)*	*Site Status*	*Site ID No.*
Reclamations Technologies Inc.	Old Bridge	NJDEP DataMiner and GeoWeb	>0.1	West	Upgradient	-	active	NJDEP Site Remediation Program PI ID #129931
E I Dupont Nemours Co. CEA	Old Bridge	NJDEP DataMiner and Geoweb	<0.1	North and South	Upgradient and Downgradient	9.20 - 10.31	active	NJDEP Site Remediation Program PI ID #008222
Road Department Garage Area 3-1	Old Bridge	NJ Release, NJ Brownfields	<0.1	North	Downgradient	9.50	active	NJDEP Site Remediation Program PI ID #012743
Global Sanitary Landfill Superfund Site & CEA	Old Bridge	NPL, NJDEP DataMiner and Geoweb	<0.1	South	Upgradient	10.13 -10.38	active	EPA ID #NJD063160667
Historic Fill	Old Bridge	NJDEP Historic Fill Maps & Geoweb	0.0	-	Transects	10.24 - 10.34	-	Mapped Historic Fill
Morgan Ordance Depot	Sayreville	USACE FUDS	0.3	Northwest	Downgradient	11.10	inactive	NJ EMS Site ID No. 80914
Morgan Fire House	Sayreville	SHWS/HIST HWS, New Jersey Release	<0.1	South	Upgradient	12.00	inactive	NJDEP Site Remediation Program PI ID #003720
1788 Route 35 in Sayreville, NJ	Sayreville	SHWS/HIST HWS, New Jersey Release, New Jersey Spill	<0.1	Northeast	Downgradient	12.00	active	NJDEP Site Remediation Program PI ID #026234
Historic Fill	Sayreville	NJDEP Historic Fill Maps & Geoweb	0.0	-	Transects	11.17 -11.25	-	Mapped Historic Fill
Historic Fill	Sayreville	NJDEP Historic Fill Maps & Geoweb	0.0	-	Transects	11.62 -11.78	-	Mapped Historic Fill

USACE FUDS – United States Army Corps of Enineers Formerly Used Defense Sites. The Department of Defense is responsible for the environmental restoration of properties that were formerly owned by, leased to, or otherwise possessed by the United States and are under the jurisdiction of the Secretary of Defense prior to October 1986.

New Jersey Brownfields – Brownfields sites are identified as former or current commercial or industrial use sites that are presently vacant or underutilized on which there is suspected to have been a discharge of contamination to the soil or groundwater at concentrations greater than the applicable cleanup criteria.

New Jersey Release – New Jersey Hazardous Material Release database is a record of the initial notification information reported to the NJDEP's Action Line.

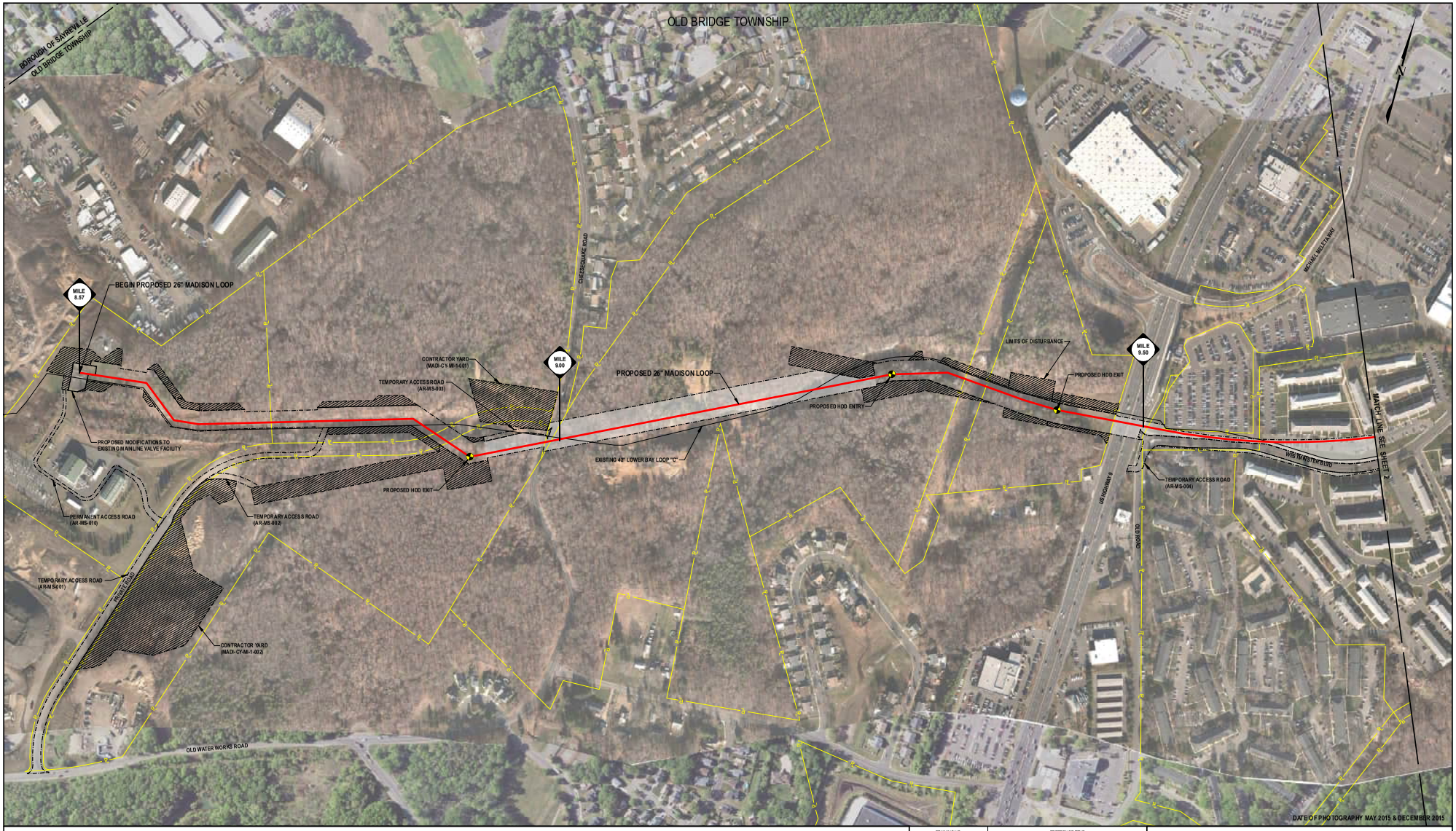
New Jersey Spill – All HazMat known or unknown spills to the ground reported to the NJ DEP's Action Line.

NPL – National Priority List database, also known as Superfund, is a subset of Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the United States Environmental Protection Agency.

SHWS/HIST HWS - State Hazardous Waste Sites/Historic Hazardous Waste Sites – Known Contaminated Sites in New Jersey database is a municipal listing of sites where contamination of soil and/or groundwater is confirmed at levels greater than the applicable cleanup criteria or standards. Remedial activities are under way or required at the sites with an on-site source(s) of contamination and at locations where the source(s) of contamination are unknown. Sites with completed remedial work that require engineering and/or institutional controls have reporting measures in place to ensure the effectiveness of past actions, and some include maintenance and/or monitoring.

APPENDICES

APPENDIX A
FERC AERIAL ROUTE MAPS (PLAN SHEETS 1 THROUGH 3)



LEGEND

- PROPOSED 26" MADISON LOOP
- EXISTING PIPELINES
- LIMITS OF DISTURBANCE
- TOWNSHIP BOUNDARY
- PROPERTY LINE
- ADDITIONAL TEMPORARY WORKSPACE (A.T.W.S.)
- HDD FOOT TRAFFIC

MUSTANG OF NEW JERSEY, INC.

0 200 400 600
SCALE IN FEET

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
FERC AERIAL ROUTE MAP
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26" MADISON LOOP
M.P. 8.57 TO M.P. 12.00
MIDDLESEX COUNTY, NEW JERSEY

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK	APP
0	03/20/2017	JN	ISSUED FOR FERC FILING	1185727	ELR	EL
1	06/01/2017	JN	ISSUED FOR SUPPLEMENTAL FILING #1	1185727	ELR	EL
2	05/10/2018	AB	ISSUED FOR SUPPLEMENTAL FILING #6	1185727	W.	EL

DRAWN BY:	JN	DATE	03/06/17	ISSUED FOR BID	SCALE 1" = 200'
CHECKED BY:	EP	DATE	03/06/17	ISSUED FOR CONSTRUCTION	REVISION 2
APPROVED BY:	EL	DATE	03/06/17	DRAWING NUMBER: F-AM-MADI-D-01	SHEET 1 OF 6
W.O.	1185727	ISSUE BY FTI			

\\ap-fs-arcgis-1.woodgroup.com\GIS_Projects\01_Projects\180259\03_Exhibits\10_Full_Size_Aerial_Maps\2018_02_14\MadisonMadison.mxd



LEGEND

- PROPOSED 26" MADISON LOOP
- EXISTING PIPELINES
- LIMITS OF DISTURBANCE
- TOWNSHIP BOUNDARY
- PROPERTY LINE
- ADDITIONAL TEMPORARY WORKSPACE (A.T.W.S.)
- HDD FOOT TRAFFIC

MUSTANG OF NEW JERSEY, INC.

0 200 400 600
SCALE IN FEET

DRAWING NO. | REFERENCE TITLE

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.
0	03/20/2017	JN	ISSUED FOR FERC FILING	1185727	ELR	EL
1	06/01/2017	JN	ISSUED FOR SUPPLEMENTAL FILING #1	1185727	ELR	EL
2	05/10/2018	AB	ISSUED FOR SUPPLEMENTAL FILING #6	1185727	W.	EL

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
FERC AERIAL ROUTE MAP
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26" MADISON LOOP
M.P. 8.57 TO M.P. 12.00
MIDDLESEX COUNTY, NEW JERSEY

Williams

DRAWN BY:	JN	DATE	03/06/17	ISSUED FOR BID	SCALE 1" = 200'
CHECKED BY:	EP	DATE	03/06/17	ISSUED FOR CONSTRUCTION	REVISION 2
APPROVED BY:	EL	DATE	03/06/17	DRAWING NUMBER: F-A-M-MADI-D-01	SHEET 2
W.O.	1185727	ROUTE ID	211		OF 6

\\ap-fs-arcgis-1.woodgroup.com\GIS_Projects\01_Projects\180259\03_Exhibits\10_Full_Size_Aerial_Maps\2018_02_14\MadisonMadison.mxd



LEGEND

- PROPOSED 26" MADISON LOOP
- EXISTING PIPELINES
- LIMITS OF DISTURBANCE
- TOWNSHIP BOUNDARY
- PROPERTY LINE
- ADDITIONAL TEMPORARY WORKSPACE (A.T.W.S.)
- HDD FOOT TRAFFIC

MUSTANG OF NEW JERSEY, INC.

0 200 400 600
SCALE IN FEET

DRAWING NO.	REFERENCE TITLE

TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC
FERC AERIAL ROUTE MAP
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26" MADISON LOOP
M.P. 8.57 TO M.P. 12.00
MIDDLESEX COUNTY, NEW JERSEY

Williams

NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK	APP
0	03/20/2017	JN	ISSUED FOR FERC FILING	1185727	ELR	EL
1	06/01/2017	JN	ISSUED FOR SUPPLEMENTAL FILING #1	1185727	ELR	EL
2	05/10/2018	AB	ISSUED FOR SUPPLEMENTAL FILING #6	1185727	W.	EL

DRAWN BY: JN	DATE 03/06/17	ISSUED FOR BID		SCALE	1" = 200'
CHECKED BY: EP	DATE 03/06/17	ISSUED FOR CONSTRUCTION		REVISION	2
APPROVED BY: EL	DATE 03/06/17	DRAWING NUMBER:	F-AM-MADI-D-01	SHEET	3
W.O. 1185727	ROUTE ID 211			OF	6

\\ap-fs-arcgis-1.woodgroup.com\GIS_Projects\011_Projects\180259\03_Exhibits\10_Full_Size_Aerial_Maps\2018_02_14\MadisonMadison.mxd

APPENDIX B
EDR DATAMAP CORRIDOR STUDY EXECUTIVE SUMMARY

EDR DataMap®
Corridor Study

Madison Loop

- Listed Sites
- Earthquake Epicenters (Richter 5 or greater)
- Search Boundary
- Roads
- Major Roads
- Waterways
- Railroads
- Contour Lines
- Pipelines
- Powerlines
- Fault Lines
- Water
- Superfund Sites
- Federal DOD Sites
- Indian Reservations BIA
- 100-Yr Flood Zones
- National Wetland Inventory



South Amboy, NJ

0 1/2 1

Scale in Miles

EDR® Environmental Data Resources, Inc

Copyright © 2016 EDR, Inc. © 2015 TomTom Rel. 2015.

4726085.2s - 19 Sep 16

Madison Loop
South Amboy, NJ 08879

Inquiry Number: 4726085.2s
September 19, 2016

EDR DataMap™ Corridor Study

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2016 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

EXECUTIVE SUMMARY

TARGET PROPERTY INFORMATION

ADDRESS

SOUTH AMBOY, NJ 08879
SOUTH AMBOY, NJ 08879

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records within the requested search area for the following databases:

FEDERAL RECORDS

Proposed NPL	Proposed National Priority List Sites
Delisted NPL	National Priority List Deletions
NPL LIENS	Federal Superfund Liens
LIENS 2	CERCLA Lien Information
HMIRS	Hazardous Materials Information Reporting System
DOT OPS	Incident and Accident Data
US CDL	National Clandestine Laboratory Register
US BROWNFIELDS	A Listing of Brownfields Sites
DOD	Department of Defense Sites
LUCIS	Land Use Control Information System
CONSENT	Superfund (CERCLA) Consent Decrees
UMTRA	Uranium Mill Tailings Sites
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
US MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
SSTS	Section 7 Tracking Systems
RADINFO	Radiation Information Database
RMP	Risk Management Plans
LEAD SMELTERS	Lead Smelter Sites
FUELS PROGRAM	EPA Fuels Program Registered Listing
DOCKET HWC	Hazardous Waste Compliance Docket Listing
FUSRAP	Formerly Utilized Sites Remedial Action Program
COAL ASH DOE	Steam-Electric Plant Operation Data
EPA WATCH LIST	EPA WATCH LIST
US FIN ASSUR	Financial Assurance Information
PCB TRANSFORMER	PCB Transformer Registration Database
US HIST CDL	Delisted National Clandestine Laboratory Register
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
FEDERAL FACILITY	Federal Facility Site Information listing
FEMA UST	Underground Storage Tank Listing

STATE AND LOCAL RECORDS

NJ PF	Publicly Funded Cleanups Site Status Report

EXECUTIVE SUMMARY

NJ CHROME Chromate Chemical Production Waste Sites
NJ SWF/LF Solid Waste Facility Directory
NJ UIC Underground Injection Wells Database
NJ LIENS Environmental LIENS
NJ AIRS Emissions Inventory Listing
NJ COAL ASH Coal Ash Listing

TRIBAL RECORDS

INDIAN RESERV Indian Reservations
INDIAN ODI Report on the Status of Open Dumps on Indian Lands
INDIAN LUST Leaking Underground Storage Tanks on Indian Land
INDIAN UST Underground Storage Tanks on Indian Land
INDIAN VCP Voluntary Cleanup Priority Listing

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

FEDERAL RECORDS

NPL: Also known as Superfund, the National Priority List database is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the U.S. EPA.

A review of the NPL list, as provided by EDR, and dated 03/07/2016 has revealed that there are 3 NPL sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***

SEMS: SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

A review of the SEMS list, as provided by EDR, and dated 03/07/2016 has revealed that there are 5 SEMS sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***
UPPER CINNAMON GULCH	8 MILES EAST OF KEYS	27	391
CHEESEQUAKE ST PARK	PERRINES RD	111	1162

SEMS-ARCHIVE: SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

A review of the SEMS-ARCHIVE list, as provided by EDR, and dated 03/07/2016 has revealed that there are 3 SEMS-ARCHIVE sites within the searched area.

Site	Address	Map ID	Page
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
HERCULES INCORPORATE	***50 S MINNISINK AVE***	***79***	***742***
DREW METALEX CORP	***WATERWORTS RD***	***117***	***1231***

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 06/27/2016 has revealed that there are 5 CORRACTS sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
HERCULES INCORPORATE	***50 S MINNISINK AVE***	***79***	***742***
GREEN TREE CHEMICAL	***50 SOUTH MINISINK AV***	***79***	***771***
DREW METALEX CORP	***WATERWORTS RD***	***117***	***1231***

RCRA-TSDF: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

A review of the RCRA-TSDF list, as provided by EDR, and dated 06/21/2016 has revealed that there are

EXECUTIVE SUMMARY

4 RCRA-TSDF sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
HERCULES INCORPORATE	***50 S MINNISINK AVE***	***79***	***742***
GREEN TREE CHEMICAL	***50 SOUTH MINISINK AV***	***79***	***771***

RCRA-LQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

A review of the RCRA-LQG list, as provided by EDR, and dated 06/21/2016 has revealed that there are 2 RCRA-LQG sites within the searched area.

Site	Address	Map ID	Page
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
MADISON INDUSTRIES I	***554 WATERWORKS RD***	***115***	***1187***

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 06/21/2016 has revealed that there are 4 RCRA-SQG sites within the searched area.

Site	Address	Map ID	Page
HERCULES INCORPORATE	***50 S MINNISINK AVE***	***79***	***742***
GREEN TREE CHEMICAL	***50 SOUTH MINISINK AV***	***79***	***771***
WALMART STORE #2825	***1126 RT 9***	***86***	***820***
PATHMARK 72581	1043 RT 9 NORTH	102	980

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 06/21/2016 has revealed that there are 5 RCRA-CESQG sites within the searched area.

Site	Address	Map ID	Page
MODERN TREND SAYREVI	1965 RTE 35	20	236

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
WAYNES AUTO BODY	***S PINE & 10TH ST***	***20***	***272***
PEP BOYS STORE #1636	1072 HWY 9 S	62	638
HOME DEPOT USA HD095	***1090 RTE 9 SOUTH***	***72***	***661***
BJS WHOLESALE CLUB #	1007 RT 9 N	72	711

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 06/21/2016 has revealed that there are 31 RCRA NonGen / NLR sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
ZUMBACH SPORTSCARS I	***2030 STATE ROUTE 35***	***14***	***178***
GOMOLKAS AUTO BODY	2017 HWY 35	18	186
BROWNS BOAT YARD INC	ERNSTON RD & GODECK	20	197
SPECTRASERV	***PIER A MAIN ST BLK 1***	***20***	***210***
LOCKWOOD BOAT WORKS	***1825 HWY 35 MORGAN***	***20***	***224***
19 PETROLEUM SERVICE	1949 RTE 35 S	20	229
SERVICE STATION	RT 35 & HAUSSLING PL	21	336
MORGAN FRAME SPEC. I	***RTE 35***	***21***	***337***
DAN O'S MATERIALS LL	31 FIELEK TER	42	433
SAYREVILLE BORO OF -	601 ERNSTON RD	50	466
COIN-OP LAUNDRY & DR	520 ERNSTON RD	61	631
BETTY BRITE	499 ERNSTON RD	61	634
PG 10 ENTERPRISES	***1030 RT 9***	***62***	***639***
JOY TRUCKING	5905 DOWNING ST	72	659
HOME DEPOT THE 905	1007 RTE 9 N OLD RID	72	714
CHEESEQUAKE AUTO REP	***BORDENTOWN AVE & CHE***	***75***	***720***
SHELL OIL CO	BORDENTOWN AVE & CHE	75	730
MOOREHOUSE SPEEDWELL	***3101 BORDENTOWN AVE***	***75***	***731***
ACADEMY HONDA AT OLD	***RTE 9 N***	***82***	***786***
NJDOT RTE 9 SEC 25J	3141 BORDENTOWN AVE	83	807
NJDOT RTE 9 SEC 25J	3141 BORDENTOWN AVE	83	811
ZOUBEK ASSOCIATES	***3220 BORDENTOWN TNPK***	***96***	***910***
C R WINES TRUCKING C	3191 BORDENTOWN AVE	96	931
RACEWAY OLD BRIDGE (	***1300 RTE 9***	***102***	***939***
GATEWAY CLEANERS - F	1054 US HWY 9 - GATE	102	983
MANZO CONTRACTING CO	***CHESEQUAKE RD***	***104***	***1066***
B ANTHONY CONSTRUCTI	3170 BORDENTOWN AVE	105	1116
AWT ENVIRONMENTAL SE	3220 BORDENTOWN AVE	105	1130
EASCO ALUMINUM CO -	***3237 BORDENTOWN AVE***	***105***	***1148***
DREW METALEX CORP	***WATERWORTS RD***	***117***	***1231***

US ENG CONTROLS: A listing of sites with engineering controls in place.

A review of the US ENG CONTROLS list, as provided by EDR, and dated 05/09/2016 has revealed that there are 3 US ENG CONTROLS sites within the searched area.

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***
HERCULES INCORPORATE	***50 S MINNISINK AVE***	***79***	***742***

US INST CONTROL: A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

A review of the US INST CONTROL list, as provided by EDR, and dated 05/09/2016 has revealed that there are 2 US INST CONTROL sites within the searched area.

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***

ERNS: The Emergency Response Notification System records and stores information on reported releases of oil and hazardous substances. The source of this database is the U.S. EPA.

A review of the ERNS list, as provided by EDR, and dated 03/28/2016 has revealed that there are 4 ERNS sites within the searched area.

Site	Address	Map ID	Page
Not reported	130 OLD SPYE ROAD	27	367
Not reported	ACROSS STREET FROM 2	93	888
Not reported	3237 BORDENTOWN ROAD	105	1148
Not reported	MANZO CONTRACTING	107	1154

FUDS: The Listing includes locations of Formerly Used Defense Sites Properties where the US Army Corps Of Engineers is actively working or will take necessary cleanup actions.

A review of the FUDS list, as provided by EDR, and dated 01/31/2015 has revealed that there are 2 FUDS sites within the searched area.

Site	Address	Map ID	Page
NIKE NY-60		16	182
MORGAN ORD SUP DEPOT		89	861

EXECUTIVE SUMMARY

ROD: Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid the cleanup.

A review of the ROD list, as provided by EDR, and dated 11/25/2013 has revealed that there are 2 ROD sites within the searched area.

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***

FTTS: FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act) over the previous five years. To maintain currency, EDR contacts the Agency on a quarterly basis.

A review of the FTTS list, as provided by EDR, has revealed that there are 3 FTTS sites within the searched area.

Site	Address	Map ID	Page
LOCKWOOD BOAT WORK	1825 RT 35 SOUTH	20	223
Database: FTTS INSP, Date of Government Version: 04/09/2009			
A W T ENVIRONMENTAL	***3220 BORDENTOWN AVE***	***96***	***917***
Database: FTTS INSP, Date of Government Version: 04/09/2009			
AWT ENVIRONMENTAL SE	***3220 BORDENTOWN TURN***	***96***	***918***
Database: FTTS INSP, Date of Government Version: 04/09/2009			

HIST FTTS: A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

A review of the HIST FTTS list, as provided by EDR, has revealed that there are 2 HIST FTTS sites within the searched area.

Site	Address	Map ID	Page
A W T ENVIRONMENTAL	***3220 BORDENTOWN AVE***	***96***	***917***
Database: HIST FTTS INSP, Date of Government Version: 10/19/2006			
AWT ENVIRONMENTAL SE	***3220 BORDENTOWN TURN***	***96***	***918***
Database: HIST FTTS INSP, Date of Government Version: 10/19/2006			

EXECUTIVE SUMMARY

ICIS: The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

A review of the ICIS list, as provided by EDR, and dated 01/23/2015 has revealed that there are 6 ICIS sites within the searched area.

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	*OLD WATER WORKS ROAD*	*0*	*78*
GLOBAL SANITARY LAND	*ERNSTON ROAD*	*0*	*105*
SPECTRASERV	*PIER A MAIN ST BLK 1*	*20*	*210*
LA MER PHASE 5 AND 6	*GIORDANO AVENUE*	*77*	*739*
RACEWAY OLD BRIDGE (	*1300 RTE 9*	*102*	*939*
PATHMARK/LIQUOR STOR	*1001 RT 9*	*102*	*1037*

PADS: The PCB Activity Database identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs who are required to notify the United States Environmental Protection Agency of such activities. The source of this database is the U.S. EPA.

A review of the PADS list, as provided by EDR, and dated 01/20/2016 has revealed that there are 2 PADS sites within the searched area.

Site	Address	Map ID	Page
E I DUPONT DE NEMOUR	*250 CHEESEQUAKE RD*	*52*	*471*
LORCO PETROLEUM SERV	*RUNTON & CHEESEQUAKE*	*119*	*1242*

MLTS: The Material Licensing Tracking System is maintained by the Nuclear Regulatory Commission and contains a list fo approximately 8,100 sites which possess or use radioactive materials and are subject to NRC licensing requirements.

A review of the MLTS list, as provided by EDR, and dated 03/07/2016 has revealed that there is 1 MLTS site within the searched area.

Site	Address	Map ID	Page
GREEN TREE CHEMICAL	*50 SOUTH MINISINK AV*	*79*	*771*

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 07/20/2015 has revealed that there are 191 FINDS sites within the searched area.

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	*OLD WATER WORKS ROAD*	*0*	*78*
GLOBAL SANITARY LAND	*ERNSTON ROAD*	*0*	*105*
73 LUKE STREET	*73 LUKE ST*	*13*	*172*
BROWNS BOAT YARD INC	*ERNSTON RD & GODECK*	*20*	*196*
JCP&L LAURENCE HARBO	*RT 35*	*20*	*206*
SOMERSET RECYCLING A	*RTE 27 & CHURCHILL A*	*20*	*206*
HORSELESS CARRIAGE S	*RTE 35*	*20*	*207*
SERVICE STATION	*W S RTE 9*	*20*	*207*
C I L CHEMICAL INC S	*CHEVALIER ST*	*20*	*208*
AMOCO OIL CO	*993 RTE 9 N & ERNSTO*	*20*	*208*
CHEVALIER ENTERPRISE	*CROSS AVE*	*20*	*208*
CONRAIL SOUTH AMBOY	*ENGINEHOUSE600 FT E*	*20*	*209*
JULIANS BODY & FENDE	*RTE 9 UPPER MAIN ST*	*20*	*209*
JAMES PETROZELLO CO	*RT 35*	*20*	*210*
SPECTRASERV	*PIER A MAIN ST BLK 1*	*20*	*210*
THE CHESTER PARTNERS	*100 METRO PARK SOUTH*	*20*	*213*
DYNASTY DRY CLEANERS	*RT 9*	*20*	*214*
RENE AMOCO	*9 & 35 SB NEAR OAK S*	*20*	*214*
SERVICE STATION	*RTE 9 MADISON TWP*	*20*	*215*
MOBIL SERVICE STATIO	*MP 124.1 MEDIAN GSP*	*20*	*215*
DAVE & SON LAWN & LA	*1201 ERNSTON RD*	*20*	*216*
MILLER INDUSTRIES IN	*RT 35 & ERNSTON RD*	*20*	*216*
LOCKWOOD BOAT WORKS	*1825 RT 35*	*20*	*221*
LOCKWOOD BOAT WORKS	*1825 HWY 35 MORGAN*	*20*	*222*
MATTYS ONSITE CORP	*1945 RT 35*	*20*	*233*
MATERIALS INTERNATIO	*1945 RT 35*	*20*	*233*
STADIUM AUTO PARTS I	*MAIN STREET AND SCOT*	*20*	*236*
MODERN TREND SAYREVI	*1965 RTE 35*	*20*	*239*
SANITARY FUEL	*RT 35 & LORRAINE AVE*	*20*	*244*
MORGAN AUTO PARTS	*1841 RT 35 S*	*20*	*244*
CENTRAL JERSEY START	*1809 RT 35*	*20*	*251*
19 PETROLEUM SERVICE	*1949 RTE 35 S*	*20*	*251*
BAYSHORE DENTAL ARTS	*1872 RT 35*	*20*	*254*
SCHNEIDER NATIONAL B	*RT 9 & 35*	*20*	*268*
VITAL MOBILE CARE IN	*RT 9 N & RT 35*	*20*	*268*
SUNOCO SERVICE STATI	*6090 RTE 9 & 35 N*	*20*	*269*
WAYNES AUTO BODY	*S PINE & 10TH ST*	*20*	*269*
MORGAN FRAME SPECIAL	*1969 RT 35*	*20*	*270*
REXINIS DEMITRIOS	*1970 RT 35 N*	*20*	*271*
CHARLES KOMAR & SONS	*259 STEVENS AVE*	*20*	*272*
WAYNES AUTO BODY	*10TH ST & S PINE AVE*	*20*	*277*
HARRYS GUARANTEED EN	*272 STEVENS AVE*	*20*	*277*
175 NORTON STREET	*175 NORTON ST*	*20*	*277*
FIBERDEX BOAT REPAIR	*229 9TH ST*	*20*	*280*
333 SOUTH PINE AVENU	*333 S PINE AVE*	*20*	*282*
MORGAN PRINTING SERV	*333 S PINE AVE*	*20*	*283*
175 GABRIEL TERRACE	*175 GABRIEL TER*	*20*	*285*
GKB LANDSCAPING	*292 STEVENS AVE*	*20*	*286*
30 LIBERTY STREET	*30 LIBERTY ST*	*20*	*288*
SAYREVILLE BORO MORG	*RT 35 & OLD SPYE RD*	*21*	*294*
SUN REFINING	*RT 35 & HAUSSLING PL*	*21*	*321*
SERVICE STATION	*RT 35 & HAUSSLING PL*	*21*	*321*
GETTY SERVICE STATIO	*1788 RT 35*	*21*	*324*
NATIONAL FUEL TRANSP	*1788 RT 35 N*	*21*	*335*
SUNOCO SERVICE STATI	*1788 RT 35*	*21*	*335*
ARCHIES BOAT TOPS CO	*1800 RT 35*	*21*	*336*

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
189 MORGAN AVENUE	*189 MORGAN AVE*	*21*	*339*
JOHN EGAN CONTRACTIN	*2 SOUTH ST*	*21*	*344*
240 TYLER STREET	*240 TYLER ST*	*21*	*345*
267 MIDLAND AVENUE	*267 MIDLAND AVE*	*21*	*345*
293 MIDLAND AVENUE	*293 MIDLAND AVE*	*21*	*350*
H&M AERONAUT TOOL CO	*64 MORRIS ST*	*21*	*350*
LAWN BUTLER	*21 MORRIS ST*	*21*	*351*
JOBMANN STEVEN & ELI	*120 OLD SPYE RD*	*27*	*359*
NJ TRANSIT AUTH NORT	*MM 3.22*	*27*	*359*
NJ TRANSIT AUTH	*OLD SPYE RD*	*27*	*364*
NJDOT REHAB OF ROUTE	*RT 35*	*27*	*364*
A&B MARINE	*RT 35*	*27*	*367*
ALLIED VAN LINES	*RT 35 S*	*27*	*367*
CANADA LAND CO INC	*OLD SPYE RD*	*27*	*370*
LOCKWOOD MARINA	*OLD SPYE RD*	*27*	*370*
OLD SPYE MARINA	*OLD SPYE RD*	*27*	*370*
BENINATO TOM	*OLD SPYE RD*	*27*	*371*
NJ NATURAL GAS CHEES	*RT 35*	*27*	*371*
VIKINGS MARINA MAINT	*1707 RT 35*	*27*	*379*
VIKINGS MARINA	*STATE HIGHWAY RT 35*	*27*	*379*
VIKINGS MARINA CORP	*1705 1707 RT 35*	*27*	*381*
SAYREVILLE BORO MUA	*OLD SPYE RD*	*27*	*390*
LEVEL 3 COMMUNICATIO	*809 ERNSTON RD*	*31*	*396*
MORGAN MARINA INC	*ERNSTON RD*	*31*	*397*
NJ HIGHWAY AUTH #841	*ERNSTON RD*	*31*	*397*
OAKVIEW CARE CENTER	*901 ERNSTON RD*	*31*	*406*
901 ERNSTON RD EASTE	*901 ERNSTON RD*	*31*	*406*
CARRIAGE HOUSE MANOR	*901 ERNSTON RD*	*31*	*406*
BRIARWOOD 901 ERNSTO	*901 ERNSTON RD*	*31*	*410*
THE BRIARWOOD CARE &	*901 ERNSTON RD*	*31*	*410*
MORGAN WTP	*GORDON AVENUE*	*32*	*415*
MATTYS ONSITE CORP	*2514 LIGHTHOUSE PL*	*35*	*419*
SAYREVILLE BORO MUA	*ERNSTON RD*	*35*	*419*
B&C AUTO SALES INC	*2115 BAYHEAD DR*	*36*	*420*
SAYREVILLE BORO MUA	*GONDEK DR*	*36*	*420*
USDOD ARMY MORGAN OR	*601 ERNSTON ROAD*	*37*	*426*
GOLDEN AGE DEVELOPME	*GONDEK DR*	*40*	*428*
DAVES AUTOMOTIVE	*27 BORDENTOWN AVE*	*41*	*432*
SAYREVILLE BORO MUA	*ERNSTON RD*	*44*	*445*
MORGAN CREEK BOATWOR	*MORGAN PLANT RD*	*46*	*453*
SAYREVILLE BORO GLOB	*ZAUNEROWICZ RD*	*46*	*453*
BROWNS BOAT YARD	*7 ZAUNEROWICZ RD*	*46*	*454*
AMERICAN INTERNATION	*10 MOLTEG DR*	*54*	*607*
14 LAURENCE PARKWAY	*14 LAURENCE PKWY*	*55*	*610*
MORGAN MARINA INC	*8000 GONDEK DR*	*56*	*611*
COIN OP LAUNDRY & CL	*520 ERNSTON RD*	*61*	*630*
PG 10 ENTERPRISES	*1030 RT 9*	*62*	*639*
NJ TURNPIKE AUTH	*GARDEN STATE PKWY MM*	*64*	*647*
416 ORCHARD AVENUE	*416 ORCHARD AVE*	*69*	*654*
LAMER DEVELOPMENT	*ERNSTON RD*	*70*	*655*
JOY TRUCKING	*5905 DOWNING ST*	*72*	*658*
BRUCE M LITTMAN DMD	*6001 DOWNING ST*	*72*	*660*
LONDON TERRACE APART	*715 DOWNING ST*	*72*	*660*
NJDOT	*RT9 & ERNSTON RD*	*72*	*698*
BJS WHOLESALE CLUB #	*1007 RT 9 N*	*72*	*703*
R&S STRAUSS	*SAYREWOODS SHOPPING*	*72*	*706*

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
R&S STRAUSS @ SAYRE	*RT 9 & ERNSTON RD*	*72*	*707*
HOME DEPOT THE 905	*1007 RTE 9 N OLD RID*	*72*	*714*
CHEESEQUAKE AUTO REP	*BORDENTOWN AVE & CHE*	*75*	*720*
JAN KULA CO	*42 OAKWOOD DR*	*76*	*738*
LA MER PHASE 5 AND 6	*GIORDANO AVENUE*	*77*	*739*
PARKSIDE GARDENS ASS	*GORNIAK DR*	*80*	*783*
ACADEMY HONDA AT OLD	*RTE 9 N*	*82*	*790*
DARON MOTORS INC ACA	*1101 CHEESEQUAKE BRO*	*82*	*790*
PROGRESSIVE MAINTENA	*3145 BORDENTOWN AVE*	*83*	*791*
THE MCCORMACK GROUP	*3145 BORDENTOWN AVE*	*83*	*792*
ARNEL LABORATORY SER	*3145 BORDENTOWN AVE*	*83*	*793*
IF ASSOC INC	*3145 BORDENTOWN AVE*	*83*	*793*
LOEFFELS WASTE OIL C	*3143 BORDENTOWN AVE*	*83*	*794*
PARADISE LAWNS 2 COR	*3143 BORDENTOWN AVE*	*83*	*794*
V CHEVALIER SR	*3143 BORDENTOWN AVE*	*83*	*795*
JOHNNY ON THE SPOT	*3143 BORDENTOWN AVE*	*83*	*798*
H HANSON INC	*3143 BORDENTOWN AVE*	*83*	*798*
ASPAR CHEMICAL CORP	*3143 BORDENTOWN AVE*	*83*	*799*
ALLOY CONCEPTS & FAB	*3143 BORDENTOWN AVE*	*83*	*807*
CME ASSOC	*3141 BORDENTOWN AVE*	*83*	*811*
ALTERNATE DISPOSAL S	*3141 BORDENTOWN AVE*	*83*	*813*
PARLIN EAST GROUP	*3141 BORDENTOWN AVE*	*83*	*813*
JOYREI ENTERPRISES I	*3143 BORDENTOWN AVE*	*83*	*814*
1005 WILBUR PLACE	*1005 WILBUR PL*	*84*	*815*
GLOBAL SLF MIDDLESEX	*UNKNOWN*	*90*	*863*
GLOBAL LANDFILL RECL	*ERNSTON STATION RD*	*90*	*864*
OLD BRIDGE TWP ROAD	*RT 9*	*91*	*881*
MIDDLESEX CNTY ROAD	*CHEESEQUAKE BROWNTOW*	*91*	*881*
TSYBULSKYY CONSTRUCT	*10 PARKWOOD DR*	*92*	*886*
GALANTE DISPOSAL INC	*3233 CHEESEQUAKE RD*	*94*	*894*
3 VAN DELFT DRIVE	*3 VAN DELFT DR*	*95*	*900*
NIEUW AMSTERDAM VILL	*1 VAN DELFT DR*	*95*	*900*
PARKWOOD VILLAGE APA	*1 WESTMINSTER BLVD*	*95*	*901*
GP CONTRACTOR CORP	*19 WESTMINSTER BLVD*	*95*	*901*
M&S HOME IMPROVEMENT	*3225 BORDENTOWN AVE*	*96*	*910*
AWT ENVIRONMENTAL SE	*3220 BORDENTOWN AMBO*	*96*	*914*
ZOUBEK ASSOCIATES	*3220 BORDENTOWN TNPK*	*96*	*917*
OJO TRUCKING CORP	*3213 BORDENTOWN AVEN*	*96*	*927*
ALTERNATE DISPOSAL S	*3200 BORDENTOWN AVE*	*96*	*930*
CR WINES TRUCKING CO	*3191 BORDENTOWN AVE*	*96*	*930*
PARK MANAGEMENT	*3168 BORDENTOWN AVE*	*97*	*932*
MANZO HOLDINGS	*WATERWORKS RD*	*98*	*935*
OLD BRIDGE CLEAN ENE	*CHEESEQUAKE ROAD AND*	*99*	*935*
PHIL VESPIA TIRE CEN	*1209 CHEESEQUAKE BRO*	*100*	*935*
EVOR PHILLIPS LEASIN	BORDENTOWN S AMBOY T	101	936
RACEWAY OLD BRIDGE (	*1300 RTE 9*	*102*	*939*
GETTY SERVICE STATIO	*1294 RT 9*	*102*	*943*
HOME DEPOT USA HD095	*1090 RTE 9 SOUTH*	*102*	*974*
LOWE'S OF OLD BRIDGE	*1324 HIGHWAY 9*	*102*	*975*
GATEWAY CLEANERS - F	*1054 US HWY 9 - GATE*	*102*	*983*
LAMAR CO @ GATEWAY S	*1054 RT 9*	*102*	*983*
HOME DEPOT INC #957	*1007 RT 9*	*102*	*1018*
BJS WHOLESALE CLUB	*1007 RT 9*	*102*	*1027*
SUNG FRENCH DRY CLEA	*15 RT 9*	*102*	*1033*
REMSCO ASSOC	*425 RTE 9 N*	*102*	*1034*
PATHMARK/LIQUOR STOR	*1001 RT 9*	*102*	*1037*

Site	Address	Map ID	Page
SATURN DEALERSHIP	*955 RT 9*	*102*	*1038*
LUKOIL SERVICE STATI	*3699 RD 1 RTE 9*	*102*	*1038*
RACEWAY SERVICE STAT	*1300 CHEESEQUAKE BRO*	*102*	*1041*
EMPORIUM GAS SERVICE	*1299 CHEESEQUAKE BRO*	*102*	*1060*
INTERTECH CONSTRUCTO	*8 OLD RD*	*102*	*1060*
U HAUL CENTER	1275 RT 9	102	1061
RLT TRUCKING CO	*OLD WATER WORKS RD*	*104*	*1076*
PJ & DAUGHTERS	*OLD WATERWORKS RD*	*104*	*1077*
EVOR PHILIPS LEASING	*OLD WATER WORKS RD*	*104*	*1078*
MOUNTAINEER CONSTRUC	*WATERWORKS RD*	*105*	*1090*
GALANTE DISPOSAL INC	*3233 WATERWORKS RD*	*105*	*1114*
CREATIVE MODULAR HOM	*WATERWORKS RD*	*105*	*1115*
JH MONTEATH CO	*3152 BORDENTOWN AVE*	*105*	*1125*
CONTINENTAL WOOD PRO	*3150 BORDENTOWN AVE*	*105*	*1128*
YONKERS PLYWOOD MFG	*BORDENTOWN AVE & CHE*	*105*	*1141*
Not reported	*WTP,BORDENTOWN AVE &*	*105*	*1143*
MIDHATTAN WOODWORKIN	*3130 BORDENTOWN AVE*	*105*	*1145*
EASCO ALUMINUM CO JE	*3237 BORDENTOWN AVE*	*105*	*1147*
DUNRITE TRANSMISSION	*3237 BORDENTOWN AVE*	*105*	*1148*
MARIOS CONCRETE & PA	*3237 BORDENTOWN AVE*	*105*	*1150*
OLD BRIDGE TWP SOMME	*CHEESEQUAKE RD*	*106*	*1151*
MANZO CONTRACTING CO	*CHEESEQUAKE RD*	*109*	*1158*
ESPOSITO CONSTRUCTIO	601 WATERWORKS RD	109	1159

RAATS: The RCRA Administration Action Tracking System contains records based on enforcement actions issued under RCRA and pertaining to major violators. It includes administrative and civil actions brought by the United States Environmental Protection Agency. The source of this database is the U.S. EPA.

A review of the RAATS list, as provided by EDR, and dated 04/17/1995 has revealed that there is 1 RAATS site within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	*570 OLD WATERWORKS R*	*0*	*4*

ECHO: ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

A review of the ECHO list, as provided by EDR, and dated 09/20/2015 has revealed that there are 193 ECHO sites within the searched area.

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	*OLD WATER WORKS ROAD*	*0*	*78*
GLOBAL SANITARY LAND	*ERNSTON ROAD*	*0*	*105*
73 LUKE STREET	*73 LUKE ST*	*13*	*172*
BROWNS BOAT YARD INC	*ERNSTON RD & GODECK*	*20*	*196*
JCP&L LAURENCE HARBO	*RT 35*	*20*	*206*
SOMERSET RECYCLING A	*RTE 27 & CHURCHILL A*	*20*	*206*
HORSELESS CARRIAGE S	*RTE 35*	*20*	*207*
SERVICE STATION	*W S RTE 9*	*20*	*207*
C I L CHEMICAL INC S	*CHEVALIER ST*	*20*	*208*

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
AMOCO OIL CO	*993 RTE 9 N & ERNSTO*	*20*	*208*
CHEVALIER ENTERPRISE	*CROSS AVE*	*20*	*208*
CONRAIL SOUTH AMBOY	*ENGINEHOUSE600 FT E*	*20*	*209*
JULIANS BODY & FENDE	*RTE 9 UPPER MAIN ST*	*20*	*209*
JAMES PETROZELLO CO	*RT 35*	*20*	*210*
SPECTRASERV	*PIER A MAIN ST BLK 1*	*20*	*210*
THE CHESTER PARTNERS	*100 METRO PARK SOUTH*	*20*	*213*
DYNASTY DRY CLEANERS	*RT 9*	*20*	*214*
RENE AMOCO	*9 & 35 SB NEAR OAK S*	*20*	*214*
SERVICE STATION	*RTE 9 MADISON TWP*	*20*	*215*
MOBIL SERVICE STATIO	*MP 124.1 MEDIAN GSP*	*20*	*215*
DAVE & SON LAWN & LA	*1201 ERNSTON RD*	*20*	*216*
MILLER INDUSTRIES IN	*RT 35 & ERNSTON RD*	*20*	*216*
LOCKWOOD BOAT WORKS	*1825 RT 35*	*20*	*221*
LOCKWOOD BOAT WORKS	*1825 HWY 35 MORGAN*	*20*	*222*
MATTYS ONSITE CORP	*1945 RT 35*	*20*	*233*
MATERIALS INTERNATIO	*1945 RT 35*	*20*	*233*
STADIUM AUTO PARTS I	*MAIN STREET AND SCOT*	*20*	*236*
MODERN TREND SAYREVI	*1965 RTE 35*	*20*	*239*
SANITARY FUEL	*RT 35 & LORRAINE AVE*	*20*	*244*
MORGAN AUTO PARTS	*1841 RT 35 S*	*20*	*244*
CENTRAL JERSEY START	*1809 RT 35*	*20*	*251*
19 PETROLEUM SERVICE	*1949 RTE 35 S*	*20*	*251*
BAYSHORE DENTAL ARTS	*1872 RT 35*	*20*	*254*
SCHNEIDER NATIONAL B	*RT 9 & 35*	*20*	*268*
VITAL MOBILE CARE IN	*RT 9 N & RT 35*	*20*	*268*
SUNOCO SERVICE STATI	*6090 RTE 9 & 35 N*	*20*	*269*
WAYNES AUTO BODY	*S PINE & 10TH ST*	*20*	*269*
MORGAN FRAME SPECIAL	*1969 RT 35*	*20*	*270*
REXINIS DEMITRIOS	*1970 RT 35 N*	*20*	*271*
CHARLES KOMAR & SONS	*259 STEVENS AVE*	*20*	*272*
WAYNES AUTO BODY	*10TH ST & S PINE AVE*	*20*	*277*
HARRYS GUARANTEED EN	*272 STEVENS AVE*	*20*	*277*
175 NORTON STREET	*175 NORTON ST*	*20*	*277*
FIBERDEX BOAT REPAIR	*229 9TH ST*	*20*	*280*
333 SOUTH PINE AVENU	*333 S PINE AVE*	*20*	*282*
MORGAN PRINTING SERV	*333 S PINE AVE*	*20*	*283*
175 GABRIEL TERRACE	*175 GABRIEL TER*	*20*	*285*
GKB LANDSCAPING	*292 STEVENS AVE*	*20*	*286*
30 LIBERTY STREET	*30 LIBERTY ST*	*20*	*288*
SAYREVILLE BORO MORG	*RT 35 & OLD SPYE RD*	*21*	*294*
SUN REFINING	*RT 35 & HAUSSLING PL*	*21*	*321*
SERVICE STATION	*RT 35 & HAUSSLING PL*	*21*	*321*
GETTY SERVICE STATIO	*1788 RT 35*	*21*	*324*
NATIONAL FUEL TRANSP	*1788 RT 35 N*	*21*	*335*
SUNOCO SERVICE STATI	*1788 RT 35*	*21*	*335*
ARCHIES BOAT TOPS CO	*1800 RT 35*	*21*	*336*
189 MORGAN AVENUE	*189 MORGAN AVE*	*21*	*339*
JOHN EGAN CONTRACTIN	*2 SOUTH ST*	*21*	*344*
240 TYLER STREET	*240 TYLER ST*	*21*	*345*
267 MIDLAND AVENUE	*267 MIDLAND AVE*	*21*	*345*
293 MIDLAND AVENUE	*293 MIDLAND AVE*	*21*	*350*
H&M AERONAUT TOOL CO	*64 MORRIS ST*	*21*	*350*
LAWN BUTLER	*21 MORRIS ST*	*21*	*351*
JOBMANN STEVEN & ELI	*120 OLD SPYE RD*	*27*	*359*
NJ TRANSIT AUTH NORT	*MM 3.22*	*27*	*359*

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
NJ TRANSIT AUTH	*OLD SPYE RD*	*27*	*364*
NJDOT REHAB OF ROUTE	*RT 35*	*27*	*364*
A&B MARINE	*RT 35*	*27*	*367*
ALLIED VAN LINES	*RT 35 S*	*27*	*367*
CANADA LAND CO INC	*OLD SPYE RD*	*27*	*370*
LOCKWOOD MARINA	*OLD SPYE RD*	*27*	*370*
OLD SPYE MARINA	*OLD SPYE RD*	*27*	*370*
BENINATO TOM	*OLD SPYE RD*	*27*	*371*
NJ NATURAL GAS CHEES	*RT 35*	*27*	*371*
VIKINGS MARINA MAINT	*1707 RT 35*	*27*	*379*
VIKINGS MARINA	*STATE HIGHWAY RT 35*	*27*	*379*
VIKINGS MARINA CORP	*1705 1707 RT 35*	*27*	*381*
SAYREVILLE BORO MUA	*OLD SPYE RD*	*27*	*390*
LEVEL 3 COMMUNICATIO	*809 ERNSTON RD*	*31*	*396*
MORGAN MARINA INC	*ERNSTON RD*	*31*	*397*
NJ HIGHWAY AUTH #841	*ERNSTON RD*	*31*	*397*
OAKVIEW CARE CENTER	*901 ERNSTON RD*	*31*	*406*
901 ERNSTON RD EASTE	*901 ERNSTON RD*	*31*	*406*
CARRIAGE HOUSE MANOR	*901 ERNSTON RD*	*31*	*406*
BRIARWOOD 901 ERNSTO	*901 ERNSTON RD*	*31*	*410*
THE BRIARWOOD CARE &	*901 ERNSTON RD*	*31*	*410*
MORGAN WTP	*GORDON AVENUE*	*32*	*415*
MATTYS ONSITE CORP	*2514 LIGHTHOUSE PL*	*35*	*419*
SAYREVILLE BORO MUA	*ERNSTON RD*	*35*	*419*
B&C AUTO SALES INC	*2115 BAYHEAD DR*	*36*	*420*
SAYREVILLE BORO MUA	*GONDEK DR*	*36*	*420*
USDOD ARMY MORGAN OR	*601 ERNSTON ROAD*	*37*	*426*
GOLDEN AGE DEVELOPME	*GONDEK DR*	*40*	*428*
DAVES AUTOMOTIVE	*27 BORDENTOWN AVE*	*41*	*432*
SAYREVILLE BORO MUA	*ERNSTON RD*	*44*	*445*
MORGAN CREEK BOATWOR	*MORGAN PLANT RD*	*46*	*453*
SAYREVILLE BORO GLOB	*ZAUNEROWICZ RD*	*46*	*453*
BROWNS BOAT YARD	*7 ZAUNEROWICZ RD*	*46*	*454*
AMERICAN INTERNATION	*10 MOLTEG DR*	*54*	*607*
14 LAURENCE PARKWAY	*14 LAURENCE PKWY*	*55*	*610*
MORGAN MARINA INC	*8000 GONDEK DR*	*56*	*611*
COIN OP LAUNDRY & CL	*520 ERNSTON RD*	*61*	*630*
PG 10 ENTERPRISES	*1030 RT 9*	*62*	*639*
NJ TURNPIKE AUTH	*GARDEN STATE PKWY MM*	*64*	*647*
416 ORCHARD AVENUE	*416 ORCHARD AVE*	*69*	*654*
LAMER DEVELOPMENT	*ERNSTON RD*	*70*	*655*
JOY TRUCKING	*5905 DOWNING ST*	*72*	*658*
BRUCE M LITTMAN DMD	*6001 DOWNING ST*	*72*	*660*
LONDON TERRACE APART	*715 DOWNING ST*	*72*	*660*
NJDOT	*RT9 & ERNSTON RD*	*72*	*698*
BJS WHOLESALE CLUB #	*1007 RT 9 N*	*72*	*703*
R&S STRAUSS	*SAYREWOODS SHOPPING*	*72*	*706*
R&S STRAUSS @ SAYRE	*RT 9 & ERNSTON RD*	*72*	*707*
HOME DEPOT THE 905	*1007 RTE 9 N OLD RID*	*72*	*714*
CHEESEQUAKE AUTO REP	*BORDENTOWN AVE & CHE*	*75*	*720*
JAN KULA CO	*42 OAKWOOD DR*	*76*	*738*
LA MER PHASE 5 AND 6	*GIORDANO AVENUE*	*77*	*739*
PARKSIDE GARDENS ASS	*GORNIAK DR*	*80*	*783*
ACADEMY HONDA AT OLD	*RTE 9 N*	*82*	*790*
DARON MOTORS INC ACA	*1101 CHEESEQUAKE BRO*	*82*	*790*
PROGRESSIVE MAINTENA	*3145 BORDENTOWN AVE*	*83*	*791*

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
THE MCCORMACK GROUP	*3145 BORDENTOWN AVE*	*83*	*792*
ARNEL LABORATORY SER	*3145 BORDENTOWN AVE*	*83*	*793*
IF ASSOC INC	*3145 BORDENTOWN AVE*	*83*	*793*
LOEFFELS WASTE OIL C	*3143 BORDENTOWN AVE*	*83*	*794*
PARADISE LAWNS 2 COR	*3143 BORDENTOWN AVE*	*83*	*794*
V CHEVALIER SR	*3143 BORDENTOWN AVE*	*83*	*795*
JOHNNY ON THE SPOT	*3143 BORDENTOWN AVE*	*83*	*798*
H HANSON INC	*3143 BORDENTOWN AVE*	*83*	*798*
ASPAR CHEMICAL CORP	*3143 BORDENTOWN AVE*	*83*	*799*
ALLOY CONCEPTS & FAB	*3143 BORDENTOWN AVE*	*83*	*807*
CME ASSOC	*3141 BORDENTOWN AVE*	*83*	*811*
ALTERNATE DISPOSAL S	*3141 BORDENTOWN AVE*	*83*	*813*
PARLIN EAST GROUP	*3141 BORDENTOWN AVE*	*83*	*813*
JOYREI ENTERPRISES I	*3143 BORDENTOWN AVE*	*83*	*814*
1005 WILBUR PLACE	*1005 WILBUR PL*	*84*	*815*
GLOBAL SLF MIDDLESEX	*UNKNOWN*	*90*	*863*
GLOBAL LANDFILL RECL	*ERNSTON STATION RD*	*90*	*864*
OLD BRIDGE TWP ROAD	*RT 9*	*91*	*881*
MIDDLESEX CNTY ROAD	*CHEESEQUAKE BROWNTOW*	*91*	*881*
TSYBULSKYY CONSTRUCT	*10 PARKWOOD DR*	*92*	*886*
GALANTE DISPOSAL INC	*3233 CHEESEQUAKE RD*	*94*	*894*
3 VAN DELFT DRIVE	*3 VAN DELFT DR*	*95*	*900*
NIEUW AMSTERDAM VILL	*1 VAN DELFT DR*	*95*	*900*
PARKWOOD VILLAGE APA	*1 WESTMINSTER BLVD*	*95*	*901*
GP CONTRACTOR CORP	*19 WESTMINSTER BLVD*	*95*	*901*
M&S HOME IMPROVEMENT	*3225 BORDENTOWN AVE*	*96*	*910*
AWT ENVIRONMENTAL SE	*3220 BORDENTOWN AMBO*	*96*	*914*
ZOUBEK ASSOCIATES	*3220 BORDENTOWN TNPK*	*96*	*917*
OJO TRUCKING CORP	*3213 BORDENTOWN AVEN*	*96*	*927*
ALTERNATE DISPOSAL S	*3200 BORDENTOWN AVE*	*96*	*930*
CR WINES TRUCKING CO	*3191 BORDENTOWN AVE*	*96*	*930*
PARK MANAGEMENT	*3168 BORDENTOWN AVE*	*97*	*932*
MANZO HOLDINGS	*WATERWORKS RD*	*98*	*935*
OLD BRIDGE CLEAN ENE	*CHEESEQUAKE ROAD AND*	*99*	*935*
PHIL VESPIA TIRE CEN	*1209 CHEESEQUAKE BRO*	*100*	*935*
SPIRAL METAL CO	3336 BORDENTOWN AVE	101	936
RACEWAY OLD BRIDGE (	*1300 RTE 9*	*102*	*939*
GETTY SERVICE STATIO	*1294 RT 9*	*102*	*943*
HOME DEPOT USA HD095	*1090 RTE 9 SOUTH*	*102*	*974*
LOWE'S OF OLD BRIDGE	*1324 HIGHWAY 9*	*102*	*975*
PATHMARK #72581	1043 RT 9	102	982
PATHMARK 72581	1043 RT 9 NORTH	102	982
GATEWAY CLEANERS - F	*1054 US HWY 9 - GATE*	*102*	*983*
LAMAR CO @ GATEWAY S	*1054 RT 9*	*102*	*983*
HOME DEPOT INC #957	*1007 RT 9*	*102*	*1018*
BJS WHOLESALE CLUB	*1007 RT 9*	*102*	*1027*
SUNG FRENCH DRY CLEA	*15 RT 9*	*102*	*1033*
REMSCO ASSOC	*425 RTE 9 N*	*102*	*1034*
PATHMARK/LIQUOR STOR	*1001 RT 9*	*102*	*1037*
SATURN DEALERSHIP	*955 RT 9*	*102*	*1038*
LUKOIL SERVICE STATI	*3699 RD 1 RTE 9*	*102*	*1038*
RACEWAY SERVICE STAT	*1300 CHEESEQUAKE BRO*	*102*	*1041*
EMPORIUM GAS SERVICE	*1299 CHEESEQUAKE BRO*	*102*	*1060*
INTERTECH CONSTRUCTO	*8 OLD RD*	*102*	*1060*
U HAUL CENTER	1275 RT 9	102	1061
RLT TRUCKING CO	*OLD WATER WORKS RD*	*104*	*1076*

Site	Address	Map ID	Page
PJ & DAUGHTERS	***OLD WATERWORKS RD***	***104***	***1077***
EVOR PHILIPS LEASING	***OLD WATER WORKS RD***	***104***	***1078***
MOUNTAINEER CONSTRUC	***WATERWORKS RD***	***105***	***1090***
GALANTE DISPOSAL INC	***3233 WATERWORKS RD***	***105***	***1114***
CREATIVE MODULAR HOM	***WATERWORKS RD***	***105***	***1115***
JH MONTEATH CO	***3152 BORDENTOWN AVE***	***105***	***1125***
CONTINENTAL WOOD PRO	***3150 BORDENTOWN AVE***	***105***	***1128***
YONKERS PLYWOOD MFG	***BORDENTOWN AVE & CHE***	***105***	***1141***
Not reported	***WTP,BORDENTOWN AVE &***	***105***	***1143***
MIDHATTAN WOODWORKIN	***3130 BORDENTOWN AVE***	***105***	***1145***
EASCO ALUMINUM CO JE	***3237 BORDENTOWN AVE***	***105***	***1147***
DUNRITE TRANSMISSION	***3237 BORDENTOWN AVE***	***105***	***1148***
MARIOS CONCRETE & PA	***3237 BORDENTOWN AVE***	***105***	***1150***
OLD BRIDGE TWP SOMME	***CHEESEQUAKE RD***	***106***	***1151***
MANZO CONTRACTING CO	***CHEESEQUAKE RD***	***109***	***1158***
ESPOSITO CONSTRUCTIO	601 WATERWORKS RD	109	1159

UXO: A listing of unexploded ordnance site locations

A review of the UXO list, as provided by EDR, and dated 10/25/2015 has revealed that there are 2 UXO sites within the searched area.

Site	Address	Map ID	Page
PRP OR TPS (CENAD-PP		89	861
MORGAN ORDNANCE SUB		89	863

US AIRS: The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

A review of the US AIRS list, as provided by EDR, has revealed that there are 6 US AIRS sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
Database: US AIRS MINOR, Date of Government Version: 10/20/2015			
MORGAN FRAME SPECIAL	1969 RT 35 S	20	268
Database: US AIRS MINOR, Date of Government Version: 10/20/2015			
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
Database: US AIRS (AFS), Date of Government Version: 10/20/2015			
JH MONTEATH CO	***3152 BORDENTOWN AVE***	***105***	***1125***
Database: US AIRS MINOR, Date of Government Version: 10/20/2015			
EASCO ALUMINUM CO -	***3237 BORDENTOWN AVE***	***105***	***1148***
Database: US AIRS MINOR, Date of Government Version: 10/20/2015			
MADISON INDUSTRIES I	***554 WATERWORKS RD***	***115***	***1187***
Database: US AIRS (AFS), Date of Government Version: 10/20/2015			

EXECUTIVE SUMMARY

2020 COR ACTION: The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

A review of the 2020 COR ACTION list, as provided by EDR, and dated 04/22/2013 has revealed that there are 2 2020 COR ACTION sites within the searched area.

Site	Address	Map ID	Page
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
GREEN TREE CHEMICAL	***50 SOUTH MINISINK AV***	***79***	***771***

PRP: A listing of verified Potentially Responsible Parties

A review of the PRP list, as provided by EDR, and dated 10/25/2013 has revealed that there are 3 PRP sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***

STATE AND LOCAL RECORDS

NJ SHWS: Known contaminated sites in New Jersey except those associated with Bureau of Underground Storage Sites (BUST)

A review of the NJ SHWS list, as provided by EDR, and dated 06/30/2016 has revealed that there are 98 NJ SHWS sites within the searched area.

Site	Address	Map ID	Page
138 GEORGE STREET Site ID: 201347 Status: Closed	***138 GEORGE ST***	***1***	***121***
119 GEORGE STREET Site ID: 523715 Status: Active	***119 GEORGE ST***	***1***	***124***
124 GEORGE STREET Site ID: 561450 Status: Closed	124 GEORGE ST	1	126
Not reported Site ID: 177982 Status: Closed	***135 JOHN ST***	***1***	***127***
SOUTH AMBOY SEWAGE T Site ID: 47446	S ROSEWELL ST & GEOR	1	129

Status: Active			
KENN AMBOY LLC Site ID: 410334 Status: Active	200 210 S BROADWAY	2	129
213 GEORGE STREET Site ID: 489450 Status: Closed	***213 GEORGE ST***	***2***	***129***
H G HOFFMAN HIGH SCH Site ID: 82030 Status: Closed	249 JOHN ST	2	131
BAYSHORE DR & JEROME Site ID: 84302 Status: Closed	BAYSHORE DR & JEROME	3	132
241 GORDON STREET Site ID: 414381 Status: Active Status: Closed	***241 GORDON ST***	***4***	***132***
POWER INSTRUMENT COR Site ID: 81604 Status: Closed	***346 BORDENTOWN AVENU***	***4***	***138***
THEOS AUTO REPAIR Site ID: 5266 Status: Active	***331 BORDENTOWN AVE***	***4***	***139***
243 CATHERINE STREET Site ID: 457279 Status: Closed	***243 CATHERINE ST***	***4***	***142***
315 GEORGE STREET Site ID: 425504 Status: Active	***315 GEORGE ST***	***4***	***144***
BELMAR REALTY PROFES Site ID: 179642 Status: Closed	***207 S STEVENS AVE***	***4***	***146***
242 244 BORDENTOWN A Site ID: 573912 Status: Closed	242 244 BORDENTOWN A	4	147
508 LEFFERT STREET Site ID: 203370 Status: Closed	***508 LEFFERT ST***	***5***	***147***
SOUTH AMBOY PLUMBING Site ID: 205009 Status: Closed	***224 LEFFERTS ST***	***5***	***148***
SOUTH AMBOY COAL GAS Site ID: 66446 Status: Active Status: Closed	200 S FELTUS ST	5	149
408 LEFFERTS STREET Site ID: 395605 Status: Closed	408 LEFFERTS ST	5	149
513 JOHN STREET	513 JOHN ST	5	149

Site ID: 460401 Status: Closed			
Not reported Site ID: 493142 Status: Closed	***20 BERTRAM AVE***	***6***	***150***
162 BERTRAM AVENUE Site ID: 422445 Status: Closed	***162 BERTRAM AVE***	***6***	***152***
FROG HOLLOW SWIM & T Site ID: 129692 Status: Closed	***LOUISA ST***	***7***	***154***
873 UPPER MAIN STREE Site ID: 163902 Status: Closed	***873 UPPER MAIN ST***	***8***	***157***
19 HARKINS STREET Site ID: 451547 Status: Closed	***19 HARKINS ST***	***9***	***160***
26 HARKINS STREET Site ID: 398450 Status: Closed	***26 HARKINS ST***	***9***	***162***
Not reported Site ID: 455563 Status: Active	***36 HARKINS ST***	***9***	***164***
150 GRAND STREET Site ID: 432306 Status: Closed	***150 GRAND ST***	***10***	***166***
434 SOUTH FELTUS STR Site ID: 522617 Status: Closed	434 S FELTUS ST	11	168
73 LUKE STREET Site ID: 383907 Status: Closed	73 LUKE ST	13	172
RENT A WRECK Site ID: 121675 Status: Active	***916 RT 9***	***17***	***183***
Not reported Site ID: 29437 Status: Active	***912 ROUTE 9 SOUTH***	***17***	***184***
175 NORTON STREET Site ID: 411290 Status: Closed	***175 NORTON ST***	***20***	***280***
175 GABRIEL TERRACE Site ID: 434279 Status: Closed	175 GABRIEL TER	20	283
GETTY SERVICE STATIO Site ID: 5275 Status: Active	***1788 RT 35***	***21***	***324***
Not reported Site ID: 394364	***189 MORGAN AVE***	***21***	***340***

Status: Closed			
240 TYLER STREET Site ID: 169978 Status: Closed	240 TYLER ST	21	342
293 MIDLAND AVENUE Site ID: 438184 Status: Closed	***293 MIDLAND AVE***	***21***	***346***
MOBIL SERVICE STATIO Site ID: 45701 Status: Active	***933 RT 9***	***22***	***351***
Not reported Site ID: 398844 Status: Closed	***23 MIARA ST***	***23***	***353***
SUNOCO 0007-6612 Site ID: 5245 Status: Active	***943 RT 9 & BORDENTOW***	***24***	***355***
1123 BORDENTOWN AVEN Site ID: 394392 Status: Closed	1123 BORDENTOWN AVE	26	358
26 ADAM BOULEVARD Site ID: 435042 Status: Closed	***26 ADAM BLVD***	***28***	***392***
38 EUGENE BOULEVARD Site ID: 223531 Status: Closed	***38 EUGENE BLVD***	***28***	***394***
36 EUGENE BOULEVARD Site ID: 378191 Status: Closed	36 EUGENE BLVD	28	395
1090 BORDENTOWN ROAD Site ID: 81023 Status: Closed	1090 BORDENTOWN RD	29	395
CARRIAGE HOUSE MANOR Site ID: 84196 Status: Closed	***901 ERNSTON RD***	***31***	***406***
1064 BORDENTOWN AVEN Site ID: 121957 Status: Closed	***1064 BORDENTOWN AVE***	***33***	***416***
K & L Site ID: 15365 Status: Closed	812 RT 35	38	427
LEHIGH GAS SERVICE S Site ID: 5260 Status: Active	***127 ERNSTON RD***	***41***	***429***
RACEWAY Site ID: 5317 Status: Closed	***198 ERNSTON RD***	***41***	***431***
DAVES AUTOMOTIVE Site ID: 147615 Status: Closed	***27 BORDENTOWN AVE***	***41***	***432***
Not reported	***318 LINCOLN AVE***	***47***	***457***

Site ID: 484995 Status: Closed			
362 BAYVIEW DRIVE Site ID: 168873 Status: Closed	***362 BAYVIEW DR***	***47***	***459***
83 WEST ROOSEVELT CI Site ID: 95448 Status: Closed	83 W ROOSEVELT CIR	48	461
ERNSTON COC Site ID: 177775 Status: Closed	***350 ERNSTON RD***	***49***	***461***
MORGAN ORDNANCE DEPO Site ID: 80914 Status: Active	***601 ERNSTON RD***	***50***	***467***
DUPONT - PARLIN Site ID: 15676 Status: Active	***250 CHEESEQUAKE ROAD***	***52***	***596***
14 LAURENCE PARKWAY Site ID: 80137 Status: Closed	***14 LAURENCE PKWY***	***55***	***610***
182 CLEVELAND AVENUE Site ID: 258649 Status: Closed	***182 CLEVELAND AVE***	***57***	***617***
SKY TOP SEWAGE PUMP Site ID: 49358 Status: Closed	***ERNSTON RD***	***58***	***618***
416 ORCHARD AVENUE Site ID: 217467 Status: Closed	***416 ORCHARD AVE***	***69***	***654***
MADISON PARK SCHOOL Site ID: 15347 Status: Closed	***33 HARVARD RD***	***71***	***655***
Not reported Site ID: 424632 Status: Closed	***346 WOODBINE AVE.***	***73***	***715***
SHELL SERVICE STATIO Site ID: 5324 Status: Closed	***BORDENTOWN AVE & CHE***	***75***	***725***
ASHLAND INC Site ID: 15689 Status: Active	***50 S MINISINK AVE***	***79***	***768***
D&V WRECKING CORP Site ID: 17033 Status: Closed	***3143 BORDENTOWN AVE***	***83***	***800***
1005 WILBUR PLACE Site ID: 78474 Status: Closed	***1005 WILBUR PL***	***84***	***815***
GLOBAL SANITARY LAND Site ID: 66176	ERNSTON STATION RD	90	877

Status: Active			
3 VAN DELFT DRIVE Site ID: 522760 Status: Closed	3 VAN DELFT DR	95	900
JOHNNY ON THE SPOT Site ID: 341604 Status: Active	***3168 BORDENTOWN AVE***	***97***	***933***
GETTY SERVICE STATIO Site ID: 15337 Status: Active	***1294 RT 9***	***102***	***943***
EMERY MANOR NURSING Site ID: 55121 Status: Closed	***4 RT 34***	***102***	***950***
WASTE MANAGEMENT Site ID: 5739 Status: Active Status: Closed	***305 RT 34***	***102***	***955***
SATURN DEALERSHIP Site ID: 80028 Status: Closed	***955 RT 9***	***102***	***1038***
RACEWAY SERVICE STAT Site ID: 5734 Status: Closed	***1300 CHEESEQUAKE BRO***	***102***	***1041***
MOUNTAINEER CONSTRUC Site ID: 52423 Status: Active	***WATERWORKS RD***	***105***	***1090***
BASF CORP Site ID: 15963 Status: Active	***570 OLD WATERWORKS R***	***105***	***1104***
BRIDGE DISPOSAL SERV Site ID: 167296 Status: Active	***586 WATERWORKS RD***	***105***	***1113***
3160 BORDENTOWN AVEN Site ID: 15372 Status: Closed	***3160 BORDENTOWN AVE***	***105***	***1121***
RECLAMATION TECHNOLO Site ID: 129931 Status: Active	***3200 BORDENTOWN AVE***	***105***	***1135***
JERSEY BILLETS Site ID: 54916 Status: Closed	***3237 BORDENTOWN AVE***	***105***	***1141***
MANZO CONTRACTING CO Site ID: 44362 Status: Closed	***CHEESEQUAKE RD***	***109***	***1158***
5 JOSEPH COURT Site ID: 456677 Status: Active	***5 JOSEPH CT***	***112***	***1164***
CHEESEQUAKE STATE PA Site ID: 15349	***300 GORDON RD***	***113***	***1165***

Status: Active			
MADISON INDUSTRIES I	***554 OLD WATERWORKS R***	***115***	***1183***
Site ID: 15957			
Status: Active			
HALLS GULF SERVICE S	***99 RT 70***	***116***	***1225***
Site ID: 12998			
Status: Active			
OLD BRIDGE GAS STATI	***1499 RT 9***	***119***	***1239***
Site ID: 40341			
Status: Closed			
LORCO PETROLEUM SERV	***RUNTON & CHEESEQUAKE***	***119***	***1242***
Site ID: 5740			
Status: Active			
AREA OF YARD	***181 RT 34***	***120***	***1266***
Site ID: 59308			
Status: Closed			
9 MICHELLE AVENUE	***9 MICHELLE AVE***	***121***	***1269***
Site ID: 374610			
Status: Closed			
SWANTON FUEL CENTRAL	***740 RT 34***	***122***	***1271***
Site ID: 463593			
Status: Closed			
202 ROUTE 34	***202 RT 34***	***122***	***1272***
Site ID: 78928			
Status: Pending			
FOUR J'S AUTO SERVIC	92 RT 34	122	1274
Site ID: 29580			
Status: Closed			
99 SCHULMEISTER ROAD	***99 SCHULMEISTER RD***	***123***	***1275***
Site ID: 91694			
Status: Closed			
24 STEAMBOAT LANDING	***24 STEAMBOAT LANDING***	***124***	***1277***
Site ID: 80833			
Status: Closed			
MINDING MIRACLES LEA	***90 SPRING HILL RD***	***125***	***1280***
Site ID: 360969			
Status: Closed			

NJ HIST HWS: The Known Contaminated Sites in New Jersey report is a municipal listing of sites where contamination of soil and/or ground water is confirmed at levels greater than the applicable cleanup criteria or standards. Remedial activities are underway or required at the sites with an on-site source(s) of contamination and at locations where the source(s) of contamination is unknown. Sites with completed remedial work that require engineering and/or institutional controls have reporting measures in place to ensure the effectiveness of past actions, and some include maintenance and/or monitoring

A review of the NJ HIST HWS list, as provided by EDR, and dated 05/09/2008 has revealed that there are 17 NJ HIST HWS sites within the searched area.

Site	Address	Map ID	Page
THEOS AUTO REPAIR	***331 BORDENTOWN AVE***	***4***	***139***

Case Status: Active Case ID: 015846			
BELMAR REALTY PROFES Case Status: Active Case ID: 235358	***207 S STEVENS AVE***	***4***	***146***
FROG HOLLOW SWIM & T Case Status: Active Case ID: 172268	***LOUISA ST***	***7***	***154***
RENT A WRECK Case Status: Active Case ID: 160091	***916 RT 9***	***17***	***183***
MORGAN FIRE HOUSE Case Status: NFA-A (Restricted Use) Case ID: 003720	***RTE 35 & OLD SPYE RD***	***21***	***293***
TIGER OPERATING LLC Case Status: Active Case ID: 026234	***1788 RTE 35 N***	***21***	***333***
MORGAN ORDNANCE DEPO Case Status: Active Case ID: G000008582	ERNSTON RD (RTE 35 &	37	426
RACEWAY Case Status: Active Case ID: 004882	***198 ERNSTON RD***	***41***	***431***
SHELL SERVICE STATIO Case Status: Active Case ID: 004782	***BORDENTOWN AVE & CHE***	***75***	***725***
GLOBAL LANDFILL Case Status: Active Case ID: G000003352	ERNSTON RD	90	877
GETTY 00304 Case Status: Active Case ID: 001705	***RT 9 & HARTLES LN***	***102***	***1046***
MOUNTAINEER CONSTRUC Case Status: Active Case ID: 019296	***OLD WATER WORKS RD***	***105***	***1094***
SOMMERS LANDFILL Case Status: Active Case ID: G000008820	***CHEESEQUAKE RD & RTE***	***106***	***1151***
EVOR PHILLIPS LEASIN Case Status: Active Case ID: G000004877	***WATERWORKS RD***	***108***	***1155***
CHEESEQUAKE STATE PA Case Status: Active Case ID: 003804	***300 GORDON RD***	***113***	***1165***
NAPPI TRUCKING CORP Case Status: Active Case ID: 003915	***305 RT 34***	***118***	***1234***
LORCO PETROLEUM SERV Case Status: Active	***RUNTON & CHEESEQUAKE***	***119***	***1242***

EXECUTIVE SUMMARY

Case ID: 013795

NJ SWRCY: Department of Environmental Protection Approved Class B Recycling Facilities

A review of the NJ SWRCY list, as provided by EDR, and dated 11/02/2015 has revealed that there are 2 NJ SWRCY sites within the searched area.

Site	Address	Map ID	Page
RECLAMATION TECHNOLO	***3200 BORDENTOWN AVEN***	***105***	***1139***
Facility Id: 132331			
STAVOLA OLD BRIDGE	1 WATERWORKS ROAD	110	1161
Facility Id: 133594			

NJ HIST LF: Old or non-permitted solid waste facilities/landfills that are not included in the current solid waste facilities/landfills database.

A review of the NJ HIST LF list, as provided by EDR, has revealed that there are 2 NJ HIST LF sites within the searched area.

Site	Address	Map ID	Page
DEP CHEESEQUAKE COMP	MADISON TWP	104	1090
Database: HIST LF, Date of Government Version: 06/10/2003			
Facility Status: CLOSED			
Facility Id: 1209000499			
ALTERNATE DISP SYSTE	3141 BORDENTOWN AVE	105	1144
Database: HIST LF, Date of Government Version: 06/10/2003			
Facility Status: TERMINATED			
Facility Id: 1209001193			

NJ LUST: A listing of regulated Underground Storage Tanks that have a cleanup underway.

A review of the NJ LUST list, as provided by EDR, and dated 05/24/2016 has revealed that there are 7 NJ LUST sites within the searched area.

Site	Address	Map ID	Page
THEOS AUTO REPAIR	***331 BORDENTOWN AVE***	***4***	***139***
Case Id: 15846			
GETTY SERVICE STATIO	***1788 RT 35***	***21***	***324***
Case Id: 26234			
SUNOCO 0007-6612	***943 RT 9 & BORDENTOW***	***24***	***355***
Case Id: 16477			
LEHIGH GAS SERVICE S	***127 ERNSTON RD***	***41***	***429***
Case Id: 1472			
GETTY 00304	***RT 9 & HARTLES LN***	***102***	***1046***

Case Id: 1705

MOUNTAINEER CONSTRUC	***OLD WATER WORKS RD***	***105***	***1094***
Case Id: 19296			
HALLS GULF SERVICE S	***99 RT 70***	***116***	***1225***
Case Id: 6707			

NJ HIST LUST: This listing is no longer updated or maintained by the DEP.

A review of the NJ HIST LUST list, as provided by EDR, and dated 09/17/2002 has revealed that there are 38 NJ HIST LUST sites within the searched area.

Site	Address	Map ID	Page
SELOVER ELEMENTARY S	150 LINCOLN ST	12	171
Case Id: 97-10-22-1120-45			
Facility Status: Administrative Deficiencies Exist			
ZUMBACH SPORTSCARS I	***2030 STATE ROUTE 35***	***14***	***178***
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
HARBOR CLUB SEWAGE P	***GONDEK DR***	***20***	***201***
Case Id: 94-09-30-1119			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
SUNOCO S/S #0007-759	1788 HWY 35	20	221
Case Id: 87-08-20-0931			
Facility Status: Assigned to a Program			
ALMAR SERVICE STATIO	1788 RTE 35 N & HAUS	20	221
Case Id: 96-05-15-1322-44			
Facility Status: Assigned to a Program			
LOCKWOOD BOAT WORKS	***1825 HWY 35 MORGAN***	***20***	***224***
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
ROUTE 3519 PETROLEUM	1945 RTE 35 S	20	232
Case Id: 00-01-05-1632-29			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MORGAN FRAME SPEC. I	***RTE 35***	***21***	***337***
Case Id: 93-06-28-1024-00			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MOBIL SERVICE STATIO	***GSP S/B***	***25***	***355***
Case Id: 93-08-17-2056			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MORGAN SEWAGE PUMP S	OLD SPY RD	27	359
Case Id: 94-09-26-1516			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
BROWNS BOAT YARD	OFF ERNSTON RD	27	371
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MOBIL GAS STATION	RTE 35 NR ERNSTON RD	31	401
Case Id: 91-01-25-1414			
Facility Status: Case Awaiting Assignment			
LAURENCE HARBOR PETR	812 RTE 35 S	38	427
Case Id: 99-03-11-1412-10			

Facility Status: Assigned to a Program			
GETTY S/S #56893	BORDENTOWN RD & ERNS	41	429
Case Id: 91-03-21-1349			
Facility Status: Assigned to a Program			
RACEWAY S/S	ERNSTON ROAD & BORDE	41	432
Case Id: 97-02-18-1018-43			
Facility Status: Case Awaiting Assignment			
HESS SERVICE STATION	974 RTE 9	43	434
Case Id: 90-06-01-1532			
Facility Status: Assigned to a Program			
LAMER SEWAGE PUMP ST	***NATHAN BLVD***	***44***	***442***
Case Id: 94-09-30-1247			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
ERNSTON SERVICE CENT	***45 ERNSTON RD***	***45***	***450***
Case Id: 93-08-13-1200			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
CARLISLE STATION	***RTE 9 ERNSTON RD***	***49***	***464***
Case Id: 92-07-16-1143			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
EISENHOWER SCHOOL	601 ERNSTON RD	50	470
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
CHURCH OF SAINT BERN	3 VILLANOVA RD	51	471
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
AMOCO S/S #1847	993 RT #9 N/ERNSTON	53	607
Case Id: 91-07-26-1533			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MOBIL SERVICE STATIO	RTE 9 S & ERNSTON RD	62	641
Case Id: 91-04-04-1335			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
DOT STATE PROPERTY	***ERNESTON & RT 9 S***	***62***	***642***
Case Id: 91-10-01-1141			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
E I DUPONT	***CHEESEQUAKE RD***	***65***	***647***
Case Id: 91-08-22-1531			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MADISON PARK SCHOOL	33 HARVARD RD	71	658
Case Id: 97-07-18-1750-57			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
ACADEMY HONDA AT OLD	***RTE 9 N***	***82***	***786***
Case Id: 95-05-01-1305-00			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
D&V WRECKING CORP	***3143 BORDENTOWN AVE***	***83***	***800***
Case Id: 98-08-07-1507-04			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
ZOUBEK ASSOCIATES	***3220 BORDENTOWN TNPK***	***96***	***910***
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
RACEWAY PETROL GAS S	***1300 RTE 9 SOUTH***	***102***	***937***
Case Id: 01-09-19-1421-04			
Facility Status: Assigned to a Program			
ROUTE 9 SOUTH & POOR	RTE 9 S & POOR FARM	102	1056

Case Id: 97-09-04-1003-14
Facility Status: Case Awaiting Assignment

MANZO CONTRACTING ***WATERWORKS RD*** ***104*** ***1064***
Case Id: 99-08-20-1444-46
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern

IZZO REALTY ASSOCIAT 3160 BORDENTOWN AVEN 105 1121
Case Id: 99-02-10-1110-51
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern

HENRY MINNING COMPAN OLD WATER WORKS RD 109 1157
Case Id: 95-02-01-1503-59
Facility Status: Assigned to a Program

CUMBERLAND FARMS/GUL RTE 9 & 34 116 1230
Case Id: 99-06-30-1535-10
Facility Status: Assigned to a Program

GULF SERV STA RTE 9 & RTE 34 116 1231
Case Id: 92-09-28-1000
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern

MADISON CITGO ROUTE 9 NORTH & OLD 119 1239
Case Id: 00-02-18-1432-23
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern

CHEESEQUAKE BOOSTER RTE 516 119 1241
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern

NJ UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environmental Protection & Energy's UST Data.

A review of the NJ UST list, as provided by EDR, and dated 04/25/2016 has revealed that there are 49 NJ UST sites within the searched area.

Site	Address	Map ID	Page
SOUTH AMBOY PLUMBING Facility Id: 269622 Tank Status: Removed	***224 LEFFERTS ST***	***5***	***148***
SELOVER ELEMENTARY S Facility Id: 031993 Tank Status: Removed	***150 LINCOLN ST***	***12***	***168***
D&M EXCAVATING INC Facility Id: 003140 Tank Status: Removed	RT 35 & KATH ST	18	187
GALLERY HOLIDAY MOTE Facility Id: 707279 Tank Status: Removed	2020 RT 35 N	18	189
MORGAN MARINA INC Facility Id: 020865 Tank Status: In-use	8000 GONDEK DR	20	195
HARBOUR CLUB SEWAGE	OFF ERNSTON RD	20	203

Facility Id: 024196 Tank Status: Removed			
LOCKWOOD BOAT WORKS Facility Id: 016728 Tank Status: Removed	1825 RTE 35	20	226
19 PETROLEUM Facility Id: 025746 Tank Status: In-use Tank Status: Removed	1949 RT 35 S	20	230
BELMAR REALTY PROFES Facility Id: 235358 Tank Status: Removed	207 STEVENS AVE S	20	260
MORGAN FIRE HOUSE Facility Id: 003720 Tank Status: Removed	***RTE 35 & OLD SPYE RD***	***21***	***293***
TIGER OPERATING LLC Facility Id: 026234 Tank Status: In-use	***1788 RTE 35 N***	***21***	***333***
MORGAN WASTEWATER PU Facility Id: 019279 Tank Status: Removed	OFF US RT 35	27	358
BROWN'S BOAT YARD IN Facility Id: 015697 Tank Status: Removed	OFF ERNSTON RD	27	372
CONNIES AKA CONNIES Facility Id: 501551 Tank Status: Removed	1899 RT 35 S	30	395
CARRIAGE HOUSE MANOR Facility Id: 025468 Tank Status: Abandoned in Place Tank Status: Removed	***ERSTON RD***	***31***	***398***
SOUTH AMBOY HOUSING Facility Id: 017343 Tank Status: Removed	BAYSHORE DR	34	418
LA MER SEWAGE PUMP S Facility Id: 024195 Tank Status: Removed	OFF ERNSTON RD	44	444
CARLISLE STATION Facility Id: 015349 Tank Status: Removed	***RTE 9 ERNSTON RD***	***49***	***464***
DWIGHT D EISENHOWER Facility Id: 030344 Tank Status: Abandoned in Place	601 EARNSTON RD	50	470
SKY TOP SEWAGE PUMP Facility Id: 024197 Tank Status: Removed	***ERNSTON RD***	***58***	***618***
AT&T SAYERVILLE Facility Id: 016020 Tank Status: Removed	ERNSTON RD	61	630
BETTY BRITE CLEANERS	499 ERNSTON RD	61	633

Facility Id: 003862 Tank Status: Removed			
STRAUSS DISCOUNT AUT Facility Id: 023264 Tank Status: Removed	1072 RT 9	62	637
LIONEL KIDDIE CITY Facility Id: 022787 Tank Status: Removed	RT 9	62	641
ST BERNADETTE RC Facility Id: 030334 Tank Status: Removed	VILLANOVA & PRINCETO	63	644
ST BERNADETTE CHURCH Facility Id: 021684 Tank Status: Removed	20 VILLANOVA RD	63	645
MADISON PARK SCHOOL Facility Id: 021894 Tank Status: Removed	***33 HARVARD RD***	***71***	***655***
I & K SHOP 2 LLC Facility Id: 008840 Tank Status: Removed Tank Status: In-use	3112 BORDENTOWN AVE	75	722
SHELL SERVICE STATIO Facility Id: 004782 Tank Status: Removed	***BORDENTOWN AVE & CHE***	***75***	***725***
ACADEMY HONDA AT OLD Facility Id: 004977 Tank Status: Removed	***RTE 9 N***	***82***	***786***
D&V WRECKING CORP Facility Id: 026225 Tank Status: Removed	***3143 BORDENTOWN AVE***	***83***	***800***
PARKWOOD VILLAGE APT Facility Id: 018534 Tank Status: Removed	1I WESTMINSTER BLVD	85	816
NIEUW AMSTERDAM VILL Facility Id: 014713 Tank Status: Removed	***1 VAN DELFT DR***	***95***	***896***
ZOUBEK ASSOCIATES Facility Id: 006797 Tank Status: Removed	***3220 BORDENTOWN TNPK***	***96***	***910***
EMERY MANOR NURSING Facility Id: 025189 Tank Status: Removed	***4 RTE 34***	***102***	***952***
HOME DEPOT 957 Facility Id: 033941 Tank Status: In-use	1100 US RT 9 S	102	958
GALLO INC Facility Id: 001283 Tank Status: Duplicate	RT 9 & 34	102	966
MADISON GARDEN APART	RT 34	102	987

Facility Id: 019228 Tank Status: Abandoned in Place			
NEW JERSEY TRANSIT B Facility Id: 003913 Tank Status: Removed	RT 34	102	992
BIRCH HILL SWIM CLUB Facility Id: 194223 Tank Status: Removed	***990 RT 9 S***	***102***	***1046***
GETTY 00304 Facility Id: 001705 Tank Status: Removed	RTE 9 & HARTLE'S LN	102	1056
MANZO CONTRACTING CO Facility Id: 009913 Tank Status: Exempt Tank Status: Removed	***CHESEQUAKE RD***	***104***	***1066***
MOUNTAINEER CONSTRUC Facility Id: 019296 Tank Status: Removed	***OLD WATER WORKS RD***	***105***	***1094***
3160 BORDENTOWN AVEN Facility Id: 032456 Tank Status: Removed	3160 BORDENTOWN AVE	105	1120
JERSEY BILLETS Facility Id: 024710 Tank Status: Removed Tank Status: Abandoned in Place	3237 BORDENTOWN AVE	105	1146
PERRINE ROAD PUMP ST Facility Id: 022180 Tank Status: In-use	80 PERRINE RD	111	1162
CHEESEQUAKE STATE PA Facility Id: 003804 Tank Status: Removed	***300 GORDON RD***	***113***	***1165***
SITE #38943 Facility Id: 008646 Tank Status: Removed Tank Status: Exempt Tank Status: In-use	1400 RT 9 S	114	1177
LORCO PETROLEUM SERV Facility Id: 013795 Tank Status: Removed	***RUNTON & CHEESEQUAKE***	***119***	***1242***

NJ MAJOR FACILITIES: 'Major Facility' means all facilities, located on one or more contiguous or adjacent properties owned or operated by the same person, having total combined storage capacity of: 1) 20,000 gallons or more for hazardous substances other than Petroleum or petroleum products; 2) 200,000 gallons or more for hazardous substances of all kinds.

A review of the NJ MAJOR FACILITIES list, as provided by EDR, and dated 05/04/2016 has revealed that there are 2 NJ MAJOR FACILITIES sites within the searched area.

Site	Address	Map ID	Page
DUPONT - PARLIN	***250 CHEESEQUAKE ROAD***	***52***	***596***

Department Integrated Facility File Number: 121900165000

MADISON INDUSTRIES I ***554 WATERWORKS RD*** ***115*** ***1187***
Department Integrated Facility File Number: 120900143000

NJ HIST MAJOR FACILITIES: 'Major Facility' means all facilities, located on one or more contiguous or adjacent properties owned or operated by the same person, having total combined storage capacity of: 1) 20,000 gallons or more for hazardous substances other than Petroleum or petroleum products; 2) 200,000 gallons or more for hazardous substances of all kinds. This file contains detail information that is no longer available by the Department of Environmental Protection due to security concerns.

A review of the NJ HIST MAJOR FACILITIES list, as provided by EDR, and dated 01/02/2002 has revealed that there are 2 NJ HIST MAJOR FACILITIES sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI Facility Id: 120900138000	***570 OLD WATERWORKS R***	***105***	***1095***
MADISON INDUSTRIES I Facility Id: 120900143000	***554 WATERWORKS RD***	***115***	***1187***

NJ MANIFEST: Hazardous waste manifest information.

A review of the NJ MANIFEST list, as provided by EDR, and dated 12/31/2013 has revealed that there are 10 NJ MANIFEST sites within the searched area.

Site	Address	Map ID	Page
WAYNES AUTO BODY EPA Id: NJD144396850	***S PINE & 10TH ST***	***20***	***272***
E I DUPONT DE NEMOUR EPA Id: NJD002444024	***250 CHEESEQUAKE RD***	***52***	***471***
HOME DEPOT USA HD095 Generator EPA Id: NJR000040360	***1090 RTE 9 SOUTH***	***72***	***661***
BJS WHOLESALE CLUB # EPA Id: NJR000069757	1007 RT 9 N	72	699
MOOREHOUSE SPEEDWELL EPA Id: NJD986610590	***3101 BORDENTOWN AVE***	***75***	***731***
GREEN TREE CHEMICAL EPA Id: NJR000035477	***50 SOUTH MINISINK AV***	***79***	***771***
WALMART STORE #2825 EPA Id: NJR000038471	***1126 RT 9***	***86***	***820***
OB CLEANERS EPA Id: NJX000331439	1063 RTE 9 N	102	959
CIBA SPECIALTY CHEMI EPA Id: NJD002141190	***570 OLD WATERWORKS R***	***105***	***1098***
MADISON INDUSTRIES I EPA Id: NJD002460855	***554 WATERWORKS RD***	***115***	***1187***

PA MANIFEST: Hazardous waste manifest information.

A review of the PA MANIFEST list, as provided by EDR, and dated 12/31/2014 has revealed that there are 3 PA MANIFEST sites within the searched area.

Site	Address	Map ID	Page
HOME DEPOT USA HD095 Generator EPA Id: NJR000040360	***1090 RTE 9 SOUTH***	***72***	***661***
WALMART STORE 2825 Generator EPA Id: NJR000038471	1126 ROUTE 9	86	848
BJS WHOLESALE CLUB # Generator EPA Id: NJR000069757	1007 US HIGHWAY 9	102	1018

NY MANIFEST: Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

A review of the NY MANIFEST list, as provided by EDR, and dated 08/01/2016 has revealed that there are 4 NY MANIFEST sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI EPA ID: NJD002141190	***570 OLD WATERWORKS R***	***0***	***4***
E I DUPONT DE NEMOUR EPA Id: NJD002444024	***250 CHEESEQUAKE RD***	***52***	***471***
MADISON INDUSTRIES I EPA Id: NJD002460855	***554 WATERWORKS RD***	***115***	***1187***
LORCO PETROLEUM SERV	***RUNTON & CHEESEQUAKE***	***119***	***1242***

NJ Release: Hazardous material release. Initial notification information reported to the Dept. of Env. Protection's Action Line. The office has not conducted any investigations to determine it's validity. or accuracy.

A review of the NJ Release list, as provided by EDR, and dated 05/18/2016 has revealed that there are 133 NJ Release sites within the searched area.

Site	Address	Map ID	Page
138 GEORGE STREET	***138 GEORGE ST***	***1***	***121***
119 GEORGE STREET	***119 GEORGE ST***	***1***	***124***
Not reported	***135 JOHN ST***	***1***	***127***
213 GEORGE STREET	***213 GEORGE ST***	***2***	***129***
241 GORDON STREET	***241 GORDON ST***	***4***	***132***
243 CATHERINE STREET	***243 CATHERINE ST***	***4***	***142***
315 GEORGE STREET	***315 GEORGE ST***	***4***	***144***
Not reported	***20 BERTRAM AVE***	***6***	***150***
162 BERTRAM AVENUE	***162 BERTRAM AVE***	***6***	***152***
873 UPPER MAIN STREE	***873 UPPER MAIN ST***	***8***	***157***
19 HARKINS STREET	***19 HARKINS ST***	***9***	***160***
26 HARKINS STREET	***26 HARKINS ST***	***9***	***162***
Not reported	***36 HARKINS ST***	***9***	***164***
150 GRAND STREET	***150 GRAND ST***	***10***	***166***

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
SELOVER ELEMENTARY S	***150 LINCOLN ST***	***12***	***168***
Not reported	73 LUKE ST.	13	172
Not reported	73 LUKE STREET	13	174
PRIVATE PROPERTY	14 PARKER CT	15	180
Not reported	***912 ROUTE 9 SOUTH***	***17***	***184***
Not reported	100 HOFFMAN PLAZA	20	191
Not reported	40 HOFFMAN AVENUE	20	193
HARBOR CLUB SEWAGE P	***GONDEK DR***	***20***	***201***
IN AREA OF	8 DOLAN ST	20	204
EQUPIMENT RENTAL	1819 RT 35	20	217
Not reported	1965 HIGHWAY 35	20	239
PETRO 19	1949 RT 35	20	242
GOMOLKA AUTO BODY	RT 35 SOUTH	20	245
PETROLEUM 19 GAS STA	***RT 35/10TH ST***	***20***	***247***
EL TROVADOR RESTAURA	1776 RT 35 N	20	258
Not reported	207 STEVENS AVE SOUT	20	262
IN THE AREA OF	16 RARITAN AVE	20	278
175 NORTON STREET	***175 NORTON ST***	***20***	***280***
IN THE AREA OF	333 PINE AVE	20	283
MORGAN FIRE HOUSE	RT 35 & OLD SPYE RD	21	289
METER STATION AT TRA	RT 35 & OLD SPYE RD	21	291
RESIDENCE	17 FIRST ST	21	295
VALVE SITE MORGAN SE	RT 35 & MORGAN	21	297
CORNER OF MORGAN AV	RT 35 NB	21	299
TRANSCO MORGAN M&R S	SH35/MORGAN AVE	21	301
AREA OF PUMPING STAT	***CHIMNEYRIDGE RD***	***21***	***303***
PIPE LINE LOCATED AT	RT 35-MORGAN AVE	21	306
ON SIDE OF ROADWAY	RT 35 S/MORGAN AREA	21	308
CORNER OF	MORGAN AVE/HWY 35	21	310
Not reported	RT 35 AT MORGAN ST	21	312
Not reported	RT 35 /MORGAN	21	314
TRANSCO/200C 60 VALV	RT 35 & MORGAN	21	316
ALMAR GASSTATION	RT 35 N. & HAUSSLING	21	322
Not reported	***189 MORGAN AVE***	***21***	***340***
293 MIDLAND AVENUE	***293 MIDLAND AVE***	***21***	***346***
Not reported	326 STEVENS AVE	21	348
Not reported	***23 MIARA ST***	***23***	***353***
MOBIL SERVICE STATIO	***GSP S/B***	***25***	***355***
S. OF CHEESEQUAKE CR	RT 35	27	360
Not reported	109 MORGAN AVE	27	373
Not reported	109 MORGAN AVE	27	375
Not reported	1707 ROUTE 35	27	382
MORGAN GREEK	1729 HWY 35	27	387
26 ADAM BOULEVARD	***26 ADAM BLVD***	***28***	***392***
Not reported	901 ERSTON RD	31	402
Not reported	901 ERNSTEN RD	31	404
Not reported	901 ERNSTINE RD	31	408
1064 BORDENTOWN AVEN	***1064 BORDENTOWN AVE***	***33***	***416***
IN THE ARI AROUND	2106 BAY HEAD DR	36	421
RESIDENCE AT	2106 BAYHEAD DR	36	423
AREA OF	22 GIERA CT	44	434
SKYTOP SEWAGE PUMP S	REAR OF 91 WOODMERE	44	438
AREA OF	35 STRATON DR	44	440
LAMER SEWAGE PUMP ST	***NATHAN BLVD***	***44***	***442***
GAS MAIN/IN ROADWAY	ERNSTON RD/NATHAN BL	44	446
ROADWAY	NATHANDR + ERNSTON	44	448

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
ERNSTON SERVICE CENT	***45 ERNSTON RD***	***45***	***450***
Not reported	***318 LINCOLN AVE***	***47***	***457***
362 BAYVIEW DRIVE	***362 BAYVIEW DR***	***47***	***459***
ERNSTON COC	***350 ERNSTON RD***	***49***	***461***
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
DUPONT - PARLIN	***250 CHEESEQUAKE ROAD***	***52***	***596***
Not reported	103 GIERA CT	54	608
ROBIN PAGANO	29-13 SKYTOP GARDENS	59	619
AREA OF	16-17 SKYTOP GARDEN	59	621
ACADEMY HONDA	US RT#9 N	61	625
DIANE SUAU	1603 W. MINSTER BLVD	61	627
DOT STATE PROPERTY	***ERNESTON & RT 9 S***	***62***	***642***
RESID	122 MALVERN CT.	68	650
MADISON PARK SCHOOL	***33 HARVARD RD***	***71***	***655***
Not reported	***346 WOODBINE AVE.***	***73***	***715***
Not reported	809 DOWNING ST	74	718
GLOBAL LANDFILL	OFF ERNSTON ROAD	76	736
IN AREA OF	9 COLBY CT.	78	740
ASHLAND INC	***50 S MINISINK AVE***	***79***	***768***
BRANDIES RD &	PRINCETON RD	81	784
Not reported	3141 BORDENTOWN AVEN	83	809
IN FRONT OF	11 VERNON ST	88	859
MIDDLESEX CNTY RD DE	AREA 31 US RT 9 NO	91	882
MIDDLESEX CTY GARAGE	US #9N	91	884
AREA NEAR	2 SOPHIE ST	93	888
AREA OF	2 SOPHIE ST	93	890
RESIDENCE	1 SOPHIE ST	93	892
Not reported	1-1 VAN DELFT DR	95	898
Not reported	3000 BORDENTOWN AVE	96	903
ZOUBEK ASSOC	3220 BORDENTOWN AVE	96	915
Not reported	3217 BORDENTOWN AV	96	918
EMERY MANOR NURSING	***4 RT 34***	***102***	***950***
Not reported	40 SHELLY RD	102	960
Not reported	40 SHELLEY DR	102	962
CUMBERLAND FARMS	RT 9/RT 34	102	998
SUNOCO SERVICE STATI	RT.34 & CHEESEQUAKE	102	1002
OLD BRIDGE TWP SENIO	RT'S #9 & 34	102	1008
GULF SERVICE STATION	RT#9+RT#34	102	1012
Not reported	1009 RT 9 NORTH	102	1014
Not reported	1007 RT 9 NORTH	102	1027
BEHIND GEORGE RESIDE	180 RT 9 NORTH	102	1034
IN FRONT OF	1001 RTE 9	102	1039
BIRCH HILL SWIM CLUB	***990 RT 9 S***	***102***	***1046***
Not reported	94 BREWSTER CIRCLE	103	1062
PROPERTY OF ABOVE CO	CHEESEQUAKE & PERINE	104	1072
IN ROAD WAY AT	SHELLEY & WATERWORKS	104	1074
Not reported	4 POOR FARMS RD.	104	1078
IN AREA OF MADISON I	WATERWORKS RD	104	1082
MANZO CONTRACTING	WATER WORKS RD	104	1088
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***105***	***1095***
BASF CORP	***570 OLD WATERWORKS R***	***105***	***1104***
RECLAMATION TECHNOLO	***3200 BORDENTOWN AVE***	***105***	***1117***
JOHNNY ON THE SPOT	***3168 BORDENTOWN AVE***	***105***	***1132***
RECLAMATION TECHNOLO	***3200 BORDENTOWN AVE***	***105***	***1135***
RECLAMATION TECHNOLO	***3200 BORDENTOWN AVEN***	***105***	***1139***
JERSEY BILLETS	***3237 BORDENTOWN AVE***	***105***	***1141***

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
MANZO CONSTRUCTION C	WATERWORKS RD	107	1152
CHEESEQUAKE STATE PA	***300 GORDON RD***	***113***	***1165***
MADISON INDUSTRIES I	***554 WATERWORKS RD***	***115***	***1187***
HALLS GULF SERVICE S	***99 RT 70***	***116***	***1225***
OLD BRIDGE GAS STATI	***1499 RT 9***	***119***	***1239***
LORCO PETROLEUM SERV	***RUNTON & CHEESEQUAKE***	***119***	***1242***
9 MICHELLE AVENUE	***9 MICHELLE AVE***	***121***	***1269***

NJ SPILLS: All hazmat known or unknown spills to the ground reported to the DEP's Env. Action Line. The office has not conducted any investigations to determine it's validity or accuracy.

A review of the NJ SPILLS list, as provided by EDR, and dated 05/18/2016 has revealed that there are 74 NJ SPILLS sites within the searched area.

Site	Address	Map ID	Page
NEW WATER REALTY COR Case Number: 02-02-13-1540-47 Facility Id: 91371	60-100 LOUISA ST	13	176
INTERSECTION OF Case Number: 01-12-12-1850-40 Facility Id: 89164	ERNSTONN RD/GONDACK	20	199
AREA OF Case Number: 01-06-23-2125-48 Facility Id: 80512	ROUTE 35 & LORRAINE	20	219
Not reported Case Number: 08-04-15-1634-05 Facility Id: 269725 Incident Status: Terminated	1825 HWY 35	20	227
ROUTE 3519 PETROLEUM Case Number: 00-01-05-1632-29 Facility Id: 55691	1945 RTE 35 SOUTH	20	234
PETROLEUM 19 GAS STA Case Number: 99-10-09-0820-54 Facility Id: 51685	***RT 35/10TH ST***	***20***	***247***
CALIFORNIA MOTEL Case Number: 95-2-10-1803-38 Facility Id: 2000	RT 35 S	20	252
MORGAN AUTO PARTS Case Number: 90-05-04-1157 Facility Id: 5661	1841 RT 35 SOUTH	20	254
BAYSIDE LANDSCAPING/ Case Number: 97-10-4-2114-09 Facility Id: 13898	1831 RT 35	20	256
PETROLEUM 19 Case Number: 99-07-12-1116-21 Facility Id: 46133	1949 HYW#35	20	264
ON ROAD WEST OF RT 9	SOUTH ST	20	266

Case Number: 94-4-21-1318-39 Facility Id: 6641			
RESID Case Number: 96-1-19-1521-00 Facility Id: 885	166 LUKE ST	20	286
AREA OF PUMPING STAT Case Number: 91-5-1-1238-46 Facility Id: 5895	***CHIMNEYRIDGE RD***	***21***	***303***
SUNOCO STATION Case Number: 87-08-20-0931 Facility Id: 5362	RT. 35 AND HAUSSLING	21	319
GETTY SERVICE STATIO Case Number: 15-11-17-0338-45 Facility Id: 580316 Incident Status: Terminated	***1788 RT 35***	***21***	***324***
Not reported Case Number: 10-08-21-1401-45 Facility Id: 363136 Incident Status: Terminated	200 S. FELTON ST	21	342
SAYREVILLE PUMP STAT Case Number: 94-9-26-1516-20 Facility Id: 17434	OLD SPY RD	27	362
IN FRONT OF Case Number: 99-04-18-0840-20 Facility Id: 41736	97 MORGAN AVE	27	365
Not reported Case Number: 05-01-05-1420-56 Facility Id: 127253 Incident Status: Continuous	1707 RT 35	27	377
CARRIAGE HOUSE MANOR Case Number: 99-08-11-1751-30 Facility Id: 47967	***ERSTON RD***	***31***	***398***
CARRIAGE HOUSE MANOR Case Number: 99-03-02-1609-39 Facility Id: 39559	***901 ERNSTON RD***	***31***	***411***
ROADWAY Case Number: 97-10-28-1531-45 Facility Id: 15068	WOODMERE+SANDPIPER	44	436
Not reported Case Number: 10-09-17-0735-09 Facility Id: 365847 Incident Status: Terminated	7 ZAUNEROWICZ RD	46	454
E I DUPONT DE NEMOUR Case Number: 93-6-9-0806-17 Case Number: 94-6-20-1720-04 Case Number: 97-12-8-0915-30 Case Number: 93-8-26-1350-35 Case Number: 95-5-16-1334-35 **Additional key fields are available in the Map Findings section* Facility Id: 9465	***250 CHEESEQUAKE RD***	***52***	***471***

Facility Id: 10829
Facility Id: 16893
Facility Id: 14525
Facility Id: 7227
**Additional key fields are available in the Map Findings section*

Not reported Case Number: 16-04-15-1408-59 Facility Id: 596504 Incident Status: Terminated	8000 GONDEK DR	56	612
MORGAN MARINA INC Case Number: 15-10-22-1206-25 Facility Id: 577673 Incident Status: Terminated	***8000 GONDEK DR***	***56***	***614***
RESIDENCE Case Number: 98-10-19-1227-42 Facility Id: 33378	2213 WESTMINSTER BLV	61	623
E I DUPONT Case Number: 94-3-25-1449-00 Facility Id: 4877	***CHEESEQUAKE RD***	***65***	***647***
IN FRON OF Case Number: 93-7-11-0107-00 Facility Id: 11580	59 DOWNING ST	72	704
U-HAUL LOT Case Number: 98-07-01-0627-47 Facility Id: 27628	RT9N/DOWNING ST	72	707
ROADWAY-NEAR DOWNING Case Number: 94-1-17-1423-45 Facility Id: 702	RT#9 SOUTH	72	709
D.V.WRECKING CORP Case Number: 98-08-07-1507-04 Facility Id: 29637	3143 BORDENTOWN AVE	83	796
BEHIND RESIDENCE AT Case Number: 98-05-28-1317-38 Facility Id: 25664	22 BRANDEIS RD	87	857
INTERSECTION OF Case Number: 95-8-16-1600-54 Facility Id: 13021	CHEESEQUAKE-CLEMSON	94	894
IN ROADWAY IN FRONT Case Number: 91-3-4-0842-53 Facility Id: 2743	3108 BORDENTOWN AVE	96	901
Not reported Case Number: 14-12-23-1359-31 Facility Id: 543464 Incident Status: Terminated	2320 BORDENTOWN AVE	96	906
EASCO ALUMINUM CO Case Number: 88-02-26-1746 Facility Id: 1276	3237 BORDENTOWN AVE	96	908
RACEWAY PETROL GAS S Case Number: 01-09-19-1421-04 Facility Id: 84907	***1300 RTE 9 SOUTH***	***102***	***937***
EMERY MANOR NURSING	***4 RTE 34***	***102***	***952***

Case Number: 96-11-6-1147-05 Facility Id: 17869			
WASTE MANAGEMENT Case Number: 01-02-15-1431-46 Facility Id: 74387	***305 RT 34***	***102***	***955***
IN AREA OF Case Number: 96-1-3-0410-02 Facility Id: 59	RT 9 NO & RT 34	102	964
ON ROAD SURFACE Case Number: 91-5-31-0642-59 Facility Id: 7713	AVERY NEAR AMARA	102	968
Not reported Case Number: 05-11-04-1114-27 Facility Id: 165831 Incident Status: Terminated	1090 RT 9 SOUTH	102	970
Not reported Case Number: 14-05-24-1520-43 Facility Id: 518096 Incident Status: Terminated	1090 RT 9 SB	102	972
Not reported Case Number: 11-10-18-0838-24 Facility Id: 406901 Incident Status: Terminated	1072 RTE 9 SOUTH	102	976
Not reported Case Number: 11-10-18-0836-43 Facility Id: 406900 Incident Status: Terminated	1072 RT 9	102	978
IN AREA OF Case Number: 96-1-3-0559-33 Facility Id: 60	RT 34 & RT 9	102	985
Not reported Case Number: 16-01-14-1355-33 Facility Id: 585750 Incident Status: Terminated	1012 ROUTE 9 SOUTH	102	994
ON ROADWAY Case Number: 89-11-20-1530 Facility Id: 13284	RT 9 S & RT 34	102	996
CUMBERLAND FARMS Case Number: 01-02-27-1113-13 Facility Id: 74813	ROUTE 9 & 34	102	1000
GULF SERVICE STATION Case Number: 98-10-26-1614-12 Facility Id: 33809	RTE 34/RTE 9	102	1004
IN FRONT OF 7-11 STO Case Number: 88-11-16-1515 Facility Id: 10301	RT 34	102	1006
ON ROADWAY Case Number: 00-07-12-1328-44 Facility Id: 64432	RT 34/RT9	102	1010
Not reported	1007 RT 9 NORTH	102	1016

Case Number: 03-08-09-1107-23 Facility Id: 67047 Incident Status: Terminated			
Not reported Case Number: 10-01-26-1031-07 Facility Id: 339320 Incident Status: Terminated	1004 RTE 9	102	1029
Not reported Case Number: 13-04-24-1447-16 Facility Id: 469349 Incident Status: Terminated	1004 RTE 9 SOUTH	102	1031
NORTHVILLE GAS STATI Case Number: 95-3-5-1912-00 Facility Id: 3061	RT 9+POOR FARM RD	102	1042
ROADWAY Case Number: 95-7-28-1254-09 Facility Id: 11822	RT9 & POOR FARM	102	1044
GETTY SERVICE STATIO Case Number: 95-12-18-1420-28 Facility Id: 19907	RT 9/HARTLES LN	102	1050
GETTY MART STATION Case Number: 01-06-07-1005-59 Facility Id: 79545	RTE 9 NORTH/ RTE 34	102	1052
ALONG ROADWAY Case Number: 01-08-08-1009-04 Facility Id: 82875	RTE 9/ POOR FARM RD	102	1054
MANZO CONTRACTING Case Number: 99-08-20-1444-46 Facility Id: 48485	***WATERWORKS RD***	***104***	***1064***
ROADWAY Case Number: 95-2-18-1058-37 Facility Id: 2376	PERINE & CHEESEQUAKE	104	1070
LORCO PETROLEUM Case Number: 97-8-25-1230-04 Facility Id: 11803	WATERWORKS & CHEESEQ	104	1080
IN ROADWAY Case Number: 90-02-09-2048 Facility Id: 1744	CHEEZEQUAKE AND POOR	104	1084
MANZO ASPHALT Case Number: 89-04-22-0211 Facility Id: 3841	CHEEZEQUAKE RD	104	1086
3160 BORDENTOWN AVEN Case Number: 99-02-10-1110-51 Facility Id: 38679	***3160 BORDENTOWN AVE***	***105***	***1121***
CHEESEQUAKE STATE PA Case Number: 98-07-01-1231-39 Facility Id: 27660	***300 GORDON RD***	***113***	***1165***
MADISON INDUSTRIES I Case Number: 00-06-08-1434-19	***554 WATERWORKS RD***	***115***	***1187***

Facility Id: 62595			
NAPPI TRUCKING CORP Case Number: 00-06-29-1020-06 Facility Id: 63796	***305 RT 34***	***118***	***1234***
AREA OF YARD Case Number: 01-02-15-1457-34 Facility Id: 74390	***181 RT 34***	***120***	***1266***
202 ROUTE 34 Case Number: 98-02-06-1425-48 Facility Id: 19663	***202 RT 34***	***122***	***1272***
99 SCHULMEISTER ROAD Case Number: 01-08-14-1447-07 Facility Id: 83208	***99 SCHULMEISTER RD***	***123***	***1275***
24 STEAMBOAT LANDING Case Number: 00-10-20-1158-17 Facility Id: 69657	***24 STEAMBOAT LANDING***	***124***	***1277***

NJ ENG CONTROLS: Legal Document that restricts the use of contaminated property; holds owner(s) to the regulatory/statutory requirements for cleanup.

A review of the NJ ENG CONTROLS list, as provided by EDR, and dated 03/14/2016 has revealed that there is 1 NJ ENG CONTROLS site within the searched area.

Site	Address	Map ID	Page
241 GORDON STREET Site ID: 414381	***241 GORDON ST***	***4***	***132***

NJ INST CONTROL: Sites where engineering and/or institutional controls remain in place as part of a remedial action to address soil and/or groundwater contamination. These restrictions ensure protection of human health and the environment as long as they are maintained.

A review of the NJ INST CONTROL list, as provided by EDR, and dated 05/05/2016 has revealed that there are 11 NJ INST CONTROL sites within the searched area.

Site	Address	Map ID	Page
241 GORDON STREET Facility Id: 414381	***241 GORDON ST***	***4***	***132***
GETTY SERVICE STATIO Facility Id: 5275	***1788 RT 35***	***21***	***324***
MOBIL SERVICE STATIO Facility Id: 45701	***933 RT 9***	***22***	***351***
LEHIGH GAS SERVICE S Facility Id: 5260	***127 ERNSTON RD***	***41***	***429***
DUPONT - PARLIN Facility Id: 15676	***250 CHEESEQUAKE ROAD***	***52***	***596***
GLOBAL LANDFILL RECL	***ERNSTON STATION RD***	***90***	***865***

Facility Id: 66176			
GETTY SERVICE STATIO	***1294 RT 9***	***102***	***943***
Facility Id: 15337			
BASF CORP	***570 OLD WATERWORKS R***	***105***	***1104***
Facility Id: 15963			
CHEESEQUAKE STATE PA	***300 GORDON RD***	***113***	***1165***
Facility Id: 15349			
MADISON INDUSTRIES I	***554 OLD WATERWORKS R***	***115***	***1183***
Facility Id: 15957			
HALLS GULF SERVICE S	***99 RT 70***	***116***	***1225***
Facility Id: 12998			

NJ VCP: Through the VCP, responsible parties, developers, local officials, or individuals may work with the department to remediate non-priority contaminated sites that pose no immediate threat to human health or the environment.

A review of the NJ VCP list, as provided by EDR, and dated 04/06/2016 has revealed that there are 16 NJ VCP sites within the searched area.

Site	Address	Map ID	Page
138 GEORGE STREET	***138 GEORGE ST***	***1***	***121***
Incident Number: 05-03-24-1058-20			
508 LEFFERT STREET	***508 LEFFERT ST***	***5***	***147***
Incident Number: 05-05-05-1119-45			
873 UPPER MAIN STREE	***873 UPPER MAIN ST***	***8***	***157***
Incident Number: 03-07-29-1149-35			
VIKING'S MARINA	1705 1707 RT 35 S	27	381
Incident Number: 07-04-23-1512-33			
38 EUGENE BOULEVARD	***38 EUGENE BLVD***	***28***	***394***
Incident Number: 05-12-21-0954-01			
CARRIAGE HOUSE MANOR	***901 ERNSTON RD***	***31***	***411***
Incident Number: 99-03-02-1609-39			
1064 BORDENTOWN AVEN	***1064 BORDENTOWN AVE***	***33***	***416***
Incident Number: 02-06-21-1345-23			
362 BAYVIEW DRIVE	***362 BAYVIEW DR***	***47***	***459***
Incident Number: 03-11-26-1029-05			
182 CLEVELAND AVENUE	***182 CLEVELAND AVE***	***57***	***617***
Incident Number: 06-08-18-1639-25			
14 HEMLOCK ROAD	14 HEMLOCK RD	60	623
Incident Number: 00-05-23-1303-30			
JOHNNY ON THE SPOT	***3168 BORDENTOWN AVE***	***97***	***933***
MANZO CONTRACTING CO	WATERWORKS & CHEESEQ	105	1114
Incident Number: 99-08-20-1444-46			
RECLAMATION TECHNOLO	***3200 BORDENTOWN AVE***	***105***	***1117***
JOHNNY ON THE SPOT	***3168 BORDENTOWN AVE***	***105***	***1132***
Incident Number: 07-10-13-0452-00			
99 SCHULMEISTER ROAD	***99 SCHULMEISTER RD***	***123***	***1275***

Incident Number: 01-08-14-1447-07			
24 STEAMBOAT LANDING	***24 STEAMBOAT LANDING***	***124***	***1277***
Incident Number: 00-10-20-1158-17			

NJ DRYCLEANERS: A listing of registered drycleaners.

A review of the NJ DRYCLEANERS list, as provided by EDR, and dated 06/06/2016 has revealed that there are 6 NJ DRYCLEANERS sites within the searched area.

Site	Address	Map ID	Page
COIN-OP LAUNDRY & DR Facility Id: L1652	520 ERNSTON ROAD	61	632
MOON CLEANERS Facility Id: L1554	***499 ERNSTON RD***	***61***	***636***
T/A SAYREWOODS DRY C Facility Id: L1630	GATEWAY PLAZA, RT9 S	66	649
MOOREHOUSE SPEEDWELL Facility Id: L1704	***3101 BORDENTOWN AVE***	***75***	***731***
O B CLEANERS Facility Id: L1748	1063 RT 9	102	960
SUNG FRENCH DRY CLEA Facility Id: L1743	***15 RT 9***	***102***	***1033***

NJ BROWNFIELDS: Brownfields are identified as formter or current commmercial or industrial use sites that are presently vacant or underutilized, on which there is suspected to have been a discharge of a contamination to the soil or groundwater at concentra tions greater than applicable cleanup criteria.

A review of the NJ BROWNFIELDS list, as provided by EDR, and dated 07/25/2016 has revealed that there are 12 NJ BROWNFIELDS sites within the searched area.

Site	Address	Map ID	Page
THEOS AUTO REPAIR PStatus: DEP Case	***331 BORDENTOWN AVE***	***4***	***139***
FROG HOLLOW SWIM & T PStatus: DEP Case	***LOUISA ST***	***7***	***154***
MORGAN ORDNANCE DEPO PStatus: DEP Case	***601 ERNSTON RD***	***50***	***467***
E I DUPONT DE NEMOUR PStatus: DEP Case	***250 CHEESEQUAKE RD***	***52***	***471***
SHELL SERVICE STATIO PStatus: DEP Case	***BORDENTOWN AVE & CHE***	***75***	***725***
ROAD DEPARTMENT GARA PStatus: DEP Case	CHEESEQUAKE BROWNTOW	91	878
GETTY SERVICE STATIO	***1294 RT 9***	***102***	***943***

PStatus: DEP Case

MOUNTAINEER CONSTRUC	***WATERWORKS RD***	***105***	***1090***
PStatus: DEP Case			
EVOR PHILLIPS LEASIN	***WATERWORKS RD***	***108***	***1155***
PStatus: DEP Case			
CPS MADISON INDUSTRI	OLD WATERWORKS RD	115	1181
PStatus: DEP Case			
NAPPI TRUCKING CORP	***305 RT 34***	***118***	***1234***
PStatus: DEP Case			
LORCO PETROLEUM SERV	***RUNTON & CHEESEQUAKE***	***119***	***1242***
PStatus: DEP Case			

NJ ISRA: The ISRA process begins with determining if the Act applies to your type of business and transaction. The provisions of ISRA only apply to industrial establishments. What is an industrial establishment? The term "industrial establishment" refers to the type of business operations and transactions that would subject a facility to review under ISRA. An industrial establishment must meet each of the following three criteria: The place of business or real property at which such business is conducted, having a North American Industry Classification System (NAICS) code listed in N.J.A.C. 7:26 B - Appendix C subject to the specified exceptions and limitations. The place of business must have been engaged in operations on or after December 31, 1983; and The place of business must involve the generation, manufacture, refining, transportation, treatment, storage, handling, or disposal of hazardous substances or hazardous wastes.

A review of the NJ ISRA list, as provided by EDR, and dated 03/23/2016 has revealed that there are 6 NJ ISRA sites within the searched area.

Site	Address	Map ID	Page
POWER INSTRUMENT COR	***346 BORDENTOWN AVENU***	***4***	***138***
Pi Number: G000014095			
Case Status: NFA (No Further Action) HISTORIC			
ARNEL INC	3145 BORDENTOWN AVE	83	792
Pi Number: 477798			
Case Status: Assigned to Program			
Case Status: Exempt from ECRA/ISRA			
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***105***	***1098***
Pi Number: G000060555			
Case Status: Waiver from ECRA/ISRA			
3160 BORDENTOWN AVEN	***3160 BORDENTOWN AVE***	***105***	***1121***
Pi Number: 032456			
Case Status: Assigned to Program			
Case Status: NFA-E (Unrestricted Use)			
MIDHATTAN WOODWORKIN	3150A BORDENTOWN ROA	105	1128
Pi Number: G000002997			
Pi Number: G000013715			
Case Status: NFA (No Further Action) HISTORIC			
LORCO PETROLEUM SERV	***RUNTON & CHEESEQUAKE***	***119***	***1242***
Pi Number: 013795			
Case Status: Assigned to Program			
Case Status: LSRP Oversight			

EXECUTIVE SUMMARY

NJ NPDES: The NJPDES contains the names, addresses and other information of all permitted New Jersey Pollutant Discharge Elimination Sytem dischargers.

A review of the NJ NPDES list, as provided by EDR, and dated 05/17/2016 has revealed that there are 16 NJ NPDES sites within the searched area.

Site	Address	Map ID	Page
LOCKWOOD BOAT WORKS NJPDES Permit Number: NJ0124630 NJPDES Permit Number: NJG0124630	***1825 HWY 35 MORGAN***	***20***	***224***
VIKINGS MARINA NJPDES Permit Number: NJ0121665 NJPDES Permit Number: NJG0121665	***STATE HIGHWAY RT 35***	***27***	***379***
MORGAN STP NJPDES Permit Number: NJ0023825	OLD SPYE ROAD	27	389
BRIARWOOD-901 ERNSTO NJPDES Permit Number: NJG0232084	***901 ERNSTON ROAD***	***31***	***410***
MORGAN WTP NJPDES Permit Number: NJ0102229	GORDON AVENUE	32	414
MORGAN WTP NJPDES Permit Number: NJ0050245	GORDON AVENUE	32	415
BROWN'S BOAT YARD NJPDES Permit Number: NJG0127531	7 ZAUNEROWICZ RD	46	456
E I DUPONT DE NEMOUR NJPDES Permit Number: NJ0000159 NJPDES Permit Number: NJ0102121	***250 CHEESEQUAKE RD***	***52***	***471***
MORGAN MARINA INC NJPDES Permit Number: NJ0125725	8000 GONDECK DR	56	611
MORGAN MARINA INC NJPDES Permit Number: NJG0125725	8000 GONDEK DR	56	612
D&V WRECKING CORP NJPDES Permit Number: NJ0123897	***3143 BORDENTOWN AVE***	***83***	***800***
OJO TRUCKING CORP NJPDES Permit Number: NJG0123315	***3213 BORDENTOWN AVE***	***96***	***928***
OJO TRUCING CORP NJPDES Permit Number: NJ0123315	3213 BORDENTOWN AVE	96	929
JOHNNY ON THE SPOT NJPDES Permit Number: NJG0127884	***3168 BORDENTOWN AVE***	***97***	***933***
STAVOLA OLD BRIDGE M NJPDES Permit Number: NJ0162434	1 WATER WORKS RD	110	1159
LORCO PETROLEUM SERV NJPDES Permit Number: NJ0065307	***RUNTON & CHEESEQUAKE***	***119***	***1242***

EXECUTIVE SUMMARY

NJ HWS RE-EVAL: The locations were removed from the Known Contaminated Sites list for a variety of reasons. Some of the sites were taken off the list because they were inactive, some were not assigned a case worker and some were no longer contaminated. Inspectors from the DEP are now undertaking a full re-evaluation of each of the locations statewide. That includes visual and environmental tests to see whether contamination still exists.

A review of the NJ HWS RE-EVAL list, as provided by EDR, and dated 09/20/2007 has revealed that there is 1 NJ HWS RE-EVAL site within the searched area.

Site	Address	Map ID	Page
SOMMERS LANDFILL	***CHEESEQUAKE RD & RTE***	***106***	***1151***
Facility Status: Assigned to Lead Bureau.			

NJ GW CONTAM AREAS: This data identifies those sites where groundwater contamination has been identified and, where appropriate, the NJDEP has established a Classification Exception Area (CEA). CEAs are institutional controls in geographically defined areas within which the New Jersey Ground Water Quality Standards (NJGWQS) for specific contaminants have been exceeded. When a CEA is designated for an area, the constituent standards and designated aquifer uses are suspended for the term of the CEA. This data layer contains information about areas in the state which are specified as the Currently Known Extent (CKE) of ground water pollution. CKE areas are geographically defined areas within which the local ground water resources are known to be compromised because the water quality exceeds drinking water and ground water quality standards for specific contaminants.

A review of the NJ GW CONTAM AREAS list, as provided by EDR, and dated 05/13/2016 has revealed that there are 3 NJ GW CONTAM AREAS sites within the searched area.

Site	Address	Map ID	Page
241 GORDON STREET	***241 GORDON ST***	***4***	***132***
GLOBAL SANITARY LAND	ERNSTON RD	90	864
HALLS GULF SERVICE S	***99 RT 70***	***116***	***1225***

NJ NJEMS: NJEMS Sites are points representing sites regulated by NJDEP under one or more regulatory permitting or enforcement programs, or sites that are otherwise of some interest to a NJDEP program. Program interests included in NJEMS are: Air, Communications Center, Discharge Prevention, Exams and Licensing, Fish Game and Wildlife, Green Acres, Hazardous Waste, Lab Certification, Land Use, Landscape Irrigation, Parks and Forestry, Pesticides, Pinelands, Planning, Radiation, Right-to-Know, Site Remediation, Soil Conservation, Solid Waste, TCPA, Water Quality, Water Supply, and Watershed Management.

A review of the NJ NJEMS list, as provided by EDR, and dated 07/16/2016 has revealed that there are 106 NJ NJEMS sites within the searched area.

Site	Address	Map ID	Page
138 GEORGE STREET	***138 GEORGE ST***	***1***	***121***
Site Id: 201347			
873 UPPER MAIN STREE	***873 UPPER MAIN ST***	***8***	***157***
Site Id: 163902			
RENT A WRECK	***916 RT 9***	***17***	***183***
Site Id: 121675			
MILLER INDUSTRIES IN	RT 35 & ERNSTON RD	20	216

Site Id: 20610			
LOCKWOOD BOAT WORKS Site Id: 38762	1825 RT 35	20	222
MATERIALS INTERNATIO Site Id: 85169	1945 RT 35	20	233
MODERN TREND SAYREVI Site Id: 5300	1965 RT 35	20	238
19 PETROLEUM SERVICE Site Id: 5253	1949 RT 35	20	241
CENTRAL JERSEY START Site Id: 23124	1809 RT 35	20	250
MORGAN FRAME SPECIAL Site Id: 5231	1969 RT 35	20	269
CHARLES KOMAR & SONS Site Id: 81258	259 STEVENS AVE	20	271
WAYNES AUTO BODY Site Id: 5285	10TH ST & S PINE AVE	20	276
CANADA LAND CO INC Site Id: 167992	OLD SPYE RD	21	288
SAYREVILLE BORO MORG Site Id: 45697	RT 35 & OLD SPYE RD	21	294
LOCKWOOD MARINA Site Id: 121678	OLD SPYE RD	21	318
OLD SPYE MARINA Site Id: 122759	OLD SPYE RD	21	318
GETTY SERVICE STATIO Site Id: 5275	1788 RT 35	21	324
ARCHIES BOAT TOPS CO Site Id: 26279	1800 RT 35	21	335
240 TYLER STREET Site Id: 169978	240 TYLER ST	21	344
LAWN BUTLER Site Id: 203948	21 MORRIS ST	21	350
NJ TRANSIT AUTH Site Id: 129859	OLD SPYE RD	27	364
JCP&L LAURENCE HARBO Site Id: 298659	RT 35	27	368
ALLIED VAN LINES Site Id: 262581	RT 35 S	27	368
OLD BRIDGE TWP MARGA Site Id: 166044	RT 35	27	369
A&B MARINE Site Id: 260448	RT 35	27	369
VIKINGS MARINA CORP Site Id: 15291	1705 1707 RT 35	27	381
SAYREVILLE BORO MUA	OLD SPYE RD	27	390

Site Id: 5283			
NJ HIGHWAY AUTH #841 Site Id: 309169	ERNSTON RD	31	397
MORGAN MARINA INC Site Id: 53075	ERNSTON RD	31	398
CARRIAGE HOUSE MANOR Site Id: 522516 Site Id: 84196	***901 ERNSTON RD***	***31***	***406***
BRIARWOOD-901 ERNSTO Site Id: 55229	***901 ERNSTON ROAD***	***31***	***410***
901 ERNSTON RD EASTE Site Id: 199151	901 ERNSTON RD	31	414
SAYREVILLE BORO MUA Site Id: 49357	ERNSTON RD	35	420
SAYREVILLE BORO MUA Site Id: 5256	GONDEK DR	36	421
GLOBAL SLF WETLAND M Site Id: 439274	7 GONDEK DR	39	427
GOLDEN AGE DEVELOPME Site Id: 412046	GONDEK DR	40	428
DAVES AUTOMOTIVE Site Id: 147615	***27 BORDENTOWN AVE***	***41***	***432***
SAYREVILLE BORO MUA Site Id: 49356	ERNSTON RD	44	446
MORGAN CREEK BOATWOR Site Id: 358499	MORGAN PLANT RD	46	452
BROWNS BOAT YARD INC Site Id: 5316	ERNSTON RD	46	453
ERNSTON COC Site Id: 177775	***350 ERNSTON RD***	***49***	***461***
AMERICAN INTERNATION Site Id: 369598	10 MOLTEG DR	54	607
14 LAURENCE PARKWAY Site Id: 80137	***14 LAURENCE PKWY***	***55***	***610***
MORGAN MARINA INC Site Id: 5254	***8000 GONDEK DR***	***56***	***614***
182 CLEVELAND AVENUE Site Id: 258649	***182 CLEVELAND AVE***	***57***	***617***
COIN OP LAUNDRY & CL Site Id: 5319	520 ERNSTON RD	61	629
MOON CLEANERS Site Id: 5318	***499 ERNSTON RD***	***61***	***636***
NJ TURNPIKE AUTH Site Id: 437587	GARDEN STATE PKWY MM	64	646
LAMER DEVELOPMENT Site Id: 91303	ERNSTON RD	70	654
R&S STRAUSS @ SAYRE	RT 9 & ERNSTON RD	72	706

Site Id: 46392			
BJS WHOLESALE CLUB # Site Id: 357204	1007 RT 9	72	713
MOOREHOUSE SPEEDWELL Site Id: 5272	***3101 BORDENTOWN AVE***	***75***	***731***
JAN KULA CO Site Id: 161741	42 OAKWOOD DR	76	738
ASHLAND INC Site Id: 15689	***50 S MINISINK AVE***	***79***	***768***
DARON MOTORS INC ACA Site Id: 27292	1101 CHEESEQUAKE BRO	82	790
IF ASSOC INC Site Id: 31623	3145 BORDENTOWN AVE	83	791
ARNEL LABORATORY SER Site Id: 26909	3145 BORDENTOWN AVE	83	792
JOHNNY ON THE SPOT Site Id: 150466	3143 BORDENTOWN AVE	83	794
ALLOY CONCEPTS & FAB Site Id: 25768	3143 BORDENTOWN AVE	83	795
ASPAR CHEMICAL CORP Site Id: 17033	3143 BORDENTOWN AVE	83	799
ALTERNATE DISPOSAL S Site Id: 93899	3141 BORDENTOWN AVE	83	814
1005 WILBUR PLACE Site Id: 78474	***1005 WILBUR PL***	***84***	***815***
PARKWOOD VILLAGE APA Site Id: 16937	1 WESTMINSTER BLVD	85	820
GLOBAL LANDFILL RECL Site Id: 66176	***ERNSTON STATION RD***	***90***	***865***
MIDDLESEX CNTY ROAD Site Id: 50370	CHEESEQUAKE BROWNTOW	91	880
OLD BRIDGE TWP ROAD Site Id: 67586	RT 9	91	881
TSYBULSKYY CONSTRUCT Site Id: 176457	10 PARKWOOD DR	92	886
GP CONTRACTOR CORP Site Id: 383293	19 WESTMINSTER BLVD	92	887
NIEUW AMSTERDAM VILL Site Id: 5741	***1 VAN DELFT DR***	***95***	***896***
GARDEN FRIENDS Site Id: 360914	3018 BORDENTOWN AVE	96	905
ZOUBEK ASSOC INC Site Id: 15318	3220 BORDENTOWN AVE	96	913
OJO TRUCKING CORP Site Id: 38722	***3213 BORDENTOWN AVE***	***96***	***928***
ALTERNATE DISPOSAL S	3200 BORDENTOWN AVE	96	930

Site Id: 5262			
JOHNNY ON THE SPOT Site Id: 341604	***3168 BORDENTOWN AVE***	***97***	***933***
MANZO HOLDINGS Site Id: 177267	WATERWORKS RD	98	934
PHIL VESPIA TIRE CEN Site Id: 23769	1209 CHEESEQUAKE BRO	100	936
GETTY SERVICE STATIO Site Id: 15337	***1294 RT 9***	***102***	***943***
EMERY MANOR NURSING Site Id: 55121	***4 RT 34***	***102***	***950***
LOWES HOME CENTERS I Site Id: 171771	1324 RT 9	102	975
LAMAR CO @ GATEWAY S Site Id: 182004	1054 RT 9	102	982
HOME DEPOT INC #957 Site Id: 58057	1007 RT 9	102	1018
SUNG FRENCH DRY CLEA Site Id: 15260	***15 RT 9***	***102***	***1033***
RACEWAY SERVICE STAT Site Id: 5734	***1300 CHEESEQUAKE BRO***	***102***	***1041***
EMPORIUM GAS SERVICE Site Id: 15373	1299 CHEESEQUAKE BRO	102	1060
INTERTECH CONSTRUCTO Site Id: 151132	8 OLD RD	102	1061
U HAUL CENTER Site Id: 332806	1275 RT 9	102	1062
PJ & DAUGHTERS Site Id: 154956	OLD WATERWORKS RD	104	1076
EVOR PHILIPS LEASING Site Id: 283999	OLD WATER WORKS RD	104	1077
RLT TRUCKING CO Site Id: 226502	OLD WATER WORKS RD	104	1078
MOUNTAINEER CONSTRUC Site Id: 52423	***WATERWORKS RD***	***105***	***1090***
BRIDGE DISPOSAL SERV Site Id: 167296	***586 WATERWORKS RD***	***105***	***1113***
CREATIVE MODULAR HOM Site Id: 155151	WATERWORKS RD	105	1115
JH MONTEATH CO Site Id: 5738	3150 BORDENTOWN AVE	105	1129
CONTINENTAL WOOD PRO Site Id: 76300	3150 BORDENTOWN AVE	105	1130
MIDHATTAN WOODWORKIN Site Id: 5754	3130 BORDENTOWN AVE	105	1144
EASCO ALUMINUM CO JE	3237 BORDENTOWN AVE	105	1151

Site Id: 54916			
OLD BRIDGE TWP SOMME Site Id: 66669	CHEESEQUAKE RD	106	1152
MANZO CONTRACTING CO Site Id: 44362	***CHEESEQUAKE RD***	***109***	***1158***
5 JOSEPH COURT Site Id: 456677	***5 JOSEPH CT***	***112***	***1164***
CHEESEQUAKE STATE PA Site Id: 15349	***300 GORDON RD***	***113***	***1165***
LORCO PETROLEUM SERV Site Id: 5740	***RUNTON & CHEESEQUAKE***	***119***	***1242***
9 MICHELLE AVENUE Site Id: 374610	***9 MICHELLE AVE***	***121***	***1269***
SWANTON FUEL CENTRAL Site Id: 463593	***740 RT 34***	***122***	***1271***
202 ROUTE 34 Site Id: 78928	***202 RT 34***	***122***	***1272***
99 SCHULMEISTER ROAD Site Id: 91694	***99 SCHULMEISTER RD***	***123***	***1275***
MINDING MIRACLES LEA Site Id: 360969	***90 SPRING HILL RD***	***125***	***1280***

EDR PROPRIETARY RECORDS

EDR MGP: The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

A review of the EDR MGP list, as provided by EDR, has revealed that there is 1 EDR MGP site within the searched area.

Site	Address	Map ID	Page
SOUTH AMBOY COAL GAS	GEORGE AND FELTUS ST	5	147

EDR Hist Auto: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk

Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there are 23 EDR Hist Auto sites within the searched area.

Site	Address	Map ID	Page
Not reported	2017 STATE ROUTE 35	18	186
Not reported	253 KATH ST	19	191
Not reported	1965 STATE ROUTE 35	20	239
Not reported	1938 STATE ROUTE 35	20	271
Not reported	187 PARKER ST	20	286
Not reported	1788 STATE ROUTE 35	21	339
Not reported	2301 WESTMINSTER BL	61	623
Not reported	499 ERNSTON RD	61	636
Not reported	1030 US HIGHWAY 9	62	639
Not reported	3112 BORDENTOWN AVE	75	720
Not reported	3105 BORDENTOWN AVE	75	731
Not reported	540 SKYTOP GDNS	76	738
Not reported	5714 WELLS DR	80	784
Not reported	3143 BORDENTOWN AVE	83	798
Not reported	1 WESTMINSTER BLVD	85	820
Not reported	10 PARKWOOD DR	92	886
Not reported	4 PARKWOOD DR	92	887
Not reported	1 PARKWOOD DR	92	887
Not reported	1101 US HIGHWAY 9	102	949
Not reported	1917 US HIGHWAY 9	102	1044
Not reported	590 WATER WORKS RD	105	1114
Not reported	3160 BORDENTOWN AVE	105	1119
Not reported	3237 BORDENTOWN AVE	105	1145

EDR Hist Cleaner: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there are 11 EDR Hist Cleaner sites within the searched area.

Site	Address	Map ID	Page
Not reported	1213 HARBOR CLUB DR	36	425
Not reported	1001 HARBOR CLUB DR	36	425
Not reported	520 ERNSTON RD	61	629
Not reported	520 ERNSTON RD	61	633
Not reported	499 ERNSTON RD	61	633
Not reported	499 ERNSTON RD	61	635
Not reported	26 FELA DR	67	650
Not reported	3101 BORDENTOWN AVE	75	735
Not reported	4702 WELLS DR	80	784
Not reported	1061 US HIGHWAY 9	102	974

Site	Address	Map ID	Page
Not reported	180 US HIGHWAY 9 N	102	1050

NJ RGA HWS: The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the New Jersey Department of Environmental Protection in New Jersey.

A review of the NJ RGA HWS list, as provided by EDR, has revealed that there are 3 NJ RGA HWS sites within the searched area.

Site	Address	Map ID	Page
175 NORTON STREET	175 NORTON ST	20	278
GLOBAL SANITARY LAND	ERNSTON STATION RD	90	877
SATURN DEALERSHIP	955 RT 9	102	1036

NJ RGA LF: The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the New Jersey Department of Environmental Protection in New Jersey.

A review of the NJ RGA LF list, as provided by EDR, has revealed that there is 1 NJ RGA LF site within the searched area.

Site	Address	Map ID	Page
ALTERNATE DISP SYSTE Facility ID: 1209001193	3141 BORDENTOWN AVE	105	1144

NJ RGA LUST: The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the New Jersey Department of Environmental Protection in New Jersey.

A review of the NJ RGA LUST list, as provided by EDR, has revealed that there is 1 NJ RGA LUST site within the searched area.

Site	Address	Map ID	Page
NJ SPORTS & EXPOSITI Facility ID: 540	50 RT 20	102	992

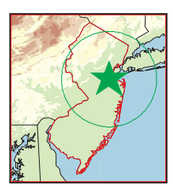
EXECUTIVE SUMMARY

Please refer to the end of the findings report for unmapped orphan sites due to poor or inadequate address information.

EDR DataMap®
Well Search

Madison Loop

- Listed Water Wells
- Study Boundary
- Roads
- Major Roads
- Waterways
- Railroads
- Contour Lines
- Fault Lines
- Water
- Superfund Sites
- 100-Yr Flood Zones
- Wetlands



South Amboy, NJ

0 1/2 1

Scale in Miles

EDR Environmental Data Resources, Inc

Copyright © 2016 EDR, Inc. © 2015 TomTom Rel. 2015.

4726085.2w - 15 Sep 16

Madison Loop
South Amboy, NJ 08879

Inquiry Number: 4726085.2w
September 15, 2016

EDR DataMap™ Well Search Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2016 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

GEOCHECK VERSION 2.1
SUMMARY

FEDERAL DATABASE WELL INFORMATION

MAP ID	WELL ID
1	USGS40000815049
3	USGS40000815043
4	USGS40000815041
4	USGS40000815039
4	USGS40000815038
4	USGS40000815037
4	USGS40000810540
7	USGS40000815017
8	USGS40000815019
8	USGS40000815006
8	USGS40000815018
9	USGS40000815016
9	USGS40000815015
10	USGS40000814957
11	USGS40000815007
12	USGS40000815064
13	USGS40000815002
14	USGS40000814999
14	USGS40000814998
15	USGS40000814992
16	USGS40000814993
17	USGS40000814989
18	USGS40000814990
19	USGS40000814982
20	USGS40000814975
20	USGS40000814974
21	USGS40000814985
22	USGS40000814969
22	USGS40000814970
23	USGS40000814967
24	USGS40000814959
25	USGS40000814948
27	USGS40000814931
28	USGS40000814925
28	USGS40000814919
28	USGS40000814918
30	USGS40000814915
32	USGS40000814908
28	USGS40000814907
28	USGS40000814905
28	USGS40000814903
28	USGS40000814902
34	USGS40000814900
35	USGS40000814874
36	USGS40000814897

GEOCHECK VERSION 2.1
SUMMARY

FEDERAL DATABASE WELL INFORMATION

MAP ID	WELL ID
37	USGS40000814893
36	USGS40000814896
36	USGS40000814892
38	USGS40000814885
39	USGS40000814868
40	USGS40000814864
41	USGS40000814862
43	USGS40000814849
44	USGS40000814850

STATE WATER WELL INFORMATION

MAP ID	WELL ID
2	2415
5	2414
6	2413
8	NJ4000000000993
8	NJ4000000000992
9	NJ4000000000959
9	NJ4000000000926
11	NJ4000000001006
22	NJ4000000000890
26	NJ4000000000811
28	NJ4000000000812
28	NJ4000000000829
31	NJ4000000000805
32	NJ4000000000807
28	NJ4000000000826
33	NJ4000000000809
34	NJ4000000000810
28	NJ4000000000808
36	NJ4000000000806
41	NJ4000000000827
42	NJ4000000000879
43	NJ4000000001009
44	NJ4000000001010

PUBLIC WATER SUPPLY SYSTEM INFORMATION

Map ID: 4
PWS ID: NJ1220001
PWS Name: SOUTH AMBOY W DEPT
SOUTH AMBOY W DEPT
1500 RONSON ROAD
ISELIN, NJ 088303020

PWS currently has or had major violation(s) or enforcement:

GEOCHECK VERSION 2.1
SUMMARY

PUBLIC WATER SUPPLY SYSTEM INFORMATION

Map ID: 4
PWS ID: NJ1220001
PWS Name: SOUTH AMBOY W DEPT
SOUTH AMBOY W DEPT
1500 RONSON ROAD
ISELIN, NJ 088303020
PWS currently has or had major violation(s) or enforcement:

Map ID: 4
PWS ID: NJ1220001
PWS Name: SOUTH AMBOY W DEPT
SOUTH AMBOY W DEPT
1500 RONSON ROAD
ISELIN, NJ 088303020
PWS currently has or had major violation(s) or enforcement:

Map ID: 9
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 9
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 29
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

GEOCHECK VERSION 2.1
SUMMARY

PUBLIC WATER SUPPLY SYSTEM INFORMATION

Map ID: 32
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 36
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

USGS TOPOGRAPHIC MAP(S)

40074-D2 KEYPORT, NJ NY
40074-D3 SOUTH AMBOY, NJ NY

AREA RADON INFORMATION

GEOCHECK VERSION 2.1
SUMMARY

AREA RADON INFORMATION

State Database: NJ Radon

Radon Test Results

City	Num Tests	# > 4 pCi/L	% > pCi/L
CARTERET BORO	939	20	2.000
CRANBURY TWP	987	124	13.000
DUNELLEN BORO	720	10	1.000
EAST BRUNSWICK TWP	7722	445	6.000
EDISON TWP	5549	705	13.000
HELMETTA BORO	142	13	9.000
HIGHLAND PARK BORO	1757	677	39.000
JAMESBURG BORO	988	161	16.000
METUCHEN BORO	2006	265	13.000
MIDDLESEX BORO	1626	158	10.000
MILLTOWN BORO	912	57	6.000
MONROE TWP	1513	219	14.000
NEW BRUNSWICK CITY	1811	348	19.000
NORTH BRUNSWICK TWP	4154	903	22.000
OLD BRIDGE TWP	2122	61	3.000
PERTH AMBOY CITY	713	10	1.000
PISCATAWAY TWP	4405	1177	27.000
PLAINSBORO TWP	1893	283	15.000
SAYREVILLE BORO	2562	82	3.000
SOUTH AMBOY CITY	503	14	3.000
SOUTH BRUNSWICK TWP	4256	852	20.000
SOUTH PLAINFIELD BOR	1387	152	11.000
SOUTH RIVER BORO	1162	38	3.000
SPOTSWOOD BORO	840	20	2.000
WOODBRIDGE TWP	3945	267	7.000

Federal EPA Radon Zone for MIDDLESEX County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for MIDDLESEX COUNTY, NJ

Number of sites tested: 735

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area	0.850 pCi/L	95%	5%	0%
Basement	1.680 pCi/L	84%	16%	1%

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Water Well Information:

Map ID:	1		
Org. Identifier:	USGS-NJ	Site ID:	USGS40000815049
Formal name:	USGS New Jersey Water Science Center		
Monloc Identifier:	USGS-402904074164801		
Monloc name:	230427-- Discontinued 1		
Monloc type:	Well		
Monloc desc:	SEALED		
Huc code:	02030104	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.4834393
Longitude:	-74.2784794	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	20.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Northern Atlantic Coastal Plain aquifer system		
Formation type:	Old Bridge Sand Member of Magothy Formation		
Aquifer type:	Not Reported		
Construction date:	19220000	Welldepth:	52
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	3		
Org. Identifier:	USGS-NJ	Site ID:	USGS40000815043
Formal name:	USGS New Jersey Water Science Center		
Monloc Identifier:	USGS-402831074171901		
Monloc name:	231366-- MW134		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	02030104	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.4753839
Longitude:	-74.2882019	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	135
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Northern Atlantic Coastal Plain aquifer system		
Formation type:	Old Bridge Sand Member of Magothy Formation		

APPENDIX C
GEOTECHNICAL INVESTIGATION DATA

GAS PIPELINE

GEOTECHNICAL INVESTIGATION REPORT
for
NORTHEAST SUPPLY ENHANCEMENT
MADISON LOOP
GARDEN STATE PARKWAY CROSSING

Middlesex County, New Jersey

Prepared for:

Transcontinental Gas Pipe Line Company, LLC
2800 Post Oak Boulevard

Houston, Texas 77056

Prepared by:

625 West Ridge Pike, Suite E-100, Conshohocken, PA 19428
(610) 832-3500

February 2018

TABLE OF CONTENTS

Section 1 Project Description 1-1

Section 2 Site Conditions 2-1

Section 3 Geologic Setting 3-1

3.1 SURFICIAL GEOLOGY 3-1
3.2 BEDROCK GEOLOGY 3-1

Section 4 Field Exploration 4-1

Section 5 Laboratory Testing 5-1

Section 6 Subsurface Conditions 6-1

6.1 STRATUM 1: EMBANKMENT fILL 6-1
6.2 STRATUM 2: NATIVE SOILS 6-1
6.3 GROUNDWATER 6-1

Section 7 Limitations 7-1

Section 8 References 8-1

Figures

Figure 1 Site Location Map

Figure 2 Boring Location Plan

Appendices

Appendix A Test Boring Logs

Appendix B Results of Laboratory Testing

Transcontinental Gas Pipe Line Company, LLC (Transco) is proposing to install an underground, 26-inch natural gas pipeline that will cross the New Jersey Turnpike Authority (NJTA) right-of-way (ROW) at Milepost 123.2 of the Garden State Parkway (GSP). The proposed 26-inch pipeline will be constructed as part of Transco's Madison Loop project that will supply natural gas service to customers in the region. **Figure 1** shows the location of the GSP crossing site (Site).

Sections 2.0 and 3.0 of this report summarize the site conditions observed at the time of our investigation and the geologic setting of the Site based on available literature. Descriptions of the field exploration and laboratory testing programs are presented in Sections 4.0 and 5.0, respectively. Logs of the test borings are presented in **Appendix A** of this report; laboratory test results are presented in **Appendix B**. Subsurface conditions encountered by the investigation are discussed in Section 6.0. Limitations and a list of reference documents are presented in Sections 7.0 and 8.0, respectively.

Figure 2 shows the Site and locations of the completed test borings.

3.1 SURFICIAL GEOLOGY

The native material underlying the GSP roadway embankment fill at the Site consists of southeast-dipping beds of the Cretaceous Magothy Formation, which includes undifferentiated Morgan Beds and Amboy Stoneware Clay overlying the Old Bridge Sand. These units are further described as follows:

- Morgan Beds - Laminated to thinly interbedded clay (light to medium gray, typically carbonaceous) and micaceous quartz sand (white, yellow, and light gray); the sand is predominantly fine-grained, massive to cross-bedded, and up to 90 feet thick;
- Amboy Stoneware Clay - Dark gray to grayish-brown clay and silt (which weathers to a white color) which is carbonaceous and micaceous with grayish-pink fine quartz sand laminae and up to 30 feet thick.

The Old Bridge Sand is a light gray quartz sand, often weathered to white, yellow and pink, with occasional clear mica and lignite. This sand unit is also interbedded with dark gray, discontinuous, carbonaceous clay beds (each up to 3 feet thick) and can be up to 100 feet thick.

3.2 BEDROCK GEOLOGY

The crystalline bedrock basement underlying the Site is metamorphic, pre-Mesozoic schist and gneiss. The elevation of the bedrock surface ranges from 275 to 300 feet below sea level.

Subsurface conditions at the Site were explored by completing six test borings, designated as Borings GB-1, GB-2, GB-3, GB-4, GB-5 and GB-7, at the approximate locations shown on **Figure 2**. (Boring GB-6 was not completed due to access issues on the GSP.)

Prior to initiating the test boring work, AECOM obtained the required Traffic Permit from the NJTA and completed a utility notification through the New Jersey One Call System to provide for mark-out of any known public utilities.

The test boring locations and termination depths were recommended by AECOM and approved by Transco. Transco also completed civil survey of the Site and marked the test boring locations prior to drill rig mobilization. The test borings were then completed by Uni-Tech Drilling Company, Inc. of Franklinville, New Jersey under subcontract to AECOM.

Test boring GB-1, completed on September 26 and 27, 2016, and boring GB-2, completed on August 24, 2017, were both located outside the GSP ROW and therefore completed earlier within the overall Madison Loop project schedule. Borings GB-1 and GB-2 were both completed using a tracked-mounted CME-55 ATV geotechnical drill rig. Following subsequent coordination with the NJTA to discuss crossing of the GSP and obtaining the necessary Traffic Permit and lane closings, test borings GB-3, GB-4, GB-7 were completed within the GSP ROW also using a tracked-mounted CME-55 ATV drill rig (except for boring GB-5 that was completed using a rubber-tire-mounted CME-750 drill rig) between August 8 and September 11, 2017. Logs of the completed test borings are presented in **Appendix A**.

All test borings were advanced using hollow-stem auger and/or mud rotary drilling methods to termination depths ranging from 78.4 feet to 122.0 feet below existing ground surface (bgs).. Vacuum excavation ('soft dig') methods were completed within the upper 6 feet of borings GB-4, GB-5 and GB-7 located within the roadway corridor of the GSP ROW. Within each test boring, representative samples were collected from the encountered soils using a 24-inch-long split-spoon sampler (2-inch O.D.) driven with a 140-pound hammer freely falling 30 inches in accordance with ASTM D-1586 ("Penetration Test and Split-Barrel Sampling of Soils"). Split-spoon samples were collected continuously to a depth of 12 feet bgs (excluding the 'soft dig' intervals in borings GB-4, GB-5 and GB-7) and at approximate 5-foot depth intervals thereafter. Representative portions of the retrieved split-spoon samples were collected, preserved and labeled in 8-ounce glass jars in accordance with industry standards. The collected split-spoon jar samples were subsequently transported to the AECOM geotechnical laboratory in Conshohocken, Pennsylvania for further examination and testing.

Groundwater levels were measured inside the hollow-stem augers used to advance boring GB-1 and, for the remaining borings, inferred from examination of the collected soil samples and the laboratory test results as further described in Section 6.3. Measured and inferred groundwater levels are stated on the test boring logs presented in **Appendix A**.

Upon completion, each boring was backfilled with a bentonite grout to within approximately 12 inches of the original ground surface as an environmental safeguard. The remaining 12 inches were then backfilled with drill cuttings or 'cold patch' asphalt consistent with the existing surface cover. The grout was placed using a tremie pipe placed at the bottom of the borehole.

Excess drill cuttings were drummed and transported to a fenced staging area located off the Site. All field activities were completed under the full-time technical supervision of an AECOM field professional.

Laboratory testing was completed on representative samples of the encountered soil materials. Results of the testing program are presented in **Appendix B** of this report.

Selected split-spoon jar samples were tested for physical properties including natural moisture content (ASTM D2216), plasticity via Atterberg limits (ASTM D4318) and grain-size distribution (ASTM D422) to assist in classifying the encountered soils and evaluating stratigraphical continuity. A table summarizing the soil testing results for these soil samples is presented on pages B-1 and B-2 of **Appendix B**. Grain-size distribution curves are presented on pages B-3 through B-12.

Distinct soil strata and apparent stratigraphical conditions, as inferred by the encountered materials, are presented on the Site Plan & Inferred Geologic Profile of **Figure 3**. Encountered soil and stratigraphical conditions are consistent with the regional geology described in Section 3. Detailed soil descriptions presented on the boring logs of **Appendix A** are summarized in below (presented in order of increasing depth).

6.1 STRATUM 1: EMBANKMENT FILL

Underlying a surficial cover of topsoil or roadway pavement materials, man-made fill consisting predominately of medium dense silty sand with gravel was encountered in borings GB-3, GB-4, GB-5 and GB-7. Two thin layers of stiff silty clay (compacted) were also encountered in boring GB-5. The man-made fill comprises the earthen embankment that supports the GSP roadway corridor at the Site.

As shown in **Figure 3**, thickness of the embankment fill appears to range from approximately 4 feet in boring GB-3 completed along the western toe of the roadway embankment slope to approximately 30 feet in boring GB-5 completed near the middle of the GSP roadway corridor. Standard penetration resistance (N-) values were observed to range from 5 to 25 blows per foot (bpf) in the Stratum 1 fill soils, although N-values were typically between 9 and 16 bpf. Gravel content was found to range from approximately 11 to 24 percent in this stratum.

6.2 STRATUM 2: NATIVE SOILS

Stratum 2 underlies Stratum 1, where present, and consists predominately of medium dense to very dense silty sand and sandy silt with intermittent silt and clay layers associated with the Upper Magothy unit and underlying Old Bridge Sand unit. This stratum was observed to extend to the termination depths of all six test borings ranging from 78.4 feet bgs (boring GB-3) to 122 feet bgs (boring GB-1). N-values were observed to range from 8 bpf in the Upper Magothy unit soils to greater than 95 bpf in the deeper, typically more dense Old Bridge Sand soils. A trace content of gravel was occasionally observed, except for a significant gravel content of 27 percent found at a depth interval of 29 to 31 feet bgs in boring GB-2.

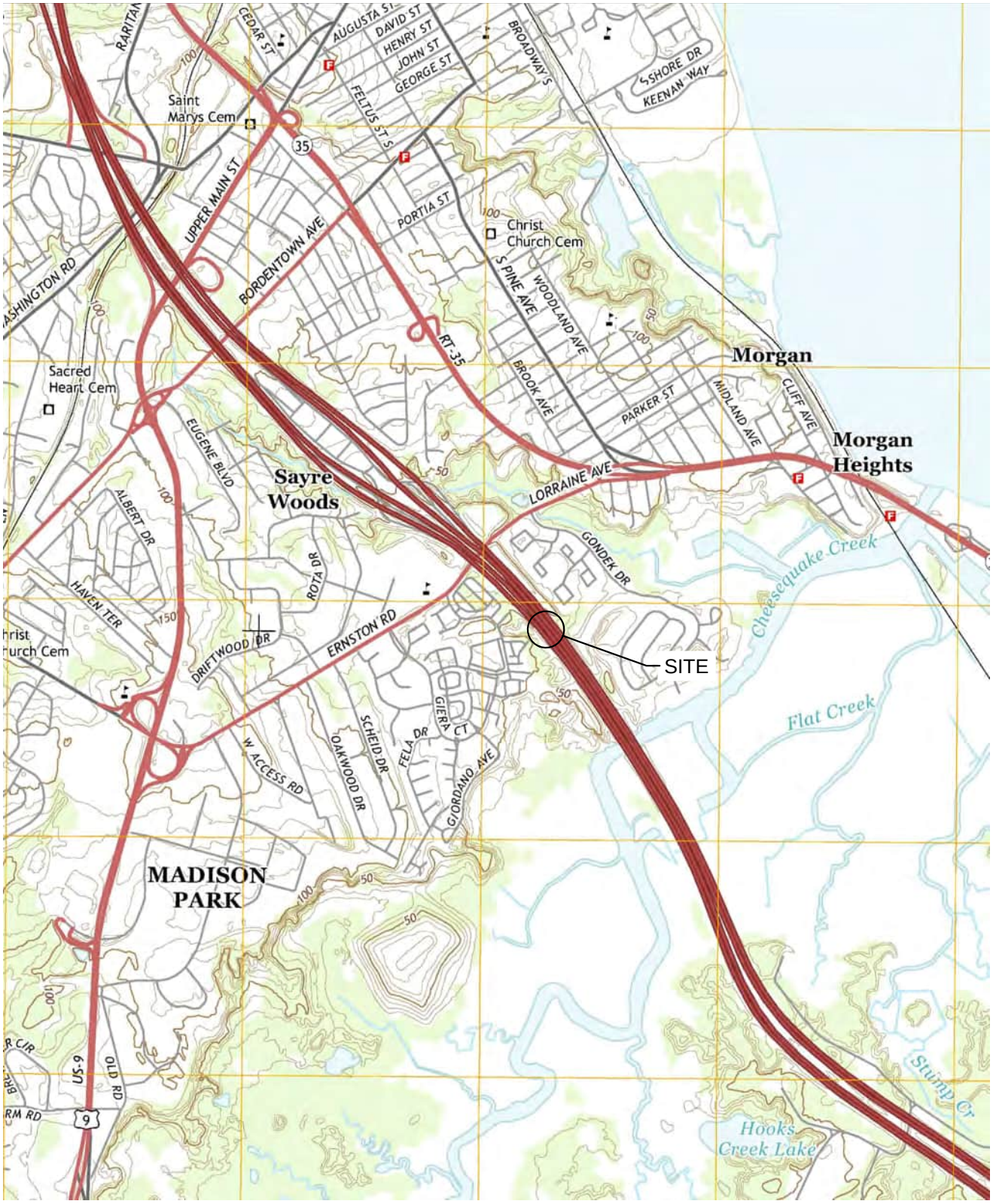
6.3 GROUNDWATER

Groundwater levels were measured inside the hollow-stem augers during the drilling of GB-1 and recorded on the boring logs presented in **Appendix A**. Depth to groundwater in boring GB-1 was measured to be approximately 29 feet bgs. Within each of the remaining five borings, mud rotary drilling methods were used to advance the boring which prevented observing and directly measuring depth to groundwater. However, based on examination of the collected soil (jar) samples and review of the moisture content testing results, groundwater levels were inferred to be present at depths ranging from 12 feet bgs in boring GB-2 to 32 feet bgs in boring GB-4. These inferred groundwater depths are consistent with the direct measurement of groundwater depth made in boring GB-1. It should also be noted that groundwater levels are subject to change due to seasonal conditions and man-made influences.

The geotechnical investigation work completed by AECOM was performed in accordance with reasonable and accepted engineering practices. No warranty or guarantee, either written or implied, is applicable to this work. The findings presented in this report are based on the assumption that the subsurface conditions do not deviate appreciably from those disclosed by the test borings.

This report has been prepared solely for use by Transcontinental Gas Pipe Line Company, LLC. Any reuse of this report, particular by third parties, without expressing the permission of AECOM is solely at their own risk.

1. Stanford, S.D. 1995. Surficial Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey. New Jersey Geological Survey Open File Map OFM 18.
2. Sandberg, S.K., D. W. Hall, J.M. Gronberg, and D.L. Pasicznyk. 1996. Geophysical investigation of the Potomac-Raritan-Magothy aquifer system and underlying bedrock in parts of Middlesex and Mercer Counties, New Jersey. New Jersey Geological Survey. Geological Survey Report GSR 37.
3. Sugarman, P.J., S.D. Stanford, J.P. Owens, and G.J. Brenner. 2005. Bedrock Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey. New Jersey Geological Survey Open File Map OFM 65.
4. New Jersey Department of Environmental Protection. Bureau of GIS. NJ-GeoWEB. Accessed Oct 2017.





QUADRANGLE LOCATION

SCALE: 1 INCH=2,000 FEET

0 2,000 4,000

MAP SOURCE
SOUTH AMBOY, NJ–NY QUADRANGLE
U.S. GEOLOGICAL SURVEY 2014

AECOM
625 WEST RIDGE PIKE, SUITE E-100
CONSHOHOCKEN, PA 19428
(610) 832-3500 FAX (610) 832-3501

Job:	60544074
Prepared by:	SMR
Checked by:	JAC
Date:	12/18/2017

SITE LOCATION MAP

MADISON LOOP GARDEN STATE PARKWAY CROSSING PLAN
SAYREVILLE BOROUGH
MIDDLESEX COUNTY, NEW JERSEY

FIGURE 1

Drawn By & Date/Time: sheril.roth Dec 18, 2017 - 3:36pm
Drawing Location & Name: S:\Projects\ENV\60544074_GPSPermSup\900-CAD-GIS\910-CAD\20-SHEETS\Figures\Fig 1 - GSP Xing USGS Location Map.dwg

NORTHEAST SUPPLY ENHANCEMENT-26" MADISON LOOP
GARDEN STATE PARKWAY CROSSING BORING LOCATION PLAN
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
6055058S.00003

AECOM

24-1947-80-07-B/11.20

PROPOSED 26-INCH GUIDED BORE CROSSING
BORING LOCATION PLAN

0 50 100 150
SCALE IN FEET

GARDEN STATE PARKWAY NORTH

GARDEN STATE PARKWAY SOUTH

PROPOSED 26"
MADISON LOOP

GB-1
GB-2
GB-3
GB-4
GB-5
GB-7

3217+00
3218+00
3219+00
3220+00
3221+00
3222+00

LEGEND

- EXISTING PIPELINE
- PROPOSED PIPELINE
- UNDERGROUND STORM
- FIBER OPTIC CABLE
- PROPOSED TEMPORARY WORKSPACE
- TEST BORING BY AECOM INSIDE GSP ROW
- TEST BORING BY AECOM OUTSIDE GSP ROW
- MAJOR CONTOUR
- MINOR CONTOUR
- STREAM CENTERLINE
- WETLAND
- TREE LINE
- WATER WELL
- PARCEL LINE
- EXISTING PIPELINE RIGHT OF WAY
- PROPOSED PIPELINE RIGHT OF WAY
- OVERHEAD POWER LINE

Filename: S:\PROJECTS\ENV\60544074_GPSPERMSUP\900-CAD\20-SHEETS\FIGURES\FIG 2-3 - GSP XING PLAN-PROFILE.DWG
Last saved by: SHEKIL.KOTHI(2018-02-06) Last Plotted: 2018-02-06

Appendix A

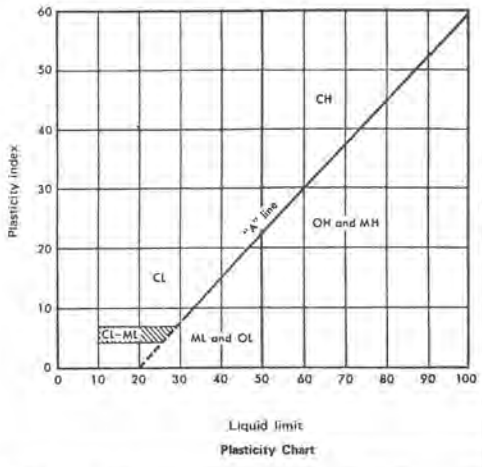
Test Boring Logs

KEY TO SOIL SYMBOLS AND TERMS

Terms used in this report for describing soils according to their texture or grain size distribution are in accordance with the Unified Soil Classification System, as described in Technical Memorandum No. 3-357, Waterways Experiment Station, March 1953.

Major Divisions			Group symbols	Typical names	Laboratory classification criteria
Coarse-grained soils (More than half of material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixture, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravels with fines (Appreciable amount of fines)	GM* d / u	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Above "A" line with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM* d / u	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Limits plotting in hatched zone with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures	Atterberg limits above "A" line with P.I. > than 7
Fine-grained soils (More than half of material is smaller than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity, organic silts	
	Highly organic soils		Pt	Peat and other highly organic soils	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 per cent ..... GW, GP, SW, SP; More than 12 per cent ..... GM, GC, SM, SC; 5 to 12 per cent ..... *Borderline* cases requiring dual symbols**



Plasticity Chart

Particle Size	Sieve Size	mm	Material
	<#200	<0.074	Silt or Clay
	#200 To #40	0.074 To 0.42	Sand Fine
	#40 To #10	0.42 To 2.00	Med.
	#10 To #4	2.00 To 4.76	Coarse

Particle Size	Sieve	mm	Material
	#4 To 3/4 in.	4.76 To 19.1	Gravel Fine
	3/4 In. To 3 In.	19.1 To 76.2	Coarse
	3 In. To 12 In.	76.2 To 304.8	Cobbles
	12 In. To 36 In.	304.8 To 914.4	Boulders

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No. 200 sieve): Includes (1) clean gravels and (2) silty or clayey gravels and sands. Condition is rated according to relative density[1] as determined by laboratory tests or standard penetration resistance tests.

Descriptive Term	Relative Density
Very loose	0 to 15%
Loose	15 to 35%
Medium dense	35 to 65%
Dense	65 to 85%
Very dense	85 to 100%

FINE GRAINED SOILS (major portion passing No. 200 sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

Descriptive Term	Unconfined Compression Strength, tons/sq. ft.
Very soft	less than 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very stiff	2.00 to 4.00
Hard	4.00 and higher

TEST AND SAMPLE IDENTIFICATION

15 — 15 – The number of blows (15) of a 140-pound hammer falling 30 inches used to drive a 2" O. D. split-barrel sampler for the last 12 inches of penetration.

50/2 — 50/2 – Number of blows (50) used to drive the split-barrel a certain number of inches (2).

P — P – Thin-wall tube sample.

P/250 — P250 – Thin-wall tube pushed hydraulically, using a certain pressure (250 psi) to push the last 6 inches.

C_1 – Denison or Pitcher-Type – core-barrel sample.

Ps — Ps – Piston sample.

A – Auger sample.

BX – Rock cored with BX core barrel, which obtains a 1-5/8" diameter core.

NX — NX – Rock cored with NX core barrel, which obtains a 2-1/8" diameter core.

65% – Percentage (65) of rock core recovered.

20 — 20% – Rock Quality Designation (RQD)[2]

VS — VS – Vane Shear Test.

Sample Recovered

C – Consolidation and specific gravity tests.
D – Maximum & minimum density.
DS – Direct Shear test.
G – Specific gravity test.
K – Permeability test.
M – Mechanical (sieve or hydrometer) analysis.
T – Triaxial compression test
U – Unconfined compression test.
W – Unit weight & natural moisture content.
X – Special tests performed – see Laboratory test results.

Laboratory Test Performed

Sample Not Recovered

*Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

**Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

[2] $RQD = \frac{\sum \text{Core Segments} > 4 \text{ Inches}}{\text{Core Interval}} \times 100$

Where Segmentation Is Not Caused By Drilling Effects

[1] ASTM 2049-69

LOG of BORING No. GB-1

Sheet 1 of 3

DATE 9/26/2016-9/27/2016 SURFACE ELEVATION 40.0 LOCATION Northing: 40.45770783 Easting: -74.27776781

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		19	SS	TOPSOIL	39.7					
		10	SS	Very loose to medium dense light brown to orange brown silty medium to fine SAND						
5		4	SS				13.2			M
		4	SS							
		4	SS							
10		4	SS				17.1			M
15		6	SS	- trace gravel			17.3			M
20		6	SS				13.0			M
25		5	SS							
30		3	SS				21.1			M
35		12	SS							
					1.5					
40		10	SS	Stiff to hard gray CLAY, trace sand (Undivided Magothy Unit)	-3.5	>4.5	15.0	34	17	M
				(Continued on Sheet 2 of 3)						

Completion Depth: 122.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-1

DATE 9/26/2016-9/27/2016 SURFACE ELEVATION 40.0 LOCATION Northing: 40.45770783 Easting: -74.27776781

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45		28	SS	Medium dense gray sandy SILT			18.1			M
					-8.5					
50		14	SS	Medium dense to very dense gray to orange brown silty medium to fine SAND			22.1			M
55		16	SS							
60		26	SS							
					-23.5					
65		17	SS	Very stiff gray to brown SILT, trace sand			22.6			M
				(Undivided Magothy Unit)	-28.5					
70		95/11"	SS	Dense to very dense brown to orange brown medium to fine SAND with silt						
75		50/5"	SS							
80		75	SS				21.8			M
85		42	SS							
				(Old Bridge Sand)						

(Continued on Sheet 3 of 3)

Completion Depth: 122.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After ____ hrs.
ft., After ____ hrs.
ft., After ____ hrs.
ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-1

Sheet 3 of 3

DATE 9/26/2016-9/27/2016 SURFACE ELEVATION 40.0 LOCATION Northing: 40.45770783 Easting: -74.27776781

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90		10	SS	- Continuing loose to very dense brown to orange brown medium to fine SAND with silt			21.3			M
95		20	SS							
100		27	SS							
105		34	SS				22.0			M
110		27	SS		-73.5					
115		37	SS	Hard gray and light brown silty CLAY with sand	-78.5	3.6				
120		50/5"	SS	Very dense orange brown and gray medium to fine SAND (Old Bridge Sand)	-82.0					
125				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors. 2. Groundwater levels were measured as shown below: Date & Time GW Depth (ft) GW Elev. (ft) 09/26/16 10:15 31.0 9.0 09/27/16 08:30 29.4 10.6 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
130										

Completion Depth: 122.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After hrs.
ft., After hrs.
ft., After hrs.
ft., After hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-2

DATE 8/24/2017 SURFACE ELEVATION 25.5 LOCATION Northing: 40.458656 Easting: -74.276231

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		4	SS	Medium dense light gray to orange brown fine SAND with silt						
		7	SS							
5		7	SS				9.8			
		9	SS							
		8	SS				8.3			M
10		7	SS							
15		8	SS				26.5			M
					8.0					
20		8	SS	Medium dense dark grayish brown to dark gray silty fine SAND			28.9	NP	NP	M
25		14	SS		0.5					
				Medium dense gray silty fine SAND	-2.0					
30		20	SS	Medium dense to dense grayish brown to brown silty coarse to fine SAND with gravel		0.5	16.4	NP	NP	M
					-6.5					
		52	SS	Very dense gray to orange brown fine SAND with silt			24.6			M
35					-11.0					
				Medium dense gray to dark gray sandy SILT						
		22	SS		-13.5	3.5				
40				Very stiff gray to dark gray sandy silty CLAY						
					-16.0					
				(Undivided Magothy Unit)						
		8	SS	(Continued on Sheet 2 of 3)						

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-2

DATE 8/24/2017 SURFACE ELEVATION 25.5 LOCATION Northing: 40.458656 Easting: -74.276231

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Medium dense to very dense gray to orange brown medium to fine SAND with silt						
		30	SS				24.4			M
50										
		25	SS							
55										
		27	SS							
60										
		38	SS							
65										
		22	SS	- gravelly						
70										
		49	SS							
75										
		55	SS	(Old Bridge Sand)	-54.5					
80										
				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors.						
85										
				(Continued on Sheet 3 of 3)						

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ft., After ____ hrs.

Project Name: Williams NESE Madison ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ft., After ____ hrs.

AECOM

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

LOG of BORING No. GB-2

Sheet 3 of 3

DATE 8/24/2017 SURFACE ELEVATION 25.5 LOCATION Northing: 40.458656 Easting: -74.276231

DEPTH, FT. / SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90			2. Groundwater level is inferred to be present at approximately 12 feet below existing ground surface based on examination of split-spoon samples and moisture content lab test results. (Groundwater level could not be observed/measured in the boring due to the use of mud rotary drilling methods to advance the boring.) 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
95									
100									
105									
110									
115									
120									
125									
130									

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-3

Sheet 1 of 3

DATE 8/22/2017 SURFACE ELEVATION 39.9 LOCATION Northing: 40.45792 Easting: -74.277532

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		15	SS	Dense to very dense brown to orange brown silty coarse to fine SAND with gravel						
		10	SS	(Fill)	35.9					
5		7	SS	Loose to medium dense brown to brownish gray silty fine SAND			16.2	NP	NP	M
		9	SS							
		10	SS				17.8			
10		9	SS				13.6			
15		7	SS				13.5	NP	NP	M
20		5	SS				8.2			
25		12	SS				23.3			M
30		9	SS		7.9					
		18	SS	Very stiff to hard gray to dark grayish brown CLAY, trace sand		>4.5	15.1	38	20	M
35										
		34	SS			>4.5				
40					-1.6					
				(Undivided Magothy Unit)						
		19	SS	(Continued on Sheet 2 of 3)						

Completion Depth: 78.4 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-3

Sheet 2 of 3

DATE 8/22/2017 SURFACE ELEVATION 39.9 LOCATION Northing: 40.45792 Easting: -74.277532

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Medium dense to very dense orange brown to light brown silty fine SAND						
		36	SS				22.5			M
50										
		30	SS							
55										
		24	SS							
60				(Undivided Magothy Unit)	-21.6					
		50/5"	SS	Very dense orange brown to light brown silty coarse to fine SAND						
65										
		50/5"	SS							
70										
		50/5"	SS							
75										
		50/5"	SS	(Old Bridge Sand)	-38.5					
80				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors. 2. Groundwater level is inferred to be present at approximately 22 feet below existing ground surface based on examination of split-spoon samples and moisture content lab test results. (Groundwater level could not be observed/measured in the boring due to the use of mud rotary drilling methods to advance the boring.)						
85				(Continued on Sheet 3 of 3)						

Completion Depth: 78.4 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-3

Sheet 3 of 3

DATE 8/22/2017 SURFACE ELEVATION 39.9 LOCATION Northing: 40.45792 Easting: -74.277532

DEPTH, FT. / SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90			3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
95									
100									
105									
110									
115									
120									
125									
130									

Completion Depth: 78.4 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ft., After ____ hrs.

Project Name: Williams NESE Madison ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-4

Sheet 1 of 2

DATE 8/9/2017 SURFACE ELEVATION 46.1 LOCATION Northing: 40.4579 Easting: -74.2773

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0				Asphalt Pavement	45.6					
				Medium dense orange brown to light brown silty coarse to fine SAND with gravel						
5		5	SS							
		12	SS				9.7	NP	NP	M
10		24	SS	- very dense						
15		15	SS				10.1			M
20		12	SS				16.0	NP	NP	M
25		15	SS				9.5			M
				(Fill)	18.6					
				Loose to medium dense light brown to orange brown silty fine SAND						
30		13	SS				13.3			M
		11	SS							
35										
		12	SS				24.6			M
40										
				(Undivided Magothy Unit)						
		7	SS	(Continued on Sheet 2 of 2)						

Completion Depth: 78.9 ft. Water Depth: See Notes ft., After hrs.

Project No.: 60515039 ft., After hrs.

Project Name: Williams NESE Madison ft., After hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ft., After hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-4

Sheet 2 of 2

DATE 8/9/2017 SURFACE ELEVATION 46.1 LOCATION Northing: 40.4579 Easting: -74.2773

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				- Continuing medium dense light brown to orange brown silty fine SAND						
		12	SS							
50										
		27	SS							
55				(Undivided Magothy Unit)	-10.4					
				Medium dense to very dense orange brown to light brown silty medium to fine SAND						
		21	SS							
60										
		33	SS				19.9			M
65										
		40	SS							
70										
		58	SS							
75										
		50/5"	SS	(Old Bridge Sand)	-32.8					
80				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors. 2. Groundwater level is inferred to be present at approximately 32 feet below existing ground surface based on examination of split-spoon samples and moisture content lab test results. (Groundwater level could not be observed/measured in the boring due to the use of mud rotary drilling methods to advance the boring.)						
85										

Completion Depth: 78.9 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger + Mud Rotary

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-5

Sheet 1 of 3

DATE 9/11/2017 SURFACE ELEVATION 42.3 LOCATION Northing: 40.458 Easting: -74.2772

DEPTH, FT. / SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Asphalt Pavement	41.3					
			Medium dense orange brown to light brown coarse to fine SAND, trace silt and clay	36.3					
5	10	SS	Stiff to very stiff gray silty CLAY, trace sand	35.3	2.8	14.4			
	16	SS	Medium dense orange brown to brown silty coarse to fine SAND, trace gravel			12.0			M
10	12	SS				12.7			M
15	10	SS				13.2	NP	NP	M
20	14	SS		21.3	1.6				
	P	P	Stiff gray silty CLAY, trace sand	17.3					
25	18	SS	Medium dense to dense brown to dark gray silty coarse to fine SAND						
	29	SS				11.9	NP	NP	M
30			(Fill)	10.8					
	9	SS	Medium dense to dense light gray to gray silty medium to fine SAND						
35									
	10	SS				25.4			M
40	P	P	(Undivided Magothy Unit)						
	39	SS	(Continued on Sheet 2 of 3)						

Completion Depth: 78.9 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger + Mud Rotary

Water Depth: See Notes ft., After hrs.
ft., After hrs.
ft., After hrs.
ft., After hrs.

AECOM

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

LOG of BORING No. GB-5

DATE 9/11/2017 SURFACE ELEVATION 42.3 LOCATION Northing: 40.458 Easting: -74.2772

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				- Continuing medium dense to dense light gray to gray silty medium to fine SAND						
		12	SS							
50				(Undivided Magothy Unit)						
		P	P		-9.7					
		35	SS	Dense to very dense light gray to orange brown silty medium to fine SAND						
55										
		39	SS				22.2			M
60										
65										
		70	SS							
70										
75										
		50/5"	SS	(Old Bridge Sand)	-36.6					
80										
				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors.						
85										
				(Continued on Sheet 3 of 3)						

Completion Depth: 78.9 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger + Mud Rotary

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-5

Sheet 3 of 3

DATE 9/11/2017 SURFACE ELEVATION 42.3 LOCATION Northing: 40.458 Easting: -74.2772

DEPTH, FT. / SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90			2. Groundwater level is inferred to be present at approximately 31 feet below existing ground surface based on examination of split-spoon samples and moisture content lab test results. (Groundwater level could not be observed/measured in the boring due to the use of mud rotary drilling methods to advance the boring.) 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
95									
100									
105									
110									
115									
120									
125									
130									

Completion Depth: 78.9 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-7

Sheet 1 of 3

DATE 8/8/2017 SURFACE ELEVATION 41.4 LOCATION Northing: 40.4583 Easting: -74.2767

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0				Asphalt Pavement	40.8					
				Medium dense to very dense orange brown to brownish gray silty coarse to fine SAND with gravel						
5		25	SS							
		18	SS				7.9			M
10		22	SS				13.4			
15		15	SS				7.6			
20		16	SS				9.4			M
				(Fill)	18.9					
				Loose to medium dense orange brown to grayish brown silty coarse to fine SAND						
25		8	SS				15.1			M
30		4	SS							
		7	SS				27.0			M
35					4.9					
				Very stiff gray silty CLAY						
		19	SS			3.3				
40					-0.1					
				(Undivided Magothy Unit)						
		13	SS	(Continued on Sheet 2 of 3)						

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After hrs.

Project No.: 60515039 ft., After hrs.

Project Name: Williams NESE Madison ft., After hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ft., After hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-7

Sheet 2 of 3

DATE 8/8/2017 SURFACE ELEVATION 41.4 LOCATION Northing: 40.4583 Easting: -74.2767

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Medium dense to very dense gray to orange brown silty medium to fine SAND						
		20	SS							
50										
		35	SS				19.1			M
55										
		40	SS							
60										
		28	SS							
65				(Undivided Magothy Unit)	-25.1					
		50/5"	SS	Very dense gray to orange brown silty medium to fine SAND						
70										
		50/5"	SS							
75										
		59	SS	(Old Bridge Sand)	-38.6					
80										
				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors.						
85										
				(Continued on Sheet 3 of 3)						

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-7

DATE 8/8/2017 SURFACE ELEVATION 41.4 LOCATION Northing: 40.4583 Easting: -74.2767

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90				2. Groundwater level is inferred to be present at approximately 27 feet below existing ground surface based on examination of split-spoon samples and moisture content lab test results. (Groundwater level could not be observed/measured in the boring due to the use of mud rotary drilling methods to advance the boring.) 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
95										
100										
105										
110										
115										
120										
125										
130										

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

Appendix B

Results of Laboratory Testing

Project: Williams GSP Crossing
Project No.: 60515039

AECOM

SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2µ (%)			Stress (psi)	Strain (%)	UU	CIU		
GB-2 S-3	4.0-6.0			9.8															
GB-2 S-5	8.0-10.0	Light brown POORLY GRADED SAND with SILT	SP-SM	8.3						12									
GB-2 S-7	14.0-16.0	Light brown POORLY GRADED SAND with SILT	SP-SM	26.5						5									
GB-2 S-8	19.0-21.0	Brown SILTY SAND	SM	28.9		NP	NP			48									
GB-2 S-10	29.0-31.0	Brown SILTY SAND with GRAVEL	SM	16.4		NP	NP			36									
GB-2 S-11	33.0-35.0	Gray POORLY GRADED SAND with SILT	SP-SM	24.6						9									
GB-2 S-14	48.0-50.0	Light brown POORLY GRADED SAND with SILT	SP-SM	24.4						8									
GB-3 S-3	4.0-6.0	Brown SILTY SAND	SM	16.2		NP	NP			30									
GB-3 S-5	8.0-10.0			17.8															
GB-3 S-6	10.0-12.0			13.6															
GB-3 S-7	14.0-16.0	Brown SILTY SAND	SM	13.5		NP	NP			24									
GB-3 S-8	19.0-21.0			8.2															
GB-3 S-9	24.0-26.0	Brown SILTY SAND	SM	23.3						12									
GB-3 S-11	33.0-35.0	Gray LEAN CLAY	CL	15.1		38	20			90									
GB-3 S-14	48.0-50.0	Gray SILTY SAND	SM	22.5						29									
GB-4 S-2	8.0-10.0	Brown SILTY SAND	SM	9.7		NP	NP			26									
GB-4 S-4	14.0-16.0	Brown SILTY SAND	SM	10.1						21									
GB-4 S-5	19.0-21.0	Brown SILTY SAND	SM	16.0		NP	NP			29									
GB-4 S-6	24.0-26.0	Brown SILTY SAND with GRAVEL	SM	9.5						15									

Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

* Refer to Laboratory Test Curves

Project File Path:

Project: Williams GSP Crossing
Project No.: 60515039

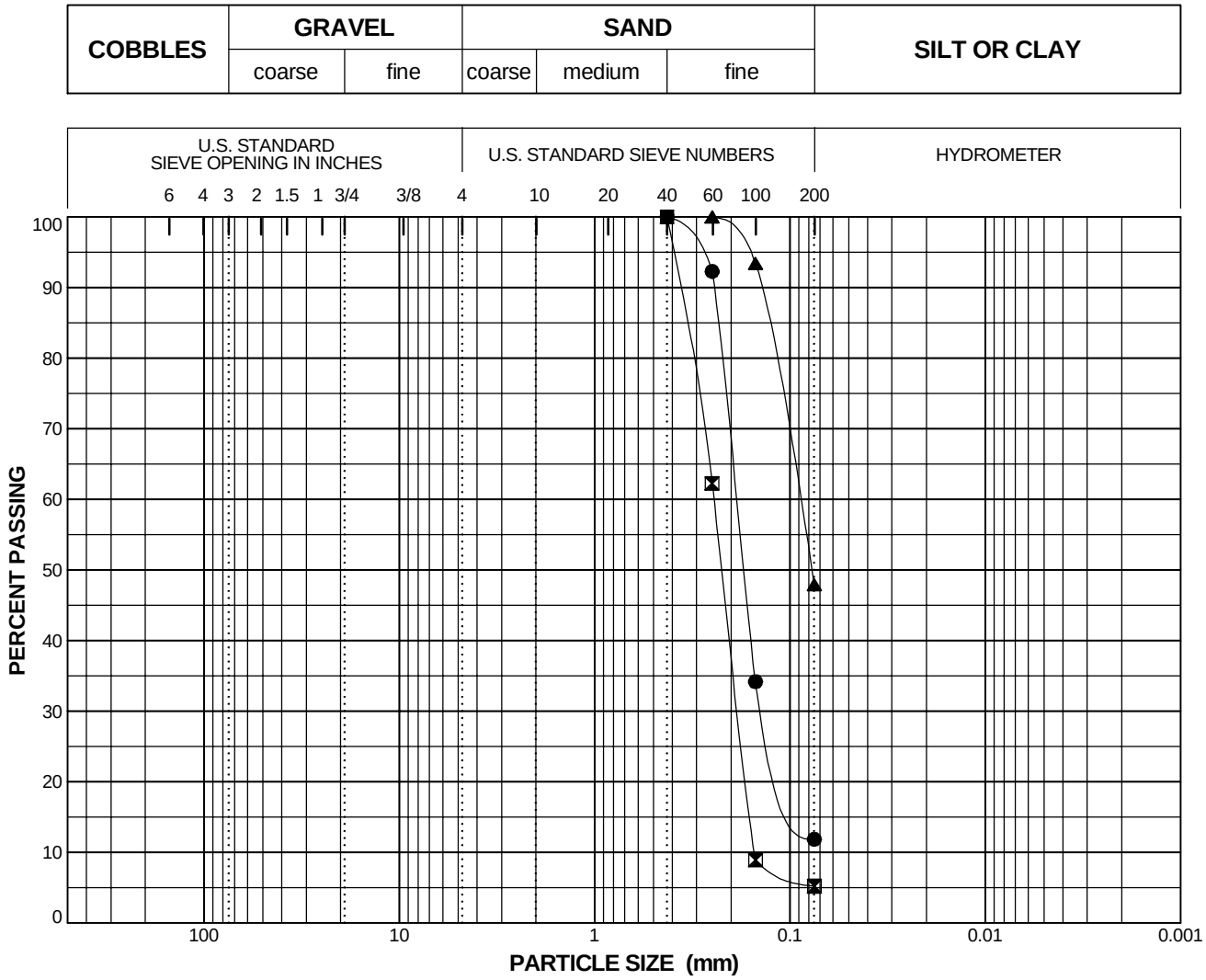
AECOM

SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2µ (%)			Stress (psi)	Strain (%)	UU	CIU		
GB-4 S-7	29.0-31.0	Light brown SILTY SAND	SM	13.3						22									
GB-4 S-9	38.0-40.0	Light brown SILTY SAND	SM	24.6						18									
GB-4 S-14	63.0-65.0	Brown SILTY SAND	SM	19.9						36									
GB-5 S-4	6.0-8.0			14.4															
GB-5 S-5	8.0-10.0	Brown SILTY SAND	SM	12.0						22									
GB-5 S-6	10.0-12.0	Brown SILTY SAND	SM	12.7						26									
GB-5 S-7	15.0-17.0	Brown SILTY SAND	SM	13.2		NP	NP			18									
GB-5 S-11	28.0-30.0	Brown SILTY SAND	SM	11.9		NP	NP			20									
GB-5 S-13	38.0-40.0	Brown SILTY SAND	SM	25.4						15									
GB-5 S-19	58.0-60.0	Gray SILTY SAND	SM	22.2						30									
GB-7 S-2	8.0-10.0	Brown SILTY SAND with GRAVEL	SM	7.9						24									
GB-7 S-3	10.0-12.0			13.4															
GB-7 S-4	14.0-16.0			7.6															
GB-7 S-5	19.0-21.0	Brown SILTY SAND with GRAVEL	SM	9.4						22									
GB-7 S-6	24.0-26.0	Brown SILTY SAND	SM	15.1						18									
GB-7 S-7	33.0-35.0	Brown SILTY SAND	SM	27.0						12									
GB-7 S-12	53.0-55.0	Gray brown SILTY SAND	SM	19.1						14									

Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

* Refer to Laboratory Test Curves



SYMBOL	●	⊠	▲
Boring	GB-2	GB-2	GB-2
Sample	S-5	S-7	S-8
Spec			
Depth (ft)	8.0-10.0	14.0-16.0	19.0-21.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	88.1	94.8	52.1
% Fines	11.9	5.2	47.9
% -2µ			
Cc	1.30	0.91	
Cu	2.66	1.61	
LL			NP
PL			NP
PI			NP
USCS	SP-SM	SP-SM	SM
w (%)	8.3	26.5	28.9

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
4			
10			
20			
40	100.0	100.0	
60	92.3	62.2	100.0
100	34.2	8.9	93.4
200	11.9	5.2	47.9

SYMBOL	DESCRIPTION AND REMARKS
●	Light brown POORLY GRADED SAND with SILT (SP-SM)
⊠	Light brown POORLY GRADED SAND with SILT (SP-SM)
▲	Brown SILTY SAND (SM)

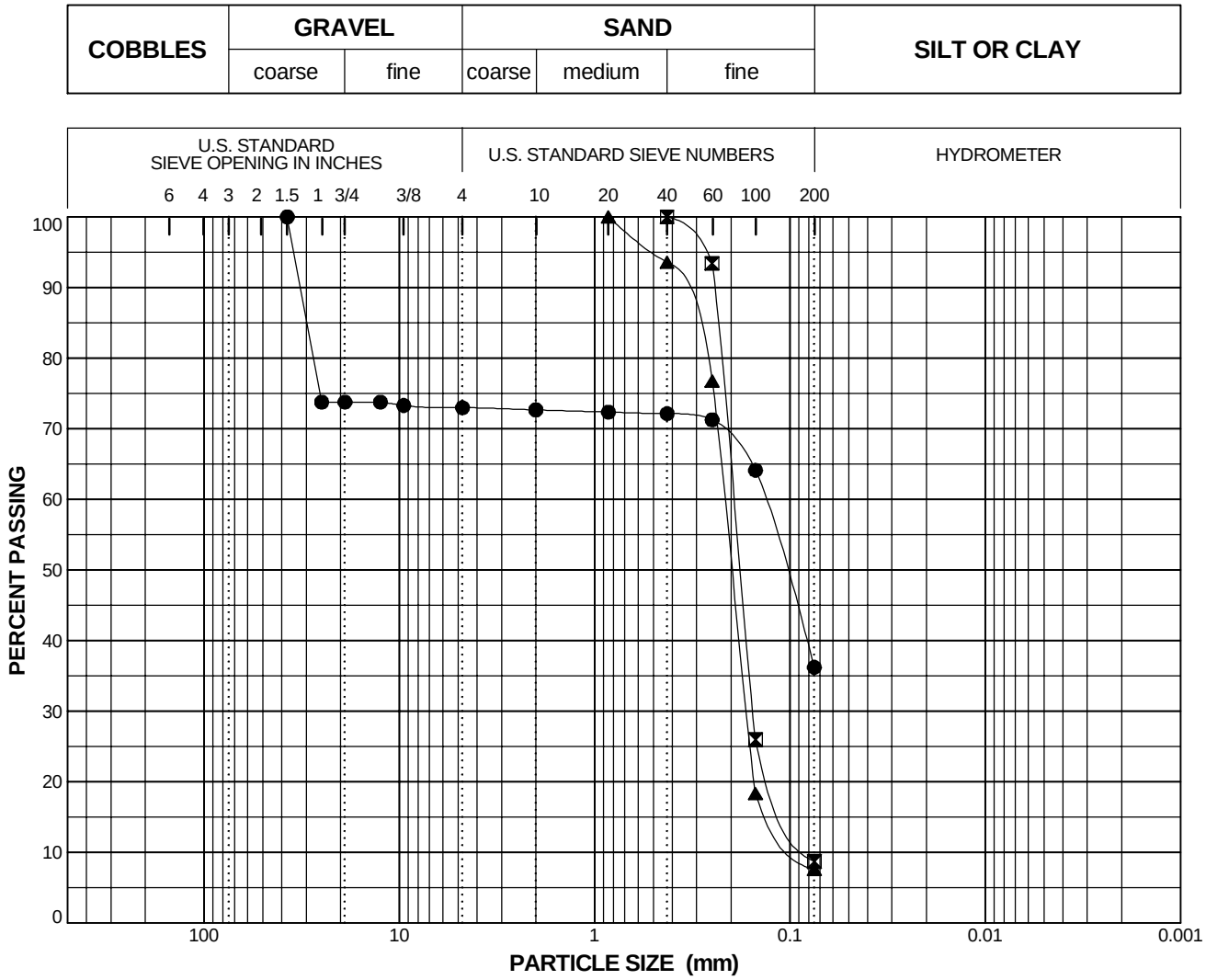
PARTICLE SIZE DISTRIBUTION

Williams GSP Crossing

Project Number 60515039	October 2017	Figure B-1

AECOM

SIEVE_BLUEBELL_NEW LAB_WILLIAMAS GSP CROSSING.GPJ URS_BLUE.GDT 10/10/17



SYMBOL	●	⊠	▲
Boring	GB-2	GB-2	GB-2
Sample	S-10	S-11	S-14
Spec			
Depth (ft)	29.0-31.0	33.0-35.0	48.0-50.0
% +3"	0.0	0.0	0.0
% Gravel	27.0	0.0	0.0
% Sand	36.8	91.3	92.4
% Fines	36.2	8.7	7.6
% -2µ			
Cc		1.56	1.46
Cu		2.46	2.46
LL	NP		
PL	NP		
PI	NP		
USCS	SM	SP-SM	SP-SM
w (%)	16.4	24.6	24.4

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
2"			
1 1/2"	100.0		
1"	73.8		
3/4"	73.8		
1/2"	73.8		
3/8"	73.3		
4	73.0		
10	72.7		
20	72.4		100.0
40	72.1	100.0	93.6
60	71.3	93.4	76.8
100	64.1	25.9	18.3
200	36.2	8.7	7.6

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SILTY SAND with GRAVEL (SM)
⊠	Gray POORLY GRADED SAND with SILT (SP-SM)
▲	Light brown POORLY GRADED SAND with SILT (SP-SM)

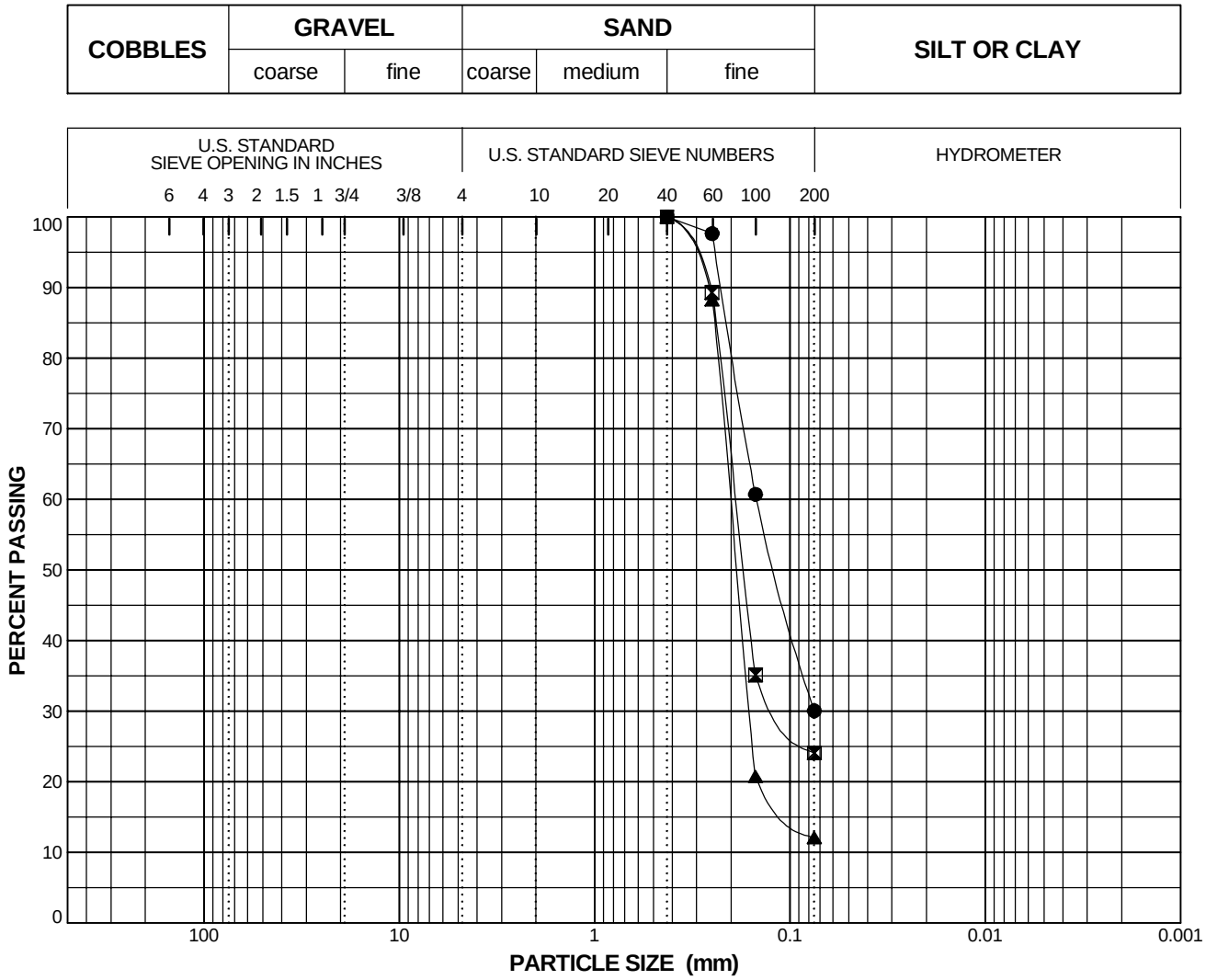
PARTICLE SIZE DISTRIBUTION

Williams GSP Crossing

Project Number 60515039	October 2017	Figure B-2

AECOM

SIEVE_BLUEBELL_NEW LAB_WILLIAMAS GSP CROSSING.GPJ URS_BLUE.GDT 10/10/17



SYMBOL	●	⊠	▲
Boring	GB-3	GB-3	GB-3
Sample	S-3	S-7	S-9
Spec			
Depth (ft)	4.0-6.0	14.0-16.0	24.0-26.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	70.0	75.9	87.9
% Fines	30.0	24.1	12.1
% -2µ			
Cc			2.02
Cu			3.17
LL	NP	NP	
PL	NP	NP	
PI	NP	NP	
USCS	SM	SM	SM
w (%)	16.2	13.5	23.3

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
4			
10			
20			
40	100.0	100.0	100.0
60	97.6	89.3	88.3
100	60.7	35.1	20.8
200	30.0	24.1	12.1

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SILTY SAND (SM)
⊠	Brown SILTY SAND (SM)
▲	Brown SILTY SAND (SM)

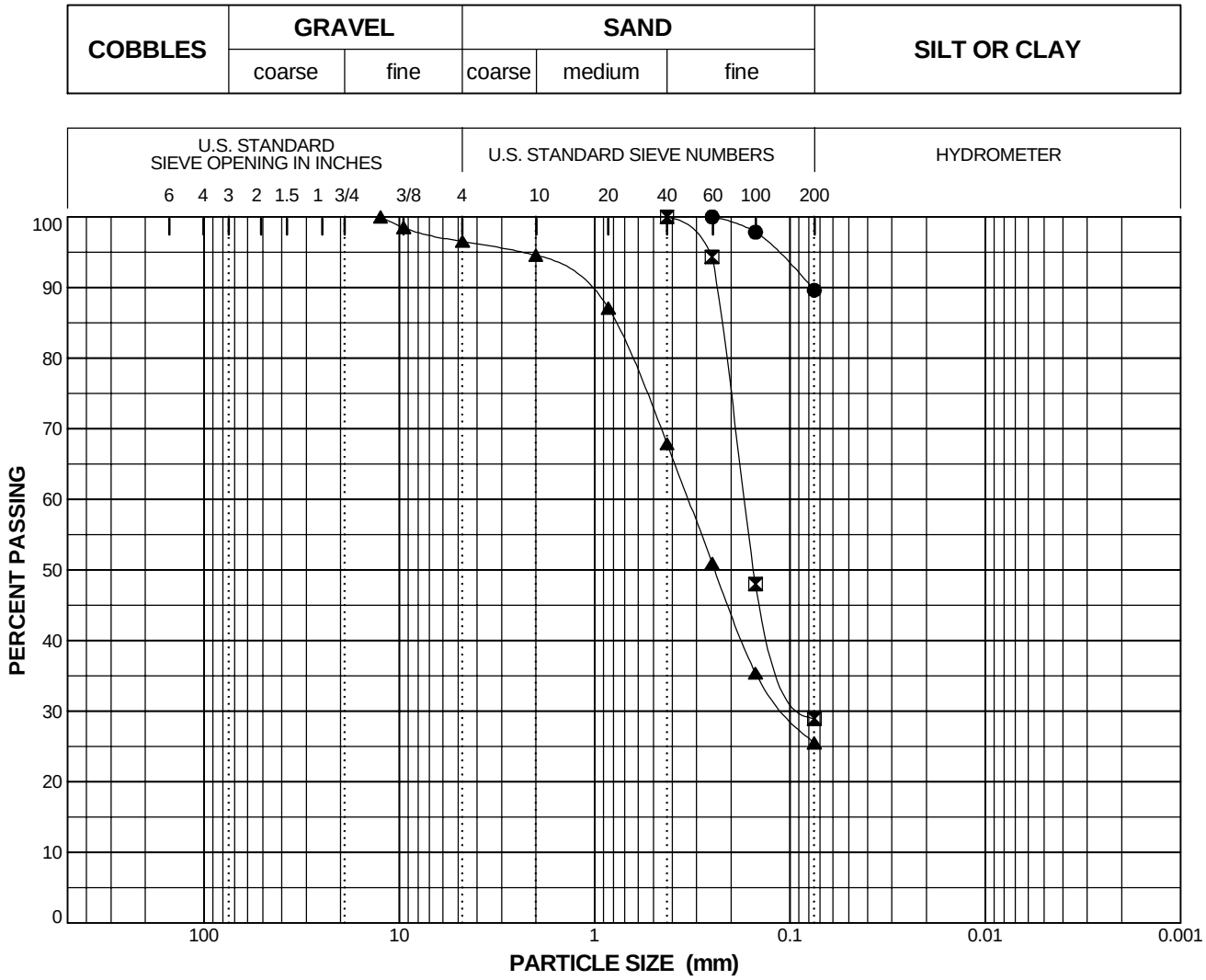
PARTICLE SIZE DISTRIBUTION

Williams GSP Crossing

Project Number 60515039	October 2017	Figure B-3

AECOM

SIEVE_BLUEBELL_NEW LAB_WILLIAMAS GSP CROSSING.GPJ URS_BLUE.GDT 10/10/17



SYMBOL	●	⊠	▲
Boring	GB-3	GB-3	GB-4
Sample	S-11	S-14	S-2
Spec			
Depth (ft)	33.0-35.0	48.0-50.0	8.0-10.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	3.5
% Sand	10.4	71.1	71.0
% Fines	89.6	28.9	25.5
% -2µ			
Cc			
Cu			
LL	38		NP
PL	20		NP
PI	18		NP
USCS	CL	SM	SM
w (%)	15.1	22.5	9.7

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
2"			
1 1/2"			
1"			
3/4"			
1/2"			100.0
3/8"			98.5
4			96.5
10			94.6
20			87.1
40		100.0	67.9
60	100.0	94.3	50.9
100	97.8	48.0	35.4
200	89.6	28.9	25.5

SYMBOL	DESCRIPTION AND REMARKS
●	Gray LEAN CLAY (CL)
⊠	Gray SILTY SAND (SM)
▲	Brown SILTY SAND (SM)

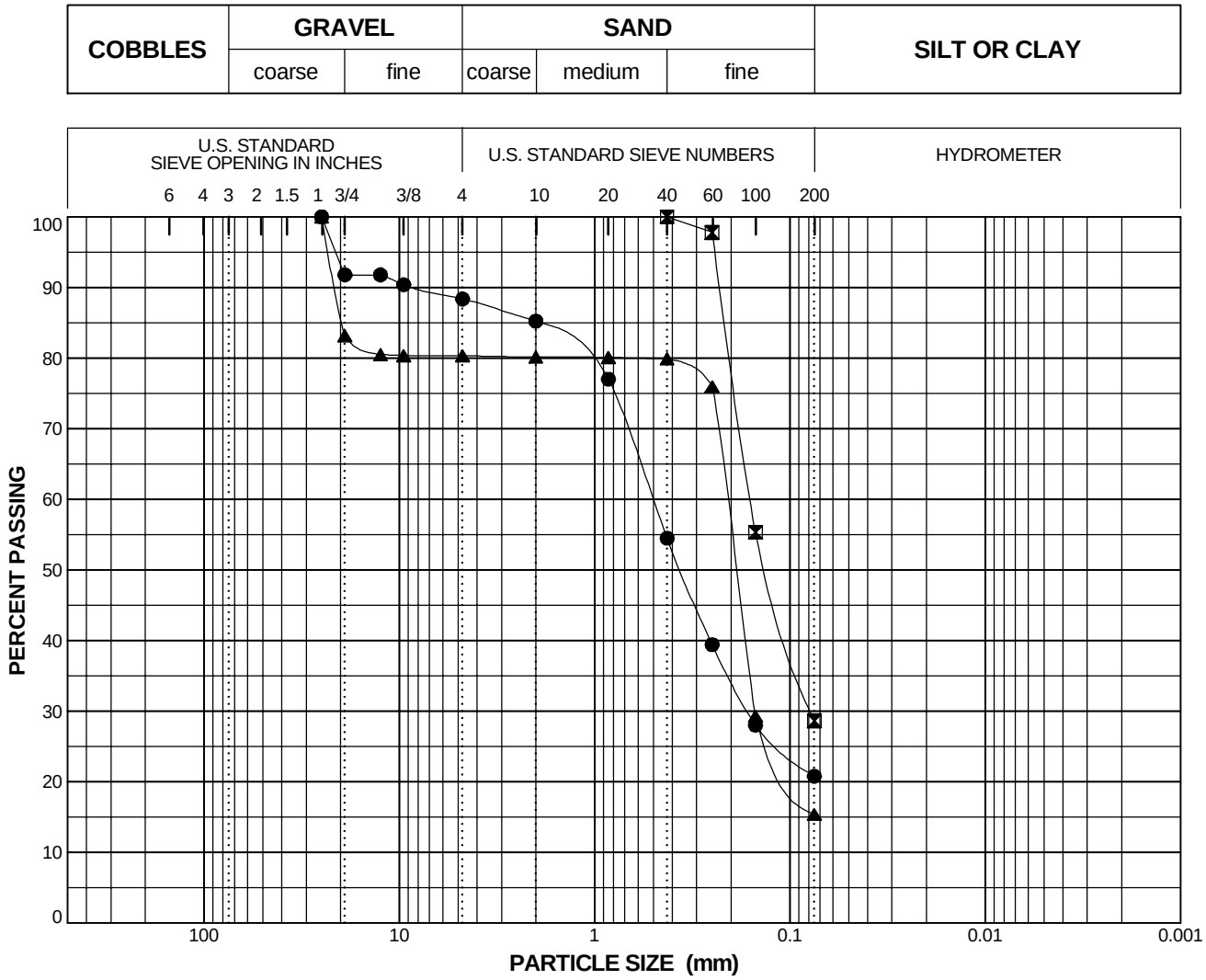
PARTICLE SIZE DISTRIBUTION

Williams GSP Crossing

Project Number		
60515039	October 2017	Figure B-4

AECOM

SIEVE_BLUEBELL_NEW LAB_WILLIAMAS GSP CROSSING.GPJ URS_BLUE.GDT 10/10/17



SYMBOL	●	⊠	▲
Boring	GB-4	GB-4	GB-4
Sample	S-4	S-5	S-6
Spec			
Depth (ft)	14.0-16.0	19.0-21.0	24.0-26.0
% +3"	0.0	0.0	0.0
% Gravel	11.6	0.0	19.7
% Sand	67.6	71.4	64.9
% Fines	20.8	28.6	15.4
% -2µ			
Cc			
Cu			
LL		NP	
PL		NP	
PI		NP	
USCS	SM	SM	SM
w (%)	10.1	16.0	9.5

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
2"			
1 1/2"			
1"	100.0		100.0
3/4"	91.8		83.2
1/2"	91.8		80.5
3/8"	90.4		80.3
4	88.4		80.3
10	85.2		80.2
20	77.0		80.1
40	54.5	100.0	79.9
60	39.4	97.8	76.0
100	28.0	55.3	29.3
200	20.8	28.6	15.4

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SILTY SAND (SM)
⊠	Brown SILTY SAND (SM)
▲	Brown SILTY SAND with GRAVEL (SM)

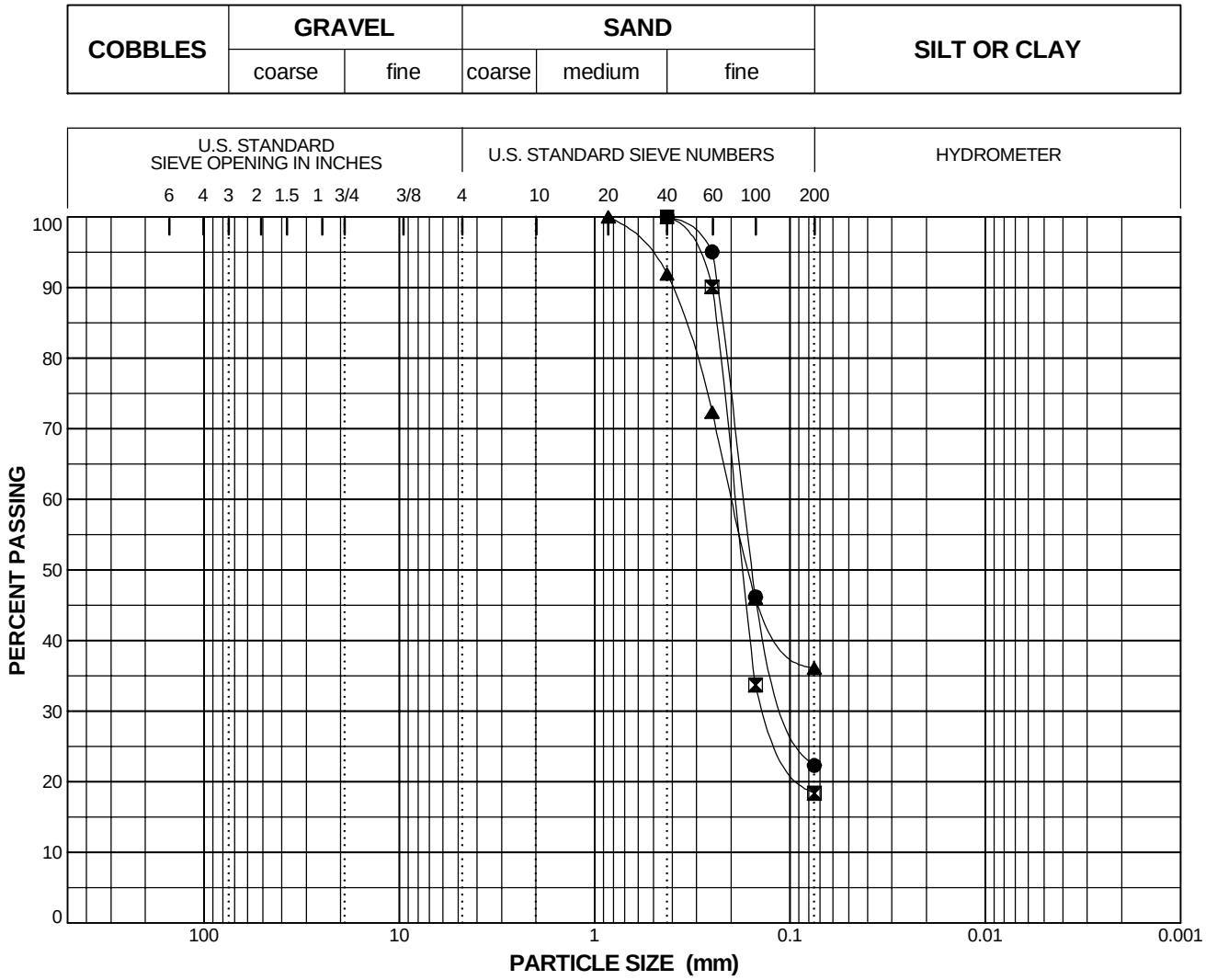
PARTICLE SIZE DISTRIBUTION

Williams GSP Crossing

Project Number 60515039	October 2017	Figure B-5

AECOM

SIEVE_BLUEBELL_NEW LAB_WILLIAMAS GSP CROSSING.GPJ URS_BLUE.GDT 10/10/17



SYMBOL	●	⊠	▲
Boring	GB-4	GB-4	GB-4
Sample	S-7	S-9	S-14
Spec			
Depth (ft)	29.0-31.0	38.0-40.0	63.0-65.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	77.7	81.6	63.9
% Fines	22.3	18.4	36.1
% -2µ			
Cc			
Cu			
LL			
PL			
PI			
USCS	SM	SM	SM
w (%)	13.3	24.6	19.9

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
4			
10			
20			100.0
40	100.0	100.0	91.9
60	95.0	90.1	72.3
100	46.2	33.7	46.0
200	22.3	18.4	36.1

SYMBOL	DESCRIPTION AND REMARKS
●	Light brown SILTY SAND (SM)
⊠	Light brown SILTY SAND (SM)
▲	Brown SILTY SAND (SM)

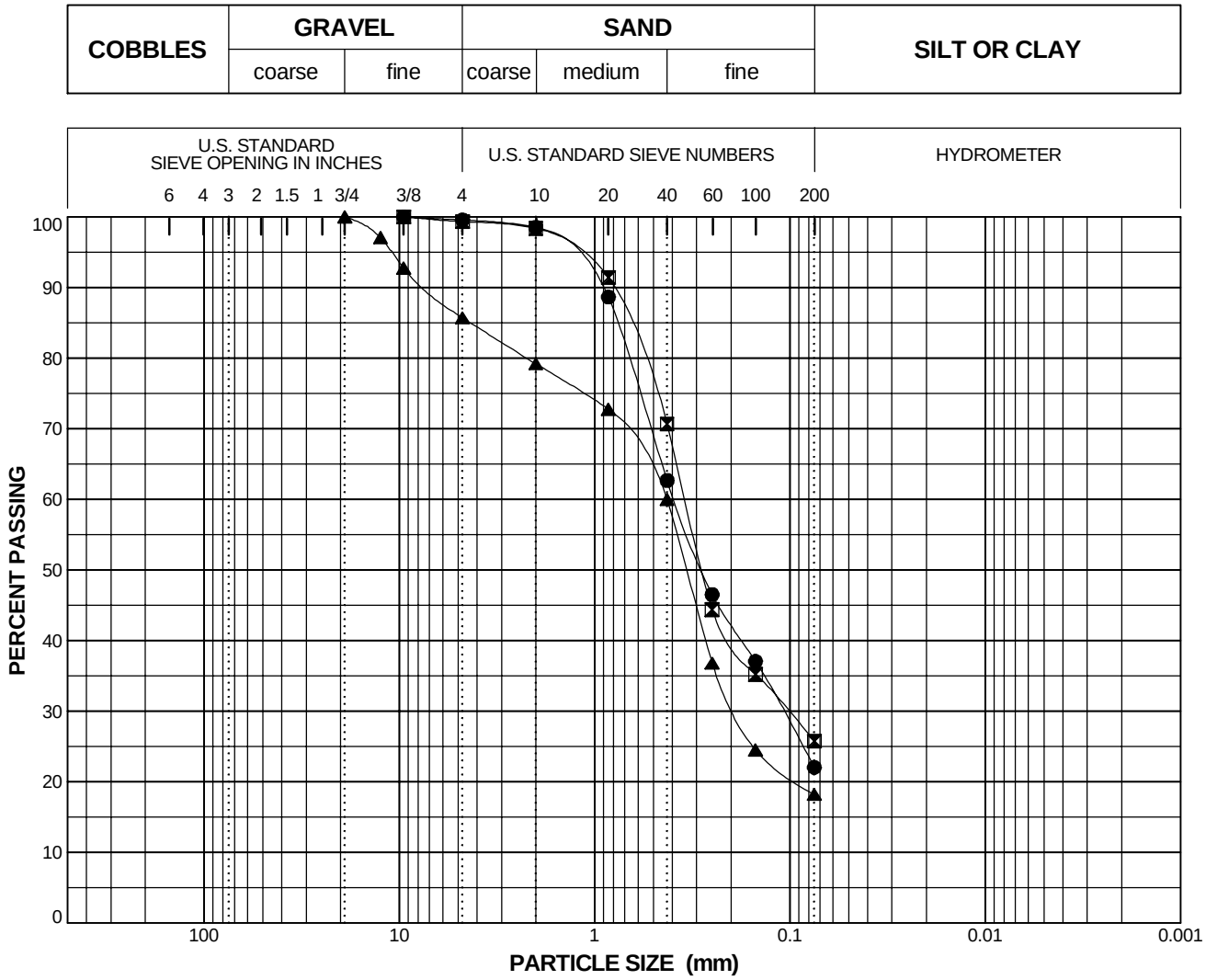
PARTICLE SIZE DISTRIBUTION

Williams GSP Crossing

Project Number 60515039	October 2017	Figure B-6

AECOM

SIEVE_BLUEBELL_NEW LAB_WILLIAMAS GSP CROSSING.GPJ URS_BLUE.GDT 10/10/17



SYMBOL	●	⊠	▲
Boring	GB-5	GB-5	GB-5
Sample	S-5	S-6	S-7
Spec			
Depth (ft)	8.0-10.0	10.0-12.0	15.0-17.0
% +3"	0.0	0.0	0.0
% Gravel	0.4	0.7	14.3
% Sand	77.5	73.6	67.5
% Fines	22.0	25.7	18.2
% -2µ			
Cc			
Cu			
LL			NP
PL			NP
PI			NP
USCS	SM	SM	SM
w (%)	12.0	12.7	13.2

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
2"			
1 1/2"			
1"			
3/4"			100.0
1/2"			97.1
3/8"	100.0	100.0	92.8
4	99.6	99.3	85.7
10	98.5	98.4	79.2
20	88.7	91.4	72.8
40	62.7	70.7	60.0
60	46.5	44.4	36.8
100	37.1	35.2	24.5
200	22.0	25.7	18.2

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SILTY SAND (SM)
⊠	Brown SILTY SAND (SM)
▲	Brown SILTY SAND (SM)

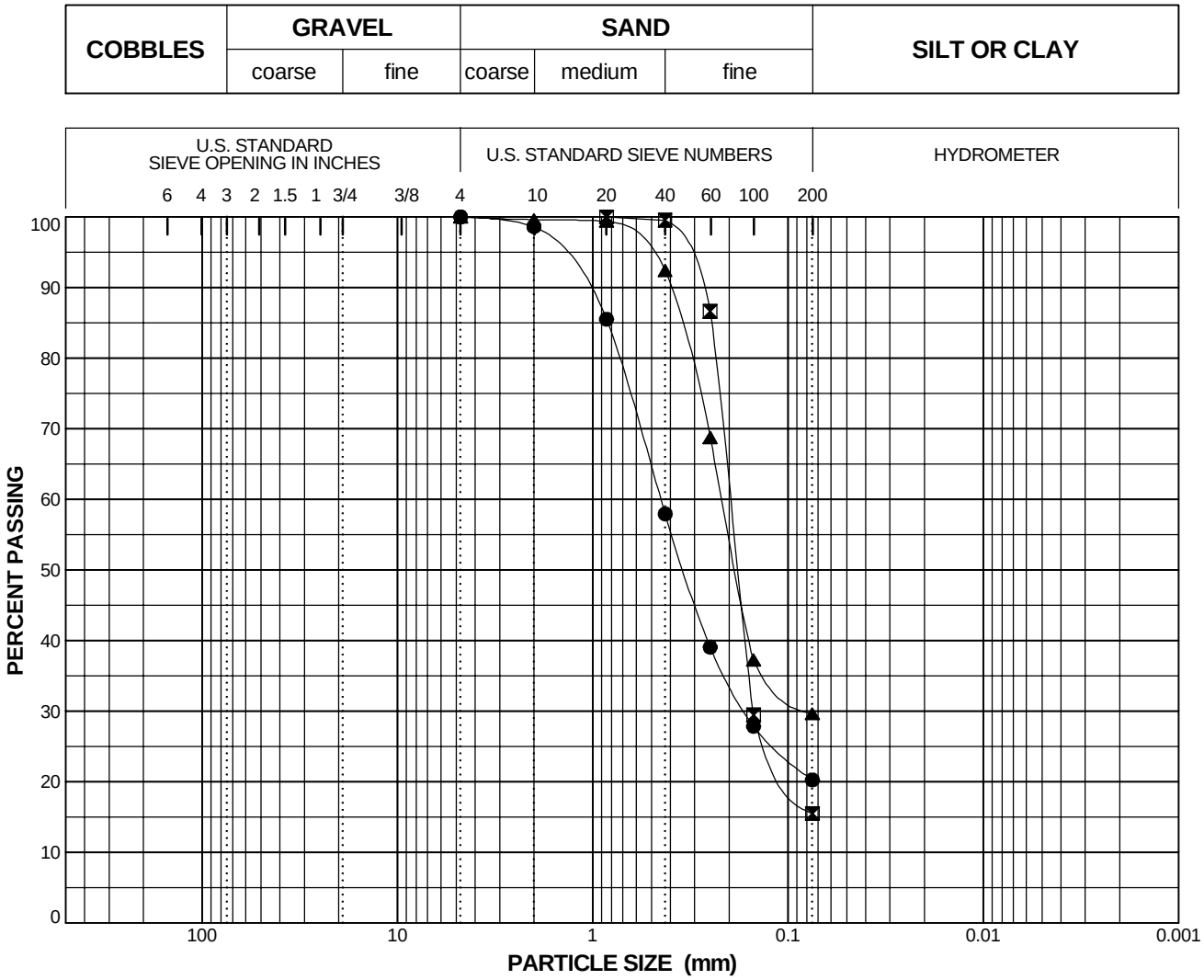
PARTICLE SIZE DISTRIBUTION

Williams GSP Crossing

Project Number 60515039	October 2017	Figure B-7

AECOM

SIEVE_BLUEBELL_NEW LAB_WILLIAMAS GSP CROSSING.GPJ URS_BLUE.GDT 10/10/17



SYMBOL	●	⊠	▲
Boring	GB-5	GB-5	GB-5
Sample	S-11	S-13	S-19
Spec			
Depth (ft)	28.0-30.0	38.0-40.0	58.0-60.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	79.7	84.5	70.4
% Fines	20.3	15.5	29.6
% -2µ			
Cc			
Cu			
LL	NP		
PL	NP		
PI	NP		
USCS	SM	SM	SM
w (%)	11.9	25.4	22.2

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
4	100.0		100.0
10	98.6		99.6
20	85.5	100.0	99.4
40	57.9	99.5	92.4
60	39.1	86.6	68.8
100	27.8	29.4	37.2
200	20.3	15.5	29.6

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SILTY SAND (SM)
⊠	Brown SILTY SAND (SM)
▲	Gray SILTY SAND (SM)

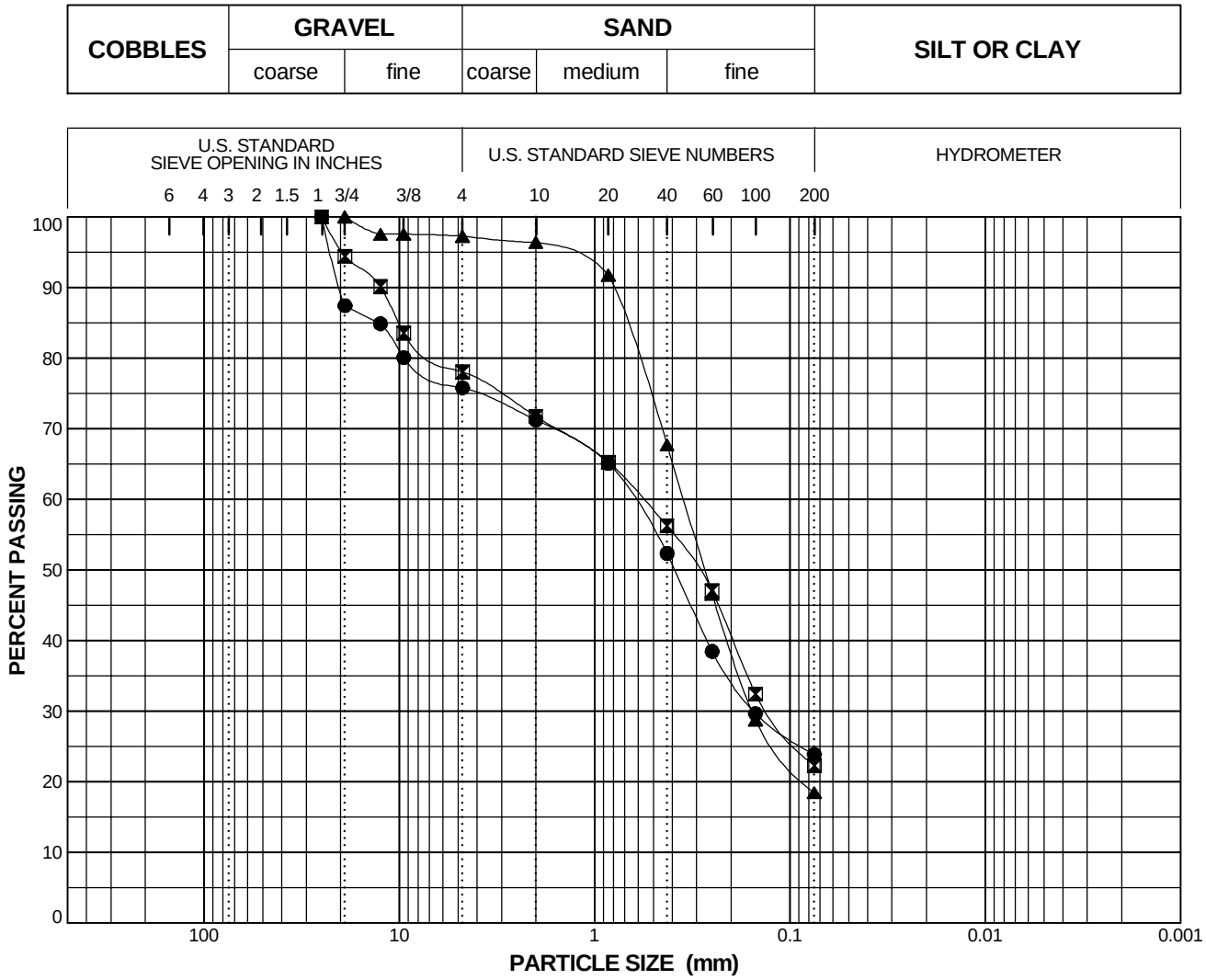
PARTICLE SIZE DISTRIBUTION

Williams GSP Crossing

Project Number		
60515039	October 2017	Figure B-8

AECOM

SIEVE_BLUEBELL_NEW LAB_WILLIAMAS GSP CROSSING.GPJ URS_BLUE.GDT 10/10/17



SYMBOL	●	⊠	▲
Boring	GB-7	GB-7	GB-7
Sample	S-2	S-5	S-6
Spec			
Depth (ft)	8.0-10.0	19.0-21.0	24.0-26.0
% +3"	0.0	0.0	0.0
% Gravel	24.2	21.9	2.7
% Sand	51.9	55.8	78.8
% Fines	23.9	22.3	18.5
% -2µ			
Cc			
Cu			
LL			
PL			
PI			
USCS	SM	SM	SM
w (%)	7.9	9.4	15.1

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
2"			
1 1/2"			
1"	100.0	100.0	
3/4"	87.4	94.4	100.0
1/2"	84.9	90.1	97.5
3/8"	80.1	83.5	97.5
4	75.8	78.1	97.3
10	71.2	71.7	96.4
20	65.1	65.3	91.8
40	52.3	56.2	67.7
60	38.5	47.0	46.5
100	29.7	32.4	28.8
200	23.9	22.3	18.5

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SILTY SAND with GRAVEL (SM)
⊠	Brown SILTY SAND with GRAVEL (SM)
▲	Brown SILTY SAND (SM)

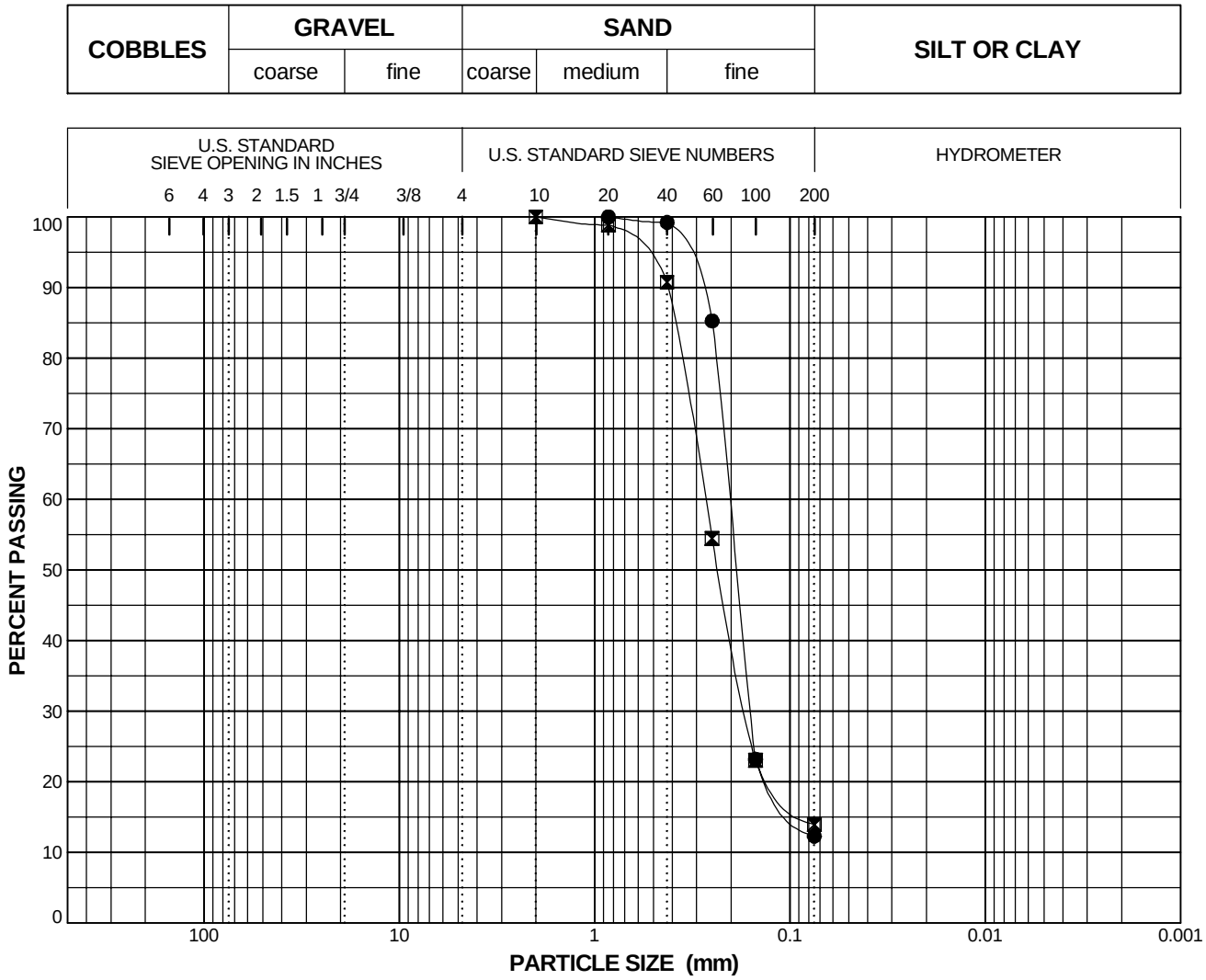
PARTICLE SIZE DISTRIBUTION

Williams GSP Crossing

Project Number 60515039	October 2017	Figure B-9

AECOM

SIEVE_BLUEBELL_NEW LAB_WILLIAMAS GSP CROSSING.GPJ URS_BLUE.GDT 10/10/17



SYMBOL	●	⊠
Boring	GB-7	GB-7
Sample	S-7	S-12
Spec		
Depth (ft)	33.0-35.0	53.0-55.0
% +3"	0.0	0.0
% Gravel	0.0	0.0
% Sand	87.7	86.1
% Fines	12.3	13.9
% -2µ		
Cc	1.91	
Cu	3.13	
LL		
PL		
PI		
USCS	SM	SM
w (%)	27.0	19.1

Particle Size (Sieve #)	PERCENT FINER ●	PERCENT FINER ⊠
2"		
1 1/2"		
1"		
3/4"		
1/2"		
3/8"		
4		
10		100.0
20	100.0	98.9
40	99.2	90.8
60	85.3	54.4
100	23.2	23.0
200	12.3	13.9

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SILTY SAND (SM)
⊠	Gray brown SILTY SAND (SM)

PARTICLE SIZE DISTRIBUTION

Williams GSP Crossing

Project Number		
60515039	October 2017	Figure B-10

AECOM

SIEVE_BLUEBELL_NEW LAB_WILLIAMAS GSP CROSSING.GPJ URS_BLUE.GDT 10/10/17

AECOM

SUMMARY OF FINDINGS
GEOTECHNICAL INVESTIGATION FOR
NORTHEAST SUPPLY ENHANCEMENT – MADISON LOOP
Middlesex County, New Jersey
(Dated October 13, 2017)

1. BACKGROUND

Transcontinental Gas Pipe Line Company, LLC (Transco) is planning approximately 3.4 miles of 26-inch looping in Middlesex County, New Jersey designated as Madison Loop (Site) as a part of its Northeast Supply Enhancement project. Site location is presented on **Figure 1**.

Transco previously authorized AECOM to complete geotechnical investigation work to characterize subsurface conditions along the planned pipeline alignment. In this regard, Transco requested AECOM to complete nine borings to provide subsurface information including the information desired by Laney Directional Drilling Company (Laney) to complete the horizontal directional drilling (HDD) design for Transco. AECOM therefore coordinated with Transco and Laney to identify the desired boring locations and sampling requirements, and subsequently completed all borings and associated laboratory testing. Findings of this subsurface investigation are further described below.

2. REGIONAL GEOLOGY

2.1 - Bedrock Geology

The crystalline bedrock basement underlying the Site consists of lower Paleozoic and Precambrian schist and gneiss. The elevation of the bedrock surface ranges from 275 to 325 feet below sea level (Sandberg, 1996) (Reference 1).

2.2 - Surficial Geology

The material overlying basement rock at the Site consists of a discontinuous overburden of Tertiary and Quaternary deposits atop southeast dipping Cretaceous units (members of Magothy and Raritan Formations) which may outcrop at the surface. The units present at the Site are listed below in order of youngest to oldest.

The elevation of the top of the Old Bridge Sand unit ranges from -20 to -30 feet NGVD 1929; the thickness of the Old Bridge Sand unit ranges 65 to 75 feet; and the elevation of the top of the Farrington Sand member is about -180 feet NGVD 1929. Each of the members of the Cliffwood beds, Morgan beds, and Amboy Stoneware Clay may be difficult to distinguish and are at times mapped as a combined undivided Magothy unit. These characteristics of the regional geology are used to identify strata in the borings (References 1 through 5).

- Holocene salt marsh/estuarine deposits - Silt, sand, peat, clay, minor pebble gravel; brown, dark-brown, gray, black; as much as 100 feet thick; contain abundant organic matter

- Holocene and late Pleistocene alluvium – Sand, gravel, silt, minor clay and peat; reddish brown, yellowish brown, brown, gray; as much as 20 feet thick; variable amounts of organic matter
- Middle to late Pleistocene upper stream terrace deposits - Sand and pebble gravel, minor silt and cobble gravel; yellow, reddish yellow, yellowish brown; as much as 20 feet thick
- Pleistocene (locally Miocene and Pliocene) weathered Cretaceous deposits - Exposed sand and clay of Cretaceous formations; includes thin, patchy alluvium and colluvium, and pebbles left from erosion of surficial deposits
- Pliocene Pennsauken Formation - Sand, clayey sand, pebble gravel, minor silt, clay, and cobble gravel; yellow, reddish yellow, white; locally iron-cemented; as much as 140 feet thick.
- Pliocene Glauconitic phase of Pennsauken Formation - Sand, clayey sand, and pebble gravel, minor silt and clay; reddish yellow to yellowish brown; sand typically includes glauconite; as much as 40 feet thick
- Cretaceous Cliffwood beds (Magothy) – Fine to medium quartz sand; white, yellow, gray; interbedded with thin, dark gray, micaceous, carbonaceous silt with pyrite; as much as 40 feet thick
- Cretaceous Morgan beds (Magothy) - Laminated to thinly interbedded clay (light to medium gray, typically carbonaceous) and micaceous quartz sand (white, yellow, and light gray); sand is predominantly fine grained, massive to cross-bedded; as much as 90 feet thick
- Cretaceous Amboy Stoneware Clay (Magothy) - Dark gray to grayish-brown clay and silt which weathers to white; carbonaceous and micaceous with grayish-pink fine quartz sand laminae; as much as 30 feet thick
- Cretaceous Old Bridge Sand unit (Magothy) - Light gray quartz sand weathered to white, yellow and pink with occasional clear mica and lignite; interbedded with dark gray, discontinuous, carbonaceous clay beds as much as 3 feet thick; unit as much as 100 feet thick
- Cretaceous South Amboy Fire Clay (Magothy) - Massive to laminated clay, locally dark gray but typically oxidized to white and red; as much as 30 feet thick
- Cretaceous Sayreville Sand (Raritan) - Fine to medium sand locally thin and clayey; has an average thickness of 35 to 40 feet
- Cretaceous Woodbridge Clay (Raritan) - Dark gray, massive clay and silt unit with mica, fine-grained wood, and pyrite; occasionally interlaminated with light gray to white sand; commonly contains gray to brown siderite; as much as 110 feet thick
- Cretaceous Farrington Sand (Raritan) - White, yellow, red, light gray micaceous quartz sand commonly interbedded with thin gravel beds and thin to thick dark gray silt beds; as much as 50 feet thick (Stanford, 1993).

3. SUBSURFACE INVESTIGATION

Nine geotechnical test borings and laboratory testing were completed as further described below.

3.1 - Test Borings

Subsurface conditions were explored by completing nine (9) geotechnical test borings, designated borings AB-1, AB-2, AB-3, AB-4, CB-1, CB-2, CB-3, MB-1 and MDB-1, at the approximate locations shown on **Figure 2**.

Prior to initiating the test boring work, AECOM obtained NJDEP well permits for the test borings with the termination depth of 50 feet or greater (i.e., all borings except boring MB-1) and completed a utility notification through the New Jersey One-Call system to provide for mark-out of any known public utilities.

Uni-Tech Drilling Co., Inc. of Franklinville, New Jersey completed the test borings under a subcontract to AECOM between September 15, 2016 and August 23, 2017. The borings were drilled using a rubber-tire-mounted CME-750 and a track-mounted CME-55 ATV drill rigs. Key findings of the test borings are summarized in **Table 1** and no bedrock was encountered in any of the nine borings until its termination depth. Logs of the test borings are presented in **Appendix A**.

The test borings were advanced using hollow stem auger (HSA) and rotary wash soil drilling techniques. Within each test boring, representative samples were collected from the encountered overburden soils using a 24-inch-long split-spoon sampler (2-inch O.D.) driven with a 140-pound hammer freely falling 30 inches in accordance with ASTM D-1586 ("Penetration Test and Split-Barrel Sampling of Soils"). In general, representative samples of the soil materials encountered in the test borings were collected at continuous depth intervals to approximately 12 feet below existing ground surface (bgs) and at five-foot depth intervals thereafter.

The collected split-spoon soils samples were preserved and labeled in accordance with industry standards. Soil samples were subsequently transported to the AECOM geotechnical laboratory in Conshohocken, Pennsylvania for further examination and testing.

Organic vapor monitoring was also conducted during the test boring operations by an AECOM field representative using a MiniRAE Photoionization Detector (PID) monitor. Upon completion, each borehole was backfilled with a cement-bentonite grout to original ground surface as an environmental safeguard. The grout was placed using a tremie pipe placed at the bottom of the borehole. All excess soil cuttings and drilling fluids produced from test borings were containerized into drums, staged at each borehole location, and hauled to an onsite drum staging area designated by Transco. All field activities were completed under the full-time technical supervision of an AECOM field professional.

3.2 - Survey of Boring Locations

Transco surveyed the planned and completed locations of each boring. The completed location of each boring is shown on **Figure 2**. Coordinates and ground surface elevations at each boring are provided in **Table 1** and the boring logs in **Appendix A**.

3.3 - Laboratory Testing Program

Geotechnical laboratory testing was completed on representative samples of the encountered soil materials. Results of the testing program are presented in **Appendix B**.

Selected split-spoon soil samples were tested for physical properties including natural moisture content (ASTM D-2216), grain-size distribution (ASTM D-421/422) and plasticity by Atterberg limits (ASTM D-4318) to assist in classifying the encountered soils and evaluating stratigraphical continuity. A table summarizing the soil testing results for these soil samples is presented on pages B-1 through B-3. Grain-size distribution curves are presented on pages B-4 through B-20.

4. SUBSURFACE CONDITIONS

AECOM identified distinct soil strata and apparent stratigraphical conditions as inferred by the soil materials encountered in the test borings and measured in the laboratory. Inferred subsurface profiles were developed and are presented on **Figures 3-1** and **3-2**. Detailed soil descriptions presented in the boring logs of **Appendix A** are summarized below (presented in order of increasing depth):

4.1 Stratum 1 – Fill

Fill materials were only encountered within the upper 2 feet of boring MB-1, consisting predominately of silty sand with gravel. Standard penetration resistance (or N-) value was 21 blows per foot (bpf), which is indicative of very dense conditions.

4.2 Stratum 2 – Undivided Magothy Unit

Stratum 2 was observed in all borings except boring MB-1, consisting predominately of silty sand and silty to sandy clay. This unit was observed to be approximately 32 to 95 feet thick. Stratum 2 starts from ground surface or underlies Stratum 3, Pennsauken Formation described below.

Stratum 2 soils were observed to be typically medium dense to dense (for sandy soils) or stiff to very stiff (for clayey soils). N-values ranged from weight-of-hammer (WOH) to split-spoon refusal (e.g., 50 blows per 3 inches sampling advancement). Gravel content was found to range from approximately zero to 14 percent. Atterberg limit testing indicated liquid limits ranging from 29 to 45 and plasticity indices ranging from 12 to 21, indicating Stratum 2 soils are medium-plastic.

4.3 Stratum 3 – Pennsauken Formation

Stratum 3 was observed in borings AB-2, AB-3 and CB-2, consisting predominately of silty sand with gravel. This unit was observed to be approximately 2 to 39 feet thick. Stratum 3 consistently starts from ground surface and overlies Stratum 2 where encountered.

Stratum 3 soils were observed to be loose to dense and N-values of Stratum 3 soils ranged from 3 to 17 bpf. Gravel content was found to be approximately 15 percent.

4.4 Stratum 4 – Old Bridge Sand

Stratum 4 was observed in borings CB-1, CB-2, CB-3 and MDB-1, consisting predominately of silty sand with interbedded silty clay. This unit was not fully penetrated by any of the four borings above so its thickness is unknown. Stratum 4 consistently underlies Stratum 2 where encountered.

Stratum 4 soils were observed to be medium dense to very dense and N-values of Stratum 4 soils ranged from 11 bpf to split-spoon refusal (e.g., 50 blows per 4 inches sampling advancement). No gravel was encountered in this stratum.

4.5 Stratum 5 – Amboy Stoneware Clay

Stratum 5 soils were encountered within boring MB-1 only, consisting predominately of silty clay. N-values ranged from 4 to 9 bpf. Unconfined compressive strength of these soils, as measured in the field with a pocket penetrometer, ranged from 1.0 to 2.5 tons per square foot (tsf), which indicates a stiff to very stiff consistency.

4.6 Groundwater

Groundwater levels were measured during drilling and were recorded in the boring logs presented in **Appendix A**. Collected groundwater level information is summarized in **Table 1**.

As shown on **Table 1**, groundwater was encountered during drilling with depths ranging from approximately 4 to 55 feet bgs (between approximate elevations 3 and 111 feet). It should be noted that groundwater levels are subject to change due to seasonal conditions and man-made influences.

5. REFERENCES

1) Sandberg, S.K., D.W. Hall, J.A.M. Gronberg, and D.L. Pasicznyk. 1996. Geophysical Investigations of the Potomac-Raritan-Magothy Aquifer System and Underlying Bedrock in Parts of Middlesex and Mercer Counties, New Jersey. New Jersey Geological Survey Report GSR 37.

2) Farlekas, G. M. 1979. Geohydrology and Digital-simulation Model of the Farrington Aquifer in the Northern Coastal Plain of New Jersey. United States Geological Survey Water-Resources Investigations 79-106.

3) Gronberg, JM., A.A. Pucci, Jr., and B.A. Birkelo. 1991. Hydrogeologic Framework of the Potomac-Raritan-Magothy Aquifer System, Northern Coastal Pan of New Jersey. United States Geological Survey Water-Resources Investigations Report 90-4016.

4) New Jersey Department of Environmental Protection. Bureau of GIS. NJ-GeoWEB. Accessed Oct 2017.

5) Sugarman, P.J., S.D. Stanford, J.P. Owens, and G.J. Brenner. 2005. Bedrock Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey. New Jersey Geological Survey Open File Map OFM 65.

6. LIMITATIONS

The geotechnical investigation work completed by AECOM was performed in accordance with reasonable and accepted engineering practices. No warranty or guarantee, either written or implied, is applicable to this work. The findings presented in this report are based on the assumption that the subsurface conditions do not deviate appreciably from those disclosed by the test borings.

This report has been prepared solely for use by Transcontinental Gas Pipe Line Company, LLC. Any reuse of this report, particular by third parties, without expressing the permission of AECOM is solely at their own risk.

FIGURE 1 - SITE AND BORING LOCATION MAP

NESE Madison Loop, Middlesex County, NJ

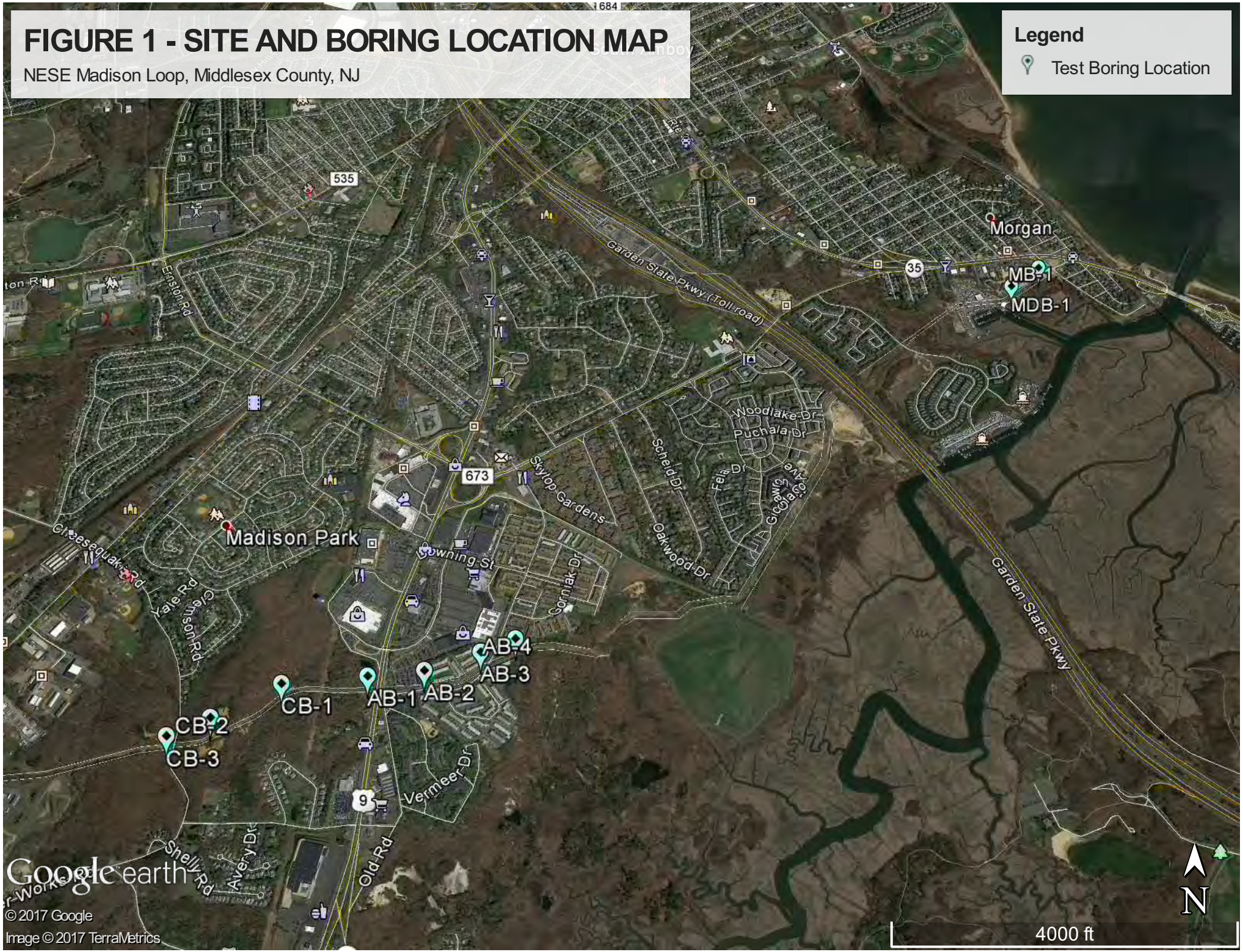


FIGURE 2 - BORING LOCATION PLAN (1 of 2)

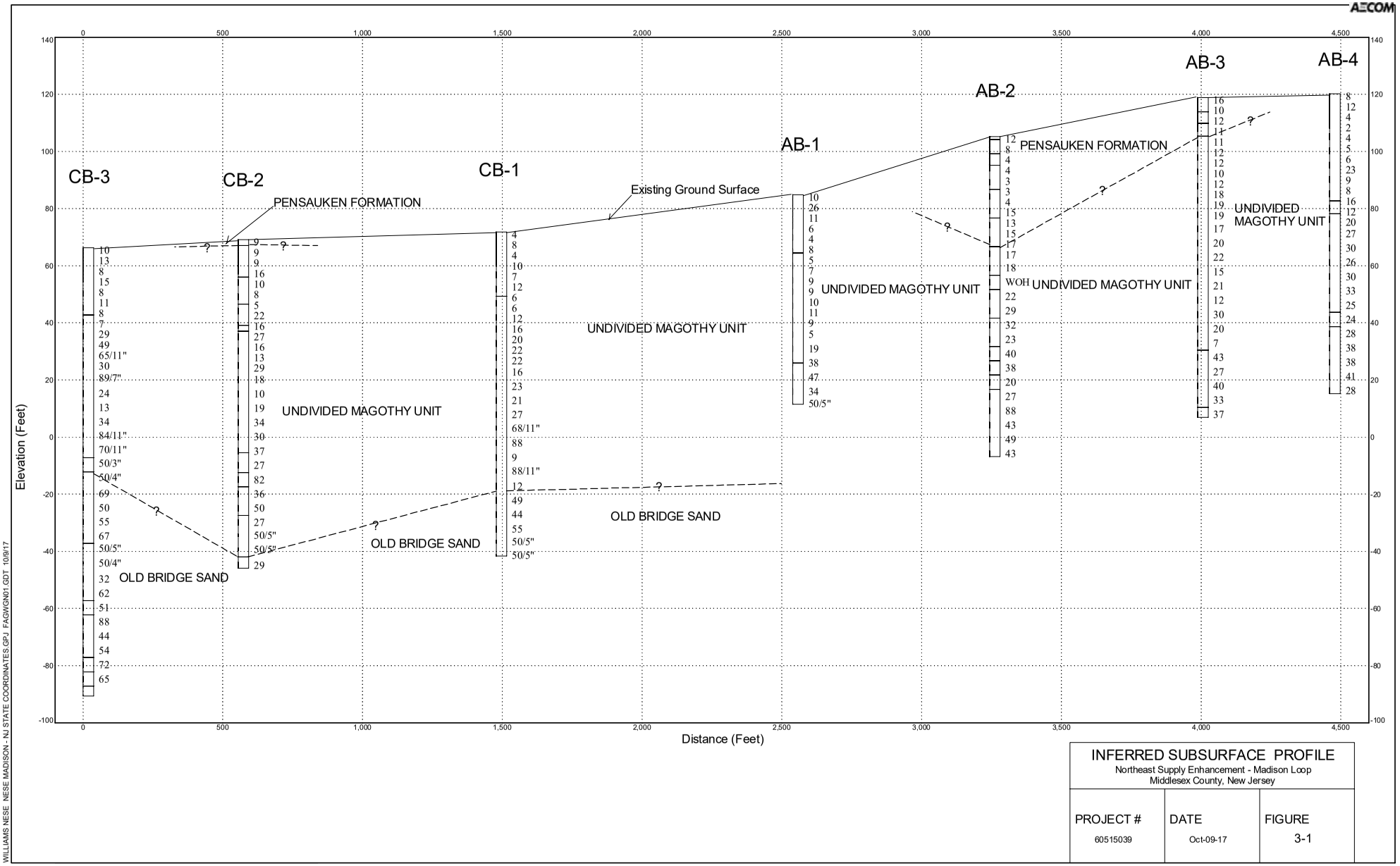
NESE Madison Loop, Middlesex County, NJ



FIGURE 2 - BORING LOCATION PLAN (2 of 2)

NESE Madison Loop, Middlesex County, NJ



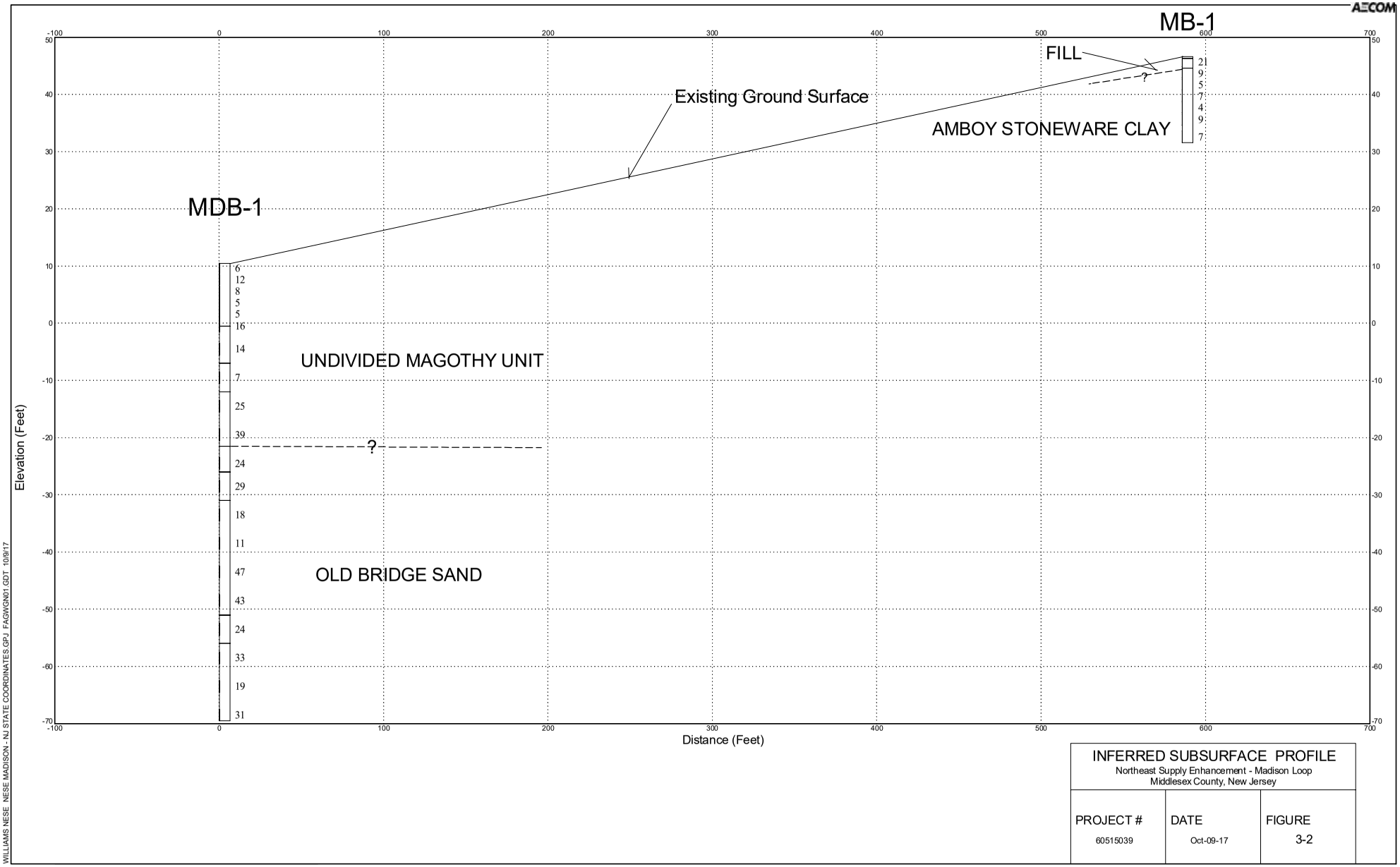


INFERRED SUBSURFACE PROFILE

Northeast Supply Enhancement - Madison Loop
Middlesex County, New Jersey

PROJECT #	DATE	FIGURE
60515039	Oct-09-17	3-1

WILLIAMS NESE_NESE MADISON - NJ STATE COORDINATES.GPJ_FAGWGN01.GDT_10/9/17



INFERRED SUBSURFACE PROFILE
Northeast Supply Enhancement - Madison Loop
Middlesex County, New Jersey

PROJECT #	DATE	FIGURE
60515039	Oct-09-17	3-2

WILLIAMS NESE NESE MADISON - NJ STATE COORDINATES.GPJ FAGWGN01.GDT 10/9/17

TABLE 1
Summary of Test Borings
Northeast Supply Enhancement - Madison Loop
Middlesex County, New Jersey

Boring ID	Northing	Easting	Termination Depth (ft, bgs)	Ground Surface Elevation (ft)	Estimated Groundwater Depth (ft, bgs)	Estimated Groundwater Elevation (ft)
AB-1	40.4450390	-74.3002870	73.4	84.9	4.5	80.4
AB-2	40.4452552	-74.2977352	112.0	105.2	45.0	60.2
AB-3	40.4459630	-74.2952180	112.0	118.9	55.0	63.9
AB-4	40.4464840	-74.2936500	105.0	120.2	9.6	110.6
CB-1	40.4447580	-74.3041550	113.4	71.8	See Note 1	See Note 1
CB-2	40.4434910	-74.3071260	115.0	69.1	12.9	56.2
CB-3	40.4428202	-74.3089444	157.0	66.3	44.0	22.3
MB-1	40.4635540	-74.2661460	15.0	46.6	NE	NA
MDB-1	40.4625600	-74.2678010	80.0	10.5	7.5	3.0

Notes:
BGS = below ground surface
NE = not encountered
NA = not available
1 = Groundwater level could not be measured due to the drilling method, although groundwater was not encountered until the depth of 31 feet during the drilling (i.e., groundwater level is deeper than 31 feet BGS).

Williams®

GAS PIPELINE

GEOTECHNICAL INVESTIGATION REPORT FOR NEW YORK BAY EXPANSION – COMPRESSOR STATION 207

Middlesex County, New Jersey

Prepared for:

Transcontinental Gas Pipe Line Company, LLC
2800 Post Oak Boulevard
Houston, Texas 77056



Prepared by:

AECOM

625 West Ridge Pike, Suite E-100, Conshohocken, PA 19428
(610) 832-3500

January 23, 2017

Table of Contents

Section 1 Project Description 1-1

Section 2 Site Conditions 2-1

Section 3 Geologic Setting 3-1

Section 4 Field Exploration 4-1

4.1 TEST BORINGS 4-1

Section 5 Laboratory Testing 5-1

Section 6 Subsurface Conditions 6-1

6.1 STRATUM 1: FILL 6-1
6.2 STRATUM 2: CLAY INTERBED 6-1
6.3 STRATUM 3: OLD BRIDGE (COASTAL PLAIN) SAND 6-1
6.4 GROUNDWATER 6-1

Section 7 Geotechnical Evaluation 7-1

7.1 FOUNDATION CONDITIONS AND SYSTEMS 7-1
7.2 SITE PREPARATION 7-1
7.3 GROUNDWATER 7-1

Section 8 Conclusions and Recommendations 8-1

8.1 SHALLOW FOUNDATIONS 8-1
8.2 STRUCTURAL FILL 8-1
8.3 TEMPORARY PIT EXCAVATION 8-2
8.4 CONSTRUCTION MONITORING 8-2

Section 9 Limitations 9-1

Figures

Figure 1 Site Location Map
Figure 2 Boring Location Plan

Appendices

Appendix A Test Boring Logs
Appendix B Geotechnical Laboratory Testing Results

Williams Gas Pipeline (Williams) is proposing to install two gas coolers, a gas cooler MCC building and a new transformer adjacent to its existing Compressor Station 207 facility (Site) located in Old Bridge, Middlesex County, New Jersey as a part of the planned New York Bay Expansion project. The Site location is shown on **Figure 1**. This report summarizes the approach and findings of the geotechnical investigation completed at the Site.

As authorized by Williams, AECOM completed a geotechnical investigation at the Site to characterize subsurface conditions for supporting the new structures described above. The scope of work was completed in accordance with our proposal dated July 1, 2016 and generally included field exploration, laboratory testing, data evaluation and project reporting.

Sections 2.0 and 3.0 of this report summarize the site conditions observed at the time of our investigation and the geologic setting based on available literature. Descriptions of the field exploration and geotechnical laboratory testing programs are presented in Sections 4.0 and 5.0, respectively. Logs of the test borings are presented in **Appendix A** of this report; geotechnical laboratory test results are presented in **Appendix B**. Subsurface conditions encountered by the investigation are discussed in Section 6.0 and Section 7.0 summarizes our geotechnical evaluation of the subsurface conditions and the foundation system for supporting the planned structures. Section 8.0 summarizes our conclusions and geotechnical-related recommendations relative to design and construction of the new structures. Limitations are presented in Section 9.0.

The Site is located approximately 500 feet north of the Williams Compressor Station 207 facility near Old Bridge, Middlesex County, New Jersey as shown on **Figure 1**. The Site is located within the undeveloped area, previously covered by trees but cleared later by a Williams contractor prior to AECOM's drilling. Ground surface elevations at the Site range from approximately El. 90 to El. 92 feet.

The Site geology generally consists of two overburden (unconsolidated soil) units underlain by bedrock. According to the New Jersey Geological Survey (by Scott D. Stanford, 1998), the surficial unit of the Site consists of a layer of man-made fill which is a mixture of sand, gravel, cobbles and boulders. Weathered shale, underlying the fill layer and overlying bedrock, is composed of reddish-brown to yellow silty clay to clayey silty sand with varying amounts of shale fragments.

The bedrock beneath the Site is classified as reddish-brown shaly siltstone to mudstone of the Passaic Formation (Lower Jurassic and Upper Triassic), which is typically fine-grained and thin-bedded.

In order to evaluate foundation soil bearing and compressibility characteristics at the Site, a geotechnical investigation was performed consisting of field exploration via three test borings, geotechnical laboratory testing and evaluation of subsurface conditions.

4.1 TEST BORINGS

Subsurface conditions at the Site were explored by completing three (3) test borings, designated as borings BH-1, BH-2 and BH-3 at the locations shown on **Figure 2**. As shown on **Figure 2**, borings BH-1 and BH-2 were completed between two gas coolers and boring BH-3 was completed south of the gas coolers.

Prior to initiating the test boring work, AECOM completed a utility notification through the New Jersey One-Call System to provide for mark-out of any known public utilities.

Williams selected the location and termination depth of each boring and surveyed the test boring locations and ground surface elevations prior to the drilling. The test borings were completed by Uni-Tech Drilling Co., Inc. under subcontract to AECOM. All three borings were drilled between December 12 and 13, 2016 using an all-terrain, track-mounted CME-55LC drill rig. Logs of the test borings are presented in **Appendix A**.

Each test boring was advanced using hollow-stem auger and rotary washing drilling techniques. Termination depth of each boring was approximately 50 feet below existing ground surface (bgs). Within each test boring, representative samples were collected using a 24-inch-long split-spoon sampler (2-inch O.D.) driven with a 140-pound hammer freely falling 30 inches in accordance with ASTM D 1586 (“Standard Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils”) continuously to approximately 12 feet bgs and at approximate 5-foot depth intervals thereafter. No bedrock was encountered.

The collected split-spoon soil samples were preserved and labeled in accordance with industry standards and subsequently transported to the AECOM geotechnical laboratory in Conshohocken, Pennsylvania for further examination and testing.

Upon completion, each borehole was backfilled with a cement-bentonite grout to approximately 18 inches of the original ground surface and the remaining 18 inches was backfilled with drill cuttings. The grout was placed using a tremie pipe placed at the bottom of the borehole. All excess soil cuttings produced from the test borings were thinly spread around each borehole. All field activities were completed under the full-time technical supervision of AECOM.

Geotechnical laboratory testing was completed on representative samples of the encountered soil materials. Results of the testing program are presented in **Appendix B** of this report.

Selected split-spoon soil samples were tested for physical properties including natural moisture content (ASTM D 2216), grain-size distribution (ASTM D 422) and Atterberg limits (ASTM D 4318) to assist in classifying the encountered soils.

A table summarizing the soil testing results is presented on page B-1. Grain-size distribution curves are presented on pages B-2 through B-7.

Encountered soil and stratigraphical conditions are generally consistent with the site geologic setting described in Section 3. Detailed soil descriptions are summarized below (presented in order of increasing depth):

6.1 STRATUM 1: FILL

Fill materials were encountered within the upper 14, 10 and 13 feet of borings BH-1, BH-2 and BH-3, respectively. The fill consists predominately of medium dense to very dense silty sand with gravel. Standard penetration resistance (or N-) values measured within this stratum ranged from 6 to 46 blows per foot (bpf). Gravel content was found to range from approximately zero to 40 percent.

6.2 STRATUM 2: CLAY INTERBED

Stratum 2 consists predominately of sandy clay and was encountered in boring BH-2 only. This unit was observed to be approximately 3 feet thick within boring BH-2. The single N-value measured within this stratum was 14 bpf, indicating this stratum possesses a stiff consistency. Atterberg limits testing indicates a liquid limit of 45 and plasticity index of 20, indicating the Stratum 2 soils are medium plastic. Gravel content was found to be approximately 6 percent.

6.3 STRATUM 3: OLD BRIDGE (COASTAL PLAIN) SAND

Stratum 3 primarily consists of loose to medium dense silty sand or sandy silt. N-values measured within this stratum ranged from 6 to 30 bpf. No gravel was encountered in this stratum. Stratum 3 was not fully penetrated by the borings; therefore, its thickness beneath the Site is unknown.

6.4 GROUNDWATER

Groundwater was measured at approximately 49 feet bgs in boring BH-1 (approximate El. 42). It should be noted that groundwater levels are subject to change due to seasonal conditions and man-made influences.

7.1 FOUNDATION CONDITIONS AND SYSTEMS

Based on the completed test borings, the subsurface conditions underlying the Site generally consist of:

- Predominately granular dense fill material (Stratum 1);
- Thin layer of stiff clay interbed (Stratum 2) (only in boring BH-2); and
- Native loose to medium dense sand (Stratum 3) that becomes increasingly denser with depth.

Based upon the findings of the field exploration and laboratory testing programs as well as the structural information provided by Williams, it is concluded that the dense soils of Stratum 1 should be suitable for supporting the new structures on a shallow-based foundation system. Our analysis indicated that the structures may be supported on shallow-based foundations such as footings with a maximum net allowable bearing capacity of 2,500 pounds per square foot (psf). Total settlement under the loads of the proposed structures is not expected to exceed ½ inch; and the maximum differential settlement between adjacent supports or across the foundation is not expected to exceed 3/8 inch. The estimated settlements are expected to take place concurrently with the load application.

7.2 SITE PREPARATION

The test boring indicates that the surficial Stratum 1 Fill that will be generated from foundation excavations should be suitable for reuse as structural fill. If oversized materials are observed during excavation, although unlikely, they would need to be removed prior to re-use.

7.3 GROUNDWATER

Groundwater was measured at approximately 49 feet bgs in boring BH-1 (El. 42 ft). Groundwater is therefore not expected to be encountered during the shallow foundation construction. However, the contractor should be prepared to perform temporary dewatering to manage perched water conditions or stormwater runoff.

Based on the findings of our geotechnical investigation, our conclusions and recommendations regarding the planned construction are presented below.

8.1 SHALLOW FOUNDATIONS

A shallow-based foundation system consisting of spread footings bearing on the dense Stratum 1 Fill or compacted structural fill are recommended for support of the planned structures. Footings should be proportioned for combined dead plus live loads not to exceed a maximum bearing pressure of 2,500 psf. This recommended bearing pressure may be increased by 33 percent for short-term loading due to wind or earthquake. The minimum width of spread footings should be 36 inches, regardless of the bearing pressures developed**.** Footings should bear at least 3 feet below adjacent finished exterior grades for frost protection. A coefficient of friction of 0.30 should be used for sliding resistance, together with a factor of safety of at least 2.0.

Footing bearing surfaces should be cleaned of all material loosened by the excavation process prior to concrete placement. Should loose or soft materials be encountered or if the bearing materials become disturbed or softened, the disturbed materials should be removed and the footing should be lowered to undisturbed bearing materials or the undercut zone may be filled with flowable fill or structural fill, as discussed below in Section 8.2. The flowable fill should have an unconfined compressive strength of 200 pounds per square inch (psi) (28-day). All footing bearing surfaces should be evaluated by the Geotechnical Engineer.

The footing excavation should be undercut by a minimum of 4 inches below the planned footing base and backfilled with AASHTO No. 57 crushed stone or flowable fill. The plan limit of the undercutting should extend 1 foot beyond the edges of the concrete footing.

Excavated footing subgrade should be compacted on-grade immediately prior to concrete placement. Upon completion of this activity, the excavation bottom should be thoroughly inspected and hand-probed by a qualified geotechnical engineer to verify the integrity of the bearing materials.

Care should be taken by the contractor to prevent softening and weakening of the foundation subgrade bearing surfaces because of prolonged atmospheric exposure, construction activity disturbance, or an increase in moisture content. All footing concrete should be poured as soon as possible after approval of the respective bearing surfaces. In the event that an overnight delay in concrete placement is anticipated, foundation excavations should be carried to approximately 6 inches above the planned subgrade and subsequently to final subgrade elevation immediately before placement of concrete. Backfilling of footings should be completed as soon as possible after adequate concrete curing.

8.2 STRUCTURAL FILL

Structural fill should be used to backfill temporary pit excavations (described in the following section). All structural fill should be placed and compacted in accordance with the following recommendations.

Materials to be used for structural fill should be predominantly granular and free from over-sized material (e.g., cobble, boulder), roots, vegetation, organic material, trash, wood or other deleterious matters. The excavated Stratum 1 (Fill) soils should be suitable for use as structural

fill after screening to remove the above-mentioned deleterious matter and drying as necessary. Any imported structural fill material should consist of a well-graded soil meeting the gradation and quality requirements of NJDOT I-5 Soil-Aggregate material.

Structural fill should be placed in essentially horizontal lifts with a loose lift thickness of no greater than 8 inches. In confined areas where manually guided equipment must be used, such as backfill around the footing, the maximum loose lift thickness should be limited to 4 inches. Structural fill utilized for support of the footing foundation should be compacted to not less than 95 percent of the maximum dry density as determined by the Modified Proctor compaction test, ASTM D1557, or not less than 80 percent of the relative density as determined by ASTM D 4253/4254 for free-draining fill materials, unless otherwise determined by a qualified geotechnical engineer.

8.3 TEMPORARY PIT EXCAVATION

Based on information provided by Williams, construction of the transformer will require excavation of temporary pit. Based on the findings of our geotechnical investigation, the following should be considered in designing and constructing the pit excavation:

- The encountered subsurface conditions should be suitable for unshored excavation techniques (i.e., unsupported sideslopes) as long as the required temporary work space remains available adjacent to the pit. In this regard, unshored excavations would require excavating unsupported pit sideslopes exhibiting an acceptable factor-of-safety against slope instability when subjected to site-specific loading conditions. Such conditions would be associated with coarse-grained soils comprising the excavated pit sidewalls and surcharge loadings associated with soil stockpiles, construction traffic and equipment and other possible loadings.
- If unshored excavation techniques are utilized, the pit excavation must also provide for stable sideslopes configured to satisfy applicable OSHA regulations. Dense sandy soils with gravel should be encountered during pit excavation.

Based on the findings of our geotechnical investigation, construction dewatering to maintain ”dry” conditions inside the excavation pit should not be needed. However, the contractor should be prepared to perform any temporary dewatering, if necessary.

8.4 CONSTRUCTION MONITORING

It is recommended that full-time construction monitoring be provided during foundation and earthworks construction by AECOM or a qualified geotechnical engineering firm that is familiar with the subsurface conditions and the foundation design criteria. The items which should be observed, monitored and/or tested include subgrade preparation, foundation installation and placement of compacted structural fill, if necessary.

The geotechnical investigation work completed by AECOM for this project was performed in accordance with the standard of care. No warranty or guarantee, either written or implied, is applicable to this work. The findings, conclusions and recommendations presented in this report are based on the assumption that the subsurface conditions do not deviate appreciably from those disclosed by the test borings and are subject to confirmation or revision upon review by AECOM of the final plans and specifications covering pertinent details of the proposed construction. The conclusions and recommendations are also based on the premise of competent field engineering, monitoring and testing during construction.

This report has been prepared solely for use by Transcontinental Gas Pipe Line Company, LLC for the design of this particular project. Any reuse of this report, particular by third parties, without the expressed permission of AECOM is solely at their own risk.

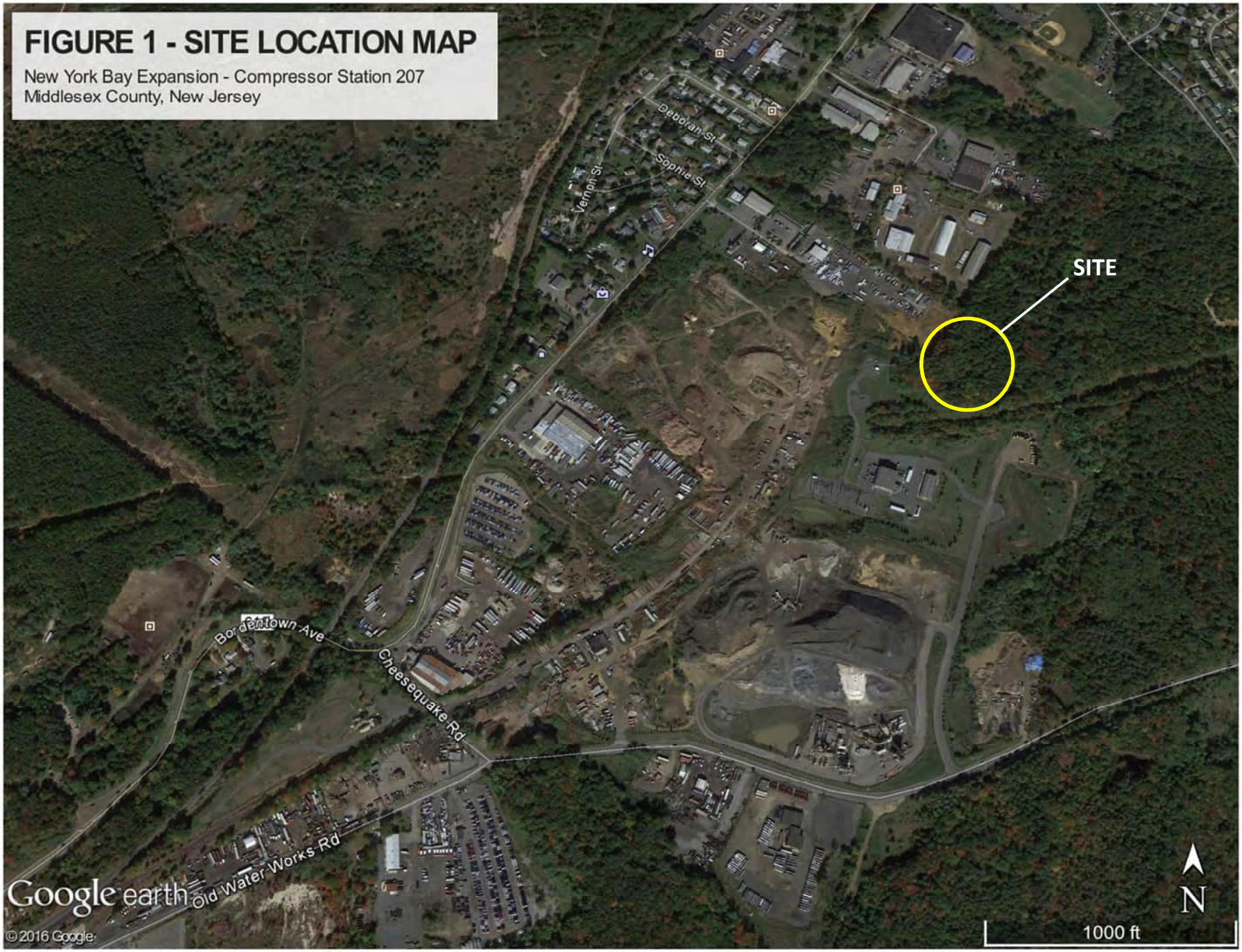
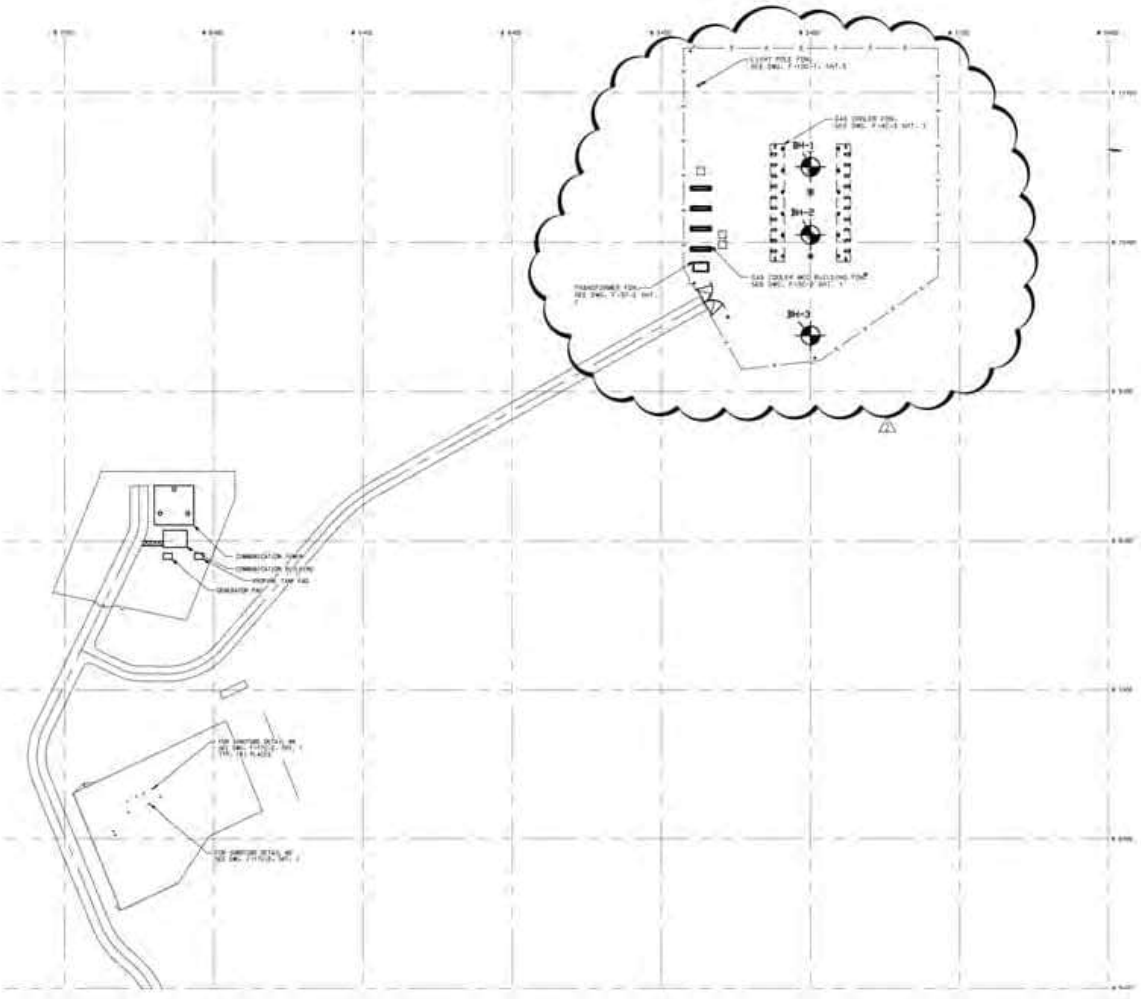

FIGURE 1 - SITE LOCATION MAP
New York Bay Expansion - Compressor Station 207
Middlesex County, New Jersey
SITE
Deborah St
Sophie St
Vernon St
Cheesequake Rd
Old Water Works Rd
Google earth
© 2016 Google
N
1000 ft

FIGURE 2 – BORING LOCATION PLAN
New York Bay Expansion – Compressor Station 207
Middlesex County, New Jersey





Legend:

BH-3 Approximate location of test boring completed by AECOM

Notes:
- Based map provided by Williams

GEOTECHNICAL INVESTIGATION

PROPOSED STREAM CROSSING FOR LNYB LATERAL EPLACEMENTS

MIDDLESEX COUNTY, NEW JERSEY

July 5, 2016

Prepared For: Transcontinental Gas Pipe Line Company, LLC

AECOM
625 West Ridge Pike, Suite E-100
Conshohocken, PA 19428
60492180

TABLE OF CONTENTS

Section 1 Project Description 1-1

Section 2 Site Conditions 2-1

Section 3 Geologic Setting 3-1

3.1 SURFICIAL GEOLOGY 3-1
3.2 BEDROCK GEOLOGY 3-1

Section 4 Field Exploration 4-1

Section 5 Laboratory Testing 5-1

Section 6 Subsurface Conditions 6-1

6.1 STRATUM 1: ALLUVIUM – MEDIUM DENSE TO VERY DENSE SILTY SAND 6-1
6.2 STRATUM 2: ALLUVIUM – VERY LOOSE TO MEDIUM DENSE SILTY SAND WITH GRAVEL 6-1
6.3 STRATUM 3: ALLUVIUM – VERY LOOSE TO MEDIUM DENSE SILTY SAND 6-1
6.4 STRATUM 4: ALLUVIUM – VERY DENSE SILTY SAND 6-1
6.5 GROUNDWATER 6-1

Section 7 Conclusions and Recommendations 7-1

7.1 CONVENTIONAL JACK AND BORE 7-1
7.2 HDD TECHNIQUES 7-2
7.3 OPEN-CUT TECHNIQUES 7-3
7.4 BOUYANCY 7-3
7.5 CONSTRUCTION DEWATERING 7-3
7.6 WORKER HEALTH AND SAFETY 7-3

Section 8 Limitations 8-1

Section 9 References 9-1

Tables

Table 1 Summary of Test Borings

Table 2 Summary of Groundwater Level Information

Figures

Figure 1 Site Location Map

Figure 2 Site Photos

Figure 3 Boring Location Plan and Inferred Geologic Profile A – A'

Appendices

Appendix A Test Boring Logs

Appendix B Results of Laboratory Testing

Transcontinental Gas Pipe Line Company, LLC (Transco) is planning the pipeline crossing of a stream (Site) near Old Bridge Township in Middlesex County, New Jersey as a part of the Lower New York Bay Lateral Replacements in conjunction with the New York Bay Expansion project. Approximate Site location is shown on **Figure 1**.

AECOM understands Transco is presently evaluating conventional bore and horizontal directional drilling (HDD) techniques to accomplish the stream crossing.

Subsurface information is required by Transco to evaluate/select appropriate installation techniques and complete the crossing design. Accordingly, the purpose of our geotechnical investigation work was to explore subsurface conditions and evaluate bore and HDD techniques for this crossing site. The scope of work was completed in accordance with AECOM proposal dated March 8, 2016 and generally included field exploration, laboratory testing, data evaluation and project reporting.

Sections 2.0 and 3.0 of this report summarize the site conditions observed at the time of our investigation and the geologic setting of the Site based on available literature. Descriptions of the field exploration and laboratory testing programs are presented in Sections 4.0 and 5.0, respectively. Logs of the test borings are presented in **Appendix A** of this report; laboratory test results are presented in **Appendix B**. Subsurface conditions encountered by the investigation are discussed in Section 6.0, while Section 7.0 summarizes our conclusions and recommendations regarding these conditions relative to the use of bore and HDD techniques. Limitations and a list of reference documents are presented in Sections 8.0 and 9.0, respectively.

The Site is located within Transco's existing pipeline right-of-way and adjacent to a stream (with stream ID MI-5001), approximately 1,300 feet east of Westminster Boulevard near Parlin, New Jersey. **Figures 2** and **3** show site photos and test boring locations, respectively.

Ground surface is generally flat and covered with vegetation. The Site consists of wetland area, wetland transition area and riparian zone.

3.1 SURFICIAL GEOLOGY

The surficial material at the Site is Quaternary (Holocene) alluvium. Alluvium may contain sand, silt, pebble gravel, minor clay and peat.

3.2 BEDROCK GEOLOGY

The underlying bedrock at the Site consists of unconsolidated Cretaceous material. The uppermost Cretaceous unit near the surface here is the Amboy Stoneware Clay member of the Magothy Formation. This unit is described as clay and silt, dark gray to grayish-brown, weathering to white; carbonaceous and micaceous, with grayish-oink fine quartz sand laminae. It can be as thick as 30 feet, although thickness can vary along strike.

Subsurface conditions at the Site were explored by completing two test borings, designated as Borings B-1 and B-2, at the approximate locations shown on **Figure 3**. Borings B-1 and B-2 were completed south and north of the stream, respectively.

Prior to initiating the test boring work, AECOM completed a utility notification through the New Jersey One Call System to provide for mark-out of any known public utilities. Transco performed all necessary landowner notifications and coordination.

Transco designated the test boring locations and specified the boring depths. Transco also surveyed and staked-out the test boring locations prior to drilling. The test borings were completed by Uni-Tech Drilling Co., Inc. of Franklinville, New Jersey under subcontract to AECOM on April 26, 2016. The borings were completed using a track-mounted CME-55 drill rig. Logs of the completed test borings are presented in **Appendix A**.

Each of the two test borings was completed to a termination depth of approximately 40 feet below existing ground surface (bgs). The test borings were advanced using hollow-stem auger drilling techniques.

Within each test boring, representative samples were collected from the encountered soils using a 24-inch-long split-spoon sampler (2-inch O.D.) driven with a 140-pound hammer freely falling 30 inches in accordance with ASTM D-1586 ("Penetration Test and Split-Barrel Sampling of Soils"). Split-spoon samples were collected continuously to a depth of 12 feet bgs and at approximate 5-foot depth intervals thereafter. The collected split-spoon samples were preserved and labeled in accordance with industry standards. Split-spoon jar samples were subsequently transported to the AECOM geotechnical laboratory in Conshohocken, Pennsylvania for further examination and testing.

Groundwater levels were measured inside augers during the drilling and recorded on the boring logs presented in **Appendix A**.

Upon completion, each boring was backfilled with a cement-bentonite grout to within approximately 18 inches of the original ground surface as an environmental safeguard. The remaining 18 inches were then backfilled with drill cuttings containing native soil material. The grout was placed using a tremie pipe placed at the bottom of the borehole. Excess drill cuttings were thin spread around each borehole. All field activities were completed under the full-time technical supervision of an AECOM field representative.

Laboratory testing was completed on representative samples of the encountered soil materials. Results of the testing program are presented in **Appendix B** of this report.

Selected split-spoon soil samples were tested for physical properties including natural moisture content (ASTM D2216) and grain-size distribution (ASTM D422) to assist in classifying the encountered soils and evaluating stratigraphical continuity. A table summarizing the soil testing results for these soil samples is presented on page B-1. Grain-size distribution curves are presented on pages B-2 through B-5.

Distinct soil strata and apparent stratigraphical conditions, as inferred by the encountered materials, are presented on the Inferred Geologic Profile of **Figure 3**. Encountered soil and stratigraphical conditions are consistent with the regional geology described in Section 3. Detailed soil descriptions presented on the boring logs of **Appendix A** are summarized below (presented in order of increasing depth):

6.1 STRATUM 1: ALLUVIUM – MEDIUM DENSE TO VERY DENSE SILTY SAND

Medium dense to very dense silty sand was encountered within the upper 13 feet of borings B-1 and B-2. Standard penetration resistance (or N-) values range from 4 to 28 blows per foot (bpf) in the Stratum 1 soils. No gravel was encountered in this stratum.

6.2 STRATUM 2: ALLUVIUM – VERY LOOSE TO MEDIUM DENSE SILTY SAND WITH GRAVEL

Stratum 2 consists predominately of very loose to medium dense silty sand containing gravel. This unit was observed to be approximately 5 feet thick at borings B-1 and B-2. N-values range from 2 to 7 bpf in the Stratum 2 soils. Gravel content ranges from approximately 4 to 7 percent.

6.3 STRATUM 3: ALLUVIUM – VERY LOOSE TO MEDIUM DENSE SILTY SAND

Stratum 3 consists predominately of very loose to medium dense silty sand. This unit was observed to be approximately 10 feet thick at boring B-1 and approximately 15 feet thick at boring B-2. N- values range from 3 to 16 bpf in the Stratum 3 soils. No gravel was encountered in this stratum.

6.4 STRATUM 4: ALLUVIUM – VERY DENSE SILTY SAND

Very dense silty sand was encountered deeper than approximately 28 feet bgs at boring B-1 and deeper than approximately 33 feet bgs at boring B-2. N-values range from 49 bpf to 88 blows per 11 inches of sampling tool advancement. No gravel was encountered in this Stratum.

6.5 GROUNDWATER

Groundwater levels were measured inside the augers during drilling and recorded on the boring logs presented in **Appendix A**. At boring B-1, groundwater level was measured approximately 11 feet bgs with approximate elevation of 8. At boring B-2, groundwater level was measured approximately 5 feet bgs with approximate elevation of 11. It should be noted that groundwater levels are subject to change due to seasonal conditions and man-made influences.

The geotechnical investigation completed at the Site has provided valuable information regarding subsurface conditions that would be encountered during the planned pipeline crossing of the stream. This investigation work included test borings, laboratory testing of the encountered soil materials, and a general evaluation of the resulting geotechnical database relative to conventional jack and bore (J&B) and HDD techniques. Our conclusions and recommendations relative to these techniques are presented below.

7.1 CONVENTIONAL JACK AND BORE

Findings of our work indicate that a J&B pipeline installation beneath the stream would encounter predominantly very loose to very dense silty sands. The following items should be considered in evaluating and designing for the use of J&B techniques to accomplish the planned stream crossing:

- Conventional J&B utilizes an open-faced auger and pipe jacking system. This method is typically used for crossings below roadways and railroads that are often supported on soil embankment above the original ground surface. The J&B methods are generally more successful where installation is above the groundwater level. As described in Section 6.5, groundwater level was measured approximately 11 and 5 feet bgs within borings B-1 and B-2, respectively. Considering the boring locations are located on either side of stream bank, the J&B pipeline profile as well as entry and exit pits will be located below the existing groundwater level, which will therefore require significant construction dewatering using a pump and sump during entry/exit pit excavations as well as the J&B operation.
- Significant potential exists for the saturated, non-cohesive, loose sandy soils to have very low shear strength and thus flow through the open-face of the auger cutting tool. This condition creates a safety risk to workers in the jacking pit and could lead to loss of the stream flow and collapse of the stream bed.
- Temporary excavations required for J&B equipment access and set-up should be planned and executed so as not to disturb existing Transco pipelines or structures, if any. Sheeting and shoring of deeper excavations, if required, should be considered to reduce groundwater infiltration (therefore minimize construction dewatering) and excavation quantities. Temporary excavation sideslopes and any sheeting and shoring should be designed and constructed by a specialty contractor and should conform to the federal OSHA requirements of 29 CFR 1926 and any local requirements. The stability of temporary excavation sideslopes, as well as the safety of personnel working within excavations, should be made the sole responsibility of the J&B contractor.
- The J&B entry and exit pits will likely be within or near a wetland area. The J&B contractor should develop and submit to Transco for approval a work plan that addresses the project constraints and permits/approvals associated with these features as well as those measures that will limit the potential for ground disturbance.

7.2 HDD TECHNIQUES

An HDD pipeline installation beneath the stream would encounter predominantly very loose to very dense silty sands. The following items should be considered in evaluating and designing for the use of HDD techniques to accomplish the planned stream crossing:

- The soil type (texture) and density conditions of the sand strata could vary with depth and over relatively short distances as the HDD pilot-hole or borehole reaming is advanced. Accordingly, because the borehole drill stem will naturally follow the path of least resistance, the drill stem may have a tendency to deviate from the planned alignment at the interface of soils possessing significantly different texture or density condition. Steering of the drill stem may also become more difficult in the relatively loose soil of Stratum 2 and Stratum 3 due to the sinking of the HDD drill head. This condition can be corrected once in more stable soil stratum, but it should be noted that the alignment might well be lost in the loose sand stratum. This may become particularly difficult when trying to exit, where upward steering becomes difficult because of the sinking drill head in the loose material.
- As most of the HDD profile will be below the existing groundwater level, a carefully designed and implemented drilling fluid program will be especially important to maintain appropriate mud pressures to keep the HDD borehole open and to counteract groundwater pressures that will be encountered in the borehole. In addition, the program must be capable of preventing a build-up of drill cuttings within the HDD borehole that could lead to a loss of circulation and, consequently, unplanned migration or release ('frac-out') of drilling fluid during HDD operations. As the Stratum 2 and Stratum 3 sand is in 'very loose' to 'loose' consistency, this should be considered a significant project risk. The drilling fluid program should be implemented such that HDD pilot-hole and reaming operations are consistent with the rate at which drill cuttings can be removed and the drilling fluid cleaned for re-use or otherwise removed and disposed off-site. Monitoring of drilling fluid quality by a qualified representative of the HDD contractor will be crucial to successful borehole installation. The contract documents should therefore require the HDD contractor to submit a detailed drilling fluid program (addressing the shallow groundwater conditions) including supporting calculations and quality control procedures and testing, for review and acceptance by Transco prior to the start of HDD operations.
- All encountered subsurface strata were found to be non-cohesive and sandy and therefore susceptible to cave-in during HDD operations. Implementation of a carefully designed drilling fluid program and best management practices should limit the potential for these soils to collapse during the HDD pilot-hole or reaming operations and subsequent carrier pipe 'pullback'. If the drilled hole were to cave in around the carrier pipe during 'pullback', the frictional resistance on the carrier pipe may increase as it is pulled through the completed HDD borehole. These conditions are more likely to develop where advancement of the carrier pipe is temporarily halted (e.g., to allow additional pipe length to be welded and tested). Accordingly, design of the HDD pipeline installation should allow for the carrier pipe to be pulled as a single unit.
- Temporary excavations required for HDD equipment access and set-up should be planned and executed so as not to disturb existing Transco pipelines or structures, if any. Sheeting and shoring of deeper excavations, if required, should be considered to reduce groundwater infiltration (therefore minimize construction dewatering) and excavation quantities.

Temporary excavation sideslopes and any sheeting and shoring should be designed and constructed by a specialty contractor and should conform to the federal OSHA requirements of 29 CFR 1926 and any local requirements. The stability of temporary excavation sideslopes, as well as the safety of personnel working within excavations, should be made the sole responsibility of the HDD contractor.

- The HDD entry and exit pits will likely be within or near a wetland area. The HDD contractor should develop and submit to Transco for approval a work plan that addresses the project constraints and permits/approvals associated with these features as well as those measures that will limit the potential for ground disturbance

7.3 OPEN-CUT TECHNIQUES

Due to the presence of existing wetlands and riparian zone at the Site, we understand that Transco will not consider open-cut techniques as an alternative unless trenchless pipeline installation techniques become infeasible due to site conditions.

7.4 BOUYANCY

The pipeline, once installed, may extend below the groundwater table and should therefore be designed to resist uplift forces associated with buoyancy. All permanent below-grade construction should therefore be designed and constructed to resist buoyancy forces assuming that groundwater at the Site is located at elevation 11.

7.5 CONSTRUCTION DEWATERING

Temporary construction dewatering may be necessary to facilitate a temporary pit excavation and to maintain dry conditions within the pit during pipeline installation. All dewatering fluids should be properly managed. As described above, sheeting and shoring (e.g., sheetpiling), if implemented to facilitate the temporary pit excavation, would significantly reduce the required volume of construction dewatering.

Construction dewatering analysis may need to be completed to estimate (1) dewatering (pumping) rate, (2) radius of (drawdown) influence (ROI), and (3) factor-of-safety against uplift within the pit bottom.

7.6 WORKER HEALTH AND SAFETY

Based on our field screening (organic vapor monitoring) conducted during the drilling operation using a MiniRAE PID monitor, no exceedance of background levels and no evidence of soil contamination were observed.

The geotechnical investigation work completed by AECOM for this project was performed in accordance with the standard of care for geotechnical engineering. No warranty or guarantee, either written or implied, is applicable to this work. The findings, conclusions and recommendations presented in this report are based on the assumption that the subsurface conditions do not deviate appreciably from those disclosed by the test borings and are subject to confirmation or revision upon review by AECOM of the final plans and specifications covering pertinent details of the proposed construction. The conclusions and recommendations are also based on the premise of competent field engineering, monitoring and testing during construction.

This report has been prepared solely for use by Transcontinental Gas Pipe Line Company, LLC for the design of this particular project. Any reuse of this report, particular by third parties, without the expressed permission of AECOM is solely at their own risk.

1. Stanford, S.D. 1995. Surficial Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey. New Jersey Geological Survey Open File Map OFM 18.
2. Sandberg, S.K., D. W. Hall, J.M. Gronberg, and D.L. Pasicznyk. 1996. Geophysical investigation of the Potomac-Raritan-Magothy aquifer system and underlying bedrock in parts of Middlesex and Mercer Counties, New Jersey. New Jersey Geological Survey. Geological Survey Report GSR 37.
3. Sugarman, P.J., S.D. Stanford, J.P. Owens, and G.J. Brenner. 2005. Bedrock Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey. New Jersey Geological Survey Open File Map OFM 65.

TABLE 1
Summary of Test Borings
Lower New York Bay Lateral Replacements - Proposed Stream Crossing
Middlesex County, New Jersey

Boring No.	Termination Depth (ft)	Soil Boring (ft)	Rock Coring (ft)	Ground Surface Elevation (ft)	Approximate Bottom-of-Boring Elevation (ft)
B-1	39.4	39.4	0.0	18.8	-20.6
B-2	39.4	39.4	0.0	15.8	-23.6
TOTAL	**78.8**	**78.8**	**0.0**		

TABLE 2

Summary of Groundwater Level Information

Lower New York Bay Lateral Replacements - Proposed Stream Crossing

Middlesex County, New Jersey

Boring No.	Groundwater Encountered During Boring	Estimated Groundwater Depth (ft)	Estimated Groundwater Elevation (ft)	Notes
B-1	Yes	10.8	8.0	Measured Inside Augers
B-2	Yes	5.0	10.8	Measured Inside Augers

Figure 1 – Site Location Map

Lower New York Bay Lateral Replacements – Proposed Stream Crossing
Middlesex County, New Jersey

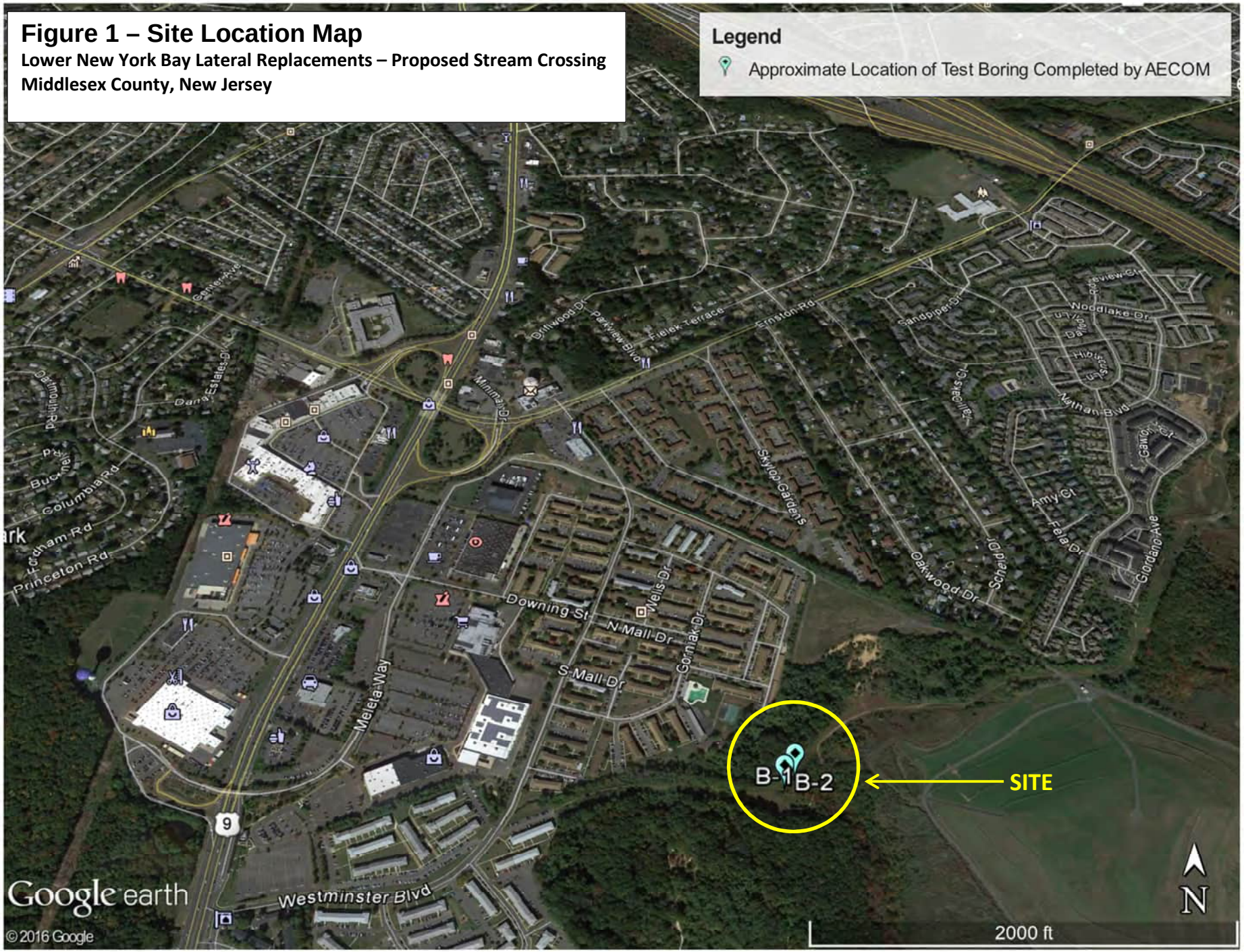
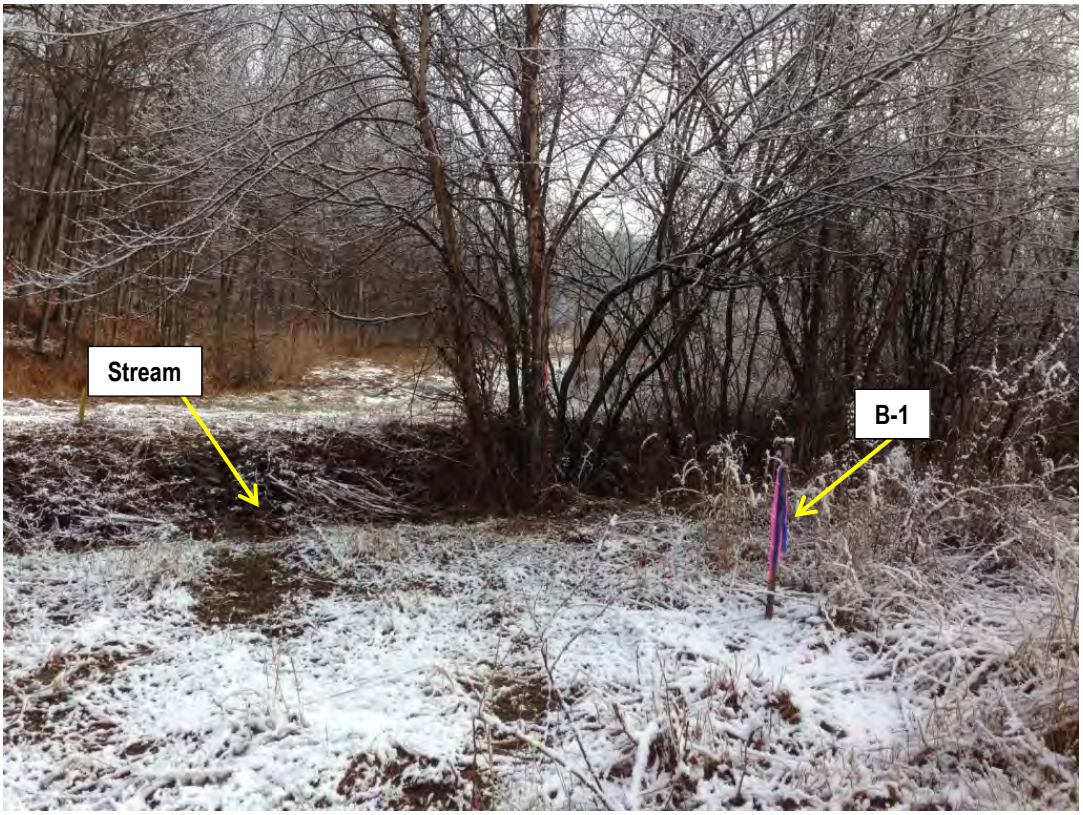
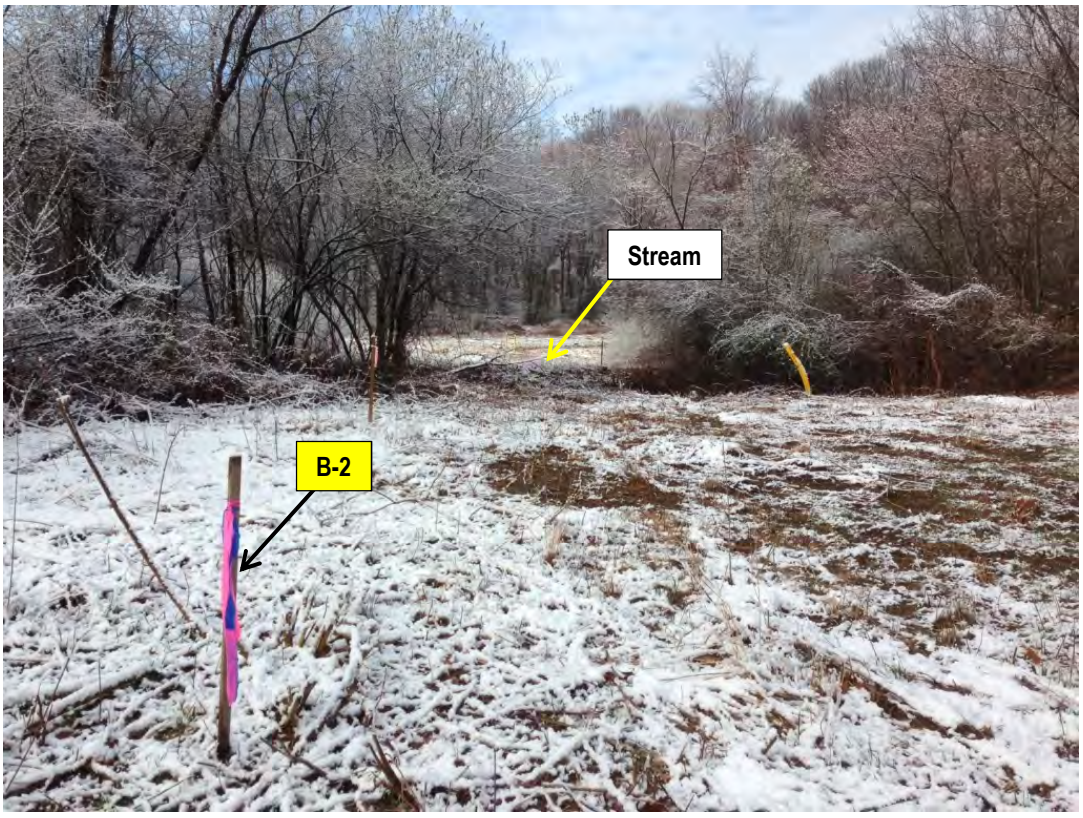


FIGURE 2 – SITE PHOTOS

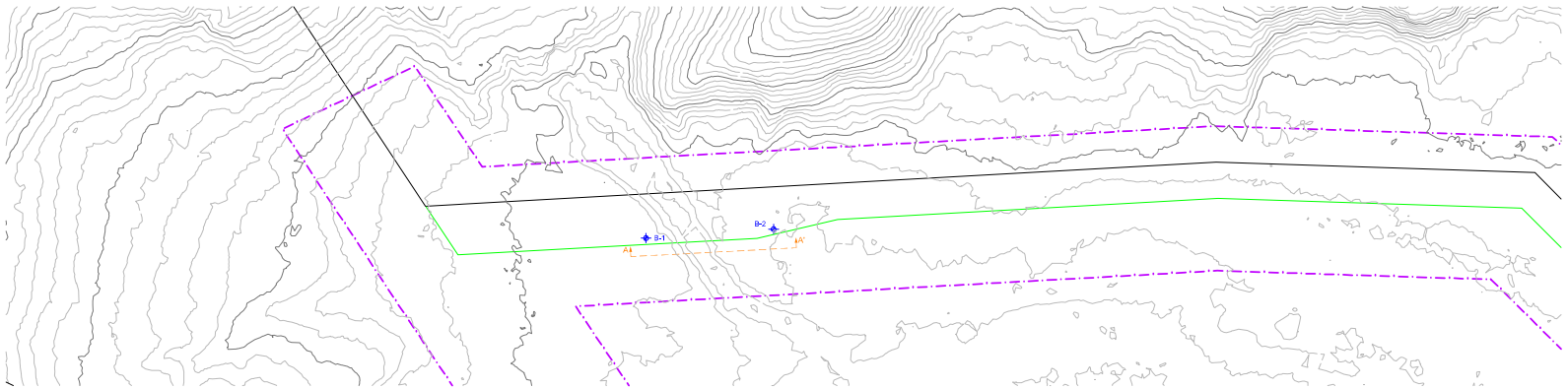
Lower New York Bay Lateral Replacements - Proposed Stream Crossing
Middlesex County, New Jersey



Looking North



Looking South

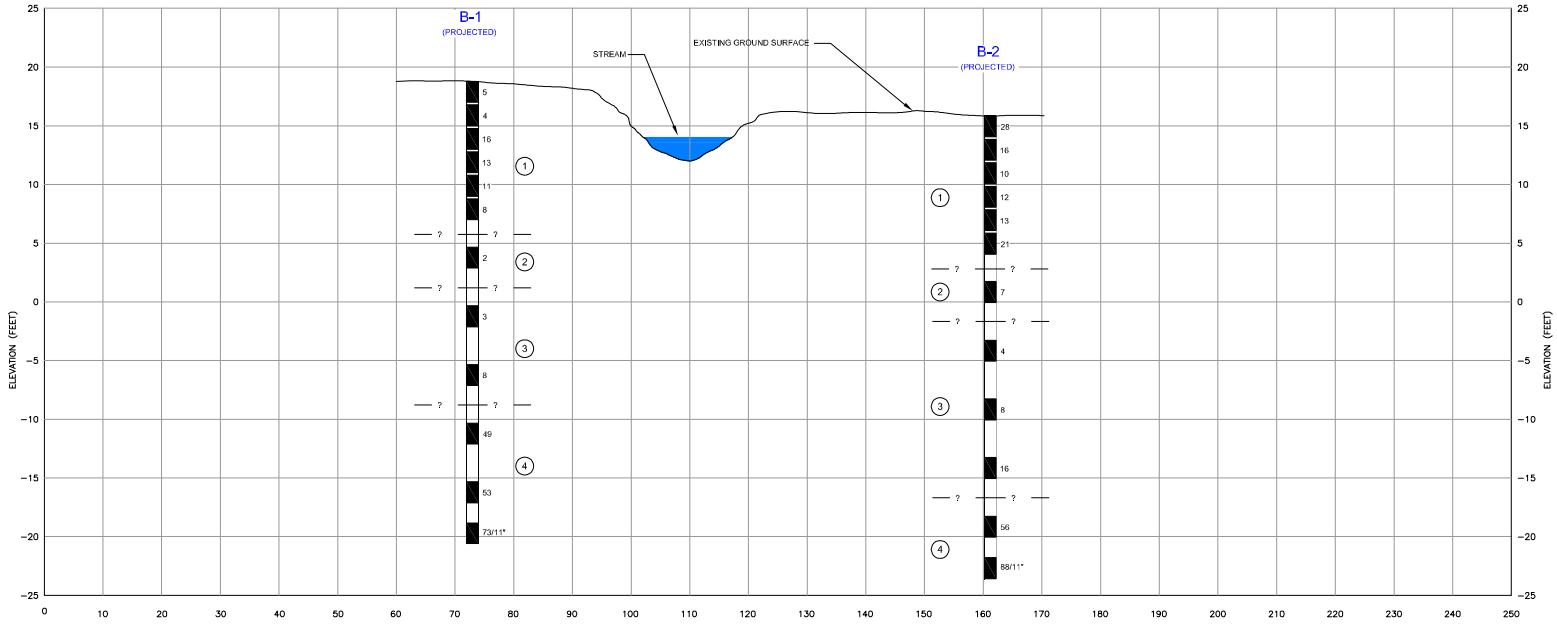


PLAN VIEW

GRAPHIC SCALE IN FEET

A

A'



PROFILE VIEW

GRAPHIC HORIZONTAL SCALE IN FEET

GRAPHIC VERTICAL SCALE IN FEET

LEGEND

- PROPOSED PIPELINE
- EXISTING PIPELINE
- A' — SUBSURFACE PROFILE LINE
- B-1 — APPROXIMATE LOCATION OF TEST BORING COMPLETED BY AECOM
- 5 — SPLIT-SPOON SAMPLING INTERVAL WITH CORRESPONDING STANDARD PENETRATION TEST (SPT) RESISTANCE VALUE
- INFERRED STRATIGRAPHIC INTERFACE
- (1) ALLUVIUM – MEDIUM DENSE TO VERY DENSE SILTY SAND
- (2) ALLUVIUM – VERY LOOSE TO MEDIUM DENSE SILTY SAND WITH GRAVEL
- (3) ALLUVIUM – VERY LOOSE TO MEDIUM DENSE SILTY SAND
- (4) ALLUVIUM – VERY DENSE SILTY SAND

BORING LOCATION PLAN NOTES:

1. BASE MAP PROVIDED BY TRANSCO.

INFERRED GEOLOGIC PROFILE NOTES:

1. THIS PROFILE IS INTENDED TO SERVE AS AN AID IN VISUALIZING CONTINUITY OF SOIL CONDITIONS INFERRED FROM BORING AND LABORATORY DATA. ALL INFORMATION IS INFERRED.
2. GROUND SURFACE ELEVATION AT EACH BORING LOCATION WAS PROVIDED BY TRANSCO.
3. BORINGS B-1 AND B-2 WERE COMPLETED ON APRIL 26, 2016

REV. NO.	DATE	DESCRIPTION	DRWN. BY	DESN. BY	CHKD. BY	APPRV BY
0	5/19/16	ISSUED FOR CLIENT USE	JES	CWK	CWK	JAC

THIS PROJECT DOCUMENT IS PROVIDED FOR THE USE AND CONVENIENCE OF THE RECIPIENT ONLY AND SHALL NOT BE COPIED OR TRANSFERRED TO ANY OTHER PARTY WITHOUT THE EXPRESS WRITTEN CONSENT OF AECOM. AECOM WILL NOT BE RESPONSIBLE FOR SUBSEQUENT CHANGES TO THIS DOCUMENT, UNLESS THE CHANGES ARE MADE BY AECOM OR WITH WRITTEN AUTHORIZATION FROM AECOM.

AECOM
625 WEST RIDGE PIKE, SUITE E-100
CONSHOHOCKEN, PA 19428
(610) 832-3500 FAX (610) 832-3501

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
LOWER NEW YORK BAY EXPANSION
LATERAL REPLACEMENTS
MIDDLESEX COUNTY, NEW JERSEY

PROPOSED STREAM CROSSING
BORING LOCATION PLAN AND INFERRED GEOLOGIC PROFILE A-A'

JOB NO. 60492180.00003
REVISION 0
DRAWING NO. FIGURE 3
SHEET: 1 of 1

Drawn By & Date/Time: joseph_shell Jun 30, 2016 - 12:03pm
Drawing Location & Name: S:\Projects\Private-Sector\Wms_Pipeline\60492180_LNYB Creek Crossing_Newjob\CAD_Plan & Profile 5-19-16.dwg

URS

GEOTECHNICAL INVESTIGATION – PROPOSED PIPELINE CROSSING

MORGAN REPLACEMENT – CROSSWAY CREEK CROSSING

MIDDLESEX COUNTY, NEW JERSEY

October 10, 2006

Prepared For: Williams Gas Pipeline

URS Corporation
335 Commerce Drive, Suite 300
Fort Washington, PA 19034-2623
19996375.00003

TABLE OF CONTENTS

Section 1 Project Description 1-1

Section 2 Site Conditions 2-1

Section 3 Geologic Setting 3-1

3.1 REGIONAL AND LOCAL GEOLOGY 3-1
3.2 REGIONAL HYDROGEOLOGY 3-1

Section 4 Field Exploration 4-1

Section 5 Laboratory Testing 5-1

Section 6 Subsurface Conditions 6-1

6.1 STRATUM 1: MORGAN BEDS 6-1
6.2 STRATUM 2: AMBOY STONEWARE CLAY MEMBER 6-1
6.3 STRATUM 3: OLD BRIDGE SAND MEMBER 6-1
6.4 GROUNDWATER 6-1

Section 7 Conclusions and Recommendations 7-1

HDD TECHNIQUES 7-1
OPEN-CUT TECHNIQUES 7-2
SUMMARY 7-4

Section 8 Limitations 8-1

Section 9 References 9-1

Figures

Figure 1 Regional Location Map

Figure 2 Boring Location Plan and Inferred Geologic Profile A – A'

Figure 3 Inferred Geologic Profile B – B' and Open-Cut Cross-Section

Appendices

Appendix A Test Boring Logs

Appendix B Results of Laboratory Testing

Attachment

Attachment A Supplemental Groundwater Investigation Report

Williams is planning to complete installation of a new 42-inch gas transmission pipeline in conjunction with its Leidy to Long Island Expansion project. Installation of the new pipeline will require crossing the Crossway Creek near South Amboy, Middlesex County, New Jersey. This stream crossing is associated with the Morgan Replacement project of the expansion project. Figure 1 shows the regional location of the project site.

Williams is presently evaluating open-cut and horizontal directional drilling (HDD) techniques to accomplish the stream crossing. Based on preliminary plan/profile information provided by Williams, pipeline depths utilizing HDD techniques would range up to 70 feet below existing ground surface (bgs) at the Crossway Creek crossing. Pipeline depths associated with open-cut techniques would extend up to approximately 10 feet below the stream bottom.

Subsurface information is required by Williams to evaluate/select appropriate installation techniques and complete the crossing design. Accordingly, the purpose of our geotechnical investigation work was to explore subsurface conditions and evaluate open-cut and HDD techniques for this crossing site. The scope of work was completed in accordance with our proposal dated June 2, 2005 and generally included field exploration, laboratory testing, data evaluation and project reporting.

Sections 2.0 and 3.0 of this report summarize the site conditions observed at the time of our investigation and the geologic setting of the site based on available literature. Descriptions of the field exploration and laboratory testing programs are presented in Sections 4.0 and 5.0, respectively. Logs of the test borings are presented in Appendix A of this report; laboratory test results are presented in Appendix B. Subsurface conditions encountered by the investigation are discussed in Section 6.0, while Section 7.0 summarizes our conclusions and recommendations regarding these conditions relative to the use of open-cut and HDD techniques. Limitations and a list of reference documents are presented in Sections 8.0 and 9.0, respectively.

The site consists of an approximately 1,860-foot section of a proposed 42-inch diameter pipeline situated at the crossing of Crossway Creek and adjacent properties near South Amboy, Middlesex County, New Jersey. Figure 2 shows the potential alternative pipeline crossing alignments associated with HDD and open-cut installation techniques. Pipeline profiles associated with HDD and open-cut techniques are shown in Figures 2 and 3.

Ground topography along the planned crossing alignment is relatively flat to mildly sloping, with elevations ranging between 4 and 9. The project site is bounded by a small wetland area, residential housing and Gondek Road to the west and undeveloped, generally open ground to the east. A large wetlands area associated with the Crossing Creek covers much of the project site except for the Lockwood Marina, which occupies the eastern portion of the site. Phragmites and other wetland plants predominate the wetland area. Multiple buildings, structures and stone-covered roads and boat maintenance areas cover the marina area.

Crossway Creek flows in a southerly direction through the middle of the site and measures approximately 40 feet in width. The creek is connected to the surface water body located approximately 1,200 feet southeast of the marina which ultimately flows into the Raritan Bay located approximately one mile northeast of the site. Crossway Creek is therefore subject to tidal fluctuation.

3.1 REGIONAL AND LOCAL GEOLOGY

The site is situated within the northern Coastal Plain and based on available literature, is underlain by the Magothy Formation (U.S.G.S., 1995). The Magothy Formation consists, in order of increasing depth, of the Cliffwood Beds, the Morgan Beds, the Amboy Stoneware Clay Member, the Old Bridge Sand Member, and the South Amboy Fire Clay Member of Upper Cretaceous Santonian age (U.S.G.S., 1995).

The Cliffwood Beds are typically very sandy and horizontally bedded to cross-bedded. Thin layers of dark carbonaceous and micaceous matter are interbedded with the less micaceous sands. Sands are typically fine to medium-grained. A pale gray clay-silt layer measuring about 5 feet thick occurs in the lower section. The Cliffwood Beds are reported to measure approximately 25 feet thick in outcrop (U.S.G.S., 1995).

The Morgan Beds consist of horizontally interbedded, thin, dark clays and light-colored, fine-grained micaceous sands that grade downward into the underlying Amboy Stoneware Clay Member. The clay unit is mainly dark gray interbedded clay and silt to fine-grained quartz sand. The clays have abundant, finely pulverized, carbonaceous matter and fine mica flakes. The Amboy Stoneware appears to lie disconformably on the underlying sand (U.S.G.S., 1995).

The Old Bridge Sand Member is a dominantly light-colored, loose sand that is extensively cross-bedded and locally interbedded with dark gray laminae. The underlying South Amboy Fire Clay Member is the basal member of the Magothy Formation. In some respects, this unit resembles the Amboy Stoneware Clay Member, particularly in its lensing character. The South Amboy Fire Clay typically is a dark, massive to finely laminated clay and locally oxidized to white or red. The clay is interbedded with fine to medium-grained, cross-bedded sands. The basal contact with the underlying Raritan Formation is well exposed in the Sayre and Fisher Pit in Sayreville where the contact is physically marked by a deeply weathered gravel zone (U.S.G.S., 1995).

3.2 REGIONAL HYDROGEOLOGY

The project site is located within the area of the Old Bridge aquifer of the Potomac-Raritan-Magothy aquifer system and approximately ½ mile south of the Old Bridge aquifer outcrop area (USGS, 1981). This aquifer is upper Cretaceous in age and would be stratigraphically equivalent to the Magothy Formation (USEPA, 1988). The Old Bridge aquifer consists primarily of sand, with locally thin, irregular clay beds. The aquifer is confined by the overlying Merchantville-Woodbury confining unit.

Natural recharge to the Potomac- Raritan-Magothy confined aquifer system is primarily by vertical leakage from the upper layers. Only a small percentage of the water within the unconfined ground water system leaks to the confined aquifers; but over a large area and a long period of time, the amount of water transmitted can be significant (USEPA, 1988).

Fresh, uncontaminated groundwater in the New Jersey Coastal Plain is typically low in dissolved solids. Calcium and bicarbonate are usually dominant ions in solution with smaller amounts of sodium, potassium, magnesium sulfate and chloride. Locally, concentrations of iron and

manganese may be a problem near the water table because the ground water tends to have low pH (USEPA, 1988). Historically, no significant quantities of heavy metals, pesticides, organics or coliform bacteria have been found in the artesian aquifers. Except for specific parameters (e.g., iron) and contamination incidents, water quality in the artesian groundwater system meets or exceeds Federal and State drinking water standards (USEPA, 1988). However, the quality of ground water in the outcrop area is variable and depends on local conditions at land surface. In addition, according to Pucci, (Pucci, *et al.* 1989), the project site is approximately 2 miles away from a saltwater intrusion area having chloride concentrations of 250 mg/L or greater.

Subsurface conditions at the site were explored by completing three test borings, designated as Borings B-1, B-2 and B-3, at the approximate locations shown on Figure 2. Boring B-1 was completed approximately 600 feet west of Crossway creek, beyond the western edge of the large wetland area, close to the eastern shoulder of Gondek Road. Boring B-2 was completed approximately 350 feet east of Crossway Creek, beyond the eastern edge of the wetland area, on a narrow berm that defines the western edge of the Lockwood marina property. B-3 was completed at the eastern edge of the marina yard.

Prior to initiating the test boring work, URS completed a utility notification through the New Jersey One Call System to provide for mark-out of any known public utilities. URS also obtained boring and monitoring well permits required for the field work. Williams performed all necessary landowner notifications and coordination.

Williams concurred with the test boring locations recommended by URS and specified the boring depths. Williams also surveyed and staked-out the test boring locations prior to drilling. The test borings were completed by Uni-Tech Drilling Co., Inc. (Uni-Tech) of Franklinville, New Jersey under subcontract to URS between June 15 and 17, 2005. The borings were completed using a truck-mounted Fountain 15 drill rig. Logs of the completed test borings are presented in Appendix A.

Each of the three test borings was completed to a termination depth of 100 feet below existing ground surface (bgs). The test borings were advanced using mud rotary drilling techniques. A bentonite-based drilling mud was used to flush cuttings and maintain adequate pressure for sidewall stability within each borehole.

Within each test boring, representative samples were collected from the encountered soils using a 24-inch-long split-spoon sampler (2-inch O.D.) driven with a 140-pound hammer freely falling 30 inches in accordance with ASTM D-1586 ("Penetration Test and Split-Barrel Sampling of Soils"). Split-spoon samples were collected continuously to a depth of 10 feet bgs and at approximate 5-foot depth intervals thereafter. Relatively undisturbed samples of cohesive, fine-grained soils were also collected using thin-walled (Shelby) tube sampling techniques in accordance with ASTM D-1587. The collected split-spoon and Shelby tube samples were preserved and labeled in accordance with industry standards. Split-spoon jar samples and Shelby tubes were subsequently transported to the URS geotechnical laboratory in Fort Washington, Pennsylvania for further examination and testing.

For measuring depth to groundwater, a temporary piezometer consisting of 2-inch PVC pipe (with 10 feet screen and 35 feet riser pipe) was installed at the bottom of the completed Boring B-1. The temporary piezometer was installed on the first day of drilling activities and removed on the final day of field work prior to borehole backfilling.

Artesian groundwater conditions were observed in the temporary piezometer at 24 and 48 hours following installation. As additional groundwater information was needed to better understand these conditions and their potential effects on the planned pipeline installation, URS proposed and installed supplemental groundwater-monitoring wells to obtain groundwater flow and potentiometric head data. Well construction, field measurements and tests, engineering analyses, findings and conclusions are presented in a separate letter report, which is provided in Attachment A.

Upon completion (or after temporary piezometer removal), each boring was backfilled with a cement-bentonite grout to within approximately 18 inches of the original ground surface as an environmental safeguard. The remaining 18 inches were then backfilled with drill cuttings containing native soil material. The grout was placed using a tremie pipe placed at the bottom of the borehole. Excess drill cuttings from all three borings were containerized into drums, staged at the Boring B-1 location, and transported off-site for proper disposal by Williams. All field activities were completed under the full-time technical supervision of a URS field representative.

Laboratory testing was completed on representative samples of the encountered soil materials. Results of the testing program are presented in Appendix B of this report.

Selected split-spoon soil samples were tested for physical properties including natural moisture content (ASTM D-2216), grain-size distribution (ASTM D-421/422) and plasticity by Atterberg limits (ASTM D-4318) to assist in classifying the encountered soils and evaluating stratigraphical continuity. A table summarizing the soil testing results for these soil samples is presented on pages B-1 and B-2. Grain-size distribution curves are presented on pages B-3 through B-7.

Unconfined compressive strength testing (ASTM D-2166) and companion physical properties testing were also completed on two relatively undisturbed (Shelby tube) samples consisting of cohesive, fine-grained soils. Results of this strength testing are presented on pages B-8 and B-9.

Distinct soil strata and apparent stratigraphical conditions, as inferred by the encountered materials, are presented on the Inferred Geologic Profile of Figure 2. Encountered soil and stratigraphical conditions are consistent with the lithology of the Magothy Formation. Detailed soil descriptions presented on the boring logs of Appendix A are summarized below (presented in order of increasing depth):

6.1 STRATUM 1: FILL AND UPPER SAND

Fill and sand were encountered within the upper 10 to 17 feet of Borings B-1, B-2 and B-3, consisting predominately of medium dense to very dense, brown to gray silty sand. Trace wood and brick fragments were encountered at Borings B-2 and B-3. An interbedded soft clay layer measuring approximately 6 feet thick was encountered at Boring B-2.

Standard penetration resistance (or N-) values range from 2 to 37 blows per foot (bpf) in the Stratum 1 soils. Gravel content ranges approximately from 3 to 28 percent.

6.2 STRATUM 2: CLAY

Stratum 2 consists predominately of dark gray micaceous fat clay to sandy clay containing trace to some sand. This unit was observed to be approximately 25 feet thick at Borings B-1 and B-2 and 17 feet thick at Boring B-3. Stratum 2 consistently underlies Stratum 1 and is also interbedded as lenses in Stratum 3, the lower sand unit described below.

The silty clay to clayey silt soils of Stratum 2 are typically very soft to soft. N-values typically range from weight-of-rods (WOR) to 3 bpf. Unconfined compressive strength, as measured in the field with a pocket penetrometer, ranged from 0.25 to 0.5 ton per square foot (tsf). Laboratory testing indicates an unconfined compressive strength of approximately 0.3 tsf, which is consistent with the pocket penetrometer values and 'soft' classification. However, interbedded clay units in Stratum 3 typically are very stiff to hard. Similarly, compressive strength of the interbedded clay via pocket penetrometer was also found to be greater than 3.25 tsf. No gravel was observed in this stratum.

6.3 STRATUM 3: LOWER SAND

At all three boring locations, Stratum 2 clay is underlain by predominantly coarse-grained deposits consisting of medium dense to very dense silty sand containing trace gravel. The sand fraction consists of fine to coarse-grained materials. N-values for this unit ranges from 8 to greater than100 bpf. Gravel content was generally less than 2 percent. Interbedded Stratum 2 clay was encountered at 67-82' in Boring B-1, at 52-57' in Boring B-2, and at 74-76' and 97-100' in Boring B-3.

6.4 GROUNDWATER

A temporary piezometer (2-inch PVC pipe, 10-feet screen and 35-feet riser, 8-inch stick-up above ground surface) was placed at the Boring B-1 location. Groundwater was observed overflowing from the top of the piezometer at 24 and 48 hours following installation.

The supplemental wells installed by URS confirmed the artesian conditions within and provided groundwater potentiometric head and flow information for the lower sand of Stratum 3. The artesian conditions encountered in Stratum 3 are believed to be associated with the Old Bridge aquifer, which is reported to exhibit artesian conditions locally due to confining layers of silt and clay. The letter report presented in Attachment A further details the findings of the supplemental well investigation.

The geotechnical investigation completed at the project site has provided valuable information regarding subsurface conditions that would be encountered during the planned pipeline crossing of Crossway Creek. This investigation work included test borings, laboratory testing of the encountered soil materials, engineering analysis, and a general evaluation of the resulting geotechnical database relative to HDD and open-cut techniques. Our conclusions and recommendations relative to these techniques are presented below.

HDD TECHNIQUES

Findings of our work indicate that an HDD pipeline installation beneath the Crossway Creek would encounter predominantly medium dense to dense sands within interbedded very stiff to hard clayey silt to silty clay along the deeper portion of the HDD profile, transitioning to soft clay and dense surficial sandy soils approaching the HDD entry and exit points. The soft clay stratum overlies and confines the deeper sand which contains groundwater under artesian conditions along the entire HDD alignment.

The following items should therefore be considered in evaluating and designing for the use of HDD techniques to accomplish the planned stream crossing:

- The soil type (texture) and density conditions of the shallow (upper) sand, clay and deep (lower) sand strata could vary with depth and over relatively short distances as the HDD pilot-hole or borehole reaming is advanced. Accordingly, because the borehole drill stem will naturally follow the path of least resistance, the drill stem may have a tendency to deviate from the planned alignment at the interface of soils possessing significantly different texture or density condition. Steering of the drill stem may also become more difficult in the soft to very soft clay soil of Stratum 2 due to the sinking of the HDD drill head. This condition can be corrected once in more stable soil stratum, but it should be noted that the alignment might well be lost in the soft clay stratum. This may become particularly difficult when trying to exit, where upward steering becomes difficult because of the sinking drill in the soft material.

- As the deep (lower) sand stratum is under artesian conditions, a carefully designed and implemented drilling fluid program will be especially important to maintain appropriate mud pressures to keep the HDD borehole open and to counteract upper groundwater pressures that will be encountered in the borehole. In addition, the program must be capable of preventing a build-up of drill cuttings within the HDD borehole that could lead to a loss of circulation and, consequently, unplanned migration or release ('frac-out') of drilling fluid during HDD operations. As the Stratum 2 clay is in 'very soft' to 'soft' consistency, this should be considered a significant project risk. As a contingency, the HDD contractor should be prepared to install casing at the entry and exit pit locations in the event drilling fluid cannot maintain hole stability in the Stratum 1 fill/sand or Stratum 2 soft clay soils. (Additional evaluation would be necessary to better understand the presence of the soft to very soft Stratum 2 clay on the potential for, e.g., factor-of-safety against, the inadvertent release of drilling mud. Such evaluation should also be helpful in assessing the possible need for casing the HDD borehole near the ground surface.) The drilling fluid program should be implemented such that HDD pilot-hole and reaming operations are consistent with the rate at which drill cuttings can be removed and the drilling fluid cleaned for re-use or otherwise removed and disposed off-site. Monitoring of drilling fluid quality by a qualified

representative of the HDD contractor will be crucial to successful borehole installation. The contract documents should therefore require the HDD contractor to submit a detailed drilling fluid program (addressing the artesian conditions) including supporting calculations and quality control procedures and testing, for review and acceptance by Williams prior to the start of HDD operations.

- The shallow (upper) and deep (lower) sand stratum were found to be typically non-cohesive and sandy and therefore susceptible to cave-in during HDD operations. Implementation of a carefully designed drilling fluid program and best management practices should limit the potential for these soils to collapse during the HDD pilot-hole or reaming operations and subsequent carrier pipe 'pullback'. If the drilled hole were to cave in around the carrier pipe during 'pullback', the frictional resistance on the carrier pipe may increase as it is pulled through the completed HDD borehole. Similarly, the clay of Stratum 2 and interbedded clayey silt/silty clay of Stratum 3 may have the potential to create adhesive (drag) forces on the carrier pipe. These conditions are more likely to develop where advancement of the carrier pipe is temporarily halted (e.g., to allow additional pipe length to be welded and tested). Accordingly, design of the HDD pipeline installation should allow for the carrier pipe to be pulled as a single unit.
- The HDD entry pit is currently planned near a wetland area, residential housing and Gondek Road. The HDD contractor should develop and submit to Williams for approval a workplan that addresses the project constraints and permits/approvals associated with these features as well as those measures that will limit the potential for noise, dust, and vibrations that affect the environment and neighboring properties.
- Temporary excavations required for HDD equipment access and set-up should be planned and executed so as not to disturb existing utilities or structures. Sheeting and shoring of deeper excavations, if required, should be considered to reduce excavation quantities and to limit potential disturbance to adjacent features or structures. Temporary excavation sideslopes and any sheeting and shoring should be designed and constructed by a specialty contractor and should conform to the federal OSHA requirements of 29 CFR 1926 and any local requirements. The stability of temporary excavation sideslopes, as well as the safety of personnel working within excavations, should be made the sole responsibility of the HDD contractor.

OPEN-CUT TECHNIQUES

Findings of our work indicate that an open-cut pipeline installation beneath the Crossway Creek would encounter predominantly Stratum 1 sand and urban fill materials overlying soft to very soft clay soils of Stratum 2.

Conventional open-cut trench construction is accomplished using shored or unshored techniques. The following items should be considered in evaluating and designing for each use of open-cut construction to accomplish the planned stream crossing:

Shored Trenching Techniques (e.g., Sheetpiling)

Williams is considering the use of sheetpiling to accomplish open-cut pipe installation across Crossway Creek. The sheetpiling would be designed and installed to support open-cut trench sidewalls and possibly, to support a work platform for equipment. In this regard, the sheetpiling should be designed to fully consider subsurface soil and groundwater conditions, allowable water level inside sheetpile-trench, 'dead' load such as 'stockpiled' soil weight behind sheetpiles and 'live' load such as the weight of construction equipment and workmen.

Shored trenching techniques typically involve the use of cantilevered, anchored or braced sheetpiling which should consider the following:

- Because the trench area must remain clear to facilitate placement of relatively long lengths of welded carrier pipe, cross-bracing or rakers that would extend across the trench area cannot be used. Accordingly braced sheetpiling is not believed to be feasible.
- Based on the type and density (N-value) characteristics of the soils encountered in the test borings, conventional pile driving techniques (e.g., vibratory hammer) should be adequate for driving steel sheetpiling to refusal depths in the deeper hard/very dense soils expected to range from approximately 50 feet bgs (at Borings B-1 and B-3) to 65 feet bgs (at Boring B-2). The soft adhesive soils of Stratum 2 and underlying medium dense to dense sandy soils through which sheetpiling would penetrate should provide for relatively straightforward sheetpile installation. Additional analyses are necessary to confirm if penetration depths as shallow as 50 feet bgs would provide for adequate structural and external (e.g., overturning) stability of driven steel sheetpiling. If such analyses indicate these penetration depths are not adequate, supplemental anchorage (e.g., 'deadman' anchor with tie-backs, vertical or battered pile anchors) may need to be considered.
- The Stratum 2 clay acts to separate and confine the underlying artesian conditions of Stratum 3 from the overlying Stratum 1 fill/sand. Steel sheetpiling that penetrates through Stratum 2 could therefore create a 'conduit' and groundwater communication between Stratum 1 and 3. In this event, significant groundwater flow could be encountered during open-cut excavation that the contractor should plan to address appropriate work platform inside trench and manage.
- The following soil/geotechnical design parameters should be used for design of temporary sheetpiling:

		Wet Unit Weight (pcf)	Saturated Unit Weight (pcf)	Cu (psf)	C' (psf)	Ø' (deg)
Stratum 1	fill/sand	125	135	--	--	32
Stratum 2	clay	100	120	300	50	18
Stratum 3	sand	130	138	--	--	34

Unshored Trenching Techniques (Unsupported sideslopes)

- Unshored trench construction would require excavating unsupported trench sideslopes that exhibit an acceptable factor-of-safety against slope instability when subjected to site-specific loading conditions. At the creek crossing, such conditions would be associated with saturated soils comprising the trench sidewalls, soil stockpiles, and any water diversion structure necessary to achieve appropriate conditions for the length of trench excavation. In general, installation of an unshored open-cut trench across the creek bottom would require installing a water barrier (e.g., sandbag cofferdam, Porta-Dam) at south side of the trench (i.e., as a barrier to rising tidal water). Partial or complete diversion of tidal water should be feasible but the environmental or ecological affects expected from each option should be considered.
- Once water diversion is in place, the pipeline trench would need to be excavated to provide for stable sideslopes within medium-dense to dense sandy materials and possibly soft clayey soils. Based on our modeling and analysis work, these slopes should be no steeper than 4(H): 1(V). In addition, the excavated soil pile shall be placed no less than 10 feet from the top of the slope. The typical cross-section presented on Figure 3 shows the recommended trench sideslope configuration. (Because the time that the trench would be open is uncertain, drained strength parameters reflecting saturated soil conditions are considered appropriate for trench stability analysis. Undrained strength conditions that would allow for steeper trench sidewalls may develop within finer-grained clayey soils, although only for an indefinite and limited period of time. As such, undrained conditions are not considered appropriate for modeling the trench sidewalls due to the associated risks.)
- Following pipe installation and trench backfilling, restoration of the trench corridor may require placement of stone armor extending across the creek bottom and up each creek bank to the top of bank. Such armoring may be required to prevent downcutting of the backfilled area of the creek bottom and scour the creek bank slopes. The remainder of the backfilled trench outside the creek and within the wetland area, and possibly the creek bank area above the 'bankfull' elevation should be stabilized with vegetation consisting of sprig, staked or potted plantings combined with overseeding to provide a suitable ground cover. Erosion control matting would be placed and maintained over all disturbed areas to minimize the potential for erosion while vegetation becomes established. Additional ecological study and evaluation beyond the scope of this investigation would be needed to identify specific bioengineering methods and planting schemes appropriate for the river crossing site.

SUMMARY

Based on the above conclusions and recommendations presented for HDD and open-cut pipeline installation methods, comparison of these methods may be summarized as follows:

- Pipeline installation using HDD methods to cross the Crossway Creek is expected to be more costly, require a longer timeframe to implement and involve significant project risks that are difficult to quantify (e.g., frac-out' into wetland area) as compared to installation (of similar length) using open-cut techniques. The primary advantage of HDD over open-cut methods is the potential for causing less impact to the creek,

wetlands and its adjacent ecology/environment during pipeline installation beneath the creek, assuming a well-design drilling mud program is implemented for the work.

- Although expected to be less costly and time-consuming to implement than HDD, pipeline installation using open-cut techniques will temporarily affect the creek and adjacent wetland environment, specifically ecological and hydraulic conditions, until complete restoration is achieved. As such, a significant period of time may be required to obtain the necessary environmental permits, which should be considered in the project scheduling.

The geotechnical investigation work completed by URS for this project was performed in accordance with reasonable and accepted engineering practices. No warranty or guarantee, either written or implied, is applicable to this work. The findings, conclusions and recommendations presented in this report are based on the assumption that the subsurface conditions do not deviate appreciably from those disclosed by the test borings and are subject to confirmation or revision upon review by URS of the final plans and specifications covering pertinent details of the proposed construction. The conclusions and recommendations are also based on the premise of competent field engineering, monitoring and testing during construction.

This report has been prepared solely for use by Williams Gas Pipeline for the design of this particular project. Any reuse of this report, particular by third parties, without the express permission of URS is solely at their own risk.

1. U.S. Department of the Interior, U.S. Geologic Survey, Open-File Report 95-253, Geologic Map of New Jersey: Central Sheet, 1995.
2. U.S. EPA, Region 2, New Jersey Coastal Plain Aquifer, May 1988.
3. Amleto A. Pucci, et al., Lead and Cadmium Associated with Saltwater Intrusion in New Jersey Aquifer System, December 1989.
4. F.L. Schaefer, R.L. Walker, Saltwater Intrusion into the Old Bridge Aquifer in the Keyport-Union Beach Area of Monmouth County, New Jersey, US Geological Survey Water-Supply Paper 2184, 1981.

Attachment A

Supplemental Groundwater Investigation Report

September 20, 2005

Mr. Mike Kologinczak
Pipeline Design
Williams Gas Pipeline - Transco
2800 Post Oak Boulevard
Houston, Texas 77056

Subject: Supplemental Groundwater Investigation
Morgan Replacement – Crossway Creek Crossing
South Amboy, Middlesex County, New Jersey
URS Project No. 19996375.00006

Dear Mr. Kologinczak:

URS Corporation (URS) has completed field activities and subsequent analysis and evaluation to better assess groundwater flow characteristics at the subject project site. Figure 1 shows the general site and well locations. The work was completed in accordance with our proposal dated July 14, 2005 and subsequently authorized by Williams Gas Pipeline (Williams) Request for Service (RFS) 500671.

The scope of our work included well installation, field monitoring, laboratory testing and flow analysis and engineering evaluation. We understand the results of this work will be used by Williams to assess the feasibility and complete the design for horizontal directional drilling (HDD) or open-cut techniques to accomplish the planned pipeline crossing at Crossway Creek. Findings of our supplemental investigation indicate the following:

- The deep sand stratum acts as a 'confined aquifer' that exhibits artesian conditions.
- The deep sand stratum appears to be hydraulically communicating, although in a 'damped' manner, with the nearby tidal surface water.
- Although some communication may exist with the nearby Crossway Creek or Marina surface water, groundwater elevations in the shallow sand stratum appear to be only slightly or not affected by tidal fluctuations.
- Estimated permeability coefficients correspond to groundwater inflow rates estimated to range from less than 0.5 to approximately 6 gallons per minute (gpm) per unit length of open-cut trench.
- Potential rate of groundwater discharge from a HDD entry or exit pit primarily depends on various parameters and theoretically could range from more than

200,000 gpm to zero (0). If dikes are built along the perimeter of the pit to be able to contain the mud to El. 8.0 (approximately 2 feet above ground surface), the mud pressure should offset the groundwater pressure inside the borehole and there would be no discharge from the pit. Considering potential flow reduction factors, the actual discharge would be expected to be significantly less than the estimated values above.

Additional discussion regarding the project background, well construction, field measurements and tests, analysis and evaluation, findings and conclusions is presented below.

1. BACKGROUND

In conjunction with the recently completed geotechnical investigation for the Morgan Replacement – Crossway Creek pipeline crossing, URS installed a 45-feet-long temporary well (2-inch PVC pipe) adjacent to boring B-1 to observe depth to groundwater. The URS site representative observed water flowing from the top of the piezometer at 24 and 48 hours after installation.

The apparent artesian condition observed in the temporary well could significantly affect the feasibility of HDD operations that may be used to install the planned pipeline, which would pass through the deep sand stratum. Williams therefore requested URS to obtain additional groundwater information to better understand the apparent artesian condition and its potential affects on the planned pipeline installation. In this regard, URS installed additional groundwater monitoring wells to obtain the necessary flow and potentiometric head data. The pressure head and flow characteristics of groundwater measured within the supplemental wells will assist Williams in assessing the feasibility of horizontal directional drilling (HDD) techniques as well as the expected groundwater inflow rate (and corresponding dewatering requirements) associated with a more shallow open-cut installation.

2. WELL CONSTRUCTION

As shown on Figure 1, URS installed two (2) well clusters, each composed of one shallow (S) well and one deep (D) well, near the locations of borings B-1 and B-2 previously completed at the site. Each cluster includes a shallow well screened within the upper (shallow) sand/fill stratum and a deep well screened within the lower (deep) sand stratum. Accordingly, the wells were designated as B-1S, B-1D, B-2S and B-2D. After completion, each well was developed using a 1-inch submersible pump until turbidity had dissipated in the discharge. Well materials, dimensions and details together with subsurface soil strata are shown on the well logs presented in Appendix A.

Prior to initiating the well installation, URS completed a utility notification through the New Jersey One Call System to provide for mark-out of any known public utilities.

Boring and monitoring well permits were also acquired by URS. Williams performed all necessary landowner notifications/coordination and approved the well locations and depths proposed by URS. Williams also surveyed and staked-out the well locations prior to installation to maintain the necessary setbacks from the existing pipeline and wetlands.

The wells were installed by Uni-Tech Drilling Co., Inc. of Franklinville, New Jersey under subcontract to URS between August 4 and 5, 2005. The two deep wells, B-1D and B-2D, were installed to depths of 47 and 44 feet below existing ground surface (bgs), respectively. The two shallow wells, B-1S and B-2S, were installed to depths of 10 and 19 feet bgs, respectively. The wells were installed using rotary wash boring techniques. To ensure the well screens were set at the proper depths, representative samples were collected from the soils encountered within each deep well using a 24-inch-long split-spoon sampler (2-inch O.D.) driven with a 140-pound hammer freely falling 30 inches in accordance with ASTM D-1586 ("Penetration Test and Split-Barrel Sampling of Soils") that confirmed the depth of each soil stratum. Split-spoon samples were generally collected at approximate 5-foot depth intervals. Excess drill cuttings from the four well locations were containerized into drums and transported to the Williams Linden station by URS. All field activities were completed under the full-time technical supervision of a URS field representative.

3. FIELD MEASUREMENTS, TESTS AND ANALYSIS/EVALUATION

3-1. Groundwater and Surface Water Levels

After installation and development of the wells, groundwater levels were measured and recorded at every 30 seconds during an approximate 72-hour period using a submersible transducer (MiniTROLL) set inside each well. In addition, surface water levels at the Marina were also surveyed at 30-minute intervals during two separate tidal cycles within this 72-hour period to compare to the groundwater levels measured within the wells. URS used a temporary benchmark set by Williams and conventional land surveying techniques to survey the surface water levels.

Groundwater levels measured in all four wells and surface water levels are summarized in Table 1 and plotted together on Figure 2. Groundwater elevation measured in each well versus surface water elevation is shown on Figures 3 through 6.

As shown on Table 1 and Figure 2, the deep sand stratum at the project site reflects confined aquifer (artesian) conditions. As shown on Figure 3 and Figure 5, groundwater level fluctuations in the two deep wells, B-1D and B-2D, are nearly coincident in time with the tidal surface water fluctuations. As shown on Table 1, however, the magnitude of groundwater fluctuation in the deep sand stratum as measured in the two deep wells ranges from only approximately 5 to 9 percent of the overall tidal surface water fluctuation, suggesting a considerable 'damping' effect that is a function of stratum

permeability. As shown on Figure 4 and Figure 6, groundwater levels in the two shallow wells, B-1S and B-2S, appear to be only slightly or not affected by the tidal fluctuations.

3-2. Permeability

A slug test was performed at each well to assist in estimating a range of permeability coefficients for the shallow and deep sand strata. During a slug test, the rate at which water in the well falls (as it drains back into the stratum) or rises (as it drains from the stratum into the well) is measured and these data are analyzed to estimate permeability.

A length of solid pipe with known volume (termed a slug) is lowered into the well to raise the water level. The water level is then recorded every ½ second until the raised water level stabilizes (falls) close to the initial level. The slug is then removed from the well to lower the water level. The water level is again recorded every ½ second until the lowered water level stabilizes (rises) close to the initial level. The published software AQTESOLV was used to analyze the slug test data and to assist in estimating a range of permeability coefficients for each stratum which are summarized in Table 2. Plots of groundwater levels measured during the slug tests and AQTESOLV outputs for each well are presented in Appendix B.

As shown in Table 2, permeability coefficient for the shallow sand stratum (at B-1S and B-2S) is estimated to range from 3.6×10^{-3} to 1.6×10^{-2} cm/sec. For deep sand stratum (at B-1D and B-2D), permeability coefficient is estimated to range from 1.5×10^{-3} to 4.8×10^{-3} cm/sec.

To assess the reasonableness of these values, Hazen's formula and the measured gradation of each sand stratum were used to estimate the permeability (see Appendix C). As shown in Appendix C, the permeability is estimated as approximately 1.4×10^{-2} cm/sec for the shallow sand stratum and to range from 4.9×10^{-3} to 1.2×10^{-2} cm/sec for the deep sand stratum.

In addition, according to the New Jersey Geological Survey (see Appendix D), estimated permeability for the upper aquifer of the Potomac-Raritan-Magothy aquifer system near the project site ranges from 1.8×10^{-2} to 4.7×10^{-2} cm/sec. As shown in Table D1, Appendix D, screen length of the USGS wells near the project site ranges from 22 to 58 feet and, therefore, these values are believed to be representative of the permeability of deeper sand stratum.

Table 3 summarizes the permeability coefficients estimated using three approaches described above and the range of permeability for each stratum. As shown in Table 3, permeability is estimated to range from 3.6×10^{-3} to 1.6×10^{-2} cm/sec for the shallow sand stratum and range from 1.5×10^{-3} to 4.7×10^{-2} cm/sec for the deep sand stratum.

3-3. Salinity Test

To further assist in evaluating the potential for saltwater intrusion and thus tidal influence on the site groundwater, groundwater samples were collected from each well and the Marina and analyzed for salinity. Salinity is defined as the total of all salts dissolved in water and is measured in parts per thousand (ppt). The salinity testing was completed by Severn Trent Laboratories (STL) of Edison, New Jersey. Test results are summarized on Table 4; an analysis report from STL is presented in Appendix E.

According to the Charleston Environmental Monitoring for Public Access and Community Tracking (EMPACT) classification system, salinity is 0 ppt for freshwater, 0 to 5 ppt for brackish water, 5 to 35 ppt for estuarine water, and 35 ppt for ocean water. As shown on Table 4, salinity for surface water at the Marina was found to range from 21.2 to 27.5 ppt and therefore classifies as estuarine water. Groundwater collected from the two shallow wells has a salinity ranging from 0.19 to 4.5 and thus classifies as brackish water. Groundwater collected from the two deep wells has a salinity of less than 0.019 ppt and therefore could be classified as freshwater.

According to published reference (see Appendix F), the project site is located approximately 2 miles from a reported saltwater intrusion area showing chloride (Cl-) concentration of 250 mg/L or greater.

3-4. Flow Rate

Using the range of permeability coefficients estimated for the shallow and deep sand strata presented in Table 3, potential groundwater flow rates into a shallower open-cut trench or deeper HDD borehole were estimated. Analyses and references are presented in Appendix G.

As shown in Appendix G, potential flow rate into open-cut trench was estimated to range from 0.1 to 6.6 gallons per minute (gpm) per unit trench length. Potential rate of groundwater discharge from a HDD entry or exit pit primarily depends on the bottom elevation of either pit, a drilling mud height within the pit and the unit weight of drilling mud. Theoretically, if no drilling mud were assumed inside the pit, the estimated discharge of groundwater from the pit could exceed 200,000 gpm. If the HDD is filled with drilling mud to ground surface (approximately El. 6.1), the estimated discharge from the pit would be approximately 100,000 gpm. If dikes are built along the perimeter of the pit to be able to contain the mud to El. 8.0 (approximately 2 feet above ground surface), the mud pressure should offset the groundwater pressure inside the borehole and there would be no discharge from the pit.

It should be noted that estimated flow rates noted above are associated with analytical evaluation based on conservative assumptions, such as steady flow within fixed

boundaries and frictionless incompressible fluid. Considering potential flow reduction factors, such as a relatively low permeability mud coating (filter cake) of the HDD borehole sidewall and the subsequently lower rate of groundwater recharge into the borehole; potential head loss along the HDD borehole; dissipation of water pressure because of potential communication (leakage) with the shallow sand stratum, the actual discharge would be expected to be significantly less than the estimated values above.

4. SUMMARY

The key findings and conclusions of our supplemental investigation are summarized as follows:

- The deep sand stratum acts as a 'confined aquifer' that exhibits artesian conditions.
- The deep sand stratum appears to be hydraulically communicating with the nearby tidal surface water at Lockwood Marina and/or Crossway Creek. This communication is, however, considerably 'damped' by the permeability of the sand stratum, reflecting daily elevation fluctuations that, while essentially coincident with the tidal cycle of the Marina surface water, are less than 10 percent of the fluctuation range measured for the surface water.
- Groundwater elevations in the shallow sand stratum appear to be only slightly or not affected by tidal fluctuations at the Marina. However, groundwater sampled within the two shallow wells was found to be brackish, suggesting that some communication does exist between the estuarine (more saline) surface water at the Marina or Crossway Creek.
- Based on the slug test results, soil gradation, and published literature, estimated coefficient of permeability values range from 3.6×10^{-3} to 1.6×10^{-2} cm/sec for the shallow sand stratum and 1.5×10^{-3} to 4.7×10^{-2} cm/sec for the deep sand stratum. These values correspond to groundwater inflow rates estimated from 0.1 to 6.6 gpm per unit length of open-cut trench.
- Potential rate of groundwater discharge from a HDD entry or exit pit primarily depends on the bottom elevation of either pit, a drilling mud height within the pit and the unit weight of drilling mud. Theoretically, potential rate of groundwater discharge could range from more than 200,000 gpm to zero (0) depending on the height of drilling mud inside the pit. If dikes are built along the perimeter of the pit to be able to contain the mud to El. 8.0 (approximately 2 feet above ground surface), the mud pressure should offset the groundwater pressure inside the borehole and there would be no discharge from the pit. Considering potential flow reduction factors described in Section 3-4, the actual discharge would be expected to be significantly less than the estimated values above.

URS appreciates the opportunity to have been of service to Williams during this project. Please contact us at 215-367-2500 if you have any questions or require additional information.

Sincerely,

Chul Woo Kim, Ph.D., P.E.
Project Engineer

James A. Coffman, III, P.E.
Project Manager

Tables, Figures and Appendices

cc: Alan Snider (GeoEngineers w/tables, figures and appendices)

Tables

Table 1 - SUMMARY OF GROUNDWATER LEVEL MEASUREMENTS
Crossway Creek Crossing - Supplemental Wells

Location	Water Level Elevation (ft)[a]				Range of Groundwater Level Fluctuation as Percentage of the Range of Tidal Surface Water Fluctuation at Lockwood Marina (%)
	Highest[b]	Lowest[c]	Average	Range	
B-1D	8.76	8.45	8.58	0.31	5%
B-1S	1.28	1.02	1.18	0.26	4%
B-2D	7.89	7.35	7.59	0.54	9%
B-2S	3.96	3.79	3.86	0.17	3%
Tidal Surface Water[d]	2.53	-3.71	-0.30	6.24	100%

Notes:

a = Groundwater levels were measured inside wells by using a submersible transducer (MiniTROLL). Surface water levels were measured using conventional ground surveying techniques and are based on a benchmark provided by Williams near Lockwood Marina.

b = corresponds to high tide as observed at Lockwood Marina.

c = corresponds to low tide as observed at Lockwood Marina.

d = Measured at the Lookwood marina during two tidal cycles within a 72-hour groundwater level monitoring period.

Table 2 - PERMEABILITY OF SHALLOW AND DEEP SAND STRATA AS ESTIMATED FROM SLUG TEST RESULTS
Crossway Creek Crossing - Supplemental Wells

WELL NUMBER	SAND STRATUM (Shallow or Deep)	ESTIMATED RANGE OF PERMEABILITY[a]	
		(ft/day)	(cm/sec)
B-1D	Deep	9.161 - 13.700	3.23×10^{-3} - 4.83×10^{-3}
B-1S	Shallow	24.560 - 44.680	8.66×10^{-3} - 1.58×10^{-2}
B-2D	Deep	4.295 - 4.744	1.52×10^{-3} - 1.67×10^{-3}
B-2S	Shallow	10.080 - 10.870	3.56×10^{-3} - 3.83×10^{-3}

Notes:
a = Permeability values were estimated using Bouwer-Rice (1976) method with slug test software, AQTESOLV.

Table 3 - SUMMARY OF PERMEABILITY COEFFICIENTS
Crossway Creek Crossing - Supplemental Wells

(UNIT : CM/SEC)

STRATUM	SLUG TESTS[a]	HAZEN'S FORMULA + SIEVE ANALYSIS[b]	PUBLISHED WELL ACCEPTANCE TESTS[c]	ESTIMATED RANGE OF PERMEABILITY
SHALLOW SAND	3.56×10^{-3} to 1.58×10^{-2}	1.44×10^{-2}	NA	**3.6×10^{-3} to 1.6×10^{-2}**
DEEP SAND	1.52×10^{-3} to 4.83×10^{-3}	4.90×10^{-3} to 1.21×10^{-2}	1.80×10^{-2} to 4.70×10^{-2}	**1.5×10^{-3} to 4.7×10^{-2}**

Notes:
a = See Table 2.
b = See Appendix C
c = See Appendix D

Table 4 - SALINITY TEST RESULTS
Crossway Creek Crossing - Supplemental Wells

SAMPLE LOCATION	DESCRIPTION	SALINITY[a]		WATER QUALITY[b]
		8/16/05 Sample	8/19/05 Sample	
SEA	At Lockwood Marina, High Tide	-	21.2	Estuarine
SEA	At Lockwood Marina, Low Tide	-	27.5	Estuarine
B-1D	Inside Well	ND (< 0.019)	ND (< 0.019)	Fresh
B-1S	Inside Well	4.5	4.2	Brackish
B-2D	Inside Well	ND (< 0.019)	ND (< 0.019)	Fresh
B-2S	Inside Well	0.19	0.27	Brackish

Notes:

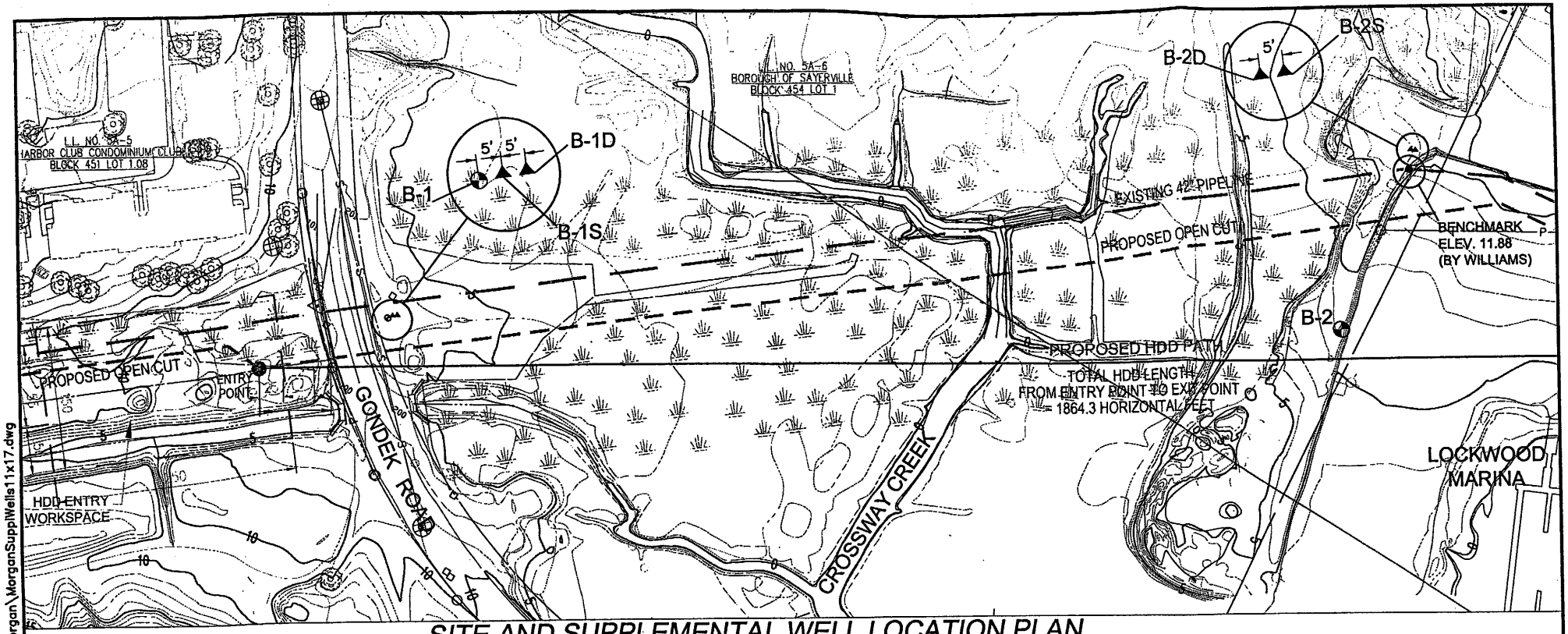
a = Salinity is the total of all salts dissolved in the water, measured in parts per thousand (ppt). Salinity tests were performed by Severn Trent Laboratories (STL).

ND = Not detected (concentration less than indicated detection limit value)

b = Water quality as defined by Charleston Environmental Monitoring for Public Access and Community Tracking (EMPACT) and as follows:

Fresh = 0 ppt
Brackish = 0 - 5 ppt
Estuarine = 5 - 35 ppt
Sea = 35 ppt

Figures



SITE AND SUPPLEMENTAL WELL LOCATION PLAN

SCALE: 1 INCH = 100 FEET

LEGEND

- B-1 — APPROXIMATE LOCATION OF TEST BORING COMPLETED BY URS BETWEEN JUNE 15 AND 17, 2005
- B-1S — APPROXIMATE LOCATION OF SUPPLEMENTAL WELL INSTALLED BY URS ON AUGUST 4 OR AUGUST 5, 2005
- BENCHMARK

NOTES:

1. BASEMAP PROVIDED BY WILLIAMS.
2. PIPELINE ALIGNMENTS ASSOCIATED WITH OPEN-CUT AND HDD TECHNIQUES PROVIDED BY WILLIAMS.

URS
335 COMMERCE DRIVE, SUITE 300
FORT WASHINGTON, PA 19034
PHONE: (215) 367-2500 FAX: (215) 367-1000

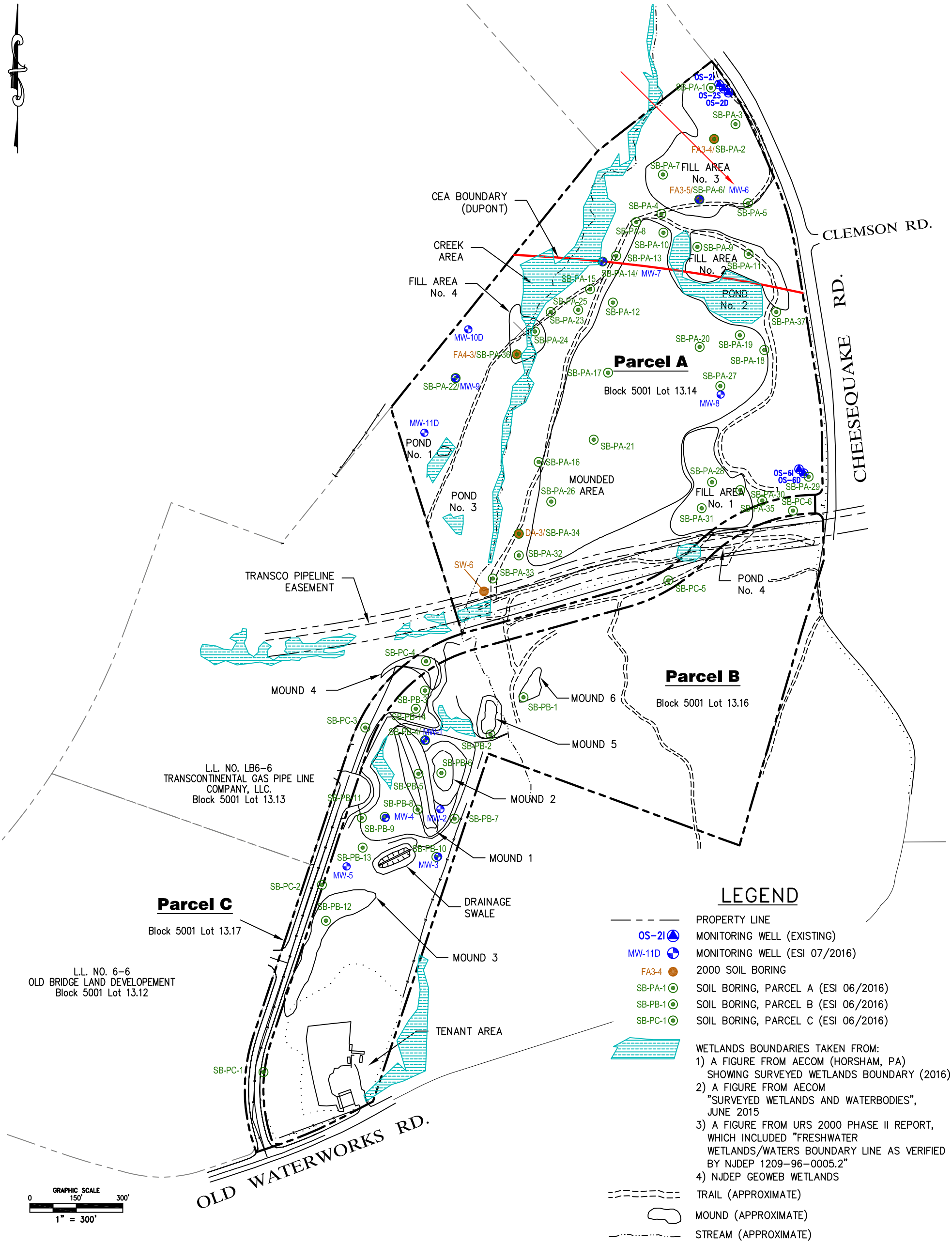
Job:	19996375.00006
Prepared by:	SMS
Checked by:	JAC
Date:	09/16/05

SITE AND SUPPLEMENTAL WELL LOCATION PLAN
WILLIAMS GAS PIPELINE
MORGAN REPLACEMENT – CROSSWAY CREEK CROSSING
MIDDLESEX COUNTY, NEW JERSEY
FIGURE 1

Drawn By & Date/Time: smshuex0 Sep 16, 2005 - 2:24pm
Drawing Location & Name: K:\19996375-Williams Neshanic Morgan\MorganSupplWells11x17.dwg

APPENDIX D
42-INCH LOWER NEW YORK BAY LATERAL REPLACEMENTS
2017 CONSTRUCTION PROJECT GRONDWATER MONITORING DATA
(to be inserted)

APPENDIX E
COMPRESSOR STATION 207 PHASE II SITE ASSESSMENT - 2016
SITE INVESTIGATION (SI) RESULTS



LEGEND

- PROPERTY LINE
- OS-2I — MONITORING WELL (EXISTING)
- MW-11D — MONITORING WELL (ESI 07/2016)
- FA3-4 — 2000 SOIL BORING
- SB-PA-1 — SOIL BORING, PARCEL A (ESI 06/2016)
- SB-PB-1 — SOIL BORING, PARCEL B (ESI 06/2016)
- SB-PC-1 — SOIL BORING, PARCEL C (ESI 06/2016)

WETLANDS BOUNDARIES TAKEN FROM:
1) A FIGURE FROM AECOM (HORSHAM, PA) SHOWING SURVEYED WETLANDS BOUNDARY (2016)
2) A FIGURE FROM AECOM "SURVEYED WETLANDS AND WATERBODIES", JUNE 2015
3) A FIGURE FROM URS 2000 PHASE II REPORT, WHICH INCLUDED "FRESHWATER WETLANDS/WATERS BOUNDARY LINE AS VERIFIED BY NJDEP 1209-96-0005.2"
4) NJDEP GEOWEB WETLANDS

- TRAIL (APPROXIMATE)
- MOUND (APPROXIMATE)
- STREAM (APPROXIMATE)

NOTES

1. THIS DRAWING WAS PREPARED USING INFORMATION TAKEN FROM:
   - *SURVEY INFORMATION FURNISHED BY TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
   - *URS FIGURE 3, SITE PLAN, DATED 01/21/2000
   - *TAX MAP, TWP. OF OLD BRIDGE, MIDDLESEX COUNTY, NJ, SHEET 4
2. WATER FEATURES MAY BE INTERMITTENT OR EPHEMERAL.

FIGURE 1

SOIL BORING AND GROUNDWATER MONITORING WELL LOCATIONS

MANZO PROPERTY
BLOCK 5001, LOTS 13.14, 13.16, & 13.17
OLD BRIDGE, NJ

PROJECT MANAGER	J I G	PROJECT NO.	WILLIAMS-MANZO-BQS101

REV. NO. | DATE | REV. BY | ENGR | CHKD BY | APPRD BY

ENVIRO-SCIENCES (OF DELAWARE), INC.
781 Route 15 South
Lake Hopatcong, NJ 07849
973-398-8183 * Fax 973-398-8037

DRAWN BY/DATE	APPROVED/DATE	DRAWING NUMBER
RLL / 08-25-16		WMZ-007

CLEANUP STANDARD OR SCREENING LEVEL

NOTE: ALL VALUES IN mg/kg

Compound	DIGWSSL	NRDCSRS	RDCSRS
Benzo(a)anthracene	0.8	2	0.6
Benzo(a)pyrene	0.2	0.2	0.2
Benzo(b)fluoranthene	2	2	0.6
Dibenzo(a,h)anthracene	0.8	0.2	0.2
Indeno(1,2,3-cd)pyrene	7	2	0.6

ANALYTICAL LEGEND

NOTE: ALL VALUES IN mg/kg

SAMPLE ID — SAMPLE DEPTH (BGS)

SBPC1-4.5 (4.0'-4.5')	CONC
Benzo(a)anthracene	13
Benzo(a)pyrene	13

COMPOUND — DETECTED CONCENTRATION

BGS.....= FEET BELOW GROUND SURFACE
DIGWSSL.....= NJDEP DEFAULT IMPACT TO GROUNDWATER SOIL SCREENING LEVELS
mg/kg.....= MILLIGRAMS PER KILOGRAM
NJDEP.....= NEW JERSEY DEPARMENT OF ENVIRONMENTAL PROTECTION
NRDCSRS.....= NJDEP NON-RESIDENTIAL DIRECT CONTACT SOIL REMEDIATION STANDARD
PAH.....= POLYNUCLEAR AROMATIC HYDROCARBON
RDCSRS.....= NJDEP RESIDENTIAL DIRECT CONTACT SOIL REMEDIATION STANDARD

SBPC4-18.5 (18.0'-18.5')	CONC
Benzo(a)anthracene	2.4
Benzo(a)pyrene	2
Benzo(b)fluoranthene	2.5
Dibenzo(a,h)anthracene	0.31
Indeno(1,2,3-cd)pyrene	1.3

SBPB3-8.5 (8.0'-8.5')	CONC
Benzo(a)anthracene	2.5
Benzo(a)pyrene	2.1
Benzo(b)fluoranthene	2.8
Dibenzo(a,h)anthracene	0.28
Indeno(1,2,3-cd)pyrene	0.95

SBPB14-0.5 (0.0'-0.5')	CONC
Benzo(a)anthracene	0.63
Benzo(a)pyrene	0.79
Benzo(b)fluoranthene	1.1

SBPB4-10.0 (9.5'-10.0')	CONC
Benzo(a)anthracene	5.3
Benzo(a)pyrene	4.5
Benzo(b)fluoranthene	5.4
Dibenzo(a,h)anthracene	0.69
Indeno(1,2,3-cd)pyrene	2.5

SBPB8-2.5 (2.0'-2.5')	CONC
Benzo(a)anthracene	0.69
Benzo(a)pyrene	0.86
Benzo(b)fluoranthene	1.1
Dibenzo(a,h)anthracene	0.29

Parcel C

Block 5001 Lot 13.17

SBPC2-9.5 (9.0'-9.5')	CONC
Benzo(a)pyrene	0.31

L.L. NO. 6-6
OLD BRIDGE LAND DEVELOPEMENT
Block 5001 Lot 13.12

SBPC1-4.5 (4.0'-4.5')	CONC
Benzo(a)anthracene	13
Benzo(a)pyrene	13
Benzo(b)fluoranthene	14
Dibenzo(a,h)anthracene	2.4
Indeno(1,2,3-cd)pyrene	8.4

Parcel B

Block 5001 Lot 13.16

SBPB6-7.5 (7.0'-7.5')	CONC
Benzo(a)anthracene	0.72
Benzo(a)pyrene	0.7
Benzo(b)fluoranthene	0.9

SBPB5-17.5 (17.0'-17.5')	CONC
Benzo(a)anthracene	1.2
Benzo(a)pyrene	1.2
Benzo(b)fluoranthene	1.5
Dibenzo(a,h)anthracene	0.21
Indeno(1,2,3-cd)pyrene	0.81

SBPB5-36.5 (36.0'-36.5')	CONC
Benzo(a)pyrene	0.33

Parcel A

Block 5001 Lot 13.14

CEA BOUNDARY (DUPONT)
CREEK AREA
FILL AREA No. 4
FILL AREA No. 3
FILL AREA No. 2
FILL AREA No. 1
POND No. 1
POND No. 2
POND No. 3
POND No. 4
MOUNDED AREA
MOUND 1
MOUND 2
MOUND 3
MOUND 4
MOUND 5
MOUND 6
TRANSCO PIPELINE EASEMENT
DRAINAGE SWALE
TENANT AREA
L.L. NO. LB6-6
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
Block 5001 Lot 13.13
CLEMSON RD.
CHEESEQUAKE RD.
OLD WATERWORKS RD.

GRAPHIC SCALE
0 150' 300'
1" = 300'

LEGEND

- PROPERTY LINE
- OS-2I — MONITORING WELL (EXISTING)
- MW-11D — MONITORING WELL (ESI 07/2016)
- FA3-4 — 2000 SOIL BORING
- SB-PA-1 — SOIL BORING, PARCEL A (ESI 06/2016)
- SB-PB-1 — SOIL BORING, PARCEL B (ESI 06/2016)
- SB-PC-1 — SOIL BORING, PARCEL C (ESI 06/2016)
- WETLANDS BOUNDARIES TAKEN FROM:
  1) A FIGURE FROM AECOM (HORSHAM, PA) SHOWING SURVEYED WETLANDS BOUNDARY (2016)
  2) A FIGURE FROM AECOM "SURVEYED WETLANDS AND WATERBODIES", JUNE 2015
  3) A FIGURE FROM URS 2000 PHASE II REPORT, WHICH INCLUDED "FRESHWATER WETLANDS/WATERS BOUNDARY LINE AS VERIFIED BY NJDEP 1209-96-0005.2"
  4) NJDEP GEOWEB WETLANDS
- TRAIL (APPROXIMATE)
- MOUND (APPROXIMATE)

NOTES

1. THIS DRAWING WAS PREPARED USING INFORMATION TAKEN FROM:
   - *SURVEY INFORMATION FURNISHED BY TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
   - *URS FIGURE 3, SITE PLAN, DATED 01/21/2000
   - *TAX MAP, TWP. OF OLD BRIDGE, MIDDLESEX COUNTY, NJ, SHEET 4
2. WATER FEATURES MAY BE INTERMITTENT OR EPHEMERAL.
3. SAMPLES WITH NO CONCENTRATIONS DO NOT EXCEED NJDEP RDCSRS, NRDCSRS or DIGWSSL.

Data: WMZ-002.xls

FIGURE 2

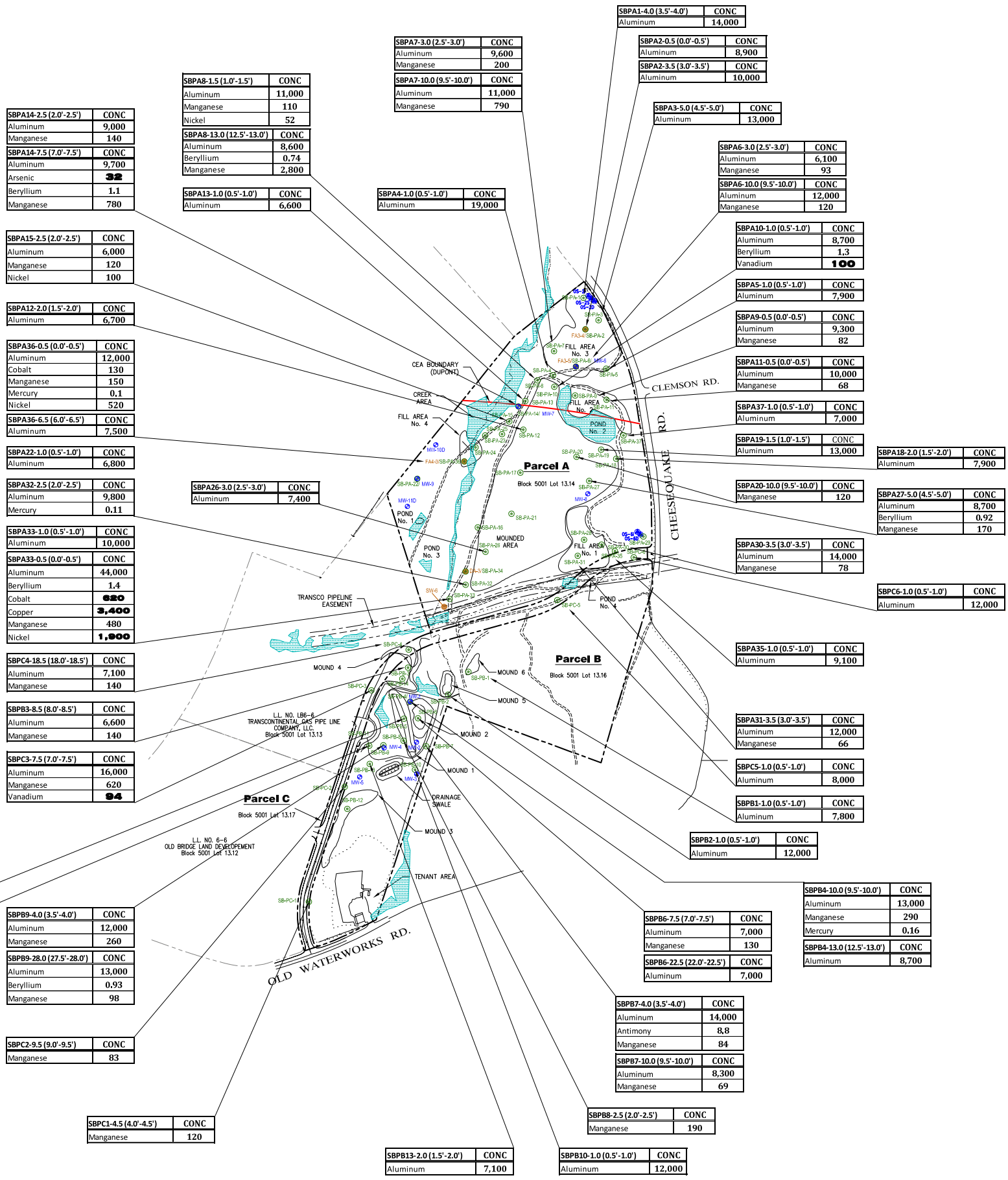
PAH SOIL ANALYTICAL RESULTS
EXCEEDING NJDEP DIRECT CONTACT SRS
JUNE 2016

MANZO PROPERTY
BLOCK 5001, LOTS 13.14, 13.16, & 13.17
OLD BRIDGE, NJ

PROJECT MANAGER	J I G	PROJECT NO.	WILLIAMS-MANZO-BQS101

ENVIRO-SCIENCES (OF DELAWARE), INC.
781 Route 15 South
Lake Hopatcong, NJ 07849
973-398-8183 * Fax 973-398-8037

DRAWN BY/DATE	APPROVED/DATE	DRAWING NUMBER
RLL / 07-12-16		WMZ-003



SBPA1-4.0 (3.5'-4.0')	CONC
Aluminum	14,000

SBPA2-0.5 (0.0'-0.5')	CONC
Aluminum	8,900

SBPA2-3.5 (3.0'-3.5')	CONC
Aluminum	10,000

SBPA3-5.0 (4.5'-5.0')	CONC
Aluminum	13,000

SBPA6-3.0 (2.5'-3.0')	CONC
Aluminum	6,100
Manganese	93

SBPA6-10.0 (9.5'-10.0')	CONC
Aluminum	12,000
Manganese	120

SBPA10-1.0 (0.5'-1.0')	CONC
Aluminum	8,700
Beryllium	1.3
Vanadium	**100**

SBPA5-1.0 (0.5'-1.0')	CONC
Aluminum	7,900

SBPA9-0.5 (0.0'-0.5')	CONC
Aluminum	9,300
Manganese	82

SBPA11-0.5 (0.0'-0.5')	CONC
Aluminum	10,000
Manganese	68

SBPA37-1.0 (0.5'-1.0')	CONC
Aluminum	7,000

SBPA19-1.5 (1.0'-1.5')	CONC
Aluminum	13,000

SBPA18-2.0 (1.5'-2.0')	CONC
Aluminum	7,900

SBPA20-10.0 (9.5'-10.0')	CONC
Manganese	120

SBPA27-5.0 (4.5'-5.0')	CONC
Aluminum	8,700
Beryllium	0.92
Manganese	170

SBPA30-3.5 (3.0'-3.5')	CONC
Aluminum	14,000
Manganese	78

SBPC6-1.0 (0.5'-1.0')	CONC
Aluminum	12,000

SBPA35-1.0 (0.5'-1.0')	CONC
Aluminum	9,100

SBPA31-3.5 (3.0'-3.5')	CONC
Aluminum	12,000
Manganese	66

SBPC5-1.0 (0.5'-1.0')	CONC
Aluminum	8,000

SBPB1-1.0 (0.5'-1.0')	CONC
Aluminum	7,800

SBPB2-1.0 (0.5'-1.0')	CONC
Aluminum	12,000

SBPB4-10.0 (9.5'-10.0')	CONC
Aluminum	13,000
Manganese	290
Mercury	0.16

SBPB4-13.0 (12.5'-13.0')	CONC
Aluminum	8,700

SBPB6-7.5 (7.0'-7.5')	CONC
Aluminum	7,000
Manganese	130

SBPB6-22.5 (22.0'-22.5')	CONC
Aluminum	7,000

SBPB7-4.0 (3.5'-4.0')	CONC
Aluminum	14,000
Antimony	8.8
Manganese	84

SBPB7-10.0 (9.5'-10.0')	CONC
Aluminum	8,300
Manganese	69

SBPB8-2.5 (2.0'-2.5')	CONC
Manganese	190

SBPB10-1.0 (0.5'-1.0')	CONC
Aluminum	12,000

SBPB13-2.0 (1.5'-2.0')	CONC
Aluminum	7,100

SBPA1-4.0 (3.5'-4.0')	CONC
Aluminum	14,000

SBPA2-0.5 (0.0'-0.5')	CONC
Aluminum	8,900

SBPA2-3.5 (3.0'-3.5')	CONC
Aluminum	10,000

SBPA3-5.0 (4.5'-5.0')	CONC
Aluminum	13,000

SBPA6-3.0 (2.5'-3.0')	CONC
Aluminum	6,100
Manganese	93

SBPA6-10.0 (9.5'-10.0')	CONC
Aluminum	12,000
Manganese	120

SBPA10-1.0 (0.5'-1.0')	CONC
Aluminum	8,700
Beryllium	1.3
Vanadium	**100**

SBPA5-1.0 (0.5'-1.0')	CONC
Aluminum	7,900

SBPA9-0.5 (0.0'-0.5')	CONC
Aluminum	9,300
Manganese	82

SBPA11-0.5 (0.0'-0.5')	CONC
Aluminum	10,000
Manganese	68

SBPA37-1.0 (0.5'-1.0')	CONC
Aluminum	7,000

SBPA19-1.5 (1.0'-1.5')	CONC
Aluminum	13,000

SBPA18-2.0 (1.5'-2.0')	CONC
Aluminum	7,900

SBPA20-10.0 (9.5'-10.0')	CONC
Manganese	120

SBPA27-5.0 (4.5'-5.0')	CONC
Aluminum	8,700
Beryllium	0.92
Manganese	170

SBPA30-3.5 (3.0'-3.5')	CONC
Aluminum	14,000
Manganese	78

SBPC6-1.0 (0.5'-1.0')	CONC
Aluminum	12,000

SBPA35-1.0 (0.5'-1.0')	CONC
Aluminum	9,100

SBPA31-3.5 (3.0'-3.5')	CONC
Aluminum	12,000
Manganese	66

SBPC5-1.0 (0.5'-1.0')	CONC
Aluminum	8,000

SBPB1-1.0 (0.5'-1.0')	CONC
Aluminum	7,800

SBPB2-1.0 (0.5'-1.0')	CONC
Aluminum	12,000

SBPB4-10.0 (9.5'-10.0')	CONC
Aluminum	13,000
Manganese	290
Mercury	0.16

SBPB4-13.0 (12.5'-13.0')	CONC
Aluminum	8,700

SBPB6-7.5 (7.0'-7.5')	CONC
Aluminum	7,000
Manganese	130

SBPB6-22.5 (22.0'-22.5')	CONC
Aluminum	7,000

SBPB7-4.0 (3.5'-4.0')	CONC
Aluminum	14,000
Antimony	8.8
Manganese	84

SBPB7-10.0 (9.5'-10.0')	CONC
Aluminum	8,300
Manganese	69

SBPB8-2.5 (2.0'-2.5')	CONC
Manganese	190

SBPB13-2.0 (1.5'-2.0')	CONC
Aluminum	7,100

SBPB10-1.0 (0.5'-1.0')	CONC
Aluminum	12,000

SBPA14-2.5 (2.0'-2.5')	CONC
Aluminum	9,000
Manganese	140

SBPA14-7.5 (7.0'-7.5')	CONC
Aluminum	9,700
Arsenic	**32**
Beryllium	1.1
Manganese	780

SBPA15-2.5 (2.0'-2.5')	CONC
Aluminum	6,000
Manganese	120
Nickel	100

SBPA12-2.0 (1.5'-2.0')	CONC
Aluminum	6,700

SBPA36-0.5 (0.0'-0.5')	CONC
Aluminum	12,000
Cobalt	130
Manganese	150
Mercury	0.1
Nickel	520

SBPA36-6.5 (6.0'-6.5')	CONC
Aluminum	7,500

SBPA22-1.0 (0.5'-1.0')	CONC
Aluminum	6,800

SBPA32-2.5 (2.0'-2.5')	CONC
Aluminum	9,800
Mercury	0.11

SBPA33-1.0 (0.5'-1.0')	CONC
Aluminum	10,000

SBPA33-0.5 (0.0'-0.5')	CONC
Aluminum	44,000
Beryllium	1.4
Cobalt	**820**
Copper	**3,400**
Manganese	480
Nickel	**1,900**

SBPC4-18.5 (18.0'-18.5')	CONC
Aluminum	7,100
Manganese	140

SBPB3-8.5 (8.0'-8.5')	CONC
Aluminum	6,600
Manganese	140

SBPC3-7.5 (7.0'-7.5')	CONC
Aluminum	16,000
Manganese	620
Vanadium	**94**

SBPB5-17.5 (17.0'-17.5')	CONC
Chlordane	0.0644
Manganese	120

SBPB5-36.5 (36.0'-36.5')	CONC
Chlordane	0.0586
Aluminum	6,700
Manganese	120

SBPB11-7.5 (7.0'-7.5')	CONC
Aluminum	8,600
Manganese	270

SBPB11-19.0 (18.5'-19.0')	CONC
Manganese	73

SBPB11-21.0 (20.5'-21.0')	CONC
Aluminum	8,400
Manganese	120

SBPB9-4.0 (3.5'-4.0')	CONC
Aluminum	12,000
Manganese	260

SBPB9-28.0 (27.5'-28.0')	CONC
Aluminum	13,000
Beryllium	0.93
Manganese	98

SBPC2-9.5 (9.0'-9.5')	CONC
Manganese	83

SBPC1-4.5 (4.0'-4.5')	CONC
Manganese	120

SBPA26-3.0 (2.5'-3.0')	CONC
Aluminum	7,400

SBPA8-1.5 (1.0'-1.5')	CONC
Aluminum	11,000
Manganese	110
Nickel	52

SBPA8-13.0 (12.5'-13.0')	CONC
Aluminum	8,600
Beryllium	0.74
Manganese	2,800

SBPA13-1.0 (0.5'-1.0')	CONC
Aluminum	6,600

SBPA4-1.0 (0.5'-1.0')	CONC
Aluminum	19,000

SBPA7-3.0 (2.5'-3.0')	CONC
Aluminum	9,600
Manganese	200

SBPA7-10.0 (9.5'-10.0')	CONC
Aluminum	11,000
Manganese	790

LEGEND

- PROPERTY LINE
- 0S-2I — MONITORING WELL (EXISTING)
- MW-11D — MONITORING WELL (ESI 07/2016)
- FA3-4 — 2000 SOIL BORING
- SB-PA-1 — SOIL BORING, PARCEL A (ESI 06/2016)
- SB-PB-1 — SOIL BORING, PARCEL B (ESI 06/2016)
- SB-PC-1 — SOIL BORING, PARCEL C (ESI 06/2016)
- WETLANDS BOUNDARIES TAKEN FROM:
  1) A FIGURE FROM AECOM (HORSHAM, PA) SHOWING SURVEYED WETLANDS BOUNDARY (2016)
  2) A FIGURE FROM AECOM "SURVEYED WETLANDS AND WATERBODIES", JUNE 2015
  3) A FIGURE FROM URS 2000 PHASE II REPORT, WHICH INCLUDED "FRESHWATER WETLANDS/WATERS BOUNDARY LINE AS VERIFIED BY NJDEP 1209-96-0005.2"
  4) NJDEP GEOWEB WETLANDS
- TRAIL (APPROXIMATE)
- MOUND (APPROXIMATE)

CLEANUP STANDARD OR SCREENING LEVEL

NOTE: ALL VALUES IN mg/kg

CONTAMINANT	NJDEP DIGWSSL	NJDEP NRDCSRS	NJDEP RDCSRS
Chlordane	0.05	1	0.2
Arsenic	19	19	19
Aluminum	6,000	NS	78,000
Beryllium	0.7	140	16
Cobalt	90	590	1,600
Copper	1,100	45,000	3,100
Manganese	65	5,900	11,000
Mercury	0.1	65	23
Nickel	48	23,000	1,600
Vanadium	NS	1,100	78

ANALYTICAL LEGEND

NOTE: ALL VALUES IN mg/kg

SAMPLE ID — SAMPLE DEPTH (BGS)

SBPA6-10.0 (9.5'-10.0')	CONC
Aluminum	12,000
Manganese	120

CONTAMINANT — DETECTED CONCENTRATION

3,400.....= BOLD TEXT, EXCEEDS DIRECT CONTACT SRS
BGS.....= FEET BELOW GROUND SURFACE
DIGWSSL.....= NJDEP DEFAULT IMPACT TO GROUNDWATER SOIL SCREENING LEVELS
mg/kg.....= MILLIGRAMS PER KILOGRAM
NJDEP.....= NEW JERSEY DEPARMENT OF ENVIRONMENTAL PROTECTION
NRDCSRS.....= NJDEP NON-RESIDENTIAL DIRECT CONTACT SOIL REMEDIATION STANDARD
RDCSRS.....= NJDEP RESIDENTIAL DIRECT CONTACT SOIL REMEDIATION STANDARD

NOTES

1. THIS DRAWING WAS PREPARED USING INFORMATION TAKEN FROM:
   - *SURVEY INFORMATION FURNISHED BY TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
   - *URS FIGURE 3, SITE PLAN, DATED 01/21/2000
   - *TAX MAP, TWP. OF OLD BRIDGE, MIDDLESEX COUNTY, NJ, SHEET 4
2. WATER FEATURES MAY BE INTERMITTENT OR EPHEMERAL.
3. SAMPLES WITH NO CONCENTRATIONS DO NOT EXCEED NJDEP RDCSRS, NRDCSRS or DIGWSSL.

GRAPHIC SCALE
0 300' 600'
1" = 300'

Data: WMZ-004.xls

FIGURE 3

PESTICIDES and METALS
SOIL ANALYTICAL RESULTS
EXCEEDING NJDEP SRS
JUNE 2016
MANZO PROPERTY
BLOCK 5001, LOTS 13.14, 13.16, & 13.17
OLD BRIDGE, NJ

PROJECT MANAGER	J I G	PROJECT NO.	WILLIAMS-MANZO-BQS101

ENVIRO-SCIENCES (OF DELAWARE), INC.
781 Route 15 South
Lake Hopatcong, NJ 07849
973-398-8183 * Fax 973-398-8037

DRAWN BY/DATE	APPROVED/DATE	DRAWING NUMBER
RLL / 07-21-16		WMZ-004

REV. NO. | DATE | REV. BY | ENGR | CHK'D BY | APPV'D BY

MW-6	Total Conc.	Dissolved Conc.	GWQS
Aluminum	**619**	**545**	200
Iron	**370**	[12.7]	300
Manganese	**596**	**593**	50

MW-7	Total Conc.	Dissolved Conc.	GWQS
Aluminum	**7,860**	**454**	200
Arsenic	**10.1**	[2.0]	3
Beryllium	**2.5**	**1.1**	1
Iron	**15,000**	[88.6]	300
Lead	**22.5**	[1.4]	5
Manganese	**162.1**	**124**	50

MW-10D	Total Conc.	Dissolved Conc.	GWQS
Aluminum	**3,780**	**2,570**	200
Iron	**1,810**	[17.8]	300
Manganese	**69.7**	**66.5**	50

MW-11D	Total Conc.	Dissolved Conc.	GWQS
Aluminum	**4,730**	**876**	200
Iron	**10,800**	**1,400**	300
Lead	**5.9**	[0.4]	5
Manganese	**454**	**446.9**	50

MW-8	Total Conc.	Dissolved Conc.	GWQS
Aluminum	**37,300**	[53.6]	200
Arsenic	**24.0**	[0.4]	3
Beryllium	**5.9**	[ND]	1
Chromium	**115.4**	[0.4]	70
Iron	**118,000**	[275]	300
Lead	**133**	[ND]	5
Manganese	**357.7**	**243**	50

MW-1	Total Conc.	Dissolved Conc.	GWQS
Aluminum	**468**	[7.5]	200
Iron	**1,080**	[ND]	300
Manganese	**351.9**	**345.1**	50

MW-2	Total Conc.	Dissolved Conc.	GWQS
Iron	**17,500**	**16,900**	300
Manganese	**63.7**	**64.8**	50

MW-5	Total Conc.	Dissolved Conc.	GWQS
Aluminum	**11,500**	[5.9]	200
Iron	**18,900**	[ND]	300
Lead	**11.9**	[ND]	5
Manganese	**56.3**	[14.2]	50

MW-3	Total Conc.	Dissolved Conc.	GWQS
Aluminum	**3,270**	**2,450**	200
Iron	**2,090**	**1,370**	300

L.L. NO. 6-6
OLD BRIDGE LAND DEVELOPEMENT
Block 5001 Lot 13.12

L.L. NO. LB6-6
TRANSCONTINENTAL GAS PIPE LINE
COMPANY, LLC.
Block 5001 Lot 13.13

CEA BOUNDARY (DUPONT)

CREEK AREA

FILL AREA No. 4

FILL AREA No. 3

FILL AREA No. 2

POND No. 1

POND No. 2

POND No. 3

POND No. 4

MOUNDED AREA

Parcel A
Block 5001 Lot 13.14

Parcel B
Block 5001 Lot 13.16

TRANSCO PIPELINE EASEMENT

DRAINAGE SWALE

TENANT AREA

MOUND 1

MOUND 2

MOUND 3

MOUND 4

MOUND 5

MOUND 6

CLEMSON RD.

CHEESEQUAKE RD.

OLD WATERWORKS RD.

GRAPHIC SCALE
0 150' 300'
1" = 300'

LEGEND

- PROPERTY LINE
- OS-2I — MONITORING WELL (EXISTING)
- MW-11D — MONITORING WELL (ESI 07/2016)
- FA3-4 — 2000 SOIL BORING
- SB-PA-1 — SOIL BORING, PARCEL A (ESI 06/2016)
- SB-PB-1 — SOIL BORING, PARCEL B (ESI 06/2016)
- SB-PC-1 — SOIL BORING, PARCEL C (ESI 06/2016)
- WETLANDS BOUNDARIES TAKEN FROM:
  1) A FIGURE FROM AECOM (HORSHAM, PA) SHOWING SURVEYED WETLANDS BOUNDARY (2016)
  2) A FIGURE FROM AECOM "SURVEYED WETLANDS AND WATERBODIES", JUNE 2015
  3) A FIGURE FROM URS 2000 PHASE II REPORT, WHICH INCLUDED "FRESHWATER WETLANDS/WATERS BOUNDARY LINE AS VERIFIED BY NJDEP 1209-96-0005.2"
  4) NJDEP GEOWEB WETLANDS
- TRAIL (APPROXIMATE)
- MOUND (APPROXIMATE)

ANALYTICAL LEGEND

NOTE: ALL VALUES IN UG/L

SAMPLE ID

MW-8	Total Conc.	Dissolved Conc.	GWQS
Iron	**118,000**	[275]	300

CONTAMINANT — DETECTED CONCENTRATION

NOTES

1. THIS DRAWING WAS PREPARED USING INFORMATION TAKEN FROM:
   - *SURVEY INFORMATION FURNISHED BY TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
   - *URS FIGURE 3, SITE PLAN, DATED 01/21/2000
   - *TAX MAP, TWP. OF OLD BRIDGE, MIDDLESEX COUNTY, NJ, SHEET 4
2. WATER FEATURES MAY BE INTERMITTENT OR EPHEMERAL.
3. SAMPLES WITH NO CONCENTRATIONS DO NOT EXCEED NJDEP RDCSRS, NRDCSRS or DIGWSSL.

BOLD TEXT.= EXCEEDS NJDEP CLASS II A GWQS
[14.2].....= BRACKETED TEXT INDICATES CONTAMINANT DOES NOT EXCEED NJDEP GWQS
GWQS.....= NJDEP CLASS IIA GROUNDWATER QUALITY STANDARDS
NJDEP....= NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
ND.....= NOT DETECTED OR BELOW METHOD DETECTION LIMITS
UG/L.....= MICROGRAMS PER LITER

Data: WMZ-005.xls

FIGURE 4

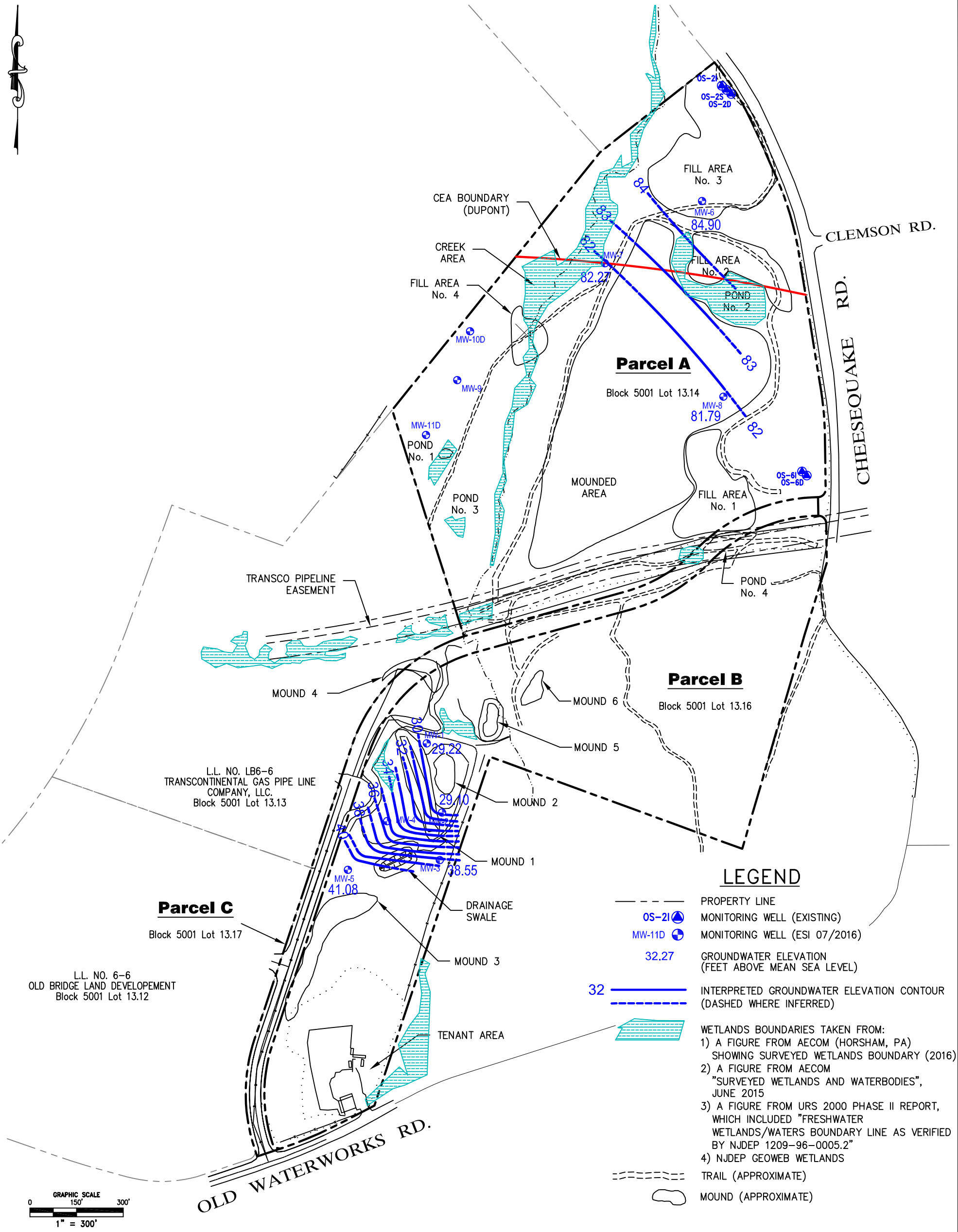
GROUNDWATER ANALYTICAL RESULTS
EXCEEDING NJDEP CLASS II A GWQS
JULY 2016

MANZO PROPERTY
BLOCK 5001, LOTS 13.14, 13.16, & 13.17
OLD BRIDGE, NJ

PROJECT MANAGER	J I G	PROJECT NO.	WILLIAMS-MANZO-BQS101

ENVIRO-SCIENCES (OF DELAWARE), INC.
781 Route 15 South
Lake Hopatcong, NJ 07849
973-398-8183 * Fax 973-398-8037

DRAWN BY/DATE	APPROVED/DATE	DRAWING NUMBER
RLL / 08-04-16		WMZ-005



NOTES

1. THIS DRAWING WAS PREPARED USING INFORMATION TAKEN FROM:
   - *SURVEY INFORMATION FURNISHED BY TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
   - *URS FIGURE 3, SITE PLAN, DATED 01/21/2000
   - *TAX MAP, TWP. OF OLD BRIDGE, MIDDLESEX COUNTY, NJ, SHEET 4
2. WATER FEATURES MAY BE INTERMITTENT OR EPHEMERAL.

FIGURE 5

GROUNDWATER ELEVATION CONTOURS
JULY 2016

MANZO PROPERTY
BLOCK 5001, LOTS 13.14, 13.16, & 13.17
OLD BRIDGE, NJ

PROJECT MANAGER	J I G	PROJECT NO.	WILLIAMS-MANZO-BQS108

ENVIRO-SCIENCES (OF DELAWARE), INC.
781 Route 15 South
Lake Hopatcong, NJ 07849
973-398-8183 * Fax 973-398-8037

DRAWN BY/DATE	APPROVED/DATE	DRAWING NUMBER
RLL / 08-04-16		WMZ-006

REV. NO. | DATE | REV. BY | ENGR | CHKD BY | APPVD BY

DRAFT

TABLE 1

Groundwater Analytical Results - July 2016

MANZO PROPERTY

Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

WELL LOCATION:	NJDEP Class IIA Groundwater Quality Standards (GWQS)	NJDEP Vapor Intrusion Groundwater Screening Levels (VI GWSL)	MW-1			MW-2			MW-3			MW-5			MW-5			MW-6			MW-7			MW-8			MW-10D			MW-11D											
SAMPLE ID:			MW-1			MW-2			MW-3			MW-5			DUP			MW-6			MW-7			MW-8			MW-10D			MW-11D			TRIP BLANK			FIELD BLANK 1			FIELD BLANK 2		
LAB ID:			L1622693-01			L1622693-02			L1622693-03			L1622693-04			L1622693-10			L1622693-05			L1622693-06			L1622693-07			L1622693-08			L1622693-09			L1622693-13			L1622693-11			L1622693-12		
COLLECTION DATE:			7/21/2016			7/21/2016			7/21/2016			7/21/2016			7/21/2016			7/20/2016			7/20/2016			7/21/2016			7/20/2016			7/20/2016			7/19/2016			7/20/2016			7/21/2016		
SAMPLE MATRIX:			WATER			WATER			WATER			WATER			WATER			WATER			WATER			WATER			WATER			WATER			WATER			WATER			WATER		
			Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Compounds/Analytes *(units)*	*(ug/L)*	*(ug/L)*	*(ug/L)*			*(ug/L)*			*(ug/L)*			*(ug/L)*			*(ug/L)*			*(ug/L)*			*(ug/L)*			*(ug/L)*			*(ug/L)*			*(ug/L)*			*(ug/L)*			*(ug/L)*			*(ug/L)*		
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																																									
Dilution Factor	-	-	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Methylene chloride	3	920	ND		0.27	ND		0.27	ND		0.27	ND		0.27	ND		0.27	ND		0.27	ND		0.27	0.45	J	0.27	ND		0.27	ND		0.27	ND		0.27	ND		0.27	ND		0.27
Chloroform	70	70	ND		0.16	ND		0.16	ND		0.16	ND		0.16	ND		0.16	ND		0.16	ND		0.16	1.5		0.16	0.37	J	0.16	0.62	J	0.16	ND		0.16	ND		0.16	ND		0.16
Dibromochloromethane	1	6	ND		0.15	ND		0.15	ND		0.15	ND		0.15	ND		0.15	ND		0.15	ND		0.15	ND		0.15	ND		0.15	1		0.15	ND		0.15	ND		0.15	ND		0.15
Bromodichloromethane	1	2	ND		0.19	ND		0.19	ND		0.19	ND		0.19	ND		0.19	ND		0.19	ND		0.19	ND		0.19	ND		0.19	0.74		0.19	ND		0.19	ND		0.19	ND		0.19
Bromoform	4	300	ND		0.25	ND		0.25	ND		0.25	ND		0.25	ND		0.25	ND		0.25	ND		0.25	ND		0.25	ND		0.25	2.2		0.25	ND		0.25	ND		0.25	ND		0.25
Toluene	600	330000	ND		0.16	ND		0.16	ND		0.16	ND		0.16	ND		0.16	ND		0.16	ND		0.16	ND		0.16	0.2	J	0.16	ND		0.16	ND		0.16	ND		0.16	ND		0.16
Chloromethane	NS	240	ND		0.09	ND		0.09	ND		0.09	ND		0.09	ND		0.09	ND		0.09	0.46	J	0.09	0.86	J	0.09	ND		0.09	ND		0.09	ND		0.09	ND		0.09	ND		0.09
Styrene	100	180000	ND		0.12	ND		0.12	ND		0.12	ND		0.12	ND		0.12	ND		0.12	ND		0.12	ND		0.12	ND		0.12	0.16	J	0.12	ND		0.12	ND		0.12	ND		0.12
Acetone	6000	21000000	ND		1.5	2.8	J	1.5	ND		1.5	ND		1.5	ND		1.5	ND		1.5	ND		1.5	4.4	J	1.5	ND		1.5	8.6		1.5	ND		1.5	ND		1.5	ND		1.5
Carbon disulfide	700	1500	ND		0.09	ND		0.09	ND		0.09	0.3	J	0.09	0.34	J	0.09	ND		0.09	0.25	J	0.09	0.34	J	0.09	ND		0.09	0.18	J	0.09	ND		0.09	ND		0.09	ND		0.09
Bromochloromethane	NS	NS	ND		0.13	ND		0.13	ND		0.13	ND		0.13	ND		0.13	ND		0.13	ND		0.13	0.44	J	0.13	ND		0.13	ND		0.13	ND		0.13	ND		0.13	ND		0.13
Total VOCs	NS	NS	ND	-	-	2.8	-	-	ND	-	-	0.3	-	-	0.34	-	-	ND	-	-	0.71	-	-	7.99	-	-	0.57	-	-	13.5	-	-	ND	-	-	ND	-	-	ND	-	-
Total VOC TICs	NS	NS	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	2.76	J	-	ND	-	-	ND	-	-	ND	-	-
TCL SEMIVOLATILE ORGANICS COMPOUNDS (SVOC)																																									
Dilution Factor	-	-	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
3-Methylphenol	50	NS	ND		1.1	ND		1.1	ND		1.1	ND		1.1	ND		1.1	ND		1.1	ND		1.1	ND		1.1	ND		1.1	3.5	J	1.1	-	-	-	ND		1.1	ND		1.1
Total SVOCs	NS	NS	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	3.5	-	-	-	-	-	ND	-	-	ND	-	-
Total SVOC TICs	NS	NS	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	ND	-	-	83.7	J	-	-	-	-	ND	-	-	ND	-	-
POLYCHLORINATED BIPHENYLS (PCB)																																									
Dilution Factor	-	-	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Total PCBs	NS	NS	ND		0.035	ND		0.035	ND		0.035	ND		0.035	ND		0.035	ND		0.035	ND		0.035	ND		0.035	ND		0.035	ND		0.035	-	-	-	ND		0.035	ND		0.035
DISSOLVED METALS																																									
Dilution Factor	-	-	*1*			*1*			*1/20*			*1*			*1*			*1/20*			*1*			*1*			*1/20*			*1/20*			*1*			*1*			*1*		
Aluminum, Dissolved*	200	NS	7.49	J	1.69	74.5		1.69	**2,450**		33.8	5.94	J	1.69	8.87	J	1.69	**545**		33.8	**454**		1.69	53.6		1.69	**2570**		33.8	**876**		33.8	-	-	-	ND		1.69	3.5	J	1.69
Antimony, Dissolved	6	NS	3.161		0.0699	0.3344	J	0.0699	0.4871	J	0.0699	0.5759	J	0.0699	0.3038	J	0.0699	0.4437	J	0.0699	0.4989	J	0.0699	0.4466	J	0.0699	0.5104	J	0.0699	0.2592	J	0.0699	-	-	-	0.4419	J	0.0699	0.5047	J	0.0699
Arsenic, Dissolved	3	NS	0.5307		0.123	0.2637	J	0.123	0.8921		0.123	0.2155	J	0.123	0.1903	J	0.123	0.2389	J	0.123	2.02		0.123	0.4295	J	0.123	1.256		0.123	1.884		0.123	-	-	-	ND		0.123	ND		0.123
Barium, Dissolved	6000	NS	74.41		0.0625	38.48		0.0625	19.9		0.0625	29.99		0.0625	34.25		0.0625	80.2		0.0625	86.11		0.0625	70.74		0.0625	61.11		0.0625	97.34		0.0625	-	-	-	ND		0.0625	ND		0.0625
Beryllium, Dissolved	1	NS	ND		0.15	ND		0.15	0.2778	J	0.15	ND		0.15	ND		0.15	0.3414	J	0.15	**1.127**		0.15	ND		0.15	0.782		0.15	0.4985	J	0.15	-	-	-	ND		0.15	ND		0.15
Cadmium, Dissolved	4	NS	0.1762	J	0.05	ND		0.05	ND		0.05	0.1955	J	0.05	0.2522		0.05	0.108	J	0.05	0.1469	J	0.05	ND		0.05	0.0519	J	0.05	0.2458		0.05	-	-	-	ND		0.05	ND		0.05
Calcium, Dissolved	NS	NS	31100		32	2410		32	1290		32	14800		32	14500		32	7680		32	1950		32	9270		32	2010		32	28800		32	-	-	-	ND		32	ND		32
Chromium, Dissolved	70	NS	0.5661	J	0.253	ND		0.253	0.4893	J	0.253	ND		0.253	0.5144	J	0.253	0.3008	J	0.253	0.3657	J	0.253	0.4322	J	0.253	0.7951	J	0.253	1.371		0.253	-	-	-	0.6198	J	0.253	0.7632	J	0.253
Cobalt, Dissolved	100	NS	14.37		0.0621	4.081		0.0621	3.849		0.0621	4.998		0.0621	5.783		0.0621	14.05		0.0621	16.95		0.0621	25		0.0621	6.764		0.0621	18.45		0.0621	-	-	-	ND		0.0621	ND		0.0621
Copper, Dissolved	1300	NS	0.481	J	0.262	ND		0.262	0.4084	J	0.262	ND		0.262	0.3362	J	0.262	0.8575	J	0.262	2.846		0.262	ND		0.262	3.832		0.262	4.62		0.262	-	-	-	ND		0.262	ND		0.262
Iron, Dissolved	300	NS	ND		12	**16,900**		12	**1,370**		12	ND		12	ND		12	12.7	J	12	88.6		12	275		12	17.8	J	12	**1,400**		12	-	-	-	ND		12	ND		12
Lead, Dissolved	5	NS	ND		0.129	ND		0.129	ND		0.129	ND		0.129	ND		0.129	0.2568	J	0.129	1.386		0.129	ND		0.129	1.184		0.129	0.3583	J	0.129	-	-	-	ND		0.129	ND		0.129
Magnesium, Dissolved	NS	NS	7580		22.3	1100		22.3	1140		22.3	6420		22.3	6030		22.3	2100		22.3	2440		22.3	1550		22.3	1770		22.3	2780		22.3	-	-	-	ND		22.3	ND		22.3
Manganese, Dissolved*	50	NS	**345.1**		0.302	**64.78**		0.302	14.28		0.302	14.24		0.302	17.14		0.302	**592.8**		6.04	**123.8**		0.302	**242.9**		0.302	**66.5**		0.302	**446.9**		0.302	-	-	-	ND		0.302	ND		0.302
Nickel, Dissolved	100	NS	6.333		0.0865	3.382		0.0865	4.797		0.0865	4.216		0.0865	6.755		0.0865	10.86		0.0865	16		0.0865	15.93		0.0865	9.997		0.0865	45.11		0.0865	-	-	-	1.821	J	0.0865	2.289	J	0.0865
Potassium, Dissolved	NS	NS	2290		19.3	688		19.3	946		19.3	1630		19.3	1510		19.3	2030		19.3	934		19.3	3360		19.3	1690		19.3	3660		19.3	-	-	-	ND		19.3	ND		19.3
Selenium, Dissolved	40	NS	4.36	J	1	ND		1	4.76	J	1	ND		1	ND		1	ND		1	ND		1	ND		1	4.22	J	1	8.94		1	-	-	-	ND		1	ND		1
Sodium, Dissolved	50000	NS	25200		16.1	7170		16.1	2820		16.1	11000		16.1	9850		16.1	10700		16.1	5780		16.1	17500		16.1	13600		16.1	18400		16.1	-	-	-	28.1	J	16.1	26.4	J	16.1
Thallium, Dissolved	2	NS	0.0847	J	0.0566	ND		0.0566	ND		0.0566	ND		0.0566	ND		0.0566	ND		0.0566	ND		0.0566	ND		0.0566	0.1593	J	0.0566	0.1483	J	0.0566	-	-	-	ND		0.0566	ND		0.0566
Vanadium, Dissolved	NS	NS	ND		0.551	ND		0.551	1.209	J	0.551	ND		0.551	ND		0.551	ND		0.551	ND		0.551	ND		0.551	ND		0.551	ND		0.551	-	-	-	ND		0.551	ND		0.551
Zinc, Dissolved	2000	NS	13.33		2.56	25.18		2.56	17.3		2.56	ND		2.56	ND		2.56	17.88		2.56	32.99		2.56	30.47		2.56	56.87		2.56	252.8		2.56	-	-	-	ND		2.56	ND		2.56
TOTAL TAL METALS																																									
Dilution Factor	-	-	*1*			*1*			*1/20*			*1*			*1/20/200*			*1/20*			*1/20*			*1/20/200*			*1/20*			*1/20*			*1*			*1*			*1*		
Aluminum, Total***	200	NS	**468**		1.69	170		1.69	**3,270**		33.8	**11,500**		338	**9,610**		33.8	**619**		33.8	**7,860**		33.8	**37,300**		338	**3,780**		33.8	**4,730**		33.8	-	-	-	ND		1.69	ND		1.69
Antimony, Total	6	NS	0.354	J	0.0699	0.17	J	0.0699	0.202	J	0.0699	0.25	J	0.0699	0.212	J	0.0699	0.146	J	0.0699	0.187	J	0.0699	0.486	J	0.0699	0.298	J	0.0699	0.274	J	0.0699	-	-	-	ND		0.0699	ND		0.0699
Arsenic, Total	3	NS	0.779		0.123	0.233	J	0.123	0.651		0.123	2.693		0.123	2.497		0.123	0.186	J	0.123	**10.12**		0.123	**24.01**		0.123	1.104		0.123	2.054		0.123	-	-	-	ND		0.123	ND		0.123
Barium, Total	6000	NS	82.23		0.0625	37.68		0.0625	21.22		0.0625	89.55		0.0625	79.57		0.0625	75.95		0.0625	127.8		0.0625	290.5		0.0625	61.44		0.0625	110.1		0.0625	-	-	-	0.0778	J	0.0625	0.1498	J	0.0625
Beryllium, Total	1	NS	0.192	J	0.15	ND		0.15	0.276	J	0.15	0.691		0.15	0.647		0.15	0.355	J	0.15	**2.488**		0.15	**5.907**		0.15	0.898		0.15	0.6		0.15	-	-	-	ND		0.15	ND		0.15
Cadmium, Total	4	NS	0.09	J	0.05	ND		0.05	ND		0.05	0.253		0.05	0.503		0.05	0.168	J	0.05	0.315		0.05	0.586		0.05	0.16	J	0.05	0.157	J	0.05	-	-	-	ND		0.05	ND		0.05
Calcium, Total	NS	NS	33600		32	2380		32	518		32	15200		32	15400		32	8270		32	2040		32	8640		32	2300		32	29400		32	-	-	-	ND		32	ND		32
Chromium, Total	70	NS	0.694	J	0.253	0.811	J	0.253	0.845	J	0.253	21.04		0.253	18.56		0.253	0.456	J	0.253	25.54		0.253	**115.4**		0.253	2.356		0.253	13.43		0.253	-	-	-	ND		0.253	ND		0.253
Cobalt, Total	100	NS	15.67		0.0621	4.026		0.0621	3.771		0.0621	10.05		0.0621	9.77		0.0621	14.06		0.0621	20.57		0.0621	80.96		0.0621	7.207		0.0621	18.48		0.0621	-	-	-	ND		0.0621	ND		0.0621
Copper, Total	1300	NS	1.213		0.262	0.786	J	0.262	0.948	J	0.262	13.32		0.262	13.25		0.262	1.174		0.262	29.44		0.262	111.6		0.262	6.295		0.262	10.39		0.262	-	-	-	0.461	J	0.262	ND		0.262
Iron, Total*	300	NS	**1,080**		12	**17,500**		12	**2,090**		12	**18,900**		12	**15,500**		12	**370**		12	**15,000**		12	**118,000**		240	**1,810**		12	**10,800**		12	-	-	-	ND		12	ND		12
Lead, Total	5	NS	0.669	J	0.129	ND		0.129	0.687	J	0.129	**11.86**		0.129	**12.73**		0.129	0.632	J	0.129	**22.49**		0.129	**133**		0.129	3.586		0.129	**5.918**		0.129	-	-	-	ND		0.129	ND		0.129
Magnesium, Total	NS	NS	8500		22.3	1200		22.3	1210		22.3	7100		22.3	7160		22.3	2320		22.3	3310		22.3	2310		22.3	2080		22.3	3190		22.3	-	-	-	ND		22.3	ND		22.3
Manganese, Total*	50	NS	**351.9**		0.302	**63.68**		0.302	12.67		0.302	**56.27**		0.302	48.14		0.302	**596**		6.04	**162.1**		0.302	**357.7**		0.302	**69.69**		0.302	**454**		0.302	-	-	-	ND		0.302	ND		0.302
Nickel, Total	100	NS	6.482		0.0865	6.707		0.0865	5.3		0.0865	11.74		0.0865	11.37		0.0865	11.32		0.0865	24.2		0.0865	92.6		0.0865	11.28		0.0865	46.62		0.0865	-	-	-	ND		0.0865	0.1346	J	0.0865
Potassium, Total	NS	NS	2220		19.3	658		19.3	832		19.3	2230		19.3	2090		19.3	1870		19.3	1650		19.3	3760		19.3	1600		19.3	3680		19.3	-	-	-	ND		19.3	ND		19.3
Selenium, Total	40	NS	1.28	J	1	ND		1	ND		1	1.74	J	1	1.83	J	1	ND		1	4.15	J	1	23.5		1	1.36	J	1	1.85	J	1	-	-	-	ND		1	ND		1
Silver, Total	40	NS	ND		0.0779	ND		0.0779	ND		0.0779	ND		0.0779	ND		0.0779	ND		0.0779	0.098	J	0.0779	0.242	J	0.0779	ND		0.0779	ND		0.0779	-	-	-	ND		0.0779	ND		0.0779
Sodium, Total	50000	NS	25200		16.1	6780		16.1	2900		16.1	10000		16.1	10000		16.1	10200		16.1	5610		16.1	13300		16.1	14000		16.1	18200		16.1	-	-	-	ND		16.1	ND		16.1
Thallium, Total	2	NS	0.1	J	0.0566	ND		0.0566	ND		0.0566	0.171	J	0.0566	0.166	J	0.0566	ND		0.0566	0.198	J	0.0566	0.636		0.0566	0.18	J	0.0566	0.199	J	0.0566	-	-	-	ND		0.0566	ND		0.0566
Vanadium, Total	NS	NS	0.684	J	0.551	ND		0.551	3.099	J	0.551	13.93		0.551	14.71		0.551	0.62	J	0.551	61.75		0.551	182.8		0.551	4.643	J	0.551	16.15		0.551	-	-	-	ND		0.551	ND		0.551
Zinc, Total	2000	NS	24.27		2.56	32.71		2.56	26.33		2.56	18.99		2.56	14.66		2.56	25.43		2.56	88.34		2.56	243		2.56	68.16		2.56	274		2.56	-	-	-	ND		2.56	ND		2.56
GENERAL CHEMISTRY																																									
Dilution Factor	-	-	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Total Cyanide	100	NS	ND		1.8	ND		1.8	ND		1.8	ND		1.8	3.62	J	1.8	ND		1.8	ND		1.8	ND		1.8	ND		1.8	ND		1.8	-	-	-	ND		1.8	ND		1.8
PESTICIDES																																									
Dilution Factor	-	-	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Total Pesticides			ND		-	ND		-	ND		-	ND		-	ND		-	ND		-	ND		-	ND		-	ND		-	ND		-	-	-	-	ND		-	ND		-

Notes:

TCL - EPA Target Compound List

TAL - EPA Target Analyte List

Conc = Concentration

J - The concentration was detected at a value below the RL and above the MDL

MDL = Method Detection Limit

ND - Analyzed for but Not Detected at the MDL

NS - No Standard Available

Q - Qualifier

Bold/Shaded - Conc exceeds NJDEP Class IIA GWQS (July 2008)

Italic - Conc exceeds NJDEP VI GWSL

Bold MDL - MDL exceeds NJDEP Class IIA GWQS and/or NJDEP VI GWSL

* - Dilution factor of 20 for analyte.

** - Dilution factor of 200 for analyte.

TABLE
Groundwater Monitoring Well Gauging Data
Collected July 20, 2016

MANZO PROPERTY
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

Monitoring Well Location	Screened Interval *(ft bgs)*	TDW *(ft bgs)*	TOC Elevation *(ft amsl)*	DTW [(1)] *(ft bTOC)*	Groundwater Elevation *(ft amsl)*
MW-1	25-35	35	59.6	30.38	29.22
MW-2	22-32	32	62.22	33.22	29.00
MW-3	15-30	30	60.43	21.88	38.55
MW-4	15-30	30	65.36	NE	--
MW-5	20-30	30	65.24	24.16	41.08
MW-6	13-28	28	102.46	17.56	84.90
MW-7	5-20	20	91.39	9.12	82.27
MW-8	14-25	25	102.02	20.23	81.79
MW-9	25-40	40	87.04	NE	--
MW-10D	58.5-73.5	73.5	93.03	61.37	31.66
MW-11D	53-68	68	91.26	60.35	30.91

NOTES:
amsl - above mean sea level
bgs - below ground surface
bTOC - Below Top of Casing
DTW - Depth to Water
ft - feet
ID - Identifier
NE - Groundwater not encountered
TOC - Top of Casing
TDW - Total Depth of Well (well record)

[(1)] Measurements are from top of pvc inner casing. All wells are are 3-foot stick up wells.

DRAFT

TABLE 1 - Parcel A
Summary of Soil Analytical Results

Manzo Property (Block 5001, Lot 13.14)
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

BORING ID:				SB-PA-1			SB-PA-1			SB-PA-2			SB-PA-2			SB-PA-3			SB-PA-4			SB-PA-4			SB-PA-5		
SAMPLE ID:	NJDEP	NJDEP	NJDEP	SBPA1-4.0			*DUP 5 (SBPA1-4.0)*			SBPA2-0.5			SBPA2-3.5			SBPA3-5.0			SBPA4-1.0			*DUP 3 (SBPA4-1.0)*			SBPA5-1.0		
LAB ID:				L1618570-07			L1618570-08			L1618570-01			L1618570-02			L1618570-15			L1618570-13			L1618570-12			L1618570-10		
COLLECTION DATE:	DIGWSSL	NRDCSRS	RDCSRS	6/16/2016			6/16/2016			6/16/2016			6/16/2016			6/16/2016			6/16/2016			6/16/2016			6/16/2016		
SAMPLE DEPTH (ft bgs):				3.5-4.0			3.5-4.0			0.0-0.5			3.0-3.5			4.5-5.0			0.5-1.0			0.5-1.0			0.5-1.0		
SAMPLE MATRIX:				SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL		
				Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Compounds/Analytes *(units)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*		
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																											
Dilution Factor	--	--	--													*1*											
2-Butanone	0.9	44000	3100	-		-	-		-	-		-	-		-	ND		0.019	-		-	-		-	-		-
Acetone	19	NS	70000	-		-	-		-	-		-	-		-	ND		0.074	-		-	-		-	-		-
Benzene	0.005	5	2	-		-	-		-	-		-	-		-	ND		0.0084	-		-	-		-	-		-
Methyl Acetate	22	NS	78000	-		-	-		-	-		-	-		-	0.82		0.019	-		-	-		-	-		-
Toluene	7	91000	6300	-		-	-		-	-		-	-		-	ND		0.014	-		-	-		-	-		-
Total VOCs	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	0.82	-	-	-	-	-	-	-	-	-	-	-
Total VOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	2.58	J	0	-		-	-		-	-		-
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*						*1*			*1*			*5*		
2-Methylnaphthalene	8	2400	230	ND		0.0021	ND		0.0021	0.011	J	0.01	ND		0.002	-		-	ND		0.0021	ND		0.0021	0.011	J	0.011
Acenaphthene	110	37000	3400	ND		0.0015	ND		0.0015	ND		0.0078	ND		0.0015	-		-	ND		0.0016	ND		0.0016	ND		0.0078
Acenaphthylene	NS	300000	NS	ND		0.00092	ND		0.00092	0.03	J	0.0046	0.0015	J	0.0009	-		-	ND		0.00093	ND		0.00094	0.03	J	0.0046
Anthracene	2400	30000	17000	ND		0.00059	ND		0.00059	0.034	J	0.003	0.0023	J	0.00057	-		-	ND		0.0006	ND		0.0006	0.034	J	0.003
Benzo(a)anthracene	0.8	2	0.6	0.0012	J	0.0007	ND		0.0007	0.082		0.0035	0.0047	J	0.00068	-		-	ND		0.00071	ND		0.00071	0.082		0.0035
Benzo(a)pyrene	0.2	0.2	0.2	0.0024	J	0.00088	ND		0.00088	0.089		0.0045	0.0091		0.00086	-		-	ND		0.00089	ND		0.0009	0.089		0.0045
Benzo(b)fluoranthene	2	2	0.6	0.0039	J	0.0007	ND		0.0007	0.1		0.0035	0.01		0.00068	-		-	ND		0.00071	ND		0.00071	0.1		0.0035
Benzo(ghi)perylene	NS	30000	380000	0.0028	J	0.00062	ND		0.00062	0.062		0.0032	0.015		0.00061	-		-	ND		0.00063	ND		0.00064	0.062		0.0032
Benzo(k)fluoranthene	25	23	6	0.0013	J	0.00066	ND		0.00066	0.034	J	0.0033	0.003	J	0.00064	-		-	ND		0.00067	ND		0.00068	0.033	J	0.0033
Chrysene	80	230	62	0.0012	J	0.00055	ND		0.00055	0.087		0.0028	0.0063	J	0.00054	-		-	ND		0.00056	ND		0.00056	0.087		0.0028
Dibenzo(a,h)anthracene	0.8	0.2	0.2	0.00077	J	0.00073	ND		0.00073	0.017	J	0.0037	0.0079		0.00072	-		-	ND		0.00074	ND		0.00075	0.017	J	0.0037
Fluoranthene	1300	24000	2300	0.0013	J	0.00051	ND		0.00051	0.16		0.0026	0.0094		0.0005	-		-	ND		0.00052	ND		0.00052	0.16		0.0026
Fluorene	170	24000	2300	ND		0.00088	ND		0.00088	0.01	J	0.0045	ND		0.00086	-		-	ND		0.00089	ND		0.0009	0.011	J	0.0045
Indeno(1,2,3-cd)pyrene	7	2	0.6	0.0029	J	0.00088	ND		0.00088	0.06		0.0045	0.0082		0.00086	-		-	ND		0.00089	ND		0.0009	0.061		0.0045
Naphthalene	25	17	6	ND		0.0013	ND		0.0013	ND		0.0067	ND		0.0013	-		-	ND		0.0013	ND		0.0014	ND		0.0067
Phenanthrene	NS	300000	NS	ND		0.00062	ND		0.00062	0.076		0.0032	0.0053	J	0.00061	-		-	ND		0.00063	ND		0.00064	0.076		0.0032
Pyrene	840	18000	1700	0.00095	J	0.00051	ND		0.00051	0.15		0.0026	0.0088		0.0005	-		-	ND		0.00052	ND		0.00052	0.15		0.0026
TCL SEMIVOLATILE ORGANIC COMPOUNDS (SVOC)																											
Dilution Factor	--	--	--													*1*											
Benzo(a)anthracene	0.8	2	0.6	-		-	-		-	-		-	-		-	ND		0.023	-		-	-		-	-		-
Benzo(a)pyrene	0.2	0.2	0.2	-		-	-		-	-		-	-		-	ND		0.05	-		-	-		-	-		-
Benzo(b)fluoranthene	2	2	0.6	-		-	-		-	-		-	-		-	ND		0.017	-		-	-		-	-		-
Benzo(ghi)perylene	NS	30000	380000	-		-	-		-	-		-	-		-	ND		0.024	-		-	-		-	-		-
Benzo(k)fluoranthene	25	23	6	-		-	-		-	-		-	-		-	ND		0.014	-		-	-		-	-		-
Bis(2-ethylhexyl)phthalate	1200	140	35	-		-	-		-	-		-	-		-	ND		0.021	-		-	-		-	-		-
Chrysene	80	230	62	-		-	-		-	-		-	-		-	ND		0.021	-		-	-		-	-		-
Fluoranthene	1300	24000	2300	-		-	-		-	-		-	-		-	ND		0.023	-		-	-		-	-		-
Indeno(1,2,3-cd)pyrene	7	2	0.6	-		-	-		-	-		-	-		-	ND		0.028	-		-	-		-	-		-
Phenanthrene	NS	300000	NS	-		-	-		-	-		-	-		-	ND		0.015	-		-	-		-	-		-
Pyrene	840	18000	1700	-		-	-		-	-		-	-		-	ND		0.018	-		-	-		-	-		-
Total SVOCs	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total SVOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	81.796	J	0	-		-	-		-	-		-
PESTICIDES																											
Dilution Factor	--	--	--													*1*											
4,4'-DDE	18	9	2	-		-	-		-	-		-	-		-	ND		0.00044	-		-	-		-	-		-
4,4'-DDT	11	8	2	-		-	-		-	-		-	-		-	ND		0.00153	-		-	-		-	-		-
cis-Chlordane	0.05	1	0.2	-		-	-		-	-		-	-		-	ND		0.00066	-		-	-		-	-		-
POLYCHLORINATED BIPHENYLS (PCB)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Aroclor 1260	0.2	1	0.2	ND		0.00278	ND		0.00277	0.00465	J	0.0028	0.00412	J	0.00273	ND		0.00306	ND		0.0028	ND		0.00284	0.00894	J	0.00276
Total PCBs	0.2	1	0.2	ND		0.00181	ND		0.0018	0.00465	J	0.00182	0.00412	J	0.00178	ND		0.00199	ND		0.00182	ND		0.00185	0.00894	J	0.0018
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)																											
Dilution Factor	--	--	--													*1*											
Total EPH	NS	NS	NS	-		-	-		-	-		-	-		-	207		29.3	-		-	-		-	-		-
TAL METALS																											
Dilution Factor	--	--	--	*2*			*2*			*2*			*2*			*2*			*2/10**			*2/10**			*2*		
Aluminum, Total	6000	NS	78000	14000		1.7	18000		1.7	8900		1.7	10000		1.7	13000		2	19000		1.7	20000		1.8	7900		1.7
Antimony, Total	6	450	31	ND		0.69	ND		0.69	ND		0.7	ND		0.71	ND		0.8	ND		3.4	ND		3.6	ND		0.69
Arsenic, Total	19	19	19	0.92		0.28	1.2		0.28	4.6		0.29	5.3		0.29	5.6		0.33	15		0.28	8.5		0.3	4.9		0.28
Barium, Total	2100	59000	16000	93		0.23	110		0.23	40		0.24	48		0.24	37		0.27	130		0.23	150		0.24	25		0.23
Beryllium, Total	0.7	140	16	0.36	J	0.1	0.48		0.09	0.24	J	0.1	0.29	J	0.1	0.39	J	0.11	0.65		0.1	0.88		0.1	0.4	J	0.1
Cadmium, Total	2	78	78	ND		0.06	ND		0.06	ND		0.06	ND		0.06	ND		0.07	ND		0.06	ND		0.06	ND		0.06
Calcium, Total	NS	NS	NS	54		2.4	130		2.4	2800		2.4	4800		2.4	880		2.7	33		2.4	15		2.5	5900		2.4
Chromium, Total	NS	NS	NS	5.9		0.15	7.4		0.15	44		0.15	77		0.15	18		0.17	12		0.15	13		0.15	92		0.15
Cobalt, Total	90	590	1600	2.4		0.42	4.6		0.42	3.5		0.43	3.5		0.43	3.4		0.49	3.5		0.42	12		0.44	7		0.42
Copper, Total	11000	45000	3100	2.8		0.16	4.6		0.15	170		0.16	330		0.16	11		0.18	3.6		0.16	3.8		0.16	390		0.16
Iron, Total	NS	NS	NS	12000		1.4	16000		1.4	13000		1.4	14000		1.4	18000		1.6	40000		1.4	49000		1.4	16000		1.4
Lead, Total	90	800	400	3.5	J	0.19	4.6		0.19	18		0.19	26		0.19	13		0.22	4.4		0.19	6.5		0.2	48		0.19
Magnesium, Total	NS	NS	NS	130		1.1	330		1.1	600		1.2	830		1.2	1000		1.3	180		1.1	170		1.2	1400		1.1
Manganese, Total	65	5900	11000	28		0.21	42		0.21	61		0.21	38		0.21	51		0.24	24		0.21	200		0.22	52		0.21
Mercury, Total	0.1	65	23	ND		0.02	ND		0.02	0.04	J	0.02	0.04	J	0.02	0.03	J	0.02	ND		0.02	ND		0.02	0.07	J	0.02
Nickel, Total	48	23000	1600	7.3		0.34	10		0.34	6.3		0.35	6.6		0.35	6.7		0.4	10		0.34	11		0.36	28		0.34
Potassium, Total	NS	NS	NS	120	J	24	230		24	350		24	280		25	420		28	370		24	320		25	880		24
Selenium, Total	11	5700	390	ND		0.23	ND		0.23	ND		0.24	ND		0.24	ND		0.27	ND		0.23	ND		0.24	ND		0.23
Silver, Total	1	5700	390	ND		0.17	ND		0.17	ND		0.17	ND		0.18	ND		0.2	ND		0.17	ND		0.18	ND		0.17
Sodium, Total	NS	NS	NS	ND		14	18	J	14	27	J	14	37	J	15	29	J	17	ND		14	ND		15	280		14
Thallium, Total	3	79	5	ND		0.28	ND		0.28	ND		0.28	ND		0.28	ND		0.32	ND		0.28	ND		0.29	ND		0.28
Vanadium, Total	NS	1100	78	16		0.08	21		0.08	21		0.08	24		0.08	31		0.09	20		0.08	21		0.08	39		0.08
Zinc, Total	930	110000	23000	18		0.6	28		0.6	32		0.61	30		0.62	21		0.7	27		0.6	33		0.63	170		0.6
GENERAL CHEMISTRY																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Cyanide, Total	20	23000	1600	-		-	-		-	-		-	-		-	ND		0.2	-		-	-		-	-		-
Solids, Total	NS	NS	NS	90.6		NS	90.8		NS	88.1		NS	90		NS	79.5		NS	89		NS	87.8		NS	88.1		NS

TCL - EPA Target Compound List
TAL - EPA Target Analyte List
Conc = Concentration
DIGWSSL - Default Impact to Groundwater Soil Screening Levels
NRDCSRS - Non Residential Direct Contact Soil Remediation Standards
RDCSRS - Residential Direct Contact Soil Remediation Standards
J = The concentration was detected at a value below the RL and above the MDL
MDL = Method Detection Limit
ND = Analyzed for but Not Detected at the MDL
NS - No Standard Available
Q = Qualifier
Shaded cell concentration exceeds the NJDEP Non Residential SRS (5/2012).
Bolded concentration exceeds the NJDEP Residential SRS (5/2012).
Underline concentration exceeds NJDEP DIGWSSL (11/2013)
* - Dilution factor of 10 for total Antimony.

DRAFT

TABLE 1 - Parcel A
Summary of Soil Analytical Results

Manzo Property (Block 5001, Lot 13.14)
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

BORING ID:				SB-PA-6			SB-PA-6			SB-PA-7			SB-PA-7			SB-PA-8			SB-PA-8			SB-PA-8			SB-PA-9		
SAMPLE ID:	NJDEP	NJDEP	NJDEP	SBPA6-3.0			SBPA6-10.0			SBPA7-3.0			SBPA7-10.0			SBPA8-1.5			SBPA8-13.0			*DUP 4 (SBPA8-13.0)*			SBPA9-0.5		
LAB ID:				L1618570-03			L1618570-04			L1618570-11			L1618570-14			L1618570-09			L1618570-05			L1618570-06			L1618780-02		
COLLECTION DATE:	DIGWSSL	NRDCSRS	RDCSRS	6/16/2016			6/16/2016			6/16/2016			6/16/2016			6/16/2016			6/16/2016			6/16/2016			6/16/2016		
SAMPLE DEPTH (ft bgs):				2.5-3.0			9.5-10.0			2.5-3.0			9.5-10.0			1.0-1.5			12.5-13.0			12.5-13.0			0.0-0.5		
SAMPLE MATRIX:				SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL		
				Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Compounds/Analytes *(units)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*		
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																											
Dilution Factor	--	--	--																								
2-Butanone	0.9	44000	3100	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Acetone	19	NS	70000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzene	0.005	5	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Methyl Acetate	22	NS	78000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Toluene	7	91000	6300	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Total VOCs	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total VOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
2-Methylnaphthalene	8	2400	230	ND		0.002	ND		0.002	ND		0.002	ND		0.0024	ND		0.0021	ND		0.0024	ND		0.0021	ND		0.0021
Acenaphthene	110	37000	3400	ND		0.0015	ND		0.0015	ND		0.0015	ND		0.0018	ND		0.0015	ND		0.0017	ND		0.0016	ND		0.0016
Acenaphthylene	NS	300000	NS	ND		0.00088	ND		0.00089	ND		0.00088	ND		0.001	0.002	J	0.00091	ND		0.001	ND		0.00093	ND		0.00093
Anthracene	2400	30000	17000	ND		0.00056	ND		0.00057	ND		0.00057	ND		0.00067	0.002	J	0.00058	ND		0.00066	ND		0.00059	0.00089	J	0.00059
Benzo(a)anthracene	0.8	2	0.6	ND		0.00067	ND		0.00068	ND		0.00067	ND		0.0008	0.0071	J	0.00069	ND		0.00079	ND		0.00071	0.004	J	0.0007
Benzo(a)pyrene	0.2	0.2	0.2	ND		0.00084	ND		0.00086	ND		0.00085	ND		0.001	0.008		0.00087	ND		0.00099	ND		0.00089	0.0043	J	0.00089
Benzo(b)fluoranthene	2	2	0.6	ND		0.00067	ND		0.00068	ND		0.00067	ND		0.0008	0.011		0.00069	ND		0.00079	ND		0.00071	0.0063	J	0.0007
Benzo(ghi)perylene	NS	30000	380000	ND		0.0006	ND		0.00061	ND		0.0006	ND		0.00072	0.0064	J	0.00062	ND		0.0007	ND		0.00063	0.0038	J	0.00063
Benzo(k)fluoranthene	25	23	6	ND		0.00063	ND		0.00064	ND		0.00064	ND		0.00076	0.0037	J	0.00065	ND		0.00074	ND		0.00067	0.0018	J	0.00067
Chrysene	80	230	62	ND		0.00053	ND		0.00053	ND		0.00053	ND		0.00063	0.0096		0.00054	ND		0.00062	ND		0.00056	0.0046	J	0.00056
Dibenzo(a,h)anthracene	0.8	0.2	0.2	ND		0.0007	ND		0.00071	ND		0.00071	ND		0.00084	0.0016	J	0.00073	ND		0.00083	ND		0.00074	ND		0.00074
Fluoranthene	1300	24000	2300	ND		0.00049	ND		0.0005	ND		0.0005	ND		0.00059	0.018		0.00051	ND		0.00058	ND		0.00052	0.0085		0.00052
Fluorene	170	24000	2300	ND		0.00084	ND		0.00086	ND		0.00085	ND		0.001	ND		0.00087	ND		0.00099	ND		0.00089	ND		0.00089
Indeno(1,2,3-cd)pyrene	7	2	0.6	ND		0.00084	ND		0.00086	ND		0.00085	ND		0.001	0.0062	J	0.00087	ND		0.00099	ND		0.00089	0.0028	J	0.00089
Naphthalene	25	17	6	ND		0.0013	ND		0.0013	ND		0.0013	ND		0.0015	0.0013	J	0.0013	ND		0.0015	ND		0.0013	0.0015	J	0.0013
Phenanthrene	NS	300000	NS	ND		0.0006	ND		0.00061	ND		0.0006	ND		0.00072	0.01		0.00062	ND		0.0007	ND		0.00063	0.0034	J	0.00063
Pyrene	840	18000	1700	ND		0.00049	ND		0.0005	ND		0.0005	ND		0.00059	0.016		0.00051	ND		0.00058	ND		0.00052	0.0072	J	0.00052
TCL SEMIVOLATILE ORGANIC COMPOUNDS (SVOC)																											
Dilution Factor	--	--	--																*1*			*1*					
Benzo(a)anthracene	0.8	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(a)pyrene	0.2	0.2	0.2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(b)fluoranthene	2	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(ghi)perylene	NS	30000	380000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(k)fluoranthene	25	23	6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Bis(2-ethylhexyl)phthalate	1200	140	35	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Chrysene	80	230	62	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Fluoranthene	1300	24000	2300	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Indeno(1,2,3-cd)pyrene	7	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Phenanthrene	NS	300000	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Pyrene	840	18000	1700	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Total SVOCs	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total SVOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
PESTICIDES																											
Dilution Factor	--	--	--																								
4,4'-DDE	18	9	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
4,4'-DDT	11	8	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
cis-Chlordane	0.05	1	0.2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
POLYCHLORINATED BIPHENYLS (PCB)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Aroclor 1260	0.2	1	0.2	ND		0.00267	ND		0.00268	ND		0.00271	ND		0.00311	ND		0.00273	ND		0.00306	ND		0.00273	ND		0.00288
Total PCBs	0.2	1	0.2	ND		0.00174	ND		0.00175	ND		0.00176	ND		0.00202	ND		0.00178	ND		0.00199	ND		0.00178	ND		0.00188
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)																											
Dilution Factor	--	--	--																								
Total EPH	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
TAL METALS																											
Dilution Factor	--	--	--	*2*			*2*			*2*			*2*			*2*			*2*			*2*			*2*		
Aluminum, Total	6000	NS	78000	6100		1.6	12000		1.6	9600		1.7	11000		2	11000		1.7	8600		1.9	7900		1.7	9300		1.7
Antimony, Total	6	450	31	ND		0.67	ND		0.66	ND		0.68	ND		0.8	ND		0.68	ND		0.77	ND		0.69	ND		0.69
Arsenic, Total	19	19	19	4.5		0.28	1.5		0.27	5.1		0.28	2		0.33	5.1		0.28	3.2		0.32	2.6		0.28	3.9		0.28
Barium, Total	2100	59000	16000	17		0.22	55		0.22	31		0.23	48		0.27	54		0.23	180		0.26	170		0.23	24		0.23
Beryllium, Total	0.7	140	16	0.32	J	0.09	0.38	J	0.09	0.47		0.09	0.38	J	0.11	0.58		0.09	0.74		0.1	0.6		0.1	0.38	J	0.1
Cadmium, Total	2	78	78	ND		0.06	ND		0.06	ND		0.06	ND		0.07	0.11	J	0.06	ND		0.07	ND		0.06	ND		0.06
Calcium, Total	NS	NS	NS	120		2.3	84		2.3	22		2.3	38		2.8	190		2.4	59		2.6	41		2.4	87		2.4
Chromium, Total	NS	NS	NS	15		0.14	5.6		0.14	21		0.14	3.8		0.17	12		0.14	10		0.16	4.4		0.15	11		0.15
Cobalt, Total	90	590	1600	3.4		0.41	3.2		0.41	9.3		0.41	18		0.49	17		0.42	79		0.47	81		0.42	4.3		0.42
Copper, Total	11000	45000	3100	4.5		0.15	2.3		0.15	4.8		0.15	2.6		0.18	87		0.15	3.4		0.17	2.7		0.16	6.1		0.16
Iron, Total	NS	NS	NS	17000		1.3	11000		1.3	24000		1.3	10000		1.6	22000		1.4	17000		1.5	15000		1.4	14000		1.4
Lead, Total	90	800	400	4.4		0.18	2.8	J	0.18	5.8		0.19	5		0.22	17		0.19	3.3	J	0.21	4	J	0.19	5.8		0.19
Magnesium, Total	NS	NS	NS	470		1.1	210		1.1	170		1.1	240		1.3	320		1.1	260		1.3	150		1.2	850		1.2
Manganese, Total	65	5900	11000	93		0.2	120		0.2	200		0.2	790		0.24	110		0.2	2800		0.23	2900		0.21	82		0.21
Mercury, Total	0.1	65	23	ND		0.02	ND		0.02	0.02	J	0.02	ND		0.02	0.07	J	0.02	ND		0.02	ND		0.02	0.03	J	0.02
Nickel, Total	48	23000	1600	5.2		0.33	6.2		0.33	6.8		0.34	6		0.4	52		0.34	11		0.38	8.9		0.35	6.8		0.35
Potassium, Total	NS	NS	NS	200	J	23	100	J	23	200	J	24	83	J	28	260		24	110	J	27	100	J	24	380		24
Selenium, Total	11	5700	390	ND		0.22	ND		0.22	ND		0.23	ND		0.27	0.26	J	0.23	ND		0.26	ND		0.23	ND		0.23
Silver, Total	1	5700	390	ND		0.17	ND		0.17	ND		0.17	ND		0.2	ND		0.17	ND		0.19	ND		0.17	ND		0.17
Sodium, Total	NS	NS	NS	ND		14	17	J	14	ND		14	ND		17	1500		14	ND		16	ND		14	ND		14
Thallium, Total	3	79	5	ND		0.27	ND		0.27	ND		0.27	ND		0.32	ND		0.27	2		0.31	2		0.28	ND		0.28
Vanadium, Total	NS	1100	78	25		0.08	11		0.08	26		0.08	7		0.09	20		0.08	9.4		0.09	8.3		0.08	22		0.08
Zinc, Total	930	110000	23000	13		0.58	12		0.58	20		0.59	15		0.7	110		0.6	27		0.67	22		0.6	18		0.61
GENERAL CHEMISTRY																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Cyanide, Total	20	23000	1600	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Solids, Total	NS	NS	NS	93.8		NS	92		NS	92.7		NS	77.5		NS	89.9		NS	80.2		NS	88.3		NS	88		NS

TCL - EPA Target Compound List
TAL - EPA Target Analyte List
Conc = Concentration
DIGWSSL - Default Impact to Groundwater Soil Screening Levels
NRDCSRS - Non Residential Direct Contact Soil Remediation Standards
RDCSRS - Residential Direct Contact Soil Remediation Standards
J = The concentration was detected at a value below the RL and above the MDL
MDL = Method Detection Limit
ND = Analyzed for but Not Detected at the MDL
NS - No Standard Available
Q = Qualifier
Shaded cell concentration exceeds the NJDEP Non Residential SRS (5/2012).
Bolded concentration exceeds the NJDEP Residential SRS (5/2012).
Underline concentration exceeds NJDEP DIGWSSL (11/2013)
* - Dilution factor of 10 for total Antimony.

DRAFT

TABLE 1 - Parcel A
Summary of Soil Analytical Results

Manzo Property (Block 5001, Lot 13.14)
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

BORING ID:				SB-PA-10			SB-PA-11			SB-PA-12			SB-PA-13			SB-PA-14			SB-PA-14			SB-PA-14			SB-PA-15		
SAMPLE ID:	NJDEP	NJDEP	NJDEP	SBPA10-1.0			SBPA11-0.5			SBPA12-2.0			SBPA13-1.0			SBPA14-2.5			SBPA14-7.5			SBPA14-12.5			SBPA15-2.5		
LAB ID:				L1618780-04			L1618780-01			L1618377-01			L1618566-01			L1618377-02			L1618377-03			L1618377-04			L1618377-05		
COLLECTION DATE:	DIGWSSL	NRDCSRS	RDCSRS	6/16/2016			6/16/2016			6/15/2016			6/15/2016			6/15/2016			6/15/2016			6/15/2016			6/15/2016		
SAMPLE DEPTH (ft bgs):				0.5-1.0			0.0-0.5			1.5-2.0			0.5-1.0			2.0-2.5			7.0-7.5			12.0-12.5			2.0-2.5		
SAMPLE MATRIX:				SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL		
				Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Compounds/Analytes *(units)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*		
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																											
Dilution Factor	--	--	--																								
2-Butanone	0.9	44000	3100	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Acetone	19	NS	70000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzene	0.005	5	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Methyl Acetate	22	NS	78000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Toluene	7	91000	6300	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Total VOCs	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total VOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
2-Methylnaphthalene	8	2400	230	ND		0.002	ND		0.0022	ND		0.0021	0.0077		0.0022	ND		0.002	ND		0.0022	ND		0.0024	0.0088		0.0022
Acenaphthene	110	37000	3400	ND		0.0015	ND		0.0016	ND		0.0016	0.012		0.0016	ND		0.0015	ND		0.0016	ND		0.0018	ND		0.0016
Acenaphthylene	NS	300000	NS	ND		0.00088	ND		0.00095	ND		0.00093	0.01		0.00095	ND		0.00088	ND		0.00098	ND		0.001	0.0037	J	0.00094
Anthracene	2400	30000	17000	ND		0.00056	0.00084	J	0.00061	ND		0.0006	0.037		0.00061	ND		0.00056	ND		0.00063	ND		0.00067	0.0045	J	0.0006
Benzo(a)anthracene	0.8	2	0.6	ND		0.00067	0.0039	J	0.00072	ND		0.00071	0.084		0.00072	ND		0.00067	ND		0.00075	ND		0.00079	0.015		0.00072
Benzo(a)pyrene	0.2	0.2	0.2	ND		0.00084	0.0039	J	0.00091	ND		0.00089	0.07		0.00091	ND		0.00084	ND		0.00094	ND		0.001	0.019		0.00091
Benzo(b)fluoranthene	2	2	0.6	ND		0.00067	0.0064	J	0.00072	ND		0.00071	0.1		0.00072	ND		0.00067	ND		0.00075	ND		0.00079	0.026		0.00072
Benzo(ghi)perylene	NS	30000	380000	ND		0.0006	0.0036	J	0.00064	ND		0.00063	0.048		0.00064	ND		0.0006	ND		0.00067	ND		0.00071	0.016		0.00064
Benzo(k)fluoranthene	25	23	6	ND		0.00063	0.0017	J	0.00068	ND		0.00067	0.027		0.00068	ND		0.00063	ND		0.00071	ND		0.00075	0.0085		0.00068
Chrysene	80	230	62	ND		0.00053	0.0042	J	0.00057	ND		0.00056	0.077		0.00057	ND		0.00053	ND		0.00059	ND		0.00062	0.021		0.00057
Dibenzo(a,h)anthracene	0.8	0.2	0.2	ND		0.0007	0.00076	J	0.00076	ND		0.00074	0.012		0.00076	ND		0.0007	ND		0.00079	ND		0.00083	0.0046	J	0.00076
Fluoranthene	1300	24000	2300	ND		0.00049	0.0078		0.00053	ND		0.00052	0.21		0.00053	ND		0.00049	ND		0.00055	ND		0.00058	0.029		0.00053
Fluorene	170	24000	2300	ND		0.00084	ND		0.00091	ND		0.00089	0.016		0.00091	ND		0.00084	ND		0.00094	ND		0.001	ND		0.00091
Indeno(1,2,3-cd)pyrene	7	2	0.6	ND		0.00084	0.0028	J	0.00091	ND		0.00089	0.04		0.00091	ND		0.00084	ND		0.00094	ND		0.001	0.015		0.00091
Naphthalene	25	17	6	ND		0.0013	ND		0.0014	ND		0.0013	0.0076		0.0014	ND		0.0013	ND		0.0014	ND		0.0015	0.0071	J	0.0014
Phenanthrene	NS	300000	NS	ND		0.0006	0.0034	J	0.00064	ND		0.00063	0.17		0.00064	ND		0.0006	ND		0.00067	ND		0.00071	0.018		0.00064
Pyrene	840	18000	1700	ND		0.00049	0.0064	J	0.00053	ND		0.00052	0.16		0.00053	ND		0.00049	ND		0.00055	ND		0.00058	0.026		0.00053
TCL SEMIVOLATILE ORGANIC COMPOUNDS (SVOC)																											
Dilution Factor	--	--	--																								
Benzo(a)anthracene	0.8	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(a)pyrene	0.2	0.2	0.2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(b)fluoranthene	2	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(ghi)perylene	NS	30000	380000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(k)fluoranthene	25	23	6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Bis(2-ethylhexyl)phthalate	1200	140	35	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Chrysene	80	230	62	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Fluoranthene	1300	24000	2300	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Indeno(1,2,3-cd)pyrene	7	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Phenanthrene	NS	300000	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Pyrene	840	18000	1700	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Total SVOCs	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total SVOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
PESTICIDES																											
Dilution Factor	--	--	--																								
4,4'-DDE	18	9	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
4,4'-DDT	11	8	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
cis-Chlordane	0.05	1	0.2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
POLYCHLORINATED BIPHENYLS (PCB)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Aroclor 1260	0.2	1	0.2	ND		0.00268	ND		0.0029	ND		0.00278	0.00451	J	0.00285	ND		0.00261	ND		0.00286	ND		0.00301	0.00587	J	0.00288
Total PCBs	0.2	1	0.2	ND		0.00174	ND		0.00189	ND		0.00181	0.00451	J	0.00186	ND		0.0017	ND		0.00186	ND		0.00196	0.00587	J	0.00187
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)																											
Dilution Factor	--	--	--																								
Total EPH	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
TAL METALS																											
Dilution Factor	--	--	--	*2*			*2*			*2/10**						*2*			*2/10**			*2*			*2*		
Aluminum, Total	6000	NS	78000	8700		1.7	10000		1.8	6700		1.7	6600		1.8	9000		1.6	9700		1.8	500		1.9	6000		1.8
Antimony, Total	6	450	31	ND		3.4	ND		0.72	ND		0.69	1.3	J	0.73	ND		0.67	ND		0.75	ND		0.78	1	J	0.71
Arsenic, Total	19	19	19	14		0.28	6.4		0.3	12		0.29	10		0.3	7.2		0.28	**32**		0.31	0.37	J	0.32	11		0.29
Barium, Total	2100	59000	16000	15		0.23	22		0.24	11		0.23	13		0.25	30		0.23	58		0.25	2.8		0.26	28		0.24
Beryllium, Total	0.7	140	16	1.3		0.09	0.32	J	0.1	0.42	J	0.1	0.24	J	0.1	0.42		0.09	1.1		0.1	ND		0.11	0.35	J	0.1
Cadmium, Total	2	78	78	ND		0.06	ND		0.06	ND		0.06	ND		0.06	ND		0.06	ND		0.07	ND		0.07	ND		0.06
Calcium, Total	NS	NS	NS	95		2.3	86		2.5	26		2.4	30		2.5	23		2.3	28		2.6	3.1	J	2.7	730		2.4
Chromium, Total	NS	NS	NS	150		0.14	19		0.15	24		0.15	11		0.16	13		0.14	12		0.16	1.4		0.16	24		0.15
Cobalt, Total	90	590	1600	3.2		0.42	3.4		0.44	1.6	J	0.42	2.3		0.45	10		0.41	15		0.46	ND		0.48	35		0.44
Copper, Total	11000	45000	3100	5.8		0.15	17		0.16	3.5		0.16	40		0.16	3.3		0.15	3.4		0.17	0.28	J	0.17	160		0.16
Iron, Total	NS	NS	NS	60000		1.3	19000		1.4	25000		1.4	14000	B	1.4	16000		1.3	46000		1.5	230		1.5	22000		1.4
Lead, Total	90	800	400	9.1		0.19	12		0.2	ND		0.95	20		0.2	ND		0.18	ND		1	1.3	J	0.21	18		0.2
Magnesium, Total	NS	NS	NS	490		1.1	830		1.2	410		1.2	360		1.2	220		1.1	68		1.2	23		1.3	420		1.2
Manganese, Total	65	5900	11000	46		0.2	68		0.22	24		0.21	42		0.22	140		0.2	780		0.22	0.67	J	0.23	120		0.21
Mercury, Total	0.1	65	23	0.03	J	0.01	0.06	J	0.02	0.03	J	0.02	0.05	J	0.02	0.02	J	0.01	ND		0.02	ND		0.02	0.08		0.02
Nickel, Total	48	23000	1600	7.6		0.34	6.3		0.36	3.8		0.35	7.4		0.37	9.8		0.34	5.4		0.38	ND		0.39	100		0.36
Potassium, Total	NS	NS	NS	1000		24	360		25	230		24	250		26	180	J	23	92	J	26	69	J	27	460		25
Selenium, Total	11	5700	390	ND		0.23	ND		0.24	ND		0.23	0.4	J	0.25	ND		0.23	ND		0.25	ND		0.26	ND		0.24
Silver, Total	1	5700	390	ND		0.17	ND		0.18	ND		0.17	0.22	J	0.18	ND		0.17	ND		0.19	ND		0.19	0.2	J	0.18
Sodium, Total	NS	NS	NS	ND		14	ND		15	ND		14	35	J	15	18	J	14	ND		16	ND		16	4300		15
Thallium, Total	3	79	5	0.45	J	0.27	ND		0.29	ND		0.28	ND		0.29	ND		0.27	ND		0.3	ND		0.31	ND		0.28
Vanadium, Total	NS	1100	78	**100**		0.08	30		0.08	25		0.08	21		0.08	18		0.08	42		0.09	2.4		0.09	23		0.08
Zinc, Total	930	110000	23000	52		0.6	27		0.63	20		0.61	16		0.64	18		0.59	18		0.66	ND		0.68	59		0.62
GENERAL CHEMISTRY																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Cyanide, Total	20	23000	1600	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Solids, Total	NS	NS	NS	93		NS	85.9		NS	88.9		NS	86.7		NS	93.8		NS	84		NS	79.8		NS	86.1		NS

TCL - EPA Target Compound List
TAL - EPA Target Analyte List
Conc = Concentration
DIGWSSL - Default Impact to Groundwater Soil Screening Levels
NRDCSRS - Non Residential Direct Contact Soil Remediation Standards
RDCSRS - Residential Direct Contact Soil Remediation Standards
J = The concentration was detected at a value below the RL and above the MDL
MDL = Method Detection Limit
ND = Analyzed for but Not Detected at the MDL
NS - No Standard Available
Q = Qualifier
Shaded cell concentration exceeds the NJDEP Non Residential SRS (5/2012).
Bolded concentration exceeds the NJDEP Residential SRS (5/2012).
Underline concentration exceeds NJDEP DIGWSSL (11/2013)
* - Dilution factor of 10 for total Antimony.

DRAFT

TABLE 1 - Parcel A
Summary of Soil Analytical Results

Manzo Property (Block 5001, Lot 13.14)
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

BORING ID:				SB-PA-16		SB-PA-17		SB-PA-18		SB-PA-19		SB-PA-20		SB-PA-21		SB-PA-22		SB-PA-23	
SAMPLE ID:	NJDEP	NJDEP	NJDEP	SBPA16-1.0		SBPA17-2.0		SBPA18-2.0		SBPA19-1.5		SBPA20-10.0		SBPA21-2.0		SBPA22-1.0		SBPA23-7.0	
LAB ID:				L1618377-06		L1618377-07		L1618781-09		L1618781-04		L1618781-07		L1618377-08		L1619708-01		L1618377-09	
COLLECTION DATE:	DIGWSSL	NRDCSRS	RDCSRS	6/15/2016		6/15/2016		6/17/2016		6/17/2016		6/17/2016		6/15/2016		6/27/2016		6/15/2016	
SAMPLE DEPTH (ft bgs):				0.5-1.0		1.5-2.0		1.5-2.0		1.0-1.5		9.5-10.0		1.5-2.0		0.5-1.0		6.5-7.0	
SAMPLE MATRIX:				SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
				Conc	Q MDL	Conc	Q MDL	Conc	Q MDL	Conc	Q MDL	Conc	Q MDL	Conc	Q MDL	Conc	Q MDL	Conc	Q MDL
Compounds/Analytes *(units)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*	
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																			
Dilution Factor	--	--	--	*1*															
2-Butanone	0.9	44000	3100	ND	0.00028	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	19	NS	70000	0.011 J	0.0011	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	0.005	5	2	ND	0.00012	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl Acetate	22	NS	78000	ND	0.00028	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	7	91000	6300	0.00053 J	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total VOCs	NS	NS	NS	0.01153	- -	-	- -	-	- -	-	- -	-	- -	-	- -	-	- -	-	- -
Total VOC TICs	NS	NS	NS	0.03 J	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)																			
Dilution Factor	--	--	--			*1*		*1*		*1*		*1*		*1*		*1*		*1*	
2-Methylnaphthalene	8	2400	230	-	-	ND	0.0022	0.0022 J	0.002	ND	0.0021	ND	0.002	ND	0.0019	ND	0.0021	ND	0.0022
Acenaphthene	110	37000	3400	-	-	ND	0.0016	ND	0.0015	ND	0.0015	ND	0.0015	ND	0.0014	ND	0.0015	ND	0.0016
Acenaphthylene	NS	300000	NS	-	-	ND	0.00097	0.0015 J	0.0009	ND	0.00091	ND	0.00088	ND	0.00085	ND	0.00092	ND	0.00096
Anthracene	2400	30000	17000	-	-	ND	0.00062	0.0024 J	0.00057	ND	0.00058	ND	0.00056	ND	0.00054	ND	0.00059	ND	0.00062
Benzo(a)anthracene	0.8	2	0.6	-	-	0.0028 J	0.00074	0.008	0.00068	0.002 J	0.00069	ND	0.00067	ND	0.00065	ND	0.0007	ND	0.00073
Benzo(a)pyrene	0.2	0.2	0.2	-	-	ND	0.00093	0.0092	0.00086	0.002 J	0.00087	ND	0.00084	ND	0.00082	ND	0.00088	ND	0.00093
Benzo(b)fluoranthene	2	2	0.6	-	-	0.0044 J	0.00074	0.013	0.00068	0.0028 J	0.00069	ND	0.00067	ND	0.00065	ND	0.0007	ND	0.00073
Benzo(ghi)perylene	NS	30000	380000	-	-	ND	0.00066	0.0069 J	0.00061	0.0016 J	0.00062	ND	0.0006	ND	0.00058	ND	0.00063	ND	0.00066
Benzo(k)fluoranthene	25	23	6	-	-	0.0015 J	0.0007	0.0043 J	0.00064	0.001 J	0.00065	ND	0.00063	ND	0.00061	ND	0.00066	ND	0.0007
Chrysene	80	230	62	-	-	0.0036 J	0.00058	0.01	0.00054	0.0023 J	0.00054	ND	0.00053	ND	0.00051	ND	0.00055	ND	0.00058
Dibenzo(a,h)anthracene	0.8	0.2	0.2	-	-	ND	0.00078	0.0018 J	0.00072	ND	0.00072	ND	0.0007	ND	0.00068	ND	0.00074	ND	0.00077
Fluoranthene	1300	24000	2300	-	-	0.0064 J	0.00054	0.018	0.0005	0.0042 J	0.00051	ND	0.00049	ND	0.00048	ND	0.00052	ND	0.00054
Fluorene	170	24000	2300	-	-	ND	0.00093	ND	0.00086	ND	0.00087	ND	0.00084	ND	0.00082	ND	0.00088	ND	0.00093
Indeno(1,2,3-cd)pyrene	7	2	0.6	-	-	ND	0.00093	0.0071 J	0.00086	0.0016 J	0.00087	ND	0.00084	ND	0.00082	ND	0.00088	ND	0.00093
Naphthalene	25	17	6	-	-	ND	0.0014	0.0019 J	0.0013	ND	0.0013	ND	0.0013	ND	0.0012	ND	0.0013	ND	0.0014
Phenanthrene	NS	300000	NS	-	-	0.0041 J	0.00066	0.0095	0.00061	0.0025 J	0.00062	ND	0.0006	ND	0.00058	ND	0.00063	ND	0.00066
Pyrene	840	18000	1700	-	-	0.0054 J	0.00054	0.015	0.0005	0.0037 J	0.00051	ND	0.00049	ND	0.00048	ND	0.00052	ND	0.00054
TCL SEMIVOLATILE ORGANIC COMPOUNDS (SVOC)																			
Dilution Factor	--	--	--	*1*															
Benzo(a)anthracene	0.8	2	0.6	ND	0.021	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	0.2	0.2	0.2	ND	0.045	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	2	2	0.6	ND	0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(ghi)perylene	NS	30000	380000	ND	0.022	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	25	23	6	ND	0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	1200	140	35	0.078 J	0.019	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	80	230	62	ND	0.019	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	1300	24000	2300	ND	0.021	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	7	2	0.6	ND	0.026	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	NS	300000	NS	ND	0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	840	18000	1700	0.017 J	0.016	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total SVOCs	NS	NS	NS	0.095	- -	-	- -	-	- -	-	- -	-	- -	-	- -	-	- -	-	- -
Total SVOC TICs	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PESTICIDES																			
Dilution Factor	--	--	--	*1*															
4,4'-DDE	18	9	2	0.00101 J	0.0004	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	11	8	2	0.00262 J	0.00141	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-Chlordane	0.05	1	0.2	ND	0.00061	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POLYCHLORINATED BIPHENYLS (PCB)																			
Dilution Factor	--	--	--	*1*		*1*		*1*		*1*		*1*		*1*		*1*		*1*	
Aroclor 1260	0.2	1	0.2	ND	0.00277	ND	0.00291	ND	0.00277	ND	0.00278	ND	0.00263	ND	0.00252	ND	0.0028	ND	0.00296
Total PCBs	0.2	1	0.2	ND	0.0018	ND	0.00189	ND	0.0018	ND	0.00181	ND	0.00171	ND	0.00164	ND	0.00182	ND	0.00192
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)																			
Dilution Factor	--	--	--	*1*															
Total EPH	NS	NS	NS	ND	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TAL METALS																			
Dilution Factor	--	--	--	*2*		*2*		*2*		*2*		*2*		*2/10**		*2*		*2*	
Aluminum, Total	6000	NS	78000	4700	1.8	4900	1.8	7900	1.6	13000	1.7	5700	1.7	4000	1.6	6800	1.7	1300	1.8
Antimony, Total	6	450	31	ND	0.71	ND	0.72	ND	0.67	ND	0.7	ND	0.68	ND	0.65	ND	0.69	ND	0.73
Arsenic, Total	19	19	19	5.5	0.29	5.2	0.3	7.4	0.28	5.6	0.29	4.2	0.28	12	0.27	2.1	0.28	5.8	0.3
Barium, Total	2100	59000	16000	14	0.24	11	0.24	15	0.22	24	0.23	18	0.23	7	0.22	22	0.23	5.8	0.25
Beryllium, Total	0.7	140	16	0.2 J	0.1	0.2 J	0.1	0.44	0.09	0.46	0.1	0.42	0.09	0.42	0.09	0.17 J	0.1	ND	0.1
Cadmium, Total	2	78	78	ND	0.06	ND	0.06	ND	0.06	ND	0.06	ND	0.06	ND	0.06	ND	0.06	ND	0.06
Calcium, Total	NS	NS	NS	100	2.4	24	2.5	21	2.3	20	2.4	53	2.3	6.8 J	2.2	23	2.4	3.4 J	2.5
Chromium, Total	NS	NS	NS	7.8	0.15	7.9	0.15	17	0.14	16	0.15	17	0.14	31	0.14	7.9	0.15	12	0.16
Cobalt, Total	90	590	1600	9.6	0.44	1.2 J	0.44	1.4 J	0.41	1.2 J	0.43	5.4	0.42	2.4	0.4	1.4 J	0.42	ND	0.45
Copper, Total	11000	45000	3100	63	0.16	5.4	0.16	18	0.15	12	0.16	3.8	0.15	2.8	0.15	3.4	0.16	8.2	0.16
Iron, Total	NS	NS	NS	9400	1.4	8400	1.4	19000	1.3	21000	1.4	20000	1.3	22000	1.3	9900	1.4	12000	1.4
Lead, Total	90	800	400	11	0.2	2.7 J	0.2	15	0.18	9.4	0.19	3.7 J	0.19	ND	0.9	4.4	0.19	ND	0.2
Magnesium, Total	NS	NS	NS	240	1.2	390	1.2	390	1.1	290	1.2	170	1.1	190	1.1	330	1.1	18	1.2
Manganese, Total	65	5900	11000	26	0.21	32	0.22	29	0.2	23	0.21	120	0.2	57	0.2	23	0.21	3	0.22
Mercury, Total	0.1	65	23	0.05 J	0.02	0.06 J	0.02	0.067 J	0.015	0.04 J	0.02	ND	0.02	0.03 J	0.01	0.03 J	0.02	0.03 J	0.02
Nickel, Total	48	23000	1600	35	0.36	2.5	0.36	4.2	0.33	4.2	0.35	4	0.34	2.5	0.33	3.3	0.34	ND	0.37
Potassium, Total	NS	NS	NS	170 J	25	160 J	25	200 J	23	260	24	180 J	24	160 J	23	140 J	24	180 J	26
Selenium, Total	11	5700	390	ND	0.24	ND	0.24	ND	0.22	ND	0.23	0.27 J	0.23	ND	0.22	ND	0.23	ND	0.25
Silver, Total	1	5700	390	ND	0.18	ND	0.18	ND	0.17	ND	0.17	ND	0.17	ND	0.16	ND	0.17	ND	0.18
Sodium, Total	NS	NS	NS	710	15	ND	15	ND	14	ND	14	ND	14	ND	14	ND	14	15 J	15
Thallium, Total	3	79	5	ND	0.28	ND	0.29	ND	0.27	ND	0.28	ND	0.27	ND	0.26	ND	0.28	ND	0.29
Vanadium, Total	NS	1100	78	14	0.08	13	0.08	24	0.08	30	0.08	22	0.08	27	0.07	14	0.08	16	0.08
Zinc, Total	930	110000	23000	12	0.62	10	0.63	18	0.58	21	0.61	14	0.59	16	0.57	11	0.6	4.9	0.64
GENERAL CHEMISTRY																			
Dilution Factor	--	--	--	*1*		*1*		*1*		*1*		*1*		*1*		*1*		*1*	
Cyanide, Total	20	23000	1600	ND	0.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solids, Total	NS	NS	NS	88.2	NS	85.1	NS	90.6	NS	90.2	NS	93.4	NS	96.6	NS	89.5	NS	84.8	NS

TCL - EPA Target Compound List
TAL - EPA Target Analyte List
Conc = Concentration
DIGWSSL - Default Impact to Groundwater Soil Screening Levels
NRDCSRS - Non Residential Direct Contact Soil Remediation Standards
RDCSRS - Residential Direct Contact Soil Remediation Standards
J = The concentration was detected at a value below the RL and above the MDL
MDL = Method Detection Limit
ND = Analyzed for but Not Detected at the MDL
NS - No Standard Available
Q = Qualifier
Shaded cell concentration exceeds the NJDEP Non Residential SRS (5/2012).
Bolded concentration exceeds the NJDEP Residential SRS (5/2012).
Underline concentration exceeds NJDEP DIGWSSL (11/2013)
* - Dilution factor of 10 for total Antimony.

DRAFT

TABLE 1 - Parcel A
Summary of Soil Analytical Results

Manzo Property (Block 5001, Lot 13.14)
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

BORING ID:				SB-PA-24			SB-PA-25			SB-PA-25			SB-PA-26			SB-PA-27			SB-PA-28			SB-PA-29			SB-PA-30		
SAMPLE ID:	NJDEP	NJDEP	NJDEP	SBPA24-1.0			SBPA25-0.5			SBPA25-4.5			SBPA26-3.0			SBPA27-5.0			SBPA28-1.0			SBPA29-8.0			SBPA30-3.5		
LAB ID:				L1618377-10			L1618377-11			L1618377-12			L1618377-13			L1618781-10			L1618781-12			L1618781-06			L1618781-02		
COLLECTION DATE:	DIGWSSL	NRDCSRS	RDCSRS	6/15/2016			6/15/2016			6/15/2016			6/15/2016			6/17/2016			6/17/2016			6/17/2016			6/17/2016		
SAMPLE DEPTH (ft bgs):				0.5-1.0			0.0-0.5			4.0-4.5			2.5-3.0			4.5-5.0			0.5-1.0			7.5-8.0			3.0-3.5		
SAMPLE MATRIX:				SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL		
				Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Compounds/Analytes *(units)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*		
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																											
Dilution Factor	--	--	--				*1*															*1*					
2-Butanone	0.9	44000	3100	-		-	ND		0.00028	-		-	-		-	-		-	-		-	0.0023	J	0.00028	-		-
Acetone	19	NS	70000	-		-	0.012	J	0.0011	-		-	-		-	-		-	-		-	0.036	J	0.0011	-		-
Benzene	0.005	5	2	-		-	ND		0.00012	-		-	-		-	-		-	-		-	ND		0.00012	-		-
Methyl Acetate	22	NS	78000	-		-	ND		0.00028	-		-	-		-	-		-	-		-	ND		0.00028	-		-
Toluene	7	91000	6300	-		-	0.00098	J	0.0002	-		-	-		-	-		-	-		-	0.00093	J	0.0002	-		-
Total VOCs	NS	NS	NS	-	-	-	0.01298	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03923	-	-	-	-	-
Total VOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	0.005	J	0	-		-
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)																											
Dilution Factor	--	--	--	*1*						*1*			*1*			*1*			*1*						*1*		
2-Methylnaphthalene	8	2400	230	0.0039	J	0.0021	-		-	ND		0.0022	ND		0.0022	ND		0.002	ND		0.002	-		-	ND		0.0021
Acenaphthene	110	37000	3400	0.0035	J	0.0015	-		-	ND		0.0016	ND		0.0016	ND		0.0015	ND		0.0015	-		-	ND		0.0015
Acenaphthylene	NS	300000	NS	0.0053	J	0.00091	-		-	ND		0.00098	ND		0.00096	ND		0.0009	ND		0.00089	-		-	ND		0.00091
Anthracene	2400	30000	17000	0.01		0.00058	-		-	ND		0.00063	ND		0.00062	ND		0.00057	ND		0.00057	-		-	ND		0.00058
Benzo(a)anthracene	0.8	2	0.6	0.046		0.00069	-		-	0.00098	J	0.00074	ND		0.00073	ND		0.00068	ND		0.00068	-		-	ND		0.00069
Benzo(a)pyrene	0.2	0.2	0.2	0.05		0.00088	-		-	ND		0.00094	ND		0.00092	ND		0.00086	ND		0.00085	-		-	ND		0.00087
Benzo(b)fluoranthene	2	2	0.6	0.07		0.00069	-		-	0.0013	J	0.00074	ND		0.00073	ND		0.00068	ND		0.00068	-		-	ND		0.00069
Benzo(ghi)perylene	NS	30000	380000	0.034		0.00062	-		-	0.00078	J	0.00066	ND		0.00065	ND		0.00061	ND		0.0006	-		-	ND		0.00062
Benzo(k)fluoranthene	25	23	6	0.023		0.00066	-		-	ND		0.0007	ND		0.00069	ND		0.00064	ND		0.00064	-		-	ND		0.00065
Chrysene	80	230	62	0.055		0.00055	-		-	0.00098	J	0.00059	ND		0.00058	ND		0.00054	ND		0.00053	-		-	ND		0.00054
Dibenzo(a,h)anthracene	0.8	0.2	0.2	0.0085		0.00073	-		-	ND		0.00078	ND		0.00077	ND		0.00072	ND		0.00071	-		-	ND		0.00072
Fluoranthene	1300	24000	2300	0.098		0.00051	-		-	0.0013	J	0.00055	ND		0.00054	ND		0.0005	ND		0.0005	-		-	ND		0.00051
Fluorene	170	24000	2300	0.0029	J	0.00088	-		-	ND		0.00094	ND		0.00092	ND		0.00086	ND		0.00085	-		-	ND		0.00087
Indeno(1,2,3-cd)pyrene	7	2	0.6	0.036		0.00088	-		-	ND		0.00094	ND		0.00092	ND		0.00086	ND		0.00085	-		-	ND		0.00087
Naphthalene	25	17	6	0.0037	J	0.0013	-		-	ND		0.0014	ND		0.0014	ND		0.0013	ND		0.0013	-		-	ND		0.0013
Phenanthrene	NS	300000	NS	0.042		0.00062	-		-	0.001	J	0.00066	ND		0.00065	ND		0.00061	ND		0.0006	-		-	ND		0.00062
Pyrene	840	18000	1700	0.08		0.00051	-		-	0.0011	J	0.00055	ND		0.00054	ND		0.0005	ND		0.0005	-		-	ND		0.00051
TCL SEMIVOLATILE ORGANIC COMPOUNDS (SVOC)																											
Dilution Factor	--	--	--				*1*															*1*					
Benzo(a)anthracene	0.8	2	0.6	-		-	ND		0.02	-		-	-		-	-		-	-		-	ND		0.022	-		-
Benzo(a)pyrene	0.2	0.2	0.2	-		-	ND		0.044	-		-	-		-	-		-	-		-	ND		0.048	-		-
Benzo(b)fluoranthene	2	2	0.6	-		-	ND		0.015	-		-	-		-	-		-	-		-	ND		0.016	-		-
Benzo(ghi)perylene	NS	30000	380000	-		-	ND		0.021	-		-	-		-	-		-	-		-	ND		0.023	-		-
Benzo(k)fluoranthene	25	23	6	-		-	ND		0.012	-		-	-		-	-		-	-		-	ND		0.014	-		-
Bis(2-ethylhexyl)phthalate	1200	140	35	-		-	ND		0.019	-		-	-		-	-		-	-		-	ND		0.02	-		-
Chrysene	80	230	62	-		-	ND		0.018	-		-	-		-	-		-	-		-	ND		0.02	-		-
Fluoranthene	1300	24000	2300	-		-	ND		0.021	-		-	-		-	-		-	-		-	ND		0.023	-		-
Indeno(1,2,3-cd)pyrene	7	2	0.6	-		-	ND		0.025	-		-	-		-	-		-	-		-	ND		0.028	-		-
Phenanthrene	NS	300000	NS	-		-	ND		0.013	-		-	-		-	-		-	-		-	ND		0.014	-		-
Pyrene	840	18000	1700	-		-	ND		0.016	-		-	-		-	-		-	-		-	ND		0.017	-		-
Total SVOCs	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total SVOC TICs	NS	NS	NS	-		-	1.468	J	0	-		-	-		-	-		-	-		-	-		-	-		-
PESTICIDES																											
Dilution Factor	--	--	--				*1*															*1*					
4,4'-DDE	18	9	2	-		-	ND		0.0004	-		-	-		-	-		-	-		-	ND		0.00042	-		-
4,4'-DDT	11	8	2	-		-	ND		0.00142	-		-	-		-	-		-	-		-	ND		0.00148	-		-
cis-Chlordane	0.05	1	0.2	-		-	ND		0.00061	-		-	-		-	-		-	-		-	ND		0.00064	-		-
POLYCHLORINATED BIPHENYLS (PCB)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Aroclor 1260	0.2	1	0.2	0.00489	J	0.00279	ND		0.00278	ND		0.00296	ND		0.00288	ND		0.00267	ND		0.00266	ND		0.00299	ND		0.00278
Total PCBs	0.2	1	0.2	0.00489	J	0.00182	ND		0.00181	ND		0.00193	ND		0.00188	ND		0.00174	ND		0.00173	ND		0.00195	ND		0.00181
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)																											
Dilution Factor	--	--	--				*1*															*1*					
Total EPH	NS	NS	NS	-		-	31.2		26.1	-		-	-		-	-		-	-		-	ND		29.2	-		-
TAL METALS																											
Dilution Factor	--	--	--	*2*			*2*			*2*			*2*			*2/10**			*2*			*2*			*2*		
Aluminum, Total	6000	NS	78000	4600		1.7	5100		1.7	3100		1.8	7400		1.8	8700		1.7	2200		1.6	3600		1.9	14000		1.7
Antimony, Total	6	450	31	ND		0.68	ND		0.69	ND		0.74	ND		0.74	ND		3.4	ND		0.66	ND		0.76	ND		0.69
Arsenic, Total	19	19	19	4.9		0.28	5.4		0.28	7.6		0.3	7.4		0.3	7.7		0.28	1.9		0.27	6.7		0.31	7.2		0.29
Barium, Total	2100	59000	16000	22		0.23	24		0.23	7.7		0.25	16		0.25	20		0.23	13		0.22	12		0.26	64		0.23
Beryllium, Total	0.7	140	16	0.21	J	0.09	0.26	J	0.09	0.22	J	0.1	0.25	J	0.1	0.92		0.09	0.25	J	0.09	0.21	J	0.1	0.63		0.1
Cadmium, Total	2	78	78	ND		0.06	ND		0.06	ND		0.07	ND		0.06	ND		0.06	ND		0.06	ND		0.07	ND		0.06
Calcium, Total	NS	NS	NS	190		2.4	210		2.4	10		2.5	6.8	J	2.5	86		2.4	17		2.3	10		2.6	12		2.4
Chromium, Total	NS	NS	NS	9.8		0.14	9.4		0.15	11		0.16	11		0.16	40		0.15	8.1		0.14	20		0.16	10		0.15
Cobalt, Total	90	590	1600	11		0.42	2.9		0.42	0.68	J	0.45	1.7	J	0.45	5.2		0.42	1	J	0.41	ND		0.46	3.8		0.42
Copper, Total	11000	45000	3100	61		0.15	36		0.15	3.8		0.17	4.2		0.17	7.4		0.15	4.9		0.15	15		0.17	5		0.16
Iron, Total	NS	NS	NS	8700		1.4	9600		1.4	14000		1.5	14000		1.4	38000		1.4	13000		1.3	26000		1.5	22000		1.4
Lead, Total	90	800	400	13		0.19	0.33	J	0.19	ND		0.2	ND		0.2	7.3		0.19	5.4		0.18	10		0.21	4	J	0.19
Magnesium, Total	NS	NS	NS	270		1.1	280		1.1	100		1.2	530		1.2	720		1.1	65		1.1	30		1.3	220		1.2
Manganese, Total	65	5900	11000	36		0.2	30		0.21	9.9		0.22	25		0.22	170		0.21	23		0.2	4.2		0.23	78		0.21
Mercury, Total	0.1	65	23	0.05	J	0.02	0.07	J	0.015	0.05	J	0.02	0.09		0.02	ND		0.02	ND		0.02	0.03	J	0.02	ND		0.02
Nickel, Total	48	23000	1600	42		0.34	13		0.34	2.6		0.37	3.3		0.37	8.3		0.34	1.8	J	0.33	ND		0.38	15		0.35
Potassium, Total	NS	NS	NS	230		24	160	J	24	62	J	26	190	J	26	420		24	190	J	23	270		27	180	J	24
Selenium, Total	11	5700	390	ND		0.23	ND		0.23	ND		0.25	ND		0.25	ND		0.23	ND		0.22	ND		0.26	ND		0.23
Silver, Total	1	5700	390	ND		0.17	ND		0.17	ND		0.18	ND		0.18	ND		0.17	ND		0.16	ND		0.19	ND		0.17
Sodium, Total	NS	NS	NS	1100		14	62	J	14	ND		15	ND		15	21	J	14	ND		14	17	J	16	ND		14
Thallium, Total	3	79	5	ND		0.27	ND		0.27	ND		0.3	ND		0.3	ND		0.28	ND		0.26	ND		0.3	ND		0.28
Vanadium, Total	NS	1100	78	13		0.08	13		0.08	14		0.08	19		0.08	45		0.08	20		0.08	14		0.09	15		0.08
Zinc, Total	930	110000	23000	23		0.6	12		0.6	5		0.65	13		0.64	28		0.6	8.9		0.58	2.5	J	0.66	24		0.61
GENERAL CHEMISTRY																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Cyanide, Total	20	23000	1600	-		-	ND		0.18	-		-	-		-	-		-	-		-	ND		0.19	-		-
Solids, Total	NS	NS	NS	89.3		NS	90.4		NS	82.9		NS	85.1		NS	92.6		NS	92.4		NS	82.1		NS	91.1		NS

TCL - EPA Target Compound List
TAL - EPA Target Analyte List
Conc = Concentration
DIGWSSL - Default Impact to Groundwater Soil Screening Levels
NRDCSRS - Non Residential Direct Contact Soil Remediation Standards
RDCSRS - Residential Direct Contact Soil Remediation Standards
J = The concentration was detected at a value below the RL and above the MDL
MDL = Method Detection Limit
ND = Analyzed for but Not Detected at the MDL
NS - No Standard Available
Q = Qualifier
Shaded cell concentration exceeds the NJDEP Non Residential SRS (5/2012).
Bolded concentration exceeds the NJDEP Residential SRS (5/2012).
Underline concentration exceeds NJDEP DIGWSSL (11/2013)
* - Dilution factor of 10 for total Antimony.

DRAFT

TABLE 1 - Parcel A
Summary of Soil Analytical Results

Manzo Property (Block 5001, Lot 13.14)
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

BORING ID:				SB-PA-31			SB-PA-31			SB-PA-32			SB-PA-33			SB-PA-33			SB-PA-33			SB-PA-34			SB-PA-34		
SAMPLE ID:	NJDEP	NJDEP	NJDEP	SBPA31-3.5			*DUP 6 (SBPA31-3.5)*			SBPA32-2.5			SBPA33-0.5			SBPA33-1.0			SBPA33-7.5			SBPA34-7.5			SBPA34-25.0		
LAB ID:				L1618781-11			L1618781-08			L1618201-13			L1618201-12			L1618201-11			L1618201-09			L1618201-08			L1618201-10		
COLLECTION DATE:	DIGWSSL	NRDCSRS	RDCSRS	6/17/2016			6/17/2016			6/14/2016			6/14/2016			6/14/2016			6/14/2016			6/14/2016			6/14/2016		
SAMPLE DEPTH (ft bgs):				3.0-3.5			3.0-3.5			2.0-2.5			0.0-0.5			0.5-1.0			7.0-7.5			7.0-7.5			24.5-25.0		
SAMPLE MATRIX:				SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL		
				Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Compounds/Analytes *(units)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*		
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																											
Dilution Factor	--	--	--																								
2-Butanone	0.9	44000	3100	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Acetone	19	NS	70000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzene	0.005	5	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Methyl Acetate	22	NS	78000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Toluene	7	91000	6300	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Total VOCs	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total VOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)																											
Dilution Factor	--	--	--	*1*			*1*			*2*			*1*			*1*			*1*			*1*			*1*		
2-Methylnaphthalene	8	2400	230	ND		0.0022	ND		0.0021	0.008	J	0.005	0.0091		0.002	ND		0.0021	ND		0.0026	ND		0.0023	ND		0.0024
Acenaphthene	110	37000	3400	ND		0.0016	ND		0.0015	ND		0.0036	ND		0.0015	ND		0.0016	ND		0.0019	ND		0.0017	ND		0.0018
Acenaphthylene	NS	300000	NS	ND		0.00095	ND		0.00092	0.0098	J	0.0022	ND		0.00088	ND		0.00094	ND		0.0011	ND		0.001	ND		0.0011
Anthracene	2400	30000	17000	ND		0.00061	ND		0.00059	0.013	J	0.0014	ND		0.00057	ND		0.0006	ND		0.00072	ND		0.00066	ND		0.00068
Benzo(a)anthracene	0.8	2	0.6	ND		0.00072	0.00095	J	0.0007	0.033		0.0016	0.0023	J	0.00067	ND		0.00071	ND		0.00086	ND		0.00078	ND		0.00081
Benzo(a)pyrene	0.2	0.2	0.2	ND		0.00092	0.00095	J	0.00088	0.039		0.0021	0.0025	J	0.00085	ND		0.0009	ND		0.0011	ND		0.00098	ND		0.001
Benzo(b)fluoranthene	2	2	0.6	ND		0.00072	ND		0.0007	0.06		0.0016	0.0035	J	0.00067	ND		0.00071	ND		0.00086	ND		0.00078	ND		0.00081
Benzo(ghi)perylene	NS	30000	380000	ND		0.00065	ND		0.00062	0.022		0.0015	0.0019	J	0.0006	ND		0.00064	ND		0.00077	ND		0.0007	ND		0.00072
Benzo(k)fluoranthene	25	23	6	ND		0.00069	ND		0.00066	0.019		0.0016	0.0011	J	0.00064	ND		0.00068	ND		0.00081	ND		0.00074	ND		0.00076
Chrysene	80	230	62	ND		0.00057	0.00095	J	0.00055	0.045		0.0013	0.0031	J	0.00053	ND		0.00056	ND		0.00068	ND		0.00061	ND		0.00064
Dibenzo(a,h)anthracene	0.8	0.2	0.2	ND		0.00076	ND		0.00073	0.0066	J	0.0017	ND		0.00071	ND		0.00075	ND		0.0009	ND		0.00082	ND		0.00085
Fluoranthene	1300	24000	2300	ND		0.00053	0.0018	J	0.00051	0.08		0.0012	0.0045	J	0.0005	ND		0.00052	ND		0.00063	ND		0.00057	ND		0.0006
Fluorene	170	24000	2300	ND		0.00092	ND		0.00088	0.003	J	0.0021	ND		0.00085	ND		0.0009	ND		0.0011	ND		0.00098	ND		0.001
Indeno(1,2,3-cd)pyrene	7	2	0.6	ND		0.00092	ND		0.00088	0.025		0.0021	0.0019	J	0.00085	ND		0.0009	ND		0.0011	ND		0.00098	ND		0.001
Naphthalene	25	17	6	ND		0.0014	ND		0.0013	0.0078	J	0.0031	0.0083		0.0013	ND		0.0014	ND		0.0016	ND		0.0015	ND		0.0015
Phenanthrene	NS	300000	NS	ND		0.00065	0.0011	J	0.00062	0.045		0.0015	0.0049	J	0.0006	ND		0.00064	ND		0.00077	ND		0.0007	ND		0.00072
Pyrene	840	18000	1700	ND		0.00053	0.0015	J	0.00051	0.067		0.0012	0.0041	J	0.0005	ND		0.00052	ND		0.00063	ND		0.00057	ND		0.0006
TCL SEMIVOLATILE ORGANIC COMPOUNDS (SVOC)																											
Dilution Factor	--	--	--																								
Benzo(a)anthracene	0.8	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(a)pyrene	0.2	0.2	0.2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(b)fluoranthene	2	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(ghi)perylene	NS	30000	380000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(k)fluoranthene	25	23	6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Bis(2-ethylhexyl)phthalate	1200	140	35	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Chrysene	80	230	62	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Fluoranthene	1300	24000	2300	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Indeno(1,2,3-cd)pyrene	7	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Phenanthrene	NS	300000	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Pyrene	840	18000	1700	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Total SVOCs	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total SVOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
PESTICIDES																											
Dilution Factor	--	--	--																								
4,4'-DDE	18	9	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
4,4'-DDT	11	8	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
cis-Chlordane	0.05	1	0.2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
POLYCHLORINATED BIPHENYLS (PCB)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Aroclor 1260	0.2	1	0.2	ND		0.00282	ND		0.00277	ND		0.0033	ND		0.00269	ND		0.00276	ND		0.00335	ND		0.00315	ND		0.00316
Total PCBs	0.2	1	0.2	ND		0.00184	ND		0.0018	ND		0.00215	ND		0.00175	ND		0.0018	ND		0.00218	ND		0.00205	ND		0.00206
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)																											
Dilution Factor	--	--	--																								
Total EPH	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
TAL METALS																											
Dilution Factor	--	--	--	*2*			*2*			*2*			*2*			*2*			*2*			*2*			*2*		
Aluminum, Total	6000	NS	78000	12000		1.8	10000		1.7	9800		2	44000		1.7	10000		1.7	530		2	1400		2	760		2
Antimony, Total	6	450	31	ND		0.73	ND		0.69	2.9	J	0.83	3.5	J	0.69	0.92	J	0.7	ND		0.82	ND		0.8	ND		0.81
Arsenic, Total	19	19	19	4.5		0.3	6.2		0.29	10		0.34	4.2		0.28	5.3		0.29	0.42	J	0.34	3.8		0.33	0.73	J	0.33
Barium, Total	2100	59000	16000	51		0.25	43		0.23	26		0.28	280		0.23	25		0.24	2.9		0.28	9.5		0.27	5.2		0.27
Beryllium, Total	0.7	140	16	0.46		0.1	0.54		0.1	0.25	J	0.11	1.4		0.09	0.31	J	0.1	ND		0.11	0.16	J	0.11	ND		0.11
Cadmium, Total	2	78	78	ND		0.06	ND		0.06	0.26	J	0.07	0.2	J	0.06	0.09	J	0.06	ND		0.07	ND		0.07	ND		0.07
Calcium, Total	NS	NS	NS	15		2.5	13		2.4	57		2.8	10000		2.4	130		2.4	12		2.8	21		2.7	9	J	2.8
Chromium, Total	NS	NS	NS	14		0.16	17		0.15	12		0.18	87		0.14	11		0.15	2		0.18	6.4		0.17	2.6		0.17
Cobalt, Total	90	590	1600	3.2		0.45	3.6		0.42	5.3		0.51	620		0.42	2.9		0.43	ND		0.5	ND		0.49	ND		0.49
Copper, Total	11000	45000	3100	6.1		0.16	7.2		0.16	65		0.19	**3400**		0.15	13		0.16	0.88	J	0.18	4		0.18	1.5		0.18
Iron, Total	NS	NS	NS	19000		1.4	24000		1.4	16000		1.6	30000		1.4	14000		1.4	1500		1.6	8200		1.6	3100		1.6
Lead, Total	90	800	400	7.2		0.2	9.6		0.19	42		0.23	1.3	J	0.19	2.7	J	0.19	1.1	J	0.23	ND		0.22	0.64	J	0.22
Magnesium, Total	NS	NS	NS	310		1.2	230		1.2	550		1.4	4900		1.1	620		1.2	18		1.4	47		1.3	35		1.3
Manganese, Total	65	5900	11000	66		0.22	68		0.21	35		0.25	480		0.2	32		0.21	0.99	J	0.25	5		0.24	3.1		0.24
Mercury, Total	0.1	65	23	ND		0.02	ND		0.02	0.11		0.02	0.02	J	0.02	0.03	J	0.02	ND		0.02	ND		0.02	ND		0.02
Nickel, Total	48	23000	1600	12		0.37	11		0.35	20		0.42	**1900**		0.34	9.8		0.35	ND		0.41	ND		0.4	0.44	J	0.4
Potassium, Total	NS	NS	NS	240		26	210	J	24	320		29	8200		24	340		24	89	J	29	220	J	28	110	J	28
Selenium, Total	11	5700	390	ND		0.25	ND		0.23	0.83	J	0.28	5.6		0.23	ND		0.24	ND		0.28	ND		0.27	ND		0.27
Silver, Total	1	5700	390	ND		0.18	ND		0.17	0.5	J	0.21	0.93		0.17	ND		0.18	ND		0.21	ND		0.2	ND		0.2
Sodium, Total	NS	NS	NS	ND		15	20	J	14	360		17	96000		14	410		15	36	J	17	55	J	17	22	J	17
Thallium, Total	3	79	5	ND		0.29	ND		0.28	ND		0.33	ND		0.27	ND		0.28	ND		0.33	ND		0.32	ND		0.32
Vanadium, Total	NS	1100	78	23		0.08	29		0.08	26		0.09	46		0.08	20		0.08	2.2		0.09	8.2		0.09	2.7		0.09
Zinc, Total	930	110000	23000	26		0.64	32		0.61	33		0.73	48		0.6	13		0.61	ND		0.72	3.2	J	0.7	2.3	J	0.71
GENERAL CHEMISTRY																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Cyanide, Total	20	23000	1600	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Solids, Total	NS	NS	NS	85.5		NS	90.5		NS	74.9		NS	92.3		NS	87.7		NS	73		NS	79		NS	77.8		NS

TCL - EPA Target Compound List
TAL - EPA Target Analyte List
Conc = Concentration
DIGWSSL - Default Impact to Groundwater Soil Screening Levels
NRDCSRS - Non Residential Direct Contact Soil Remediation Standards
RDCSRS - Residential Direct Contact Soil Remediation Standards
J = The concentration was detected at a value below the RL and above the MDL
MDL = Method Detection Limit
ND = Analyzed for but Not Detected at the MDL
NS - No Standard Available
Q = Qualifier
Shaded cell concentration exceeds the NJDEP Non Residential SRS (5/2012).
Bolded concentration exceeds the NJDEP Residential SRS (5/2012).
Underline concentration exceeds NJDEP DIGWSSL (11/2013)
* - Dilution factor of 10 for total Antimony.

TABLE 1 - Parcel A
Summary of Soil Analytical Results

Manzo Property (Block 5001, Lot 13.14)
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

BORING ID:				SB-PA-35			SB-PA-35			SB-PA-36			SB-PA-36			SB-PA-37		
SAMPLE ID:	NJDEP	NJDEP	NJDEP	SBPA35-1.0			*DUP 7 (SBPA35-1.0)*			SBPA36-0.5			SBPA36-6.5			SBPA37-1.0		
LAB ID:				L1618781-03			L1618781-05			L1619708-02			L1619708-03			L1618780-03		
COLLECTION DATE:	DIGWSSL	NRDCSRS	RDCSRS	6/17/2016			6/17/2016			6/27/2016			6/27/2016			6/16/2016		
SAMPLE DEPTH (ft bgs):				0.5-1.0			0.5-1.0			0.0-0.5			6.0-6.5			0.5-1.0		
SAMPLE MATRIX:				SOIL			SOIL			SOIL			SOIL			SOIL		
				Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Compounds/Analytes *(units)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*		
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																		
Dilution Factor	--	--	--							*1*								
2-Butanone	0.9	44000	3100	-		-	-		-	ND		0.00034	-		-	-		-
Acetone	19	NS	70000	-		-	-		-	0.027	J	0.0013	-		-	-		-
Benzene	0.005	5	2	-		-	-		-	ND		0.00015	-		-	-		-
Methyl Acetate	22	NS	78000	-		-	-		-	ND		0.00034	-		-	-		-
Toluene	7	91000	6300	-		-	-		-	0.0011	J	0.00024	-		-	-		-
Total VOCs	NS	NS	NS	-	-	-	-	-	-	0.0281	-	-	-	-	-	-	-	-
Total VOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)																		
Dilution Factor	--	--	--	*1*			*1*						*1*			*1*		
2-Methylnaphthalene	8	2400	230	ND		0.0021	ND		0.002	-		-	ND		0.0022	ND		0.0021
Acenaphthene	110	37000	3400	ND		0.0016	ND		0.0015	-		-	ND		0.0016	ND		0.0016
Acenaphthylene	NS	300000	NS	ND		0.00093	ND		0.0009	-		-	ND		0.00096	ND		0.00093
Anthracene	2400	30000	17000	ND		0.00059	ND		0.00058	-		-	ND		0.00061	ND		0.0006
Benzo(a)anthracene	0.8	2	0.6	ND		0.0007	ND		0.00069	-		-	ND		0.00073	0.0034	J	0.00071
Benzo(a)pyrene	0.2	0.2	0.2	ND		0.00089	ND		0.00087	-		-	ND		0.00092	0.0027	J	0.0009
Benzo(b)fluoranthene	2	2	0.6	ND		0.0007	ND		0.00069	-		-	ND		0.00073	0.0033	J	0.00071
Benzo(ghi)perylene	NS	30000	380000	ND		0.00063	ND		0.00061	-		-	ND		0.00065	0.0017	J	0.00063
Benzo(k)fluoranthene	25	23	6	ND		0.00067	ND		0.00065	-		-	ND		0.00069	0.0011	J	0.00067
Chrysene	80	230	62	ND		0.00056	ND		0.00054	-		-	ND		0.00058	0.0025	J	0.00056
Dibenzo(a,h)anthracene	0.8	0.2	0.2	ND		0.00074	ND		0.00072	-		-	ND		0.00077	ND		0.00075
Fluoranthene	1300	24000	2300	ND		0.00052	ND		0.0005	-		-	ND		0.00054	0.0051	J	0.00052
Fluorene	170	24000	2300	ND		0.00089	ND		0.00087	-		-	ND		0.00092	ND		0.0009
Indeno(1,2,3-cd)pyrene	7	2	0.6	ND		0.00089	ND		0.00087	-		-	ND		0.00092	0.0014	J	0.0009
Naphthalene	25	17	6	ND		0.0013	ND		0.0013	-		-	ND		0.0014	ND		0.0013
Phenanthrene	NS	300000	NS	ND		0.00063	ND		0.00061	-		-	ND		0.00065	0.0014	J	0.00063
Pyrene	840	18000	1700	ND		0.00052	ND		0.0005	-		-	ND		0.00054	0.0041	J	0.00052
TCL SEMIVOLATILE ORGANIC COMPOUNDS (SVOC)																		
Dilution Factor	--	--	--							*1*								
Benzo(a)anthracene	0.8	2	0.6	-		-	-		-	0.051	J	0.022	-		-	-		-
Benzo(a)pyrene	0.2	0.2	0.2	-		-	-		-	0.049	J	0.048	-		-	-		-
Benzo(b)fluoranthene	2	2	0.6	-		-	-		-	0.068		0.016	-		-	-		-
Benzo(ghi)perylene	NS	30000	380000	-		-	-		-	0.034	J	0.023	-		-	-		-
Benzo(k)fluoranthene	25	23	6	-		-	-		-	0.026	J	0.014	-		-	-		-
Bis(2-ethylhexyl)phthalate	1200	140	35	-		-	-		-	0.039	J	0.02	-		-	-		-
Chrysene	80	230	62	-		-	-		-	0.043	J	0.02	-		-	-		-
Fluoranthene	1300	24000	2300	-		-	-		-	0.08	J	0.022	-		-	-		-
Indeno(1,2,3-cd)pyrene	7	2	0.6	-		-	-		-	0.04	J	0.027	-		-	-		-
Phenanthrene	NS	300000	NS	-		-	-		-	0.032	J	0.014	-		-	-		-
Pyrene	840	18000	1700	-		-	-		-	0.08	J	0.017	-		-	-		-
Total SVOCs	NS	NS	NS	-	-	-	-	-	-	0.542	-	-	-	-	-	-	-	-
Total SVOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-
PESTICIDES																		
Dilution Factor	--	--	--							*1*								
4,4'-DDE	18	9	2	-		-	-		-	0.00174	J	0.00042	-		-	-		-
4,4'-DDT	11	8	2	-		-	-		-	0.0027	J	0.00149	-		-	-		-
cis-Chlordane	0.05	1	0.2	-		-	-		-	0.00133	J	0.00064	-		-	-		-
POLYCHLORINATED BIPHENYLS (PCB)																		
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*		
Aroclor 1260	0.2	1	0.2	ND		0.00273	ND		0.00266	ND		0.00299	ND		0.0029	ND		0.00282
Total PCBs	0.2	1	0.2	ND		0.00178	ND		0.00173	ND		0.00194	ND		0.00188	ND		0.00184
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)																		
Dilution Factor	--	--	--							*1*								
Total EPH	NS	NS	NS	-		-	-		-	131		27.2	-		-	-		-
TAL METALS																		
Dilution Factor	--	--	--	*2*			*2*			*2*			*2*			*2*		
Aluminum, Total	6000	NS	78000	9100		1.8	6900		1.7	12000		1.8	7500		1.7	7000		1.7
Antimony, Total	6	450	31	ND		0.71	ND		0.69	ND		0.75	ND		0.71	ND		0.7
Arsenic, Total	19	19	19	4.4		0.29	3.2		0.29	5.8		0.31	2.7		0.29	4.2		0.29
Barium, Total	2100	59000	16000	48		0.24	33		0.23	74		0.25	27		0.24	22		0.24
Beryllium, Total	0.7	140	16	0.47		0.1	0.34	J	0.1	0.51		0.1	0.11	J	0.1	0.36	J	0.1
Cadmium, Total	2	78	78	ND		0.06	ND		0.06	ND		0.07	ND		0.06	ND		0.06
Calcium, Total	NS	NS	NS	28		2.4	12		2.4	1800		2.6	270		2.4	27		2.4
Chromium, Total	NS	NS	NS	8.2		0.15	6.9		0.15	19		0.16	8.8		0.15	9.9		0.15
Cobalt, Total	90	590	1600	2.2		0.44	1.7		0.42	130		0.46	0.66	J	0.43	1.3	J	0.43
Copper, Total	11000	45000	3100	6.1		0.16	4		0.16	530		0.17	6.7		0.16	7.4		0.16
Iron, Total	NS	NS	NS	20000		1.4	16000		1.4	16000		1.5	4400		1.4	13000		1.4
Lead, Total	90	800	400	5.7		0.2	3.5	J	0.19	28		0.21	6.6		0.2	8		0.19
Magnesium, Total	NS	NS	NS	170		1.2	120		1.2	1100		1.2	210		1.2	360		1.2
Manganese, Total	65	5900	11000	43		0.21	36		0.21	150		0.23	3.7		0.21	34		0.21
Mercury, Total	0.1	65	23	ND		0.02	ND		0.02	0.1		0.02	0.05	J	0.02	0.05	J	0.02
Nickel, Total	48	23000	1600	8.1		0.36	6.4		0.35	520		0.38	12		0.35	3.2		0.35
Potassium, Total	NS	NS	NS	200	J	25	140	J	24	1700		26	160	J	25	200	J	24
Selenium, Total	11	5700	390	ND		0.24	ND		0.23	0.79	J	0.25	0.32	J	0.24	ND		0.24
Silver, Total	1	5700	390	ND		0.18	ND		0.17	ND		0.19	ND		0.18	ND		0.17
Sodium, Total	NS	NS	NS	ND		15	ND		14	15000		16	110	J	15	ND		14
Thallium, Total	3	79	5	ND		0.28	ND		0.28	ND		0.3	ND		0.28	ND		0.28
Vanadium, Total	NS	1100	78	16		0.08	12		0.08	27		0.09	15		0.08	18		0.08
Zinc, Total	930	110000	23000	17		0.62	12		0.61	35		0.66	6.4		0.62	13		0.61
GENERAL CHEMISTRY																		
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*		
Cyanide, Total	20	23000	1600	-		-	-		-	ND		0.19	-		-	-		-
Solids, Total	NS	NS	NS	89.2		NS	91		NS	83.5		NS	86.5		NS	88.1		NS

TCL - EPA Target Compound List
TAL - EPA Target Analyte List
Conc = Concentration
DIGWSSL - Default Impact to Groundwater Soil Screening Levels
NRDCSRS - Non Residential Direct Contact Soil Remediation Standards
RDCSRS - Residential Direct Contact Soil Remediation Standards
J = The concentration was detected at a value below the RL and above the MDL
MDL = Method Detection Limit
ND = Analyzed for but Not Detected at the MDL
NS - No Standard Available
Q = Qualifier
Shaded cell concentration exceeds the NJDEP Non Residential SRS (5/2012).
Bolded concentration exceeds the NJDEP Residential SRS (5/2012).
Underline concentration exceeds NJDEP DIGWSSL (11/2013)
* - Dilution factor of 10 for total Antimony.

DRAFT

TABLE 2 - Parcel B
Summary of Soil Analytical Results

Manzo Property (Block 5001, Lot 13.16)
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

BORING ID:				SB-PB-1			SB-PB-1			SB-PB-2			SB-PB-3			SB-PB-4			SB-PB-4			SB-PB-5			SB-PB-5		
SAMPLE ID:	NJDEP	NJDEP	NJDEP	SBPB1-1.0			*DUP 2 (SBPB1-1.0)*			SBPB2-1.0			SBPB3-8.5			SBPB4-10.0			SBPB4-13.0			SBPB5-17.5			*DUP 1A (SBPB5-17.5)*		
LAB ID:				L1618201-05			L1618201-07			L1618256-01			L1618201-14			L1618201-03			L1618201-04			L1618052-16&17			L1618052-18		
COLLECTION DATE:	DIGWSSL	NRDCSRS	RDCSRS	6/14/2016			6/14/2016			6/13/2016			6/14/2016			6/14/2016			6/14/2016			6/13/2016			6/13/2016		
SAMPLE DEPTH (ft bgs):				0.5-1.0			0.5-1.0			0.5-1.0			8.0-8.5			9.5-10.0			12.5-13.0			17.0-17.5			17.0-17.5		
SAMPLE MATRIX:				SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL		
				Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Compounds/Analytes *(units)*	(mg/kg)	(mg/kg)	(mg/kg)	*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*		
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																											
Dilution Factor	--	--	--																			*1*			*1*		
2-Butanone	0.9	44000	3100	-		-	-		-	-		-	-		-	-		-	-		-	0.0035	J	0.00026	0.0026	J	0.0003
Acetone	19	NS	70000	-		-	-		-	-		-	-		-	-		-	-		-	0.019	J	0.00098	0.02	J	0.0011
Benzene	0.005	5	2	-		-	-		-	-		-	-		-	-		-	-		-	ND		0.00011	ND		0.00013
Ethylbenzene	13	110000	7800	-		-	-		-	-		-	-		-	-		-	-		-	ND		0.00012	ND		0.00014
Methyl Acetate	22	NS	78000	-		-	-		-	-		-	-		-	-		-	-		-	ND		0.00025	ND		0.0003
Methyl cyclohexane	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	ND		0.00014	ND		0.00017
o-Xylene	19	170000	12000	-		-	-		-	-		-	-		-	-		-	-		-	ND		0.00016	ND		0.00019
p/m-Xylene	19	170000	12000	-		-	-		-	-		-	-		-	-		-	-		-	ND		0.00019	ND		0.00022
Toluene	7	91000	6300	-		-	-		-	-		-	-		-	-		-	-		-	0.001	J	0.00018	0.0025		0.00022
Xylene (Total)	19	170000	12000	-		-	-		-	-		-	-		-	-		-	-		-	ND		0.00016	ND		0.00019
Total VOCs	NS	NS	NS	-		-	-	-	-	-		-	-		-	-		-	-		-	0.0235	-	-	0.0251	-	-
Total VOC TICs	NS	NS	NS	-		-	-	-	-	-		-	-		-	-		-	-		-	0.0019	J	0	0.0028	J	0
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*25*			*25*											
2-Methylnaphthalene	8	2400	230	ND		0.002	ND		0.0022	0.0051	J	0.002	0.29		0.051	0.25		0.053	ND		0.002	-		-	-		-
Acenaphthene	110	37000	3400	ND		0.0015	ND		0.0016	0.0081		0.0015	0.52		0.038	0.64		0.039	0.0041	J	0.0015	-		-	-		-
Acenaphthylene	NS	300000	NS	ND		0.00087	ND		0.00096	0.044		0.00089	0.38		0.022	0.64		0.023	0.0045	J	0.00087	-		-	-		-
Anthracene	2400	30000	17000	ND		0.00056	0.002	J	0.00061	0.05		0.00057	1.5		0.014	2.7		0.015	0.017		0.00056	-		-	-		-
Benzo(a)anthracene	0.8	2	0.6	ND		0.00066	0.0055	J	0.00073	0.17		0.00068	**2.5**		0.017	**5.3**		0.018	0.034		0.00066	-		-	-		-
Benzo(a)pyrene	0.2	0.2	0.2	ND		0.00084	0.005	J	0.00092	0.18		0.00085	**2.1**		0.022	**4.5**		0.022	0.03		0.00084	-		-	-		-
Benzo(b)fluoranthene	2	2	0.6	ND		0.00066	0.0068	J	0.00073	0.26		0.00068	**2.8**		0.017	**5.4**		0.018	0.036		0.00066	-		-	-		-
Benzo(ghi)perylene	NS	30000	380000	ND		0.00059	0.003	J	0.00065	0.12		0.0006	0.83		0.015	2.3		0.016	0.016		0.00059	-		-	-		-
Benzo(k)fluoranthene	25	23	6	ND		0.00063	0.0023	J	0.00069	0.069		0.00064	0.91		0.016	1.8		0.017	0.012		0.00063	-		-	-		-
Chrysene	80	230	62	ND		0.00052	0.0065	J	0.00057	0.19		0.00053	2.6		0.013	5.1		0.014	0.033		0.00052	-		-	-		-
Dibenzo(a,h)anthracene	0.8	0.2	0.2	ND		0.0007	0.00096	J	0.00077	0.03		0.00071	**0.28**		0.018	**0.69**		0.018	0.0049	J	0.0007	-		-	-		-
Fluoranthene	1300	24000	2300	ND		0.00049	0.011		0.00054	0.39		0.0005	5.4		0.012	11		0.013	0.078		0.00049	-		-	-		-
Fluorene	170	24000	2300	ND		0.00084	ND		0.00092	0.012		0.00085	0.91		0.022	1.2		0.022	0.0078		0.00084	-		-	-		-
Indeno(1,2,3-cd)pyrene	7	2	0.6	ND		0.00084	0.0032	J	0.00092	0.11		0.00085	**0.95**		0.022	**2.5**		0.022	0.018		0.00084	-		-	-		-
Naphthalene	25	17	6	ND		0.0012	ND		0.0014	0.0097		0.0013	0.25		0.032	0.28		0.033	0.002	J	0.0012	-		-	-		-
Phenanthrene	NS	300000	NS	ND		0.00059	0.0061	J	0.00065	0.16		0.0006	5		0.015	9.1		0.016	0.061		0.00059	-		-	-		-
Pyrene	840	18000	1700	ND		0.00049	0.0091		0.00054	0.33		0.0005	4.6		0.012	8.7		0.013	0.062		0.00049	-		-	-		-
SEMIVOLATILE ORGANIC COMPOUNDS (SVOC)																											
Dilution Factor	--	--	--																			*5*			*5*		
2-Methylnaphthalene	8	2400	230	-		-	-		-	-		-	-		-	-		-	-		-	ND		0.094	ND		0.093
Acenaphthene	110	37000	3400	-		-	-		-	-		-	-		-	-		-	-		-	0.17	J	0.074	0.22	J	0.073
Acenaphthylene	NS	300000	NS	-		-	-		-	-		-	-		-	-		-	-		-	0.27	J	0.1	0.33	J	0.098
Anthracene	2400	30000	17000	-		-	-		-	-		-	-		-	-		-	-		-	0.6		0.079	0.74		0.078
Benzo(a)anthracene	0.8	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	**1.2**		0.1	**1.5**		0.099
Benzo(a)pyrene	0.2	0.2	0.2	-		-	-		-	-		-	-		-	-		-	-		-	**1.2**		0.22	**1.5**		0.21
Benzo(b)fluoranthene	2	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	**1.5**		0.074	**1.8**		0.073
Benzo(ghi)perylene	NS	30000	380000	-		-	-		-	-		-	-		-	-		-	-		-	0.78		0.1	0.95		0.1
Benzo(k)fluoranthene	25	23	6	-		-	-		-	-		-	-		-	-		-	-		-	0.5		0.062	0.63		0.061
Carbazole	NS	96	24	-		-	-		-	-		-	-		-	-		-	-		-	0.14	J	0.057	0.15	J	0.056
Chrysene	80	230	62	-		-	-		-	-		-	-		-	-		-	-		-	1.3		0.091	1.6		0.09
Dibenzo(a,h)anthracene	0.8	0.2	0.2	-		-	-		-	-		-	-		-	-		-	-		-	**0.21**	J	0.1	**0.27**	J	0.1
Dibenzofuran	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	0.15	J	0.078	0.19	J	0.077
Fluoranthene	1300	24000	2300	-		-	-		-	-		-	-		-	-		-	-		-	2.8		0.1	3.3		0.1
Fluorene	170	24000	2300	-		-	-		-	-		-	-		-	-		-	-		-	0.31	J	0.086	0.4	J	0.084
Indeno(1,2,3-cd)pyrene	7	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	**0.81**		0.12	**0.97**		0.12
Naphthalene	25	17	6	-		-	-		-	-		-	-		-	-		-	-		-	ND		0.11	0.11	J	0.11
Phenanthrene	NS	300000	NS	-		-	-		-	-		-	-		-	-		-	-		-	1.7		0.064	1.9		0.063
Pyrene	840	18000	1700	-		-	-		-	-		-	-		-	-		-	-		-	2.5		0.077	3		0.076
Total SVOCs	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.14	-	-	19.56	-	-
Total SVOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	0.774	J	0
PESTICIDES																											
Dilution Factor	--	--	--																			*1*			*1*		
4,4'-DDD	4	13	3	-		-	-		-	-		-	-		-	-		-	-		-	0.00284		0.00059	0.00286		0.00059
4,4'-DDE	18	9	2	-		-	-		-	-		-	-		-	-		-	-		-	0.00136	J	0.00038	0.00154	J	0.00038
4,4'-DDT	11	8	2	-		-	-		-	-		-	-		-	-		-	-		-	0.00437		0.00133	0.00465		0.00133
Chlordane	0.05	1	0.2	-		-	-		-	-		-	-		-	-		-	-		-	0.0644	P	0.00547	0.0616	P	0.00549
cis-Chlordane	0.05	1	0.2	-		-	-		-	-		-	-		-	-		-	-		-	0.00779		0.00057	0.00749		0.00057
Dieldrin	0.003	0.2	0.04	-		-	-		-	-		-	-		-	-		-	-		-	0.00263		0.00051	ND		0.00051
Heptachlor epoxide	0.01	0.3	0.07	-		-	-		-	-		-	-		-	-		-	-		-	0.00197	J	0.00093	ND		0.00093
trans-Chlordane	0.05	1	0.2	-		-	-		-	-		-	-		-	-		-	-		-	0.00448	PI	0.00054	0.00342	PI	0.00054
POLYCHLORINATED BIPHENYLS (PCBs)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Aroclor 1254	0.2	1	0.2	ND		0.00287	ND		0.00318	ND		0.00296	ND		0.00296	ND		0.00298	ND		0.00285	ND		0.0028	ND		0.00288
Aroclor 1260	0.2	1	0.2	ND		0.00266	ND		0.00294	ND		0.00275	ND		0.00274	ND		0.00276	ND		0.00264	0.00828	J	0.00259	0.00802	J	0.00267
Total PCBs	0.2	1	0.2	ND		0.00173	ND		0.00192	ND		0.00179	ND		0.00178	ND		0.0018	ND		0.00172	0.00828	J	0.00169	0.00802	J	0.00174
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)																											
Dilution Factor	--	--	--																			*3*			*3*		
C10-C12 Aromatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	ND		16.6	ND		16.6
C12-C16 Aliphatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	22		16.6	22.2		16.6
C12-C16 Aromatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	ND		24.9	ND		24.9
C16-C21 Aliphatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	47.2		24.9	48.3		24.9
C16-C21 Aromatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	56.8		41.5	75.1		41.5
C21-C36 Aromatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	458		66.4	667		66.3
C21-C40 Aliphatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	873		83.1	1140		82.9
C9-C12 Aliphatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	ND		24.9	ND		24.9
Total EPH (fractionated)	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	1460		299	1950		298
Total EPH	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
TAL METALS																											
Dilution Factor	--	--	--	*2*			*2*			*2*			*2*			*2*			*2*			*2*			*2*		
Aluminum, Total	6000	NS	78000	7800		1.6	9200		1.7	12000		1.7	6600		1.6	13000		1.8	8700		1.6	5600		1.7	6000		1.6
Antimony, Total	6	450	31	1.1	J	0.65	1.3	J	0.7	ND		0.68	1.9	J	0.64	1.4	J	0.71	1	J	0.67	1.5	J	0.68	0.78	J	0.65
Arsenic, Total	19	19	19	4.4		0.27	4.8		0.29	2.6		0.28	6.4		0.26	8.6		0.29	8.1		0.28	7.3		0.28	8.2		0.27
Barium, Total	2100	59000	16000	22		0.22	26		0.24	51		0.23	28		0.22	42		0.24	28		0.23	18		0.23	22		0.22
Beryllium, Total	0.7	140	16	0.29	J	0.09	0.33	J	0.1	0.37	J	0.09	0.24	J	0.09	0.47		0.1	0.52		0.09	0.14	J	0.09	0.18	J	0.09
Cadmium, Total	2	78	78	0.1	J	0.06	0.12	J	0.06	ND		0.06	0.35	J	0.06	0.33	J	0.06	0.26	J	0.06	ND		0.06	ND		0.06
Calcium, Total	NS	NS	NS	260		2.2	360		2.4	110		2.4	8500		2.2	11000		2.4	230		2.3	7300		2.3	7000		2.2
Chromium, Total	NS	NS	NS	11		0.14	12		0.15	6.7		0.14	22		0.14	29		0.15	24		0.14	16		0.14	20		0.14
Cobalt, Total	90	590	1600	1.6		0.4	1.9		0.43	3.1		0.42	5		0.39	9.7		0.44	2.7		0.41	5.2		0.42	5.6		0.4
Copper, Total	11000	45000	3100	14		0.15	13		0.16	3.6		0.15	490		0.14	44		0.16	5.4		0.15	57		0.15	74		0.14
Iron, Total	NS	NS	NS	13000		1.3	15000		1.4	11000		1.4	17000		1.3	20000		1.4	30000		1.3	12000		1.3	15000		1.3
Lead, Total	90	800	400	9.2		0.18	7.3		0.19	3.7	J	0.19	32		0.18	51		0.2	ND		0.18	17		0.19	33		0.18
Magnesium, Total	NS	NS	NS	410		1.1	470		1.2	350		1.1	3000		1.1	6600		1.2	720		1.1	3100		1.1	3200		1.1
Manganese, Total	65	5900	11000	28		0.2	33		0.21	26		0.2	140		0.19	290		0.21	59		0.2	120		0.2	150		0.19
Mercury, Total	0.1	65	23	0.03	J	0.02	0.03	J	0.02	ND		0.01	0.05	J	0.02	0.16		0.02	0.02	J	0.02	0.05	J	0.01	0.05	J	0.01
Nickel, Total	48	23000	1600	4.6		0.33	5.5		0.35	4.3		0.34	9		0.32	17		0.36	5.5		0.34	10		0.34	10		0.32
Potassium, Total	NS	NS	NS	190	J	23	220		25	160	J	24	690		22	2400		25	440		23	480		24	490		23
Selenium, Total	11	5700	390	ND		0.22	0.32	J	0.24	ND		0.23	ND		0.22	ND		0.24	ND		0.23	ND		0.23	ND		0.22
Silver, Total	1	5700	390	ND		0.16	ND		0.18	ND		0.17	ND		0.16	ND		0.18	ND		0.17	ND		0.17	ND		0.16
Sodium, Total	NS	NS	NS	ND		14	17	J	15	21	J	14	250		13	450		15	40	J	14	390		14	300		13
Thallium, Total	3	79	5	ND		0.26	ND		0.28	ND		0.27	ND		0.26	ND		0.28	ND		0.27	ND		0.27	ND		0.26
Vanadium, Total	NS	1100	78	18		0.07	20		0.08	13		0.08	45		0.07	47		0.08	32		0.08	37		0.08	42		0.07
Zinc, Total	930	110000	23000	20		0.57	24		0.62	19		0.6	220		0.56	67		0.62	26		0.59	44		0.6	54		0.56
GENERAL CHEMISTRY																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Cyanide, Total	20	23000	1600	-		-	-		-	-		-	-		-	-		-	-		-	0.3	J	0.17	0.27	J	0.16
Solids, Total	NS	NS	NS	93.3		NS	85.3		NS	91.3		NS	91.4		NS	88		NS	92.9		NS	93.2		NS	93.9		NS

TCL - EPA Target Compound List
TAL - EPA Target Analyte List
Conc = Concentration
DIGWSSL - Default Impact to Groundwater Soil Screening Levels
NRDCSRS - Non Residential Direct Contact Soil Remediation Standards
RDCSRS - Residential Direct Contact Soil Remediation Standards
J = The concentration was detected at a value below the RL and above the MDL
MDL = Method Detection Limit
ND = Analyzed for but Not Detected at the MDL
NS - No Standard Available
Q = Qualifier
Shaded cell concentration exceeds the NJDEP Non Residential SRS (5/2012).
Bolded concentration exceeds the NJDEP Residential SRS (5/2012).
Underline concentration exceeds NJDEP DIGWSSL (11/2013)
Exceeds EPH Ecological Screening Criterion of 1700 mg/kg, but below the calculated Site Remediation Criterion
An Ecological Evalution must be performed to determine if a sensative receptor is located nearby.

DRAFT

TABLE 2 - Parcel B
Summary of Soil Analytical Results

Manzo Property (Block 5001, Lot 13.16)
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

BORING ID:				SB-PB-5			SB-PB-6			SB-PB-6			SB-PB-7			SB-PB-7			SB-PB-8			SB-PB-9			SB-PB-9		
SAMPLE ID:	NJDEP	NJDEP	NJDEP	SBPB5-36.5			SBPB6-7.5			SBPB6-22.5			SBPB7-4.0			SBPB7-10.0			SBPB8-2.5			SBPB9-4.0			SBPB9-28.0		
LAB ID:				L1618052-19&20			L1618256-02			L1618256-03			L1618052-13			L1618052-14&15			L1618052-03			L1618052-04			L1618052-05		
COLLECTION DATE:	DIGWSSL	NRDCSRS	RDCSRS	6/13/2016			6/13/2016			6/13/2016			6/13/2016			6/13/2016			6/13/2016			6/13/2016			6/13/2016		
SAMPLE DEPTH (ft bgs):				36.0-36.5			7.0-7.5			22.0-22.5			3.5-4.0			9.5-10.0			2.0-2.5			3.5-4.0			27.5-28.0		
SAMPLE MATRIX:				SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL		
				Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Compounds/Analytes *(units)*	(mg/kg)	(mg/kg)	(mg/kg)	*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*		
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																											
Dilution Factor	--	--	--	*1*			*1*			*1*						*1*											
2-Butanone	0.9	44000	3100	ND		0.00024	0.0067	J	0.00027	0.0016	J	0.00031	-		-	0.0022	J	0.00032	-		-	-		-	-		-
Acetone	19	NS	70000	0.013	J	0.00092	0.075		0.001	0.041		0.0012	-		-	0.014	J	0.0012	-		-	-		-	-		-
Benzene	0.005	5	2	ND		0.0001	0.00013	J	0.00012	ND		0.00014	-		-	ND		0.00014	-		-	-		-	-		-
Ethylbenzene	13	110000	7800	ND		0.00011	0.0002	J	0.00012	ND		0.00015	-		-	ND		0.00015	-		-	-		-	-		-
Methyl Acetate	22	NS	78000	ND		0.00024	0.0022	J	0.00026	ND		0.00031	-		-	ND		0.00032	-		-	-		-	-		-
Methyl cyclohexane	NS	NS	NS	ND		0.00014	0.00017	J	0.00015	ND		0.00018	-		-	ND		0.00018	-		-	-		-	-		-
o-Xylene	19	170000	12000	ND		0.00015	0.00023	J	0.00017	ND		0.0002	-		-	ND		0.0002	-		-	-		-	-		-
p/m-Xylene	19	170000	12000	ND		0.00018	0.00047	J	0.00019	ND		0.00023	-		-	ND		0.00023	-		-	-		-	-		-
Toluene	7	91000	6300	0.0021		0.00017	0.0014	J	0.00019	0.0024		0.00022	-		-	0.0014	J	0.00023	-		-	-		-	-		-
Xylene (Total)	19	170000	12000	ND		0.00015	0.0007	J	0.00017	ND		0.0002	-		-	ND		0.0002	-		-	-		-	-		-
Total VOCs	NS	NS	NS	0.0151	-	-	0.0872	-	-	0.045	-	-	-		-	0.0176	-	-	-		-	-		-	-		-
Total VOC TICs	NS	NS	NS	-		-	0.005	J	0	-		-	-		-	-		-	-		-	-		-	-		-
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)																											
Dilution Factor	--	--	--										*10*						*20*			*5*			*2*		
2-Methylnaphthalene	8	2400	230	-		-	-		-	-		-	ND		0.026	-		-	ND		0.082	ND		0.011	ND		0.0042
Acenaphthene	110	37000	3400	-		-	-		-	-		-	ND		0.019	-		-	ND		0.06	ND		0.0079	ND		0.0031
Acenaphthylene	NS	300000	NS	-		-	-		-	-		-	ND		0.011	-		-	0.15	J	0.036	0.024	J	0.0047	0.01	J	0.0019
Anthracene	2400	30000	17000	-		-	-		-	-		-	ND		0.0072	-		-	0.2	J	0.023	0.034	J	0.003	0.015		0.0012
Benzo(a)anthracene	0.8	2	0.6	-		-	-		-	-		-	ND		0.0085	-		-	**0.69**		0.027	0.089		0.0036	0.046		0.0014
Benzo(a)pyrene	0.2	0.2	0.2	-		-	-		-	-		-	ND		0.011	-		-	**0.86**		0.034	0.096		0.0045	0.048		0.0018
Benzo(b)fluoranthene	2	2	0.6	-		-	-		-	-		-	ND		0.0085	-		-	**1.1**		0.027	0.12		0.0036	0.063		0.0014
Benzo(ghi)perylene	NS	30000	380000	-		-	-		-	-		-	ND		0.0076	-		-	0.35		0.024	0.064		0.0032	0.03		0.0013
Benzo(k)fluoranthene	25	23	6	-		-	-		-	-		-	ND		0.0081	-		-	0.45		0.026	0.036	J	0.0034	0.019		0.0013
Chrysene	80	230	62	-		-	-		-	-		-	ND		0.0067	-		-	0.74		0.021	0.1		0.0028	0.047		0.0011
Dibenzo(a,h)anthracene	0.8	0.2	0.2	-		-	-		-	-		-	ND		0.009	-		-	**0.29**		0.029	0.017	J	0.0037	0.0082	J	0.0015
Fluoranthene	1300	24000	2300	-		-	-		-	-		-	ND		0.0063	-		-	1.1		0.02	0.15		0.0026	0.07		0.001
Fluorene	170	24000	2300	-		-	-		-	-		-	ND		0.011	-		-	0.034	J	0.034	ND		0.0045	ND		0.0018
Indeno(1,2,3-cd)pyrene	7	2	0.6	-		-	-		-	-		-	ND		0.011	-		-	0.53		0.034	0.053		0.0045	0.025		0.0018
Naphthalene	25	17	6	-		-	-		-	-		-	ND		0.016	-		-	0.074	J	0.052	ND		0.0067	ND		0.0027
Phenanthrene	NS	300000	NS	-		-	-		-	-		-	ND		0.0076	-		-	0.31		0.024	0.079		0.0032	0.021		0.0013
Pyrene	840	18000	1700	-		-	-		-	-		-	ND		0.0063	-		-	0.99		0.02	0.13		0.0026	0.06		0.001
SEMIVOLATILE ORGANIC COMPOUNDS (SVOC)																											
Dilution Factor	--	--	--	*4*			*2*			*1*						*2*											
2-Methylnaphthalene	8	2400	230	ND		0.078	0.098	J	0.038	ND		0.019	-		-	ND		0.04	-		-	-		-	-		-
Acenaphthene	110	37000	3400	0.068	J	0.062	0.14	J	0.03	ND		0.015	-		-	ND		0.031	-		-	-		-	-		-
Acenaphthylene	NS	300000	NS	ND		0.082	0.14	J	0.04	ND		0.02	-		-	ND		0.042	-		-	-		-	-		-
Anthracene	2400	30000	17000	0.18	J	0.066	0.35		0.032	ND		0.016	-		-	ND		0.033	-		-	-		-	-		-
Benzo(a)anthracene	0.8	2	0.6	0.34		0.083	**0.72**		0.04	ND		0.02	-		-	ND		0.042	-		-	-		-	-		-
Benzo(a)pyrene	0.2	0.2	0.2	**0.33**	J	0.18	**0.7**		0.088	ND		0.044	-		-	ND		0.092	-		-	-		-	-		-
Benzo(b)fluoranthene	2	2	0.6	0.4		0.061	**0.9**		0.03	ND		0.015	-		-	ND		0.031	-		-	-		-	-		-
Benzo(ghi)perylene	NS	30000	380000	0.23	J	0.086	0.4		0.042	ND		0.021	-		-	ND		0.044	-		-	-		-	-		-
Benzo(k)fluoranthene	25	23	6	0.15		0.052	0.32		0.025	ND		0.012	-		-	ND		0.026	-		-	-		-	-		-
Carbazole	NS	96	24	0.067	J	0.047	0.1	J	0.023	ND		0.011	-		-	ND		0.024	-		-	-		-	-		-
Chrysene	80	230	62	0.39	J	0.076	0.73		0.037	ND		0.018	-		-	ND		0.038	-		-	-		-	-		-
Dibenzo(a,h)anthracene	0.8	0.2	0.2	ND		0.085	0.11	J	0.042	ND		0.021	-		-	ND		0.043	-		-	-		-	-		-
Dibenzofuran	NS	NS	NS	ND		0.065	0.098	J	0.032	ND		0.016	-		-	ND		0.033	-		-	-		-	-		-
Fluoranthene	1300	24000	2300	0.84		0.084	1.5		0.041	ND		0.02	-		-	ND		0.043	-		-	-		-	-		-
Fluorene	170	24000	2300	0.12	J	0.071	0.22	J	0.034	ND		0.017	-		-	ND		0.036	-		-	-		-	-		-
Indeno(1,2,3-cd)pyrene	7	2	0.6	0.22	J	0.1	0.43		0.05	ND		0.025	-		-	ND		0.052	-		-	-		-	-		-
Naphthalene	25	17	6	ND		0.09	0.12	J	0.044	ND		0.022	-		-	ND		0.046	-		-	-		-	-		-
Phenanthrene	NS	300000	NS	0.63		0.053	1.2		0.026	ND		0.013	-		-	ND		0.027	-		-	-		-	-		-
Pyrene	840	18000	1700	0.73		0.064	1.4		0.031	ND		0.016	-		-	ND		0.032	-		-	-		-	-		-
Total SVOCs	NS	NS	NS	4.695	-	-	9.676	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total SVOC TICs	NS	NS	NS	-		-	1.067	J	0	-		-	-		-	-		-	-		-	-		-	-		-
PESTICIDES																											
Dilution Factor	--	--	--	*1*			*1*			*1*						*1*											
4,4'-DDD	4	13	3	0.00148	J	0.0006	0.0026		0.00062	ND		0.0006	-		-	ND		0.00061	-		-	-		-	-		-
4,4'-DDE	18	9	2	0.0008	J	0.00039	0.00133	J	0.0004	ND		0.00038	-		-	ND		0.00039	-		-	-		-	-		-
4,4'-DDT	11	8	2	0.00224	J	0.00137	0.00188	J	0.0014	ND		0.00135	-		-	ND		0.00139	-		-	-		-	-		-
Chlordane	0.05	1	0.2	0.0586	P	0.00565	0.0302		0.00578	ND		0.00557	-		-	ND		0.00572	-		-	-		-	-		-
cis-Chlordane	0.05	1	0.2	0.00746		0.00059	0.00213	J	0.0006	ND		0.00058	-		-	ND		0.0006	-		-	-		-	-		-
Dieldrin	0.003	0.2	0.04	0.00118		0.00053	0.00065	J	0.00054	ND		0.00052	-		-	ND		0.00054	-		-	-		-	-		-
Heptachlor epoxide	0.01	0.3	0.07	ND		0.00095	ND		0.00098	ND		0.00094	-		-	ND		0.00097	-		-	-		-	-		-
trans-Chlordane	0.05	1	0.2	0.00381	PI	0.00056	0.00407	PI	0.00057	ND		0.00055	-		-	ND		0.00057	-		-	-		-	-		-
POLYCHLORINATED BIPHENYLS (PCBs)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Aroclor 1254	0.2	1	0.2	ND		0.00301	0.00528	J	0.00289	ND		0.00285	ND		0.00371	ND		0.00295	ND		0.00287	ND		0.00305	ND		0.00313
Aroclor 1260	0.2	1	0.2	0.00437	J	0.00279	ND		0.00268	ND		0.00265	ND		0.00344	0.00298	J	0.00274	ND		0.00266	0.00292	J	0.00283	ND		0.0029
Total PCBs	0.2	1	0.2	0.00437	J	0.00181	0.00528	J	0.00174	ND		0.00172	ND		0.00224	0.00298	J	0.00178	ND		0.00173	0.00292	J	0.00184	ND		0.00189
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)																											
Dilution Factor	--	--	--				*4*																				
C10-C12 Aromatics	NS	NS	NS	-		-	ND		34.5	-		-	-		-	-		-	-		-	-		-	-		-
C12-C16 Aliphatics	NS	NS	NS	-		-	35.6		34.5	-		-	-		-	-		-	-		-	-		-	-		-
C12-C16 Aromatics	NS	NS	NS	-		-	ND		51.7	-		-	-		-	-		-	-		-	-		-	-		-
C16-C21 Aliphatics	NS	NS	NS	-		-	66.1		51.7	-		-	-		-	-		-	-		-	-		-	-		-
C16-C21 Aromatics	NS	NS	NS	-		-	91.5		86.2	-		-	-		-	-		-	-		-	-		-	-		-
C21-C36 Aromatics	NS	NS	NS	-		-	985		138	-		-	-		-	-		-	-		-	-		-	-		-
C21-C40 Aliphatics	NS	NS	NS	-		-	1440		172	-		-	-		-	-		-	-		-	-		-	-		-
C9-C12 Aliphatics	NS	NS	NS	-		-	ND		51.7	-		-	-		-	-		-	-		-	-		-	-		-
Total EPH (fractionated)	NS	NS	NS	-		-	2620		621	-		-	-		-	-		-	-		-	-		-	-		-
Total EPH	NS	NS	NS	1120		26.2	-		-	49		25.4	-		-	284		26.3	-		-	-		-	-		-
TAL METALS																											
Dilution Factor	--	--	--	*2*			*2*			*2*			*2*			*2*			*2*			*2*			*2*		
Aluminum, Total	6000	NS	78000	6700		1.8	7000		1.7	7000		1.7	14000		2	8300		1.7	3600		1.6	12000		1.7	13000		1.7
Antimony, Total	6	450	31	ND		0.71	ND		0.7	ND		0.69	8.8		0.82	2.6	J	0.69	ND		0.67	ND		0.71	ND		0.7
Arsenic, Total	19	19	19	14		0.29	4.7		0.29	7		0.29	13		0.34	15		0.28	10		0.28	9.4		0.29	10		0.29
Barium, Total	2100	59000	16000	26		0.24	27		0.24	24		0.23	89		0.28	33		0.23	12		0.22	58		0.24	91		0.23
Beryllium, Total	0.7	140	16	0.39	J	0.1	0.28	J	0.1	0.56		0.1	0.62		0.11	0.32	J	0.09	0.15	J	0.09	0.51		0.1	0.93		0.1
Cadmium, Total	2	78	78	ND		0.06	ND		0.06	ND		0.06	ND		0.07	ND		0.06	ND		0.06	ND		0.06	ND		0.06
Calcium, Total	NS	NS	NS	5000		2.4	8400		2.4	370		2.4	2300		2.8	900		2.4	1800		2.3	1300		2.4	450		2.4
Chromium, Total	NS	NS	NS	34		0.15	18		0.15	25		0.15	18		0.17	19		0.14	18		0.14	14		0.15	12		0.15
Cobalt, Total	90	590	1600	5.4		0.44	4.4		0.43	2.4		0.42	7.2		0.5	3.2		0.42	4.3		0.41	10		0.43	5		0.42
Copper, Total	11000	45000	3100	54		0.16	25		0.16	4.4		0.16	17		0.18	14		0.15	24		0.15	20		0.16	5.9		0.16
Iron, Total	NS	NS	NS	25000		1.4	15000		1.4	19000		1.4	22000		1.6	19000		1.4	19000		1.3	16000		1.4	22000		1.4
Lead, Total	90	800	400	47		0.2	21		0.19	5.2		0.19	ND		0.22	1.3	J	0.19	ND		0.18	5.5		0.19	ND		0.19
Magnesium, Total	NS	NS	NS	2600		1.2	2300		1.2	560		1.2	1000		1.4	960		1.1	1500		1.1	710		1.2	460		1.2
Manganese, Total	65	5900	11000	120		0.21	130		0.21	40		0.21	84		0.25	69		0.2	190		0.2	260		0.21	98		0.21
Mercury, Total	0.1	65	23	0.02	J	0.02	0.04	J	0.01	ND		0.02	ND		0.02	ND		0.02	ND		0.02	ND		0.02	ND		0.02
Nickel, Total	48	23000	1600	11		0.36	7.6		0.35	5.3		0.35	8.8		0.41	5.3		0.34	9.2		0.33	7.7		0.35	10		0.35
Potassium, Total	NS	NS	NS	420		25	550		24	370		24	420		29	500		24	320		23	350		25	180	J	24
Selenium, Total	11	5700	390	ND		0.24	ND		0.24	ND		0.23	ND		0.28	ND		0.23	ND		0.22	ND		0.24	ND		0.23
Silver, Total	1	5700	390	ND		0.18	ND		0.18	ND		0.17	ND		0.2	ND		0.17	ND		0.17	ND		0.18	ND		0.17
Sodium, Total	NS	NS	NS	250		15	140	J	15	45	J	14	140	J	17	44	J	14	100	J	14	43	J	15	39	J	14
Thallium, Total	3	79	5	ND		0.28	ND		0.28	ND		0.28	ND		0.33	ND		0.27	ND		0.27	ND		0.28	ND		0.28
Vanadium, Total	NS	1100	78	41		0.08	34		0.08	42		0.08	39		0.09	35		0.08	28		0.08	24		0.08	13		0.08
Zinc, Total	930	110000	23000	69		0.62	27		0.61	23		0.61	31		0.72	19		0.6	19		0.58	32		0.62	30		0.61
GENERAL CHEMISTRY																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Cyanide, Total	20	23000	1600	0.18	J	0.17	ND		0.18	ND		0.18	-		-	0.54	J	0.17	-		-	-		-	-		-
Solids, Total	NS	NS	NS	89		NS	90.9		NS	90.6		NS	73.1		NS	88		NS	91.9		NS	89		NS	87.1		NS

TCL - EPA Target Compound List
TAL - EPA Target Analyte List
Conc = Concentration
DIGWSSL - Default Impact to Groundwater Soil Screening Levels
NRDCSRS - Non Residential Direct Contact Soil Remediation Standards
RDCSRS - Residential Direct Contact Soil Remediation Standards
J = The concentration was detected at a value below the RL and above the MDL
MDL = Method Detection Limit
ND = Analyzed for but Not Detected at the MDL
NS - No Standard Available
Q = Qualifier
Shaded cell concentration exceeds the NJDEP Non Residential SRS (5/2012).
Bolded concentration exceeds the NJDEP Residential SRS (5/2012).
Underline concentration exceeds NJDEP DIGWSSL (11/2013)
Exceeds EPH Ecological Screening Criterion of 1700 mg/kg, but below the calculated Sit
An Ecological Evalution must be performed to determine if a sensative receptor is locate

DRAFT

TABLE 2 - Parcel B
Summary of Soil Analytical Results

Manzo Property (Block 5001, Lot 13.16)
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

BORING ID:				SB-PB-10			SB-PB-11			SB-PB-11			SB-PB-11			SB-PB-12			SB-PB-12			SB-PB-13			SB-PB-14		
SAMPLE ID:	NJDEP	NJDEP	NJDEP	SBPB10-1.0			SBPB11-7.5			SBPB11-19.0			SBPB11-21.0			SBPB12-7.5			*DUP 1 (SBPB12-7.5)*			SBPB13-2.0			SBPB14-0.5		
LAB ID:				L1618052-06			L1618052-07			L1618052-08			L1618052-09			L1618052-11			L1618052-10			L1618052-12			L1619845-01		
COLLECTION DATE:	DIGWSSL	NRDCSRS	RDCSRS	6/13/2016			6/13/2016			6/13/2016			6/13/2016			6/13/2016			6/13/2016			6/13/2016			6/27/2016		
SAMPLE DEPTH (ft bgs):				0.5-1.0			7.0-7.5			18.5-19.0			20.5-21.0			7.0-7.5			7.0-7.5			1.5-2.0			0.0-0.5		
SAMPLE MATRIX:				SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL		
				Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Compounds/Analytes *(units)*	(mg/kg)	(mg/kg)	(mg/kg)	*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*		
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																											
Dilution Factor	--	--	--																								
2-Butanone	0.9	44000	3100	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Acetone	19	NS	70000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzene	0.005	5	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Ethylbenzene	13	110000	7800	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Methyl Acetate	22	NS	78000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Methyl cyclohexane	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
o-Xylene	19	170000	12000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
p/m-Xylene	19	170000	12000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Toluene	7	91000	6300	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Xylene (Total)	19	170000	12000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Total VOCs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Total VOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)																											
Dilution Factor	--	--	--	*1*			*20*			*40*			*20*			*20*			*20*			*1*			*10*		
2-Methylnaphthalene	8	2400	230	ND		0.002	ND		0.039	ND		0.08	ND		0.044	ND		0.039	ND		0.047	ND		0.002	ND		0.021
Acenaphthene	110	37000	3400	ND		0.0015	ND		0.029	ND		0.059	ND		0.033	ND		0.028	ND		0.035	ND		0.0015	0.031	J	0.016
Acenaphthylene	NS	300000	NS	ND		0.00089	0.038	J	0.017	ND		0.035	0.021	J	0.019	ND		0.017	ND		0.021	0.0036	J	0.00088	0.098		0.0093
Anthracene	2400	30000	17000	0.0018	J	0.00057	0.063	J	0.011	ND		0.022	0.077	J	0.012	ND		0.011	ND		0.013	0.0047	J	0.00056	0.16		0.006
Benzo(a)anthracene	0.8	2	0.6	0.0052	J	0.00067	0.22		0.013	ND		0.026	0.22		0.015	ND		0.013	ND		0.016	0.013		0.00066	**0.63**		0.0071
Benzo(a)pyrene	0.2	0.2	0.2	0.0055	J	0.00085	0.2		0.017	ND		0.034	0.18		0.019	ND		0.016	ND		0.02	0.013		0.00084	**0.79**		0.009
Benzo(b)fluoranthene	2	2	0.6	0.008		0.00067	0.28		0.013	ND		0.026	0.25		0.015	ND		0.013	ND		0.016	0.018		0.00066	**1.1**		0.0071
Benzo(ghi)perylene	NS	30000	380000	0.0049	J	0.0006	ND		0.012	ND		0.024	0.091	J	0.013	ND		0.012	ND		0.014	0.011		0.0006	0.57		0.0063
Benzo(k)fluoranthene	25	23	6	0.002	J	0.00064	0.071	J	0.012	ND		0.025	0.081	J	0.014	ND		0.012	ND		0.015	0.0053	J	0.00063	0.35		0.0067
Chrysene	80	230	62	0.0062	J	0.00053	0.25		0.01	ND		0.021	0.17		0.012	ND		0.01	ND		0.012	0.014		0.00052	0.74		0.0056
Dibenzo(a,h)anthracene	0.8	0.2	0.2	ND		0.00071	ND		0.014	ND		0.028	0.12	J	0.016	ND		0.014	ND		0.017	ND		0.0007	0.14		0.0075
Fluoranthene	1300	24000	2300	0.0097		0.0005	0.43		0.0097	ND		0.02	0.4		0.011	0.028	J	0.0095	0.017	J	0.012	0.02		0.00049	1.2		0.0052
Fluorene	170	24000	2300	ND		0.00085	0.055	J	0.017	ND		0.034	0.051	J	0.019	ND		0.016	ND		0.02	ND		0.00084	0.035	J	0.009
Indeno(1,2,3-cd)pyrene	7	2	0.6	0.0039	J	0.00085	ND		0.017	ND		0.034	0.19		0.019	ND		0.016	ND		0.02	0.0084		0.00084	0.47		0.009
Naphthalene	25	17	6	ND		0.0013	ND		0.025	ND		0.05	ND		0.028	ND		0.024	ND		0.03	ND		0.0013	ND		0.013
Phenanthrene	NS	300000	NS	0.0049	J	0.0006	0.22		0.012	ND		0.024	0.26		0.013	ND		0.012	ND		0.014	0.0079		0.0006	0.55		0.0063
Pyrene	840	18000	1700	0.008		0.0005	0.32		0.0097	ND		0.02	0.32		0.011	0.03	J	0.0095	0.02	J	0.012	0.018		0.00049	1		0.0052
SEMIVOLATILE ORGANIC COMPOUNDS (SVOC)																											
Dilution Factor	--	--	--																								
2-Methylnaphthalene	8	2400	230	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Acenaphthene	110	37000	3400	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Acenaphthylene	NS	300000	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Anthracene	2400	30000	17000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(a)anthracene	0.8	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(a)pyrene	0.2	0.2	0.2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(b)fluoranthene	2	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(ghi)perylene	NS	30000	380000	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Benzo(k)fluoranthene	25	23	6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Carbazole	NS	96	24	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Chrysene	80	230	62	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Dibenzo(a,h)anthracene	0.8	0.2	0.2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Dibenzofuran	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Fluoranthene	1300	24000	2300	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Fluorene	170	24000	2300	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Indeno(1,2,3-cd)pyrene	7	2	0.6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Naphthalene	25	17	6	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Phenanthrene	NS	300000	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Pyrene	840	18000	1700	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Total SVOCs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Total SVOC TICs	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
PESTICIDES																											
Dilution Factor	--	--	--																								
4,4'-DDD	4	13	3	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
4,4'-DDE	18	9	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
4,4'-DDT	11	8	2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Chlordane	0.05	1	0.2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
cis-Chlordane	0.05	1	0.2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Dieldrin	0.003	0.2	0.04	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Heptachlor epoxide	0.01	0.3	0.07	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
trans-Chlordane	0.05	1	0.2	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
POLYCHLORINATED BIPHENYLS (PCBs)																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Aroclor 1254	0.2	1	0.2	ND		0.00285	ND		0.0028	ND		0.00282	ND		0.00305	ND		0.00276	ND		0.0034	ND		0.00278	ND		0.00308
Aroclor 1260	0.2	1	0.2	ND		0.00264	ND		0.00259	ND		0.00262	ND		0.00283	0.00359	J	0.00256	ND		0.00315	ND		0.00257	0.0378		0.00286
Total PCBs	0.2	1	0.2	ND		0.00172	ND		0.00169	ND		0.0017	ND		0.00184	0.00359	J	0.00167	ND		0.00205	ND		0.00168	0.0378		0.00186
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)																											
Dilution Factor	--	--	--																								*1*
C10-C12 Aromatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	ND		9.13
C12-C16 Aliphatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	ND		6.08
C12-C16 Aromatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	53		9.13
C16-C21 Aliphatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	328		30.4
C16-C21 Aromatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	ND		6.08
C21-C36 Aromatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	ND		9.13
C21-C40 Aliphatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	43.9		15.2
C9-C12 Aliphatics	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	179		24.3
Total EPH (fractionated)	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	604		110
Total EPH	NS	NS	NS	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
TAL METALS																											
Dilution Factor	--	--	--	*2*			*2*			*2*			*2*			*2*			*2*			*2*					
Aluminum, Total	6000	NS	78000	12000		1.6	8600		1.6	4200		1.6	8400		1.8	4300		1.6	6200		1.9	7100		1.6	-		-
Antimony, Total	6	450	31	ND		0.66	ND		0.64	ND		0.67	ND		0.73	ND		0.64	ND		0.77	ND		0.64	-		-
Arsenic, Total	19	19	19	8.3		0.27	8		0.26	6.5		0.28	9.6		0.3	11		0.26	9.3		0.32	3.1		0.26	-		-
Barium, Total	2100	59000	16000	50		0.22	24		0.21	12		0.22	28		0.25	11		0.22	14		0.26	25		0.22	-		-
Beryllium, Total	0.7	140	16	0.37	J	0.09	0.1	J	0.09	0.18	J	0.09	0.37	J	0.1	0.28	J	0.09	0.31	J	0.11	0.38	J	0.09	-		-
Cadmium, Total	2	78	78	ND		0.06	ND		0.06	ND		0.06	ND		0.06	ND		0.06	ND		0.07	ND		0.06	-		-
Calcium, Total	NS	NS	NS	110		2.3	8100		2.2	2900		2.3	8500		2.5	1000		2.2	2100		2.6	96		2.2	-		-
Chromium, Total	NS	NS	NS	8		0.14	17		0.14	10		0.14	62		0.16	37		0.14	25		0.16	9.3		0.14	-		-
Cobalt, Total	90	590	1600	2.4		0.4	10		0.39	3		0.41	5.6		0.45	2.7		0.39	3.6		0.47	2.4		0.39	-		-
Copper, Total	11000	45000	3100	6.5		0.15	53		0.14	26		0.15	320		0.16	28		0.14	81		0.17	2.1		0.14	-		-
Iron, Total	NS	NS	NS	18000		1.3	19000		1.2	9000		1.3	15000		1.4	18000		1.3	14000		1.5	7400		1.3	-		-
Lead, Total	90	800	400	ND		0.18	1.5	J	0.17	0.74	J	0.18	12		0.2	ND		0.18	1.4	J	0.21	0.51	J	0.18	-		-
Magnesium, Total	NS	NS	NS	340		1.1	6200		1	1700		1.1	3500		1.2	680		1.1	1500		1.3	460		1.1	-		-
Manganese, Total	65	5900	11000	56		0.2	270		0.19	73		0.2	120		0.22	62		0.19	81		0.23	32		0.19	-		-
Mercury, Total	0.1	65	23	ND		0.02	0.07		0.02	ND		0.02	ND		0.02	ND		0.01	ND		0.02	ND		0.01	-		-
Nickel, Total	48	23000	1600	9.3		0.33	18		0.32	5.3		0.33	10		0.36	5		0.32	8.2		0.38	7.4		0.32	-		-
Potassium, Total	NS	NS	NS	220		23	290		22	230		23	460		26	320		22	370		27	110	J	22	-		-
Selenium, Total	11	5700	390	ND		0.22	ND		0.21	ND		0.22	ND		0.25	ND		0.22	ND		0.26	ND		0.22	-		-
Silver, Total	1	5700	390	ND		0.16	ND		0.16	ND		0.17	ND		0.18	ND		0.16	ND		0.19	ND		0.16	-		-
Sodium, Total	NS	NS	NS	ND		14	300		13	79	J	14	150	J	15	48	J	13	80	J	16	13	J	13	-		-
Thallium, Total	3	79	5	ND		0.26	ND		0.25	ND		0.27	ND		0.29	ND		0.26	ND		0.31	ND		0.26	-		-
Vanadium, Total	NS	1100	78	16		0.07	61		0.07	28		0.08	33		0.08	52		0.07	45		0.09	6		0.07	-		-
Zinc, Total	930	110000	23000	20		0.58	30		0.56	13		0.58	41		0.64	14		0.56	18		0.67	20		0.56	-		-
GENERAL CHEMISTRY																											
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Cyanide, Total	20	23000	1600	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-
Solids, Total	NS	NS	NS	91.6		NS	94.8		NS	92.5		NS	84.4		NS	96.5		NS	77.9		NS	94.8		NS	87.3		NS

TCL - EPA Target Compound List
TAL - EPA Target Analyte List
Conc = Concentration
DIGWSSL - Default Impact to Groundwater Soil Screening Levels
NRDCSRS - Non Residential Direct Contact Soil Remediation Standards
RDCSRS - Residential Direct Contact Soil Remediation Standards
J = The concentration was detected at a value below the RL and above the MDL
MDL = Method Detection Limit
ND = Analyzed for but Not Detected at the MDL
NS - No Standard Available
Q = Qualifier
Shaded cell concentration exceeds the NJDEP Non Residential SRS (5/2012).
Bolded concentration exceeds the NJDEP Residential SRS (5/2012).
Underline concentration exceeds NJDEP DIGWSSL (11/2013)
Exceeds EPH Ecological Screening Criterion of 1700 mg/kg, but below the calculated Sit
An Ecological Evalution must be performed to determine if a sensative receptor is locate

DRAFT

Table 3 - Parcel C
Summary of Soil Analytical Results

Manzo Property (Block 5001, Lot 13.17)
Old Bridge, New Jersey

Enviro-Sciences (of Delaware), Inc.

BORING ID:				SB-PC-1			SB-PC-2			SB-PC-3			SB-PC-4			SB-PC-5			SB-PC-6			SB-PC-6		
SAMPLE ID:	NJDEP	NJDEP	NJDEP	SBPC1-4.5			SBPC2-9.5			SBPC3-7.5			SBPC4-18.5			SBPC5-1.0			SBPC6-1.0			*DUP 2A (SBPC6-1.0)*		
LAB ID:				L1618052-01			L1618052-02			L1618201-01			L1618201-02			L1618201-06			L1618781-01			L1618781-14		
COLLECTION DATE:	DIGWSSL	NRDCSRS	RDCSRS	6/13/2016			6/13/2016			6/14/2016			6/14/2016			6/14/2016			6/17/2016			6/17/2016		
SAMPLE DEPTH (ft bgs):				4.0-4.5			9.0-9.5			7.0-7.5			18.0-18.5			0.5-1.0			0.5-1.0			0.5-1.0		
SAMPLE MATRIX:				SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL		
				Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL	Conc	Q	MDL
Compounds/Analytes *(units)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*			*(mg/kg)*		
TCL VOLATILE ORGANIC COMPOUNDS (VOC)																								
Dilution Factor	--	--	--										*1*						*1*			*1*		
2-Butanone	0.9	44000	3100	-	-	-	-	-	-	-		-	ND		0.015	-		-	0.0047	J	0.00027	0.004	J	0.0003
Acetone	19	NS	70000	-	-	-	-	-	-	-		-	0.093	J	0.057	-		-	0.24		0.001	0.18		0.0011
Chloromethane	NS	12	4	-	-	-	-	-	-	-		-	0.037	J	0.016	-		-	ND		0.00029	ND		0.00032
Methyl Acetate	22	NS	78000	-	-	-	-	-	-	-		-	0.16	J	0.015	-		-	ND		0.00027	ND		0.0003
Toluene	7	91000	6300	-	-	-	-	-	-	-		-	0.018	J	0.011	-		-	0.00048	J	0.00019	0.00084	J	0.00021
Total VOCs	NS	NS	NS	-			-			-	-	-	0.308	-	-	-	-	-	0.24518	-	-	0.18484	-	-
Total VOC TICs	NS	NS	NS	-	-	-	-	-	-	-		-	2.169	J		-		-	0.0786	J	0	0.005	J	0
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)																								
Dilution Factor	--	--	--	*100*			*20*			*1*						*1*								
2-Methylnaphthalene	8	2400	230	1.5		0.2	ND		0.04	ND		0.0021	-		-	ND		0.002	-		-	-		-
Acenaphthene	110	37000	3400	2.4		0.15	0.051	J	0.03	ND		0.0015	-		-	ND		0.0015	-		-	-		-
Acenaphthylene	NS	300000	NS	1.2		0.089	0.022	J	0.018	ND		0.00092	-		-	ND		0.00088	-		-	-		-
Anthracene	2400	30000	17000	10		0.057	0.19		0.011	ND		0.00058	-		-	ND		0.00056	-		-	-		-
Benzo(a)anthracene	0.8	2	0.6	**13**		0.068	0.33		0.013	ND		0.0007	-		-	ND		0.00067	-		-	-		-
Benzo(a)pyrene	0.2	0.2	0.2	**13**		0.086	**0.31**		0.017	ND		0.00088	-		-	ND		0.00085	-		-	-		-
Benzo(b)fluoranthene	2	2	0.6	**14**		0.068	0.35		0.013	ND		0.0007	-		-	ND		0.00067	-		-	-		-
Benzo(ghi)perylene	NS	30000	380000	7.6		0.06	0.2		0.012	ND		0.00062	-		-	ND		0.0006	-		-	-		-
Benzo(k)fluoranthene	25	23	6	5		0.064	0.093	J	0.013	ND		0.00066	-		-	ND		0.00064	-		-	-		-
Chrysene	80	230	62	13		0.053	0.27		0.01	ND		0.00055	-		-	ND		0.00053	-		-	-		-
Dibenzo(a,h)anthracene	0.8	0.2	0.2	**2.4**		0.071	0.13	J	0.014	ND		0.00073	-		-	ND		0.00071	-		-	-		-
Fluoranthene	1300	24000	2300	31		0.05	0.76		0.0098	ND		0.00051	-		-	ND		0.00049	-		-	-		-
Fluorene	170	24000	2300	5.4		0.086	0.1	J	0.017	ND		0.00088	-		-	ND		0.00085	-		-	-		-
Indeno(1,2,3-cd)pyrene	7	2	0.6	**8.4**		0.086	0.27		0.017	ND		0.00088	-		-	ND		0.00085	-		-	-		-
Naphthalene	25	17	6	1		0.13	ND		0.025	ND		0.0013	-		-	ND		0.0013	-		-	-		-
Phenanthrene	NS	300000	NS	31		0.06	0.61		0.012	ND		0.00062	-		-	ND		0.0006	-		-	-		-
Pyrene	840	18000	1700	26		0.05	0.61		0.0098	ND		0.00051	-		-	ND		0.00049	-		-	-		-
TCL SEMIVOLATILE ORGANIC COMPOUNDS (SVOC)																								
Dilution Factor	--	--	--										*2*						*1*			*1*		
2-Methylnaphthalene	8	2400	230	-	-	-	-	-	-	-		-	0.12	J	0.037	-		-	ND		0.019	ND		0.019
Acenaphthene	110	37000	3400	-	-	-	-	-	-	-		-	0.69		0.029	-		-	ND		0.015	ND		0.015
Acenaphthylene	NS	300000	NS	-	-	-	-	-	-	-		-	0.25	J	0.039	-		-	ND		0.02	ND		0.02
Anthracene	2400	30000	17000	-	-	-	-	-	-	-		-	1.4		0.031	-		-	ND		0.016	ND		0.016
Benzaldehyde	NS	68000	6100	-	-	-	-	-	-	-		-	ND		0.055	-		-	0.063	J	0.028	ND		0.028
Benzo(a)anthracene	0.8	2	0.6	-	-	-	-	-	-	-		-	**2.4**		0.039	-		-	ND		0.02	ND		0.02
Benzo(a)pyrene	0.2	0.2	0.2	-	-	-	-	-	-	-		-	**2**		0.086	-		-	ND		0.044	ND		0.044
Benzo(b)fluoranthene	2	2	0.6	-	-	-	-	-	-	-		-	**2.5**		0.029	-		-	ND		0.015	ND		0.015
Benzo(ghi)perylene	NS	30000	380000	-	-	-	-	-	-	-		-	1.1		0.041	-		-	ND		0.021	ND		0.021
Benzo(k)fluoranthene	25	23	6	-	-	-	-	-	-	-		-	0.81		0.024	-		-	ND		0.013	ND		0.013
Bis(2-ethylhexyl)phthalate	1200	140	35	-	-	-	-	-	-	-		-	0.036	J	0.036	-		-	ND		0.019	ND		0.019
Carbazole	NS	96	24	-	-	-	-	-	-	-		-	0.33	J	0.022	-		-	ND		0.012	ND		0.012
Chrysene	80	230	62	-	-	-	-	-	-	-		-	2.1		0.036	-		-	ND		0.019	ND		0.018
Dibenzo(a,h)anthracene	0.8	0.2	0.2	-	-	-	-	-	-	-		-	**0.31**		0.04	-		-	ND		0.021	ND		0.021
Dibenzofuran	NS	NS	NS	-	-	-	-	-	-	-		-	0.47		0.031	-		-	ND		0.016	ND		0.016
Fluoranthene	1300	24000	2300	-	-	-	-	-	-	-		-	5.1		0.04	-		-	ND		0.021	ND		0.021
Fluorene	170	24000	2300	-	-	-	-	-	-	-		-	1.1		0.034	-		-	ND		0.017	ND		0.017
Indeno(1,2,3-cd)pyrene	7	2	0.6	-	-	-	-	-	-	-		-	**1.3**		0.049	-		-	ND		0.025	ND		0.025
Naphthalene	25	17	6	-	-	-	-	-	-	-		-	0.16	J	0.043	-		-	ND		0.022	ND		0.022
Phenanthrene	NS	300000	NS	-	-	-	-	-	-	-		-	3.5		0.025	-		-	ND		0.013	ND		0.013
Pyrene	840	18000	1700	-	-	-	-	-	-	-		-	4.7		0.03	-		-	ND		0.016	ND		0.016
Total SVOCs	NS	NS	NS	-			-			-	-	-	30.376	-	-	-	-	-	0.063	-	-	-	-	-
Total SVOC TICs	NS	NS	NS	-	-	-	-	-	-	-		-	8.536	J	0	-		-	1.205	J	0	1.728	J	0
PESTICIDES																								
Dilution Factor	--	--	--										*1*						*1*			*1*		
4,4'-DDD	4	13	3	-	-	-	-	-	-	-		-	0.00211		0.00058	-		-	ND		0.00061	ND		0.00061
4,4'-DDE	18	9	2	-	-	-	-	-	-	-		-	0.00164		0.00037	-		-	ND		0.00039	ND		0.00039
4,4'-DDT	11	8	2	-	-	-	-	-	-	-		-	0.00301	J	0.00132	-		-	ND		0.00138	ND		0.00138
Chlordane	0.05	1	0.2	-	-	-	-	-	-	-		-	0.048	PI	0.00543	-		-	ND		0.00571	ND		0.00569
cis-Chlordane	0.05	1	0.2	-	-	-	-	-	-	-		-	0.00845		0.00057	-		-	ND		0.0006	ND		0.00059
trans-Chlordane	0.05	1	0.2	-	-	-	-	-	-	-		-	0.00459	PI	0.00054	-		-	ND		0.00056	ND		0.00056
POLYCHLORINATED BIPHENYLS (PCBs)																								
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Aroclor 1260	0.2	1	0.2	0.109		0.00269	ND		0.00254	ND		0.00284	0.0142	J	0.00262	ND		0.00268	ND		0.00269	ND		0.00272
Total PCBs	0.2	1	0.2	0.109		0.00175	ND		0.00166	ND		0.00185	0.0142	J	0.0017	ND		0.00174	ND		0.00175	ND		0.00177
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)																								
Dilution Factor	--	--	--										*2*						*1*			*1*		
Total EPH	NS	NS	NS	-	-	-	-	-	-	-		-	1030		49.6	-		-	ND		25.6	ND		25.4
TAL METALS																								
Dilution Factor	--	--	--	*2*			*2*			*2*			*2*			*2*			*2*			*2*		
Aluminum, Total	6000	NS	78000	5600		1.6	4100		1.6	16000		1.7	7100		1.6	8000		1.6	12000		1.7	14000		1.7
Antimony, Total	6	450	31	ND		0.67	ND		0.66	2	J	0.7	1.8	J	0.66	ND		0.66	ND		0.68	ND		0.68
Arsenic, Total	19	19	19	5		0.28	12		0.27	3.2		0.29	8		0.27	3.4		0.27	5.8		0.28	6.5		0.28
Barium, Total	2100	59000	16000	39		0.22	12		0.22	22		0.24	49		0.22	20		0.22	54		0.23	62		0.23
Beryllium, Total	0.7	140	16	0.28	J	0.09	0.29	J	0.09	ND		0.1	0.41		0.09	0.3	J	0.09	0.52		0.09	0.6		0.09
Cadmium, Total	2	78	78	ND		0.06	ND		0.06	0.48	J	0.06	0.31	J	0.06	0.07	J	0.06	ND		0.06	ND		0.06
Calcium, Total	NS	NS	NS	2500		2.3	1100		2.3	12000		2.4	8400		2.3	27		2.3	42		2.4	48		2.4
Chromium, Total	NS	NS	NS	23		0.14	16		0.14	24		0.15	29		0.14	8.8		0.14	9.8		0.14	12		0.14
Cobalt, Total	90	590	1600	5.7		0.41	4.2		0.4	21		0.43	4.2		0.4	1.5	J	0.41	3.4		0.42	3.7		0.42
Copper, Total	11000	45000	3100	65		0.15	14		0.15	200		0.16	24		0.15	3.6		0.15	5.9		0.15	6.4		0.15
Iron, Total	NS	NS	NS	29000		1.3	15000		1.3	41000		1.4	21000		1.3	11000		1.3	20000		1.4	22000		1.4
Lead, Total	90	800	400	32		0.18	ND		0.18	ND		1.9	16		0.18	1.5	J	0.18	4.9		0.19	4.9		0.19
Magnesium, Total	NS	NS	NS	1900		1.1	860		1.1	8100		1.2	2400		1.1	470		1.1	360		1.1	400		1.1
Manganese, Total	65	5900	11000	120		0.2	83		0.2	620		0.21	140		0.2	28		0.2	46		0.2	53		0.2
Mercury, Total	0.1	65	23	0.03	J	0.02	ND		0.02	ND		0.02	0.06	J	0.02	ND		0.02	ND		0.02	ND		0.02
Nickel, Total	48	23000	1600	13		0.33	3.9		0.33	21		0.35	8		0.33	4.1		0.33	9.3		0.34	10		0.34
Potassium, Total	NS	NS	NS	360		23	550		23	210	J	24	630		23	170	J	23	210		24	220		24
Selenium, Total	11	5700	390	ND		0.22	ND		0.22	ND		0.24	ND		0.22	ND		0.22	ND		0.23	ND		0.23
Silver, Total	1	5700	390	ND		0.17	ND		0.16	0.35	J	0.18	ND		0.16	ND		0.16	ND		0.17	ND		0.17
Sodium, Total	NS	NS	NS	280		14	69	J	14	1800		15	250		14	ND		14	ND		14	ND		14
Thallium, Total	3	79	5	ND		0.27	ND		0.26	ND		0.28	ND		0.26	ND		0.26	ND		0.27	ND		0.27
Vanadium, Total	NS	1100	78	47		0.08	34		0.07	94		0.08	48		0.07	14		0.07	17		0.08	18		0.08
Zinc, Total	930	110000	23000	37		0.58	13		0.58	63		0.61	63		0.58	14		0.58	27		0.6	30		0.6
GENERAL CHEMISTRY																								
Dilution Factor	--	--	--	*1*			*1*			*1*			*1*			*1*			*1*			*1*		
Cyanide, Total	20	23000	1600	-	-	-	-	-	-	-		-	ND		0.17	-		-	ND		0.18	ND		0.17
Solids, Total	NS	NS	NS	92.1		NS	94.4		NS	88.4		NS	92.6		NS	91.4		NS	91.4		NS	90.8		NS

TCL - EPA Target Compound List
TAL - EPA Target Analyte List
Conc = Concentration
DIGWSSL - Default Impact to Groundwater Soil Screening Levels
NRDCSRS - Non Residential Direct Contact Soil Remediation Standards
RDCSRS - Residential Direct Contact Soil Remediation Standards
J = The concentration was detected at a value below the RL and above the MDL
MDL = Method Detection Limit
ND = Analyzed for but Not Detected at the MDL
NS - No Standard Available
Q = Qualifier
Shaded cell concentration exceeds the NJDEP Non Residential SRS (5/2012).
Bolded concentration exceeds the NJDEP Residential SRS (5/2012).
Underline concentration exceeds NJDEP DIGWSSL (11/2013)

APPENDIX F
PRE-CONSTRUCTION ENVIRONMENTAL SAMPLING RESULTS
(to be obtained)

APPENDIX G
CONSTRUCTION DEWATERING ASSESSMENT TECHNICAL REPORTS

Prepared for:
Transcontinental Gas Pipe Line Company
Houston, TX

Prepared by:
AECOM
Conshohocken, PA

March 2018

Construction Dewatering Assessment Technical Report

Transcontinental Gas Pipe Line Company, LLC
Northeast Supply Enhancement Project – Madison Loop

Old Bridge Township
Middlesex County, New Jersey

March 2018

Prepared for:
Transcontinental Gas Pipe Line Company
Houston, TX

Prepared by:
AECOM
Conshohocken, PA

March 2018

Construction Dewatering Assessment Technical Report

Transcontinental Gas Pipe Line Company, LLC
Northeast Supply Enhancement Project – Madison Loop

Old Bridge Township
Middlesex County, New Jersey



Prepared By: Matthias Ohr, AECOM



Reviewed By: Heather Brewster, AECOM

Table of Contents

1.0 Introduction 1-1

1.1 Project Description 1-1

1.2 Scope and Objectives 1-2

1.3 Public Interest 1-3

1.4 Summary of Previous Investigations 1-4

1.4.1 Geotechnical Investigation 1-4

1.4.2 Review of Hazardous Waste or Known Contaminated Sites 1-4

2.0 Geological and Hydrogeological Setting 2-1

2.1 Regional Geology and Soil Classification 2-1

2.1.1 Subsurface Geology 2-1

2.1.2 Surface Geology 2-2

2.2 Site Setting and Land Use 2-3

2.3 Site Hydrology 2-3

2.3.1 Surface Water and Wetlands 2-3

2.3.2 Groundwater-Bearing Units at the Project Site 2-5

3.0 Project Dewatering 3-1

3.1 Construction Overview and Decision Criteria 3-1

3.2 Construction Dewatering 3-2

3.2.1 Overview 3-2

3.2.2 Estimating the Radius of Influence 3-2

3.2.3 Open Cut Trenches 3-3

3.2.4 Other Excavations 3-3

3.2.5 Uncertainties 3-4

3.2.6 **Limitations** 3-6

3.2.7 Estimated Dewatering Discharge Rates 3-6

3.2.8 Anticipated Methods of Dewatering 3-7

4.0 Environmental Impact 4-1

4.1 Potential Impacts to Groundwater Supply and Nearby Groundwater Users 4-1

4.2 Potential for Spreading Groundwater Contamination 4-1

4.3 Potential Impacts to Wetlands and Waterbodies 4-1

4.4 Potential for Salt Water Intrusion 4-2

5.0 References 5-1

List of Appendices

Appendix A Geotechnical Investigation Reports

Appendix B Dewatering Calculation Details

List of Tables

Table 1 Summary of Linear Project

Table 2 Sites with Confirmed Contamination with ¼-mile Radius of the NESE Project – Madison Loop

Table 3 ¼-mile Well Search Results

Table 4 Summary of Geotechnical Testing and Estimated Permeability

Table 5 Estimated Dewatering Rates along Project Extent

List of Figures

Figure 1 USGS Topographic Quadrangle

Figure 2 Project Location Map – USGS, Aerial, Surficial Geology and Bedrock Geology

Figure 3 Hazardous Waste and Known Contaminated Sites

Figure 4 Topography and Hydrogeolocial Project Profile

Figure 5 Regional Groundwater Elevation Contour Map

Figure 6 Well Search Map

List of Acronyms

ASTM	American Society of Testing Materials
Certificate	Certificate of Public Convenience and Necessity
cm/sec	centimeter per second
CEA	Classification Exception Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CP	cathodic protection
dth/d	dekatherms per day
Δh	drawdown, $H-h_w$
EDR	Environmental Data Resources, Inc.
FERC	Federal Energy Regulatory Commission
ft/day	feet per day
ft bgs	feet below ground surface
ft msl	elevation in feet relative to mean sea level (NAVD 88)
gpm	gallons per minute
H	saturated thickness, static
h_w	saturated thickness, when pumping
HDD	horizontal directional drill
hp	horsepower
i	hydraulic gradient
K	hydraulic conductivity
LNYBL	Lower New York Bay Lateral
M&R	metering and regulating
μm/sec	micrometer per second
m/day	meter per day
Mgm	million gallons per month
Mgy	million gallons per year
MP	milepost
NAVFAC	Navy Facilities Engineering Command
NESE	Northeast Supply Enhancement
NJ	New Jersey
NJGS	New Jersey Geological Survey
NJ KCS	New Jersey Known Contaminated Sites
NJN	New Jersey Natural Gas Company
NJ Releases	NJ Hazardous Materials Incident Database
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priority List
RCRA-CORRACTS	Resource Conservation and Recovery Act – Corrective Action Sites
RCRA NonGen	Resource Conservation Recovery Act Non-Generator
RDL	Rockaway Delivery Lateral
R(o)	radius of Influence
ROW	right-of-way
SHWS	NJ Known Contaminated Sites List
Transco	Transcontinental Gas Pipe Line Company, LLC
TSD	treatment, storage and disposal
USCS	United Soil Classification System
VOCs	Volatile Organic Constituents
WRA	Well Restriction Area

Executive Summary

This technical report was prepared in support of the application package for a temporary dewatering permit BWA-002 for the Madison Loop project (the Project), located in the Borough of Sayreville and Old Bridge Township as part of Transcontinental Gas Pipe Line Company, LLC (Transco), a wholly-owned subsidiary of Williams Partners L.P., Northeast Supply Enhancement (NESE) Project. The technical report was prepared in accordance with the permit application requirements and includes the following sections:

- **Section 1** includes the Project description, a discussion regarding the public interest, and a summary of previous investigations;
- **Section 2** provides a discussion of the local geologic and hydrogeologic conditions of the Project;
- **Section 3** presents the methodology employed and the results of estimating the anticipated dewatering rates and yield for the trenching activities of the Project. The stated duration and depths of line trench excavations are based on the currently anticipated construction details for the Project.
- **Section 4** discusses the potential for impacts to local groundwater resources and environmental impacts; and
- **Section 5** provides the references used in the technical report.

Conceptually, the following approach was taken to estimate dewatering rates, and therefore to estimate the anticipated diversion limits (in Mgal/month) and linear yield (gal/ft) for the Project:

- The Project was subdivided into 100-ft segments and each segment was analyzed in terms of its proposed construction activities, the prevailing geological and hydrogeological conditions, and the potential that construction dewatering will be required. **Tables 1** and **5** provide the details of this analysis, which in turn is visualized as a topographic and hydrogeological profile shown as **Figure 4**.
- Construction elements that were anticipated to require dewatering included open cut trenches and the launch / exit pits for direct bores and horizontal directional drilling (HDD). The HDD segments itself were not considered.
- If the base of the excavation of a specific segment was determined to be near or below the ambient water table, or in the vicinity of perched water table conditions or hydric soils, the segment was included in the estimation of the diversion. Conversely, if the base of the excavation of a specific segment was determined to be well above the ambient water table, or at a distance from perched water table or other hydric conditions, the segment was not included.
- The dewatering rate (per 100-ft segment) was estimated from available geotechnical and geological information (such as grain size curves or soil types) and standard dewatering equations for line sources and excavations (e.g., Dupuit-Forchtheimer equation), as summarized in **Appendix B**.
- Once the dewatering rate was estimated (in gpm/100 ft), the overall estimated yield was calculated using an estimate of the duration of construction along each segment.
- Adding up these total (incremental) yield estimates (for those segments that were determined to require potential dewatering) resulted in the total estimated yield for the Project. (see **Table 5**)
- The linear yield (in gal per ft) was then calculated from the total estimated yield divided by the total length of the Project. (see **Table 5**)
- Based on these calculations, as summarized in **Table 5** (which corresponds to **Table D.5** of the permit application form), the following diversion and yield quantities were entered into permit application form:
    - Section D.2 - Requested Allocation (Mgm): = 2-times the cumulative estimated dewatering yield for the Project (the factor 2 was introduced to provide a margin of conservatism);
    - Section D.2 – Maximum diversion Rate (gpm): = estimated maximum pumping capacity that may be deployed to the Project;
    - Section F.5 – Average diversion (gal/ft) per foot of open trench = estimated total yield divided by the length of the actively dewatered trench segments (i.e., not divided by the total length of the project).

1.0 Introduction

1.1 Project Description

Transcontinental Gas Pipe Line Company, LLC (Transco), a wholly-owned subsidiary of Williams Partners L.P., is developing its Northeast Supply Enhancement (NESE) Project (Project) to support National Grid's long-term growth, reliability, and flexibility beginning in the 2019/2020 heating season. Transco is proposing to expand its existing interstate natural gas pipeline system in Pennsylvania and New Jersey and its existing offshore natural gas pipeline system in New Jersey and New York waters. The Project capacity is fully subscribed by two entities of National Grid: Brooklyn Union Gas Company (d/b/a [doing business as] National Grid NY) and KeySpan Gas East Corporation (d/b/a National Grid), collectively referred to herein as "National Grid."

To provide the incremental 400,000 dekatherms per day (Dth/d) of capacity, Transco plans to expand portions of its system from the existing Compressor Station 195 in York County, Pennsylvania, to the Rockaway Transfer Point in New York State waters. As defined in executed precedent agreements with National Grid, the Rockaway Transfer Point is the interconnection point between Transco's existing Lower New York Bay Lateral (LNYBL) and existing offshore Rockaway Delivery Lateral (RDL).

A description of the entirety of the Project facilities is provided below. The project elements that are subject to this Technical Report are highlighted in **bold** with an asterisk (*). Note that the mileposts (MPs) provided below for the onshore pipeline facilities correspond to the existing Transco Mainline and Lower New York Bay Lateral. The offshore pipeline facility MPs are unique to the Raritan Bay Loop. The starting MP for the Raritan Bay Loop corresponds to MP12.00 of the Lower New York Bay Lateral, and the end MP corresponds to the Rockaway Transfer Point.

Onshore Pipeline Facilities

Quarryville Loop

- 10.17 miles of 42-inch-diameter pipeline from MP1681.00 near Compressor Station 195 to MP1691.17 co-located with the Transco Mainline in Drumore, East Drumore, and Eden Townships, Lancaster County, Pennsylvania. Once in service, the Quarryville Loop will be referred to as Mainline D.

Madison Loop *

- 3.43 miles of 26-inch-diameter pipeline from Compressor Station 207 at MP8.57 to MP12.00 southwest of the Morgan meter and regulating (M&R) Station on the Lower New York Bay Lateral Loop C in Old Bridge Township and the Borough of Sayreville, Middlesex County, New Jersey. Once in service, the Madison Loop will be referred to as Lower New York Bay Lateral Loop F.

Raritan Bay Loop

- 0.16 mile of 26-inch-diameter pipeline from MP12.00 west-southwest of the Morgan M&R Station to the Sayreville shoreline at MP12.16. Additionally, a cathodic protection (CP) power cable will be installed from a rectifier located at the existing Transco Morgan M&R Station near MP12.10 and extending to a connecting point on the proposed 26-inch-diameter pipeline at MP12.00. The approximately 545-foot-long power cable will be installed by horizontal directional drill (HDD).

Offshore Pipeline Facilities

Raritan Bay Loop

- 23.33 miles of 26-inch-diameter pipeline from MP12.16 at the Sayreville shoreline in Middlesex County, New Jersey, to MP35.49 at the Rockaway Transfer Point in the Lower New York Bay, New York, south of the Rockaway Peninsula in Queens County, New York. Additionally, a 1,831-foot-long CP power cable will be installed via HDD from a rectifier at the existing Transco Morgan M&R Station near MP12.10 to an offshore anode sled located approximately 1,200 feet north of

MP12.32. Once in service, the Raritan Bay Loop will be referred to as Lower New York Bay Lateral Loop F.

Aboveground Facilities

New Compressor Station 206

- Construction of a new 32,000 ISO (International Organization for Standardization) horsepower (hp) compressor station and related ancillary equipment in Franklin Township, Somerset County, New Jersey, with two Solar Mars® 100 (or equivalent) natural gas-fired, turbine-driven compressors.

Modifications to Existing Compressor Station 200

- Addition of one electric motor-driven compressor (21,902 hp) and related ancillary equipment to Transco's existing Compressor Station 200 in East Whiteland Township, Chester County, Pennsylvania.

Modifications to Existing Mainline Valve Facilities

- *Existing Valve Site 195-5* – Installation of a new mainline valve, launcher/receiver and tie-in facilities at the start of the Quarryville Loop (MP1681.00).
- *Existing Valve Site 195-10* – Installation of a new mainline valve, launcher/receiver, and tie-in facilities at the end of the Quarryville Loop (MP1691.17).
- *Existing Valve Site 200-55* – Installation of a new mainline valve, launcher/receiver, and tie-in facilities at the start of the Madison Loop (MP8.57).

New Mainline Valve Facilities

- *Proposed Valve Site 195-8* – Installation of a new intermediate mainline valve for the Quarryville Loop (MP1687.86).
- ***Proposed Valve Site 200-59*** * – Installation of a new mainline (isolation) valve for the Madison Loop (MP11.90).

On March 27, 2017, Transco filed an application with the Federal Energy Regulatory Commission (FERC) requesting a Certificate of Public Convenience and Necessity (Certificate) under Section 7(c) of the Natural Gas Act (NGA). The Project has been assigned Docket No. CP17-101-000 b FERC.

This Technical Report is focused on the construction activities occurring on the Madison Loop pipeline facilities in Old Bridge Township, Middlesex County, New Jersey. The modifications to Valve Site 200-55 at the existing Compressor Station 207 will not require dewatering.

1.2 Scope and Objectives

The construction of the Madison Loop pipeline facilities in Old Bridge Township is expected to require excavation dewatering along certain segments of the Project. The overall location of the project is shown on **Figure 1** (USGS quadrangle map) and **Figure 2**. The segments of the Project that will likely require dewatering (based on the analysis presented in this report) are shown in **Figure 4** (project profile).

AECOM, on behalf of Transco, has prepared this technical report in support of its temporary dewatering permit application for trench dewatering activities in Old Bridge Township. The purpose of this report is to provide the necessary hydrogeological information to support the Application Requirements for a Temporary Dewatering Permit in accordance with N.J.A.C. 7:19-2.3. For cross-reference, the presentation elements of this Technical Report correspond to those included within the Temporary Dewatering Permit application as follows:

This Report	Temp Dewatering Permit Application	Description
Table 1	Portion of Table D.5	Summary of project elements
Table 2	Table E.2.b	Hazardous waste and known contaminated sites
Table 3	Table E.1.b	Supply Wells within ¼-mile radius of Project
Table 4	---	Summary of geotechnical testing results
Table 5	Portion of Table D.5	Estimated dewatering rates and linear yield
Figure 1	Figure E.1.a	USGS quadrangle map
Figure 2	----	Project extent and aerial and geological overlay maps
Figure 3	Figure E.1.c	Hazardous waste and known contaminated sites
Figure 4	Figure F.1	Topographic and hydrogeological profile
Figure 5	---	Regional groundwater elevation contours
Figure 6	Figure E.1.b	Well search map

This technical report is organized as follows:

- Section 1 includes the Project description, a discussion regarding the public interest, and a summary of previous investigations;
- Section 2 provides a discussion of the local geologic and hydrogeologic conditions of the Project;
- Section 3 presents the methodology employed and the results of estimating the anticipated dewatering rates and yield for the trenching activities of the Project. The stated duration and depths of line trench excavations are based on the currently anticipated construction details for the Madison Loop.
- Section 4 discusses the potential for impacts to local groundwater resources and environmental impacts; and
- Section 5 provides the references used in the technical report.

1.3 Public Interest

As introduced above, the Project proposes to construct, install, and operate the Project facilities to provide 400,000 Dth/d of incremental firm transportation capacity to National Grid from Compressor Station 195 through the Rockaway Transfer Point to supply National Grid's existing service territory beginning in the 2019/2020 heating season, when the incremental supply will be needed.

Transco's existing natural gas transportation system currently supplies natural gas to the New York City metropolitan region via National Grid's existing receipt points. Transco's New York Bay Expansion project, which has been certificated and is currently under construction, will provide National Grid with 50,000 Dth/d at the Narrows meter station and 65,000 Dth/d at the Rockaway Transfer Point to satisfy upcoming supply needs for the 2017/2018 heating season. However, National Grid is experiencing incremental firm demand and anticipating system growth beyond the 2017/2018 heating season. Therefore, subsequent incremental supplies are needed beginning in the 2019/2020 heating season that will be provided through the NESE Project.

Transco has executed long-term, fully binding precedent agreements with National Grid for 100% of the Project capacity. Transco held an open season for the Project from May 16, 2016, to June 9, 2016, to allow other shippers to receive service under the Project, but no other shippers participated in the Binding Open Season. Therefore, National Grid will utilize 100% of the Project's capacity. National Grid's precedent agreement describes its intention to utilize the capacity provided by the Project to serve its retail customers across its existing service territory.

In order to construct the facilities, it is anticipated that excavation dewatering of certain segments of the construction will be necessary (e.g., line trenching to install the pipeline facilities).

1.4 Summary of Previous Investigations

Previous site investigation activities have involved the completion of limited geotechnical testing along the Project. In addition, a review of potential hazardous waste and/or NJ known contaminated sites in the vicinity of the Project was conducted in the conjunction with the March 2017 filing of the Certificate application with FERC. A summary of each of these investigations is provided below.

1.4.1 Geotechnical Investigation

AECOM, on behalf Transco, conducted several geotechnical investigation of the Project between September 2016 and August 2017. The geotechnical reports specific to the Project are presented as **Appendix A** to this technical report. The investigation locations are shown in **Figure 2** and included the following components (locations in Old Bridge Township are marked with an asterisk [*] and in **bold**):

- Installation and logging of seventeen (17) test borings, as follows:
    - * 3 borings (**CB-1** through **CB-3**) between Station No. 121+10 and Station No. 135+10;
    - * 4 borings (**AB-1** through **AB-4**) between Station No. 146+10 and Station No. 167+90;
    - * 2 borings (**B-1** and **B-2**) between Station No. 177+00 and Station No. 177+90;
    - 6 borings (GB-1 through GB-7) between Station No. 235+97 and Station No. 241+47; and
    - 2 borings (MDB-1 and MB-1) between Station No. 269+20 and Station 275+00.

- Sample collection from representative soil intervals and analysis for the following parameters: natural water content, grain size distribution, Atterberg Limits, and specific gravity. In addition, triaxial compression tests and consolidation tests were performed on undisturbed samples.

The data obtained during the geotechnical investigation in the context of deriving estimated dewatering rates and dewatering yields is further discussed in **Section 2.1.2**.

1.4.2 Review of Hazardous Waste or Known Contaminated Sites

In order to identify landfills, hazardous waste sites or other known contaminated sites (KCS) in the vicinity of the Project area, a hazardous material environmental data search was conducted for the proposed onshore pipeline facilities and the new aboveground facilities in Pennsylvania and New Jersey. This search was performed according to the government records search requirements of the American Society of Testing Materials (ASTM) Standard Practice for Environmental Site Assessments, E 1527-13. The objective of the database searches was to identify sites of known environmental or regulatory concern that are located within 0.25 mile of the construction work areas. The detailed output of the database searches, as conducted by Environmental Data Resources, Inc. (EDR), are available upon request, and were filed previously with the FERC Certificate submittals. **Table 2** provides a summary of the information shown below.

The database search covered Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Superfund Sites, National Priority List (NPL) Sites, Resource Conservation and Recovery Act – Corrective Action (RCRA-CORRACTS) facilities, RCRA treatment, storage and disposal (TSD) Facilities, RCRA Generators, Leaking Underground Storage Tank Sites, and State Spill Sites that may have the potential to impact soils, groundwater, surface streams or sediments.

Within the Old Bridge Township, the EDR Datamap™ Corridor Study for the Madison Loop (EDR 2016c) identified two (2) active sites with confirmed contamination and two (2) NJDEP Classification Exception Areas (CEA) within 0.25-mile of the Madison Loop. In addition, the NJDEP database of KCS was reviewed and resulted in one (1) additional active site of potential concern that was not otherwise identified in the EDR search. These sites have reported contamination that have the potential to impact groundwater quality in the vicinity of the Project facilities.

Reclamation Technologies Inc.: The NJDEP database search of KCS returned site remediation program (SRP) ID 129931, located at 3200 Bordentown Avenue, Old Bridge, NJ with the status indicated as active. The SRP case tracking tool indicates the Site to be in multi-phase remedial action, with discharges to both groundwater and soil.

*Road Department Garage Area 3-1***:** The New Jersey Open Public Records Act (OPRA) database indicates that the Middlesex County Road Department Garage Area 3-1 is located along Route 9 North in Old Bridge Township, New Jersey, less than 0.1 mile north of MP9.50 of the Madison Loop (NJDEP 2016a). The site had two leaking fuel tanks removed on October 13, 1993 — one 1,000-gallon leaded-gasoline tank and one 4,000-gallon unleaded gasoline tank. The New Jersey Brownfields database indicates that the property was assigned to the Brownfields Program on August 31, 1994, as a known source and release of groundwater contamination (New Jersey State 2015). Because this property is relatively close to the Project facilities, is a known contaminated site, and has an unclear remedial history, it is possible that contamination associated with this property could be present in the soil in the vicinity of the Project facilities. If contamination is unearthed, Transco will employ best management practices and working with the New Jersey Department of Environmental Protection (NJDEP) Division of Solid and Hazardous Waste to mitigate adverse effects such as re-suspension of impacted sediments during construction. In addition, Transco will follow their Waste Management Procedures, which include an Unanticipated Discovery of Contamination Plan.

Global Sanitary Landfill Superfund Site and Associated CEA: The EPA National Priorities List (NPL) database indicated that the Global Sanitary Landfill, located along Ernston Road in Old Bridge Township, New Jersey, is less than 0.1 mile south of MP10.13 to MP10.38 of the Madison Loop (EPA 2016a). This site has a historical record of groundwater, soil, sediment, and surface water contamination. The Global Sanitary Landfill is a 57.5-acre area used for solid waste disposal from 1968 to 1984 by the Global Landfill Reclaiming Corporation (EPA 2016b). Operations ceased in 1984 after a landfill side-slope failure impacted several acres of adjacent wetlands. In 1989, the site was placed on the EPA National Priorities List (NPL) due to the presence of contaminated leachate and the discovery of buried drums containing hazardous waste in a portion of the landfill. The EPA issued a Record of Decision, which included remedial action objectives for addressing contaminant migration (volatile and semi-volatile organic compounds, pesticides, and metals) from the landfill into groundwater, surface water, sediment, and soil.

The Project is not located within the footprint of the CEA associated with the Global Landfill or its Well Restriction Area (WRA). Therefore, it is unlikely that contamination associated with this site would be present in the soil or groundwater in the vicinity of the project. Trenching associated with the project is planned to be approximately 8 feet bgs in the vicinity of the Global Landfill. If apparent contamination is encountered, Transco will adhere to its Unanticipated Discovery of Contamination Plan.

E.I. DuPont Nemours and Company Site and Associated CEA: The E. I. DuPont Nemours and Company property (DuPont site) is located approximately 1.2 miles northwest of the project, which is outside the EDR search radius. However, this site contains an active NJDEP CEA and WRA that overlaps the Madison Loop from approximately MP9.20 to MP10.31 (NJDEP 2016b). The CEA was established to ensure that uses of the impacted aquifer zone are restricted until constituent standards are achieved. When contaminant concentrations in a CEA exceed maximum contaminant levels (and the designated aquifer use includes potable use), the NJDEP will identify the CEA as a WRA. The CEA for the DuPont site is divided into two portions: (a) groundwater use in the eastern portion is restricted at a depth from the ground surface to 150 feet bgs, and (b) groundwater use in the western portion is restricted at a depth from the ground surface to 190 feet bgs (NJDEP 2016b). The impacted groundwater at the DuPont site includes volatile organic compounds (VOCs) and metals.

A field survey completed by Doyle Land Services, Inc. noted that four groundwater monitoring wells associated with the CEA and WRA are located within 150 feet of the Project facilities. Three groundwater monitoring wells (OS-7S, OS-7I and OS-7D) are located near MP10.16 and MP10.17, and one groundwater monitoring well (OS-6D) is located near MP9.85.

Since the project is located in an active NJDEP CEA and WRA from approximately MP9.20 to MP10.31, contamination associated with the DuPont site could be present. The project in this area will be installed using conventional trenching and HDD to depths up to 75 feet bgs. The actual groundwater contamination plume in this area has been reported at depths more than 150 feet bgs (personal communication, Lasky, 2017). Therefore, it is probable that the Project construction will not impact (or will not be impacted by) contaminated groundwater associated with the DuPont site. Transco's *Unanticipated Discovery of Contamination Plan* outlines the control methods that will be employed in the event of an unanticipated discovery of apparent contamination in soil, groundwater, or sediment when excavating during construction and/or maintenance activities.

2.0 Geological and Hydrogeological Setting

The Project subject to this technical report is located in Old Bridge Township between MP 8.57 and MP 10.36 (corresponding to Stations 99+23 through 193+30, as summarized in **Table 1**).

The Project is located within the Coastal Plain physiographic province. The northern boundary of the Coastal Plain Province is known as the Fall Line boundary line, and deposits associated with the Coastal Plains province extend east and southeast toward and beneath the current shoreline of the Atlantic Ocean. Near the Fall Line, the Coastal Plain deposits appear at the surface where Cretaceous unconsolidated sediments rest unconformably on top of older Triassic and Jurassic bedrock divisions, with successively younger Cretaceous and Tertiary deposits (alternating sandy and clayey formations) appearing toward the southeast. The deposits of the Coastal Plain province, therefore, from a wedge of progressively thickening and progressively more recent strata that dip, in a general sense, toward the east and southeast.

The relevant source materials for the geological and hydrogeological description include the NJ Geological Survey Open File Map 65 (OFM 65) *Bedrock Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey* (P.J. Sugarman et al., 2005) and the NJ Geological Survey OFM 18 *Surficial Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey* (S.D. Stanford, 1995). Excerpts of both maps are provided in **Figure 2** of this Technical Report, with the Project extent superimposed on both maps.

2.1 Regional Geology and Soil Classification

2.1.1 Subsurface Geology

The Project site is situated within the subcrop area of various divisions of the Cretaceous Magothy Formation and overlying Tertiary and Quaternary sequences (see **Figure 2**), which include from oldest to youngest:

Cretaceous:	Old Bridge Sand (Kmo) South Amboy Stoneware Clay (Kma) Morgan Beds (Kmm) Cliffwood Beds (Kmc)
Tertiary (Pliocene)	Pennsauken (or Bridgeton) Formation (Tb)
Quaternary	Various terrace or colluvial deposits (Qtl, Qcl) Alluvium (Qal) Estuarine Deposits (Qm)

Detailed description of the general lithologies encountered in these units are provided in the mapping notes to OFM 65 (bedrock geology) and OFM 18 (surficial geology).

Figure 4 represents a topographic and hydrogeologic profile of the linear extent of the Project, which shows the construction elements of the Project, the interpreted intersection of these elements with the geological units summarized above, the vertical position of the interpreted regional water table within the project profile, the location of geotechnical borings and adjacent monitoring wells, the observed or inferred vertical position of the water table (from discrete boring or well data), and the presence of stream crossings and wetlands along the Project profile.

2.1.2 Surface Geology

The majority of the project profile is underlain by the mixed sandy and silty deposits of either Pliocene-aged (Pennsauken Fm.) or Cretaceous-aged (Magothy divisions) Coastal Plain formations, including occasional occurrences of alluvial deposits and colluvial or terrace deposits along streams, as shown in **Figure 2**.

The boring logs of a series of geotechnical borings (as described in **Section 1.4.1**, and shown in **Figure 2** [plan view] and **Figure 4** [profile view]) are provided in **Appendix A**, together with the grain size analyses of representative soil samples that were collected from these borings. **Table 4** summarizes the geotechnical samples by sample ID, corresponding sampling depth, the position of the boring locations along the Project profile, the likely assignment of the geotechnical samples to the stated geological units, the general USCS classification of each sample, and numerical grain size thresholds.

Formal hydrometer testing or permeability testing was not performed for any of the geotechnical samples. However, based on the soil classifications alone (see **Table 4**), the range of permeability would be expected to span a relatively wide rang (estimated in the range of 1×10^{-5} to 1×10^{-1} cm/sec). Applicable for coarser-grained soils only, Hazen (1892 - *Some physical properties of sands and gravels: Mass. State Board of Health, Ann. Rept. pp. 539-556*) also developed an empirical formula for approximating hydraulic conductivity K that is based on sieve analysis only and is sometimes to used estimate permeability:

$$K = C(D_{10})^2$$

where C = Hazen's empirical coefficient, with C = 100, if D_{10} is expressed in cm, and K is expressed in cm/sec; and

D_{10} is the diameter of 10th percentile grain size of the material (see **Table**

Since unit-specific conductivity is an important factor in the estimation of dewatering rates, AECOM used the geotechnical grain size data to derive a non-parametric estimate of the expected (average) conductivity for a specific geological unit. Although soil boring information is available along some sections of the Project (see **Figure 2** and **Figure 4**), other sections have few test borings or no test borings at all. Since the Project aligns roughly along geological strike of the Cretaceous geological units and also varies greatly in topographic elevation, AECOM believes that the average ('compounded') conductivity value (for each unit) adequately describes the average permeability for a specific unit along the Project as a whole. **Table 4** (4th page) shows a summary of the observed soil types for the five geological units encountered (also reproduced below). Specifically, a reasonable conductivity values was assigned to each soil type (SP = 1×10^{-1} cm/sec; SP-SM = 2.5×10^{-2} cm/sec, SW-SM = 7.5×10^{-3} cm/sec; SM = 2.5×10^{-3} cm/sec; ML = 1.0×10^{-4} cm/sec; CL = 1×10^{-5} cm/sec). Cross-multiplying these conductivity values with the number of soil types observed (separately for each unit), and dividing by the total number of soil samples (for each unit) resulted in a conductivity estimate for each unit. These average conductivity values were then used in the dewatering calculations (**Section 3** and **Appendix B)**.

USCS Symbol	SP	SP-SM	SW-SM	SM	ML	CL	Compounded Estimated K	
K (est), cm/sec	1.0E-01	2.5E-02	7.5E-03	2.5E-03	1.0E-04	1.0E-05		
K (est), ft/d	283	71	21	7	0.3	0.03	cm/sec	ft/d
Alluvium (Qal)	0	1	0	4	0	0	7.0E-03	20
Pennsauken	0	0	0	1	0	1	1.3E-03	3.6
Magothy (K)	0	6	1	24	7	1	5.6E-03	16
Magothy (Kma)	0	0	0	8	0	1	2.2E-03	6.3
Magothy (Kmo)	0	4	0	3	0	0	1.5E-02	44
total number of samples	*0*	*11*	*1*	*40*	*7*	*3*		

2.2 Site Setting and Land Use

The Madison Loop crosses open land, wetlands, transportation land, upland forest and woodland, industrial and commercial land, residential land, and open water.

Open Land: Open land crossed by the Project includes the portions of the ROW that will be co-located with the existing Transco Lower Bay Loop C ROW, which is currently maintained as herbaceous cover. Transco has identified one foreign utility that will be crossed by the Project. Additional local utilities (e.g., water lines, sewer lines, cable/telephone lines) may also be crossed by the pipeline loop.

Wetlands: Overall, the Project facilities will cross nineteen (19) wetlands. Of these wetlands, nine are classified as palustrine emergent (PEM); one is classified as palustrine scrub-shrub (PSS)/PEM, and three are classified as estuarine emergent (E2EM) wetlands due to their estuarine and intertidal locations. Palustrine forested (PFO) wetlands account for two of the wetlands crossed by the Madison Loop. Additionally, two wetlands were classified as PFO/PEM; one was classified as a PFO/PSS/PEM wetland; and one was classified as an E2EM/PEM wetland. **Section 2.3.1** below further details for the twelve (12) wetland areas crossed within Old Bridge Township.

Transportation Land: Within Old Bridge Township, the Project will cross two public roads (Cheesequake Road and U.S. Highway 9) and one private road (Westminster Boulevard). No railroad lines will be crossed during construction and operation of the Madison Loop.

Upland Forest/Woodland: Overall, the construction of the Madison Loop facilities will temporarily impact upland forests. Upland forest surveys for the Madison Loop were completed in August 2016. The survey indicated that the forestland surrounding the Madison Loop consists mainly of hardwood forest. Dominant species within the stands surveyed include northern red oak, white oak, chestnut oak, red maple, white pine, and black gum. Using a linear regression model to predict the age of sampled trees within each stand, the average age of forest stands within and adjacent to the Madison Loop ranges from approximately 39 to 69 years. No woodlands used for commercial silviculture have been identified along the Madison Loop.

Industrial/Commercial Land: No quarries, underground mines, or strip mines will be crossed by the Project. Several larger-scale commercial developments will be crossed by the Madison Loop. In Old Bridge Township, the parking lot of the New Jersey Transit-Old Bridge Park and Ride facility will be crossed by the Madison Loop (via HDD) at approximate MP 9.50.

Residential Land: Residential land crossed by the Project includes areas of single-family homes, multi-family homes, and apartment complexes.

Open Water: **Section 2.3.1** below further details the open water bodies crossed within Old Bridge Township.

2.3 Site Hydrology

2.3.1 Surface Water and Wetlands

AECOM, on behalf of Transco, conducted field surveys of the Project area to delineate wetlands and associated water bodies within or immediately adjacent to the Project site. The resulting jurisdictional wetlands surveys were submitted to the NJDEP to support the application for the required wetlands disturbance and mitigation permits.

Within the Old Bridge Township footprint of the Project, the field survey identified six (6) intermittent streams within the pipeline alignment (see *Table 2B-1* of the FERC submittal):

- Unnamed tributary to Tennent Brook (MP 8.61), referenced as WW-T01-001, with water quality use FW2-NT and a crossing length of 13 ft via dry open cut methods;

- Unnamed tributary to Tennent Brook (MP 8.76), referenced as WW-T01-002, with water quality use FW2-NT and a crossing length of 11 ft dry open cut methods;

- Unnamed tributary to Tennent Brook (MP 9.02), referenced as WW-T15-003, with water quality use FW2-NT and a crossing length of 7 ft via HDD;

- Unnamed tributary to Tennent Brook (MP 9.08), referenced as WW-T15-002, with water quality use FW2-NT and a crossing length of 2 ft via HDD;

- Unnamed tributary to Tennent Brook (MP 9.21), referenced as WW-T15-004A, with water quality use FW2-NT and a crossing length of 33 ft via HDD;

- Unnamed tributary to Cheesequake Creek (MP 10.05), referenced as WW-T01-004 with water quality FW2-NT and a crossing length of 11 ft via dry open cut.

The delineated waterways described above do not represent sensitive surface waters, as defined in the Guidance Manual for Environmental Report Preparation (FERC August 2003).

Within the Old Bridge Township footprint of the Project, the field survey also identified several wetlands resources as summarized below.

- MP 8.61: PEM wetlands, referenced as W-T01-008, temporarily occupied by workspace project elements only;
- MP 8.70: PEM wetlands, referenced as W-T01-006, temporarily occupied by workspace project elements only;
- MP 8.71: PEM wetlands, referenced as W-T01-007, temporarily occupied by workspace project elements only;
- MP 8.73: PEM wetlands, referenced as W-T15-001, temporarily occupied by workspace project elements only;
- MP 8.76: PEM/PFO wetlands, referenced as W-T01-003, within the pipeline alignment and crossing length of 186 ft;
- MP 8.90: PEM wetlands, referenced as W-T01-009, temporarily occupied by workspace project elements only;
- MP 8.96: PFO wetlands, referenced as W-T01-010, to be crossed via HDD with a crossing length of 33 ft;
- MP 9.21: PEM/PFO wetlands, referenced as W-T15-003, within the pipeline alignment and crossing length of 171 ft;
- MP 9.32: PEM wetlands, referenced as W-T15-002, temporarily occupied by workspace project elements only;
- MP 10.05: PFO wetlands, referenced as W-T15-004, within the pipeline alignment and crossing length of 1 ft;
- MP 10.08: PEM/PSS/PFO wetlands, referenced as W-T01-014, within the pipeline alignment and crossing length of 332 ft; and
- MP 10.17: PEM wetlands, referenced as W-T01-015, temporarily occupied by workspace project elements only.

A comprehensive description of the mapped surface and wetlands resources can be provided to the NJDEP Bureau of Water Allocation upon request, as previously submitted with the March 2017 FERC Certificate submittals and subsequent the NJDEP Land Use Regulation Program Freshwater Wetlands application.

2.3.2 Groundwater-Bearing Units at the Project Site

The principal water-bearing units underlying the Project are comprised of the various divisions of the Magothy aquifer, with groundwater elevations in the Old Bridge Township portion of the Project (based on measurements at monitoring wells across the project area) ranging from 16 to 34-ft NAVD 88, and generally sloping from northwest to southeast (see also **Figure 4** and **Figure 5**). Based on the data reviewed, the erosional remnants of the Pennsauken Fm. (Tb) (where present) overlie the Cretaceous-age units and are generally not saturated, except for the local presence of perched, saturated conditions in the vicinity of the mapped wetlands and intermittent streams. The younger alluvial and terrace/ colluvial deposits should be expected to exhibit similar saturated conditions in the vicinity of wetlands or intermittent streams.

The construction elements listed in **Table 1** (see also **Figure 2** and **Figure 4**) include trenching, horizontal directional drilling (HDD, including entry and exit pits) and directional bores (DB, including bore pits) within (or overlying) these water-bearing unit. **Figure 4** shows the relationship of topographic grade, the various construction elements, the location of local intermittent stream and wetlands crossings and the vertical position of the regional water table. In addition, **Figure 5** shows the contours of regional equal head (groundwater elevation contours), as interpreted from recent depth to water measurements reported from monitoring wells associated with the Global Landfill site and the DuPont site.

The proposed construction and dewatering activities could have a minor impact on the groundwater resources described above. However, much of the potential impacts will be avoided or minimized by utilizing both standard and specialized construction techniques. Since there is an expectation that limited amounts of groundwater will be encountered during trenching (see **Section 3**), Transco will adhere to the requirements and conditions of the NJDEP Temporary Dewatering and Water Allocation permit, in addition to the FERC Upland Erosion Control, Revegetation, and Maintenance Plan and the Wetland and Waterbody Construction and Mitigation Procedures guidelines for all dewatering activities:

- The upper water-bearing unit could sustain minor effects from temporary changes in overland water flow or recharge caused by clearing and grading of the proposed Project areas. In addition, near-surface soil compaction that may be caused by heavy construction vehicles has the potential to reduce the ability of soils to absorb water. These minor impacts will be localized, temporary and will not adversely affect groundwater resources in the Project vicinity.

- It is anticipated that construction dewatering will be necessary along a portion of the trenches (as shown in **Figure 4** and further described in **Table 5**), either as a result of controlling perched water table conditions or because the excavation base will be near or below the regional water table. The effects of the proposed temporary water withdrawal to manage water infiltration into the excavations are expected to be minor, as the construction activities will be typically completed over period of no more than a few days and the localized lowering of the water table will be temporary.

- In order to locally recharge the water-bearing units, Transco proposes to discharge the dewatering fluids (after removal of fines by a combination of installed filter fabric in the construction sumps and/or subsequent filtration via portable, skid-mounted cartridge filters) into well-vegetated upland areas, or into hay bale/dissipation structures in those areas where dense vegetation is absent. Any discharges would be in compliance with an issues Discharge certificate (which will applied for and will be issued separately from the temporary dewatering permit).

- Several supply wells that have the potential to be sources of potable water are located within ¼-mile of the Project area and therefore have the potential to be affected by the construction activities. **Table 3** list the identities and locations of these supply wells (including public supply wells, domestic supply wells and industrial supply wells) as obtained from the NJDEP Bureau of

Water Allocation via a current well search request (NJDEP, February 20, 2018). The locations of these wells relative to the Project footprint are shown in **Figure 6**. Transco's standard mitigation measure is to ensure that no construction equipment, vehicles, hazardous materials, chemicals, fuels, lubricating oils, or petroleum products will be parked, stored, or serviced within a 200-foot radius of any private wells, within a 400-foot radius of any municipal or community wells, or within 100-feet of any waterbody or wetlands, which is consistent with FERC guidelines.

- Within the Old Bridge Township portion of the Project, the well search results indicated eight (8) potential supply wells (two industrial wells and six domestic wells) within ¼-mile of the Project (see **Table 3** and **Figure 6**).

- The construction activities and final land use of the Project are not anticipated to generate long-term degradation of the volume and quality of groundwater resources, as they do not involve conversion to a long-term land use that would threaten the quality of groundwater. Any inadvertent release of hazardous or non-permitted materials during the construction activities will be immediately contained and cleaned-up, in accordance with Transco's Construction Spill Plan.

3.0 Project Dewatering

3.1 Construction Overview and Decision Criteria

After the completion of surveying and staking, and installation of temporary sediment controls and best management practices (BMPs), clearing and grading will occur, as necessary. Once the Project area has been cleared and graded, trench excavation will begin for the installation of the gas pipelines and associated facilities. Away from the HDD and DB segment, the pipe will be installed via open-cut trenching methods. The open-cut trenches are expected to be approximately 5 feet wide to accommodate the installation of 26-inch diameter piping. As shown in **Table 1**, the depths for pipe installation will be approximately 7 feet, with occasional deeper excavations at the indicated stream crossings or directional bore pits.

Figure 4 shows a keyed profile of the construction segments that are anticipated to require construction dewatering, either due to their proximity to perched water table conditions, to nearby intermittent streams or wetlands, or because the base of the excavation is anticipated to be near or below the regional water table. The excavation and dewatering details in **Table 5** are based on information received from Transco (e.g., dimensions of the trenches and/or excavations, the depth of the excavations compared to final site grade, or the duration of construction at each identified segment) and an interpretation of the static head and hydrostratigraphy of the Project area, as follows:

- **Figure 4** (topographic profile of the Project) shows the intersection of the Project elements with mapped intermittent streams or wetland areas. Even in portions of the Project where the regional groundwater table was interpreted to be significantly deeper than the streams or wetlands, groundwater infiltration into excavation segments was assumed to be likely in the vicinity of these freshwater and wetlands areas.

- **Figure 5** shows an interpreted map of the contours of regional equal head (groundwater elevation contours) in the Magothy divisions underlying the Project area. The groundwater elevation contour lines are based on reported groundwater elevation measurements at the Global Landfill site and the DuPont site (off-site wells). The regional water table contours were projected into the topographic profile of the Project (**Figure 4**) and those construction segments where the excavation base either approaches the regional water table or is anticipated to be below the regional water table were assumed to require dewatering.

- **Table 5** shows a comprehensive summary of the stratigraphic and hydrological conditions at each of the construction elements, which in turn serve as input values for the dewatering scenarios and calculated dewatering rates presented in **Section 3.2**.

For the purpose of generating a cumulative estimate of dewatering yield of the Project, and to maintain an adequate level of resolution relative to topography, water table and geological constraints, **Table 5** lists the individual trench segments in 100-ft sections (whether or not these correspond to actual construction sections), in addition to the identity and location of the HDD pits and DB pits (which are listed at their actual long dimensions):

- The potential need for dewatering was identified individually for each element listed in **Table 5**, by examining the presence of perched water table conditions (e.g., intermittent streams and wetlands) or the position of the regional water table relative to the base of the excavation at each individual element. If the excavation base for a specific element is in the vicinity of wetlands or streams or is at or below the regional water table, dewatering was considered to be “likely” (“Yes” in **Table 5**). Conversely, dewatering was considered “unlikely” (“No” in **Table 5**) if the excavation base for a specific element was not in the vicinity of wetlands or streams or was several feet or more above the regional water table.

- The estimated rate of dewatering at each element was based on the conductivity values derived in **Section 2.1.2** (and shown in detail as **Table 3**), as a function of the geological unit intersected by the construction element, the estimated construction duration and the anticipated base of the excavation relative to the water table. The dewatering calculations are shown as **Appendix B**.

It should be noted that the generation of dewatering fluids and mixing of the same with drilling mud at the indicated HDD segments and associated HDD entry and exit pits was assumed to be handled in the context of the overall management of drilling spoils. Any dewatering fluids entrained in mud and drilling spoils will be recirculated to storage tanks for staging and disposal, and were therefore not considered further in this dewatering analysis. However, since it is possible that HDD entry and exit pits may be installed some time prior to commencing the HDD activities, it was assumed that 7-days of dewatering would be necessary for those pits that are at or below the interpreted regional water table.

The Project profile shown as **Figure 4** is a cross-sectional representation of the discrete information shown in **Table 5**.

For the portion of the Project located in Old Bridge Township, this conceptual approach to estimating dewatering rates and yield resulted in the identification of likely dewatering needs between Station 99+23 and 111+00 (i.e., an approximate 1,180-ft stretch in the vicinity of intermittent streams and wetland) and between Stations 175+00 and 192+00 (i.e., an approximate 1,700-ft stretch in the topographically low-lying portion of the Project where the excavation base is expected to be near or below the regional water table).

3.2 Construction Dewatering

3.2.1 Overview

Temporary construction dewatering was anticipated to be necessary in order to manage water infiltration at open trench excavations and at HDD pit or DB pit excavations, in cases when the excavation base was at or below the perched or regionally observed water table. Two different types of excavation scenarios were considered:

- Open cut trenches where the length of the trench greatly exceeds its width. As the excavation proceeds below the static groundwater table, gravity flow (and hence dewatering) was estimated using the base equation for a “partially penetrating line slot with two line sources and gravity flow” (from *Figure 4-3c*, NAVFAC, 1983). Gravity flow to simple line trenches (i.e., construction elements labeled “Trench” in **Table 1** and **Table 5**) was estimated as 2-times (i.e., 2-sided) the one-dimensional line flow to the trench elements, on a unit basis per 100-ft trench length.

- Square or slightly elongated pit excavations, where the length of the excavation is equal to or moderately greater than its width. When excavation is anticipated to proceed below the static groundwater table, gravity flow was estimated using the *Dupuit-Forchheimer approximation* of radial flow to a well that is centered in the excavation and having an effective radius that is proportional to the area of the excavation itself. The estimated dewatering rate has the effect of lowering the water table to the desired excavation base elevation at the perimeter of the excavation (and lower than the excavation base elevation in the center of the excavation).

The dewatering rates estimates summarized in **Table 5** are based on input values of total aquifer thickness H, dewatered saturated thickness h_w, permeability (or conductivity) k, the estimated radius of influence $R_{(o)}$, and the effective excavation radius r_e (in the case of pit excavations).

3.2.2 Estimating the Radius of Influence

According to *Navy Facilities Engineering Command (NAVFAC) Technical Manual P-418, page 4-2*, the radius of influence $R_{(o)}$ is defined as the radius of a circle beyond which pumping of a dewatering system has no significant effect on the original groundwater level or piezometric surface. Absent site-specific

pumping tests, the value of $R_{(o)}$ is commonly estimated from the *Siechart equation* below (see also NAVFAC P-418, Page 4-24) (originally proposed by Kyrieleis and Siechart, 1930):

$$R_{(o)} = C\,(H - h_w)\,\sqrt{k}$$

where *R(o): in feet*
C = 3, for gravity flow to a well
$(H - h_w) = \Delta h$, drawdown in feet
k = coefficient of permeability in micrometer / sec (μm/sec)

For all construction elements, the drawdown value (Δh) was computed as the anticipated depth of the excavation minus 1-ft (i.e., the perched or regional water table was assumed to be 1-ft below grade). This is a simplified approach which results in conservative (i.e., 'high') estimates of potential dewatering rates. In addition, since excessively large values of $R_{(o)}$ are unlikely to develop, because the dewatering duration at each construction element will be too short to result in equilibrium [steady-state] drawdown cones, the values of $R_{(o)}$ as generated by the equilibrium Siechart equation was multiplied by 0.5. This safety factor essentially shortens the estimated radius of influence, which in turn steepens the residual head differences and therefore leads to larger, more conservative estimates of dewatering rates.

3.2.3 Open Cut Trenches

The estimated dewatering along an open-cut line trench was based on solving for a "partially penetrating line slot with two line sources and gravity flow" (Navy Technical Manual "*Dewatering and Groundwater Control*", NAVFAC P-418, as per *Figure 4-3c*, *Equation 3, Page 4*, 1983). Therefore, the estimated dewatering along an open-cut trench was estimated from the equation below:

$$Q = \left(0.73 + 0.27\,\frac{H - h_w}{H}\right)\frac{k_x}{2\,L}\left(H^2 - h_w^2\right) \times 2$$

where *Q = required dewatering (pumping) per unit length of open-cut trench (ft^3/sec/ft)*
H = saturated thickness at each construction element
h_w = dewatered saturated thickness (aquifer thickness H minus the required drawdown Δh)
k_x = coefficient of permeability (ft/sec), estimated from the information provided in Table 3
L = radius of influence $R_{(o)}$, as computed by the Siechart equation multiplied by 0.5

The dewatering rate at each of the trench elements was computed by multiplying the estimated unit dewatering rates (via the equation shown) by the length of the trench segment (up to 100-ft) and converting to a convenient unit (gallons per minute, gpm). The converted estimated dewatering rates (in gpm per trench segment) are summarized in **Table 5.** The estimated total yield was calculated by multiplying the dewatering rate with the anticipated dewatering duration, and expressed either as (a) million gallons per month (Mgal/month, a unit consistent with the required input for form BWA-002) or b.) expressed as the linear yield (gal/ft, also a required input for Form BWA-002) by dividing the total yield by the length of the construction segment.

3.2.4 Other Excavations

The estimated dewatering along for pit excavations where the sides are equal to or of similar proportions was estimated by solving the *Dupuit-Forcheimer* approximation of radial flow to a well having an effective radius that is proportional to the area of the excavation itself. The governing equations are as follows (for example, J. Powers, *Construction Dewatering, New Methods and Applications*, 2007), in consistent units:

Estimate of effective radius r_e:

$$r_e = \sqrt{\frac{a \times b}{\pi}}$$

Estimate of radius of influence $R_{(o)}$

$$R_O = C \times (H - h) \times \sqrt{k} + r_e$$

Estimate of gravity flow to well with radius r_e:

$$Q = n \times q = \frac{\pi \times k \times (H^2 - h^2)}{\ln\left(\frac{R_O}{r_e}\right)}$$

where

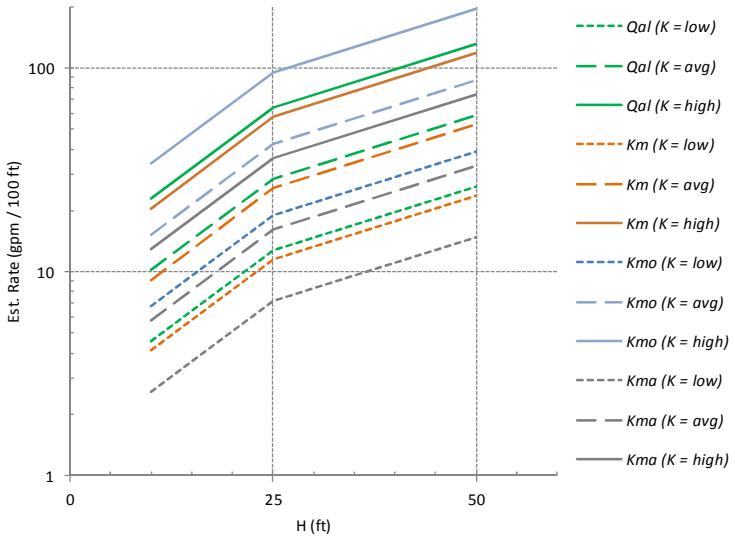
Q = overall flow rate [m^3/s]
n = number of well points (or sumps)
q = flow rate per well point [m^3/s]
k = hydraulic conductivity [m/s]
H = total head of the water table aquifer [m]
h = total head of dewatered aquifer [m]
R_O = radius of influence [m]
r_e = effective radius of dewatering [m]
a = width of excavation [m]
b = length of excavation [m]

Only four (4) such construction elements (the two bore pits for the Godenk Drive crossing directional bore, the exit pit for the Garden State Parkway directional bore at Sta. 240.90, and the entry pit for the HDD at Sta. 253.02) were anticipated to require dewatering, based on the decision criteria stated in **Section 3.1**. The input and output data for these four project elements are shown in **Appendix B** and are summarized in **Table 5**.

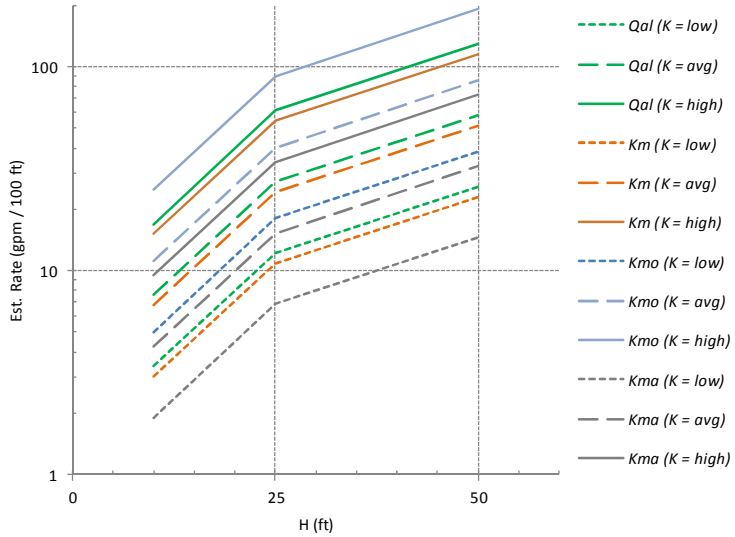
3.2.5 Uncertainties

Since the geotechnical borings did not encounter a clearly defined or regionally extensive aquitard, the aquifer thickness contributing to the dewatering flow (H in the set of equations in **Sections 3.2.2** through **3.2.4**) is generally unknown. Lesser values of H tend to minimize the rate of estimated dewatering, whereas greater values of H tend to maximize the rate of estimated dewatering. Therefore, separate dewatering rates were computed based on three separate assumptions for H (10-ft, 25-ft, and 50-ft), in conjunction with three separate values for K: a high value (=5x the average value), the average value (as stated in **Section 2.1.2**), and a low value (1/5th the average value). This uncertainty analysis was conducted for four of the geological units (Qal, Km [undivided], Kmo, and Kma). The tabular and graphic output of this analysis for variable values for H and K is shown in the plot below (for excavation depths of 7-ft and 12-ft, respectively).

H (ft)	Alluvium, Qal (gpm / 100 ft)			Magothy, K (gpm / 100 ft)			Magothy, Kmo (gpm/ 100 ft)			Magothy, Kma (gpm/100 ft)		
	for K (cm/sec)			for K (cm/sec)			for K (cm/sec)			for K (cm/sec)		
	Low	Avg	High	Low	Avg	High	Low	Avg	High	Low	Avg	High
for excavation d = 7 ft	1.4E-03	7.0E-03	3.5E-02	1.1E-03	5.6E-03	2.8E-02	3.1E-03	1.5E-02	7.7E-02	4.4E-04	2.2E-03	1.1E-02
10	4.6	10.3	22.9	4.1	9.2	20.5	6.8	15.2	34.0	2.6	5.8	12.9
25	12.8	28.7	64.2	11.5	25.7	57.4	19.0	42.5	95.1	7.2	16.2	36.2
50	26.3	58.9	131.6	23.5	52.6	117.7	39.0	87.2	194.9	14.8	33.2	74.2
Avg. Rate (gpm/100 ft)	23.9			49.6			82.1			13.5		



H (ft)	Alluvium, Qal (gpm / 100 ft)			Magothy, K (gpm / 100 ft)			Magothy, Kmo (gpm/ 100 ft)			Magothy, Kma (gpm/100 ft)		
	for K (cm/sec)			for K (cm/sec)			for K (cm/sec)			for K (cm/sec)		
	Low	Avg	High	Low	Avg	High	Low	Avg	High	Low	Avg	High
for excavation d = 12 ft	1.4E-03	7.0E-03	3.5E-02	1.1E-03	5.6E-03	2.8E-02	3.1E-03	1.5E-02	7.7E-02	4.4E-04	2.2E-03	1.1E-02
10	3.4	7.6	17.0	3.0	6.8	15.2	5.0	11.2	25.1	1.9	4.3	9.6
25	12.2	27.2	60.8	10.9	24.3	54.4	18.0	40.3	90.0	6.9	15.3	34.3
50	25.8	57.7	129.0	23.1	51.6	115.4	38.2	85.5	191.1	14.5	32.5	72.7
Avg. Rate (gpm/100 ft)	21.3			47.3			78.4			12.0		



The uncertainty analysis suggests that estimated dewatering rates can vary over approximately one order of magnitude for the stated input ranges for H and K. Therefore, the applied dewatering rates shown in **Table 5** (per 100-ft segment or any pro-rated portion thereof) are average values derived from the permutations shown above (yellow cells only).

- For the Qal and the Kma units (which tend to be thinner and likely contain lithologies with a wider range of permeabilities), the input dewatering rates (21.3-23.9 gpm/100 ft and 12.0-13.5 gpm/100 ft, respectively) were derived by averaging the output values for H=10 ft, H=25 ft, and for low K, average K, and high K values.

- For the Km and Kmo units (which tend to be thicker and consist of lithologies that tend to contain more permeable units), the input dewatering rates (47.3-49.6 gpm/100 ft and 78.4-82.1 gpm/100 ft, respectively) were derived by averaging the output values for H and K as shown above, with a bias toward the greater values of H and K.

Finally, the gravity flow (=dewatering rate) at each construction element was estimated under the assumption that the entire excavation will be open (and therefore acting as a gravity drain) at any given time. It should be noted, however, that standard construction methods typically seek to minimize the area of open excavation at any time.

3.2.6 Limitations

The dewatering analysis presented above is based on stratigraphic and groundwater-related data collected (and interpreted) from geotechnical test borings installed by AECOM. Since the anticipated soil characteristics along the project profile are heterogeneous, the estimates of the average expected permeability coefficient were made from the individual soil classifications of geotechnical samples (separate for each of the geological units) and, if applicable, also using Hazen's convention. Consequently, the individual dewatering estimates presented in **Table 5** could be under- or over-estimated depending on the actual subsurface conditions at each excavation.

The actual dewatering volumes generated during linear construction efforts are often less than those estimated for permitting purposes, since in practice the construction methods employed by the contractor typically seek to minimize infiltration into the excavation (for example, by minimizing the area and time period over which an excavation is open below the water table). Therefore, the dewatering rates (gpm per stated segment length) and yields (yield per month [Mgal/month] and linear yield [gal/ft] should be viewed as conservative estimates.

3.2.7 Estimated Dewatering Discharge Rates

The anticipated dewatering rates for the specified construction elements are shown in **Table 5**:

- 2.96 Mgal/month or 315 gal/ft for the entire length of the Project located in Old Bridge Township; when considering only the elements that were anticipated to be dewatered, the effective linear yield was estimated to be 963 gal/ft.

These dewatering estimates were derived using conservative assumptions throughout and provide a cumulative estimate for the entire Project as located in Old Bridge Township. For those elements that were predicted to result in excavations that extend to or below the static groundwater table, temporary construction dewatering will be necessary to facilitate open-cut trench excavation and to maintain dry conditions within the trench during installation of the piping sections. Based on Transco's current schedule, it is anticipated that the construction dewatering will be implemented over a period of approximately 134 days for the portion of the Project portion located in Old Bridge Township, with dewatering, when and if necessary, occurring 24-hours per day. The estimated duration of dewatering at each trench segment (as provided by Transco) is shown in **Table 5**.

The construction dewatering was analyzed for the trench segments and the pit excavations features, by first estimating the radius of influence and then calculating an equilibrium dewatering (pumping) rate to maintain the water level at or below the base of the excavation. The construction dewatering analysis results are based on the anticipated depth to groundwater, the projected depth of the excavation beneath the water table, and the permeability coefficients derived from a review of the soil classification and gradation curves for soil samples collected from the geotechnical borings**.**

Table 5 expresses these dewatering estimates using the following units:

- Dewatering rate in gallons per minute (gpm), which should be considered a long-term average dewatering rate, meaning that initial dewatering may occur at a faster rate and later dewatering may occur at a slower rate, as would be expected when the head difference between the outside and the inside approach one another during prolonged dewatering.

- Yield rate per linear foot, in gallons per foot (gal/ft), which represents a measure of the total estimated yield of each excavation segment (in gallons = rate [gpm] x duration [days] x 1440 min/day) divided by the length of each construction segment: gal/ft = Yield (gal) / Length (ft)

Based on the data shown in **Tables 4** and **5**, the estimated dewatering yield in Old Bridge Township portion of the Project varies over one order of magnitude, with the higher linear yield rates apparent at Stations 108+00 through 111+00 and at Stations 175+00 through 186+00. On average, and including the Project segments that are not anticipated to require dewatering, the linear yield was estimated to be 315 gal/ft.

Note that the dewatering rates and yield summarized in **Table 5** should be considered estimates that are based on the assumption that each segment will be fully exposed to infiltrating groundwater along its entire length or its entire footprint. From a practical perspective, this is unlikely to occur as typical construction methods seek to minimize water infiltration by sequential trenching and backfilling operations. In general, the subsurface soils along the Project alignment have moderate to low permeabilities, which will limit the amount of infiltration and continuing recharge. However, in segments where coarser alluvial or estuarine soils may be encountered, or in the vicinity of streams or wetlands, the actually encountered yields may temporarily approach or even exceed the estimated conditions shown in **Table 5**.

3.2.8 Anticipated Methods of Dewatering

During the dewatering of the Project segments, infiltrating groundwater (and any stormwater run-on) will be removed from the excavation by using properly-sized sump pumps, well point systems, and/or constructed dewatering sumps by grading the excavation base to a collection point. The actual means and methods of construction dewatering will be determined by Transco's construction contractor, or as specified in the construction documents. The dewatering construction plans will also specify one or more settling tanks to allow for the removal of sediments and solids, appropriately-sized cartridge filters prior to recharge, and properly constructed recharge features (such as hay bale structures) to facilitate the permitted on-site recharge.

It should be noted also that all drilling mud that will be generated at the HDD launch and exit pits (including any infiltrating groundwater into these pits) will be staged in properly sized and secured containers and transported off-site for proper disposal at permitted facilities. No drill mud (or infiltration water containing drill mud) will be discharged alongside the Project extent.

4.0 Environmental Impact

4.1 Potential Impacts to Groundwater Supply and Nearby Groundwater Users

The construction dewatering analysis (**Section 3** and **Appendix B**) suggests that the pumping radius of influence may extend between approximately 50 to 200-ft from specific excavation segments. In general, however, due to the short-term nature of dewatering, the actual radius of influence will be less. Based on Transco's current construction schedule, groundwater dewatering will be performed for not more than 2 days at any given 100-ft construction segment, with longer dewatering likely at some of the indicated stream and road crossings. Dewatering of the excavation segments will be completed to a depth of generally not more than 6-ft below the anticipated groundwater surface. The groundwater that will be affected by the proposed dewatering will be either localized, perched water-bearing zones in the vicinity of streams or wetlands, or water stored in low-lying estuarine or laterally extensive alluvial units, or the regionally saturated aquifer soils of the various Cretaceous unconsolidated units when the land surface is near the regional groundwater table (see **Figure 4**).

Away from alluvial units or estuarine deposits, the actual dewatering rates are anticipated to be relatively modest and together with the potential intermittent nature of the withdrawal, the data suggest that the proposed withdrawal will not adversely impact the local groundwater resources. Furthermore, the well search completed for the due diligence phase of the Project did not identify private or public water supply wells that are located within 50- to 200-ft estimated radius of influence for the Project (see also **Figure 6**). The regional groundwater table in the Project vicinity is represented by the saturated Magothy aquifer soils which typically occur at elevations of 30-ft NAVD 88 or less (**Figure 4** and **Figure 5**) in the Old Bridge Township portion of the Project.

4.2 Potential for Spreading Groundwater Contamination

AECOM, on behalf of Transco, has completed a review of various environmental databases, as described in **Section 1.4.2** and summarized in **Table 2** of this technical report. The purpose of the review was to identify sites of potential environmental concern within or adjacent to the Project site. The search area extended outward and perpendicular to the circumference of the Project Site to a total distance of 0.25 miles in each direction. In addition to known contaminated NJ Sites, the search also included data for state and federal, public and private water supply. Within the Old Bridge Township portion of the Project, two sites that were identified within 0.25 miles (Global Landfill CEA and DuPont CEA) are known to have associated groundwater concerns. Water quality sampling along these segments of the Project is being completed by Transco to discern potential groundwater impacts in the Project vicinity. It should be noted, however, that the estimated radius of influence that will result from managing infiltration into the excavation is likely less than 200-ft, which limits the potential for migration of impacted groundwater, if any. In addition, the depth of reported groundwater impacts within the DuPont CEA is greater than 150-ft, while any required dewatering along the Project would be occurring at depths not greater than 7-15 ft bgs.

4.3 Potential Impacts to Wetlands and Waterbodies

It is possible that the pumping of groundwater from certain excavation elements will temporarily reverse the hydraulic gradient that may ordinarily allow for shallow groundwater to discharge into nearby wetlands and surface water bodies (when present). Therefore, the potential exists that the water table across some of the nearby wetland areas may be temporarily lowered and that the mapped surface water bodies may experience a short-term decrease in flow as a result of dewatering. None of these effects are considered to be severe or long-term in nature, as the dewatering is anticipated to be short in duration and relatively minor in volume. In addition, in the Old Bridge Township portion of the Project the mapped surface water bodies have intermittent flow, suggesting that the ambient discharge to these streams is not continuous and dependent on precipitation events or temporarily perched water table conditions.

4.4 Potential for Salt Water Intrusion

In the Old Bridge Township portion of the Project, there is no potential for salt water intrusion into previously non-impacted groundwater resources. The closest principal unit that shows signs of saltwater intrusion is the Raritan Farrington sand (Krf), which occurs underneath the Old Bridge sand (Kmo) and is separated from the Kmo by the thick confining unit of the Woodbridge Clay (Krw).

5.0 References

Environmental Data Resources, Inc. (EDR). 2016c. DataMap Corridor Study, Madison Loop, South Amboy, NJ, 08879, Inquiry Number: 4726085.2s. September 19, 2016.

U.S. Environmental Protection Agency (EPA). 2016a. Superfund National Priorities List Sites-by State. https://www.epa.gov/superfund/national-priorities-list-npl-sites-state. Accessed January 3, 2017.

EPA. 2016b. EPA Superfund Program: Global Sanitary Landfill, Ild Bridge Township, New Jersey. https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0200398&msspp=med

Hazen, W., 1892, Some physical properties of sands and gravels: Mass. State Board of Health, Ann. Rept. pp. 539-556.

Kyrieleis, W. and Siechart, W., 1930, Grundwasserabsenkung bei Fundierungsarbeiten, Berlin.

Lasky, Loren. 2017. Case Manager of the E.I. DuPont Nemours & Company Site. New Jersey Department of Environmental Protection. NESE Project Contact Report, phone call on February 14 and 15, 2017 from Bob Meyers, Ecology and Environment, Inc., Lancaster, New York.

NAVFAC, 1983, Dewatering and Groundwater Control, Navy Manual P-418,

New Jersey Department of Environmental Protection (NJDEP). 2016a. Open Public Records Act, Data Miner. http://datamine2.state.nj.us/dep/DEP_OPRA/. Accessed January 3, 2017.

NJDEP. 2016b. NJ-Geo Web. http://www.nj.gov/dep/gis/geowebsplash.htm. Accessed January 3, 2017.

New Jersey State. 2015. Brownfields SiteMart. http://www.njbrownfieldsproperties.com/SiteInformation.aspx?Site_Number=8072. Accessed January 3, 2017.

NJDEP Office of Water Allocation and Well Permits, February 20, 2018, 0.25-mile Well Search Results Transmittal.

Powers, J., Corwin, A.B., Small, P.C. and Kaeck, W.E., 2007, Construction Dewatering and Groundwater Control, New Methods and Applications, 3rd Edition, 656 pp.

Sharma, H. and Reddy, K., 2004, Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies, Wiley, 992 pp.

Stanford, S.A., 1995, Surficial Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey (OFM 18).

Sugarman, P.J. at al,, 2005, Bedrock Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey (OFM 18).

Woodward, J., 2005, An Introduction to Geotechnical Processes, CRC Press, 136 pp.

Figures

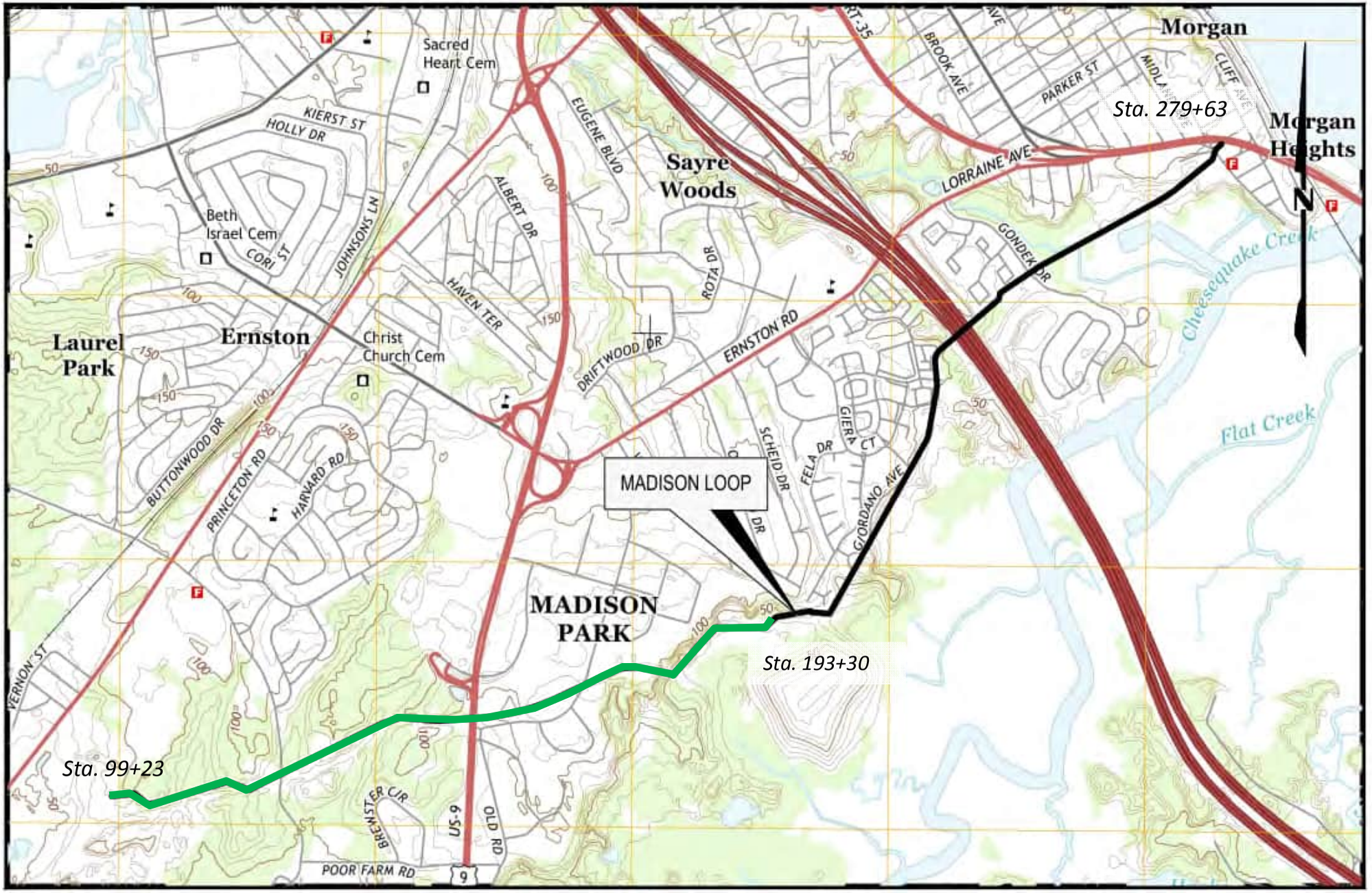
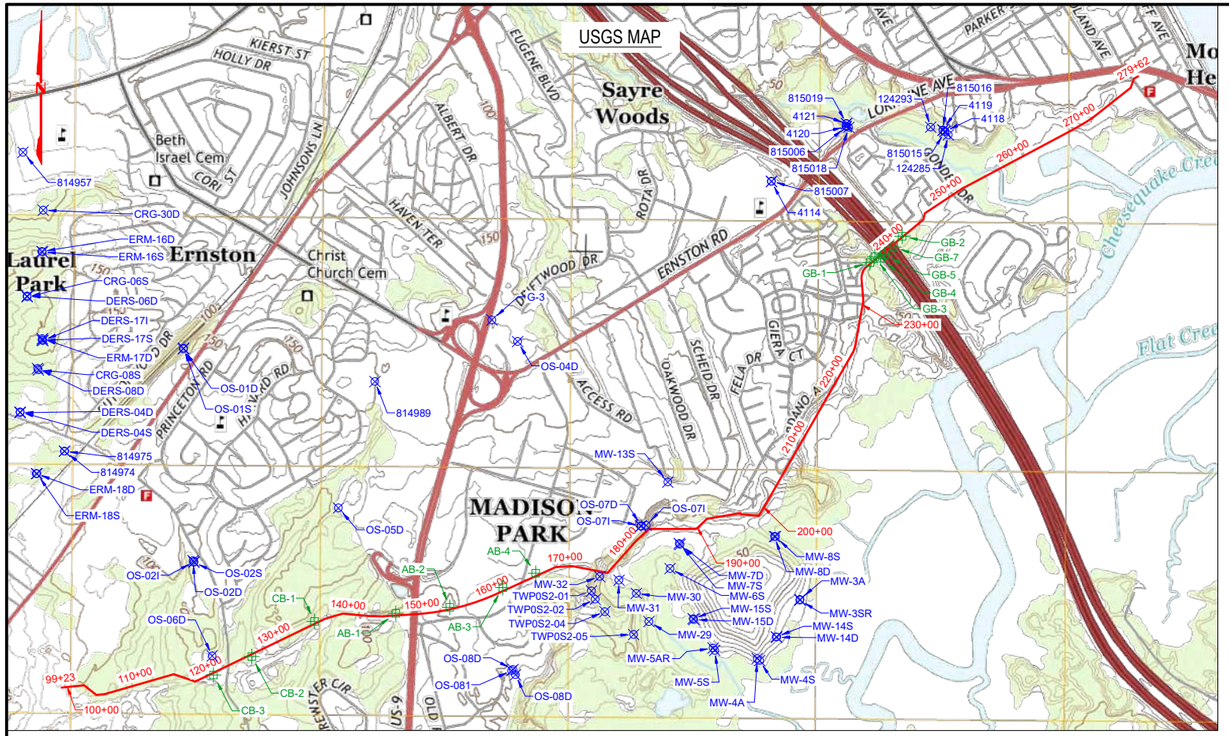
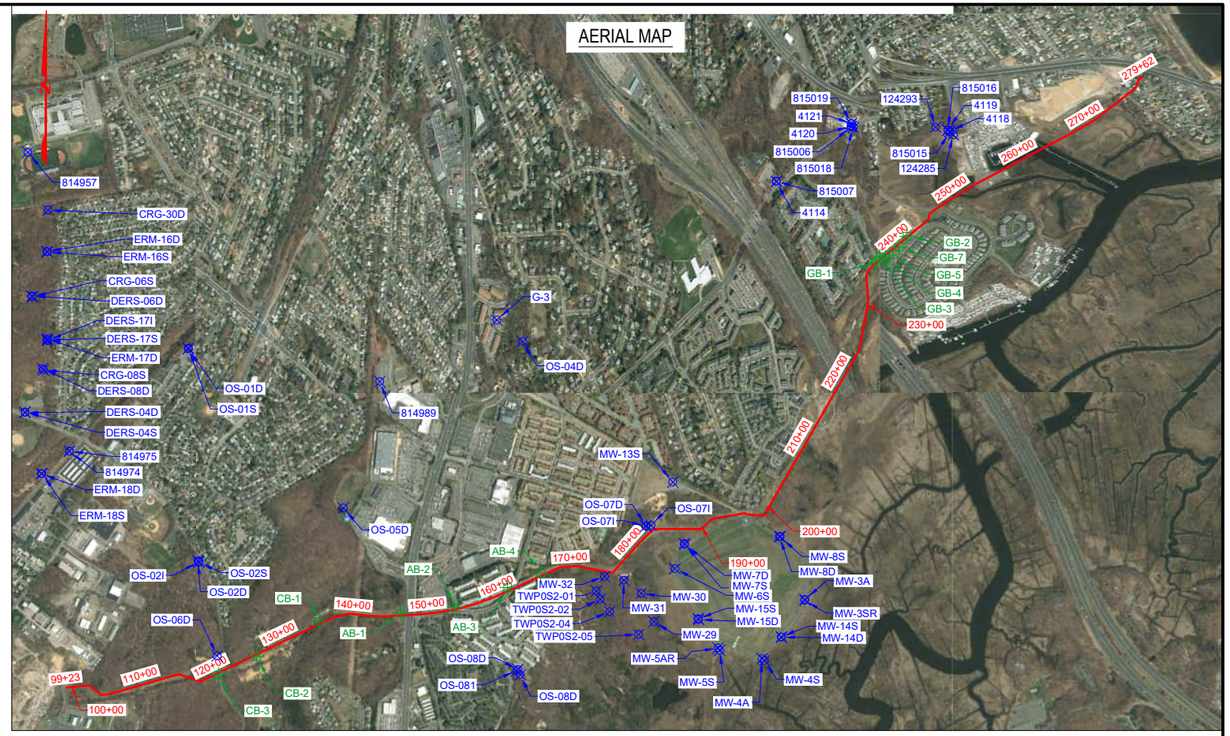
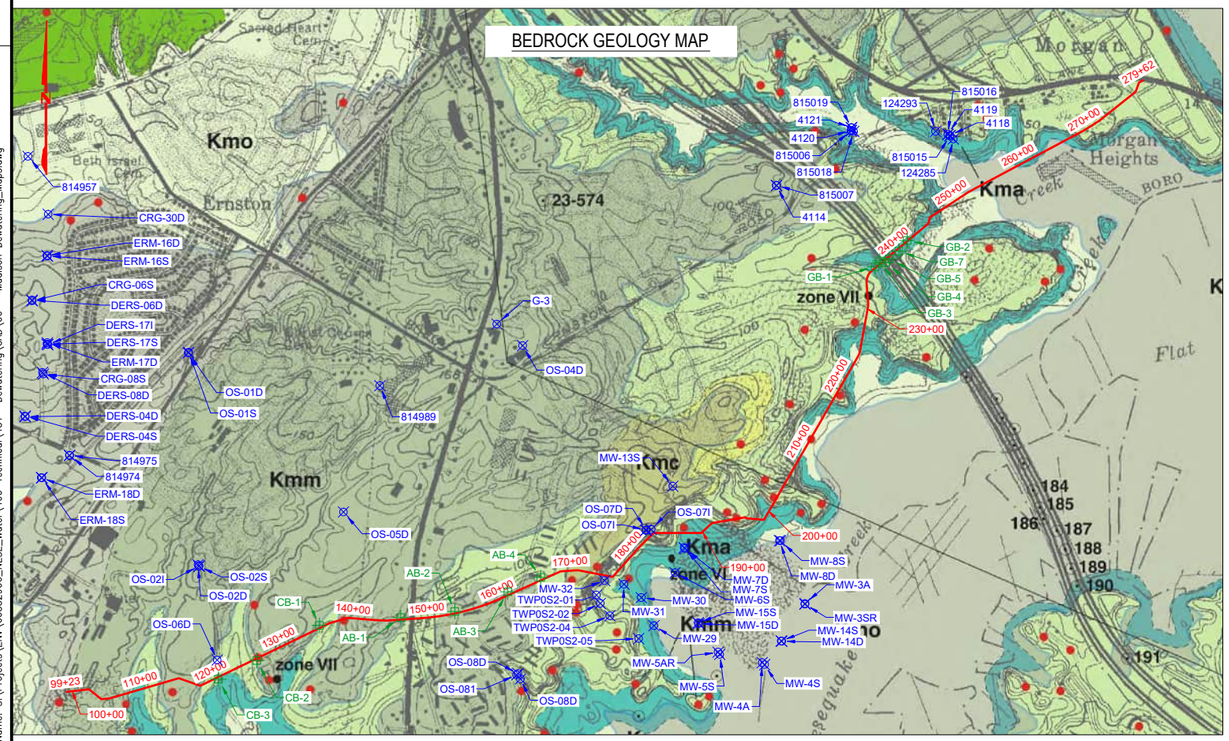


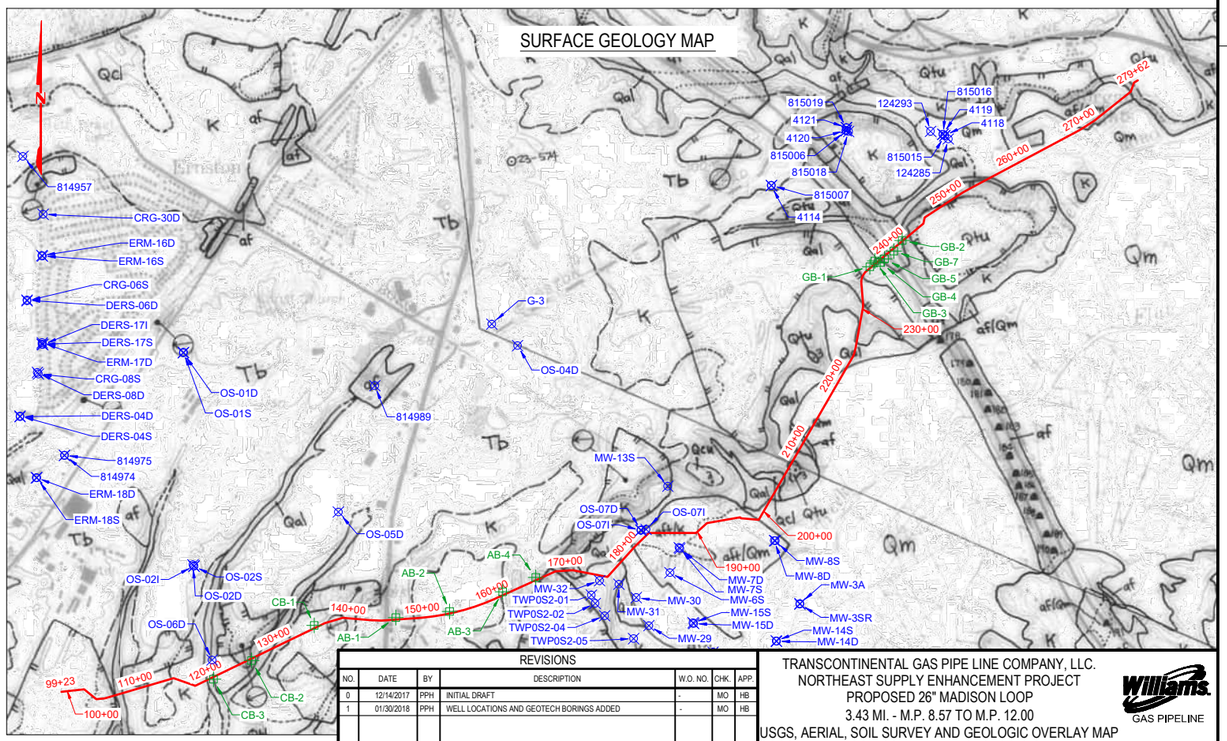
Figure 1 – USGS Map showing Proposed Dewatering Sources in Support of BWA-002 (Old Bridge Township) – Sta. 99+23 to Sta. 193+30 Northeast Supply Enhancement Project (NESE) – Madison Loop

Old Bridge Township portion of Madison Loop (Sta. 99+23 to Sta. 193+30)









NOTES:

1. USGS MAP FROM 7.5' QUADRANGLE, SOUTH AMBOY, NJ-NY 2014.
2. AERIAL IMAGERY OBTAINED FROM NJ OFFICE OF INFORMATION TECHNOLOGY (NJOIT), OFFICE OF GEOGRAPHIC INFORMATION SYSTEMS (OGIS).
3. BEDROCK GEOLOGY FROM OPEN FILE MAP OFM 65 ENTITLED "BEDROCK GEOLOGY OF THE SOUTH AMBOY QUADRANGLE, MIDDLESEX AND MONMOUTH COUNTIES, NEW JERSEY", DATED 2005.
4. SURFACE GEOLOGY FROM OPEN FILE MAP OFM 18 ENTITLED "SURFICIAL GEOLOGY OF THE SOUTH AMBOY QUADRANGLE, MIDDLESEX AND MONMOUTH COUNTIES, NEW JERSEY", DATED 1995.

WELL LOCATIONS
GEOTECHNICAL BORING

REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.
0	12/14/2017	PPH	INITIAL DRAFT	-	MO	HB
1	01/30/2018	PPH	WELL LOCATIONS AND GEOTECH BORINGS ADDED	-	MO	HB

AECOM
625 WEST RIDGE PIKE, SUITE E-100
CONSHOHOCKEN, PA 19428
(610) 832-3500

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26" MADISON LOOP
3.43 MI. - M.P. 8.57 TO M.P. 12.00
USGS, AERIAL, SOIL SURVEY AND GEOLOGIC OVERLAY MAP
MIDDLESEX COUNTY, NEW JERSEY

Williams GAS PIPELINE

DRAWN BY:	PPH	DATE: 12/13/2017	ISSUED FOR BID: TBD	SCALE:	1" = 1000'
CHECKED BY:	MO	DATE: 12/13/2017	ISSUED FOR CONSTRUCTION: TBD	REVISION:	1
APPROVED BY:	HB	DATE: 12/13/2017	DRAWING NUMBER:	SHEET	01 OF 8
W.O.					

Figure 2

Drawn By & Date/Time: hoasp Jan 30, 2018 - 10:42am
Drawing Location & Name: S:\Projects\ENV\60552906_NESE_Water\400-Technical\431- Dewatering\CAD\00 - Madison Dewatering_Maps.dwg

AH SPECTOR SAYREVILLE PROJECT
Albemarle Corporation
JOHN B MOORE CORPORATION
TIGER PAW INC
Shell Service Station #138498
Restriction Depth 50
Mobil Service Station #15-JNG
Restriction Depth 50
MOBIL OIL CORP
SUNOCO 0007-6612
SUNOCO #0327 9627
Sunoco Service Station #0007-6612
Restriction Depth 50
NJ FUEL LLC DBA PARLIN SHELL
GETTY 00670
HESS STATION 30228
Sayreville Junction
Sayre Woods
Laurel Park
Ernston
Morgan
Morgan Heights
1788 Route 35
Restriction Depth 50
Old Spye Road
Conventional Bore
35
Sta. 279+63
DELTA
MP 12.00
MORGAN FIRE HOUSE
MP 13.00
Area 7
Area 11
Area 8
Area 6
Raritan Bay Slag
Superfund Site
RARITAN BAY SLAG
Area 5
Area 2
Area 1
Areas 3
and 4
K & L
LAURENCE HARBOR STATION INC
HARBOR CHEVRON
Laurence Harbor
Area 9
Area
MORGAN ORDNANCE DEPOT
Garden State Parkway
Conventional Bore
Gondek Drive
Conventional Bore
MP 11.00
RACEWAY PARLIN
SAYREVILLE 127 ERNSTON RD
Getty Service Station #56893
Restriction Depth 50
E I DUPONT DENEMOURS & CO
STRAUSS DISCOUNT AUTO
9
Middlesex
County
Borough of Sayreville
Old Bridge Township
Sta. 193+30
BLACK TIE CLEANERS
E I Dupont
Denemours & Co
Restriction Depth 190
GREEN TREE CHEMICAL TECH INC
ROAD DEPARTMENT GARAGE AREA 3-1
MP 10.00
GLOBAL SANITARY LANDFILL
Global Sanitary Landfill
Restriction Depth 25
Global Sanitary
Landfill
Restriction Depth 150
RECLAMATION TECHNOLOGIES INC
Sta. 99+23
MP 9.00
MP 8.57
GETTY 00304
Getty Service Station #00304
Restriction Depth 50
SOMMERS LANDFILL
CENTRAL JERSEY TANK CLEANERS
LIONETTI OIL RECOVERY INC
EVOR PHILLIPS LEASING COMPANY
Evor Phillips Leasing Waste Disposal
Restriction Depth 100
Stavola Old Bridge Materials,
LLC Restriction Depth 100
MOUNTAINEER CONSTRUCTION
5 JOSEPH COURT
SITE #38943
CUMBERLAND GULF 060608
MANZO CONTRACTING INCORPORATED
CPS MADISON INDUSTRIES
Runyon
CPS Chemical (CPS Madison)
Madison Industries
34
CHEESEQUAKE STATE PARK
Cheesequake State Park
Restriction Depth 14
YACUZZIO FAMILY LLC
RARITAN BAY AUTO BODY
FIBER CHEMICAL CORPORATION
Monmouth
County
ABERDEEN TWP WATER DEPT
BRUNO'S GENERAL STORE
WEHRLE BUS SERVICE IN
SOMERSET ANCHOR LLC

Figure 3 Hazardous Waste and Known Contaminated Sites within ¼-mile Radius
in Support of BWA-002 (Old Bridge Township)
Northeast Supply Enhancement Project (NESE)

¼-mile radius corridor from Sta. 99+23 to Sta. 279+63

NJDEP Classification Exception Area (CEA)

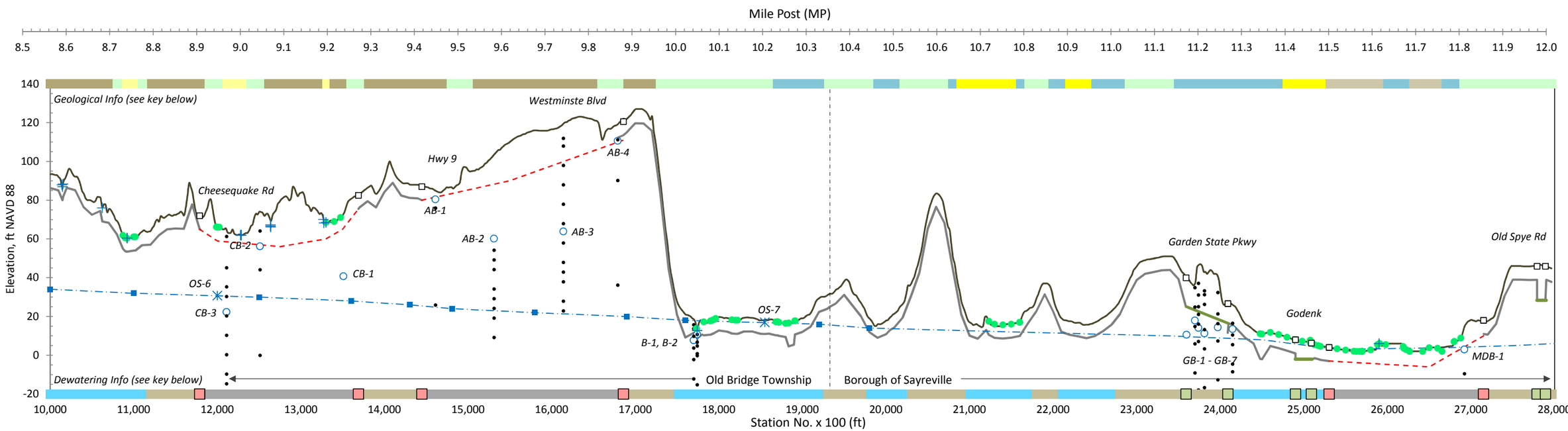
NJDEP Known Contaminated Site

N
0 0.25 0.5
Miles

Figure adapted from Williams Figure 2A-5 (dated 3/22/2017)

Figure 4 - Topography and Hydrogeological Project Profile

Northeast Supply Enhancement (NESE) Project - Old Bridge Township (BWA-002)

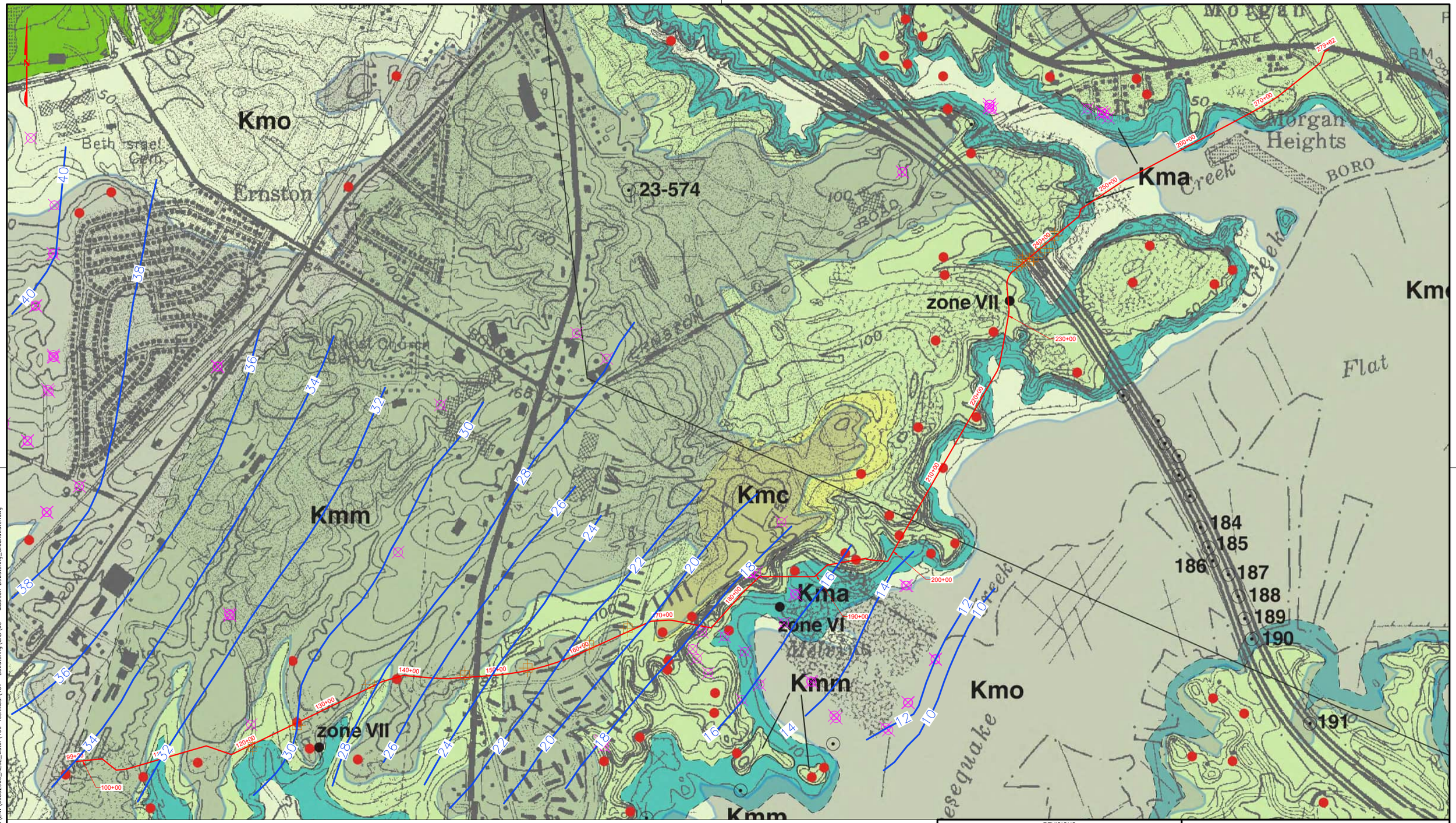


Surface EL — *Pipe Profile (S_EL - 7 ft)* — *Landmarks* — *Monitoring Well (WL)* — *GW Contour (Magothy)* — *Geotech Boring (WL)* — *Geotech Boring (samples)* — *Wetland*

Stream Intersections — *HDD or Bore Pit* — *Dewatering Likely* — *Dewatering Unlikely* — *No Dewatering (HDD)* — *HDD Pit* — *DB Pit* — *HDD-1*

HDD-2 — *GSP Crossing* — *GD Crossing* — *HDD-3* — *OSR Crossing* — *Regional GW Table* — *Holocene (Qm)* — *Alluvium (Qal)*

Pennsauken Fm. (Tb) — *Magothy Fm. (K, undiv)* — *Magothy Fm. (Kma)* — *Magothy (Kmo)* — *Municipality Bdry*



BEDROCK GEOLOGY MAP

NOTES:

1. BEDROCK GEOLOGY FROM OPEN FILE MAP OFM 65 ENTITLED "BEDROCK GEOLOGY OF THE SOUTH AMBOY QUADRANGLE, MIDDLESEX AND MONMOUTH COUNTIES, NEW JERSEY", DATED 2005.

WELL LOCATIONS

GEOTECHNICAL BORING

28 GROUNDWATER ELEVATION CONTOUR

REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.
0	01/31/2018	PPH	INITIAL DRAFT	-	MO	HB

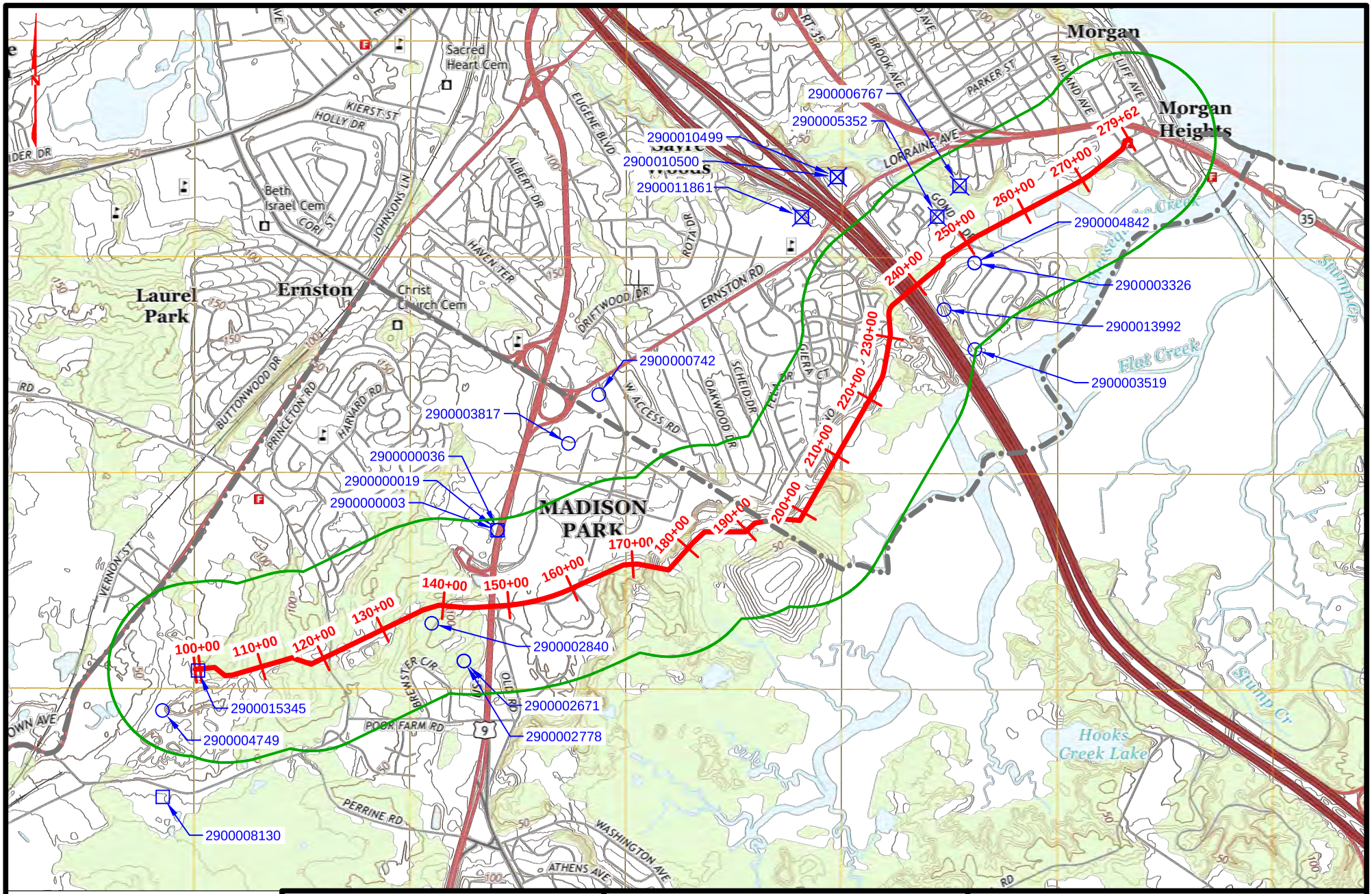
AECOM
625 WEST RIDGE PIKE, SUITE E-100
CONSHOHOCKEN, PA 19428
(610) 832-3500

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26" MADISON LOOP
3.43 MI. - M.P. 8.57 TO M.P. 12.00
GROUNDWATER ELEVATION CONTOUR MAP
MIDDLESEX COUNTY, NEW JERSEY

Williams GAS PIPELINE

DRAWN BY: PPH	DATE: 01/31/2018	ISSUED FOR BID: TBD	SCALE: 1" = 500'
CHECKED BY: MO	DATE: 01/31/2018	ISSUED FOR CONSTRUCTION: TBD	REVISION: 0
APPROVED BY: HB	DATE: 1	DRAWING NUMBER: Figure 5	SHEET 01 OF 1
WO:			

Drawn By & Date/Time: hoasp Feb 01, 2018 - 10:00am
Drawing Location & Name: S:\Projects\ENV\60552906_NESE_Water\400-Technical\431- Dewatering\CAD\00 - Madison Dewatering_Groundwater.dwg



MADISON LOOP
1/4 MILE BUFFER
TOWNSHIP / BOROUGH BOUNDARY
DOMESTIC WELLS
INDUSTRIAL WELLS
PUBLIC COMMUNITY WELLS

NOTES:
1. USGS MAP FROM 7.5' QUADRANGLE, SOUTH AMBOY, NJ-NY 2014..

2,000' 1,000' 0' 2,000'

SCALE: 1" = 2,000'

AECOM
625 WEST RIDGE PIKE, SUITE E-100
CONSHOHOCKEN, PA 19428
(610) 832-3500

REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26" MADISON LOOP
FIGURE 6
WELL SEARCH MAP
MIDDLESEX COUNTY, NEW JERSEY

Williams GAS PIPELINE

DRAWN BY: PPH	DATE: 02/26/2018	ISSUED FOR BID: TBD	SCALE: 1" = 1,000'
CHECKED BY: MO	DATE: 02/26/2018	ISSUED FOR CONSTRUCTION: TBD	REVISION: 0
APPROVED BY: HB	DATE: 02/26/2018	DRAWING NUMBER:	SHEET 1 OF 1
WO:			

Drawn By & Date/Time: hoasp Feb 27, 2018 - 2:53pm
Drawing Location & Name: C:\Project Files\Williams\Madison\Dewatering\00 - Madison Dewatering_Figure 6.dwg

Tables

Table 1 - Summary of Linear Project (Old Bridge Township)

Station ID	EL (ft msl)	Municipality	State Well Permit No.	Location Description	Geological Formation	Length, ft	Excavation Depth, ft
99 +23	90.5	Old Bridge	N/A	Trench	Pennsauken (Tb)	77	7
100 +00	93.3	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
101 +00	92.0	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
102 +00	93.3	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
103 +00	92.1	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
104 +00	83.5	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
105 +00	79.5	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
106 +00	81.5	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
107 +00	75.3	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
108 +00	69.3	Old Bridge	N/A	Trench	Magothy (K)	100	7
109 +00	60.6	Old Bridge	N/A	Trench	Alluvium (Qal)	100	7
110 +00	61.0	Old Bridge	N/A	Trench	Alluvium (Qal)	100	7
111 +00	63.8	Old Bridge	N/A	Trench	Magothy (K)	100	7
112 +00	64.1	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
113 +00	68.9	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
114 +00	72.0	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
115 +00	72.4	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
116 +00	72.2	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
117 +00	84.8	Old Bridge	N/A	Trench	Pennsauken (Tb)	89	7
117 +89	84.8	Old Bridge	N/A	HDD Entry Pit	Pennsauken (Tb)	11	12
118 +00	71.7	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
119 +00	79.5	Old Bridge	N/A	HDD	Magothy (K)	100	---
120 +00	66.0	Old Bridge	N/A	HDD	Magothy (K)	100	---
121 +00	65.0	Old Bridge	N/A	HDD	Alluvium (Qal)	100	---
122 +00	62.7	Old Bridge	N/A	HDD	Alluvium (Qal)	100	---
123 +00	61.9	Old Bridge	N/A	HDD	Alluvium (Qal)	100	---
124 +00	66.2	Old Bridge	N/A	HDD	Magothy (K)	100	---
125 +00	74.0	Old Bridge	N/A	HDD	Magothy (K)	100	---
126 +00	73.1	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
127 +00	74.9	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
128 +00	81.4	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
129 +00	87.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
130 +00	83.8	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
131 +00	76.5	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
132 +00	74.3	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
133 +00	68.2	Old Bridge	N/A	HDD	Alluvium (Qal)	100	---
134 +00	69.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
135 +00	72.3	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
136 +00	80.6	Old Bridge	N/A	HDD	Magothy (K)	89	---
136 +89	80.6	Old Bridge	N/A	HDD Exit Pit	Magothy (K)	11	12
137 +00	83.2	Old Bridge	N/A	Trench	Magothy (K)	100	7
138 +00	86.5	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
139 +00	83.2	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
140 +00	91.2	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
141 +00	96.0	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
142 +00	89.4	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
143 +00	88.2	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
144 +00	87.9	Old Bridge	N/A	Trench	Pennsauken (Tb)	47	7

Table 1 - Summary of Linear Project (Old Bridge Township)

Station ID	EL (ft msl)	Municipality	State Well Permit No.	Location Description	Geological Formation	Length, ft	Excavation Depth, ft
144 +47	87.0	Old Bridge	N/A	HDD Entry Pit	Pennsauken (Tb)	15	12
144 +62	87.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	38	---
145 +00	86.8	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
146 +00	85.2	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
147 +00	84.8	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
148 +00	86.7	Old Bridge	N/A	HDD	Magothy (K)	100	---
149 +00	88.8	Old Bridge	N/A	HDD	Magothy (K)	100	---
150 +00	95.6	Old Bridge	N/A	HDD	Magothy (K)	100	---
151 +00	95.8	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
152 +00	98.2	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
153 +00	103.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
154 +00	107.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
155 +00	110.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
156 +00	113.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
157 +00	114.7	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
158 +00	116.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
159 +00	115.7	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
160 +00	116.6	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
161 +00	118.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
162 +00	121.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
163 +00	122.7	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
164 +00	123.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
165 +00	121.4	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---
166 +00	111.9	Old Bridge	N/A	HDD	Magothy (K)	100	---
167 +00	116.8	Old Bridge	N/A	HDD	Magothy (K)	100	---
168 +00	119.4	Old Bridge	N/A	HDD	Magothy (K)	60	---
168 +60	121.0	Old Bridge	N/A	HDD Exit Pit	Magothy (K)	15	12
168 +75	121.0	Old Bridge	N/A	Trench	Magothy (K)	25	7
169 +00	122.0	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
170 +00	126.7	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
171 +00	126.6	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
172 +00	122.7	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7
173 +00	90.6	Old Bridge	N/A	Trench	Magothy (K)	100	7
174 +00	51.4	Old Bridge	N/A	Trench	Magothy (K)	100	7
175 +00	27.9	Old Bridge	N/A	Trench	Magothy (K)	100	7
176 +00	21.1	Old Bridge	N/A	Trench	Magothy (K)	100	12
177 +00	18.5	Old Bridge	N/A	Trench	Magothy (K)	100	7
178 +00	17.7	Old Bridge	N/A	Trench	Magothy (K)	100	7
179 +00	17.7	Old Bridge	N/A	Trench	Magothy (K)	100	7
180 +00	19.7	Old Bridge	N/A	Trench	Magothy (K)	100	7
181 +00	19.2	Old Bridge	N/A	Trench	Magothy (K)	100	7
182 +00	18.1	Old Bridge	N/A	Trench	Magothy (K)	100	7
183 +00	19.3	Old Bridge	N/A	Trench	Magothy (K)	100	7
184 +00	19.3	Old Bridge	N/A	Trench	Magothy (K)	100	7
185 +00	18.0	Old Bridge	N/A	Trench	Magothy (K)	100	7
186 +00	18.1	Old Bridge	N/A	Trench	Magothy (K)	100	7
187 +00	17.2	Old Bridge	N/A	Trench	Magothy (Kma)	100	7
188 +00	16.4	Old Bridge	N/A	Trench	Magothy (Kma)	100	7

Table 1 - Summary of Linear Project (Old Bridge Township)

Station ID	EL (ft msl)	Municipality	State Well Permit No.	Location Description	Geological Formation	Length, ft	Excavation Depth, ft
189 +00	17.4	Old Bridge	N/A	Trench	Magothy (Kma)	100	12
190 +00	19.0	Old Bridge	N/A	Trench	Magothy (Kma)	100	7
191 +00	21.8	Old Bridge	N/A	Trench	Magothy (Kma)	100	7
192 +00	29.4	Old Bridge	N/A	Trench	Magothy (Kma)	100	7
193 +00	31.0	Old Bridge	N/A	Trench	Magothy (K)	30	7
193 +30	31.6	Old Bridge	N/A	Trench	Magothy (K)	0	7
					Total Length	9407	

HDD Horizontal Direction Drill
GPDB Garden State Parkway Directional Bore
GDDB Godenk Drive Directional Bore
OSDB Old Spye Road Directional Bore
The assigned geological formations are consistent with Figure 2

Table 2

Sites with Confirmed Contamination within a 1/4-mile radius of Northeast Supply Enhancement (NESE) Project - Madison Loop

Site Name	Municipality	Source	Distance from Pipeline	Direction from Pipeline	Position of Pipeline Relative to Identified Site	Geological Fm. Impacted	Site Status	Site ID No.
			miles					
Reclamations Technologies Inc.	Old Bridge	NJDEP DataMiner and GeoWeb	>0.1	West	Upgradient	Magothy Fm.	active	NJDEP Site Remediation Program PI ID #129931
Road Department Garage Area 3-1	Old Bridge	NJ Release, NJ Brownfields	<0.1	North	Downgradient	Pennsauken Fm., Magothy Fm.	active	NJDEP Site Remediation Program PI ID #012743
Global Sanitary Landfill Superfund Site	Old Bridge	NPL	<0.1	South	Upgradient	Magothy Fm.	active	EPA ID #NJD063160667
Global Sanitary Landfill CEA	Old Bridge	NJDEP DataMiner and Geoweb	<0.1	South	Downgradient	Magothy Fm.	active	EPA ID #NJD063160667
E I Dupont Nemours Co. CEA	Old Bridge	NJDEO DataMiner and Geoweb	<0.1	North and South	Upgradient and Downgradient	Magothy Fm.	active	NJDEP Site Remediation Program PI ID #008222

FUDS – Formerly Used Defense Sites. The Department of Defense is responsible for the environmental restoration of properties that were formerly owned by, leased to, or otherwise possessed by the United States and are under the jurisdiction of the Secretary of Defense prior to October 1986.

New Jersey Brownfields – Brownfields sites are identified as former or current commercial or industrial use sites that are presently vacant or underutilized on which there is suspected to have been a discharge of contamination to the soil or groundwater at concentrations greater than the applicable cleanup criteria.

New Jersey Release – New Jersey Hazardous Material Release database is a record of the initial notification information reported to the NJDEP's Action Line.

New Jersey Spill – All HazMat known or unknown spills to the ground reported to the NJ DEP's Action Line.

NPL – National Priority List database, also known as Superfund, is a subset of Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the United States Environmental Protection Agency.

SHWS/HIST HWS - State Hazardous Waste Sites/Historic Hazardous Waste Sites – Known Contaminated Sites in New Jersey database is a municipal listing of sites where contamination of soil and/or groundwater is confirmed at levels greater than the applicable cleanup criteria or standards. Remedial activities are under way or required at the sites with an on-site source(s) of contamination and at locations where the source(s) of contamination are unknown. Sites with completed remedial work that require engineering and/or institutional controls have reporting measures in place to ensure the effectiveness of past actions, and some include maintenance and/or monitoring.

Table 3 - 1/4-Mile Well Search Results

Northeast Supply Enhancement (NESE) - Madison Loop (Old Bridge Township)

NJDEP Doc ID	Activity_ID	Municipality	Loc_Type	Well_Type	Permit_No	Local Well ID	Status	X_Coord (ft)	Y_Coord (ft)	Diversion ID
Int_doc_id	Activity_i	---	Subject__1	Subject__2	Subject__3	Subject__4	Status_des	Spc83x	Spc83y	Sicc_siid
3788094	WPN470003	Old Bridge	Well	Domestic	2900000003			547,898	588,228	WSWL_746083
14747860	WAR110036	Old Bridge	Well	Domestic	2900000019	#1	Active	547,898	588,228	WSWL_746099
3788203	WPN490001	Old Bridge	Well	Industrial	2900000036			547,898	588,228	WSWL_746114
14700026	WAR110012	Old Bridge	Well	Domestic	2900002671	1	Active	547,387	586,236	WSWL_720286
14700161	WAR110013	Old Bridge	Well	Domestic	2900002778	1	Active	547,387	586,236	WSWL_720390
3698542	WPN590002	Old Bridge	Well	Domestic	2900002840			546,896	586,809	WSWL_720452
14722992	WAR110042	Old Bridge	Well	Domestic	2900003817		Active	548,977	589,546	WSWL_703250
3596563	WPN650091	Old Bridge	Well	Domestic	2900004749			542,801	585,485	WSWL_692141
14722947	WAR112320	Old Bridge	Well	Industrial	2900008130	#1	Active	542,804	584,169	WSWL_66336
14814698	WAR110174	Old Bridge	Well	Industrial	2900015345		Active	543,341	586,093	WSWL_552722

Column titles (2nd row) in gray are the original field names of the shape file received from NJDEP on February 20, 2018.
The original shape file (as received on February 20, 2018) was edited in order to remove obvious duplicate entries.
The true field locations of these wells were not verified independently, either by AECOM or Transco.
Figure 6 shows the locations (based on the X- and Y-coordinate fields) in relation to the linear extent of the Project, with each well labeled by its reported permit number.
The listing is sorted by well permit number.

Table 4 - Summary of Geotechnical Testing and Estimated Permeability

Loc ID	Sta. ID	S_EL	Municipality	Geological Formation	Depth, ft	Samp_EL	Description	Symbol	<#200 (%)	D_{90}, cm	D_{50}, cm	D_{10}, cm	$K = 100 (D_{10})^2$, cm/sec
CB-3	12110	66.3	Old Bridge	Magothy (K)	4-6	60.3-62.3	silty sand	SM	40	0.5	0.01	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	20-22	44.3-46.3	silty sand	SM	19	0.03	0.02	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	30-32	34.3-36.3	silt with sand	ML	77	---	---	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	35-37	29.3-31.3	sand with silt	SP-SM	7	0.03	0.02	0.01	1.0E-02
CB-3	12110	66.3	Old Bridge	Magothy (K)	45-47	19.3-21.3	silty sand	SM	18	0.04	0.02	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	55-57	9.3-11.3	silty sand	SM	23	0.035	0.02	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	65-67	-0.7 - 1.3	sand with silt	SP-SM	9	0.04	0.025	0.01	1.0E-02
CB-3	12110	66.3	Old Bridge	Magothy (K)	75-77	-10.7 - -8.7	clay	CL	71	0.015	---	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	80-82	-15.7 - -13.7	silty sand	SM	18	0.03	0.02	---	---
CB-3	12110	66.3	Old Bridge	Magothy (Kmo)	90-92	-25.7 - -23.7	sand with silt	SP-SM	9	0.07	0.025	0.008	6.4E-03
CB-3	12110	66.3	Old Bridge	Magothy (Kmo)	95-97	-30.7 - -28.7	silty sand	SM	48	0.015	0.007	---	---
CB-3	12110	66.3	Old Bridge	Magothy (Kmo)	110-112	-45.7 - -43.7	sand with silt	SP-SM	8	0.07	0.035	0.01	1.0E-02
CB-2	12510	69.1	Old Bridge	Magothy (K)	4-6	63.1-65.1	sand with silt	SP-SM	7	0.025	0.02	0.01	1.0E-02
CB-2	12510	69.1	Old Bridge	Magothy (K)	24-26	43.1-45.1	silty sand	SM	32	0.02	0.01	---	---
CB-2	12510	69.1	Old Bridge	Magothy (K)	68-70	-0.9 - 1.1	sand with silt	SP-SM	7	0.2	0.025	0.015	2.3E-02
AB-1	14610	84.9	Old Bridge	Magothy (K)	8-10	74.9-76.9	silty sand	SM	15	0.1	0.04	0.007	4.9E-03
AB-1	14610	84.9	Old Bridge	Magothy (K)	58-60	24.9-26.9	sandy silt	ML	87	0.02	---	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	50-52	53.2-55.2	silty sand	SM	17	1	0.03	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	55-57	48.2-50.2	silt	ML	86	0.01	---	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	60-62	43.2-45.2	silt with sand	ML	71	2	---	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	70-72	33.2-35.2	silty sand	SM	33	0.02	0.01	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	75-77	28.2-30.2	sandy silt	ML	54	0.015	0.007	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	80-82	23.2-25.2	clay	CL	81	0.015	---	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	85-87	18.2-20.2	silt with sand	ML	82	0.01	---	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	95-97	8.2-10.2	silty sand	SM	19	0.05	0.03	---	---
AB-3	16140	118.9	Old Bridge	Pennsauken	6-8	110.9-112.9	silty sand	SM	24	0.9	0.025	---	---
AB-3	16140	118.9	Old Bridge	Pennsauken	10-12	106.9-108.9	sandy clay	CL	60	0.025	---	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	20-22	96.9-98.9	silty sand	SM	30	0.025	0.015	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	30-32	86.9-88.9	silty sand	SM	16	0.035	0.02	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	40-42	76.9-78.9	silty sand	SM	25	0.04	0.02	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	50-52	66.9-68.9	silty sand	SM	27	0.04	0.02	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	60-62	56.9-58.9	sand with silt	SP-SM	11	0.04	0.025	0.007	4.9E-03
AB-3	16140	118.9	Old Bridge	Magothy (K)	70-72	46.9-48.9	silty sand	SM	19	0.03	0.02	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	75-77	41.9-43.9	silty sand	SM	25	0.02	0.015	---	---

Table 4 - Summary of Geotechnical Testing and Estimated Permeability

Loc ID	Sta. ID	S_EL	Municipality	Geological Formation	Depth, ft	Samp_EL	Description	Symbol	<#200 (%)	D_{90}, cm	D_{50}, cm	D_{10}, cm	$K = 100 (D_{10})^2$, cm/sec
AB-3	16140	118.9	Old Bridge	Magothy (K)	80-82	36.9-38.9	silty sand	SM	16	0.03	0.02	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	90-92	26.9-28.9	silt	ML	91	0.008	---	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	95-97	21.9-23.9	sandy silt	ML	69	0.018	---	---	---
AB-4	16790	120.2	Old Bridge	Magothy (K)	8-10	110.2-112.2	silty sand	SM	17	0.025	0.015	---	---
AB-4	16790	120.2	Old Bridge	Magothy (K)	29-31	89.2-91.2	sand with silt	SP-SM	12	0.05	0.03	0.007	4.9E-03
AB-4	16790	120.2	Old Bridge	Magothy (K)	83-85	35.2-37.2	silty sand	SM	31	0.035	0.02	---	---
B-1	17700	18.8	Old Bridge	Alluvium (Qal)	2-4	14.8-16.8	silty sand	SM	15	0.04	0.02	0.001	1.0E-04
B-1	17700	18.8	Old Bridge	Alluvium (Qal)	4-6	12.8-14.8	silty sand	SM	21	0.04	0.02	0.001	1.0E-04
B-1	17700	18.8	Old Bridge	Alluvium (Qal)	10-12	8.8-10.8	silty sand	SM	21	0.04	0.02	0.0004	1.6E-05
B-1	17700	18.8	Old Bridge	Magothy (K)	14-16	2.8-4.8	sand with silt	SW-SM	11	0.4	0.025	0.0035	1.2E-03
B-1	17700	18.8	Old Bridge	Magothy (K)	24-26	-7.2 - 2.8	silty sand	SM	14	0.07	0.035	0.002	4.0E-04
B-1	17700	18.8	Old Bridge	Magothy (Kmo)	34-36	-17.2 - -7.2	silty sand	SM	26	0.04	0.015	---	---
B-2	17741	15.8	Old Bridge	Alluvium (Qal)	4-6	9.8-11.8	silty sand	SM	13	0.04	0.02	0.002	4.0E-04
B-2	17741	15.8	Old Bridge	Alluvium (Qal)	8-10	5.8-7.8	sand and silt	SP-SM	9	0.04	0.02	0.008	6.4E-03
B-2	17741	15.8	Old Bridge	Magothy (K)	10-12	3.8-5.8	silty sand	SM	16	0.04	0.02	0.002	4.0E-04
B-2	17741	15.8	Old Bridge	Magothy (K)	14-16	-0.2 - 1.8	silty sand	SM	12	0.05	0.025	0.003	9.0E-04
B-2	17741	15.8	Old Bridge	Magothy (K)	19-21	-5.2 - 4.8	sand with silt	SP-SM	9	0.04	0.02	0.01	1.0E-02
B-2	17741	15.8	Old Bridge	Magothy (Kmo)	34-36	-20.2 - -10.2	sand with silt	SP-SM	10	0.03	0.015	0.008	6.4E-03
MDB-1	26920	10.5	Sayreville	Magothy (K)	19-21	-10.5 - -8.5	silty sand	SM	33	0.02	0.015	---	---
MDB-1	26920	10.5	Sayreville	Magothy (Kmo)	34-36	-25.5 - -23.5	sand with silt	SP-SM	9	0.025	0.02	0.008	6.4E-03
MDB-1	26920	10.5	Sayreville	Magothy (Kmo)	48-50	-39.5 - -37.5	sand with silt	SP-SM	7	0.04	0.025	0.015	2.3E-02
GB-2	24147	25.5	Sayreville	Magothy (K)	8-10	15.5-17.5	sand with silt	SP-SM	12	0.025	0.018	0.005	2.5E-03
GB-2	24147	25.5	Sayreville	Magothy (K)	14-16	9.5-11.5	sand with silt	SP-SM	5	0.04	0.022	0.015	2.3E-02
GB-2	24147	25.5	Sayreville	Magothy (K)	19-21	4.5-6.5	silty sand	SM	48	0.015	0.008	---	---
GB-2	24147	25.5	Sayreville	Magothy (K)	29-31	-5.5 - -3.5	silty sand	SM	36	2	0.01	---	---
GB-2	24147	25.5	Sayreville	Magothy (K)	33-35	-9.5 - -7.5	sand with silt	SP-SM	9	0.025	0.02	0.01	1.0E-02
GB-2	24147	25.5	Sayreville	Magothy (Kmo)	48-50	-24.5 - -22.5	sand with silt	SP-SM	8	0.03	0.02	0.01	1.0E-02
GB-3	23697	39.9	Sayreville	Fill	4-6	33.9-35.9	silty sand	SM	30	0.02	0.012	---	---
GB-3	23697	39.9	Sayreville	Magothy (Kma)	14-16	23.9-25.9	silty sand	SM	24	0.025	0.018	---	---
GB-3	23697	39.9	Sayreville	Magothy (Kma)	24-26	13.9-15.9	silty sand	SM	12	0.025	0.02	0.007	4.9E-03
GB-3	23697	39.9	Sayreville	Magothy (Kma)	33-35	4.9-6.9	clay	CL	90	0.007	---	---	---
GB-3	23697	39.9	Sayreville	Magothy (K)	48-50	-10.1 - -8.1	silty sand	SM	29	0.025	0.015	---	---
GB-4	23739	46.1	Sayreville	Fill	8-10	36.1-38.1	silty sand	SM	26	0.1	0.025	---	---
GB-4	23739	46.1	Sayreville	Fill	14-16	30.1-32.1	silty sand	SM	21	1	0.04	---	---

Table 4 - Summary of Geotechnical Testing and Estimated Permeability

Loc ID	Sta. ID	S_EL	Municipality	Geological Formation	Depth, ft	Samp_EL	Description	Symbol	<#200 (%)	D_{90}, cm	D_{50}, cm	D_{10}, cm	$K = 100 (D_{10})^2$, cm/sec
GB-4	23739	46.1	Sayreville	Fill	19-21	24.1-26.1	silty sand	SM	29	0.022	0.015	---	---
GB-4	23739	46.1	Sayreville	Fill	24-26	20.1-22.1	silty sand	SM	15	2	0.02	---	---
GB-4	23739	46.1	Sayreville	Magothy (K)	29-31	15.1-17.1	silty sand	SM	22	0.022	0.018	---	---
GB-4	23739	46.1	Sayreville	Magothy (K)	38-40	6.1-8.1	silty sand	SM	18	0.025	0.02	---	---
GB-4	23739	46.1	Sayreville	Magothy (Kmo)	63-65	-18.9 - -16.9	silty sand	SM	36	0.04	0.018	---	---
GB-5	23810	42.3	Sayreville	Magothy (Kma)	8-10	32.3-34.3	silty sand	SM	22	0.09	0.03	---	---
GB-5	23810	42.3	Sayreville	Magothy (Kma)	10-12	30.3-32.3	silty sand	SM	26	0.07	0.03	---	---
GB-5	23810	42.3	Sayreville	Magothy (Kma)	15-17	25.3-27.3	silty sand	SM	18	0.7	0.035	---	---
GB-5	23810	42.3	Sayreville	Magothy (Kma)	28-30	12.3-14.3	silty sand	SM	20	0.1	0.035	---	---
GB-5	23810	42.3	Sayreville	Magothy (K)	38-40	2.3-4.3	silty sand	SM	15	0.025	0.02	---	---
GB-5	23810	42.3	Sayreville	Magothy (Kmo)	58-60	-17.7 - -15.7	silty sand	SM	30	0.04	0.02	---	---
GB-7	23971	41.4	Sayreville	Fill	8-10	31.4-33.4	silty sand	SM	24	2	0.04	---	---
GB-7	23971	41.4	Sayreville	Fill	19-21	20.4-22.4	silty sand	SM	22	1.2	0.03	---	---
GB-7	23971	41.4	Sayreville	Magothy (Kma)	24-26	15.4-17.4	silty sand	SM	18	0.08	0.03	---	---
GB-7	23971	41.4	Sayreville	Magothy (Kma)	33-35	6.4-8.4	silty sand	SM	12	0.028	0.02	0.005	2.5E-03
GB-7	23971	41.4	Sayreville	Magothy (K)	53-55	-13.6 - -11.6	silty sand	SM	14	0.04	0.025	---	---

Table 4 - Summary of Geotechnical Testing and Estimated Permeability

USCS Symbol	SP	SP-SM	SW-SM	SM	ML	CL	Compounded Estimated K	
K (est), cm/sec	1.0E-01	2.5E-02	7.5E-03	2.5E-03	1.0E-04	1.0E-05		
K (est), ft/d	283	71	21	7	0.3	0.03	cm/sec	ft/d
Alluvium (Qal)	0	1	0	4	0	0	7.0E-03	20
Pennsauken	0	0	0	1	0	1	1.3E-03	3.6
Magothy (K)	0	6	1	24	7	1	5.6E-03	16
Magothy (Kma)	0	0	0	8	0	1	2.2E-03	6.3
Magothy (Kmo)	0	4	0	3	0	0	1.5E-02	44
total number of samples	*0*	*11*	*1*	*40*	*7*	*3*		

Table 5 - Estimated Dewatering Rates Along Project Extent (Old Bridge Township)

Station ID	EL (ft msl)	Municipality	State Well Permit No.	Location Description	Geological Formation	Length, ft	Excavation Depth, ft	Dewatering Anticipated?	Dewatering Rationale	Withdrawal Rate, gpm	Estimated Duration of Dewatering, days	Est. Max Withdrawal Rate (Mgal/mo)	Est. Max Withdrawal Rate (Mgal/yr)	Total Yield, Mgal	Total Yield, gal/ft
99 +23	90.5	Old Bridge	N/A	Trench	Pennsauken (Tb)	77	7	Yes	Perched water / wetland or stream	18.4	2	0.053	0.053	0.053	689
100 +00	93.3	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	Yes	Perched water / wetland or stream	23.9	2	0.069	0.069	0.069	689
101 +00	92.0	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	Yes	Perched water / wetland or stream	23.9	2	0.069	0.069	0.069	689
102 +00	93.3	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	Yes	Perched water / wetland or stream	23.9	2	0.069	0.069	0.069	689
103 +00	92.1	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	Yes	Perched water / wetland or stream	23.9	2	0.069	0.069	0.069	689
104 +00	83.5	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	Yes	Perched water / wetland or stream	23.9	2	0.069	0.069	0.069	689
105 +00	79.5	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	Yes	Perched water / wetland or stream	23.9	2	0.069	0.069	0.069	689
106 +00	81.5	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	Yes	Perched water / wetland or stream	23.9	2	0.069	0.069	0.069	689
107 +00	75.3	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	Yes	Perched water / wetland or stream	23.9	2	0.069	0.069	0.069	689
108 +00	69.3	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Perched water / wetland or stream	49.6	2	0.143	0.143	0.143	1428
109 +00	60.6	Old Bridge	N/A	Trench	Alluvium (Qal)	100	7	Yes	Perched water / wetland or stream	23.9	2	0.069	0.069	0.069	689
110 +00	61.0	Old Bridge	N/A	Trench	Alluvium (Qal)	100	7	Yes	Perched water / wetland or stream	23.9	2	0.069	0.069	0.069	689
111 +00	63.8	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Perched water / wetland or stream	49.6	2	0.143	0.143	0.143	1428
112 +00	64.1	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
113 +00	68.9	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
114 +00	72.0	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
115 +00	72.4	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
116 +00	72.2	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
117 +00	84.8	Old Bridge	N/A	Trench	Pennsauken (Tb)	89	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
117 +89	84.8	Old Bridge	N/A	HDD Entry Pit	Pennsauken (Tb)	11	12	No	Pit EL > GW Table, no perched water evidence	0.0	7	0.000	0.000	0.000	0
118 +00	71.7	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
119 +00	79.5	Old Bridge	N/A	HDD	Magothy (K)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
120 +00	66.0	Old Bridge	N/A	HDD	Magothy (K)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
121 +00	65.0	Old Bridge	N/A	HDD	Alluvium (Qal)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
122 +00	62.7	Old Bridge	N/A	HDD	Alluvium (Qal)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
123 +00	61.9	Old Bridge	N/A	HDD	Alluvium (Qal)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
124 +00	66.2	Old Bridge	N/A	HDD	Magothy (K)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
125 +00	74.0	Old Bridge	N/A	HDD	Magothy (K)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
126 +00	73.1	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
127 +00	74.9	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
128 +00	81.4	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
129 +00	87.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
130 +00	83.8	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
131 +00	76.5	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
132 +00	74.3	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
133 +00	68.2	Old Bridge	N/A	HDD	Alluvium (Qal)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
134 +00	69.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
135 +00	72.3	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
136 +00	80.6	Old Bridge	N/A	HDD	Magothy (K)	89	---	No	HDD	0.0	0	0.000	0.000	0.000	0
136 +89	80.6	Old Bridge	N/A	HDD Exit Pit	Magothy (K)	11	12	No	Pit EL > GW Table, no perched water evidence	0.0	7	0.000	0.000	0.000	0
137 +00	83.2	Old Bridge	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
138 +00	86.5	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
139 +00	83.2	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
140 +00	91.2	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
141 +00	96.0	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
142 +00	89.4	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
143 +00	88.2	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
144 +00	87.9	Old Bridge	N/A	Trench	Pennsauken (Tb)	47	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
144 +47	87.0	Old Bridge	N/A	HDD Entry Pit	Pennsauken (Tb)	15	12	No	Pit EL > GW Table, no perched water evidence	0.0	7	0.000	0.000	0.000	0
144 +62	87.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	38	---	No	HDD	0.0	0	0.000	0.000	0.000	0
145 +00	86.8	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
146 +00	85.2	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
147 +00	84.8	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
148 +00	86.7	Old Bridge	N/A	HDD	Magothy (K)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
149 +00	88.8	Old Bridge	N/A	HDD	Magothy (K)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
150 +00	95.6	Old Bridge	N/A	HDD	Magothy (K)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0

Table 5 - Estimated Dewatering Rates Along Project Extent (Old Bridge Township)

Station ID	EL (ft msl)	Municipality	State Well Permit No.	Location Description	Geological Formation	Length, ft	Excavation Depth, ft	Dewatering Anticipated?	Dewatering Rationale	Withdrawal Rate, gpm	Estimated Duration of Dewatering, days	Est. Max Withdrawal Rate (Mgal/mo)	Est. Max Withdrawal Rate (Mgal/yr)	Total Yield, Mgal	Total Yield, gal/ft
151 +00	95.8	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
152 +00	98.2	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
153 +00	103.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
154 +00	107.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
155 +00	110.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
156 +00	113.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
157 +00	114.7	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
158 +00	116.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
159 +00	115.7	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
160 +00	116.6	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
161 +00	118.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
162 +00	121.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
163 +00	122.7	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
164 +00	123.0	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
165 +00	121.4	Old Bridge	N/A	HDD	Pennsauken (Tb)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
166 +00	111.9	Old Bridge	N/A	HDD	Magothy (K)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
167 +00	116.8	Old Bridge	N/A	HDD	Magothy (K)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
168 +00	119.4	Old Bridge	N/A	HDD	Magothy (K)	60	---	No	HDD	0.0	0	0.000	0.000	0.000	0
168 +60	121.0	Old Bridge	N/A	HDD Exit Pit	Magothy (K)	15	12	No	Pit EL > GW Table, no perched water evidence	0.0	7	0.000	0.000	0.000	0
168 +75	121.0	Old Bridge	N/A	Trench	Magothy (K)	25	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
169 +00	122.0	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
170 +00	126.7	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
171 +00	126.6	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
172 +00	122.7	Old Bridge	N/A	Trench	Pennsauken (Tb)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
173 +00	90.6	Old Bridge	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
174 +00	51.4	Old Bridge	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
175 +00	27.9	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
176 +00	21.1	Old Bridge	N/A	Trench	Magothy (K)	100	12	Yes	Pipe EL < GW Table, or proximal to GW Table	47.3	2	0.136	0.136	0.136	1362
177 +00	18.5	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
178 +00	17.7	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
179 +00	17.7	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
180 +00	19.7	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
181 +00	19.2	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
182 +00	18.1	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
183 +00	19.3	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
184 +00	19.3	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
185 +00	18.0	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
186 +00	18.1	Old Bridge	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
187 +00	17.2	Old Bridge	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
188 +00	16.4	Old Bridge	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
189 +00	17.4	Old Bridge	N/A	Trench	Magothy (Kma)	100	12	Yes	Pipe EL < GW Table, or proximal to GW Table	12.0	2	0.035	0.035	0.035	347
190 +00	19.0	Old Bridge	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
191 +00	21.8	Old Bridge	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
192 +00	29.4	Old Bridge	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
193 +00	31.0	Old Bridge	N/A	Trench	Magothy (K)	30	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
193 +30	31.6	Old Bridge	N/A	Trench	Magothy (K)	0	7	No	Pipe EL > GW Table, no perched water evidence	0.0	0	0.000	0.000	0.000	0
					Total Length	9407					134			2.96	315

HDD Horizontal Direction Drill
GSDB Garden State Parkway Directional Bore
GDDB Godenk Drive Directional Bore
OSDB Old Spye Road Directional Bore
The assigned geological formations are consistent with Figure 2

Prepared for:
Transcontinental Gas Pipe Line Company
Houston, TX

Prepared by:
AECOM
Conshohocken, PA

March 2018

Construction Dewatering Assessment Technical Report

Transcontinental Gas Pipe Line Company, LLC
Northeast Supply Enhancement Project – Madison Loop

Borough of Sayreville
Middlesex County, New Jersey

March 2018

Prepared for:
Transcontinental Gas Pipe Line Company
Houston, TX

Prepared by:
AECOM
Conshohocken, PA

March 2018

Construction Dewatering Assessment Technical Report

Transcontinental Gas Pipe Line Company, LLC
Northeast Supply Enhancement Project – Madison Loop

Borough of Sayreville
Middlesex County, New Jersey

Prepared By: Matthias Ohr, AECOM

Reviewed By: Heather Brewster, AECOM

Table of Contents

1.0 Introduction 1-1

1.1 Project Description 1-1

1.2 Scope and Objectives 1-2

1.3 Public Interest 1-3

1.4 Summary of Previous Investigations 1-4

1.4.1 Geotechnical Investigation 1-4

1.4.2 Review of Hazardous Waste or Known Contaminated Sites 1-4

2.0 Geological and Hydrogeological Setting 2-1

2.1 Regional Geology and Soil Classification 2-1

2.1.1 Subsurface Geology 2-1

2.1.2 Surface Geology 2-2

2.2 Site Setting and Land Use 2-3

2.3 Site Hydrology 2-3

2.3.1 Surface Water and Wetlands 2-3

2.3.2 Groundwater-Bearing Units at the Project Site 2-4

3.0 Project Dewatering 3-1

3.1 Construction Overview and Decision Criteria 3-1

3.2 Construction Dewatering 3-2

3.2.1 Overview 3-2

3.2.2 Estimating the Radius of Influence 3-2

3.2.3 Open Cut Trenches 3-3

3.2.4 Other Excavations 3-3

3.2.5 Uncertainties 3-4

3.2.6 **Limitations** 3-6

3.2.7 Estimated Dewatering Discharge Rates 3-6

3.2.8 Anticipated Methods of Dewatering 3-7

4.0 Environmental Impact 4-1

4.1 Potential Impacts to Groundwater Supply and Nearby Groundwater Users 4-1

4.2 Potential for Spreading Groundwater Contamination 4-1

4.3 Potential Impacts to Wetlands and Waterbodies 4-1

4.4 Potential for Salt Water Intrusion 4-2

5.0 References 5-1

List of Appendices

Appendix A Geotechnical Investigation Reports

Appendix B Dewatering Calculation Details

List of Tables

Table 1 Summary of Linear Project

Table 2 Sites with Confirmed Contamination with ¼-mile Radius of the NESE Project – Madison Loop

Table 3 ¼-mile Well Search Results

Table 4 Summary of Geotechnical Testing and Estimated Permeability

Table 5 Estimated Dewatering Rates along Project Extent

List of Figures

Figure 1 USGS Topographic Quadrangle

Figure 2 Project Location Map – USGS, Aerial, Surficial Geology and Bedrock Geology

Figure 3 Hazardous Waste and Known Contaminated Sites

Figure 4 Topography and Hydrogeolocial Project Profile

Figure 5 Regional Groundwater Elevation Contour Map

Figure 6 Well Search Map

List of Acronyms

ASTM	American Society of Testing Materials
Certificate	Certificate of Public Convenience and Necessity
cm/sec	centimeter per second
CEA	Classification Exception Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CP	cathodic protection
dth/d	dekatherms per day
Δh	drawdown, $H-h_w$
EDR	Environmental Data Resources, Inc.
FERC	Federal Energy Regulatory Commission
ft/day	feet per day
ft bgs	feet below ground surface
ft msl	elevation in feet relative to mean sea level (NAVD 88)
gpm	gallons per minute
H	saturated thickness, static
h_w	saturated thickness, when pumping
HDD	horizontal directional drill
hp	horsepower
i	hydraulic gradient
K	hydraulic conductivity
LNYBL	Lower New York Bay Lateral
M&R	metering and regulating
μm/sec	micrometer per second
m/day	meter per day
Mgm	million gallons per month
Mgy	million gallons per year
MP	milepost
NAVFAC	Navy Facilities Engineering Command
NESE	Northeast Supply Enhancement
NJ	New Jersey
NJGS	New Jersey Geological Survey
NJ KCS	New Jersey Known Contaminated Sites
NJN	New Jersey Natural Gas Company
NJ Releases	NJ Hazardous Materials Incident Database
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priority List
RCRA-CORRACTS	Resource Conservation and Recovery Act – Corrective Action Sites
RCRA NonGen	Resource Conservation Recovery Act Non-Generator
RDL	Rockaway Delivery Lateral
R(o)	radius of Influence
ROW	right-of-way
SHWS	NJ Known Contaminated Sites List
Transco	Transcontinental Gas Pipe Line Company, LLC
TSD	treatment, storage and disposal
USCS	United Soil Classification System
VOCs	Volatile Organic Constituents
WRA	Well Restriction Area

Executive Summary

This technical report was prepared in support of the application package for a temporary dewatering permit BWA-002 for the Madison Loop project (the Project), located in the Borough of Sayreville and Old Bridge Township as part of Transcontinental Gas Pipe Line Company, LLC (Transco), a wholly-owned subsidiary of Williams Partners L.P., Northeast Supply Enhancement (NESE) Project. The technical report was prepared in accordance with the permit application requirements and includes the following sections:

- **Section 1** includes the Project description, a discussion regarding the public interest, and a summary of previous investigations;
- **Section 2** provides a discussion of the local geologic and hydrogeologic conditions of the Project;
- **Section 3** presents the methodology employed and the results of estimating the anticipated dewatering rates and yield for the trenching activities of the Project. The stated duration and depths of line trench excavations are based on the currently anticipated construction details for the Project.
- **Section 4** discusses the potential for impacts to local groundwater resources and environmental impacts; and
- **Section 5** provides the references used in the technical report.

Conceptually, the following approach was taken to estimate dewatering rates, and therefore to estimate the anticipated diversion limits (in Mgal/month) and linear yield (gal/ft) for the Project:

- The Project was subdivided into 100-ft segments and each segment was analyzed in terms of its proposed construction activities, the prevailing geological and hydrogeological conditions, and the potential that construction dewatering will be required. **Tables 1** and **5** provide the details of this analysis, which in turn is visualized as a topographic and hydrogeological profile shown as **Figure 4**.
- Construction elements that were anticipated to require dewatering included open cut trenches and the launch / exit pits for direct bores and horizontal directional drilling (HDD). The HDD segments itself were not considered.
- If the base of the excavation of a specific segment was determined to be near or below the ambient water table, or in the vicinity of perched water table conditions or hydric soils, the segment was included in the estimation of the diversion. Conversely, if the base of the excavation of a specific segment was determined to be well above the ambient water table, or at a distance from perched water table or other hydric conditions, the segment was not included.
- The dewatering rate (per 100-ft segment) was estimated from available geotechnical and geological information (such as grain size curves or soil types) and standard dewatering equations for line sources and excavations (e.g., Dupuit-Forchtheimer equation), as summarized in **Appendix B**.
- Once the dewatering rate was estimated (in gpm/100 ft), the overall estimated yield was calculated using an estimate of the duration of construction along each segment.
- Adding up these total (incremental) yield estimates (for those segments that were determined to require potential dewatering) resulted in the total estimated yield for the Project. (see **Table 5**)
- The linear yield (in gal per ft) was then calculated from the total estimated yield divided by the total length of the Project. (see **Table 5**)
- Based on these calculations, as summarized in **Table 5** (which corresponds to **Table D.5** of the permit application form), the following diversion and yield quantities were entered into the permit application form:
    - o Section D.2 - Requested Allocation (Mgm): = 2-times the cumulative estimated dewatering yield for the Project (the factor 2 was introduced to provide a margin of conservatism);
    - o Section D.2 – Maximum diversion Rate (gpm): = estimated maximum pumping capacity that may be deployed to the Project;
    - o Section F.5 – Average diversion (gal/ft) per foot of open trench = estimated total yield divided by the length of the actively dewatered trench segments (i.e., not divided by the total length of the project).

1.0 Introduction

1.1 Project Description

Transcontinental Gas Pipe Line Company, LLC (Transco), a wholly-owned subsidiary of Williams Partners L.P., is developing its Northeast Supply Enhancement (NESE) Project (Project) to support National Grid's long-term growth, reliability, and flexibility beginning in the 2019/2020 heating season. Transco is proposing to expand its existing interstate natural gas pipeline system in Pennsylvania and New Jersey and its existing offshore natural gas pipeline system in New Jersey and New York waters. The Project capacity is fully subscribed by two entities of National Grid: Brooklyn Union Gas Company (d/b/a [doing business as] National Grid NY) and KeySpan Gas East Corporation (d/b/a National Grid), collectively referred to herein as "National Grid."

To provide the incremental 400,000 dekatherms per day (Dth/d) of capacity, Transco plans to expand portions of its system from the existing Compressor Station 195 in York County, Pennsylvania, to the Rockaway Transfer Point in New York State waters. As defined in executed precedent agreements with National Grid, the Rockaway Transfer Point is the interconnection point between Transco's existing Lower New York Bay Lateral (LNYBL) and existing offshore Rockaway Delivery Lateral (RDL).

A description of the entirety of the Project facilities is provided below. The project elements that are subject to this Technical Report are highlighted in **bold** with an asterisk (*). Note that the mileposts (MPs) provided below for the onshore pipeline facilities correspond to the existing Transco Mainline and Lower New York Bay Lateral. The offshore pipeline facility MPs are unique to the Raritan Bay Loop. The starting MP for the Raritan Bay Loop corresponds to MP12.00 of the Lower New York Bay Lateral, and the end MP corresponds to the Rockaway Transfer Point.

Onshore Pipeline Facilities

Quarryville Loop

- 10.17 miles of 42-inch-diameter pipeline from MP1681.00 near Compressor Station 195 to MP1691.17 co-located with the Transco Mainline in Drumore, East Drumore, and Eden Townships, Lancaster County, Pennsylvania. Once in service, the Quarryville Loop will be referred to as Mainline D.

Madison Loop *

- 3.43 miles of 26-inch-diameter pipeline from Compressor Station 207 at MP8.57 to MP12.00 southwest of the Morgan meter and regulating (M&R) Station on the Lower New York Bay Lateral Loop C in Old Bridge Township and the Borough of Sayreville, Middlesex County, New Jersey. Once in service, the Madison Loop will be referred to as Lower New York Bay Lateral Loop F.

Raritan Bay Loop

- 0.16 mile of 26-inch-diameter pipeline from MP12.00 west-southwest of the Morgan M&R Station to the Sayreville shoreline at MP12.16. Additionally, a cathodic protection (CP) power cable will be installed from a rectifier located at the existing Transco Morgan M&R Station near MP12.10 and extending to a connecting point on the proposed 26-inch-diameter pipeline at MP12.00. The approximately 545-foot-long power cable will be installed by horizontal directional drill (HDD).

Offshore Pipeline Facilities

Raritan Bay Loop

- 23.33 miles of 26-inch-diameter pipeline from MP12.16 at the Sayreville shoreline in Middlesex County, New Jersey, to MP35.49 at the Rockaway Transfer Point in the Lower New York Bay, New York, south of the Rockaway Peninsula in Queens County, New York. Additionally, a 1,831-foot-long CP power cable will be installed via HDD from a rectifier at the existing Transco Morgan M&R Station near MP12.10 to an offshore anode sled located approximately 1,200 feet north of

MP12.32. Once in service, the Raritan Bay Loop will be referred to as Lower New York Bay Lateral Loop F.

Aboveground Facilities

New Compressor Station 206

- Construction of a new 32,000 ISO (International Organization for Standardization) horsepower (hp) compressor station and related ancillary equipment in Franklin Township, Somerset County, New Jersey, with two Solar Mars® 100 (or equivalent) natural gas-fired, turbine-driven compressors.

Modifications to Existing Compressor Station 200

- Addition of one electric motor-driven compressor (21,902 hp) and related ancillary equipment to Transco's existing Compressor Station 200 in East Whiteland Township, Chester County, Pennsylvania.

Modifications to Existing Mainline Valve Facilities

- ***Existing Valve Site 195-5*** – Installation of a new mainline valve, launcher/receiver and tie-in facilities at the start of the Quarryville Loop (MP1681.00).
- ***Existing Valve Site 195-10*** – Installation of a new mainline valve, launcher/receiver, and tie-in facilities at the end of the Quarryville Loop (MP1691.17).
- ***Existing Valve Site 200-55*** – Installation of a new mainline valve, launcher/receiver, and tie-in facilities at the start of the Madison Loop (MP8.57).

New Mainline Valve Facilities

- ***Proposed Valve Site 195-8*** – Installation of a new intermediate mainline valve for the Quarryville Loop (MP1687.86).
- ***Proposed Valve Site 200-59*** * – Installation of a new mainline (isolation) valve for the Madison Loop (MP11.90).

On March 27, 2017, Transco filed an application with the Federal Energy Regulatory Commission (FERC) requesting a Certificate of Public Convenience and Necessity (Certificate) under Section 7(c) of the Natural Gas Act (NGA). The Project has been assigned Docket No. CP17-101-000 b FERC.

This Technical Report is focused on the construction activities occurring on the Madison Loop pipeline facilities in the Borough of Sayreville, Middlesex County, New Jersey. The modifications to Valve Site 200-55 at the existing Compressor Station 207 will not require dewatering.

1.2 Scope and Objectives

The construction of the Madison Loop pipeline facilities in the Borough of Sayreville is expected to require excavation dewatering along certain segments of the Project. The overall location of the project is shown on **Figure 1** (USGS quadrangle map) and **Figure 2**. The segments of the Project that will likely require dewatering (based on the analysis presented in this report) are shown in **Figure 4** (project profile).

AECOM, on behalf of Transco, has prepared this technical report in support of its temporary dewatering permit application for trench dewatering activities in the Borough of Sayreville. The purpose of this report is to provide the necessary hydrogeological information to support the Application Requirements for a Temporary Dewatering Permit in accordance with N.J.A.C. 7:19-2.3. For cross-reference, the presentation elements of this Technical Report correspond to those included within the Temporary Dewatering Permit application as follows:

This Report	Temp Dewatering Permit Application	Description
Table 1	Portion of Table D.5	Summary of project elements
Table 2	Table E.2.b	Hazardous waste and known contaminated sites
Table 3	Table E.1.b	Supply Wells within ¼-mile radius of Project
Table 4	---	Summary of geotechnical testing results
Table 5	Portion of Table D.5	Estimated dewatering rates and linear yield
Figure 1	Figure E.1.a	USGS quadrangle map
Figure 2	----	Project extent and aerial and geological overlay maps
Figure 3	Figure E.1.c	Hazardous waste and known contaminated sites
Figure 4	Figure F.1	Topographic and hydrogeological profile
Figure 5	---	Regional groundwater elevation contours
Figure 6	Figure E.1.b	Well search map

This technical report is organized as follows:

- **Section 1** includes the Project description, a discussion regarding the public interest, and a summary of previous investigations;
- **Section 2** provides a discussion of the local geologic and hydrogeologic conditions of the Project;
- **Section 3** presents the methodology employed and the results of estimating the anticipated dewatering rates and yield for the trenching activities of the Project. The stated duration and depths of line trench excavations are based on the currently anticipated construction details for the Madison Loop.
- **Section 4** discusses the potential for impacts to local groundwater resources and environmental impacts; and
- **Section 5** provides the references used in the technical report.

1.3 Public Interest

As introduced above, the Project proposes to construct, install, and operate the Project facilities to provide 400,000 Dth/d of incremental firm transportation capacity to National Grid from Compressor Station 195 through the Rockaway Transfer Point to supply National Grid's existing service territory beginning in the 2019/2020 heating season, when the incremental supply will be needed.

Transco's existing natural gas transportation system currently supplies natural gas to the New York City metropolitan region via National Grid's existing receipt points. Transco's New York Bay Expansion project, which has been certificated and is currently under construction, will provide National Grid with 50,000 Dth/d at the Narrows meter station and 65,000 Dth/d at the Rockaway Transfer Point to satisfy upcoming supply needs for the 2017/2018 heating season. However, National Grid is experiencing incremental firm demand and anticipating system growth beyond the 2017/2018 heating season. Therefore, subsequent incremental supplies are needed beginning in the 2019/2020 heating season that will be provided through the NESE Project.

Transco has executed long-term, fully binding precedent agreements with National Grid for 100% of the Project capacity. Transco held an open season for the Project from May 16, 2016, to June 9, 2016, to allow other shippers to receive service under the Project, but no other shippers participated in the Binding Open Season. Therefore, National Grid will utilize 100% of the Project's capacity. National Grid's precedent agreement describes its intention to utilize the capacity provided by the Project to serve its retail customers across its existing service territory.

In order to construct the facilities, it is anticipated that excavation dewatering of certain segments of the construction will be necessary (e.g., line trenching to install the pipeline facilities).

1.4 Summary of Previous Investigations

Previous site investigation activities have involved the completion of limited geotechnical testing along the Project. In addition, a review of potential hazardous waste and/or NJ known contaminated sites in the vicinity of the Project was conducted in the conjunction with the March 2017 filing of the Certificate application with FERC. A summary of each of these investigations is provided below.

1.4.1 Geotechnical Investigation

AECOM, on behalf Transco, conducted several geotechnical investigation of the Project between September 2016 and August 2017. The geotechnical reports specific to the Project are presented as **Appendix A** to this technical report. The investigation locations are shown in **Figure 2** and included the following components (locations in the Borough of Sayreville are marked with an asterisk [*] and in **bold**):

- Installation and logging of seventeen (17) test borings, as follows:
    - 3 borings (CB-1 through CB-3) between Station No. 121+10 and Station No. 135+10;
    - 4 borings (AB-1 through AB-4) between Station No. 146+10 and Station No. 167+90;
    - 2 borings (B-1 and B-2) between Station No. 177+00 and Station No. 177+90;
    - * 6 borings (**GB-1** through **GB-7**) between Station No. 235+97 and Station No. 241+47; and
    - * 2 borings (**MDB-1** and **MB-1**) between Station No. 269+20 and Station 275+00.

- Sample collection from representative soil intervals and analysis for the following parameters: natural water content, grain size distribution, Atterberg Limits, and specific gravity. In addition, triaxial compression tests and consolidation tests were performed on undisturbed samples.

The data obtained during the geotechnical investigation in the context of deriving estimated dewatering rates and dewatering yields is further discussed in **Section 2.1.2**.

1.4.2 Review of Hazardous Waste or Known Contaminated Sites

In order to identify landfills, hazardous waste sites or other known contaminated sites (KCS) in the vicinity of the Project area, a hazardous material environmental data search was conducted for the proposed onshore pipeline facilities and the new aboveground facilities in Pennsylvania and New Jersey. This search was performed according to the government records search requirements of the American Society of Testing Materials (ASTM) Standard Practice for Environmental Site Assessments, E 1527-13. The objective of the database searches was to identify sites of known environmental or regulatory concern that are located within 0.25 mile of the construction work areas. The detailed output of the database searches, as conducted by Environmental Data Resources, Inc. (EDR), are available upon request, and were filed previously with the FERC Certificate submittals. **Table 2** provides a summary of the information shown below.

The database search covered Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Superfund Sites, National Priority List (NPL) Sites, Resource Conservation and Recovery Act – Corrective Action (RCRA-CORRACTS) facilities, RCRA treatment, storage and disposal (TSD) Facilities, RCRA Generators, Leaking Underground Storage Tank Sites, and State Spill Sites that may have the potential to impact soils, groundwater, surface streams or sediments.

Within the Borough of Sayreville portion of the Project, the EDR Datamap™ Corridor Study for the Madison Loop (EDR 2016c) identified two (2) active sites with confirmed contamination and one (1) NJDEP Classification Exception Areas (CEA) within 0.25-mile of the Madison Loop. In addition, the NJDEP database of KCS was reviewed and resulted in zero (0) additional active site of potential concern that was not otherwise identified in the EDR search. These sites have reported contamination that have the potential to impact groundwater quality in the vicinity of the Project facilities.

1788 Route 35 Site: The New Jersey Open Public Records Act database indicates that the property located at 1788 Route 35 North in Sayreville, New Jersey, is located less than 0.1 mile northeast of MP 12.0 of the Project (NJDEP 2016a). This property has been and currently is the location of a gas station and is listed on the underground storage tank (UST) active remediation list (NJDEP 2016a). This site contains an active NJDEP CEA and WRA in effect from October 2015 to October 2026, which extends within 200 feet northeast of the Project (NJDEP 2016b). Since the Project does not intersect the CEA and WRA, it is unlikely that contamination associated with this site would be present in the soil in the vicinity of the Project. The 1788 Route 35 site is listed as NJDEP site remediation program (SRP) ID 026234, with the status indicated as active.

The Morgan Fire House Site: The New Jersey Open Public Records Act database indicates that the Morgan Fire House property is located at Route 35 and Old Spye Road in Sayreville, New Jersey, which is less than 0.1 mile south of MP12.0 of the Project. The site is listed on both the NJDEP Active Sites with Confirmed Contamination list and the NJDEP Closed Sites with Remediated Contamination list (NJDEP 2016a). The site is included on the KCS list but is classified as no further action (restricted use) with an active deed notice and engineering controls in the NJDEP post-remediation group. Contamination at this site was due to a leaking 550-gallon UST that contained #2 fuel oil (diesel fuel). The site is approximately 150 feet south of the Project, and the specifics of the active deed notice and engineering controls are not known. However, since no further action is required for the site, it is unlikely that significant contamination associated with this site would be present in the soil in the vicinity of the Project. The Morgan Fire House site is listed as SRP ID 003720, with the status indicated as inactive.

2.0 Geological and Hydrogeological Setting

The Project subject to this technical report is located in the Borough of Sayreville, between MP 10.36 and MP 12.00 (corresponding to Stations 193+30 through 279+62, as summarized in **Table 1**).

The Project is located within the Coastal Plain physiographic province. The northern boundary of the Coastal Plain Province is known as the Fall Line boundary line, and deposits associated with the Coastal Plains province extend east and southeast toward and beneath the current shoreline of the Atlantic Ocean. Near the Fall Line, the Coastal Plain deposits appear at the surface where Cretaceous unconsolidated sediments rest unconformably on top of older Triassic and Jurassic bedrock divisions, with successively younger Cretaceous and Tertiary deposits (alternating sandy and clayey formations) appearing toward the southeast. The deposits of the Coastal Plain province, therefore, from a wedge of progressively thickening and progressively more recent strata that dip, in a general sense, toward the east and southeast.

The relevant source materials for the geological and hydrogeological description include the NJ Geological Survey Open File Map 65 (OFM 65) ***Bedrock Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey*** (P.J. Sugarman et al., 2005) and the NJ Geological Survey OFM 18 ***Surficial Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey*** (S.D. Stanford, 1995). Excerpts of both maps are provided in **Figure 2** of this Technical Report, with the Project extent superimposed on both maps.

2.1 Regional Geology and Soil Classification

2.1.1 Subsurface Geology

The Project site is situated within the subcrop area of various divisions of the Cretaceous Magothy Formation and overlying Tertiary and Quaternary sequences (see **Figure 2**), which include from oldest to youngest:

Cretaceous:	Old Bridge Sand (Kmo) South Amboy Stoneware Clay (Kma) Morgan Beds (Kmm) Cliffwood Beds (Kmc)
Tertiary (Pliocene)	Pennsauken (or Bridgeton) Formation (Tb)
Quaternary	Various terrace or colluvial deposits (Qtl, Qcl) Alluvium (Qal) Estuarine Deposits (Qm)

Detailed description of the general lithologies encountered in these units are provided in the mapping notes to OFM 65 (bedrock geology) and OFM 18 (surficial geology).

Figure 4 represents a topographic and hydrogeologic profile of the linear extent of the Project, which shows the construction elements of the Project, the interpreted intersection of these elements with the geological units summarized above, the vertical position of the interpreted regional water table within the project profile, the location of geotechnical borings and adjacent monitoring wells, the observed or inferred vertical position of the water table (from discrete boring or well data), and the presence of stream crossings and wetlands along the Project profile.

2.1.2 Surface Geology

The majority of the project profile is underlain by the mixed sandy and silty deposits of either Pliocene-aged (Pennsauken Fm.) or Cretaceous-aged (Magothy divisions) Coastal Plain formations, including occasional occurrences of alluvial deposits and colluvial or terrace deposits along streams, as shown in **Figure 2**.

The boring logs of a series of geotechnical borings (as described in **Section 1.4.1**, and shown in **Figure 2** [plan view] and **Figure 4** [profile view]) are provided in **Appendix A**, together with the grain size analyses of representative soil samples that were collected from these borings. **Table 4** summarizes the geotechnical samples by sample ID, corresponding sampling depth, the position of the boring locations along the Project profile, the likely assignment of the geotechnical samples to the stated geological units, the general USCS classification of each sample, and numerical grain size thresholds.

Formal hydrometer testing or permeability testing was not performed for any of the geotechnical samples. However, based on the soil classifications alone (see **Table 4**), the range of permeability would be expected to span a relatively wide rang (estimated in the range of 1×10^{-5} to 1×10^{-1} cm/sec). Applicable for coarser-grained soils only, Hazen (1892 - ***Some physical properties of sands and gravels: Mass. State Board of Health, Ann. Rept. pp. 539-556***) also developed an empirical formula for approximating hydraulic conductivity K that is based on sieve analysis only and is sometimes to used estimate permeability:

$$K = C(D_{10})^2$$

where C = Hazen's empirical coefficient, with C = 100, if D_{10} is expressed in cm, and K is expressed in cm/sec; and

D_{10} is the diameter of 10th percentile grain size of the material (see **Table**

Since unit-specific conductivity is an important factor in the estimation of dewatering rates, AECOM used the geotechnical grain size data to derive a non-parametric estimate of the expected (average) conductivity for a specific geological unit. Although soil boring information is available along some sections of the Project (see **Figure 2** and **Figure 4**), other sections have few test borings or no test borings at all. Since the Project aligns roughly along geological strike of the Cretaceous geological units and also varies greatly in topographic elevation, AECOM believes that the average ('compounded') conductivity value (for each unit) adequately describes the average permeability for a specific unit along the Project as a whole. **Table 4** (4th page) shows a summary of the observed soil types for the five geological units encountered (also reproduced below). Specifically, a reasonable conductivity values was assigned to each soil type (SP = 1×10^{-1} cm/sec; SP-SM = 2.5×10^{-2} cm/sec, SW-SM = 7.5×10^{-3} cm/sec; SM = 2.5×10^{-3} cm/sec; ML = 1.0×10^{-4} cm/sec; CL = 1×10^{-5} cm/sec). Cross-multiplying these conductivity values with the number of soil types observed (separately for each unit), and dividing by the total number of soil samples (for each unit) resulted in a conductivity estimate for each unit. These average conductivity values were then used in the dewatering calculations (**Section 3** and **Appendix B)**.

USCS Symbol	SP	SP-SM	SW-SM	SM	ML	CL	Compounded Estimated K	
K (est), cm/sec	1.0E-01	2.5E-02	7.5E-03	2.5E-03	1.0E-04	1.0E-05		
K (est), ft/d	283	71	21	7	0.3	0.03	cm/sec	ft/d
Alluvium (Qal)	0	1	0	4	0	0	7.0E-03	20
Pennsauken	0	0	0	1	0	1	1.3E-03	3.6
Magothy (K)	0	6	1	24	7	1	5.6E-03	16
Magothy (Kma)	0	0	0	8	0	1	2.2E-03	6.3
Magothy (Kmo)	0	4	0	3	0	0	1.5E-02	44
total number of samples	*0*	*11*	*1*	*40*	*7*	*3*		

2.2 Site Setting and Land Use

The Madison Loop crosses open land, wetlands, transportation land, upland forest and woodland, industrial and commercial land, residential land, and open water.

Open Land: Open land crossed by the Project includes the portions of the ROW that will be co-located with the existing Transco Lower Bay Loop C ROW, which is currently maintained as herbaceous cover. Transco has identified one foreign utility that will be crossed by the Project. Additional local utilities (e.g., water lines, sewer lines, cable/telephone lines) may also be crossed by the pipeline loop.

Wetlands: Overall, the Project facilities will cross nineteen (19) wetlands. Of these wetlands, nine are classified as palustrine emergent (PEM); one is classified as palustrine scrub-shrub (PSS)/PEM, and three are classified as estuarine emergent (E2EM) wetlands due to their estuarine and intertidal locations. Palustrine forested (PFO) wetlands account for two of the wetlands crossed by the Madison Loop. Additionally, two wetlands were classified as PFO/PEM; one was classified as a PFO/PSS/PEM wetland; and one was classified as an E2EM/PEM wetland. **Section 2.3.1** below further details for the seven (7) wetlands areas crossed within the Borough of Sayreville.

Transportation Land: Within the Borough Sayreville, the Project will cross three public roads (the Garden State Parkway, Godenk Drive and Old Spye Road).

Upland Forest/Woodland: Overall, the construction of the Madison Loop facilities will temporarily impact upland forests. Upland forest surveys for the Madison Loop were completed in August 2016. The survey indicated that the forestland surrounding the Madison Loop consists mainly of hardwood forest. Dominant species within the stands surveyed include northern red oak, white oak, chestnut oak, red maple, white pine, and black gum. Using a linear regression model to predict the age of sampled trees within each stand, the average age of forest stands within and adjacent to the Madison Loop ranges from approximately 39 to 69 years. No woodlands used for commercial silviculture have been identified along the Madison Loop.

Industrial/Commercial Land: No quarries, underground mines, or strip mines will be crossed by the Project. Several larger-scale commercial developments will be crossed by the Madison Loop. In the Borough of Sayreville, a boat maintenance and marine supply facility will be crossed (via HDD) at approximate MP 11.70.

Residential Land: Residential land crossed by the Project includes areas of single-family homes, multi-family homes, and apartment complexes.

Open Water: Open water crossed by the Project includes the marina area for a boat maintenance and marine supply facility near MP 11.70. **Section 2.3.1** below further details the open water bodies crossed within the Borough of Sayreville.

2.3 Site Hydrology

2.3.1 Surface Water and Wetlands

AECOM, on behalf of Transco, conducted field surveys of the Project area to delineate wetlands and associated water bodies within or immediately adjacent to the Project site. The resulting jurisdictional wetlands surveys were submitted to the NJDEP to support the application for the required wetlands disturbance and mitigation permits.

Within the Borough of Sayreville footprint of the Project, the field survey identified one (1) perennial stream and one (1) estuary within the pipeline alignment (see ***Table 2B-1*** of the FERC submittal):

- Unnamed tributary to Cheesequake Creek (MP 11.55), referenced as WW-R5-005, with water quality use FW2-NT/SE-1 and a crossing length of 43 ft via HDD;

- Estuary of the Cheesequake Flats (MP 11.72), referenced as WB-T01-001, with water quality use FW2-NT/SE-1 and crossing length of 185 ft via HDD.

The delineated waterways described above do not represent sensitive surface waters, as defined in the Guidance Manual for Environmental Report Preparation (FERC August 2003).

Within the Borough of Sayreville footprint of the Project, the field survey also identified several wetlands resources as summarized below.

- MP 10.68: E2EM wetlands, referenced as W-T01-012, temporarily occupied by workspace project elements only;
- MP 10.75: PEM wetlands, referenced as W-T01-011, within the pipeline alignment and crossing length of 371 ft;
- MP 10.89: E2EM wetlands, referenced as W-T07-001, temporarily occupied by workspace project elements only;
- MP 10.94: PEM wetlands, referenced as W-T07-002, temporarily occupied by workspace project elements only;
- MP 11.35: PEM/PSS wetlands, referenced as W-T01-003, within the pipeline alignment and crossing length of 503 ft;
- MP 11.45: E2EM wetlands, referenced as W-T07-004, within the pipeline alignment and crossing length of 793 ft; and
- MP 11.78: PEM/E2EM wetlands, referenced as W-T01-017, within the pipeline alignment and crossing length of 157 ft.

A comprehensive description of the mapped surface and wetlands resources can be provided to the NJDEP Bureau of Water Allocation upon request, as previously submitted with the March 2017 FERC Certificate submittals and subsequent the NJDEP Land Use Regulation Program Freshwater Wetlands application.

2.3.2 Groundwater-Bearing Units at the Project Site

The principal water-bearing units underlying the Project are comprised of the various divisions of the Magothy aquifer, with groundwater elevations in the Borough of Sayreville portion of the Project (based on measurements at monitoring wells across the project area) ranging from 4 to 16-ft NAVD 88, and generally sloping from northwest to southeast (see also **Figure 4** and **Figure 5**). Based on the data reviewed, the erosional remnants of the Pennsauken Fm. (Tb) (where present) overlie the Cretaceous-age units and are generally not saturated, except for the local presence of perched, saturated conditions in the vicinity of the mapped wetlands and intermittent streams. The younger alluvial and terrace/ colluvial deposits should be expected to exhibit similar saturated conditions in the vicinity of wetlands or intermittent streams.

The construction elements listed in **Table 1** (see also **Figure 2** and **Figure 4**) include trenching, horizontal directional drilling (HDD, including entry and exit pits) and directional bores (DB, including bore pits) within (or overlying) these water-bearing unit. **Figure 4** shows the relationship of topographic grade, the various construction elements, the location of local intermittent stream and wetlands crossings and the vertical position of the regional water table. In addition, **Figure 5** shows the contours of regional equal head (groundwater elevation contours), as interpreted from recent depth to water measurements reported from monitoring wells associated with the Global Landfill site and the DuPont site.

The proposed construction and dewatering activities could have a minor impact on the groundwater resources described above. However, much of the potential impacts will be avoided or minimized by utilizing both standard and specialized construction techniques. Since there is an expectation that limited amounts of groundwater will be encountered during trenching (see **Section 3**), Transco will adhere to the requirements and conditions of the NJDEP Temporary Dewatering and Water Allocation permit, in addition to the FERC Upland Erosion Control, Revegetation, and Maintenance Plan and the Wetland and Waterbody Construction and Mitigation Procedures guidelines for all dewatering activities:

- The upper water-bearing unit could sustain minor effects from temporary changes in overland water flow or recharge caused by clearing and grading of the proposed Project areas. In addition, near-surface soil compaction that may be caused by heavy construction vehicles has the potential to reduce the ability of soils to absorb water. These minor impacts will be localized, temporary and will not adversely affect groundwater resources in the Project vicinity.

- It is anticipated that construction dewatering will be necessary along a portion of the trenches (as shown in **Figure 4** and further described in **Table 5**), either as a result of controlling perched water table conditions or because the excavation base will be near or below the regional water table. The effects of the proposed temporary water withdrawal to manage water infiltration into the excavations are expected to be minor, as the construction activities will be typically completed over period of no more than a few days and the localized lowering of the water table will be temporary.

- In order to locally recharge the water-bearing units, Transco proposes to discharge the dewatering fluids (after removal of fines by a combination of installed filter fabric in the construction sumps and/or subsequent filtration via portable, skid-mounted cartridge filters) into well-vegetated upland areas, or into hay bale/dissipation structures in those areas where dense vegetation is absent. Any discharges would be in compliance with an issues Discharge certificate (which will applied for and will be issued separately from the temporary dewatering permit).

- Several supply wells that have the potential to be sources of potable water are located within ¼-mile of the Project area and therefore have the potential to be affected by the construction activities. **Table 3** list the identities and locations of these supply wells (including public supply wells, domestic supply wells and industrial supply wells) as obtained from the NJDEP Bureau of Water Allocation via a current well search request (NJDEP, February 20, 2018). The locations of these wells relative to the Project footprint are shown in **Figure 6**. Transco's standard mitigation measure is to ensure that no construction equipment, vehicles, hazardous materials, chemicals, fuels, lubricating oils, or petroleum products will be parked, stored, or serviced within a 200-foot radius of any private wells, within a 400-foot radius of any municipal or community wells, or within 100-feet of any waterbody or wetlands, which is consistent with FERC guidelines.

- Within the Borough of Sayreville portion of the Project, the well search results indicated eight (6) potential supply wells (two community water supply wells and four domestic wells) within ¼-mile of the Project. The locations of three additional community water supply wells were reported beyond the ¼-mile buffer of the Project. It should be noted that the five (5) water supply wells (wells P, Q, R, S and T, water allocation permit 5313, Borough of Sayreville) that were identified in **Table 3** and **Figure 6** have been inactive since 2005, based on a review of public water allocation reports for water allocation permit 5313.

The construction activities and final land use of the Project are not anticipated to generate long-term degradation of the volume and quality of groundwater resources, as they do not involve conversion to a long-term land use that would threaten the quality of groundwater. Any inadvertent release of hazardous or non-permitted materials during the construction activities will be immediately contained and cleaned-up, in accordance with Transco's Construction Spill Plan.

3.0 Project Dewatering

3.1 Construction Overview and Decision Criteria

After the completion of surveying and staking, and installation of temporary sediment controls and best management practices (BMPs), clearing and grading will occur, as necessary. Once the Project area has been cleared and graded, trench excavation will begin for the installation of the gas pipelines and associated facilities. Away from the HDD and DB segment, the pipe will be installed via open-cut trenching methods. The open-cut trenches are expected to be approximately 5 feet wide to accommodate the installation of 26-inch diameter piping. As shown in **Table 1**, the depths for pipe installation will be approximately 7 feet, with occasional deeper excavations at the indicated stream crossings or directional bore pits.

Figure 4 shows a keyed profile of the construction segments that are anticipated to require construction dewatering, either due to their proximity to perched water table conditions, to nearby intermittent streams or wetlands, or because the base of the excavation is anticipated to be near or below the regional water table. The excavation and dewatering details in **Table 5** are based on information received from Transco (e.g., dimensions of the trenches and/or excavations, the depth of the excavations compared to final site grade, or the duration of construction at each identified segment) and an interpretation of the static head and hydrostratigraphy of the Project area, as follows:

- **Figure 4** (topographic profile of the Project) shows the intersection of the Project elements with mapped intermittent streams or wetland areas. Even in portions of the Project where the regional groundwater table was interpreted to be significantly deeper than the streams or wetlands, groundwater infiltration into excavation segments was assumed to be likely in the vicinity of these freshwater and wetlands areas.

- **Figure 5** shows an interpreted map of the contours of regional equal head (groundwater elevation contours) in the Magothy divisions underlying the Project area. The groundwater elevation contour lines are based on reported groundwater elevation measurements at the Global Landfill site and the DuPont site (off-site wells). The regional water table contours were projected into the topographic profile of the Project (**Figure 4**) and those construction segments where the excavation base either approaches the regional water table or is anticipated to be below the regional water table were assumed to require dewatering.

- **Table 5** shows a comprehensive summary of the stratigraphic and hydrological conditions at each of the construction elements, which in turn serve as input values for the dewatering scenarios and calculated dewatering rates presented in **Section 3.2**.

For the purpose of generating a cumulative estimate of dewatering yield of the Project, and to maintain an adequate level of resolution relative to topography, water table and geological constraints, **Table 5** lists the individual trench segments in 100-ft sections (whether or not these correspond to actual construction sections), in addition to the identity and location of the HDD pits and DB pits (which are listed at their actual long dimensions):

- The potential need for dewatering was identified individually for each element listed in **Table 5**, by examining the presence of perched water table conditions (e.g., intermittent streams and wetlands) or the position of the regional water table relative to the base of the excavation at each individual element. If the excavation base for a specific element is in the vicinity of wetlands or streams or is at or below the regional water table, dewatering was considered to be “likely” (“Yes” in **Table 5**). Conversely, dewatering was considered “unlikely” (“No” in **Table 5**) if the excavation base for a specific element was not in the vicinity of wetlands or streams or was several feet or more above the regional water table.

- The estimated rate of dewatering at each element was based on the conductivity values derived in **Section 2.1.2** (and shown in detail as **Table 3**), as a function of the geological unit intersected by the construction element, the estimated construction duration and the anticipated base of the excavation relative to the water table. The dewatering calculations are shown as **Appendix B**.

It should be noted that the generation of dewatering fluids and mixing of the same with drilling mud at the indicated HDD segments and associated HDD entry and exit pits was assumed to be handled in the context of the overall management of drilling spoils. Any dewatering fluids entrained in mud and drilling spoils will be recirculated to storage tanks for staging and disposal, and were therefore not considered further in this dewatering analysis. However, since it is possible that HDD entry and exit pits may be installed some time prior to commencing the HDD activities, it was assumed that 7-days of dewatering would be necessary for those pits that are at or below the interpreted regional water table.

The Project profile shown as **Figure 4** is a cross-sectional representation of the discrete information shown in **Table 5**.

For the portion of the Project located in the Borough of Sayreville, this conceptual approach to estimating dewatering rates and yield resulted in the identification of likely dewatering needs between Station 198+00 to 202+00, Station 210+00 to 217+00, Station 221+00 to 227+00, and Station 241+00 to 253+00 (i.e., an approximate combined 3,200-ft stretch in the topographically low-lying portion of the Project where the excavation base is expected to be near or below the regional water table).

3.2 Construction Dewatering

3.2.1 Overview

Temporary construction dewatering was anticipated to be necessary in order to manage water infiltration at open trench excavations and at HDD pit or DB pit excavations, in cases when the excavation base was at or below the perched or regionally observed water table. Two different types of excavation scenarios were considered:

- Open cut trenches where the length of the trench greatly exceeds its width. As the excavation proceeds below the static groundwater table, gravity flow (and hence dewatering) was estimated using the base equation for a “partially penetrating line slot with two line sources and gravity flow” (from ***Figure 4-3c***, NAVFAC, 1983). Gravity flow to simple line trenches (i.e., construction elements labeled “Trench” in **Table 1** and **Table 5**) was estimated as 2-times (i.e., 2-sided) the one-dimensional line flow to the trench elements, on a unit basis per 100-ft trench length.

- Square or slightly elongated pit excavations, where the length of the excavation is equal to or moderately greater than its width. When excavation is anticipated to proceed below the static groundwater table, gravity flow was estimated using the ***Dupuit-Forchheimer approximation*** of radial flow to a well that is centered in the excavation and having an effective radius that is proportional to the area of the excavation itself. The estimated dewatering rate has the effect of lowering the water table to the desired excavation base elevation at the perimeter of the excavation (and lower than the excavation base elevation in the center of the excavation).

The dewatering rates estimates summarized in **Table 5** are based on input values of total aquifer thickness H, dewatered saturated thickness h_w, permeability (or conductivity) k, the estimated radius of influence $R_{(o)}$, and the effective excavation radius r_e (in the case of pit excavations).

3.2.2 Estimating the Radius of Influence

According to ***Navy Facilities Engineering Command (NAVFAC) Technical Manual P-418, page 4-2*** , the radius of influence $R_{(o)}$ is defined as the radius of a circle beyond which pumping of a dewatering system has no significant effect on the original groundwater level or piezometric surface. Absent site-specific

pumping tests, the value of $R_{(o)}$ is commonly estimated from the ***Siechart equation*** below (see also NAVFAC P-418, Page 4-24) (originally proposed by Kyrieleis and Siechart, 1930):

$$R_{(o)} = C\,(H - h_w)\,\sqrt{k}$$

where ***R(o): in feet***
C = 3, for gravity flow to a well
$(H - h_w) = \Delta h$, drawdown in feet
k = coefficient of permeability in micrometer / sec (μm/sec)

For all construction elements, the drawdown value (Δh) was computed as the anticipated depth of the excavation minus 1-ft (i.e., the perched or regional water table was assumed to be 1-ft below grade). This is a simplified approach which results in conservative (i.e., 'high') estimates of potential dewatering rates. In addition, since excessively large values of $R_{(o)}$ are unlikely to develop, because the dewatering duration at each construction element will be too short to result in equilibrium [steady-state] drawdown cones, the values of $R_{(o)}$ as generated by the equilibrium Siechart equation was multiplied by 0.5. This safety factor essentially shortens the estimated radius of influence, which in turn steepens the residual head differences and therefore leads to larger, more conservative estimates of dewatering rates.

3.2.3 Open Cut Trenches

The estimated dewatering along an open-cut line trench was based on solving for a "partially penetrating line slot with two line sources and gravity flow" (Navy Technical Manual "***Dewatering and Groundwater Control***", NAVFAC P-418, as per ***Figure 4-3c***, ***Equation 3, Page 4***, 1983). Therefore, the estimated dewatering along an open-cut trench was estimated from the equation below:

$$Q = \left(0.73 + 0.27\,\frac{H - h_w}{H}\right)\frac{k_x}{2\,L}\left(H^2 - h_w^2\right) \times 2$$

where ***Q = required dewatering (pumping) per unit length of open-cut trench (ft^3/sec/ft)***
H = saturated thickness at each construction element
h_w = dewatered saturated thickness (aquifer thickness H minus the required drawdown Δh)
k_x = coefficient of permeability (ft/sec), estimated from the information provided in Table 3
L = radius of influence $R_{(o)}$,as computed by the Siechart equation multiplied by 0.5

The dewatering rate at each of the trench elements was computed by multiplying the estimated unit dewatering rates (via the equation shown) by the length of the trench segment (up to 100-ft) and converting to a convenient unit (gallons per minute, gpm). The converted estimated dewatering rates (in gpm per trench segment) are summarized in **Table 5.** The estimated total yield was calculated by multiplying the dewatering rate with the anticipated dewatering duration, and expressed either as (a) million gallons per month (Mgal/month, a unit consistent with the required input for form BWA-002) or b.) expressed as the linear yield (gal/ft, also a required input for Form BWA-002) by dividing the total yield by the length of the construction segment.

3.2.4 Other Excavations

The estimated dewatering along for pit excavations where the sides are equal to or of similar proportions was estimated by solving the ***Dupuit-Forcheimer*** approximation of radial flow to a well having an effective radius that is proportional to the area of the excavation itself. The governing equations are as follows (for example, J. Powers, ***Construction Dewatering, New Methods and Applications***, 2007), in consistent units:

Estimate of effective radius r_e:

$$r_e = \sqrt{\frac{a \times b}{\pi}}$$

Estimate of radius of influence $R_{(o)}$

$$R_O = C \times (H - h) \times \sqrt{k} + r_e$$

Estimate of gravity flow to well with radius r_e:

$$Q = n \times q = \frac{\pi \times k \times (H^2 - h^2)}{\ln\left(\frac{R_O}{r_e}\right)}$$

where

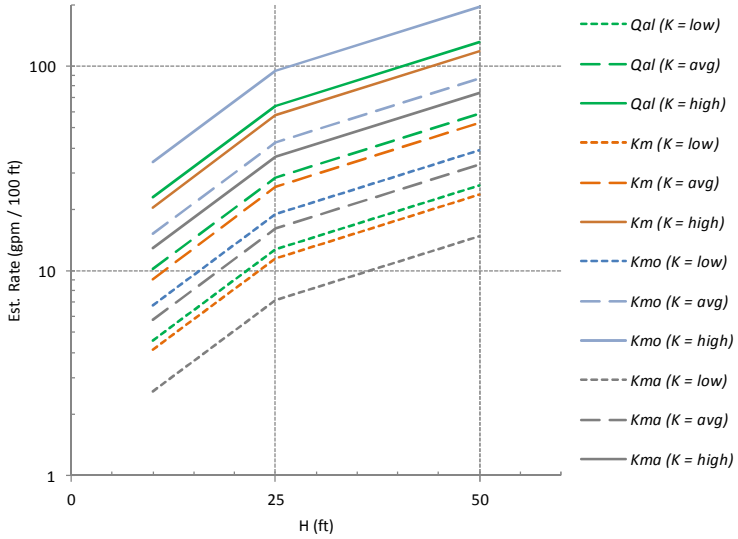
Q = overall flow rate [m^3/s]
n = number of well points (or sumps)
q = flow rate per well point [m^3/s]
k = hydraulic conductivity [m/s]
H = total head of the water table aquifer [m]
h = total head of dewatered aquifer [m]
R_o = radius of influence [m]
r_e = effective radius of dewatering [m]
a = width of excavation [m]
b = length of excavation [m]

Only four (4) such construction elements (the two bore pits for the Godenk Drive crossing directional bore, the exit pit for the Garden State Parkway directional bore at Sta. 240.90, and the entry pit for the HDD at Sta. 253.02) were anticipated to require dewatering, based on the decision criteria stated in **Section 3.1**. The input and output data for these four project elements are shown in **Appendix B** and are summarized in **Table 5**.

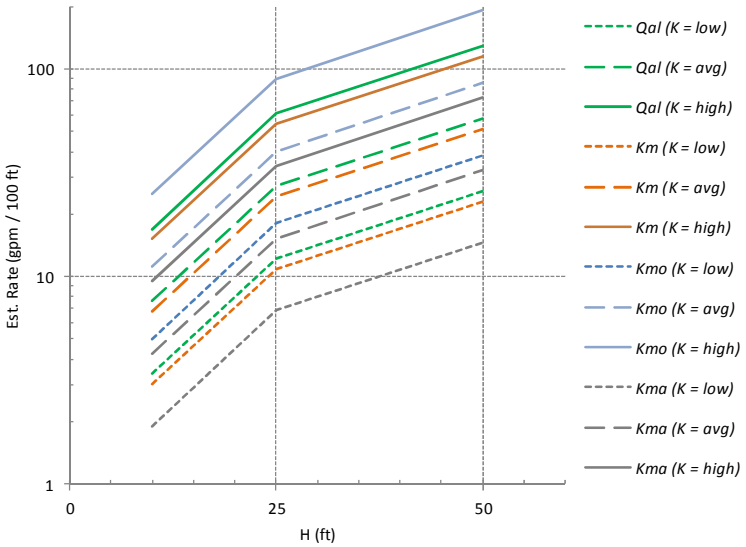
3.2.5 Uncertainties

Since the geotechnical borings did not encounter a clearly defined or regionally extensive aquitard, the aquifer thickness contributing to the dewatering flow (H in the set of equations in **Sections 3.2.2** through **3.2.4**) is generally unknown. Lesser values of H tend to minimize the rate of estimated dewatering, whereas greater values of H tend to maximize the rate of estimated dewatering. Therefore, separate dewatering rates were computed based on three separate assumptions for H (10-ft, 25-ft, and 50-ft), in conjunction with three separate values for K: a high value (=5x the average value), the average value (as stated in **Section 2.1.2**), and a low value (1/5th the average value). This uncertainty analysis was conducted for four of the geological units (Qal, Km [undivided], Kmo, and Kma). The tabular and graphic output of this analysis for variable values for H and K is shown in the plot below (for excavation depths of 7-ft and 12-ft, respectively).

H (ft)	Alluvium, Qal (gpm / 100 ft)			Magothy, K (gpm / 100 ft)			Magothy, Kmo (gpm/ 100 ft)			Magothy, Kma (gpm/100 ft)		
	for K (cm/sec)			for K (cm/sec)			for K (cm/sec)			for K (cm/sec)		
	Low	Avg	High	Low	Avg	High	Low	Avg	High	Low	Avg	High
for excavation d = 7 ft	1.4E-03	7.0E-03	3.5E-02	1.1E-03	5.6E-03	2.8E-02	3.1E-03	1.5E-02	7.7E-02	4.4E-04	2.2E-03	1.1E-02
10	4.6	10.3	22.9	4.1	9.2	20.5	6.8	15.2	34.0	2.6	5.8	12.9
25	12.8	28.7	64.2	11.5	25.7	57.4	19.0	42.5	95.1	7.2	16.2	36.2
50	26.3	58.9	131.6	23.5	52.6	117.7	39.0	87.2	194.9	14.8	33.2	74.2
Avg. Rate (gpm/100 ft)	23.9			49.6			82.1			13.5		



H (ft)	Alluvium, Qal (gpm / 100 ft)			Magothy, K (gpm / 100 ft)			Magothy, Kmo (gpm/ 100 ft)			Magothy, Kma (gpm/100 ft)		
	for K (cm/sec)			for K (cm/sec)			for K (cm/sec)			for K (cm/sec)		
	Low	Avg	High	Low	Avg	High	Low	Avg	High	Low	Avg	High
for excavation d = 12 ft	1.4E-03	7.0E-03	3.5E-02	1.1E-03	5.6E-03	2.8E-02	3.1E-03	1.5E-02	7.7E-02	4.4E-04	2.2E-03	1.1E-02
10	3.4	7.6	17.0	3.0	6.8	15.2	5.0	11.2	25.1	1.9	4.3	9.6
25	12.2	27.2	60.8	10.9	24.3	54.4	18.0	40.3	90.0	6.9	15.3	34.3
50	25.8	57.7	129.0	23.1	51.6	115.4	38.2	85.5	191.1	14.5	32.5	72.7
Avg. Rate (gpm/100 ft)	21.3			47.3			78.4			12.0		



The uncertainty analysis suggests that estimated dewatering rates can vary over approximately one order of magnitude for the stated input ranges for H and K. Therefore, the applied dewatering rates shown in **Table 5** (per 100-ft segment or any pro-rated portion thereof) are average values derived from the permutations shown above (yellow cells only).

- For the Qal and the Kma units (which tend to be thinner and likely contain lithologies with a wider range of permeabilities), the input dewatering rates (21.3-23.9 gpm/100 ft and 12.0-13.5 gpm/100 ft, respectively) were derived by averaging the output values for H=10 ft, H=25 ft, and for low K, average K, and high K values.

- For the Km and Kmo units (which tend to be thicker and consist of lithologies that tend to contain more permeable units), the input dewatering rates (47.3-49.6 gpm/100 ft and 78.4-82.1 gpm/100 ft, respectively) were derived by averaging the output values for H and K as shown above, with a bias toward the greater values of H and K.

Finally, the gravity flow (=dewatering rate) at each construction element was estimated under the assumption that the entire excavation will be open (and therefore acting as a gravity drain) at any given time. It should be noted, however, that standard construction methods typically seek to minimize the area of open excavation at any time.

3.2.6 Limitations

The dewatering analysis presented above is based on stratigraphic and groundwater-related data collected (and interpreted) from geotechnical test borings installed by AECOM. Since the anticipated soil characteristics along the project profile are heterogeneous, the estimates of the average expected permeability coefficient were made from the individual soil classifications of geotechnical samples (separate for each of the geological units) and, if applicable, also using Hazen's convention. Consequently, the individual dewatering estimates presented in **Table 5** could be under- or over-estimated depending on the actual subsurface conditions at each excavation.

The actual dewatering volumes generated during linear construction efforts are often less than those estimated for permitting purposes, since in practice the construction methods employed by the contractor typically seek to minimize infiltration into the excavation (for example, by minimizing the area and time period over which an excavation is open below the water table). Therefore, the dewatering rates (gpm per stated segment length) and yields (yield per month [Mgal/month] and linear yield [gal/ft] should be viewed as conservative estimates.

3.2.7 Estimated Dewatering Discharge Rates

The anticipated dewatering rates for the specified construction elements are shown in **Table 5**:

- 8.76 Mgal/month or 1,015 gal/ft for the entire length of the Project located in the Borough of Sayreville; when considering only the elements that were anticipated to be dewatered, the effective linear yield was estimated to be 2,715 gal/ft.

These dewatering estimates were derived using conservative assumptions throughout and provide a cumulative estimate for the entire Project as located in the Borough of Sayreville. For those elements that were predicted to result in excavations that extend to or below the static groundwater table, temporary construction dewatering will be necessary to facilitate open-cut trench excavation and to maintain dry conditions within the trench during installation of the piping sections. Based on Transco's current schedule, it is anticipated that the construction dewatering will be implemented over a period of approximately 333 days for the Project portion located in the Borough of Sayreville, with dewatering, when and if necessary, occurring 24-hours per day. The estimated duration of dewatering at each trench segment (as provided by Transco) is shown in **Table 5**.

The construction dewatering was analyzed for the trench segments and the pit excavations features, by first estimating the radius of influence and then calculating an equilibrium dewatering (pumping) rate to maintain the water level at or below the base of the excavation. The construction dewatering analysis results are based on the anticipated depth to groundwater, the projected depth of the excavation beneath the water table, and the permeability coefficients derived from a review of the soil classification and gradation curves for soil samples collected from the geotechnical borings**.**

Table 5 expresses these dewatering estimates using the following units:

- Dewatering rate in gallons per minute (gpm), which should be considered a long-term average dewatering rate, meaning that initial dewatering may occur at a faster rate and later dewatering may occur at a slower rate, as would be expected when the head difference between the outside and the inside approach one another during prolonged dewatering.

- Yield rate per linear foot, in gallons per foot (gal/ft), which represents a measure of the total estimated yield of each excavation segment (in gallons = rate [gpm] x duration [days] x 1440 min/day) divided by the length of each construction segment: gal/ft = Yield (gal) / Length (ft)

Based on the data shown in **Tables 4** and **5**, the estimated dewatering yield in the Borough of Sayreville portion of the Project varies over one order of magnitude, with the higher linear yield rates apparent at Stations 198+00 through 224+00 and at Stations 248+00 through 253+00. On average, and including the Project segments that are not anticipated to require dewatering, the linear yield was estimated to be 1,015 gal/ft.

Note that the dewatering rates and yield summarized in **Table 5** should be considered estimates that are based on the assumption that each segment will be fully exposed to infiltrating groundwater along its entire length or its entire footprint. From a practical perspective, this is unlikely to occur as typical construction methods seek to minimize water infiltration by sequential trenching and backfilling operations. In general, the subsurface soils along the Project alignment have moderate to low permeabilities, which will limit the amount of infiltration and continuing recharge. However, in segments where coarser alluvial or estuarine soils may be encountered, or in the vicinity of streams or wetlands, the actually encountered yields may temporarily approach or even exceed the estimated conditions shown in **Table 5**.

3.2.8 Anticipated Methods of Dewatering

During the dewatering of the Project segments, infiltrating groundwater (and any stormwater run-on) will be removed from the excavation by using properly-sized sump pumps, well point systems, and/or constructed dewatering sumps by grading the excavation base to a collection point. The actual means and methods of construction dewatering will be determined by Transco's construction contractor, or as specified in the construction documents. The dewatering construction plans will also specify one or more settling tanks to allow for the removal of sediments and solids, appropriately-sized cartridge filters prior to recharge, and properly constructed recharge features (such as hay bale structures) to facilitate the permitted on-site recharge.

It should be noted also that all drilling mud that will be generated at the HDD launch and exit pits (including any infiltrating groundwater into these pits) will be staged in properly sized and secured containers and transported off-site for proper disposal at permitted facilities. No drill mud (or infiltration water containing drill mud) will be discharged alongside the Project extent.

4.0 Environmental Impact

4.1 Potential Impacts to Groundwater Supply and Nearby Groundwater Users

The construction dewatering analysis (**Section 3** and **Appendix B**) suggests that the pumping radius of influence may extend between approximately 50 to 200-ft from specific excavation segments. In general, however, due to the short-term nature of dewatering, the actual radius of influence will be less. Based on Transco's current construction schedule, groundwater dewatering will be performed for not more than 2 days at any given 100-ft construction segment, with longer dewatering likely at some of the indicated stream and road crossings. Dewatering of the excavation segments will be completed to a depth of generally not more than 6-ft below the anticipated groundwater surface. The groundwater that will be affected by the proposed dewatering will be either localized, perched water-bearing zones in the vicinity of streams or wetlands, or water stored in low-lying estuarine or laterally extensive alluvial units, or the regionally saturated aquifer soils of the various Cretaceous unconsolidated units when the land surface is near the regional groundwater table (see **Figure 4**).

Away from alluvial units or estuarine deposits, the actual dewatering rates are anticipated to be relatively modest and together with the potential intermittent nature of the withdrawal, the data suggest that the proposed withdrawal will not adversely impact the local groundwater resources. Furthermore, the well search completed for the due diligence phase of the Project did not identify private or public water supply wells that are located within 50- to 200-ft estimated radius of influence for the Project (see also **Figure 6**). The regional groundwater table in the Project vicinity is represented by the saturated Magothy aquifer soils which typically occur at elevations of 16-ft NAVD 88 or less (**Figure 4** and **Figure 5**) in the Borough of Sayreville portion of the Project.

4.2 Potential for Spreading Groundwater Contamination

AECOM, on behalf of Transco, has completed a review of various environmental databases, as described in **Section 1.4.2** and summarized in **Table 2** of this technical report. The purpose of the review was to identify sites of potential environmental concern within or adjacent to the Project site. The search area extended outward and perpendicular to the circumference of the Project Site to a total distance of 0.25 miles in each direction. In addition to known contaminated NJ Sites, the search also included data for state and federal, public and private water supply. Within the Borough of Sayreville portion of the Project, one site that was identified within 0.25 miles (1788 Route 35 Site) are known to have associated groundwater concerns. Water quality sampling along these segments of the Project is being completed by Transco to discern potential groundwater impacts in the Project vicinity. It should be noted, however, that the estimated radius of influence that will result from managing infiltration into the excavation is likely less than 200-ft, which limits the potential for migration of impacted groundwater, if any.

4.3 Potential Impacts to Wetlands and Waterbodies

It is possible that the pumping of groundwater from certain excavation elements will temporarily reverse the hydraulic gradient that may ordinarily allow for shallow groundwater to discharge into nearby wetlands and surface water bodies (when present). Therefore, the potential exists that the water table across some of the nearby wetland areas may be temporarily lowered and that the mapped surface water bodies may experience a short-term decrease in flow as a result of dewatering. None of these effects are considered to be severe or long-term in nature, as the dewatering is anticipated to be short in duration and relatively minor in volume.

4.4 Potential for Salt Water Intrusion

In the Borough of Sayreville portion of the Project, there is no potential for salt water intrusion into previously non-impacted groundwater resources. The recent alluvial and Holocene estuarine deposits that occur adjacent to or along Cheesequake Creek or the Cheesequake Flats (see **Figure 2**) are already considered to be brackish in nature, as they are connected to the tidal system of the Raritan River estuary. However, the local recharge of brackish dewatering fluids (if any) must not occur onto lands or adjacent surface water bodies resources that would be adversely affected by the salinity of the recharged water.

5.0 References

Environmental Data Resources, Inc. (EDR). 2016c. DataMap Corridor Study, Madison Loop, South Amboy, NJ, 08879, Inquiry Number: 4726085.2s. September 19, 2016.

U.S. Environmental Protection Agency (EPA). 2016a. Superfund National Priorities List Sites-by State. https://www.epa.gov/superfund/national-priorities-list-npl-sites-state. Accessed January 3, 2017.

EPA. 2016b. EPA Superfund Program: Global Sanitary Landfill, Ild Bridge Township, New Jersey. https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0200398&msspp=med

Hazen, W., 1892, Some physical properties of sands and gravels: Mass. State Board of Health, Ann. Rept. pp. 539-556.

Kyrieleis, W. and Siechart, W., 1930, Grundwasserabsenkung bei Fundierungsarbeiten, Berlin.

Lasky, Loren. 2017. Case Manager of the E.I. DuPont Nemours & Company Site. New Jersey Department of Environmental Protection. NESE Project Contact Report, phone call on February 14 and 15, 2017 from Bob Meyers, Ecology and Environment, Inc., Lancaster, New York.

NAVFAC, 1983, Dewatering and Groundwater Control, Navy Manual P-418,

New Jersey Department of Environmental Protection (NJDEP). 2016a. Open Public Records Act, Data Miner. http://datamine2.state.nj.us/dep/DEP_OPRA/. Accessed January 3, 2017.

NJDEP. 2016b. NJ-Geo Web. http://www.nj.gov/dep/gis/geowebsplash.htm. Accessed January 3, 2017.

New Jersey State. 2015. Brownfields SiteMart. http://www.njbrownfieldsproperties.com/SiteInformation.aspx?Site_Number=8072. Accessed January 3, 2017.

NJDEP Office of Water Allocation and Well Permits, February 20, 2018, 0.25-mile Well Search Results Transmittal.

Powers, J., Corwin, A.B., Small, P.C. and Kaeck, W.E., 2007, Construction Dewatering and Groundwater Control, New Methods and Applications, 3rd Edition, 656 pp.

Sharma, H. and Reddy, K., 2004, Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies, Wiley, 992 pp.

Stanford, S.A., 1995, Surficial Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey (OFM 18).

Sugarman, P.J. at al,, 2005, Bedrock Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey (OFM 18).

Woodward, J., 2005, An Introduction to Geotechnical Processes, CRC Press, 136 pp.

Figures

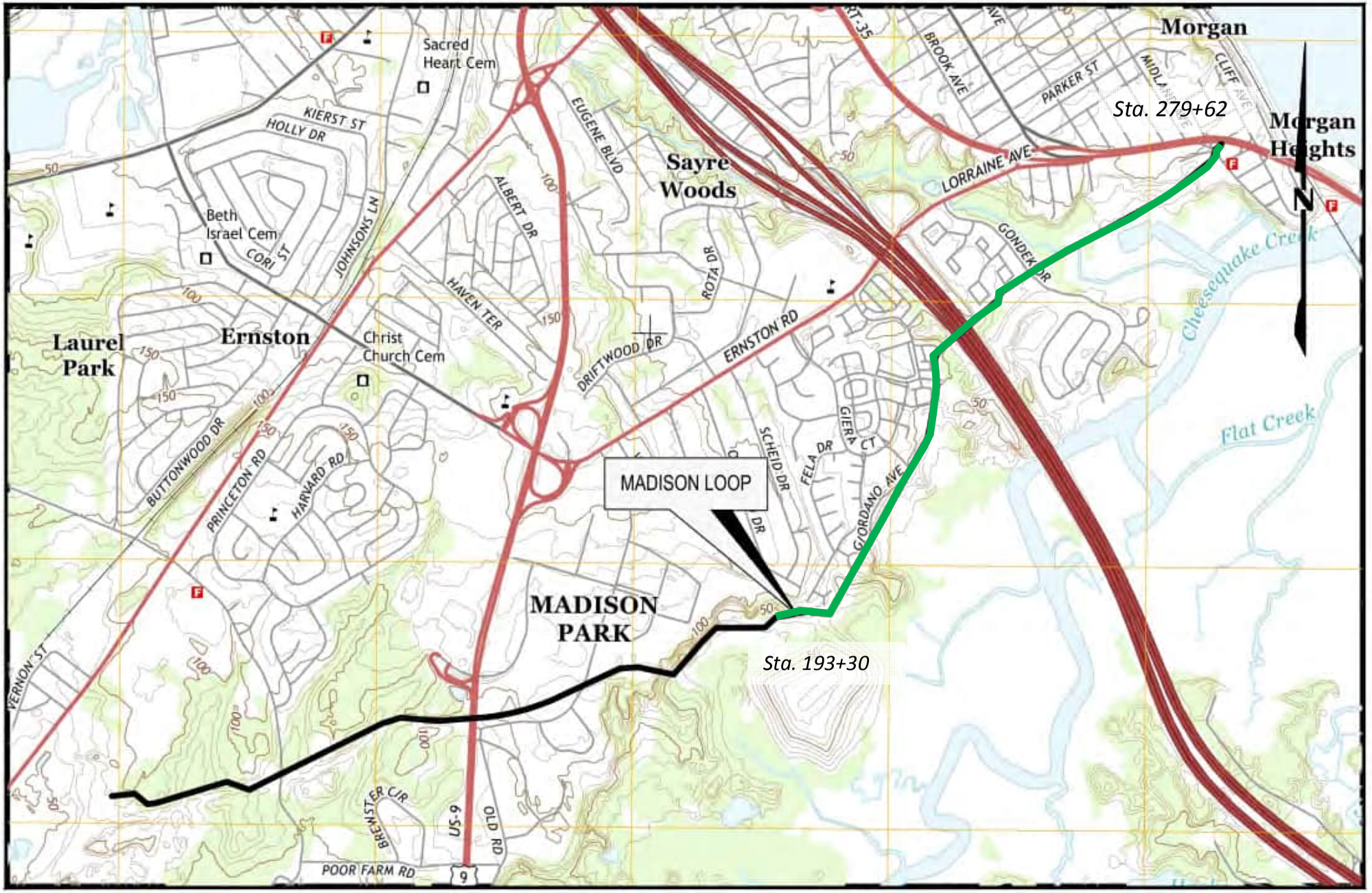
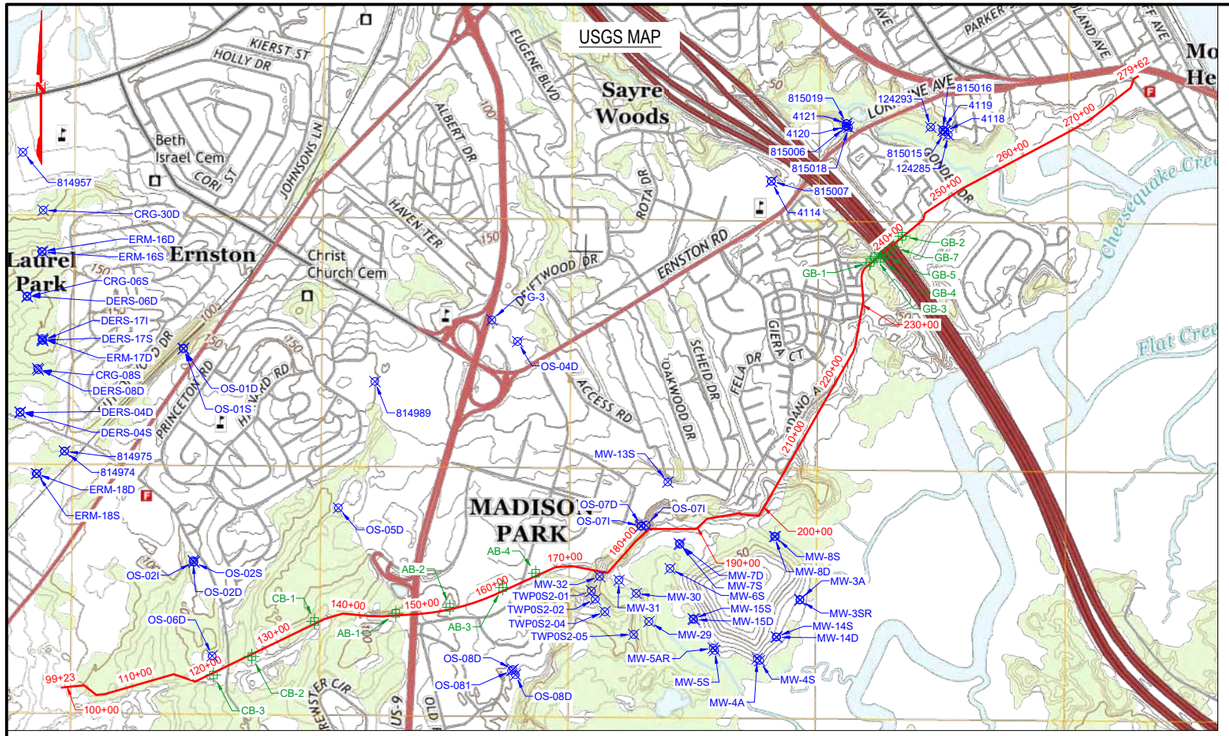
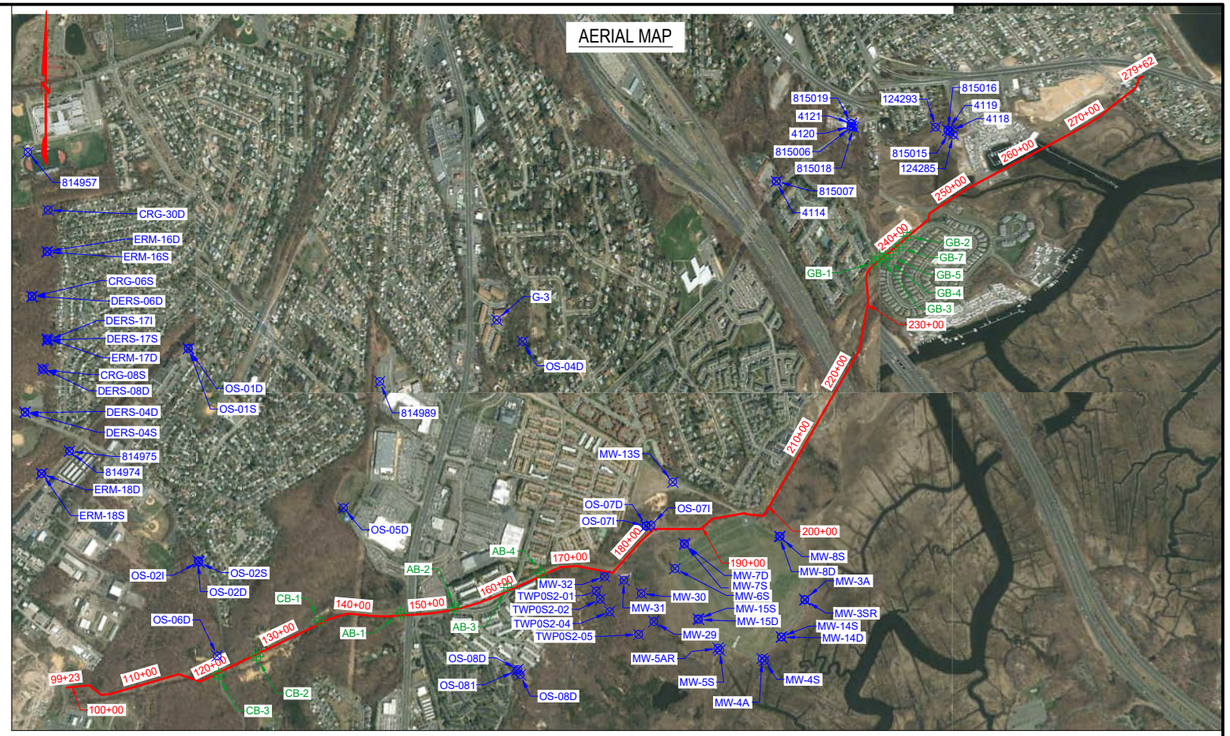
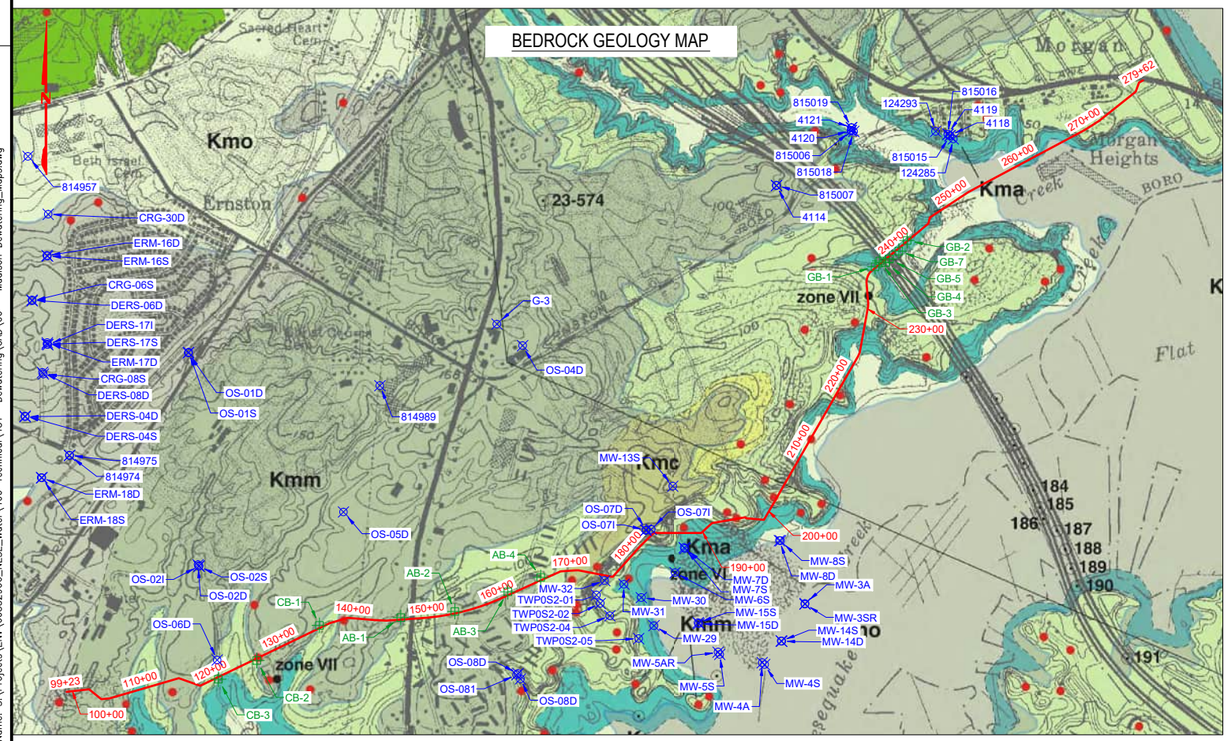


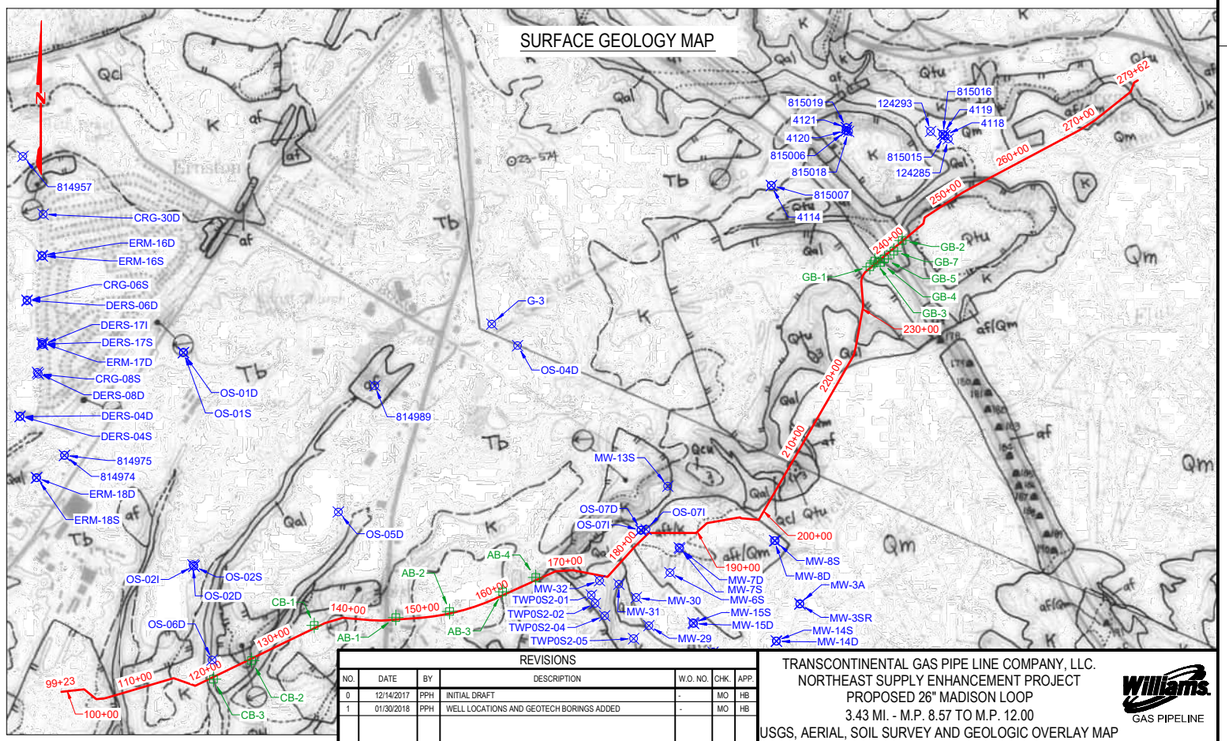
Figure 1 – USGS Map showing Proposed Dewatering Sources
in Support of BWA-002 (Borough of Sayreville) – Sta. 193+30 to Sta. 279+62
Northeast Supply Enhancement Project (NESE) – Madison Loop

Borough of Sayreville portion of Madison Loop (Sta. 99+23 to Sta. 279+62)









NOTES:

1. USGS MAP FROM 7.5' QUADRANGLE, SOUTH AMBOY, NJ-NY 2014.
2. AERIAL IMAGERY OBTAINED FROM NJ OFFICE OF INFORMATION TECHNOLOGY (NJOIT), OFFICE OF GEOGRAPHIC INFORMATION SYSTEMS (OGIS).
3. BEDROCK GEOLOGY FROM OPEN FILE MAP OFM 65 ENTITLED "BEDROCK GEOLOGY OF THE SOUTH AMBOY QUADRANGLE, MIDDLESEX AND MONMOUTH COUNTIES, NEW JERSEY", DATED 2005.
4. SURFACE GEOLOGY FROM OPEN FILE MAP OFM 18 ENTITLED "SURFICIAL GEOLOGY OF THE SOUTH AMBOY QUADRANGLE, MIDDLESEX AND MONMOUTH COUNTIES, NEW JERSEY", DATED 1995.

WELL LOCATIONS
GEOTECHNICAL BORING

REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.
0	12/14/2017	PPH	INITIAL DRAFT	-	MO	HB
1	01/30/2018	PPH	WELL LOCATIONS AND GEOTECH BORINGS ADDED	-	MO	HB

AECOM
625 WEST RIDGE PIKE, SUITE E-100
CONSHOHOCKEN, PA 19428
(610) 832-3500

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26" MADISON LOOP
3.43 MI. - M.P. 8.57 TO M.P. 12.00
USGS, AERIAL, SOIL SURVEY AND GEOLOGIC OVERLAY MAP
MIDDLESEX COUNTY, NEW JERSEY

Williams GAS PIPELINE

DRAWN BY:	PPH	DATE: 12/13/2017	ISSUED FOR BID: TBD	SCALE:	1" = 1000'
CHECKED BY:	MO	DATE: 12/13/2017	ISSUED FOR CONSTRUCTION: TBD	REVISION:	1
APPROVED BY:	HB	DATE: 12/13/2017	DRAWING NUMBER:	SHEET	01 OF 8
WO:					

Figure 2

Drawn By & Date/Time: hoasp Jan 30, 2018 - 10:42am
Drawing Location & Name: S:\Projects\ENV\60552906_NESE_Water\400-Technical\431- Dewatering\CAD\00 - Madison Dewatering_Maps.dwg

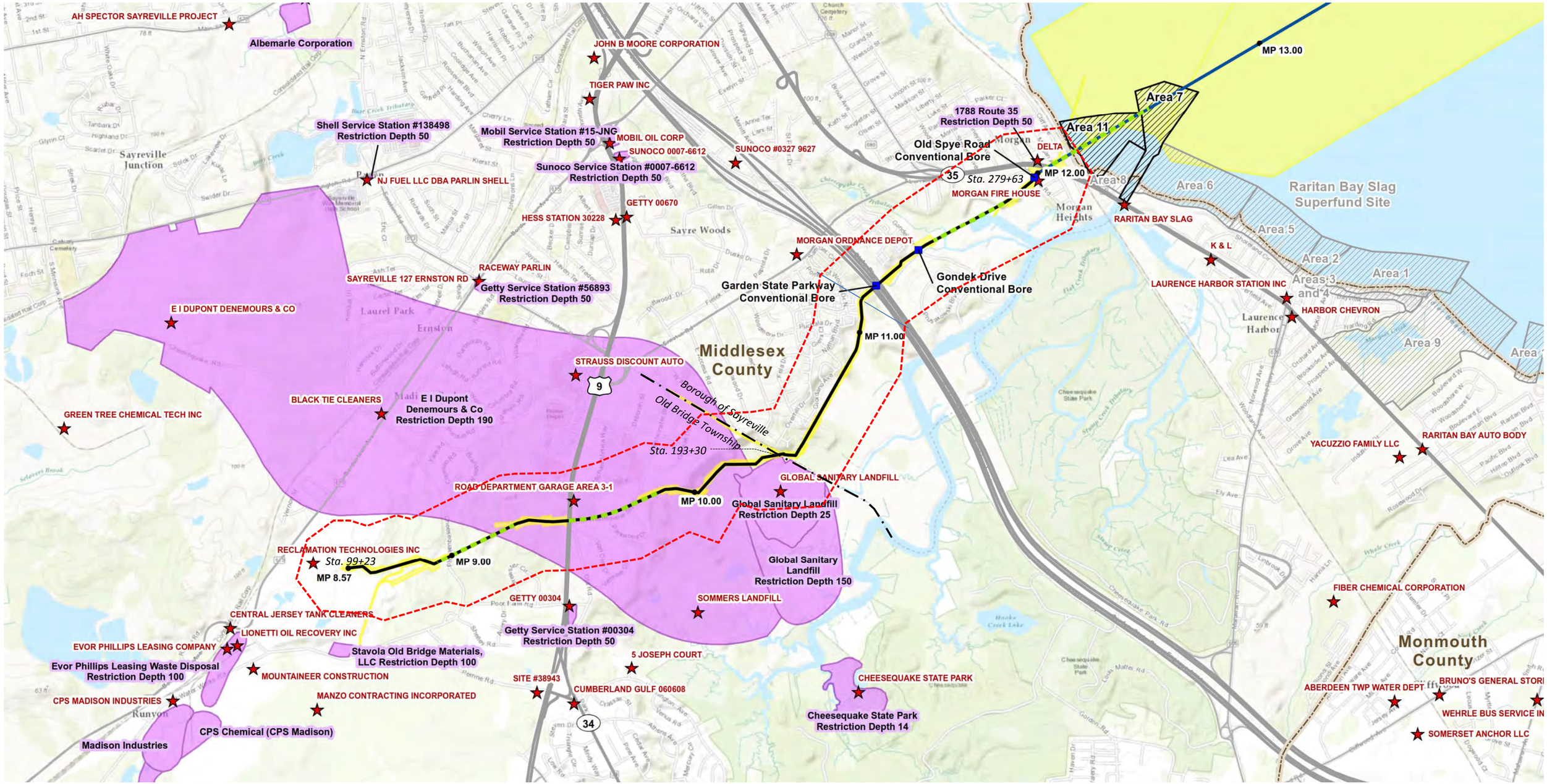


Figure 3 Hazardous Waste and Known Contaminated Sites within ¼-mile Radius

in Support of BWA-002 (Borough of Sayreville)

Northeast Supply Enhancement Project (NESE)

¼-mile radius corridor from Sta. 99+23 to Sta. 279+63

NJDEP Classification Exception Area (CEA)

NJDEP Known Contaminated Site

N

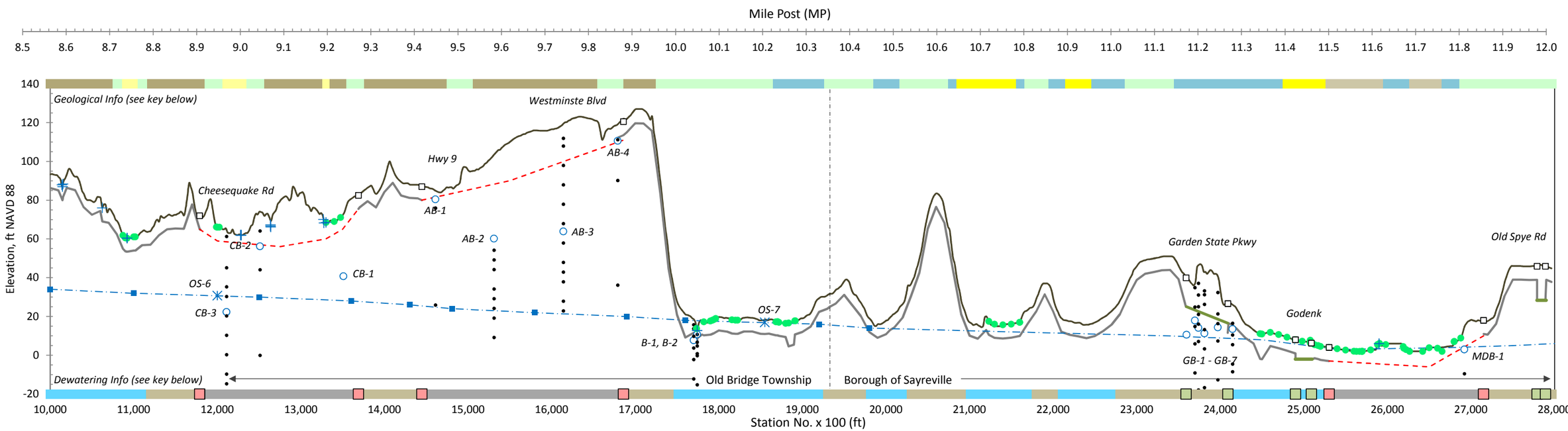
0 0.25 0.5

Miles

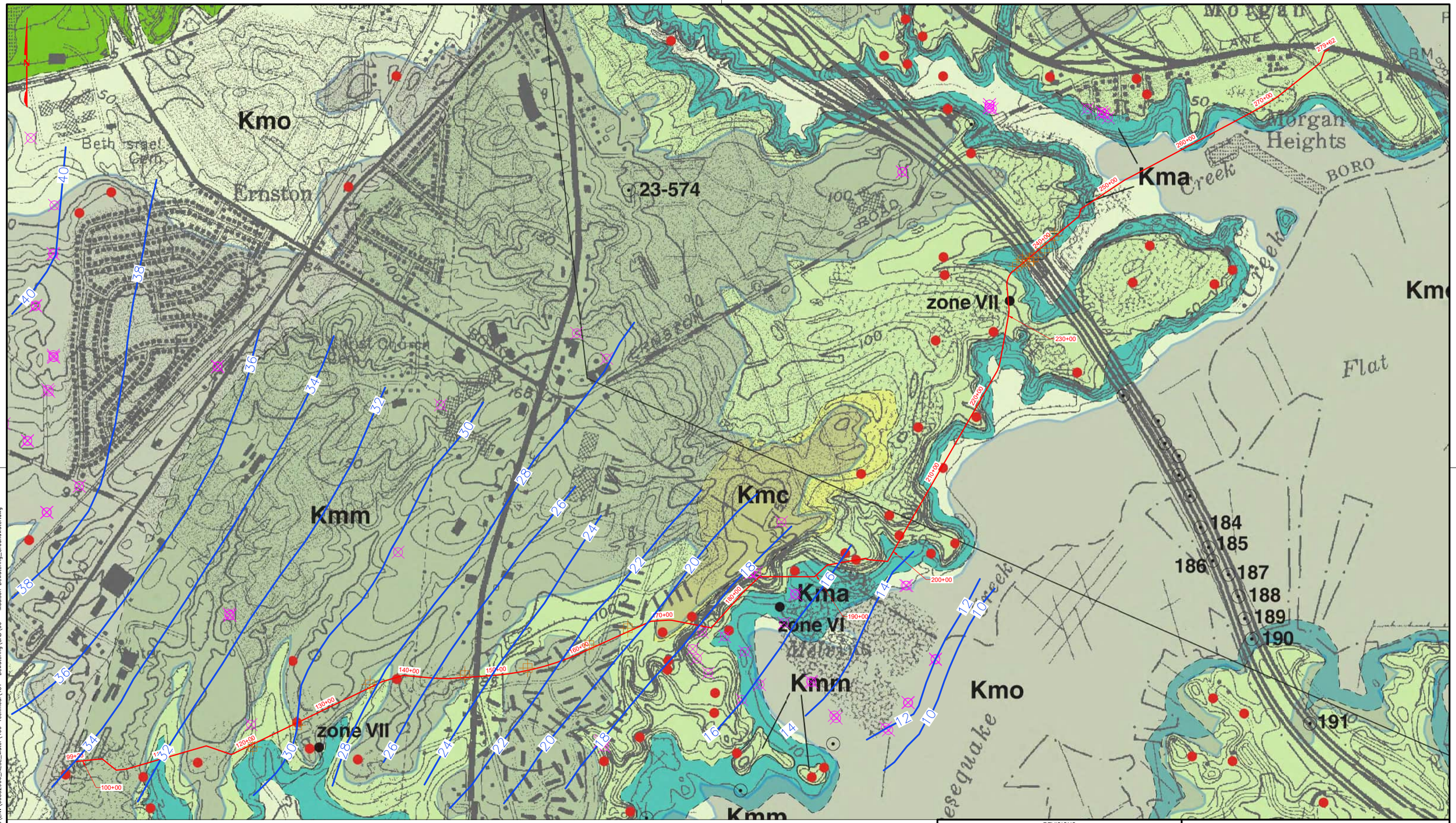
Figure adapted from Williams Figure 2A-5 (dated 3/22/2017)

Figure 4 - Topography and Hydrogeological Project Profile

Northeast Supply Enhancement (NESE) Project - Borough of Sayreville (BWA-002)



- Surface EL
- Pipe Profile (S_EL - 7 ft)
- Landmarks
- Monitoring Well (WL)
- GW Contour (Magothy)
- Geotech Boring (WL)
- Geotech Boring (samples)
- Wetland
- Stream Intersections
- HDD or Bore Pit
- Dewatering Likely
- Dewatering Unlikely
- No Dewatering (HDD)
- HDD Pit
- DB Pit
- HDD-1
- HDD-2
- GSP Crossing
- GD Crossing
- HDD-3
- OSR Crossing
- Regional GW Table
- Holocene (Qm)
- Alluvium (Qal)
- Pennsauken Fm. (Tb)
- Magothy Fm. (K, undiv)
- Magothy Fm. (Kma)
- Magothy (Kmo)
- Municipality Bdry



BEDROCK GEOLOGY MAP

NOTES:

1. BEDROCK GEOLOGY FROM OPEN FILE MAP OFM 65 ENTITLED "BEDROCK GEOLOGY OF THE SOUTH AMBOY QUADRANGLE, MIDDLESEX AND MONMOUTH COUNTIES, NEW JERSEY", DATED 2005.

WELL LOCATIONS

GEOTECHNICAL BORING

28 GROUNDWATER ELEVATION CONTOUR

REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.
0	01/31/2018	PPH	INITIAL DRAFT	-	MO	HB

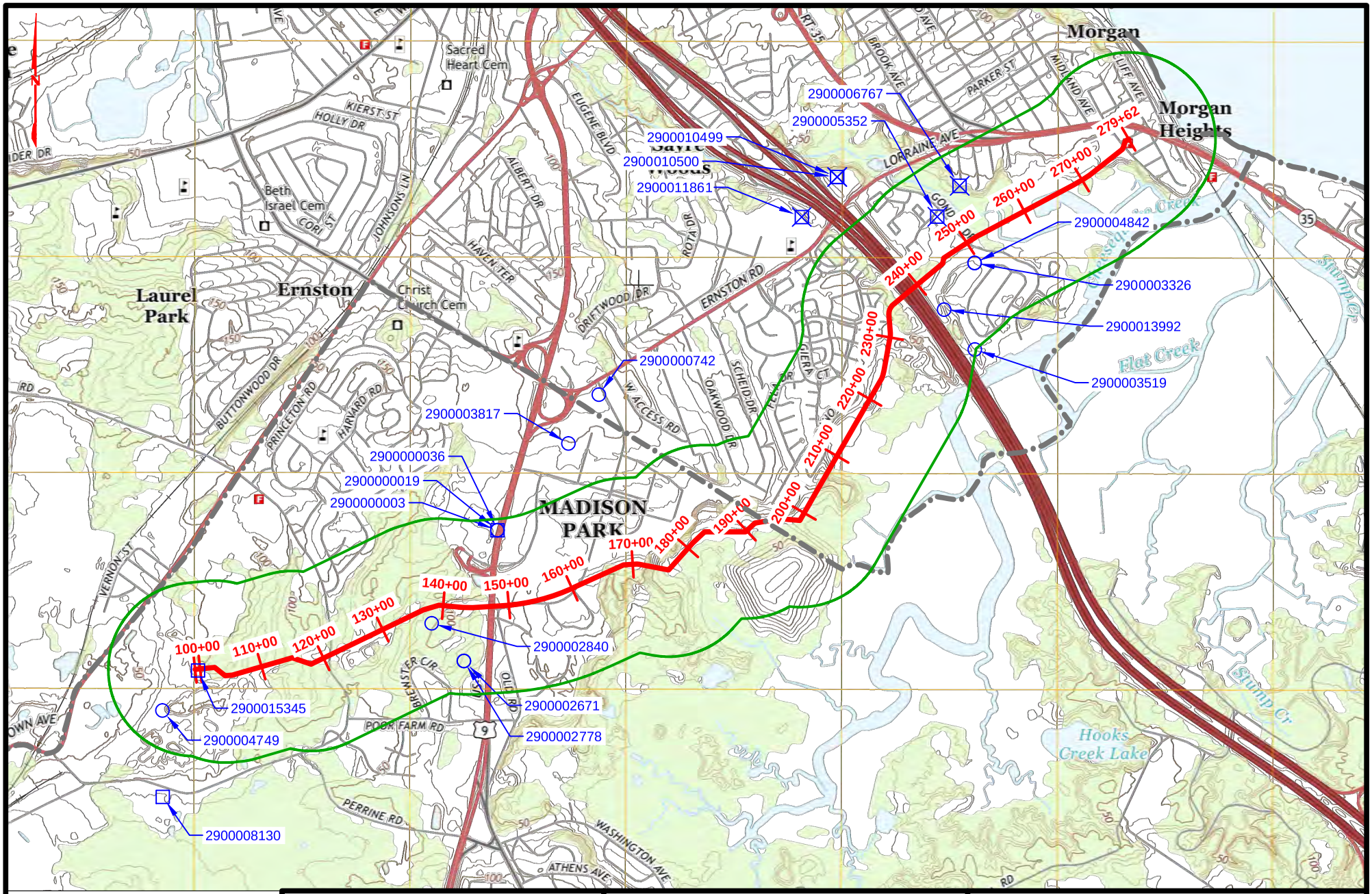
AECOM
625 WEST RIDGE PIKE, SUITE E-100
CONSHOHOCKEN, PA 19428
(610) 832-3500

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26" MADISON LOOP
3.43 MI. - M.P. 8.57 TO M.P. 12.00
GROUNDWATER ELEVATION CONTOUR MAP
MIDDLESEX COUNTY, NEW JERSEY

Williams GAS PIPELINE

DRAWN BY: PPH	DATE: 01/31/2018	ISSUED FOR BID: TBD	SCALE: 1" = 500'
CHECKED BY: MO	DATE: 01/31/2018	ISSUED FOR CONSTRUCTION: TBD	REVISION: 0
APPROVED BY: HB	DATE: 1	DRAWING NUMBER: Figure 5	SHEET 01 OF 1
WO:			

Drawn By & Date/Time: hoasp Feb 01, 2018 - 10:00am
Drawing Location & Name: S:\Projects\ENV\60552906_NESE_Water\400-Technical\431- Dewatering\CAD\00 - Madison Dewatering_Groundwater.dwg



MADISON LOOP
1/4 MILE BUFFER
TOWNSHIP / BOROUGH BOUNDARY
DOMESTIC WELLS
INDUSTRIAL WELLS
PUBLIC COMMUNITY WELLS

NOTES:
1. USGS MAP FROM 7.5' QUADRANGLE, SOUTH AMBOY, NJ-NY 2014..

2,000' 1,000' 0' 2,000'

SCALE: 1" = 2,000'

AECOM
625 WEST RIDGE PIKE, SUITE E-100
CONSHOHOCKEN, PA 19428
(610) 832-3500

REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26" MADISON LOOP
FIGURE 6
WELL SEARCH MAP
MIDDLESEX COUNTY, NEW JERSEY

Williams GAS PIPELINE

DRAWN BY: PPH	DATE: 02/26/2018	ISSUED FOR BID: TBD	SCALE: 1" = 1,000'
CHECKED BY: MO	DATE: 02/26/2018	ISSUED FOR CONSTRUCTION: TBD	REVISION: 0
APPROVED BY: HB	DATE: 02/26/2018	DRAWING NUMBER:	SHEET 1 OF 1
WO:			

Drawn By & Date/Time: hoasp Feb 27, 2018 - 2:53pm
Drawing Location & Name: C:\Project Files\Williams\Madison\Dewatering\00 - Madison Dewatering_Figure 6.dwg

Tables

Table 1 - Summary of Linear Project (Borough of Sayreville)

Station ID	EL (ft msl)	Municipality	State Well Permit No.	Location Description	Geological Formation	Length, ft	Excavation Depth, ft
193 +30	31.6	Sayreville	N/A	Trench	Magothy (K)	70	7
194 +00	33.7	Sayreville	N/A	Trench	Magothy (K)	100	7
195 +00	38.2	Sayreville	N/A	Trench	Magothy (K)	100	7
196 +00	32.6	Sayreville	N/A	Trench	Magothy (K)	100	7
197 +00	27.2	Sayreville	N/A	Trench	Magothy (K)	100	7
198 +00	19.0	Sayreville	N/A	Trench	Magothy (K)	100	7
199 +00	16.0	Sayreville	N/A	Trench	Magothy (Kma)	100	7
200 +00	17.8	Sayreville	N/A	Trench	Magothy (Kma)	100	7
201 +00	21.3	Sayreville	N/A	Trench	Magothy (Kma)	100	7
202 +00	26.4	Sayreville	N/A	Trench	Magothy (K)	100	7
203 +00	37.5	Sayreville	N/A	Trench	Magothy (K)	100	7
204 +00	49.6	Sayreville	N/A	Trench	Magothy (K)	100	7
205 +00	72.3	Sayreville	N/A	Trench	Magothy (K)	100	7
206 +00	83.5	Sayreville	N/A	Trench	Magothy (K)	100	7
207 +00	75.2	Sayreville	N/A	Trench	Magothy (K)	100	7
208 +00	51.3	Sayreville	N/A	Trench	Magothy (Kma)	100	7
209 +00	28.2	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
210 +00	17.1	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
211 +00	15.6	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
212 +00	20.0	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
213 +00	16.0	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
214 +00	15.7	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
215 +00	16.1	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
216 +00	17.0	Sayreville	N/A	Trench	Magothy (Kma)	100	7
217 +00	23.5	Sayreville	N/A	Trench	Magothy (K)	100	7
218 +00	29.7	Sayreville	N/A	Trench	Magothy (K)	100	7
219 +00	38.4	Sayreville	N/A	Trench	Magothy (K)	100	7
220 +00	29.7	Sayreville	N/A	Trench	Magothy (Kma)	100	7
221 +00	19.1	Sayreville	N/A	Trench	Magothy (Kma)	100	7
222 +00	17.5	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
223 +00	16.8	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
224 +00	15.8	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
225 +00	17.0	Sayreville	N/A	Trench	Magothy (Kma)	100	7
226 +00	19.5	Sayreville	N/A	Trench	Magothy (Kma)	100	7
227 +00	22.8	Sayreville	N/A	Trench	Magothy (Kma)	100	7
228 +00	28.2	Sayreville	N/A	Trench	Magothy (Kma)	100	7
229 +00	37.7	Sayreville	N/A	Trench	Magothy (K)	100	7
230 +00	45.9	Sayreville	N/A	Trench	Magothy (K)	100	7
231 +00	49.0	Sayreville	N/A	Trench	Magothy (K)	100	7
232 +00	49.9	Sayreville	N/A	Trench	Magothy (K)	100	7
233 +00	50.8	Sayreville	N/A	Trench	Magothy (K)	100	7
234 +00	51.0	Sayreville	N/A	Trench	Magothy (K)	100	7
235 +00	46.2	Sayreville	N/A	Trench	Magothy (Kma)	90	7
235 +90	40.0	Sayreville	N/A	Bore Pit	Magothy (Kma)	10	15
236 +00	40.1	Sayreville	N/A	GSDB	Magothy (Kma)	100	---
237 +00	37.2	Sayreville	N/A	GSDB	Magothy (Kma)	100	---
238 +00	43.0	Sayreville	N/A	GSDB	Magothy (Kma)	100	---
239 +00	43.3	Sayreville	N/A	GSDB	Magothy (Kma)	100	---

Table 1 - Summary of Linear Project (Borough of Sayreville)

Station ID	EL (ft msl)	Municipality	State Well Permit No.	Location Description	Geological Formation	Length, ft	Excavation Depth, ft
240 +00	34.0	Sayreville	N/A	GSDB	Magothy (Kma)	90	---
240 +90	26.6	Sayreville	N/A	Bore Pit	Magothy (Kma)	10	15
241 +00	26.6	Sayreville	N/A	Trench	Magothy (Kma)	100	7
242 +00	23.6	Sayreville	N/A	Trench	Magothy (Kma)	100	7
243 +00	16.0	Sayreville	N/A	Trench	Magothy (Kma)	100	7
244 +00	13.0	Sayreville	N/A	Trench	Magothy (Kma)	100	7
245 +00	10.9	Sayreville	N/A	Trench	Magothy (Kma)	100	12
246 +00	11.8	Sayreville	N/A	Trench	Magothy (Kma)	100	7
247 +00	10.6	Sayreville	N/A	Trench	Magothy (Kma)	100	7
248 +00	9.3	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
249 +00	8.0	Sayreville	N/A	Bore Pit	Magothy (Kmo)	10	9
249 +10	8.0	Sayreville	N/A	GDDB	Magothy (Kmo)	90	---
250 +00	7.0	Sayreville	N/A	GDDB	Magothy (Kmo)	90	---
250 +90	6.3	Sayreville	N/A	Bore Pit	Magothy (Kmo)	10	9
251 +00	6.3	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
252 +00	4.6	Sayreville	N/A	Trench	Magothy (Kmo)	100	7
253 +00	4.0	Sayreville	N/A	Trench	Holocene (Qm)	2	7
253 +02	4.0	Sayreville	N/A	HDD Entry Pit	Holocene (Qm)	15	12
253 +18	4.0	Sayreville	N/A	HDD	Holocene (Qm)	83	--
254 +00	3.3	Sayreville	N/A	HDD	Holocene (Qm)	100	---
255 +00	2.6	Sayreville	N/A	HDD	Holocene (Qm)	100	---
256 +00	2.1	Sayreville	N/A	HDD	Holocene (Qm)	100	---
257 +00	2.0	Sayreville	N/A	HDD	Holocene (Qm)	100	---
258 +00	2.8	Sayreville	N/A	HDD	Holocene (Qm)	100	---
259 +00	6.0	Sayreville	N/A	HDD	Holocene (Qm)	100	---
260 +00	6.5	Sayreville	N/A	HDD	Magothy (Kma)	100	---
261 +00	6.4	Sayreville	N/A	HDD	Magothy (Kma)	100	---
262 +00	3.1	Sayreville	N/A	HDD	Magothy (Kma)	100	---
263 +00	2.0	Sayreville	N/A	HDD	Holocene (Qm)	100	---
264 +00	2.0	Sayreville	N/A	HDD	Holocene (Qm)	100	---
265 +00	3.9	Sayreville	N/A	HDD	Holocene (Qm)	100	---
266 +00	3.6	Sayreville	N/A	HDD	Holocene (Qm)	100	---
267 +00	4.4	Sayreville	N/A	HDD	Magothy (Kma)	100	---
268 +00	7.1	Sayreville	N/A	HDD	Magothy (Kma)	100	---
269 +00	11.5	Sayreville	N/A	HDD	Magothy (K)	100	---
270 +00	18.2	Sayreville	N/A	HDD	Magothy (K)	100	---
271 +00	18.1	Sayreville	N/A	HDD	Magothy (K)	51	---
271 +51	18.1	Sayreville	N/A	HDD Exit Pit	Magothy (K)	15	12
271 +66	18.1	Sayreville	N/A	Trench	Magothy (K)	34	7
272 +00	17.7	Sayreville	N/A	Trench	Magothy (K)	100	7
273 +00	23.2	Sayreville	N/A	Trench	Magothy (K)	100	7
274 +00	37.4	Sayreville	N/A	Trench	Magothy (K)	100	7
275 +00	46.0	Sayreville	N/A	Trench	Magothy (K)	100	7
276 +00	46.0	Sayreville	N/A	Trench	Magothy (K)	100	7
277 +00	45.9	Sayreville	N/A	Trench	Magothy (K)	90	7
277 +90	45.9	Sayreville	N/A	Bore Pit	Magothy (K)	10	17
278 +00	45.9	Sayreville	N/A	OSDB	Magothy (K)	90	17
278 +90	45.9	Sayreville	N/A	Bore Pit	Magothy (K)	10	17

Table 1 - Summary of Linear Project (Borough of Sayreville)

Station ID	EL (ft msl)	Municipality	State Well Permit No.	Location Description	Geological Formation	Length, ft	Excavation Depth, ft
279 +00	45.9	Sayreville	N/A	Trench	Magothy (K)	62	7
279 +62	44.8	Sayreville	N/A	Trench	Magothy (K)	0	7
					Total Length	8632	

HDD Horizontal Direction Drill
GSDB Garden State Parkway Directional Bore
GDDB Godenk Drive Directional Bore
OSDB Old Spye Road Directional Bore
The assigned geological formations are consistent with Figure 2

Table 2

Sites with Confirmed Contamination within a 1/4-mile radius of Northeast Supply Enhancement (NESE) Project - Madison Loop

Site Name	Municipality	Source	Distance from Pipeline	Direction from Pipeline	Position of Pipeline Relative to Identified Site	Geological Fm. Impacted	Site Status	Site ID No.
			miles					
1788 Route 35 in Sayreville, NJ	Sayreville	SHWS/HIST HWS, New Jersey Release, New Jersey Spill	<0.1	Northeast	Downgradient	Magothy Fm.	active	NJDEP Site Remediation Program PI ID #026234
Morgan Fire House*	Sayreville	SHWS/HIST HWS, New Jersey Release	<0.1	South	Upgradient	Magothy Fm.	inactive	NJDEP Site Remediation Program PI ID #003720

FUDS – Formerly Used Defense Sites. The Department of Defense is responsible for the environmental restoration of properties that were formerly owned by, leased to, or otherwise possessed by the United States and are under the jurisdiction of the Secretary of Defense prior to October 1986.

New Jersey Brownfields – Brownfields sites are identified as former or current commercial or industrial use sites that are presently vacant or underutilized on which there is suspected to have been a discharge of contamination to the soil or groundwater at concentrations greater than the applicable cleanup criteria.

New Jersey Release – New Jersey Hazardous Material Release database is a record of the initial notification information reported to the NJDEP's Action Line.

New Jersey Spill – All HazMat known or unknown spills to the ground reported to the NJ DEP's Action Line.

NPL – National Priority List database, also known as Superfund, is a subset of Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the United States Environmental Protection Agency.

SHWS/HIST HWS - State Hazardous Waste Sites/Historic Hazardous Waste Sites – Known Contaminated Sites in New Jersey database is a municipal listing of sites where contamination of soil and/or groundwater is confirmed at levels greater than the applicable cleanup criteria or standards. Remedial activities are under way or required at the sites with an on-site source(s) of contamination and at locations where the source(s) of contamination are unknown. Sites with completed remedial work that require engineering and/or institutional controls have reporting measures in place to ensure the effectiveness of past actions, and some include maintenance and/or monitoring.

** The Morgan Fire House is listed on both the NJDEP Active Sites with Confirmed Contamination list and the NJDEP Closed Sites with Remediated Contamination list. The site is included on the Known Contaminated Site list but is classified as no further action (restricted use) with an active deed notice in the NJDEP post-remediation group.*

Table 3 - 1/4-Mile Well Search Results

Northeast Supply Enhancement (NESE) - Madison Loop (Borough of Sayreville)

NJDEP Doc ID	Activity_ID	Municipality	Loc_Type	Well_Type	Permit_No	Local Well ID	Status	X_Coord (ft)	Y_Coord (ft)	Diversion ID
Int_doc_id	Activity_i	---	Subject__1	Subject__2	Subject__3	Subject__4	Status_des	Spc83x	Spc83y	Sicc_siid
14719520	WAR110031	Sayreville	Well	Domestic	2900000742	#1	Active	549,439	590,289	WSWL_738863
3662515	WPN600018	Sayreville	Well	Domestic	2900003326			555,154	592,293	WSWL_711250
3663085	WPN610002	Sayreville	Well	Domestic	2900003519			555,158	590,977	WSWL_711442
14747673	WAR110066	Sayreville	Well	Domestic	2900004842	#1	Active	555,154	592,293	WSWL_692231
14723009	WAR110004	Sayreville	Well	Public Community	2900005352	WELL P	Active	554,586	593,000	WSWL_66259
23701989	WAP160001	Sayreville	Well	Public Community	2900006767	WELL Q	Active	554,927	593,468	WSWL_66313
14745302	WAR110016	Sayreville	Well	Public Community	2900010499	S	Active	553,064	593,603	WSWL_66372
14745363	WAR110118	Sayreville	Well	Public Community	2900010500	R	Active	553,064	593,603	WSWL_66373
14745173	WAR110095	Sayreville	Well	Public Community	2900011861	T	Active	552,525	592,994	WSWL_66399
3288010	WPN840009	Sayreville	Well	Domestic	2900013992			554,692	591,583	WSWL_577275

Column titles (2nd row) in gray are the original field names of the shape file received from NJDEP on February 20, 2018.
The original shape file (as received on February 20, 2018) was edited in order to remove obvious duplicate entries.
The true field locations of these wells were not verified independently, either by AECOM or Transco.
Figure 6 shows the locations (based on the X- and Y-coordinate fields) in relation to the linear extent of the Project, with each well labeled by its reported permit number.
The listing is sorted by well permit number.

Table 4 - Summary of Geotechnical Testing and Estimated Permeability

Loc ID	Sta. ID	S_EL	Municipality	Geological Formation	Depth, ft	Samp_EL	Description	Symbol	<#200 (%)	D_{90}, cm	D_{50}, cm	D_{10}, cm	$K = 100 (D_{10})^2$, cm/sec
CB-3	12110	66.3	Old Bridge	Magothy (K)	4-6	60.3-62.3	silty sand	SM	40	0.5	0.01	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	20-22	44.3-46.3	silty sand	SM	19	0.03	0.02	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	30-32	34.3-36.3	silt with sand	ML	77	---	---	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	35-37	29.3-31.3	sand with silt	SP-SM	7	0.03	0.02	0.01	1.0E-02
CB-3	12110	66.3	Old Bridge	Magothy (K)	45-47	19.3-21.3	silty sand	SM	18	0.04	0.02	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	55-57	9.3-11.3	silty sand	SM	23	0.035	0.02	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	65-67	-0.7 - 1.3	sand with silt	SP-SM	9	0.04	0.025	0.01	1.0E-02
CB-3	12110	66.3	Old Bridge	Magothy (K)	75-77	-10.7 - -8.7	clay	CL	71	0.015	---	---	---
CB-3	12110	66.3	Old Bridge	Magothy (K)	80-82	-15.7 - -13.7	silty sand	SM	18	0.03	0.02	---	---
CB-3	12110	66.3	Old Bridge	Magothy (Kmo)	90-92	-25.7 - -23.7	sand with silt	SP-SM	9	0.07	0.025	0.008	6.4E-03
CB-3	12110	66.3	Old Bridge	Magothy (Kmo)	95-97	-30.7 - -28.7	silty sand	SM	48	0.015	0.007	---	---
CB-3	12110	66.3	Old Bridge	Magothy (Kmo)	110-112	-45.7 - -43.7	sand with silt	SP-SM	8	0.07	0.035	0.01	1.0E-02
CB-2	12510	69.1	Old Bridge	Magothy (K)	4-6	63.1-65.1	sand with silt	SP-SM	7	0.025	0.02	0.01	1.0E-02
CB-2	12510	69.1	Old Bridge	Magothy (K)	24-26	43.1-45.1	silty sand	SM	32	0.02	0.01	---	---
CB-2	12510	69.1	Old Bridge	Magothy (K)	68-70	-0.9 - 1.1	sand with silt	SP-SM	7	0.2	0.025	0.015	2.3E-02
AB-1	14610	84.9	Old Bridge	Magothy (K)	8-10	74.9-76.9	silty sand	SM	15	0.1	0.04	0.007	4.9E-03
AB-1	14610	84.9	Old Bridge	Magothy (K)	58-60	24.9-26.9	sandy silt	ML	87	0.02	---	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	50-52	53.2-55.2	silty sand	SM	17	1	0.03	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	55-57	48.2-50.2	silt	ML	86	0.01	---	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	60-62	43.2-45.2	silt with sand	ML	71	2	---	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	70-72	33.2-35.2	silty sand	SM	33	0.02	0.01	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	75-77	28.2-30.2	sandy silt	ML	54	0.015	0.007	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	80-82	23.2-25.2	clay	CL	81	0.015	---	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	85-87	18.2-20.2	silt with sand	ML	82	0.01	---	---	---
AB-2	15310	105.2	Old Bridge	Magothy (K)	95-97	8.2-10.2	silty sand	SM	19	0.05	0.03	---	---
AB-3	16140	118.9	Old Bridge	Pennsauken	6-8	110.9-112.9	silty sand	SM	24	0.9	0.025	---	---
AB-3	16140	118.9	Old Bridge	Pennsauken	10-12	106.9-108.9	sandy clay	CL	60	0.025	---	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	20-22	96.9-98.9	silty sand	SM	30	0.025	0.015	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	30-32	86.9-88.9	silty sand	SM	16	0.035	0.02	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	40-42	76.9-78.9	silty sand	SM	25	0.04	0.02	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	50-52	66.9-68.9	silty sand	SM	27	0.04	0.02	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	60-62	56.9-58.9	sand with silt	SP-SM	11	0.04	0.025	0.007	4.9E-03
AB-3	16140	118.9	Old Bridge	Magothy (K)	70-72	46.9-48.9	silty sand	SM	19	0.03	0.02	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	75-77	41.9-43.9	silty sand	SM	25	0.02	0.015	---	---

Table 4 - Summary of Geotechnical Testing and Estimated Permeability

Loc ID	Sta. ID	S_EL	Municipality	Geological Formation	Depth, ft	Samp_EL	Description	Symbol	<#200 (%)	D_{90}, cm	D_{50}, cm	D_{10}, cm	$K = 100 (D_{10})^2$, cm/sec
AB-3	16140	118.9	Old Bridge	Magothy (K)	80-82	36.9-38.9	silty sand	SM	16	0.03	0.02	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	90-92	26.9-28.9	silt	ML	91	0.008	---	---	---
AB-3	16140	118.9	Old Bridge	Magothy (K)	95-97	21.9-23.9	sandy silt	ML	69	0.018	---	---	---
AB-4	16790	120.2	Old Bridge	Magothy (K)	8-10	110.2-112.2	silty sand	SM	17	0.025	0.015	---	---
AB-4	16790	120.2	Old Bridge	Magothy (K)	29-31	89.2-91.2	sand with silt	SP-SM	12	0.05	0.03	0.007	4.9E-03
AB-4	16790	120.2	Old Bridge	Magothy (K)	83-85	35.2-37.2	silty sand	SM	31	0.035	0.02	---	---
B-1	17700	18.8	Old Bridge	Alluvium (Qal)	2-4	14.8-16.8	silty sand	SM	15	0.04	0.02	0.001	1.0E-04
B-1	17700	18.8	Old Bridge	Alluvium (Qal)	4-6	12.8-14.8	silty sand	SM	21	0.04	0.02	0.001	1.0E-04
B-1	17700	18.8	Old Bridge	Alluvium (Qal)	10-12	8.8-10.8	silty sand	SM	21	0.04	0.02	0.0004	1.6E-05
B-1	17700	18.8	Old Bridge	Magothy (K)	14-16	2.8-4.8	sand with silt	SW-SM	11	0.4	0.025	0.0035	1.2E-03
B-1	17700	18.8	Old Bridge	Magothy (K)	24-26	-7.2 - 2.8	silty sand	SM	14	0.07	0.035	0.002	4.0E-04
B-1	17700	18.8	Old Bridge	Magothy (Kmo)	34-36	-17.2 - -7.2	silty sand	SM	26	0.04	0.015	---	---
B-2	17741	15.8	Old Bridge	Alluvium (Qal)	4-6	9.8-11.8	silty sand	SM	13	0.04	0.02	0.002	4.0E-04
B-2	17741	15.8	Old Bridge	Alluvium (Qal)	8-10	5.8-7.8	sand and silt	SP-SM	9	0.04	0.02	0.008	6.4E-03
B-2	17741	15.8	Old Bridge	Magothy (K)	10-12	3.8-5.8	silty sand	SM	16	0.04	0.02	0.002	4.0E-04
B-2	17741	15.8	Old Bridge	Magothy (K)	14-16	-0.2 - 1.8	silty sand	SM	12	0.05	0.025	0.003	9.0E-04
B-2	17741	15.8	Old Bridge	Magothy (K)	19-21	-5.2 - 4.8	sand with silt	SP-SM	9	0.04	0.02	0.01	1.0E-02
B-2	17741	15.8	Old Bridge	Magothy (Kmo)	34-36	-20.2 - -10.2	sand with silt	SP-SM	10	0.03	0.015	0.008	6.4E-03
MDB-1	26920	10.5	Sayreville	Magothy (K)	19-21	-10.5 - -8.5	silty sand	SM	33	0.02	0.015	---	---
MDB-1	26920	10.5	Sayreville	Magothy (Kmo)	34-36	-25.5 - -23.5	sand with silt	SP-SM	9	0.025	0.02	0.008	6.4E-03
MDB-1	26920	10.5	Sayreville	Magothy (Kmo)	48-50	-39.5 - -37.5	sand with silt	SP-SM	7	0.04	0.025	0.015	2.3E-02
GB-2	24147	25.5	Sayreville	Magothy (K)	8-10	15.5-17.5	sand with silt	SP-SM	12	0.025	0.018	0.005	2.5E-03
GB-2	24147	25.5	Sayreville	Magothy (K)	14-16	9.5-11.5	sand with silt	SP-SM	5	0.04	0.022	0.015	2.3E-02
GB-2	24147	25.5	Sayreville	Magothy (K)	19-21	4.5-6.5	silty sand	SM	48	0.015	0.008	---	---
GB-2	24147	25.5	Sayreville	Magothy (K)	29-31	-5.5 - -3.5	silty sand	SM	36	2	0.01	---	---
GB-2	24147	25.5	Sayreville	Magothy (K)	33-35	-9.5 - -7.5	sand with silt	SP-SM	9	0.025	0.02	0.01	1.0E-02
GB-2	24147	25.5	Sayreville	Magothy (Kmo)	48-50	-24.5 - -22.5	sand with silt	SP-SM	8	0.03	0.02	0.01	1.0E-02
GB-3	23697	39.9	Sayreville	Fill	4-6	33.9-35.9	silty sand	SM	30	0.02	0.012	---	---
GB-3	23697	39.9	Sayreville	Magothy (Kma)	14-16	23.9-25.9	silty sand	SM	24	0.025	0.018	---	---
GB-3	23697	39.9	Sayreville	Magothy (Kma)	24-26	13.9-15.9	silty sand	SM	12	0.025	0.02	0.007	4.9E-03
GB-3	23697	39.9	Sayreville	Magothy (Kma)	33-35	4.9-6.9	clay	CL	90	0.007	---	---	---
GB-3	23697	39.9	Sayreville	Magothy (K)	48-50	-10.1 - -8.1	silty sand	SM	29	0.025	0.015	---	---
GB-4	23739	46.1	Sayreville	Fill	8-10	36.1-38.1	silty sand	SM	26	0.1	0.025	---	---
GB-4	23739	46.1	Sayreville	Fill	14-16	30.1-32.1	silty sand	SM	21	1	0.04	---	---

Table 4 - Summary of Geotechnical Testing and Estimated Permeability

Loc ID	Sta. ID	S_EL	Municipality	Geological Formation	Depth, ft	Samp_EL	Description	Symbol	<#200 (%)	D_{90}, cm	D_{50}, cm	D_{10}, cm	$K = 100 (D_{10})^2$, cm/sec
GB-4	23739	46.1	Sayreville	Fill	19-21	24.1-26.1	silty sand	SM	29	0.022	0.015	---	---
GB-4	23739	46.1	Sayreville	Fill	24-26	20.1-22.1	silty sand	SM	15	2	0.02	---	---
GB-4	23739	46.1	Sayreville	Magothy (K)	29-31	15.1-17.1	silty sand	SM	22	0.022	0.018	---	---
GB-4	23739	46.1	Sayreville	Magothy (K)	38-40	6.1-8.1	silty sand	SM	18	0.025	0.02	---	---
GB-4	23739	46.1	Sayreville	Magothy (Kmo)	63-65	-18.9 - -16.9	silty sand	SM	36	0.04	0.018	---	---
GB-5	23810	42.3	Sayreville	Magothy (Kma)	8-10	32.3-34.3	silty sand	SM	22	0.09	0.03	---	---
GB-5	23810	42.3	Sayreville	Magothy (Kma)	10-12	30.3-32.3	silty sand	SM	26	0.07	0.03	---	---
GB-5	23810	42.3	Sayreville	Magothy (Kma)	15-17	25.3-27.3	silty sand	SM	18	0.7	0.035	---	---
GB-5	23810	42.3	Sayreville	Magothy (Kma)	28-30	12.3-14.3	silty sand	SM	20	0.1	0.035	---	---
GB-5	23810	42.3	Sayreville	Magothy (K)	38-40	2.3-4.3	silty sand	SM	15	0.025	0.02	---	---
GB-5	23810	42.3	Sayreville	Magothy (Kmo)	58-60	-17.7 - -15.7	silty sand	SM	30	0.04	0.02	---	---
GB-7	23971	41.4	Sayreville	Fill	8-10	31.4-33.4	silty sand	SM	24	2	0.04	---	---
GB-7	23971	41.4	Sayreville	Fill	19-21	20.4-22.4	silty sand	SM	22	1.2	0.03	---	---
GB-7	23971	41.4	Sayreville	Magothy (Kma)	24-26	15.4-17.4	silty sand	SM	18	0.08	0.03	---	---
GB-7	23971	41.4	Sayreville	Magothy (Kma)	33-35	6.4-8.4	silty sand	SM	12	0.028	0.02	0.005	2.5E-03
GB-7	23971	41.4	Sayreville	Magothy (K)	53-55	-13.6 - -11.6	silty sand	SM	14	0.04	0.025	---	---

Table 4 - Summary of Geotechnical Testing and Estimated Permeability

USCS Symbol	SP	SP-SM	SW-SM	SM	ML	CL	Compounded Estimated K	
K (est), cm/sec	1.0E-01	2.5E-02	7.5E-03	2.5E-03	1.0E-04	1.0E-05		
K (est), ft/d	283	71	21	7	0.3	0.03	cm/sec	ft/d
Alluvium (Qal)	0	1	0	4	0	0	7.0E-03	20
Pennsauken	0	0	0	1	0	1	1.3E-03	3.6
Magothy (K)	0	6	1	24	7	1	5.6E-03	16
Magothy (Kma)	0	0	0	8	0	1	2.2E-03	6.3
Magothy (Kmo)	0	4	0	3	0	0	1.5E-02	44
total number of samples	*0*	*11*	*1*	*40*	*7*	*3*		

Table 5 - Estimated Dewatering Rates Along Project Extent (Borough of Sayreville)

Station ID	EL (ft msl)	Municipality	State Well Permit No.	Location Description	Geological Formation	Length, ft	Excavation Depth, ft	Dewatering Anticipated?	Dewatering Rationale	Withdrawal Rate, gpm	Estimated Duration of Dewatering, days	Est. Max Withdrawal Rate (Mgal/mo)	Est. Max Withdrawal Rate (Mgal/yr)	Total Yield, Mgal	Total Yield, gal/ft
193 +30	31.6	Sayreville	N/A	Trench	Magothy (K)	70	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
194 +00	33.7	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
195 +00	38.2	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
196 +00	32.6	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
197 +00	27.2	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
198 +00	19.0	Sayreville	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
199 +00	16.0	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
200 +00	17.8	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
201 +00	21.3	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
202 +00	26.4	Sayreville	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
203 +00	37.5	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
204 +00	49.6	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
205 +00	72.3	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
206 +00	83.5	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
207 +00	75.2	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
208 +00	51.3	Sayreville	N/A	Trench	Magothy (Kma)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
209 +00	28.2	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
210 +00	17.1	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
211 +00	15.6	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
212 +00	20.0	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
213 +00	16.0	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
214 +00	15.7	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
215 +00	16.1	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
216 +00	17.0	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
217 +00	23.5	Sayreville	N/A	Trench	Magothy (K)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	49.6	2	0.143	0.143	0.143	1428
218 +00	29.7	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
219 +00	38.4	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
220 +00	29.7	Sayreville	N/A	Trench	Magothy (Kma)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
221 +00	19.1	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
222 +00	17.5	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
223 +00	16.8	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
224 +00	15.8	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
225 +00	17.0	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
226 +00	19.5	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
227 +00	22.8	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
228 +00	28.2	Sayreville	N/A	Trench	Magothy (Kma)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
229 +00	37.7	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
230 +00	45.9	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
231 +00	49.0	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
232 +00	49.9	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
233 +00	50.8	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
234 +00	51.0	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
235 +00	46.2	Sayreville	N/A	Trench	Magothy (Kma)	90	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
235 +90	40.0	Sayreville	N/A	Bore Pit	Magothy (Kma)	10	15	No	Pit EL > GW Table, no perched water evidence	0.0	45	0.000	0.000	0.000	0
236 +00	40.1	Sayreville	N/A	GSDB	Magothy (Kma)	100	---	No	Directional Bore	0.0	0	0.000	0.000	0.000	0
237 +00	37.2	Sayreville	N/A	GSDB	Magothy (Kma)	100	---	No	Directional Bore	0.0	0	0.000	0.000	0.000	0
238 +00	43.0	Sayreville	N/A	GSDB	Magothy (Kma)	100	---	No	Directional Bore	0.0	0	0.000	0.000	0.000	0
239 +00	43.3	Sayreville	N/A	GSDB	Magothy (Kma)	100	---	No	Directional Bore	0.0	0	0.000	0.000	0.000	0
240 +00	34.0	Sayreville	N/A	GSDB	Magothy (Kma)	90	---	No	Directional Bore	0.0	0	0.000	0.000	0.000	0
240 +90	26.6	Sayreville	N/A	Bore Pit	Magothy (Kma)	10	15	Yes	Pit EL < GW Table, or proximal to GW Table	13.7	45	0.610	0.885	0.885	88487
241 +00	26.6	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
242 +00	23.6	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
243 +00	16.0	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
244 +00	13.0	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
245 +00	10.9	Sayreville	N/A	Trench	Magothy (Kma)	100	12	Yes	Pipe EL < GW Table, or proximal to GW Table	12.0	2	0.035	0.035	0.035	347
246 +00	11.8	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388

Table 5 - Estimated Dewatering Rates Along Project Extent (Borough of Sayreville)

Station ID	EL (ft msl)	Municipality	State Well Permit No.	Location Description	Geological Formation	Length, ft	Excavation Depth, ft	Dewatering Anticipated?	Dewatering Rationale	Withdrawal Rate, gpm	Estimated Duration of Dewatering, days	Est. Max Withdrawal Rate (Mgal/mo)	Est. Max Withdrawal Rate (Mgal/yr)	Total Yield, Mgal	Total Yield, gal/ft
247 +00	10.6	Sayreville	N/A	Trench	Magothy (Kma)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	13.5	2	0.039	0.039	0.039	388
248 +00	9.3	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
249 +00	8.0	Sayreville	N/A	Bore Pit	Magothy (Kmo)	10	9	Yes	Pit EL < GW Table, or proximal to GW Table	57.1	10	0.822	0.822	0.822	82202
249 +10	8.0	Sayreville	N/A	GDDB	Magothy (Kmo)	90	---	Yes	Directional Bore	73.9	5	0.532	0.532	0.532	5913
250 +00	7.0	Sayreville	N/A	GDDB	Magothy (Kmo)	90	---	Yes	Directional Bore	73.9	5	0.532	0.532	0.532	5913
250 +90	6.3	Sayreville	N/A	Bore Pit	Magothy (Kmo)	10	9	Yes	Pit EL < GW Table, or proximal to GW Table	57.1	10	0.822	0.822	0.822	82202
251 +00	6.3	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
252 +00	4.6	Sayreville	N/A	Trench	Magothy (Kmo)	100	7	Yes	Pipe EL < GW Table, or proximal to GW Table	82.1	2	0.237	0.237	0.237	2365
253 +00	4.0	Sayreville	N/A	Trench	Holocene (Qm)	2	7	Yes	Pipe EL < GW Table, or proximal to GW Table	3.0	2	0.009	0.009	0.009	4320
253 +02	4.0	Sayreville	N/A	HDD Entry Pit	Holocene (Qm)	15	12	Yes	Pit EL < GW Table, or proximal to GW Table	130	7	1.314	1.314	1.314	87570
253 +18	4.0	Sayreville	N/A	HDD	Holocene (Qm)	83	--	No	HDD	0.0	0	0.000	0.000	0.000	0
254 +00	3.3	Sayreville	N/A	HDD	Holocene (Qm)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
255 +00	2.6	Sayreville	N/A	HDD	Holocene (Qm)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
256 +00	2.1	Sayreville	N/A	HDD	Holocene (Qm)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
257 +00	2.0	Sayreville	N/A	HDD	Holocene (Qm)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
258 +00	2.8	Sayreville	N/A	HDD	Holocene (Qm)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
259 +00	6.0	Sayreville	N/A	HDD	Holocene (Qm)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
260 +00	6.5	Sayreville	N/A	HDD	Magothy (Kma)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
261 +00	6.4	Sayreville	N/A	HDD	Magothy (Kma)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
262 +00	3.1	Sayreville	N/A	HDD	Magothy (Kma)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
263 +00	2.0	Sayreville	N/A	HDD	Holocene (Qm)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
264 +00	2.0	Sayreville	N/A	HDD	Holocene (Qm)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
265 +00	3.9	Sayreville	N/A	HDD	Holocene (Qm)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
266 +00	3.6	Sayreville	N/A	HDD	Holocene (Qm)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
267 +00	4.4	Sayreville	N/A	HDD	Magothy (Kma)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
268 +00	7.1	Sayreville	N/A	HDD	Magothy (Kma)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
269 +00	11.5	Sayreville	N/A	HDD	Magothy (K)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
270 +00	18.2	Sayreville	N/A	HDD	Magothy (K)	100	---	No	HDD	0.0	0	0.000	0.000	0.000	0
271 +00	18.1	Sayreville	N/A	HDD	Magothy (K)	51	---	No	HDD	0.0	0	0.000	0.000	0.000	0
271 +51	18.1	Sayreville	N/A	HDD Exit Pit	Magothy (K)	15	12	No	Pit EL > GW Table, no perched water evidence	0.0	7	0.000	0.000	0.000	0
271 +66	18.1	Sayreville	N/A	Trench	Magothy (K)	34	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
272 +00	17.7	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
273 +00	23.2	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
274 +00	37.4	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
275 +00	46.0	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
276 +00	46.0	Sayreville	N/A	Trench	Magothy (K)	100	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
277 +00	45.9	Sayreville	N/A	Trench	Magothy (K)	90	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
277 +90	45.9	Sayreville	N/A	Bore Pit	Magothy (K)	10	17	No	Pit EL > GW Table, no perched water evidence	0.0	10	0.000	0.000	0.000	0
278 +00	45.9	Sayreville	N/A	OSDB	Magothy (K)	90	17	No	Directional Bore	0.0	0	0.000	0.000	0.000	0
278 +90	45.9	Sayreville	N/A	Bore Pit	Magothy (K)	10	17	No	Pit EL > GW Table, no perched water evidence	0.0	10	0.000	0.000	0.000	0
279 +00	45.9	Sayreville	N/A	Trench	Magothy (K)	62	7	No	Pipe EL > GW Table, no perched water evidence	0.0	2	0.000	0.000	0.000	0
279 +62	44.8	Sayreville	N/A	Trench	Magothy (K)	0	7	No	Pipe EL > GW Table, no perched water evidence	0.0	0	0.000	0.000	0.000	0
					Total Length	8632					278			8.76	1015

HDD Horizontal Direction Drill
GSDB Garden State Parkway Directional Bore
GDDB Godenk Drive Directional Bore
OSDB Old Spye Road Directional Bore
The assigned geological formations are consistent with Figure 2

APPENDIX H
ENVIRONMENTAL HEALTH AND SAFETY CONTACT LIST

GAS PIPELINE – Atlantic-Gulf Operating Area
2800 Post Oak Blvd.
Houston, TX

ENVIRONMENTAL HEALTH & SAFETY CONTACT LIST (WILLIAMS)

Environmental, Health & Safety

Karen Olson - Environmental Scientist, Atlantic-Gulf Environmental Permitting
Cell: 281-513-0667

Michael Maben - Environmental Specialist V, Atlantic-Gulf Field EHS
Cell: 609-865-1929

Michael Hiddemen - Safety Specialist III. Field EHS Atlantic Gulf
Cell: 610-733-9031

Michael Aversa - Safety Specialist II, Field EHS Atlantic Gulf
Cell: 717-572-9939

Chief Inspector - Tim Ciencin
Cell: 609-651-2059

Environmental Inspector - Christian Sobiech
Cell: 845-258-7244

Project MMP Field Coordinator - Larry Coddington (GWI, Inc.)
Cell: 914-772-3751

Other Numbers:

Transco Pipeline Control: 800-440-8475

Williams Security Operations Center: 855-945-5762

Site/Project Safety Officer: (TBD)

APPENDIX I
NJPDES AND/OR MCUA AUTHORIZATIONS TO DISCHARGE
(to be obtained)

APPENDIX J
CLEAN FILL CERTIFICATION TEMPLATE

GAS PIPE LINE – TRANSCO
99 Farber Road
Princeton, N.J. 08540
(609) 936-2400
Fax: (609) 936-2430

CERTIFICATION OF CLEAN FILL

This certificate is being provided as required in NJAC 7:26E-6.4(b) 2iv to document that the quality of the fill being used to backfill and/or cap this site is virgin material from a commercial or noncommercial source or decontaminated recycled soil. The following information is related to the material being provided for the project in question.

Name of Material Supplier:_____

Relationship to the Source of Fill:_____

Location Where Fill was Obtained:_____

Street:_____ Town:_____ State:_____

Lot:_____ Block:_____ County:_____

Brief History of the Source of Fill:

_____
_____
_____
_____
_____
_____

*"To the best of my knowledge and belief, the fill provided for this project is **NOT** contaminated pursuant to any applicable remediation standards"*

Signature: _____

Name: _____ Company: _____

Title: _____ Date: _____

Draft Materials Management Plan

Williams/Transcontinental Gas Pipe Line Company, LLC
Northeast Supply Enhancement (NESE) Project
26-Inch Raritan Bay Loop Linear Construction Project (LCP)

Raritan Bay Loop Onshore Pipeline Construction
Milepost 12.00 to Milepost 12.16
Borough of Sayreville
Middlesex County, New Jersey

And

Raritan Bay Loop Offshore Pipeline Construction
Milepost 12.16 to Milepost 35.49
Waters of the State of New Jersey and
Waters of the State of New York

May 2018

Prepared by:
Williams/Transcontinental Gas Pipe Line Company, LLC
2800 Post Oak Boulevard
Houston, Texas 77056

MATERIALS MANAGEMENT PLAN
NORTHEAST SUPPLY ENHANCEMENT (NESE) PROJECT
26-INCH RARITAN BAY LOOP - LINEAR CONSTRUCTION PROJECT (LCP)
BOROUGH OF SAYREVILLE, MIDDLESEX COUNTY, NEW JERSEY
WATERS OF THE STATES OF NEW JERSEY AND NEW YORK

TABLE OF CONTENTS

1.0 INTRODUCTION

2.0 PROJECT DESCRIPTION

3.0 PRE-CONSTRUCTION INVESTIGATION
- 3.1 Pipeline Corridor Limited Environmental Site Assessment
- 3.2 Known Contaminated Sites Identified within Close Proximity
- 3.3 Geotechnical Investigation Data for NESE Raritan Bay Loop
- 3.4 Offshore Sediments Investigation 2016-2017
- 3.5 Proposed Additional Pre-Construction Investigation

4.0 HEALTH AND SAFETY PLAN REQUIREMENTS

5.0 MATERIALS MANAGEMENT
- 5.1 Management of Excavated Soil/Unsuitable Backfill (Onshore)
- 5.2 Construction Dewatering/Water Management (Onshore)
- 5.3 Management of Horizontal Directional Drilling (HDD) Fluids/Cuttings
  - 5.3.1 Onshore HDD Fluids Returns
  - 5.3.2 Offshore HDD Fluids Returns
- 5.4 Management of Offshore Sediments
- 5.5 Field Evaluations of Excavated Material, Groundwater and HDD Fluids
- 5.6 Disposal Documentation and Backfill Material Requirements

6.0 REPORTING AND DOCUMENTATION

ATTACHED FIGURES

Figure 1 Project Location
Figure 2 Proposed Pipeline Route
Figure 3 Aerial View of Proposed Onshore and Nearshore Pipeline Alignment
Figure 4 NJDEP Known Contaminated Sites

MATERIALS MANAGEMENT PLAN
NORTHEAST SUPPLY ENHANCEMENT (NESE) PROJECT
26-INCH RARITAN BAY LOOP - LINEAR CONSTRUCTION PROJECT (LCP)
BOROUGH OF SAYREVILLE, MIDDLESEX COUNTY, NEW JERSEY
WATERS OF THE STATES OF NEW JERSEY AND NEW YORK

TABLE OF CONTENTS (Continued)

ATTACHED TABLES

Table 1	2018 Construction Line List Summary - Property Parcels
Table 2	List of Known Contaminated Sites within Close Proximity to Proposed Alignment

APPENDICES

Appendix A	EDR DataMap Corridor Study Executive Summary
Appendix B	Geotechnical Investigation Reports
Appendix C	Pre-Construction Sediment Sampling Results Summary
Appendix D	Offshore Horizontal Directional Drill Contingency Plan
Appendix E	Clean Fill Certification Template

1.0 INTRODUCTION

This Materials Management Plan (MMP) has been prepared by Transcontinental Gas Pipe line Company, LLC (Transco) for construction of the proposed 26-inch Raritan Bay Loop Pipeline portion of the Northeast Supply Enhancement (NESE) Project (herein referred to as the Raritan Bay Loop). Specifically, this MMP has been prepared to address planned onshore and offshore pipeline construction activities that will include excavation, horizontal directional drilling (HDD), dredging and seafloor jetting activities to complete construction of the proposed 26-inch Raritan Bay Loop Pipeline. The onshore portion of the Raritan Bay Loop will extend from the end of the Madison Loop at Milepost (M.P.) 12.00 in the Borough of Sayreville, New Jersey to the Sayreville Shoreline at M.P. 12.16 located in Middlesex County, New Jersey. The offshore portion of the Raritan Bay Loop will extend 23.33 miles from M.P. 12.16 at the Sayreville shoreline through the waters of the states of New Jersey and New York across the Raritan Bay and Lower New York Bay to the Rockaway Delivery Lateral (RDL) Transfer Point at M.P. 35.49. Currently, the RDL subsea manifold is tied into the existing Transco 26-inch-diameter Lower New York Bay Lateral (LNYBL), which supplies gas through the RDL to an onshore Metering and Regulating (M&R) station in Kings County, New York. Approximately 5.95 miles of the offshore Raritan Bay Loop route crosses New Jersey waters, while the remaining 17.38 miles cross New York waters.

Figure 1 illustrates the approximate location of the proposed pipeline construction area on U.S.G.S. topographic quadrangle maps. **Figure 2** illustrates the proposed Raritan Bay Loop pipeline route in relation to existing subsea pipeline facilities and marine navigation features. **Figure 3** provides an aerial view of the onshore and near shore portions of the Raritan Bay Loop pipeline alignment in the vicinity of the crossing of the Sayreville shoreline.

This document contains project specific information for construction activities associated with the Raritan Bay Loop only and has been developed in accordance with the guidelines set forth in the New Jersey Department of Environmental Protection (NJDEP) Linear Construction Project Technical Guidance (LCPTG), dated January 2012. The purpose of this MMP is to provide general procedures and site-specific requirements for addressing and minimizing worker exposure and the handling of encountered excavation materials and backfill during the planned construction activities.

2.0 PROJECT DESCRIPTION

Transcontinental Gas Pipe Line Company, LLC (Transco), a subsidiary of Williams, owns and operates a natural gas pipeline system that transports natural gas to the market areas of the northeastern United States. Transco filed an application for a Certificate of Public Convenience and Necessity (Certificate) with the Federal Energy Regulatory Commission (FERC) to construct facilities on its existing natural gas transmission system. The application was filed on March 27, 2017 and assigned docket number CP17-101 by FERC. The Project will provide 400,000 dekatherms per day (dth/d) of incremental firm transportation service from Transco's existing Station 195 in York County, Pennsylvania to Transco's offshore Rockaway Transfer Point in New York State waters. The Raritan Bay Loop portion of the proposed NESE project consists of 0.16 miles of onshore pipe in Middlesex County, New Jersey and 23.33 miles of offshore pipe in the waters of the State of New Jersey and the State of New York. Construction is scheduled to begin in the first quarter of 2019 in order to meet a target in-service date in the fourth quarter of 2019.

The proposed 26-inch Raritan Bay Loop is a 23.49 mile-long new pipeline that will begin at the end of the Transco 26-inch Madison Loop pipeline at M.P. 12.00 in the Borough of Sayreville and terminate at M.P. 35.49 at the Rockaway Transfer Point in New York State waters within the Atlantic Ocean, approximately 3 miles seaward of Rockaway, New York (refer to **Figure 1** and **Figure 2**). The FERC Aerial Route Overview Map for the onshore and nearshore portion of the Raritan Bay Loop at the Sayreville shoreline is provided herein as **Figure 3.** **Table 1** presents a summary of the construction line list detailing the property tracts to be traversed during pipeline construction and anticipated materials to be managed for each parcel.

Activities associated with the construction of the 26-inch Raritan Bay Loop pipeline will include the following:

- Site preparation including marking the corridor, and installation of erosion & sediment control measures prior to earth disturbance for onshore pipeline construction;

- Clearing and grading for onshore pipeline construction;

- Preparation of temporary work space/contractor yards for both onshore and offshore construction;

- Excavation/trenching and pipeline installation onshore;

- Completion of horizontal directional drilling (HDD) to facilitate 26-inch pipeline placement along two (2) HDD segments including the Morgan Shore Approach HDD crossing at the Sayreville shoreline; and at the Ambrose Channel HDD crossing. In addition, the cathodic protection (CP) power cable for the Raritan Bay Loop CP system will also be installed via HDD. One CP HDD will extend to the northeast approximately 1,831 feet to tie-in with the anode sled located approximately 1,200 feet north of M.P. 12.32 on the Raritan Bay Loop. The second CP HDD will extend to the northwest approximately 545 feet to tie-in to M.P. 12.00 at the junction between the Madison Loop and Raritan Bay Loop (refer **to Figure 3**).

- Excavation of the Morgan Crossing HDD entry pit onshore;

- Clamshell dredging for excavation and backfilling of HDD entry and exit pits offshore. Transco is considering using a clamshell dredge to excavate the three offshore HDD entry/exit pits (M.P. 12.50, M.P. 29.52, and M.P. 30.40) and;

- Clamshell dredging and backfilling for the pipeline trench between the Morgan Shore Approach HDD exit pit (M.P. 12.50) and approximate M.P. 16.6, the open cut channel crossings of Raritan Bay Channel and Chapel Hill Channel, as well as in the anchorage areas;

- Transco will use a jet trencher to lower the pipeline to the Project-defined depths for the majority of the remainder of the line beginning at approximate M.P. 16.6;

- Divers working from a crane barge and using hand jets will be used to expose existing subsea infrastructure at cable crossings (M.P. 13.88 and M.P. 35.19), the subsea manifold (M.P. 35.49), and the Raritan Bay Loop pipe connections with the HDD pipe strings at approximate M.P. 16.6. Divers using a combination of hand jets and suction dredge equipment will be used to excavate the location for the placement of the tie-in skid. Material excavated in this manner will be dispersed and may be recovered for backfill. Transco may use the excavated material for a portion of the backfill at the Rockaway Transfer Point tie-in. These methods will avoid the risk of damaging existing infrastructure that is associated with other dredging methods.

- Following dredging of the trench located between the Morgan Shore Approach HDD exit point and approximate M.P. 16.6, Transco will use a pipelay barge to lay the pipe. Transco will utilize a pipelay barge that uses a multi-point anchoring system to lay the pipe for the Raritan Bay Loop in deeper waters east of M.P. 16.6 to approximately M.P. 35.49, excluding the Ambrose Channel HDD crossing. Pipe will be welded and tested on the pipelay barge. After burial to permitted depths, the pipeline will be hydrotested and conditioned for introduction of hydrocarbons;

- Pipe preparation including but not limited to welding, assembling, installation, testing, dewatering and backfilling of approximately 23.49 miles of 26-inch coated steel pipe;

- The Raritan Bay Loop will begin at the end of Transco's proposed 26-inch Madison Loop at M.P. 12.00 and will tie-in with Transco's RDL subsea manifold that is currently tied into the existing Transco 26-inch-diameter Lower New York Bay Lateral (LNYBL) at M.P. 35.49;

- Site restoration and cleanup onshore and backfilling of the offshore trench where necessary.

3.0 PRE-CONSTRUCTION INVESTIGATION

Pre-construction investigation activities included a review of available environmental data records to identify potential contaminated properties, a review of available geotechnical information, and a review of pre-construction sediment environmental sampling results to aid in the development of this materials management plan and to identify potential data gaps that may require additional pre-construction investigation environmental sampling.

3.1 Pipeline Corridor Limited Environmental Site Assessment

A pipeline corridor study was completed to identify Federal and State-listed spill sites or waste disposal sites utilizing Environmental Data Resources, Inc. (EDR), a commercial database search service. As part of this database search, a radius map report was generated to identify agency listed sites of potential environmental concern within the proposed pipeline corridor. The search area of the EDR DataMap Corridor Study was based on a two-mile radius extending from the centerline of the proposed pipeline route. The results of the EDR DataMap Corridor study are presented in **Appendix A**. In addition, EDR performed as well record search for the proposed pipeline corridor. The EDR Well Search results are included in **Appendix A**. Additional records were also identified using the New Jersey Open Public Records Act Database (NJDEP 2016) and New Jersey Department of Environmental Protection (NJDEP) GeoWeb Database (NJDEP 2017).

3.2 Known Contaminated Sites Identified within Close Proximity

The EDR DataMap Corridor Study (**Appendix A**) for the NESE 26-inch Raritan Bay Loop Project identified two (2) active sites and one (1) inactive site with confirmed contamination within a 0.25 mile of the proposed pipeline alignment. In addition, the NJDEP GeoWeb site lists mapped areas of *Historic Fill* that lie within the project corridor study area. **Figure 4** illustrates the NJDEP known contaminated sites in the vicinity of the Project. **Table 2** presents a list of the identified sites.

A brief discussion of each known contaminated site in the vicinity of the Project follows.

Morgan Fire House

The New Jersey Open Public Records Act database indicates that the Morgan Fire House property is located at Route 35 and Old Spye Road in Sayreville, New Jersey, which is less than 0.1 mile south of M.P. 12.0 of the Raritan Bay Loop (refer to **Figure 4**). The site is on both the NJDEP Active Sites with Contamination List and the NJDEP Closed sites with Remediated Contamination Site List. The site is included on the Known Contaminated Sites List, but is classified as no further action (restricted use) with an active deed notice and engineering controls in the NJDEP post-remediation group. Contamination at this site was attributed to a leaking 550 gallon underground storage tank (UST) that contained diesel fuel (#2-D). The site is approximately 150 feet south of the Project facilities, and the specifics of the active deed notice and engineering controls are unknown. However, since no further action is required for this site, it is unlikely that significant contamination associated with this site would be present within soils encountered in the proposed Project workspace.

1788 Route 35 in Sayreville, New Jersey

The New Jersey Open public Records Act database indicates that the property located at 1788 Route 35 North in South Amboy, New Jersey, is located less than 0.1 mile north of M.P. 12.0 of the Raritan Bay Loop (refer to **Figure 4**). This property has been and currently is the location of a gas station and is listed on the UST Active Remediation List. This site contains an active CEA and WRA in effect from October 2015 to October 2026, which extends within 200 feet northeast of the Raritan Bay Loop and 165 feet north of the Raritan Bay Loop. Since the Raritan Bay Loop alignment is not situated within the CEA and WRA, it is unlikely that any contamination associated with this site would be present in the soil or groundwater in the vicinity of the Project facilities.

Historic Fill

NJDEP Historic Fill Maps identify areas of Historic Fill overlying natural surficial geologic deposits in one onshore area along the proposed 26-inch Raritan Bay Loop Project pipeline alignment (refer to **Figure 4**). Historic Fill is a non-indigenous material placed on a site in order to raise the topographic elevation of the site. Constituents of potential concern typically associated with Historic Fill include, but are not limited to, SVOCs and metals in excess of the NJDEP Soil Remediation Standards.

NJDEP mapping shows Historic Fill present between approximately mileposts M.P. 12.12 to M.P. 12.16 in the vicinity of the New Jersey Transit Railway which should not be disturbed as the Morgan Shore Approach HDD Crossing is planned through this portion of the proposed alignment (refer to **Figure 4**).

Based on the history of the industrialization and development within the vicinity of the proposed Project workspace, there is the possibility that unmapped areas of Historic Fill could be encountered during onshore pipeline construction in the vicinity of the Morgan Approach HDD entry pit. Mapped Historic Fill areas shown on the NJDEP Historic Fill Maps are typically greater than 5 acres.

Raritan Bay Slag Site

The New Jersey Open Public Records Act database identified the Raritan Bay Slag site (NJDEP Program Interest Number 514709) located along the southern shore and in the Raritan Bay in Old Bridge Township and Sayreville, New Jersey. The site is located approximately 0.5 mile south of the Raritan Bay Loop, which is outside the EDR search radius. The site is included on the NJDEP Known Contaminated Site list (NJDEP 2016a) and is on the EPA National Priorities List (NPL) site list (EPA ID NJN000206276) (EPA 2016a). Although the physical address of the site is located outside the EDR search radius, Study Areas 7 and 11 (Jetty Sector) of the NPL site are located within the Project facility temporary workspace in Raritan Bay (refer to **Figure 4**). However, areas associated with project disturbance are outside areas currently planned for remediation by the EPA. Transco proposes to dispose of all dredged materials from the Study Areas 7 and 11 removed for the proposed project at an approved upland facility.

The Raritan Bay Slag site is approximately 1.5 miles long and consists of waterfront areas between Margaret's Creek and the areas just beyond the western jetty at the Cheesequake Creek Inlet. In the late 1960s and early 1970s, the Laurence Harbor seawall, which makes up a portion of the site, was reported to have metal slag from blast furnace bottoms deposited along the beachfront. The primary sources of contamination are slag from a lead reclamation process and battery casings. The prevailing currents in the vicinity of the western jetty promote sediment deposition on the western side of the jetty and transport sediment into Raritan Bay. Contamination associated with this site may be present in the Raritan Bay sediment in Area 11 (M.P. 12.17 to M.P. 12.46) and in Area 7 (M.P. 12.46 to 12.66) where the Raritan Bay Loop pipeline will be located (**Figure 4**).

3.3 Geotechnical Investigation Data for NESE Raritan Bay Loop

Pre-construction geotechnical investigations have been completed specifically for the Raritan Bay Loop Project and the Madison Loop portion of the NESE project proposed pipeline facilities. Subsurface soil and sediment information obtained through these studies has been reviewed and used to aid in evaluating materials to be managed during construction. Pertinent subsurface geotechnical information has been included in **Appendix B** and was excerpted from the following available Geotechnical Investigation Reports:

- Summary of Findings Geotechnical Investigation for Northeast Supply Enhancement - Madison Loop, Middlesex County, New Jersey, AECOM, October 13, 2017.

- Vibracore Sampling Survey Technical Report for Williams NESE Project Raritan Bay and New York Harbor; Survey Date November-December 2016 and May-June 2017; Prepared by Alpine Ocean Seismic Survey, Inc. (Alpine); Report Submittal Dated August 22, 2017.

- Geotechnical Boring Survey Field Report for Williams NESE Project Raritan Bay and Chapel Hill Channel; Survey Date January 2018; Prepared by Alpine Ocean Seismic Survey, Inc. (Alpine); Report Submittal Dated February 6, 2018.

3.4 Offshore Sediments Investigation 2016-2017

Transco conducted a field survey of the offshore sediments to evaluate the physical, chemical and biological characteristics of the sediment along the proposed Raritan Bay Loop route. The survey was performed to support evaluation of the route for both engineering design and environmental review purposes. Physical properties of the water column were also measured at the sampling sites.

The environmental sampling of the sediments was performed in conjunction with the Vibracore Sampling Survey (referenced in **Section 3.3**). Four (4) types of samples were collected under this program from each station including a vibracore sample for chemical analyses of the sediments, a vibracore sample for geotechnical analyses of the sediments, three (3) grab samples at each site for benthic analyses and one CTD (conductivity-temperature-depth) cast to characterize the water column. The sediment sampling program was conducted during the period of November through December 2016 and additional supplemental sampling was conducted in May and June 2017.

The results of the offshore sediment sampling program have been presented in the following documents previously provided to FERC under separate cover:

- Vibracore Sampling Survey Technical Report for Williams NESE Project Raritan Bay and New York Harbor; Survey Date November-December 2016 and May-June 2017; Prepared by Alpine Ocean Seismic Survey, Inc. (Alpine); Report Submittal Dated August 22, 2017.

- Fall/Winter 2016 Offshore Environmental Sampling Report for the Northeast Supply Enhancement Project, New Jersey, New York; prepared for Transcontinental Gas Pipe Line Company, LLC; prepared by Ecology and Environment, Inc; dated June 2017.

- Fall/Winter 2016 Offshore Environmental Sampling Report for the Northeast Supply Enhancement Project, New Jersey, New York – Errata and Addendum; prepared for Transcontinental Gas Pipe Line Company, LLC; prepared by Ecology and Environment, Inc; dated August 2017.

- Fall/Winter 2016 Offshore Environmental Sampling Report for the Northeast Supply Enhancement Project, New Jersey, New York – Errata and Addendum; prepared for Transcontinental Gas Pipe Line Company, LLC; prepared by Ecology and Environment, Inc; dated October 2017

A summary of the results of the sediment sampling program has been excerpted from the Resource Report No. 7 and is included herein as **Appendix C**.

Additional sediment sampling is currently being conducted along the alignment to aid in the evaluation of potential offshore sediment disposal options at the New York State District Army Corps of Engineers Historic Area Remediation Site (HARS).

3.5 Proposed Additional Pre-Construction Investigation

Transco is currently evaluating the need for additional pre-construction investigation sampling to be completed prior to pipeline construction. Any additional environmental sampling results will be included in the final MMP.

4.0 HEALTH AND SAFETY PLAN REQUIREMENTS

Prior to commencement of any intrusive or excavation activities for the Project, a site-specific health and safety plan (HASP) will be prepared by Transco or its contractors in accordance with the OSHA requirements outlined in 29 CFR 1910 and 29 CFR 1926. Transco personnel, Transco oversight personnel and Transco's construction contractor will follow site-specific HASPs for all proposed intrusive work.

Transco and/or its Contractor (if applicable) shall prepare a HASP that specifically addresses potential worker exposure to potential compounds of concern (COCs) that may be encountered at the work location. Additionally, the Contractor shall handle all regulated material in a manner that protects site personnel, the public, and the environment in accordance with all applicable federal, state and local laws and regulations.

Portions of the Project area generally lie within mapped or documented historic fill areas of New Jersey, as such, Transco will conservatively use COCs generally found in historic fill, as well as historical and/or current data available for each property, as a basis for the initial HASP (i.e., Raritan Bay Slag Site). All HASPs will be prepared and signed by a qualified safety professional. Any site-specific HASP will include the following.

- Description of the Work Activities
- Hazard Assessment
- Summary of Training Requirements
- Description of Monitoring Equipment
- Directions to Hospital
- Air Monitoring Action Levels
- Personnel Protective Equipment
- Decontamination Procedures
- Contingency Procedures

All HASPs will include a provision for the upgrading of personal protective equipment (PPE) should onsite conditions warrant. Daily job safety analyses (JSA) meetings shall be performed before the start of each work shift to discuss and address specific health and safety concerns to the project.

5.0 MATERIALS MANAGEMENT

Proper handling of encountered materials (excavated soil, water, HDD fluids and dredged sediment materials) and details of how materials generated during construction of the Project will be managed are further described below.

5.1 Management of Excavated Soil/Unsuitable Backfill (Onshore)

During the planned pipeline construction excavation activities described in **Section 2.0**, excavated material will be allowed to drain of any free liquid over the excavation and will be field screened by Transco (as described in **Section 5.5)**. If deemed suitable for use as backfill, the material will be staged directly adjacent to the ditch or staged at designated stockpile areas within the approved workspace. Excavated material that has been determined to be unsuitable for use as pipeline backfill will either be direct loaded into roll-off containers/triaxle dump trucks or staged on two layers of 6-mil plastic sheeting at a designated stockpile area within the approved workspace. Suitability for use as pipeline backfill will be based on 1.) Satisfactory physical and engineering properties (i.e. particle size less than 4-inches, compactability, free of debris and vegetation, moisture content, etc.); and 2.) Environmental field screening (refer to **Section 5.5**) or available pre-construction environmental sampling results. Any temporary stockpile of excavated material determined to be of concern, must remain covered with 6-mil poly sheeting or tarps while stockpiling activities are not being performed. Transco's Contractor will maintain and inspect all stockpile areas daily. All stockpiles containing material determined to be unsuitable for use as backfill will be surrounded and secured with orange safety fence at the end of each day. Soil erosion and sediment control features must be in place and maintained for stockpiled material, including soils staged along the ditch.

Any excavated material from the planned excavation that is determined to be unsuitable for use as backfill based on field screening observations (refer to **Section 5.5** below) will be characterized and disposed of properly, at a permitted, Transco-approved, off-site disposal facility. Detailed records of excavated material management for the Project will be maintained including areas where excess materials were generated, stockpiled and disposed. Copies of all waste characterization data and final disposal documentation will be maintained in the project files.

Pre-construction environmental samples may be completed prior to pipeline construction in an effort to identify subsurface conditions to be encountered and aid in the evaluation of material handling and disposal considerations. However, pre-construction environmental samples may not be sufficient alone for waste characterization.

Representative waste characterization sampling will be required of any material deemed unsuitable for use as backfill and being considered for offsite disposal. Transco will conduct waste characterization sampling based on the sampling protocol and laboratory analyses required by the approved waste disposal facility. Waste characterization samples will be collected in-situ (i.e. pothole sampling) or from excavated soil stockpiles, or from roll-off containers located within Transco's temporary workspace. Additionally, the Contractor will prepare a project specific Waste Management Plan (WMP) for any waste stream to be managed for off-site disposal. The WMP will identify specific waste transporters and disposal facilities, as applicable, for each waste stream and will be approved by a Company environmental representative.

Any discovery of unknown environmental condition (i.e. buried waste, drums, tanks, free-product, etc.) must be reported to Transco immediately and Transco's ***Unanticipated Discovery of Contamination Plan (UDCP)*** should be implemented.

Excavated material will be managed in accordance with approved site-specific requirements for each property (if any identified) and/or Best Management Practices (BMPs). Details of how excavated material will be managed at each property are further described below.

5.2 Construction Dewatering/Water Management (Onshore)

Based on regional land use of the area where construction activities are planned and available historical data, groundwater encountered within planned excavations through known contaminated areas may potentially be contaminated and will need to be assessed during pre-construction sampling or through field screening and sampling (if required) during construction dewatering. Water derived from dewatering of planned excavations will be managed in order of preference as follows:

- Discharge to upland ground surface through sediment control devices in accordance with approved ***Soil Erosion Sediment Control (SESC) Plan*** requirements and authorization to discharge under general permit;

- Authorization to discharge under a general permit or individual permits;

- Discharge to a sanitary sewer with proper municipality pre-approvals inplace;

- Off-site disposal at a permitted facility.

Measures will be taken to properly collect and dispose of potentially contaminated groundwater as further described below.

During all excavation activities, Transco's inspectors will make initial and routine periodic assessments to determine the presence/absence of free product and/or potential groundwater contamination. Although measurable free product is not anticipated, in the event free product or any potential contaminant is observed, discharge will be ceased and this condition will be managed through the placement of absorbents and/or booms, or other appropriate measures. A product recovery vacuum truck will be employed if warranted. Any recovered product will be disposed of at a permitted off-site facility. If no recoverable free product is observed but it is determined that water quality is not suitable for discharge, dewatering may commence to the appropriate container or tank truck. Any temporary tank containers will have secondary containment (overflow/spill guards).

Contractor will provide hoses, pumps, vacuum trucks, tanks, vehicles, equipment and personnel to containerize or dispose of any collected dewatering fluids. Additional tanks will be provided as needed. Any temporary tank containers will have secondary containment. If tank containers are situated in an unsecure area, all tanks will be fitted with valve locks. Transco will sample all containerized fluids to evaluate disposal options. Additionally, the Contractor will prepare a project specific Waste Management Plan (WMP) for any waste stream to be managed for off-site disposal. The WMP will identify specific waste transporters and disposal facilities, as applicable, for each waste stream and will be approved by a Company environmental representative.

For any construction dewatering, Transco will evaluate permitting options and implement proper procedures to satisfy the specific permit requirements. For any discharge to a sanitary sewer, Transco will obtain an authorization to discharge approval from the applicable entity. Copies on any Authorizations to Discharge under a permit and/or Temporary Discharge Approvals to sanitary sewers will be included in LCP Final Report.

5.3 Management of Horizontal Directional Drilling (HDD) Fluids/Cuttings

The HDD operations planned on this Project will generate combined drilling mud and soil/sediment cuttings (HDD fluids) in the form of "slurry". These "slurry" materials will be collected at both the entry and exit pits utilizing submersible pumps and transferred directly to storage tanks for temporary storage within designated workspace areas. The containerized HDD fluids will be characterized by Contractor for proper transport and off-site disposal via tanker truck or other appropriate container. Copies of all analytical testing and disposal documentation will be maintained and included in the final

documentation for this project. "*Transcontinental Gas Pipe Line Company, LLC*" will be identified as the generator of all construction derived waste that is managed for offsite disposal. Transco will pre-approve any disposal facility and will review and sign ALL profiles, manifests and shipping documents.

Contractor is responsible for management of all excavated materials at the HDD entry and exit points in accordance with **Section 5.1**; as well as all HDD fluids, cuttings and any wastes generated during any HDD activity.

Additionally, the Contractor will prepare a project specific Waste Management Plan (WMP) for any waste stream to be managed for off-site disposal. The WMP will identify specific waste transporters and disposal facilities, as applicable, for each waste stream and will be approved by a Company environmental representative.

5.3.1 Onshore HDD Fluids Returns

During onshore HDD activities, visual inspection of the alignment in conjunction with monitoring the volume of the fluids produced versus returned will be accomplished in an effort to identify any inadvertent return of HDD fluids to the land surface. In the event that an inadvertent return occurs, HDD operations will temporarily cease while measures to mitigate the return are employed. These measures will at a minimum include; notification to construction supervision, surrounding the area with the approved sediment barrier, collection of fluids that have accumulated at the land surface, containerizing the fluids, and characterization for proper disposal. HDD fluids collected during an inadvertent return event will not be co-mingled with HDD fluids generated and collected at the entry or exit pits until waste characterization has been completed. The ground surface at the inadvertent return location will be restored to pre-existing grade and condition. Monitoring and mitigation of any inadvertent fluid returns during onshore HDD operations will be completed in accordance with the ***Offshore Directional Drill Contingency Plan*** included herein as **Appendix D.**

5.3.2 Offshore HDD Fluids Returns

A significant inadvertent return occurring offshore may be detected by a visible plume. If an inadvertent drilling fluid release is detected offshore, outside of the exit pit, it will be monitored and documented. Drilling activities may be temporarily suspended to evaluate possible implementation of mitigation measures to regain hole integrity. Drilling activities will not be suspended unless the volume of inadvertent drilling fluid returns creates an immediate threat to public health and safety. If an extended shutdown were required to try to reduce the turbidity or amount of drilling fluid being released, it

could lead to a hole collapse and, ultimately, a failure in the HDD. This could require drilling a new hole and would therefore extend the duration of the Project.

Removal of drilling fluid surfacing offshore is not feasible because of the currents in the area. The exit pit is designed to contain the exiting fluid and cuttings. Drilling fluid returns and cuttings entering the exit pit will have a higher density than the seawater around it and thus, will settle into the excavated pit. The drilling fluid would also thicken as it is mixed with cuttings from the borehole. Any inadvertent leakage would be expected to disperse naturally with the currents.

After the inadvertent drilling fluid return has been assessed, the HDD contractor and Transco will make every effort to determine why the seepage occurred. Once the cause of the drilling fluid release has been determined, measures will be developed to control the factors causing the seepage and to minimize the chance of recurrence. Developing the corrective measure will be a joint effort of Transco and the HDD contractor and will be site- and problem-specific. Monitoring and mitigation of any inadvertent fluid returns during offshore HDD operations will be completed in accordance with the ***Offshore Directional Drill Contingency Plan*** included herein as **Appendix D.**

5.4 Management of Offshore Sediments

Transco is currently evaluating the options for management of sediments derived from dredging operations to be performed during pipeline construction. All Class C contaminated dredged sediments will be managed for upland onshore disposal. In general the following steps will be followed for upland disposal of Class C contaminated dredge sediment material:

- A clamshell dredger would be utilized to dredge material from an offshore location and placed into a sealed barge.

- The material would then be transported by barge to a local quayside processing facility.

- Once at the quayside facility, the surface water would be decanted from the sediment barge into a holding barge.

- After a hold period to allow sediments to settle out of the stored water, the holding barge would then discharge the water at the original offshore dredge location.

- Once the dredge barge is dewatered, the dredge material is treated/mixed with Portland cement and then the amended material is either loaded into trucks or placed on site. The treated dredge sediment material will be transported by land to the final disposal destination.

Sediments that are not classified as Class C contaminated dredge material and are located in waters deeper than 15 feet will be side cast for possible re-use as pipeline backfill material.

Transco is also currently evaluating potential options for disposal of sediments at the New York State District Army Corps of Engineers HARS offshore site.

5.5 Field Evaluations of Excavated Material, Groundwater & HDD Fluids

The following field guidance is provided for identification of potential buried waste and/or soil and groundwater contamination during the Project for the planned onshore pipeline excavations described in **Section 2.0,** including any open cut pipeline installation and the HDD entry pit excavation. The expected visual and olfactory signs and photoionization detector (PID) readings which may indicate the presence of obvious waste, soil or groundwater contamination are discussed below.

Visual

- The soil may have an oily or tar-like appearance and may exhibit an oily sheen on the surface.
- Debris and waste may be present in the form of bags of plastic, paper, metals, etc.
- Water may exhibit an oil sheen, or petroleum hydrocarbons may be visible as tar balls or free product floating on the surface.
- The presence of drums or other waste containers including tanks.
- The presence of flowing petroleum product or sludge.

Olfactory

- The soil or water may have a sulfur (rotten egg), petroleum or chemical odor.
- A petroleum odor will likely be coupled with an oily or tar-like appearance. Soils or water with a chemical odor may not exhibit any visual signs of contamination.

PID Readings

- All soil, debris, waste and water encountered during pipeline excavation will be field screened for volatile organic vapors using a PID.
- PID readings will be recorded for each type of excavated material encountered and used in conjunction with visual and olfactory observations to make determinations with regard to proper management of excavated material.

If field observations (visual/olfactory) and elevated PID readings indicate that obvious waste materials or contamination appear to be present, or heavy staining is present in the excavated material from the planned excavations, the soils/materials will be required to be handled as impacted/unsuitable and will be managed as described above.

If encountered soil is deemed suitable as pipeline backfill based on field observations (visual/olfactory) and PID readings, the excavated material will be temporarily placed adjacent to the trench during excavation or in a designated stockpile area in the approved workspace.

5.6 Disposal Documentation and Backfill Material Requirements

Transportation and disposal of any waste material generated during the planned excavation activities will be managed as described above and will be accomplished utilizing only approved licensed and permitted waste haulers and disposal facilities All federal, state, and local rules and regulations will be adhered to including county solid waste flow control rules. **TBD** will be responsible for obtaining all waste acceptance and approvals for disposal. For the planned excavation, HDD and conventional bore activities, "*Transcontinental Gas Pipe Line Company, LLC"* will be identified as the generator of all construction derived waste that is managed for offsite disposal.

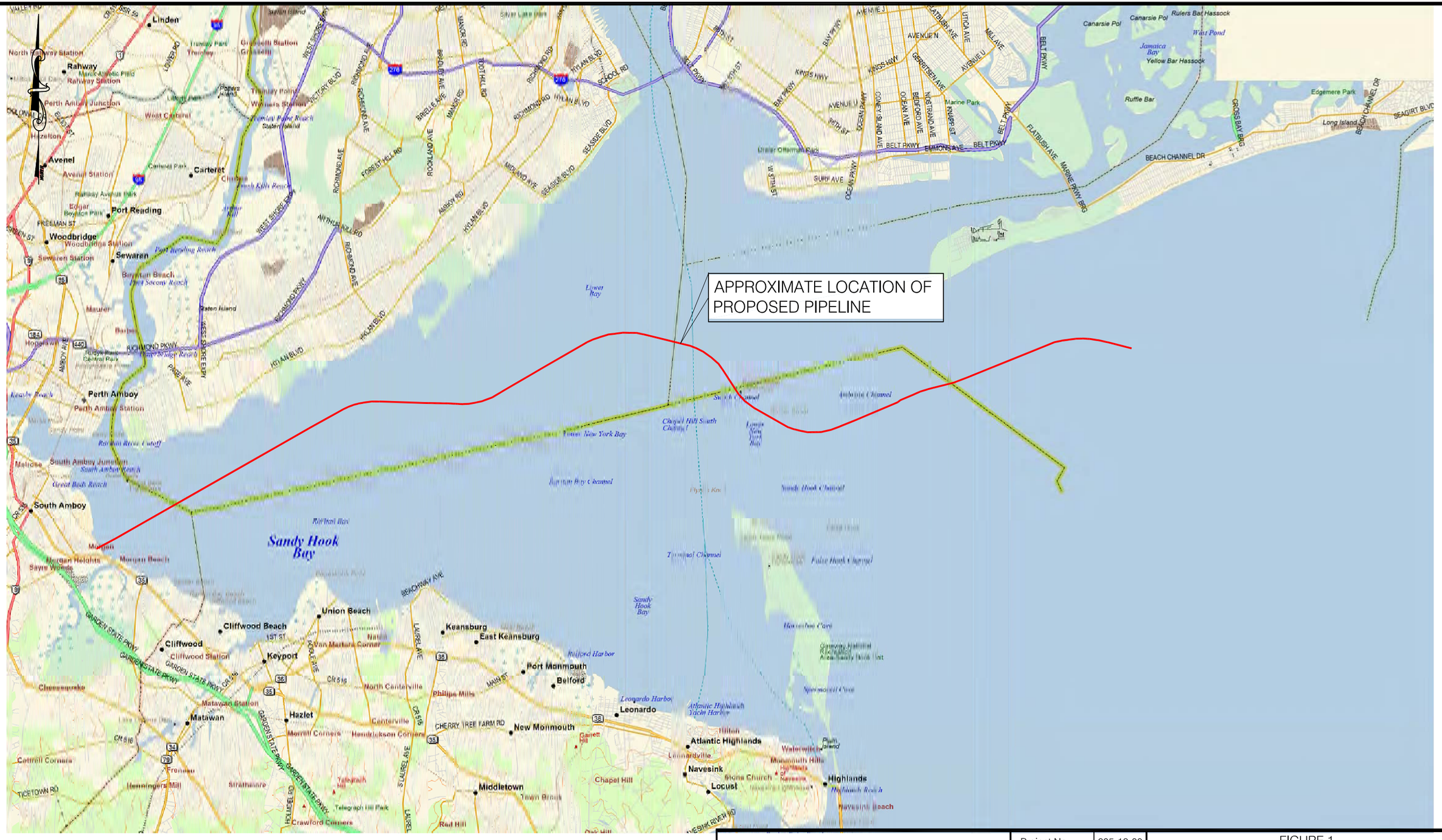
Transco will be responsible for performing any required waste characterization sampling. **TBD** is also responsible for obtaining all the required paperwork for shipment of this waste material including bill-of-lading, manifest, etc. **TBD** is responsible for the accurate completion of all shipping documentation and ensuring that all disposal information is provided for the final summary report.

Certified clean fill will be required for backfill supplied for any onshore excavation where unsuitable material was removed. If backfill is required for offshore environments, clean compatible fill will be required. Transco must pre-approve any imported backfill material and will review ALL clean fill certification documents including laboratory analytical data packages and clean fill certification letters to be provided by the supplier. A copy of a clean fill certification template is provided in **Appendix E.**

6.0 REPORTING AND DOCUMENTATION

Following completion of this linear construction project, a *Final Linear Construction Report* and *Final Report Form* will be prepared and submitted to the NJDEP by the assigned Licensed Site Remediation Professional **(**LSRP**)**. The *Final Linear Construction Report* will include, among other things, a summary of the materials management activities, waste characterization sampling results and all associated disposal and backfill documentation.

ATTACHED FIGURES



SOURCE:
DELORME XMAP 4.5

LEGEND:

APPROXIMATE LOCATION OF PROPOSED PIPELINE

S:\Projects\01-Transco\605-18-00(NESE Raritan Loop)\Figure-01.dwg LAST REV: 5/3/18

GROUND WATER INVESTIGATIONS HYDROGEOLOGY, P.C.

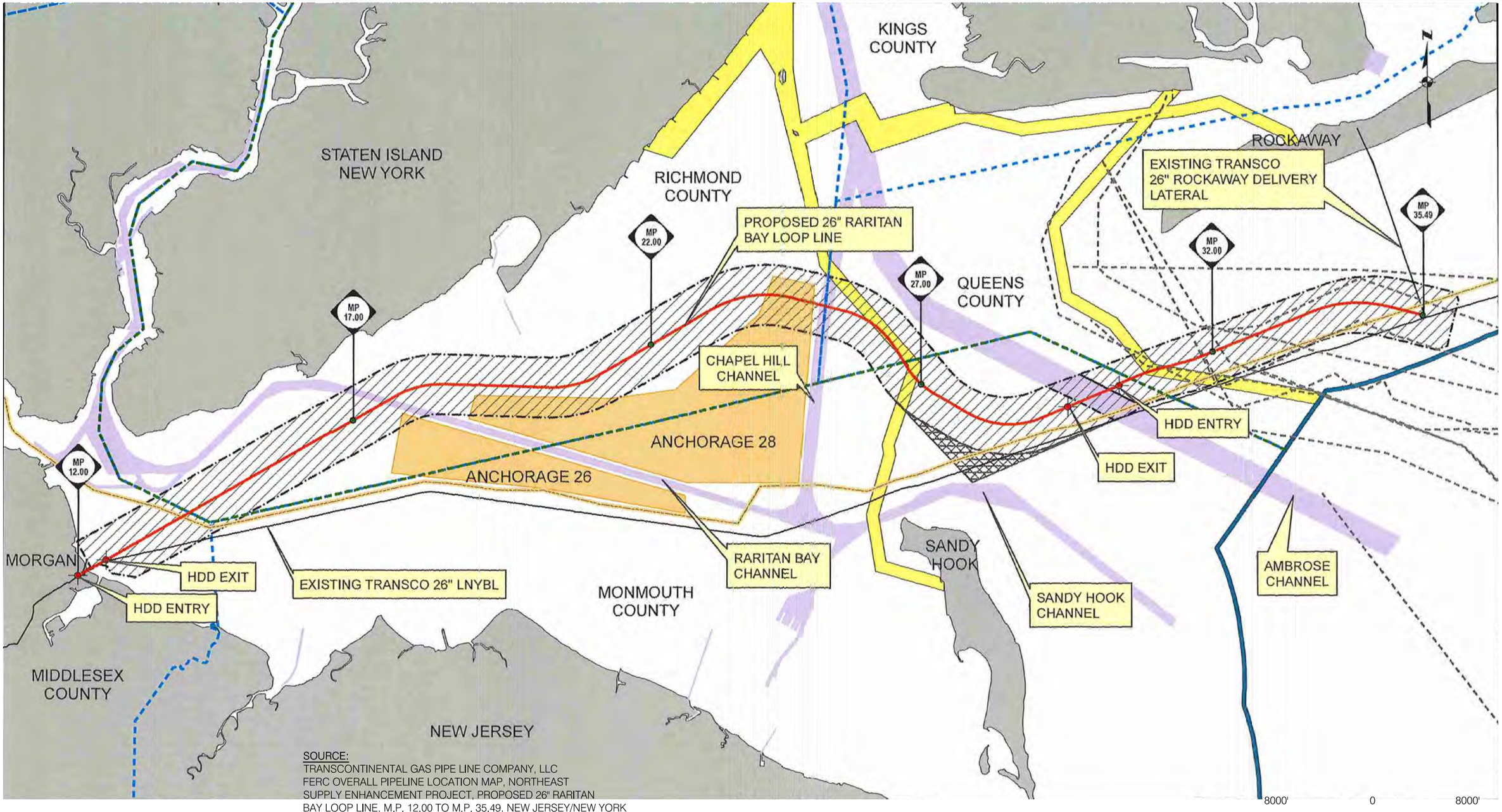
Montgomery, New York

Project No.	605-18-00
Scale:	AS SHOWN
Date:	4/25/18
Designed By:	LFC
Checked By:	LFC
Drawn By:	KAH

FIGURE 1

PROJECT LOCATION

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26-INCH RARITAN BAY LOOP
NEW JERSEY/NEW YORK



SOURCE:
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
FERC OVERALL PIPELINE LOCATION MAP, NORTHEAST SUPPLY ENHANCEMENT PROJECT, PROPOSED 26" RARITAN BAY LOOP LINE, M.P. 12.00 TO M.P. 35.49, NEW JERSEY/NEW YORK
ATTACHMENT 14, SHEET 1 OF 1, DATED 3/15/17.

PROPOSED PIPELINE
EXISTING PIPELINE
NEPTUNE CABLE
NY/NJ STATE BOUNDARY
TEMPORARY WORKSPACE
ADDITIONAL TEMPORARY WORKSPACE
USCG ANCHORAGE AREA
MARINE TRAFFIC ZONES
COUNTY LINE
3 NAUTICAL MILE BOUNDARY
SUBSEA CABLE
CABLE AREA

0 0.5 1 2 3 4 Miles

Projection: State Plane Coordinate System
Zone: New York - Long Island NAD83
Unit: US Survey Feet

Note: Operational Easement is 30 ft. for New Jersey and 200 ft. for New York, Centered on Pipeline Route.

INTECSEA
Worley Parsons Group

GROUND WATER INVESTIGATIONS
HYDROGEOLOGY, P.C.

Montgomery, New York

Project No.	605-18-00
Scale:	1"=8000'
Date:	4/20/18
Designed By:	LFC
Checked By:	LFC
Drawn By:	KAH

FIGURE 2

PROPOSED PIPELINE ROUTE

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26-INCH RARITAN BAY LOOP
NEW JERSEY/NEW YORK

S:\Projects\01-Transco\605-18-00\NESE Raritan Loop\Figure-02.dwg LAST REV: 5/3/18



HDD ENTRY OR EXIT
EXISTING TRANSCO LINE
MADISON LOOP
EXISTING TRANSCO ROW
CATHODIC PROTECTION ROUTE
PROPOSED RARITAN BAY LOOP LINE

AFFECTED PARCELS
TEMPORARY WORKSPACE
ADDITIONAL TEMPORARY WORKSPACE
PERMANENT EASEMENT
ACCESS ROADS
FACILITIES

SOURCE:
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
"FERC AERIAL PHOTO OVERVIEW MAP", NORTHEAST SUPPLY ENHANCEMENT PROJECT, PROPOSED 26" RARITAN BAY LOOP LINE, MIDDLESEX COUNTY, NEW JERSEY. ATTACHMENT 13, SHEET 1 OF 1, DATED 3/15/17.

GROUND WATER INVESTIGATIONS HYDROGEOLOGY, P.C.

Montgomery, New York

Project No.	605-18-00
Scale:	1"=170'
Date:	4/20/18
Designed By:	LFC
Checked By:	LFC
Drawn By:	KAH

FIGURE 3

AERIAL VIEW OF PROPOSED ONSHORE AND NEARSHORE PIPELINE ALIGNMENT

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC.
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26-INCH RARITAN BAY LOOP
MIDDLESEX COUNTY, NEW JERSEY

S:\Projects\01-Transco\605-18-00(NESE Raritan Loop)\Figure-03.dwg LAST REV: 5/3/18

AH SPECTOR SAYREVILLE PROJECT
Albemarle Corporation
JOHN B MOORE CORPORATION
TIGER PAW INC
Shell Service Station #138498
Restriction Depth 50
Mobil Service Station #15-JNC
Restriction Depth 50
MOBIL OIL CORP
SUNOCO 0007-6612
Sunoco Service Station #0007-6612
Restriction Depth 50
SUNOCO #0327 9627
NJ FUEL LLC DBA PARLIN SHELL
GETTY 00670
HESS STATION 30228
RACEWAY PARLIN
SAYREVILLE 127 ERNSTON RD
Getty Service Station #56893
Restriction Depth 50
E I DUPONT DENEMOURS & CO
STRAUSS DISCOUNT AUTO
BLACK TIE CLEANERS
E I Dupont
Denemours & Co
Restriction Depth 190
GREEN TREE CHEMICAL TECH INC
ROAD DEPARTMENT GARAGE AREA 3-1
RECLAMATION TECHNOLOGIES INC
MP 8.57
MP 9.00
MP 10.00
GLOBAL SANITARY LANDFILL
Global Sanitary Landfill
Restriction Depth 25
Global Sanitary
Landfill
Restriction Depth 150
GETTY 00304
SOMMERS LANDFILL
Getty Service Station #00304
Restriction Depth 50
CENTRAL JERSEY TANK CLEANERS
LIONETTI OIL RECOVERY INC
EVOR PHILLIPS LEASING COMPANY
Evor Phillips Leasing Waste Disposal
Restriction Depth 100
Stavola Old Bridge Materials,
LLC Restriction Depth 100
MOUNTAINEER CONSTRUCTION
CPS MADISON INDUSTRIES
MANZO CONTRACTING INCORPORATED
Madison Industries
CPS Chemical (CPS Madison)
SITE #38943
CUMBERLAND GULF 060608
5 JOSEPH COURT
CHEESEQUAKE STATE PARK
Cheesequake State Park
Restriction Depth 14
MORGAN ORDNANCE DEPOT
Garden State Parkway
Conventional Bore
Gondek Drive
Conventional Bore
MP 11.00
MP 12.00
MP 13.00
1788 Route 35
Restriction Depth 50
Old Spye Road
Conventional Bore
DELTA
MORGAN FIRE HOUSE
RARITAN BAY SLAG
LAURENCE HARBOR STATION INC
K & L
HARBOR CHEVRON
YACUZZIO FAMILY LLC
RARITAN BAY AUTO BODY
FIBER CHEMICAL CORPORATION
ABERDEEN TWP WATER DEPT
BRUNO'S GENERAL STORE
WEHRLE BUS SERVICE INC
SOMERSET ANCHOR LLC
Area 7
Area 11
Area 8
Area 6
Area 5
Area 2
Area 3
and 4
Area 1
Area 9
Area 10
Raritan Bay Slag
Superfund Site
Middlesex
County
Monmouth
County
Sayreville
Junction
Sayre Woods
Morgan
Morgan
Heights
Laurence
Harbor
Laurel Park
Ernston
35
9
34

Legend

- Milepost
- Approximate Conventional Boring Location
- Madison Loop (Proposed)
- Raritan Bay Loop
- Approximate HDD Segment
- County Boundary
- Major and Secondary Roads
- Local Road
- Construction Workspace
- NJDEP Known Contaminated Site
- NJDEP Groundwater Contamination Classification Exception Area (CEA)
- Historic Fill Area (>5 acres, as of Jan 2016)
- Raritan Bay Slag Superfund Site

NJDEP = New Jersey Department of Environmental Protection

0 0.25 0.5
Miles

SITE LOCATION



SOURCE:
TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC NJDEP KNOWN CONTAMINATED SITES, NORTHEAST SUPPLY ENHANCEMENT PROJECT, NEW JERSEY-FIGURE 2A-5, SHEET 1 OF 1, DATED 4/19/17.

2000' 0 2000'
SCALE IN FEET

GROUND WATER INVESTIGATIONS HYDROGEOLOGY, P.C.
Montgomery, New York

Project No.	596-17-00
Scale:	1"=2000'
Date:	11/30/17
Designed By:	LFC
Checked By:	LFC
Drawn By:	KAH

FIGURE 4

NJDEP KNOWN CONTAMINATED SITES

TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
NORTHEAST SUPPLY ENHANCEMENT PROJECT
PROPOSED 26-INCH RARITAN BAY LOOP
MIDDLESEX COUNTY, NEW JERSEY

S:\Projects\01-Transco\605-18-00(NESE Raritan Bay Loop)\Figure-04.dwg LAST REV: 5/3/18

ATTACHED TABLES

TABLE 1

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
NORTHEAST SUPPLY ENHANCEMENT (NESE) PROJECT
26-INCH RARITAN BAY LOOP LINEAR CONSTRUCTION PROJECT (LCP)
BOROUGH OF SAYREVILLE, MIDDLESEX COUNTY, NEW JERSEY
NEW JERSEY STATE WATERS & NEW YORK STATE WATERS

2018 CONSTRUCTION LINE LIST SUMMARY - PROPERTY PARCELS

Tract No.	*Tax ID No.*	*Alignment Sheet Reference*	*Ownership/Stakeholder*	*Anticipated Types of Materials to be Generated*
NESE 26-INCH RARITAN BAY LOOP - ONSHORE (Middlesex County, New Jersey)				
NJ-MI-39	1219_538_99-111, 201	1 of 8	Transco	E/HDD
NJ-MI-41	1219_540_90-94	1 of 8	1776 Fernandes, LLC	None
NJ-MI-008.000.RD	NJ RTE 35	1 of 8	New Jersey DOT	None
NJ-MI-009.000.RD	Morgan Avenue	1 of 8	Borough of Sayreville	None
NJ-MI-010.00.RD	Cliff Avenue	1 of 8	Borough of Sayreville	None
NJ-MI-46	1219_541_8-11,67-70	1 of 8	Transco	None
NJ-MI-50	1219_541_12-19,64-66	1 of 8	Transco	E/HDD
NJ-MI-67	1219_505.01_4	1 of 8	New Jersey Transit	None
NJ-MI-68	1219_505.01_1	1 of 8	New Jersey Transit	None
NJ-MI-69	1219_505.01_3	1 of 8	New Jersey Transit	None
NJ-MI-69.001	1219_553_1	1 of 8	Transco	None
NESE 26-INCH RARITAN BAY LOOP - OFFSHORE				
NJ-MI-70	New Jersey State Waters - Middlesex & Monmouth Counties	1, 2, 5 & 6 of 8	New Jersey	Sediment*
NY-RI-1	New York State Waters - Richmond & Queens Counties	2 - 7 of 8	New York	Sediment*

Notes:

E - Excavated materials derived from pipeline trench and HDD entry or exit pit excavations.

HDD - Horizontal Directional Drilling Fluids/Cuttings collected at HDD entry or exit pits.

* - Sediment Materials derived from Offshore pipeline constructon.

TABLE 2

NORTHEAST SUPPLY ENHANCEMENT (NESE) PROJECT
26-INCH RARITAN BAY LOOP LINEAR CONSTRUCTION PROJECT (LCP)
BOROUGH OF SAYREVILLE, MIDDLESEX COUNTY, NEW JERSEY
NEW JERSEY STATE WATERS & NEW YORK STATE WATERS

LIST OF KNOWN CONTAMINATED SITES WITHIN CLOSE PROXIMITY TO PROPOSED ALIGNMENT

Site Name	*Municipality*	*Source*	*Distance from Pipeline (in miles)*	*Direction from Pipeline*	*Position of Pipeline Relative to Identified Site*	*Approximate Milepost (M.P.)*	*Site Status*	*Site ID No.*
NESE 26-INCH RARITAN BAY LOOP ONSHORE (Middlesex County, New Jersey)								
Morgan Fire House	Sayreville	SHWS/HIST HWS, New Jersey Release	<0.1	South	Upgradient	12.00	inactive	NJDEP Site Remediation Program PI ID #003720
1788 Route 35 in Sayreville, NJ	Sayreville	SHWS/HIST HWS, New Jersey Release, New Jersey Spill	<0.1	Northeast	Downgradient	12.00	active	NJDEP Site Remediation Program PI ID #026234
Historic Fill	Sayreville	NJDEP Historic Fill Maps & Geoweb	0.0	-	Transects	12.12 - 12.16	-	Mapped Historic Fill
NESE 26-INCH RARITAN BAY LOOP OFFSHORE (Waters of the State of New Jersey and the State of New York)								
Raritan Bay Slag Site (Areas 11 & 7)	Sayreville	SHWS/HIST HWS, New Jersey Release; NPL	0	-	Transects	12.17 - 12.66	active	NJDEP Site Remediation Program PI ID #514709; EPA ID NJN000206276

Notes:

New Jersey Release – New Jersey Hazardous Material Release database is a record of the initial notification information reported to the NJDEP's Action Line.

New Jersey Spill – All HazMat known or unknown spills to the ground reported to the NJ DEP's Action Line.

NPL – National Priority List database, also known as Superfund, is a subset of Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the United States Environmental Protection Agency.

SHWS/HIST HWS - State Hazardous Waste Sites/Historic Hazardous Waste Sites – Known Contaminated Sites in New Jersey database is a municipal listing of sites where contamination of soil and/or groundwater is confirmed at levels greater than the applicable cleanup criteria or standards. Remedial activities are under way or required at the sites with an on-site source(s) of contamination and at locations where the source(s) of contamination are unknown. Sites with completed remedial work that require engineering and/or institutional controls have reporting measures in place to ensure the effectiveness of past actions, and some include maintenance and/or monitoring.

APPENDICES

APPENDIX A
EDR DATAMAP CORRIDOR STUDY EXECUTIVE SUMMARY

EDR DataMap®
Corridor Study

Madison Loop

- Listed Sites
- Earthquake Epicenters (Richter 5 or greater)
- Search Boundary
- Roads
- Major Roads
- Waterways
- Railroads
- Contour Lines
- Pipelines
- Powerlines
- Fault Lines
- Water
- Superfund Sites
- Federal DOD Sites
- Indian Reservations BIA
- 100-Yr Flood Zones
- National Wetland Inventory



South Amboy, NJ

0 1/2 1

Scale in Miles

EDR® Environmental Data Resources, Inc

Copyright © 2016 EDR, Inc. © 2015 TomTom Rel. 2015.

4726085.2s - 19 Sep 16

Madison Loop
South Amboy, NJ 08879

Inquiry Number: 4726085.2s
September 19, 2016

EDR DataMap™ Corridor Study

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2016 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

EXECUTIVE SUMMARY

TARGET PROPERTY INFORMATION

ADDRESS

SOUTH AMBOY, NJ 08879
SOUTH AMBOY, NJ 08879

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records within the requested search area for the following databases:

FEDERAL RECORDS

Proposed NPL	Proposed National Priority List Sites
Delisted NPL	National Priority List Deletions
NPL LIENS	Federal Superfund Liens
LIENS 2	CERCLA Lien Information
HMIRS	Hazardous Materials Information Reporting System
DOT OPS	Incident and Accident Data
US CDL	National Clandestine Laboratory Register
US BROWNFIELDS	A Listing of Brownfields Sites
DOD	Department of Defense Sites
LUCIS	Land Use Control Information System
CONSENT	Superfund (CERCLA) Consent Decrees
UMTRA	Uranium Mill Tailings Sites
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
US MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
SSTS	Section 7 Tracking Systems
RADINFO	Radiation Information Database
RMP	Risk Management Plans
LEAD SMELTERS	Lead Smelter Sites
FUELS PROGRAM	EPA Fuels Program Registered Listing
DOCKET HWC	Hazardous Waste Compliance Docket Listing
FUSRAP	Formerly Utilized Sites Remedial Action Program
COAL ASH DOE	Steam-Electric Plant Operation Data
EPA WATCH LIST	EPA WATCH LIST
US FIN ASSUR	Financial Assurance Information
PCB TRANSFORMER	PCB Transformer Registration Database
US HIST CDL	Delisted National Clandestine Laboratory Register
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
FEDERAL FACILITY	Federal Facility Site Information listing
FEMA UST	Underground Storage Tank Listing

STATE AND LOCAL RECORDS

NJ PF	Publicly Funded Cleanups Site Status Report

EXECUTIVE SUMMARY

NJ CHROME Chromate Chemical Production Waste Sites
NJ SWF/LF Solid Waste Facility Directory
NJ UIC Underground Injection Wells Database
NJ LIENS Environmental LIENS
NJ AIRS Emissions Inventory Listing
NJ COAL ASH Coal Ash Listing

TRIBAL RECORDS

INDIAN RESERV Indian Reservations
INDIAN ODI Report on the Status of Open Dumps on Indian Lands
INDIAN LUST Leaking Underground Storage Tanks on Indian Land
INDIAN UST Underground Storage Tanks on Indian Land
INDIAN VCP Voluntary Cleanup Priority Listing

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

FEDERAL RECORDS

NPL: Also known as Superfund, the National Priority List database is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the U.S. EPA.

A review of the NPL list, as provided by EDR, and dated 03/07/2016 has revealed that there are 3 NPL sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***

SEMS: SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

A review of the SEMS list, as provided by EDR, and dated 03/07/2016 has revealed that there are 5 SEMS sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***
UPPER CINNAMON GULCH	8 MILES EAST OF KEYS	27	391
CHEESEQUAKE ST PARK	PERRINES RD	111	1162

SEMS-ARCHIVE: SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

A review of the SEMS-ARCHIVE list, as provided by EDR, and dated 03/07/2016 has revealed that there are 3 SEMS-ARCHIVE sites within the searched area.

Site	Address	Map ID	Page
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
HERCULES INCORPORATE	***50 S MINNISINK AVE***	***79***	***742***
DREW METALEX CORP	***WATERWORTS RD***	***117***	***1231***

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 06/27/2016 has revealed that there are 5 CORRACTS sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
HERCULES INCORPORATE	***50 S MINNISINK AVE***	***79***	***742***
GREEN TREE CHEMICAL	***50 SOUTH MINISINK AV***	***79***	***771***
DREW METALEX CORP	***WATERWORTS RD***	***117***	***1231***

RCRA-TSDF: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

A review of the RCRA-TSDF list, as provided by EDR, and dated 06/21/2016 has revealed that there are

EXECUTIVE SUMMARY

4 RCRA-TSDF sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
HERCULES INCORPORATE	***50 S MINNISINK AVE***	***79***	***742***
GREEN TREE CHEMICAL	***50 SOUTH MINISINK AV***	***79***	***771***

RCRA-LQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

A review of the RCRA-LQG list, as provided by EDR, and dated 06/21/2016 has revealed that there are 2 RCRA-LQG sites within the searched area.

Site	Address	Map ID	Page
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
MADISON INDUSTRIES I	***554 WATERWORKS RD***	***115***	***1187***

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 06/21/2016 has revealed that there are 4 RCRA-SQG sites within the searched area.

Site	Address	Map ID	Page
HERCULES INCORPORATE	***50 S MINNISINK AVE***	***79***	***742***
GREEN TREE CHEMICAL	***50 SOUTH MINISINK AV***	***79***	***771***
WALMART STORE #2825	***1126 RT 9***	***86***	***820***
PATHMARK 72581	1043 RT 9 NORTH	102	980

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 06/21/2016 has revealed that there are 5 RCRA-CESQG sites within the searched area.

Site	Address	Map ID	Page
MODERN TREND SAYREVI	1965 RTE 35	20	236

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
WAYNES AUTO BODY	***S PINE & 10TH ST***	***20***	***272***
PEP BOYS STORE #1636	1072 HWY 9 S	62	638
HOME DEPOT USA HD095	***1090 RTE 9 SOUTH***	***72***	***661***
BJS WHOLESALE CLUB #	1007 RT 9 N	72	711

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 06/21/2016 has revealed that there are 31 RCRA NonGen / NLR sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
ZUMBACH SPORTSCARS I	***2030 STATE ROUTE 35***	***14***	***178***
GOMOLKAS AUTO BODY	2017 HWY 35	18	186
BROWNS BOAT YARD INC	ERNSTON RD & GODECK	20	197
SPECTRASERV	***PIER A MAIN ST BLK 1***	***20***	***210***
LOCKWOOD BOAT WORKS	***1825 HWY 35 MORGAN***	***20***	***224***
19 PETROLEUM SERVICE	1949 RTE 35 S	20	229
SERVICE STATION	RT 35 & HAUSSLING PL	21	336
MORGAN FRAME SPEC. I	***RTE 35***	***21***	***337***
DAN O'S MATERIALS LL	31 FIELEK TER	42	433
SAYREVILLE BORO OF -	601 ERNSTON RD	50	466
COIN-OP LAUNDRY & DR	520 ERNSTON RD	61	631
BETTY BRITE	499 ERNSTON RD	61	634
PG 10 ENTERPRISES	***1030 RT 9***	***62***	***639***
JOY TRUCKING	5905 DOWNING ST	72	659
HOME DEPOT THE 905	1007 RTE 9 N OLD RID	72	714
CHEESEQUAKE AUTO REP	***BORDENTOWN AVE & CHE***	***75***	***720***
SHELL OIL CO	BORDENTOWN AVE & CHE	75	730
MOOREHOUSE SPEEDWELL	***3101 BORDENTOWN AVE***	***75***	***731***
ACADEMY HONDA AT OLD	***RTE 9 N***	***82***	***786***
NJDOT RTE 9 SEC 25J	3141 BORDENTOWN AVE	83	807
NJDOT RTE 9 SEC 25J	3141 BORDENTOWN AVE	83	811
ZOUBEK ASSOCIATES	***3220 BORDENTOWN TNPK***	***96***	***910***
C R WINES TRUCKING C	3191 BORDENTOWN AVE	96	931
RACEWAY OLD BRIDGE (	***1300 RTE 9***	***102***	***939***
GATEWAY CLEANERS - F	1054 US HWY 9 - GATE	102	983
MANZO CONTRACTING CO	***CHESEQUAKE RD***	***104***	***1066***
B ANTHONY CONSTRUCTI	3170 BORDENTOWN AVE	105	1116
AWT ENVIRONMENTAL SE	3220 BORDENTOWN AVE	105	1130
EASCO ALUMINUM CO -	***3237 BORDENTOWN AVE***	***105***	***1148***
DREW METALEX CORP	***WATERWORTS RD***	***117***	***1231***

US ENG CONTROLS: A listing of sites with engineering controls in place.

A review of the US ENG CONTROLS list, as provided by EDR, and dated 05/09/2016 has revealed that there are 3 US ENG CONTROLS sites within the searched area.

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***
HERCULES INCORPORATE	***50 S MINNISINK AVE***	***79***	***742***

US INST CONTROL: A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

A review of the US INST CONTROL list, as provided by EDR, and dated 05/09/2016 has revealed that there are 2 US INST CONTROL sites within the searched area.

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***

ERNS: The Emergency Response Notification System records and stores information on reported releases of oil and hazardous substances. The source of this database is the U.S. EPA.

A review of the ERNS list, as provided by EDR, and dated 03/28/2016 has revealed that there are 4 ERNS sites within the searched area.

Site	Address	Map ID	Page
Not reported	130 OLD SPYE ROAD	27	367
Not reported	ACROSS STREET FROM 2	93	888
Not reported	3237 BORDENTOWN ROAD	105	1148
Not reported	MANZO CONTRACTING	107	1154

FUDS: The Listing includes locations of Formerly Used Defense Sites Properties where the US Army Corps Of Engineers is actively working or will take necessary cleanup actions.

A review of the FUDS list, as provided by EDR, and dated 01/31/2015 has revealed that there are 2 FUDS sites within the searched area.

Site	Address	Map ID	Page
NIKE NY-60		16	182
MORGAN ORD SUP DEPOT		89	861

EXECUTIVE SUMMARY

ROD: Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid the cleanup.

A review of the ROD list, as provided by EDR, and dated 11/25/2013 has revealed that there are 2 ROD sites within the searched area.

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***

FTTS: FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act) over the previous five years. To maintain currency, EDR contacts the Agency on a quarterly basis.

A review of the FTTS list, as provided by EDR, has revealed that there are 3 FTTS sites within the searched area.

Site	Address	Map ID	Page
LOCKWOOD BOAT WORK	1825 RT 35 SOUTH	20	223
Database: FTTS INSP, Date of Government Version: 04/09/2009			
A W T ENVIRONMENTAL	***3220 BORDENTOWN AVE***	***96***	***917***
Database: FTTS INSP, Date of Government Version: 04/09/2009			
AWT ENVIRONMENTAL SE	***3220 BORDENTOWN TURN***	***96***	***918***
Database: FTTS INSP, Date of Government Version: 04/09/2009			

HIST FTTS: A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

A review of the HIST FTTS list, as provided by EDR, has revealed that there are 2 HIST FTTS sites within the searched area.

Site	Address	Map ID	Page
A W T ENVIRONMENTAL	***3220 BORDENTOWN AVE***	***96***	***917***
Database: HIST FTTS INSP, Date of Government Version: 10/19/2006			
AWT ENVIRONMENTAL SE	***3220 BORDENTOWN TURN***	***96***	***918***
Database: HIST FTTS INSP, Date of Government Version: 10/19/2006			

EXECUTIVE SUMMARY

ICIS: The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

A review of the ICIS list, as provided by EDR, and dated 01/23/2015 has revealed that there are 6 ICIS sites within the searched area.

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	*OLD WATER WORKS ROAD*	*0*	*78*
GLOBAL SANITARY LAND	*ERNSTON ROAD*	*0*	*105*
SPECTRASERV	*PIER A MAIN ST BLK 1*	*20*	*210*
LA MER PHASE 5 AND 6	*GIORDANO AVENUE*	*77*	*739*
RACEWAY OLD BRIDGE (	*1300 RTE 9*	*102*	*939*
PATHMARK/LIQUOR STOR	*1001 RT 9*	*102*	*1037*

PADS: The PCB Activity Database identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs who are required to notify the United States Environmental Protection Agency of such activities. The source of this database is the U.S. EPA.

A review of the PADS list, as provided by EDR, and dated 01/20/2016 has revealed that there are 2 PADS sites within the searched area.

Site	Address	Map ID	Page
E I DUPONT DE NEMOUR	*250 CHEESEQUAKE RD*	*52*	*471*
LORCO PETROLEUM SERV	*RUNTON & CHEESEQUAKE*	*119*	*1242*

MLTS: The Material Licensing Tracking System is maintained by the Nuclear Regulatory Commission and contains a list fo approximately 8,100 sites which possess or use radioactive materials and are subject to NRC licensing requirements.

A review of the MLTS list, as provided by EDR, and dated 03/07/2016 has revealed that there is 1 MLTS site within the searched area.

Site	Address	Map ID	Page
GREEN TREE CHEMICAL	*50 SOUTH MINISINK AV*	*79*	*771*

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 07/20/2015 has revealed that there are 191 FINDS sites within the searched area.

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	*OLD WATER WORKS ROAD*	*0*	*78*
GLOBAL SANITARY LAND	*ERNSTON ROAD*	*0*	*105*
73 LUKE STREET	*73 LUKE ST*	*13*	*172*
BROWNS BOAT YARD INC	*ERNSTON RD & GODECK*	*20*	*196*
JCP&L LAURENCE HARBO	*RT 35*	*20*	*206*
SOMERSET RECYCLING A	*RTE 27 & CHURCHILL A*	*20*	*206*
HORSELESS CARRIAGE S	*RTE 35*	*20*	*207*
SERVICE STATION	*W S RTE 9*	*20*	*207*
C I L CHEMICAL INC S	*CHEVALIER ST*	*20*	*208*
AMOCO OIL CO	*993 RTE 9 N & ERNSTO*	*20*	*208*
CHEVALIER ENTERPRISE	*CROSS AVE*	*20*	*208*
CONRAIL SOUTH AMBOY	*ENGINEHOUSE600 FT E*	*20*	*209*
JULIANS BODY & FENDE	*RTE 9 UPPER MAIN ST*	*20*	*209*
JAMES PETROZELLO CO	*RT 35*	*20*	*210*
SPECTRASERV	*PIER A MAIN ST BLK 1*	*20*	*210*
THE CHESTER PARTNERS	*100 METRO PARK SOUTH*	*20*	*213*
DYNASTY DRY CLEANERS	*RT 9*	*20*	*214*
RENE AMOCO	*9 & 35 SB NEAR OAK S*	*20*	*214*
SERVICE STATION	*RTE 9 MADISON TWP*	*20*	*215*
MOBIL SERVICE STATIO	*MP 124.1 MEDIAN GSP*	*20*	*215*
DAVE & SON LAWN & LA	*1201 ERNSTON RD*	*20*	*216*
MILLER INDUSTRIES IN	*RT 35 & ERNSTON RD*	*20*	*216*
LOCKWOOD BOAT WORKS	*1825 RT 35*	*20*	*221*
LOCKWOOD BOAT WORKS	*1825 HWY 35 MORGAN*	*20*	*222*
MATTYS ONSITE CORP	*1945 RT 35*	*20*	*233*
MATERIALS INTERNATIO	*1945 RT 35*	*20*	*233*
STADIUM AUTO PARTS I	*MAIN STREET AND SCOT*	*20*	*236*
MODERN TREND SAYREVI	*1965 RTE 35*	*20*	*239*
SANITARY FUEL	*RT 35 & LORRAINE AVE*	*20*	*244*
MORGAN AUTO PARTS	*1841 RT 35 S*	*20*	*244*
CENTRAL JERSEY START	*1809 RT 35*	*20*	*251*
19 PETROLEUM SERVICE	*1949 RTE 35 S*	*20*	*251*
BAYSHORE DENTAL ARTS	*1872 RT 35*	*20*	*254*
SCHNEIDER NATIONAL B	*RT 9 & 35*	*20*	*268*
VITAL MOBILE CARE IN	*RT 9 N & RT 35*	*20*	*268*
SUNOCO SERVICE STATI	*6090 RTE 9 & 35 N*	*20*	*269*
WAYNES AUTO BODY	*S PINE & 10TH ST*	*20*	*269*
MORGAN FRAME SPECIAL	*1969 RT 35*	*20*	*270*
REXINIS DEMITRIOS	*1970 RT 35 N*	*20*	*271*
CHARLES KOMAR & SONS	*259 STEVENS AVE*	*20*	*272*
WAYNES AUTO BODY	*10TH ST & S PINE AVE*	*20*	*277*
HARRYS GUARANTEED EN	*272 STEVENS AVE*	*20*	*277*
175 NORTON STREET	*175 NORTON ST*	*20*	*277*
FIBERDEX BOAT REPAIR	*229 9TH ST*	*20*	*280*
333 SOUTH PINE AVENU	*333 S PINE AVE*	*20*	*282*
MORGAN PRINTING SERV	*333 S PINE AVE*	*20*	*283*
175 GABRIEL TERRACE	*175 GABRIEL TER*	*20*	*285*
GKB LANDSCAPING	*292 STEVENS AVE*	*20*	*286*
30 LIBERTY STREET	*30 LIBERTY ST*	*20*	*288*
SAYREVILLE BORO MORG	*RT 35 & OLD SPYE RD*	*21*	*294*
SUN REFINING	*RT 35 & HAUSSLING PL*	*21*	*321*
SERVICE STATION	*RT 35 & HAUSSLING PL*	*21*	*321*
GETTY SERVICE STATIO	*1788 RT 35*	*21*	*324*
NATIONAL FUEL TRANSP	*1788 RT 35 N*	*21*	*335*
SUNOCO SERVICE STATI	*1788 RT 35*	*21*	*335*
ARCHIES BOAT TOPS CO	*1800 RT 35*	*21*	*336*

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
189 MORGAN AVENUE	*189 MORGAN AVE*	*21*	*339*
JOHN EGAN CONTRACTIN	*2 SOUTH ST*	*21*	*344*
240 TYLER STREET	*240 TYLER ST*	*21*	*345*
267 MIDLAND AVENUE	*267 MIDLAND AVE*	*21*	*345*
293 MIDLAND AVENUE	*293 MIDLAND AVE*	*21*	*350*
H&M AERONAUT TOOL CO	*64 MORRIS ST*	*21*	*350*
LAWN BUTLER	*21 MORRIS ST*	*21*	*351*
JOBMANN STEVEN & ELI	*120 OLD SPYE RD*	*27*	*359*
NJ TRANSIT AUTH NORT	*MM 3.22*	*27*	*359*
NJ TRANSIT AUTH	*OLD SPYE RD*	*27*	*364*
NJDOT REHAB OF ROUTE	*RT 35*	*27*	*364*
A&B MARINE	*RT 35*	*27*	*367*
ALLIED VAN LINES	*RT 35 S*	*27*	*367*
CANADA LAND CO INC	*OLD SPYE RD*	*27*	*370*
LOCKWOOD MARINA	*OLD SPYE RD*	*27*	*370*
OLD SPYE MARINA	*OLD SPYE RD*	*27*	*370*
BENINATO TOM	*OLD SPYE RD*	*27*	*371*
NJ NATURAL GAS CHEES	*RT 35*	*27*	*371*
VIKINGS MARINA MAINT	*1707 RT 35*	*27*	*379*
VIKINGS MARINA	*STATE HIGHWAY RT 35*	*27*	*379*
VIKINGS MARINA CORP	*1705 1707 RT 35*	*27*	*381*
SAYREVILLE BORO MUA	*OLD SPYE RD*	*27*	*390*
LEVEL 3 COMMUNICATIO	*809 ERNSTON RD*	*31*	*396*
MORGAN MARINA INC	*ERNSTON RD*	*31*	*397*
NJ HIGHWAY AUTH #841	*ERNSTON RD*	*31*	*397*
OAKVIEW CARE CENTER	*901 ERNSTON RD*	*31*	*406*
901 ERNSTON RD EASTE	*901 ERNSTON RD*	*31*	*406*
CARRIAGE HOUSE MANOR	*901 ERNSTON RD*	*31*	*406*
BRIARWOOD 901 ERNSTO	*901 ERNSTON RD*	*31*	*410*
THE BRIARWOOD CARE &	*901 ERNSTON RD*	*31*	*410*
MORGAN WTP	*GORDON AVENUE*	*32*	*415*
MATTYS ONSITE CORP	*2514 LIGHTHOUSE PL*	*35*	*419*
SAYREVILLE BORO MUA	*ERNSTON RD*	*35*	*419*
B&C AUTO SALES INC	*2115 BAYHEAD DR*	*36*	*420*
SAYREVILLE BORO MUA	*GONDEK DR*	*36*	*420*
USDOD ARMY MORGAN OR	*601 ERNSTON ROAD*	*37*	*426*
GOLDEN AGE DEVELOPME	*GONDEK DR*	*40*	*428*
DAVES AUTOMOTIVE	*27 BORDENTOWN AVE*	*41*	*432*
SAYREVILLE BORO MUA	*ERNSTON RD*	*44*	*445*
MORGAN CREEK BOATWOR	*MORGAN PLANT RD*	*46*	*453*
SAYREVILLE BORO GLOB	*ZAUNEROWICZ RD*	*46*	*453*
BROWNS BOAT YARD	*7 ZAUNEROWICZ RD*	*46*	*454*
AMERICAN INTERNATION	*10 MOLTEG DR*	*54*	*607*
14 LAURENCE PARKWAY	*14 LAURENCE PKWY*	*55*	*610*
MORGAN MARINA INC	*8000 GONDEK DR*	*56*	*611*
COIN OP LAUNDRY & CL	*520 ERNSTON RD*	*61*	*630*
PG 10 ENTERPRISES	*1030 RT 9*	*62*	*639*
NJ TURNPIKE AUTH	*GARDEN STATE PKWY MM*	*64*	*647*
416 ORCHARD AVENUE	*416 ORCHARD AVE*	*69*	*654*
LAMER DEVELOPMENT	*ERNSTON RD*	*70*	*655*
JOY TRUCKING	*5905 DOWNING ST*	*72*	*658*
BRUCE M LITTMAN DMD	*6001 DOWNING ST*	*72*	*660*
LONDON TERRACE APART	*715 DOWNING ST*	*72*	*660*
NJDOT	*RT9 & ERNSTON RD*	*72*	*698*
BJS WHOLESALE CLUB #	*1007 RT 9 N*	*72*	*703*
R&S STRAUSS	*SAYREWOODS SHOPPING*	*72*	*706*

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
R&S STRAUSS @ SAYRE	*RT 9 & ERNSTON RD*	*72*	*707*
HOME DEPOT THE 905	*1007 RTE 9 N OLD RID*	*72*	*714*
CHEESEQUAKE AUTO REP	*BORDENTOWN AVE & CHE*	*75*	*720*
JAN KULA CO	*42 OAKWOOD DR*	*76*	*738*
LA MER PHASE 5 AND 6	*GIORDANO AVENUE*	*77*	*739*
PARKSIDE GARDENS ASS	*GORNIAK DR*	*80*	*783*
ACADEMY HONDA AT OLD	*RTE 9 N*	*82*	*790*
DARON MOTORS INC ACA	*1101 CHEESEQUAKE BRO*	*82*	*790*
PROGRESSIVE MAINTENA	*3145 BORDENTOWN AVE*	*83*	*791*
THE MCCORMACK GROUP	*3145 BORDENTOWN AVE*	*83*	*792*
ARNEL LABORATORY SER	*3145 BORDENTOWN AVE*	*83*	*793*
IF ASSOC INC	*3145 BORDENTOWN AVE*	*83*	*793*
LOEFFELS WASTE OIL C	*3143 BORDENTOWN AVE*	*83*	*794*
PARADISE LAWNS 2 COR	*3143 BORDENTOWN AVE*	*83*	*794*
V CHEVALIER SR	*3143 BORDENTOWN AVE*	*83*	*795*
JOHNNY ON THE SPOT	*3143 BORDENTOWN AVE*	*83*	*798*
H HANSON INC	*3143 BORDENTOWN AVE*	*83*	*798*
ASPAR CHEMICAL CORP	*3143 BORDENTOWN AVE*	*83*	*799*
ALLOY CONCEPTS & FAB	*3143 BORDENTOWN AVE*	*83*	*807*
CME ASSOC	*3141 BORDENTOWN AVE*	*83*	*811*
ALTERNATE DISPOSAL S	*3141 BORDENTOWN AVE*	*83*	*813*
PARLIN EAST GROUP	*3141 BORDENTOWN AVE*	*83*	*813*
JOYREI ENTERPRISES I	*3143 BORDENTOWN AVE*	*83*	*814*
1005 WILBUR PLACE	*1005 WILBUR PL*	*84*	*815*
GLOBAL SLF MIDDLESEX	*UNKNOWN*	*90*	*863*
GLOBAL LANDFILL RECL	*ERNSTON STATION RD*	*90*	*864*
OLD BRIDGE TWP ROAD	*RT 9*	*91*	*881*
MIDDLESEX CNTY ROAD	*CHEESEQUAKE BROWNTOW*	*91*	*881*
TSYBULSKYY CONSTRUCT	*10 PARKWOOD DR*	*92*	*886*
GALANTE DISPOSAL INC	*3233 CHEESEQUAKE RD*	*94*	*894*
3 VAN DELFT DRIVE	*3 VAN DELFT DR*	*95*	*900*
NIEUW AMSTERDAM VILL	*1 VAN DELFT DR*	*95*	*900*
PARKWOOD VILLAGE APA	*1 WESTMINSTER BLVD*	*95*	*901*
GP CONTRACTOR CORP	*19 WESTMINSTER BLVD*	*95*	*901*
M&S HOME IMPROVEMENT	*3225 BORDENTOWN AVE*	*96*	*910*
AWT ENVIRONMENTAL SE	*3220 BORDENTOWN AMBO*	*96*	*914*
ZOUBEK ASSOCIATES	*3220 BORDENTOWN TNPK*	*96*	*917*
OJO TRUCKING CORP	*3213 BORDENTOWN AVEN*	*96*	*927*
ALTERNATE DISPOSAL S	*3200 BORDENTOWN AVE*	*96*	*930*
CR WINES TRUCKING CO	*3191 BORDENTOWN AVE*	*96*	*930*
PARK MANAGEMENT	*3168 BORDENTOWN AVE*	*97*	*932*
MANZO HOLDINGS	*WATERWORKS RD*	*98*	*935*
OLD BRIDGE CLEAN ENE	*CHEESEQUAKE ROAD AND*	*99*	*935*
PHIL VESPIA TIRE CEN	*1209 CHEESEQUAKE BRO*	*100*	*935*
EVOR PHILLIPS LEASIN	BORDENTOWN S AMBOY T	101	936
RACEWAY OLD BRIDGE (	*1300 RTE 9*	*102*	*939*
GETTY SERVICE STATIO	*1294 RT 9*	*102*	*943*
HOME DEPOT USA HD095	*1090 RTE 9 SOUTH*	*102*	*974*
LOWE'S OF OLD BRIDGE	*1324 HIGHWAY 9*	*102*	*975*
GATEWAY CLEANERS - F	*1054 US HWY 9 - GATE*	*102*	*983*
LAMAR CO @ GATEWAY S	*1054 RT 9*	*102*	*983*
HOME DEPOT INC #957	*1007 RT 9*	*102*	*1018*
BJS WHOLESALE CLUB	*1007 RT 9*	*102*	*1027*
SUNG FRENCH DRY CLEA	*15 RT 9*	*102*	*1033*
REMSCO ASSOC	*425 RTE 9 N*	*102*	*1034*
PATHMARK/LIQUOR STOR	*1001 RT 9*	*102*	*1037*

Site	Address	Map ID	Page
SATURN DEALERSHIP	*955 RT 9*	*102*	*1038*
LUKOIL SERVICE STATI	*3699 RD 1 RTE 9*	*102*	*1038*
RACEWAY SERVICE STAT	*1300 CHEESEQUAKE BRO*	*102*	*1041*
EMPORIUM GAS SERVICE	*1299 CHEESEQUAKE BRO*	*102*	*1060*
INTERTECH CONSTRUCTO	*8 OLD RD*	*102*	*1060*
U HAUL CENTER	1275 RT 9	102	1061
RLT TRUCKING CO	*OLD WATER WORKS RD*	*104*	*1076*
PJ & DAUGHTERS	*OLD WATERWORKS RD*	*104*	*1077*
EVOR PHILIPS LEASING	*OLD WATER WORKS RD*	*104*	*1078*
MOUNTAINEER CONSTRUC	*WATERWORKS RD*	*105*	*1090*
GALANTE DISPOSAL INC	*3233 WATERWORKS RD*	*105*	*1114*
CREATIVE MODULAR HOM	*WATERWORKS RD*	*105*	*1115*
JH MONTEATH CO	*3152 BORDENTOWN AVE*	*105*	*1125*
CONTINENTAL WOOD PRO	*3150 BORDENTOWN AVE*	*105*	*1128*
YONKERS PLYWOOD MFG	*BORDENTOWN AVE & CHE*	*105*	*1141*
Not reported	*WTP,BORDENTOWN AVE &*	*105*	*1143*
MIDHATTAN WOODWORKIN	*3130 BORDENTOWN AVE*	*105*	*1145*
EASCO ALUMINUM CO JE	*3237 BORDENTOWN AVE*	*105*	*1147*
DUNRITE TRANSMISSION	*3237 BORDENTOWN AVE*	*105*	*1148*
MARIOS CONCRETE & PA	*3237 BORDENTOWN AVE*	*105*	*1150*
OLD BRIDGE TWP SOMME	*CHEESEQUAKE RD*	*106*	*1151*
MANZO CONTRACTING CO	*CHEESEQUAKE RD*	*109*	*1158*
ESPOSITO CONSTRUCTIO	601 WATERWORKS RD	109	1159

RAATS: The RCRA Administration Action Tracking System contains records based on enforcement actions issued under RCRA and pertaining to major violators. It includes administrative and civil actions brought by the United States Environmental Protection Agency. The source of this database is the U.S. EPA.

A review of the RAATS list, as provided by EDR, and dated 04/17/1995 has revealed that there is 1 RAATS site within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	*570 OLD WATERWORKS R*	*0*	*4*

ECHO: ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

A review of the ECHO list, as provided by EDR, and dated 09/20/2015 has revealed that there are 193 ECHO sites within the searched area.

Site	Address	Map ID	Page
EVOR PHILLIPS LEASIN	*OLD WATER WORKS ROAD*	*0*	*78*
GLOBAL SANITARY LAND	*ERNSTON ROAD*	*0*	*105*
73 LUKE STREET	*73 LUKE ST*	*13*	*172*
BROWNS BOAT YARD INC	*ERNSTON RD & GODECK*	*20*	*196*
JCP&L LAURENCE HARBO	*RT 35*	*20*	*206*
SOMERSET RECYCLING A	*RTE 27 & CHURCHILL A*	*20*	*206*
HORSELESS CARRIAGE S	*RTE 35*	*20*	*207*
SERVICE STATION	*W S RTE 9*	*20*	*207*
C I L CHEMICAL INC S	*CHEVALIER ST*	*20*	*208*

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
AMOCO OIL CO	*993 RTE 9 N & ERNSTO*	*20*	*208*
CHEVALIER ENTERPRISE	*CROSS AVE*	*20*	*208*
CONRAIL SOUTH AMBOY	*ENGINEHOUSE600 FT E*	*20*	*209*
JULIANS BODY & FENDE	*RTE 9 UPPER MAIN ST*	*20*	*209*
JAMES PETROZELLO CO	*RT 35*	*20*	*210*
SPECTRASERV	*PIER A MAIN ST BLK 1*	*20*	*210*
THE CHESTER PARTNERS	*100 METRO PARK SOUTH*	*20*	*213*
DYNASTY DRY CLEANERS	*RT 9*	*20*	*214*
RENE AMOCO	*9 & 35 SB NEAR OAK S*	*20*	*214*
SERVICE STATION	*RTE 9 MADISON TWP*	*20*	*215*
MOBIL SERVICE STATIO	*MP 124.1 MEDIAN GSP*	*20*	*215*
DAVE & SON LAWN & LA	*1201 ERNSTON RD*	*20*	*216*
MILLER INDUSTRIES IN	*RT 35 & ERNSTON RD*	*20*	*216*
LOCKWOOD BOAT WORKS	*1825 RT 35*	*20*	*221*
LOCKWOOD BOAT WORKS	*1825 HWY 35 MORGAN*	*20*	*222*
MATTYS ONSITE CORP	*1945 RT 35*	*20*	*233*
MATERIALS INTERNATIO	*1945 RT 35*	*20*	*233*
STADIUM AUTO PARTS I	*MAIN STREET AND SCOT*	*20*	*236*
MODERN TREND SAYREVI	*1965 RTE 35*	*20*	*239*
SANITARY FUEL	*RT 35 & LORRAINE AVE*	*20*	*244*
MORGAN AUTO PARTS	*1841 RT 35 S*	*20*	*244*
CENTRAL JERSEY START	*1809 RT 35*	*20*	*251*
19 PETROLEUM SERVICE	*1949 RTE 35 S*	*20*	*251*
BAYSHORE DENTAL ARTS	*1872 RT 35*	*20*	*254*
SCHNEIDER NATIONAL B	*RT 9 & 35*	*20*	*268*
VITAL MOBILE CARE IN	*RT 9 N & RT 35*	*20*	*268*
SUNOCO SERVICE STATI	*6090 RTE 9 & 35 N*	*20*	*269*
WAYNES AUTO BODY	*S PINE & 10TH ST*	*20*	*269*
MORGAN FRAME SPECIAL	*1969 RT 35*	*20*	*270*
REXINIS DEMITRIOS	*1970 RT 35 N*	*20*	*271*
CHARLES KOMAR & SONS	*259 STEVENS AVE*	*20*	*272*
WAYNES AUTO BODY	*10TH ST & S PINE AVE*	*20*	*277*
HARRYS GUARANTEED EN	*272 STEVENS AVE*	*20*	*277*
175 NORTON STREET	*175 NORTON ST*	*20*	*277*
FIBERDEX BOAT REPAIR	*229 9TH ST*	*20*	*280*
333 SOUTH PINE AVENU	*333 S PINE AVE*	*20*	*282*
MORGAN PRINTING SERV	*333 S PINE AVE*	*20*	*283*
175 GABRIEL TERRACE	*175 GABRIEL TER*	*20*	*285*
GKB LANDSCAPING	*292 STEVENS AVE*	*20*	*286*
30 LIBERTY STREET	*30 LIBERTY ST*	*20*	*288*
SAYREVILLE BORO MORG	*RT 35 & OLD SPYE RD*	*21*	*294*
SUN REFINING	*RT 35 & HAUSSLING PL*	*21*	*321*
SERVICE STATION	*RT 35 & HAUSSLING PL*	*21*	*321*
GETTY SERVICE STATIO	*1788 RT 35*	*21*	*324*
NATIONAL FUEL TRANSP	*1788 RT 35 N*	*21*	*335*
SUNOCO SERVICE STATI	*1788 RT 35*	*21*	*335*
ARCHIES BOAT TOPS CO	*1800 RT 35*	*21*	*336*
189 MORGAN AVENUE	*189 MORGAN AVE*	*21*	*339*
JOHN EGAN CONTRACTIN	*2 SOUTH ST*	*21*	*344*
240 TYLER STREET	*240 TYLER ST*	*21*	*345*
267 MIDLAND AVENUE	*267 MIDLAND AVE*	*21*	*345*
293 MIDLAND AVENUE	*293 MIDLAND AVE*	*21*	*350*
H&M AERONAUT TOOL CO	*64 MORRIS ST*	*21*	*350*
LAWN BUTLER	*21 MORRIS ST*	*21*	*351*
JOBMANN STEVEN & ELI	*120 OLD SPYE RD*	*27*	*359*
NJ TRANSIT AUTH NORT	*MM 3.22*	*27*	*359*

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
NJ TRANSIT AUTH	*OLD SPYE RD*	*27*	*364*
NJDOT REHAB OF ROUTE	*RT 35*	*27*	*364*
A&B MARINE	*RT 35*	*27*	*367*
ALLIED VAN LINES	*RT 35 S*	*27*	*367*
CANADA LAND CO INC	*OLD SPYE RD*	*27*	*370*
LOCKWOOD MARINA	*OLD SPYE RD*	*27*	*370*
OLD SPYE MARINA	*OLD SPYE RD*	*27*	*370*
BENINATO TOM	*OLD SPYE RD*	*27*	*371*
NJ NATURAL GAS CHEES	*RT 35*	*27*	*371*
VIKINGS MARINA MAINT	*1707 RT 35*	*27*	*379*
VIKINGS MARINA	*STATE HIGHWAY RT 35*	*27*	*379*
VIKINGS MARINA CORP	*1705 1707 RT 35*	*27*	*381*
SAYREVILLE BORO MUA	*OLD SPYE RD*	*27*	*390*
LEVEL 3 COMMUNICATIO	*809 ERNSTON RD*	*31*	*396*
MORGAN MARINA INC	*ERNSTON RD*	*31*	*397*
NJ HIGHWAY AUTH #841	*ERNSTON RD*	*31*	*397*
OAKVIEW CARE CENTER	*901 ERNSTON RD*	*31*	*406*
901 ERNSTON RD EASTE	*901 ERNSTON RD*	*31*	*406*
CARRIAGE HOUSE MANOR	*901 ERNSTON RD*	*31*	*406*
BRIARWOOD 901 ERNSTO	*901 ERNSTON RD*	*31*	*410*
THE BRIARWOOD CARE &	*901 ERNSTON RD*	*31*	*410*
MORGAN WTP	*GORDON AVENUE*	*32*	*415*
MATTYS ONSITE CORP	*2514 LIGHTHOUSE PL*	*35*	*419*
SAYREVILLE BORO MUA	*ERNSTON RD*	*35*	*419*
B&C AUTO SALES INC	*2115 BAYHEAD DR*	*36*	*420*
SAYREVILLE BORO MUA	*GONDEK DR*	*36*	*420*
USDOD ARMY MORGAN OR	*601 ERNSTON ROAD*	*37*	*426*
GOLDEN AGE DEVELOPME	*GONDEK DR*	*40*	*428*
DAVES AUTOMOTIVE	*27 BORDENTOWN AVE*	*41*	*432*
SAYREVILLE BORO MUA	*ERNSTON RD*	*44*	*445*
MORGAN CREEK BOATWOR	*MORGAN PLANT RD*	*46*	*453*
SAYREVILLE BORO GLOB	*ZAUNEROWICZ RD*	*46*	*453*
BROWNS BOAT YARD	*7 ZAUNEROWICZ RD*	*46*	*454*
AMERICAN INTERNATION	*10 MOLTEG DR*	*54*	*607*
14 LAURENCE PARKWAY	*14 LAURENCE PKWY*	*55*	*610*
MORGAN MARINA INC	*8000 GONDEK DR*	*56*	*611*
COIN OP LAUNDRY & CL	*520 ERNSTON RD*	*61*	*630*
PG 10 ENTERPRISES	*1030 RT 9*	*62*	*639*
NJ TURNPIKE AUTH	*GARDEN STATE PKWY MM*	*64*	*647*
416 ORCHARD AVENUE	*416 ORCHARD AVE*	*69*	*654*
LAMER DEVELOPMENT	*ERNSTON RD*	*70*	*655*
JOY TRUCKING	*5905 DOWNING ST*	*72*	*658*
BRUCE M LITTMAN DMD	*6001 DOWNING ST*	*72*	*660*
LONDON TERRACE APART	*715 DOWNING ST*	*72*	*660*
NJDOT	*RT9 & ERNSTON RD*	*72*	*698*
BJS WHOLESALE CLUB #	*1007 RT 9 N*	*72*	*703*
R&S STRAUSS	*SAYREWOODS SHOPPING*	*72*	*706*
R&S STRAUSS @ SAYRE	*RT 9 & ERNSTON RD*	*72*	*707*
HOME DEPOT THE 905	*1007 RTE 9 N OLD RID*	*72*	*714*
CHEESEQUAKE AUTO REP	*BORDENTOWN AVE & CHE*	*75*	*720*
JAN KULA CO	*42 OAKWOOD DR*	*76*	*738*
LA MER PHASE 5 AND 6	*GIORDANO AVENUE*	*77*	*739*
PARKSIDE GARDENS ASS	*GORNIAK DR*	*80*	*783*
ACADEMY HONDA AT OLD	*RTE 9 N*	*82*	*790*
DARON MOTORS INC ACA	*1101 CHEESEQUAKE BRO*	*82*	*790*
PROGRESSIVE MAINTENA	*3145 BORDENTOWN AVE*	*83*	*791*

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
THE MCCORMACK GROUP	*3145 BORDENTOWN AVE*	*83*	*792*
ARNEL LABORATORY SER	*3145 BORDENTOWN AVE*	*83*	*793*
IF ASSOC INC	*3145 BORDENTOWN AVE*	*83*	*793*
LOEFFELS WASTE OIL C	*3143 BORDENTOWN AVE*	*83*	*794*
PARADISE LAWNS 2 COR	*3143 BORDENTOWN AVE*	*83*	*794*
V CHEVALIER SR	*3143 BORDENTOWN AVE*	*83*	*795*
JOHNNY ON THE SPOT	*3143 BORDENTOWN AVE*	*83*	*798*
H HANSON INC	*3143 BORDENTOWN AVE*	*83*	*798*
ASPAR CHEMICAL CORP	*3143 BORDENTOWN AVE*	*83*	*799*
ALLOY CONCEPTS & FAB	*3143 BORDENTOWN AVE*	*83*	*807*
CME ASSOC	*3141 BORDENTOWN AVE*	*83*	*811*
ALTERNATE DISPOSAL S	*3141 BORDENTOWN AVE*	*83*	*813*
PARLIN EAST GROUP	*3141 BORDENTOWN AVE*	*83*	*813*
JOYREI ENTERPRISES I	*3143 BORDENTOWN AVE*	*83*	*814*
1005 WILBUR PLACE	*1005 WILBUR PL*	*84*	*815*
GLOBAL SLF MIDDLESEX	*UNKNOWN*	*90*	*863*
GLOBAL LANDFILL RECL	*ERNSTON STATION RD*	*90*	*864*
OLD BRIDGE TWP ROAD	*RT 9*	*91*	*881*
MIDDLESEX CNTY ROAD	*CHEESEQUAKE BROWNTOW*	*91*	*881*
TSYBULSKYY CONSTRUCT	*10 PARKWOOD DR*	*92*	*886*
GALANTE DISPOSAL INC	*3233 CHEESEQUAKE RD*	*94*	*894*
3 VAN DELFT DRIVE	*3 VAN DELFT DR*	*95*	*900*
NIEUW AMSTERDAM VILL	*1 VAN DELFT DR*	*95*	*900*
PARKWOOD VILLAGE APA	*1 WESTMINSTER BLVD*	*95*	*901*
GP CONTRACTOR CORP	*19 WESTMINSTER BLVD*	*95*	*901*
M&S HOME IMPROVEMENT	*3225 BORDENTOWN AVE*	*96*	*910*
AWT ENVIRONMENTAL SE	*3220 BORDENTOWN AMBO*	*96*	*914*
ZOUBEK ASSOCIATES	*3220 BORDENTOWN TNPK*	*96*	*917*
OJO TRUCKING CORP	*3213 BORDENTOWN AVEN*	*96*	*927*
ALTERNATE DISPOSAL S	*3200 BORDENTOWN AVE*	*96*	*930*
CR WINES TRUCKING CO	*3191 BORDENTOWN AVE*	*96*	*930*
PARK MANAGEMENT	*3168 BORDENTOWN AVE*	*97*	*932*
MANZO HOLDINGS	*WATERWORKS RD*	*98*	*935*
OLD BRIDGE CLEAN ENE	*CHEESEQUAKE ROAD AND*	*99*	*935*
PHIL VESPIA TIRE CEN	*1209 CHEESEQUAKE BRO*	*100*	*935*
SPIRAL METAL CO	3336 BORDENTOWN AVE	101	936
RACEWAY OLD BRIDGE (	*1300 RTE 9*	*102*	*939*
GETTY SERVICE STATIO	*1294 RT 9*	*102*	*943*
HOME DEPOT USA HD095	*1090 RTE 9 SOUTH*	*102*	*974*
LOWE'S OF OLD BRIDGE	*1324 HIGHWAY 9*	*102*	*975*
PATHMARK #72581	1043 RT 9	102	982
PATHMARK 72581	1043 RT 9 NORTH	102	982
GATEWAY CLEANERS - F	*1054 US HWY 9 - GATE*	*102*	*983*
LAMAR CO @ GATEWAY S	*1054 RT 9*	*102*	*983*
HOME DEPOT INC #957	*1007 RT 9*	*102*	*1018*
BJS WHOLESALE CLUB	*1007 RT 9*	*102*	*1027*
SUNG FRENCH DRY CLEA	*15 RT 9*	*102*	*1033*
REMSCO ASSOC	*425 RTE 9 N*	*102*	*1034*
PATHMARK/LIQUOR STOR	*1001 RT 9*	*102*	*1037*
SATURN DEALERSHIP	*955 RT 9*	*102*	*1038*
LUKOIL SERVICE STATI	*3699 RD 1 RTE 9*	*102*	*1038*
RACEWAY SERVICE STAT	*1300 CHEESEQUAKE BRO*	*102*	*1041*
EMPORIUM GAS SERVICE	*1299 CHEESEQUAKE BRO*	*102*	*1060*
INTERTECH CONSTRUCTO	*8 OLD RD*	*102*	*1060*
U HAUL CENTER	1275 RT 9	102	1061
RLT TRUCKING CO	*OLD WATER WORKS RD*	*104*	*1076*

Site	Address	Map ID	Page
PJ & DAUGHTERS	***OLD WATERWORKS RD***	***104***	***1077***
EVOR PHILIPS LEASING	***OLD WATER WORKS RD***	***104***	***1078***
MOUNTAINEER CONSTRUC	***WATERWORKS RD***	***105***	***1090***
GALANTE DISPOSAL INC	***3233 WATERWORKS RD***	***105***	***1114***
CREATIVE MODULAR HOM	***WATERWORKS RD***	***105***	***1115***
JH MONTEATH CO	***3152 BORDENTOWN AVE***	***105***	***1125***
CONTINENTAL WOOD PRO	***3150 BORDENTOWN AVE***	***105***	***1128***
YONKERS PLYWOOD MFG	***BORDENTOWN AVE & CHE***	***105***	***1141***
Not reported	***WTP,BORDENTOWN AVE &***	***105***	***1143***
MIDHATTAN WOODWORKIN	***3130 BORDENTOWN AVE***	***105***	***1145***
EASCO ALUMINUM CO JE	***3237 BORDENTOWN AVE***	***105***	***1147***
DUNRITE TRANSMISSION	***3237 BORDENTOWN AVE***	***105***	***1148***
MARIOS CONCRETE & PA	***3237 BORDENTOWN AVE***	***105***	***1150***
OLD BRIDGE TWP SOMME	***CHEESEQUAKE RD***	***106***	***1151***
MANZO CONTRACTING CO	***CHEESEQUAKE RD***	***109***	***1158***
ESPOSITO CONSTRUCTIO	601 WATERWORKS RD	109	1159

UXO: A listing of unexploded ordnance site locations

A review of the UXO list, as provided by EDR, and dated 10/25/2015 has revealed that there are 2 UXO sites within the searched area.

Site	Address	Map ID	Page
PRP OR TPS (CENAD-PP		89	861
MORGAN ORDNANCE SUB		89	863

US AIRS: The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

A review of the US AIRS list, as provided by EDR, has revealed that there are 6 US AIRS sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
Database: US AIRS MINOR, Date of Government Version: 10/20/2015			
MORGAN FRAME SPECIAL	1969 RT 35 S	20	268
Database: US AIRS MINOR, Date of Government Version: 10/20/2015			
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
Database: US AIRS (AFS), Date of Government Version: 10/20/2015			
JH MONTEATH CO	***3152 BORDENTOWN AVE***	***105***	***1125***
Database: US AIRS MINOR, Date of Government Version: 10/20/2015			
EASCO ALUMINUM CO -	***3237 BORDENTOWN AVE***	***105***	***1148***
Database: US AIRS MINOR, Date of Government Version: 10/20/2015			
MADISON INDUSTRIES I	***554 WATERWORKS RD***	***115***	***1187***
Database: US AIRS (AFS), Date of Government Version: 10/20/2015			

EXECUTIVE SUMMARY

2020 COR ACTION: The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

A review of the 2020 COR ACTION list, as provided by EDR, and dated 04/22/2013 has revealed that there are 2 2020 COR ACTION sites within the searched area.

Site	Address	Map ID	Page
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
GREEN TREE CHEMICAL	***50 SOUTH MINISINK AV***	***79***	***771***

PRP: A listing of verified Potentially Responsible Parties

A review of the PRP list, as provided by EDR, and dated 10/25/2013 has revealed that there are 3 PRP sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***0***	***4***
EVOR PHILLIPS LEASIN	***OLD WATER WORKS ROAD***	***0***	***78***
GLOBAL SANITARY LAND	***ERNSTON ROAD***	***0***	***105***

STATE AND LOCAL RECORDS

NJ SHWS: Known contaminated sites in New Jersey except those associated with Bureau of Underground Storage Sites (BUST)

A review of the NJ SHWS list, as provided by EDR, and dated 06/30/2016 has revealed that there are 98 NJ SHWS sites within the searched area.

Site	Address	Map ID	Page
138 GEORGE STREET Site ID: 201347 Status: Closed	***138 GEORGE ST***	***1***	***121***
119 GEORGE STREET Site ID: 523715 Status: Active	***119 GEORGE ST***	***1***	***124***
124 GEORGE STREET Site ID: 561450 Status: Closed	124 GEORGE ST	1	126
Not reported Site ID: 177982 Status: Closed	***135 JOHN ST***	***1***	***127***
SOUTH AMBOY SEWAGE T Site ID: 47446	S ROSEWELL ST & GEOR	1	129

Status: Active			
KENN AMBOY LLC Site ID: 410334 Status: Active	200 210 S BROADWAY	2	129
213 GEORGE STREET Site ID: 489450 Status: Closed	***213 GEORGE ST***	***2***	***129***
H G HOFFMAN HIGH SCH Site ID: 82030 Status: Closed	249 JOHN ST	2	131
BAYSHORE DR & JEROME Site ID: 84302 Status: Closed	BAYSHORE DR & JEROME	3	132
241 GORDON STREET Site ID: 414381 Status: Active Status: Closed	***241 GORDON ST***	***4***	***132***
POWER INSTRUMENT COR Site ID: 81604 Status: Closed	***346 BORDENTOWN AVENU***	***4***	***138***
THEOS AUTO REPAIR Site ID: 5266 Status: Active	***331 BORDENTOWN AVE***	***4***	***139***
243 CATHERINE STREET Site ID: 457279 Status: Closed	***243 CATHERINE ST***	***4***	***142***
315 GEORGE STREET Site ID: 425504 Status: Active	***315 GEORGE ST***	***4***	***144***
BELMAR REALTY PROFES Site ID: 179642 Status: Closed	***207 S STEVENS AVE***	***4***	***146***
242 244 BORDENTOWN A Site ID: 573912 Status: Closed	242 244 BORDENTOWN A	4	147
508 LEFFERT STREET Site ID: 203370 Status: Closed	***508 LEFFERT ST***	***5***	***147***
SOUTH AMBOY PLUMBING Site ID: 205009 Status: Closed	***224 LEFFERTS ST***	***5***	***148***
SOUTH AMBOY COAL GAS Site ID: 66446 Status: Active Status: Closed	200 S FELTUS ST	5	149
408 LEFFERTS STREET Site ID: 395605 Status: Closed	408 LEFFERTS ST	5	149
513 JOHN STREET	513 JOHN ST	5	149

Site ID: 460401 Status: Closed			
Not reported Site ID: 493142 Status: Closed	***20 BERTRAM AVE***	***6***	***150***
162 BERTRAM AVENUE Site ID: 422445 Status: Closed	***162 BERTRAM AVE***	***6***	***152***
FROG HOLLOW SWIM & T Site ID: 129692 Status: Closed	***LOUISA ST***	***7***	***154***
873 UPPER MAIN STREE Site ID: 163902 Status: Closed	***873 UPPER MAIN ST***	***8***	***157***
19 HARKINS STREET Site ID: 451547 Status: Closed	***19 HARKINS ST***	***9***	***160***
26 HARKINS STREET Site ID: 398450 Status: Closed	***26 HARKINS ST***	***9***	***162***
Not reported Site ID: 455563 Status: Active	***36 HARKINS ST***	***9***	***164***
150 GRAND STREET Site ID: 432306 Status: Closed	***150 GRAND ST***	***10***	***166***
434 SOUTH FELTUS STR Site ID: 522617 Status: Closed	434 S FELTUS ST	11	168
73 LUKE STREET Site ID: 383907 Status: Closed	73 LUKE ST	13	172
RENT A WRECK Site ID: 121675 Status: Active	***916 RT 9***	***17***	***183***
Not reported Site ID: 29437 Status: Active	***912 ROUTE 9 SOUTH***	***17***	***184***
175 NORTON STREET Site ID: 411290 Status: Closed	***175 NORTON ST***	***20***	***280***
175 GABRIEL TERRACE Site ID: 434279 Status: Closed	175 GABRIEL TER	20	283
GETTY SERVICE STATIO Site ID: 5275 Status: Active	***1788 RT 35***	***21***	***324***
Not reported Site ID: 394364	***189 MORGAN AVE***	***21***	***340***

Status: Closed			
240 TYLER STREET Site ID: 169978 Status: Closed	240 TYLER ST	21	342
293 MIDLAND AVENUE Site ID: 438184 Status: Closed	***293 MIDLAND AVE***	***21***	***346***
MOBIL SERVICE STATIO Site ID: 45701 Status: Active	***933 RT 9***	***22***	***351***
Not reported Site ID: 398844 Status: Closed	***23 MIARA ST***	***23***	***353***
SUNOCO 0007-6612 Site ID: 5245 Status: Active	***943 RT 9 & BORDENTOW***	***24***	***355***
1123 BORDENTOWN AVEN Site ID: 394392 Status: Closed	1123 BORDENTOWN AVE	26	358
26 ADAM BOULEVARD Site ID: 435042 Status: Closed	***26 ADAM BLVD***	***28***	***392***
38 EUGENE BOULEVARD Site ID: 223531 Status: Closed	***38 EUGENE BLVD***	***28***	***394***
36 EUGENE BOULEVARD Site ID: 378191 Status: Closed	36 EUGENE BLVD	28	395
1090 BORDENTOWN ROAD Site ID: 81023 Status: Closed	1090 BORDENTOWN RD	29	395
CARRIAGE HOUSE MANOR Site ID: 84196 Status: Closed	***901 ERNSTON RD***	***31***	***406***
1064 BORDENTOWN AVEN Site ID: 121957 Status: Closed	***1064 BORDENTOWN AVE***	***33***	***416***
K & L Site ID: 15365 Status: Closed	812 RT 35	38	427
LEHIGH GAS SERVICE S Site ID: 5260 Status: Active	***127 ERNSTON RD***	***41***	***429***
RACEWAY Site ID: 5317 Status: Closed	***198 ERNSTON RD***	***41***	***431***
DAVES AUTOMOTIVE Site ID: 147615 Status: Closed	***27 BORDENTOWN AVE***	***41***	***432***
Not reported	***318 LINCOLN AVE***	***47***	***457***

Site ID: 484995 Status: Closed			
362 BAYVIEW DRIVE Site ID: 168873 Status: Closed	***362 BAYVIEW DR***	***47***	***459***
83 WEST ROOSEVELT CI Site ID: 95448 Status: Closed	83 W ROOSEVELT CIR	48	461
ERNSTON COC Site ID: 177775 Status: Closed	***350 ERNSTON RD***	***49***	***461***
MORGAN ORDNANCE DEPO Site ID: 80914 Status: Active	***601 ERNSTON RD***	***50***	***467***
DUPONT - PARLIN Site ID: 15676 Status: Active	***250 CHEESEQUAKE ROAD***	***52***	***596***
14 LAURENCE PARKWAY Site ID: 80137 Status: Closed	***14 LAURENCE PKWY***	***55***	***610***
182 CLEVELAND AVENUE Site ID: 258649 Status: Closed	***182 CLEVELAND AVE***	***57***	***617***
SKY TOP SEWAGE PUMP Site ID: 49358 Status: Closed	***ERNSTON RD***	***58***	***618***
416 ORCHARD AVENUE Site ID: 217467 Status: Closed	***416 ORCHARD AVE***	***69***	***654***
MADISON PARK SCHOOL Site ID: 15347 Status: Closed	***33 HARVARD RD***	***71***	***655***
Not reported Site ID: 424632 Status: Closed	***346 WOODBINE AVE.***	***73***	***715***
SHELL SERVICE STATIO Site ID: 5324 Status: Closed	***BORDENTOWN AVE & CHE***	***75***	***725***
ASHLAND INC Site ID: 15689 Status: Active	***50 S MINISINK AVE***	***79***	***768***
D&V WRECKING CORP Site ID: 17033 Status: Closed	***3143 BORDENTOWN AVE***	***83***	***800***
1005 WILBUR PLACE Site ID: 78474 Status: Closed	***1005 WILBUR PL***	***84***	***815***
GLOBAL SANITARY LAND Site ID: 66176	ERNSTON STATION RD	90	877

Status: Active			
3 VAN DELFT DRIVE Site ID: 522760 Status: Closed	3 VAN DELFT DR	95	900
JOHNNY ON THE SPOT Site ID: 341604 Status: Active	***3168 BORDENTOWN AVE***	***97***	***933***
GETTY SERVICE STATIO Site ID: 15337 Status: Active	***1294 RT 9***	***102***	***943***
EMERY MANOR NURSING Site ID: 55121 Status: Closed	***4 RT 34***	***102***	***950***
WASTE MANAGEMENT Site ID: 5739 Status: Active Status: Closed	***305 RT 34***	***102***	***955***
SATURN DEALERSHIP Site ID: 80028 Status: Closed	***955 RT 9***	***102***	***1038***
RACEWAY SERVICE STAT Site ID: 5734 Status: Closed	***1300 CHEESEQUAKE BRO***	***102***	***1041***
MOUNTAINEER CONSTRUC Site ID: 52423 Status: Active	***WATERWORKS RD***	***105***	***1090***
BASF CORP Site ID: 15963 Status: Active	***570 OLD WATERWORKS R***	***105***	***1104***
BRIDGE DISPOSAL SERV Site ID: 167296 Status: Active	***586 WATERWORKS RD***	***105***	***1113***
3160 BORDENTOWN AVEN Site ID: 15372 Status: Closed	***3160 BORDENTOWN AVE***	***105***	***1121***
RECLAMATION TECHNOLO Site ID: 129931 Status: Active	***3200 BORDENTOWN AVE***	***105***	***1135***
JERSEY BILLETS Site ID: 54916 Status: Closed	***3237 BORDENTOWN AVE***	***105***	***1141***
MANZO CONTRACTING CO Site ID: 44362 Status: Closed	***CHEESEQUAKE RD***	***109***	***1158***
5 JOSEPH COURT Site ID: 456677 Status: Active	***5 JOSEPH CT***	***112***	***1164***
CHEESEQUAKE STATE PA Site ID: 15349	***300 GORDON RD***	***113***	***1165***

Status: Active			
MADISON INDUSTRIES I	***554 OLD WATERWORKS R***	***115***	***1183***
Site ID: 15957			
Status: Active			
HALLS GULF SERVICE S	***99 RT 70***	***116***	***1225***
Site ID: 12998			
Status: Active			
OLD BRIDGE GAS STATI	***1499 RT 9***	***119***	***1239***
Site ID: 40341			
Status: Closed			
LORCO PETROLEUM SERV	***RUNTON & CHEESEQUAKE***	***119***	***1242***
Site ID: 5740			
Status: Active			
AREA OF YARD	***181 RT 34***	***120***	***1266***
Site ID: 59308			
Status: Closed			
9 MICHELLE AVENUE	***9 MICHELLE AVE***	***121***	***1269***
Site ID: 374610			
Status: Closed			
SWANTON FUEL CENTRAL	***740 RT 34***	***122***	***1271***
Site ID: 463593			
Status: Closed			
202 ROUTE 34	***202 RT 34***	***122***	***1272***
Site ID: 78928			
Status: Pending			
FOUR J'S AUTO SERVIC	92 RT 34	122	1274
Site ID: 29580			
Status: Closed			
99 SCHULMEISTER ROAD	***99 SCHULMEISTER RD***	***123***	***1275***
Site ID: 91694			
Status: Closed			
24 STEAMBOAT LANDING	***24 STEAMBOAT LANDING***	***124***	***1277***
Site ID: 80833			
Status: Closed			
MINDING MIRACLES LEA	***90 SPRING HILL RD***	***125***	***1280***
Site ID: 360969			
Status: Closed			

NJ HIST HWS: The Known Contaminated Sites in New Jersey report is a municipal listing of sites where contamination of soil and/or ground water is confirmed at levels greater than the applicable cleanup criteria or standards. Remedial activities are underway or required at the sites with an on-site source(s) of contamination and at locations where the source(s) of contamination is unknown. Sites with completed remedial work that require engineering and/or institutional controls have reporting measures in place to ensure the effectiveness of past actions, and some include maintenance and/or monitoring

A review of the NJ HIST HWS list, as provided by EDR, and dated 05/09/2008 has revealed that there are 17 NJ HIST HWS sites within the searched area.

Site	Address	Map ID	Page
THEOS AUTO REPAIR	***331 BORDENTOWN AVE***	***4***	***139***

Case Status: Active Case ID: 015846			
BELMAR REALTY PROFES Case Status: Active Case ID: 235358	***207 S STEVENS AVE***	***4***	***146***
FROG HOLLOW SWIM & T Case Status: Active Case ID: 172268	***LOUISA ST***	***7***	***154***
RENT A WRECK Case Status: Active Case ID: 160091	***916 RT 9***	***17***	***183***
MORGAN FIRE HOUSE Case Status: NFA-A (Restricted Use) Case ID: 003720	***RTE 35 & OLD SPYE RD***	***21***	***293***
TIGER OPERATING LLC Case Status: Active Case ID: 026234	***1788 RTE 35 N***	***21***	***333***
MORGAN ORDNANCE DEPO Case Status: Active Case ID: G000008582	ERNSTON RD (RTE 35 &	37	426
RACEWAY Case Status: Active Case ID: 004882	***198 ERNSTON RD***	***41***	***431***
SHELL SERVICE STATIO Case Status: Active Case ID: 004782	***BORDENTOWN AVE & CHE***	***75***	***725***
GLOBAL LANDFILL Case Status: Active Case ID: G000003352	ERNSTON RD	90	877
GETTY 00304 Case Status: Active Case ID: 001705	***RT 9 & HARTLES LN***	***102***	***1046***
MOUNTAINEER CONSTRUC Case Status: Active Case ID: 019296	***OLD WATER WORKS RD***	***105***	***1094***
SOMMERS LANDFILL Case Status: Active Case ID: G000008820	***CHEESEQUAKE RD & RTE***	***106***	***1151***
EVOR PHILLIPS LEASIN Case Status: Active Case ID: G000004877	***WATERWORKS RD***	***108***	***1155***
CHEESEQUAKE STATE PA Case Status: Active Case ID: 003804	***300 GORDON RD***	***113***	***1165***
NAPPI TRUCKING CORP Case Status: Active Case ID: 003915	***305 RT 34***	***118***	***1234***
LORCO PETROLEUM SERV Case Status: Active	***RUNTON & CHEESEQUAKE***	***119***	***1242***

EXECUTIVE SUMMARY

Case ID: 013795

NJ SWRCY: Department of Environmental Protection Approved Class B Recycling Facilities

A review of the NJ SWRCY list, as provided by EDR, and dated 11/02/2015 has revealed that there are 2 NJ SWRCY sites within the searched area.

Site	Address	Map ID	Page
RECLAMATION TECHNOLO	***3200 BORDENTOWN AVEN***	***105***	***1139***
Facility Id: 132331			
STAVOLA OLD BRIDGE	1 WATERWORKS ROAD	110	1161
Facility Id: 133594			

NJ HIST LF: Old or non-permitted solid waste facilities/landfills that are not included in the current solid waste facilities/landfills database.

A review of the NJ HIST LF list, as provided by EDR, has revealed that there are 2 NJ HIST LF sites within the searched area.

Site	Address	Map ID	Page
DEP CHEESEQUAKE COMP	MADISON TWP	104	1090
Database: HIST LF, Date of Government Version: 06/10/2003			
Facility Status: CLOSED			
Facility Id: 1209000499			
ALTERNATE DISP SYSTE	3141 BORDENTOWN AVE	105	1144
Database: HIST LF, Date of Government Version: 06/10/2003			
Facility Status: TERMINATED			
Facility Id: 1209001193			

NJ LUST: A listing of regulated Underground Storage Tanks that have a cleanup underway.

A review of the NJ LUST list, as provided by EDR, and dated 05/24/2016 has revealed that there are 7 NJ LUST sites within the searched area.

Site	Address	Map ID	Page
THEOS AUTO REPAIR	***331 BORDENTOWN AVE***	***4***	***139***
Case Id: 15846			
GETTY SERVICE STATIO	***1788 RT 35***	***21***	***324***
Case Id: 26234			
SUNOCO 0007-6612	***943 RT 9 & BORDENTOW***	***24***	***355***
Case Id: 16477			
LEHIGH GAS SERVICE S	***127 ERNSTON RD***	***41***	***429***
Case Id: 1472			
GETTY 00304	***RT 9 & HARTLES LN***	***102***	***1046***

Case Id: 1705

MOUNTAINEER CONSTRUC	***OLD WATER WORKS RD***	***105***	***1094***
Case Id: 19296			
HALLS GULF SERVICE S	***99 RT 70***	***116***	***1225***
Case Id: 6707			

NJ HIST LUST: This listing is no longer updated or maintained by the DEP.

A review of the NJ HIST LUST list, as provided by EDR, and dated 09/17/2002 has revealed that there are 38 NJ HIST LUST sites within the searched area.

Site	Address	Map ID	Page
SELOVER ELEMENTARY S	150 LINCOLN ST	12	171
Case Id: 97-10-22-1120-45			
Facility Status: Administrative Deficiencies Exist			
ZUMBACH SPORTSCARS I	***2030 STATE ROUTE 35***	***14***	***178***
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
HARBOR CLUB SEWAGE P	***GONDEK DR***	***20***	***201***
Case Id: 94-09-30-1119			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
SUNOCO S/S #0007-759	1788 HWY 35	20	221
Case Id: 87-08-20-0931			
Facility Status: Assigned to a Program			
ALMAR SERVICE STATIO	1788 RTE 35 N & HAUS	20	221
Case Id: 96-05-15-1322-44			
Facility Status: Assigned to a Program			
LOCKWOOD BOAT WORKS	***1825 HWY 35 MORGAN***	***20***	***224***
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
ROUTE 3519 PETROLEUM	1945 RTE 35 S	20	232
Case Id: 00-01-05-1632-29			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MORGAN FRAME SPEC. I	***RTE 35***	***21***	***337***
Case Id: 93-06-28-1024-00			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MOBIL SERVICE STATIO	***GSP S/B***	***25***	***355***
Case Id: 93-08-17-2056			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MORGAN SEWAGE PUMP S	OLD SPY RD	27	359
Case Id: 94-09-26-1516			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
BROWNS BOAT YARD	OFF ERNSTON RD	27	371
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MOBIL GAS STATION	RTE 35 NR ERNSTON RD	31	401
Case Id: 91-01-25-1414			
Facility Status: Case Awaiting Assignment			
LAURENCE HARBOR PETR	812 RTE 35 S	38	427
Case Id: 99-03-11-1412-10			

Facility Status: Assigned to a Program			
GETTY S/S #56893	BORDENTOWN RD & ERNS	41	429
Case Id: 91-03-21-1349			
Facility Status: Assigned to a Program			
RACEWAY S/S	ERNSTON ROAD & BORDE	41	432
Case Id: 97-02-18-1018-43			
Facility Status: Case Awaiting Assignment			
HESS SERVICE STATION	974 RTE 9	43	434
Case Id: 90-06-01-1532			
Facility Status: Assigned to a Program			
LAMER SEWAGE PUMP ST	***NATHAN BLVD***	***44***	***442***
Case Id: 94-09-30-1247			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
ERNSTON SERVICE CENT	***45 ERNSTON RD***	***45***	***450***
Case Id: 93-08-13-1200			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
CARLISLE STATION	***RTE 9 ERNSTON RD***	***49***	***464***
Case Id: 92-07-16-1143			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
EISENHOWER SCHOOL	601 ERNSTON RD	50	470
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
CHURCH OF SAINT BERN	3 VILLANOVA RD	51	471
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
AMOCO S/S #1847	993 RT #9 N/ERNSTON	53	607
Case Id: 91-07-26-1533			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MOBIL SERVICE STATIO	RTE 9 S & ERNSTON RD	62	641
Case Id: 91-04-04-1335			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
DOT STATE PROPERTY	***ERNESTON & RT 9 S***	***62***	***642***
Case Id: 91-10-01-1141			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
E I DUPONT	***CHEESEQUAKE RD***	***65***	***647***
Case Id: 91-08-22-1531			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
MADISON PARK SCHOOL	33 HARVARD RD	71	658
Case Id: 97-07-18-1750-57			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
ACADEMY HONDA AT OLD	***RTE 9 N***	***82***	***786***
Case Id: 95-05-01-1305-00			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
D&V WRECKING CORP	***3143 BORDENTOWN AVE***	***83***	***800***
Case Id: 98-08-07-1507-04			
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
ZOUBEK ASSOCIATES	***3220 BORDENTOWN TNPK***	***96***	***910***
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern			
RACEWAY PETROL GAS S	***1300 RTE 9 SOUTH***	***102***	***937***
Case Id: 01-09-19-1421-04			
Facility Status: Assigned to a Program			
ROUTE 9 SOUTH & POOR	RTE 9 S & POOR FARM	102	1056

Case Id: 97-09-04-1003-14
Facility Status: Case Awaiting Assignment

MANZO CONTRACTING ***WATERWORKS RD*** ***104*** ***1064***
Case Id: 99-08-20-1444-46
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern

IZZO REALTY ASSOCIAT 3160 BORDENTOWN AVEN 105 1121
Case Id: 99-02-10-1110-51
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern

HENRY MINNING COMPAN OLD WATER WORKS RD 109 1157
Case Id: 95-02-01-1503-59
Facility Status: Assigned to a Program

CUMBERLAND FARMS/GUL RTE 9 & 34 116 1230
Case Id: 99-06-30-1535-10
Facility Status: Assigned to a Program

GULF SERV STA RTE 9 & RTE 34 116 1231
Case Id: 92-09-28-1000
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern

MADISON CITGO ROUTE 9 NORTH & OLD 119 1239
Case Id: 00-02-18-1432-23
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern

CHEESEQUAKE BOOSTER RTE 516 119 1241
Facility Status: Site Issued Letter of No Further Action for Area(s) Of Concern

NJ UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environmental Protection & Energy's UST Data.

A review of the NJ UST list, as provided by EDR, and dated 04/25/2016 has revealed that there are 49 NJ UST sites within the searched area.

Site	Address	Map ID	Page
SOUTH AMBOY PLUMBING Facility Id: 269622 Tank Status: Removed	***224 LEFFERTS ST***	***5***	***148***
SELOVER ELEMENTARY S Facility Id: 031993 Tank Status: Removed	***150 LINCOLN ST***	***12***	***168***
D&M EXCAVATING INC Facility Id: 003140 Tank Status: Removed	RT 35 & KATH ST	18	187
GALLERY HOLIDAY MOTE Facility Id: 707279 Tank Status: Removed	2020 RT 35 N	18	189
MORGAN MARINA INC Facility Id: 020865 Tank Status: In-use	8000 GONDEK DR	20	195
HARBOUR CLUB SEWAGE	OFF ERNSTON RD	20	203

Facility Id: 024196 Tank Status: Removed			
LOCKWOOD BOAT WORKS Facility Id: 016728 Tank Status: Removed	1825 RTE 35	20	226
19 PETROLEUM Facility Id: 025746 Tank Status: In-use Tank Status: Removed	1949 RT 35 S	20	230
BELMAR REALTY PROFES Facility Id: 235358 Tank Status: Removed	207 STEVENS AVE S	20	260
MORGAN FIRE HOUSE Facility Id: 003720 Tank Status: Removed	***RTE 35 & OLD SPYE RD***	***21***	***293***
TIGER OPERATING LLC Facility Id: 026234 Tank Status: In-use	***1788 RTE 35 N***	***21***	***333***
MORGAN WASTEWATER PU Facility Id: 019279 Tank Status: Removed	OFF US RT 35	27	358
BROWN'S BOAT YARD IN Facility Id: 015697 Tank Status: Removed	OFF ERNSTON RD	27	372
CONNIES AKA CONNIES Facility Id: 501551 Tank Status: Removed	1899 RT 35 S	30	395
CARRIAGE HOUSE MANOR Facility Id: 025468 Tank Status: Abandoned in Place Tank Status: Removed	***ERSTON RD***	***31***	***398***
SOUTH AMBOY HOUSING Facility Id: 017343 Tank Status: Removed	BAYSHORE DR	34	418
LA MER SEWAGE PUMP S Facility Id: 024195 Tank Status: Removed	OFF ERNSTON RD	44	444
CARLISLE STATION Facility Id: 015349 Tank Status: Removed	***RTE 9 ERNSTON RD***	***49***	***464***
DWIGHT D EISENHOWER Facility Id: 030344 Tank Status: Abandoned in Place	601 EARNSTON RD	50	470
SKY TOP SEWAGE PUMP Facility Id: 024197 Tank Status: Removed	***ERNSTON RD***	***58***	***618***
AT&T SAYERVILLE Facility Id: 016020 Tank Status: Removed	ERNSTON RD	61	630
BETTY BRITE CLEANERS	499 ERNSTON RD	61	633

Facility Id: 003862 Tank Status: Removed			
STRAUSS DISCOUNT AUT Facility Id: 023264 Tank Status: Removed	1072 RT 9	62	637
LIONEL KIDDIE CITY Facility Id: 022787 Tank Status: Removed	RT 9	62	641
ST BERNADETTE RC Facility Id: 030334 Tank Status: Removed	VILLANOVA & PRINCETO	63	644
ST BERNADETTE CHURCH Facility Id: 021684 Tank Status: Removed	20 VILLANOVA RD	63	645
MADISON PARK SCHOOL Facility Id: 021894 Tank Status: Removed	***33 HARVARD RD***	***71***	***655***
I & K SHOP 2 LLC Facility Id: 008840 Tank Status: Removed Tank Status: In-use	3112 BORDENTOWN AVE	75	722
SHELL SERVICE STATIO Facility Id: 004782 Tank Status: Removed	***BORDENTOWN AVE & CHE***	***75***	***725***
ACADEMY HONDA AT OLD Facility Id: 004977 Tank Status: Removed	***RTE 9 N***	***82***	***786***
D&V WRECKING CORP Facility Id: 026225 Tank Status: Removed	***3143 BORDENTOWN AVE***	***83***	***800***
PARKWOOD VILLAGE APT Facility Id: 018534 Tank Status: Removed	1I WESTMINSTER BLVD	85	816
NIEUW AMSTERDAM VILL Facility Id: 014713 Tank Status: Removed	***1 VAN DELFT DR***	***95***	***896***
ZOUBEK ASSOCIATES Facility Id: 006797 Tank Status: Removed	***3220 BORDENTOWN TNPK***	***96***	***910***
EMERY MANOR NURSING Facility Id: 025189 Tank Status: Removed	***4 RTE 34***	***102***	***952***
HOME DEPOT 957 Facility Id: 033941 Tank Status: In-use	1100 US RT 9 S	102	958
GALLO INC Facility Id: 001283 Tank Status: Duplicate	RT 9 & 34	102	966
MADISON GARDEN APART	RT 34	102	987

Facility Id: 019228 Tank Status: Abandoned in Place			
NEW JERSEY TRANSIT B Facility Id: 003913 Tank Status: Removed	RT 34	102	992
BIRCH HILL SWIM CLUB Facility Id: 194223 Tank Status: Removed	***990 RT 9 S***	***102***	***1046***
GETTY 00304 Facility Id: 001705 Tank Status: Removed	RTE 9 & HARTLE'S LN	102	1056
MANZO CONTRACTING CO Facility Id: 009913 Tank Status: Exempt Tank Status: Removed	***CHESEQUAKE RD***	***104***	***1066***
MOUNTAINEER CONSTRUC Facility Id: 019296 Tank Status: Removed	***OLD WATER WORKS RD***	***105***	***1094***
3160 BORDENTOWN AVEN Facility Id: 032456 Tank Status: Removed	3160 BORDENTOWN AVE	105	1120
JERSEY BILLETS Facility Id: 024710 Tank Status: Removed Tank Status: Abandoned in Place	3237 BORDENTOWN AVE	105	1146
PERRINE ROAD PUMP ST Facility Id: 022180 Tank Status: In-use	80 PERRINE RD	111	1162
CHEESEQUAKE STATE PA Facility Id: 003804 Tank Status: Removed	***300 GORDON RD***	***113***	***1165***
SITE #38943 Facility Id: 008646 Tank Status: Removed Tank Status: Exempt Tank Status: In-use	1400 RT 9 S	114	1177
LORCO PETROLEUM SERV Facility Id: 013795 Tank Status: Removed	***RUNTON & CHEESEQUAKE***	***119***	***1242***

NJ MAJOR FACILITIES: 'Major Facility' means all facilities, located on one or more contiguous or adjacent properties owned or operated by the same person, having total combined storage capacity of: 1) 20,000 gallons or more for hazardous substances other than Petroleum or petroleum products; 2) 200,000 gallons or more for hazardous substances of all kinds.

A review of the NJ MAJOR FACILITIES list, as provided by EDR, and dated 05/04/2016 has revealed that there are 2 NJ MAJOR FACILITIES sites within the searched area.

Site	Address	Map ID	Page
DUPONT - PARLIN	***250 CHEESEQUAKE ROAD***	***52***	***596***

Department Integrated Facility File Number: 121900165000

MADISON INDUSTRIES I ***554 WATERWORKS RD*** ***115*** ***1187***
Department Integrated Facility File Number: 120900143000

NJ HIST MAJOR FACILITIES: 'Major Facility' means all facilities, located on one or more contiguous or adjacent properties owned or operated by the same person, having total combined storage capacity of: 1) 20,000 gallons or more for hazardous substances other than Petroleum or petroleum products; 2) 200,000 gallons or more for hazardous substances of all kinds. This file contains detail information that is no longer available by the Department of Environmental Protection due to security concerns.

A review of the NJ HIST MAJOR FACILITIES list, as provided by EDR, and dated 01/02/2002 has revealed that there are 2 NJ HIST MAJOR FACILITIES sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI Facility Id: 120900138000	***570 OLD WATERWORKS R***	***105***	***1095***
MADISON INDUSTRIES I Facility Id: 120900143000	***554 WATERWORKS RD***	***115***	***1187***

NJ MANIFEST: Hazardous waste manifest information.

A review of the NJ MANIFEST list, as provided by EDR, and dated 12/31/2013 has revealed that there are 10 NJ MANIFEST sites within the searched area.

Site	Address	Map ID	Page
WAYNES AUTO BODY EPA Id: NJD144396850	***S PINE & 10TH ST***	***20***	***272***
E I DUPONT DE NEMOUR EPA Id: NJD002444024	***250 CHEESEQUAKE RD***	***52***	***471***
HOME DEPOT USA HD095 Generator EPA Id: NJR000040360	***1090 RTE 9 SOUTH***	***72***	***661***
BJS WHOLESALE CLUB # EPA Id: NJR000069757	1007 RT 9 N	72	699
MOOREHOUSE SPEEDWELL EPA Id: NJD986610590	***3101 BORDENTOWN AVE***	***75***	***731***
GREEN TREE CHEMICAL EPA Id: NJR000035477	***50 SOUTH MINISINK AV***	***79***	***771***
WALMART STORE #2825 EPA Id: NJR000038471	***1126 RT 9***	***86***	***820***
OB CLEANERS EPA Id: NJX000331439	1063 RTE 9 N	102	959
CIBA SPECIALTY CHEMI EPA Id: NJD002141190	***570 OLD WATERWORKS R***	***105***	***1098***
MADISON INDUSTRIES I EPA Id: NJD002460855	***554 WATERWORKS RD***	***115***	***1187***

PA MANIFEST: Hazardous waste manifest information.

A review of the PA MANIFEST list, as provided by EDR, and dated 12/31/2014 has revealed that there are 3 PA MANIFEST sites within the searched area.

Site	Address	Map ID	Page
HOME DEPOT USA HD095 Generator EPA Id: NJR000040360	***1090 RTE 9 SOUTH***	***72***	***661***
WALMART STORE 2825 Generator EPA Id: NJR000038471	1126 ROUTE 9	86	848
BJS WHOLESALE CLUB # Generator EPA Id: NJR000069757	1007 US HIGHWAY 9	102	1018

NY MANIFEST: Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

A review of the NY MANIFEST list, as provided by EDR, and dated 08/01/2016 has revealed that there are 4 NY MANIFEST sites within the searched area.

Site	Address	Map ID	Page
CIBA SPECIALTY CHEMI EPA ID: NJD002141190	***570 OLD WATERWORKS R***	***0***	***4***
E I DUPONT DE NEMOUR EPA Id: NJD002444024	***250 CHEESEQUAKE RD***	***52***	***471***
MADISON INDUSTRIES I EPA Id: NJD002460855	***554 WATERWORKS RD***	***115***	***1187***
LORCO PETROLEUM SERV	***RUNTON & CHEESEQUAKE***	***119***	***1242***

NJ Release: Hazardous material release. Initial notification information reported to the Dept. of Env. Protection's Action Line. The office has not conducted any investigations to determine it's validity. or accuracy.

A review of the NJ Release list, as provided by EDR, and dated 05/18/2016 has revealed that there are 133 NJ Release sites within the searched area.

Site	Address	Map ID	Page
138 GEORGE STREET	***138 GEORGE ST***	***1***	***121***
119 GEORGE STREET	***119 GEORGE ST***	***1***	***124***
Not reported	***135 JOHN ST***	***1***	***127***
213 GEORGE STREET	***213 GEORGE ST***	***2***	***129***
241 GORDON STREET	***241 GORDON ST***	***4***	***132***
243 CATHERINE STREET	***243 CATHERINE ST***	***4***	***142***
315 GEORGE STREET	***315 GEORGE ST***	***4***	***144***
Not reported	***20 BERTRAM AVE***	***6***	***150***
162 BERTRAM AVENUE	***162 BERTRAM AVE***	***6***	***152***
873 UPPER MAIN STREE	***873 UPPER MAIN ST***	***8***	***157***
19 HARKINS STREET	***19 HARKINS ST***	***9***	***160***
26 HARKINS STREET	***26 HARKINS ST***	***9***	***162***
Not reported	***36 HARKINS ST***	***9***	***164***
150 GRAND STREET	***150 GRAND ST***	***10***	***166***

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
SELOVER ELEMENTARY S	***150 LINCOLN ST***	***12***	***168***
Not reported	73 LUKE ST.	13	172
Not reported	73 LUKE STREET	13	174
PRIVATE PROPERTY	14 PARKER CT	15	180
Not reported	***912 ROUTE 9 SOUTH***	***17***	***184***
Not reported	100 HOFFMAN PLAZA	20	191
Not reported	40 HOFFMAN AVENUE	20	193
HARBOR CLUB SEWAGE P	***GONDEK DR***	***20***	***201***
IN AREA OF	8 DOLAN ST	20	204
EQUPIMENT RENTAL	1819 RT 35	20	217
Not reported	1965 HIGHWAY 35	20	239
PETRO 19	1949 RT 35	20	242
GOMOLKA AUTO BODY	RT 35 SOUTH	20	245
PETROLEUM 19 GAS STA	***RT 35/10TH ST***	***20***	***247***
EL TROVADOR RESTAURA	1776 RT 35 N	20	258
Not reported	207 STEVENS AVE SOUT	20	262
IN THE AREA OF	16 RARITAN AVE	20	278
175 NORTON STREET	***175 NORTON ST***	***20***	***280***
IN THE AREA OF	333 PINE AVE	20	283
MORGAN FIRE HOUSE	RT 35 & OLD SPYE RD	21	289
METER STATION AT TRA	RT 35 & OLD SPYE RD	21	291
RESIDENCE	17 FIRST ST	21	295
VALVE SITE MORGAN SE	RT 35 & MORGAN	21	297
CORNER OF MORGAN AV	RT 35 NB	21	299
TRANSCO MORGAN M&R S	SH35/MORGAN AVE	21	301
AREA OF PUMPING STAT	***CHIMNEYRIDGE RD***	***21***	***303***
PIPE LINE LOCATED AT	RT 35-MORGAN AVE	21	306
ON SIDE OF ROADWAY	RT 35 S/MORGAN AREA	21	308
CORNER OF	MORGAN AVE/HWY 35	21	310
Not reported	RT 35 AT MORGAN ST	21	312
Not reported	RT 35 /MORGAN	21	314
TRANSCO/200C 60 VALV	RT 35 & MORGAN	21	316
ALMAR GASSTATION	RT 35 N. & HAUSSLING	21	322
Not reported	***189 MORGAN AVE***	***21***	***340***
293 MIDLAND AVENUE	***293 MIDLAND AVE***	***21***	***346***
Not reported	326 STEVENS AVE	21	348
Not reported	***23 MIARA ST***	***23***	***353***
MOBIL SERVICE STATIO	***GSP S/B***	***25***	***355***
S. OF CHEESEQUAKE CR	RT 35	27	360
Not reported	109 MORGAN AVE	27	373
Not reported	109 MORGAN AVE	27	375
Not reported	1707 ROUTE 35	27	382
MORGAN GREEK	1729 HWY 35	27	387
26 ADAM BOULEVARD	***26 ADAM BLVD***	***28***	***392***
Not reported	901 ERSTON RD	31	402
Not reported	901 ERNSTEN RD	31	404
Not reported	901 ERNSTINE RD	31	408
1064 BORDENTOWN AVEN	***1064 BORDENTOWN AVE***	***33***	***416***
IN THE ARI AROUND	2106 BAY HEAD DR	36	421
RESIDENCE AT	2106 BAYHEAD DR	36	423
AREA OF	22 GIERA CT	44	434
SKYTOP SEWAGE PUMP S	REAR OF 91 WOODMERE	44	438
AREA OF	35 STRATON DR	44	440
LAMER SEWAGE PUMP ST	***NATHAN BLVD***	***44***	***442***
GAS MAIN/IN ROADWAY	ERNSTON RD/NATHAN BL	44	446
ROADWAY	NATHANDR + ERNSTON	44	448

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
ERNSTON SERVICE CENT	***45 ERNSTON RD***	***45***	***450***
Not reported	***318 LINCOLN AVE***	***47***	***457***
362 BAYVIEW DRIVE	***362 BAYVIEW DR***	***47***	***459***
ERNSTON COC	***350 ERNSTON RD***	***49***	***461***
E I DUPONT DE NEMOUR	***250 CHEESEQUAKE RD***	***52***	***471***
DUPONT - PARLIN	***250 CHEESEQUAKE ROAD***	***52***	***596***
Not reported	103 GIERA CT	54	608
ROBIN PAGANO	29-13 SKYTOP GARDENS	59	619
AREA OF	16-17 SKYTOP GARDEN	59	621
ACADEMY HONDA	US RT#9 N	61	625
DIANE SUAU	1603 W. MINSTER BLVD	61	627
DOT STATE PROPERTY	***ERNESTON & RT 9 S***	***62***	***642***
RESID	122 MALVERN CT.	68	650
MADISON PARK SCHOOL	***33 HARVARD RD***	***71***	***655***
Not reported	***346 WOODBINE AVE.***	***73***	***715***
Not reported	809 DOWNING ST	74	718
GLOBAL LANDFILL	OFF ERNSTON ROAD	76	736
IN AREA OF	9 COLBY CT.	78	740
ASHLAND INC	***50 S MINISINK AVE***	***79***	***768***
BRANDIES RD &	PRINCETON RD	81	784
Not reported	3141 BORDENTOWN AVEN	83	809
IN FRONT OF	11 VERNON ST	88	859
MIDDLESEX CNTY RD DE	AREA 31 US RT 9 NO	91	882
MIDDLESEX CTY GARAGE	US #9N	91	884
AREA NEAR	2 SOPHIE ST	93	888
AREA OF	2 SOPHIE ST	93	890
RESIDENCE	1 SOPHIE ST	93	892
Not reported	1-1 VAN DELFT DR	95	898
Not reported	3000 BORDENTOWN AVE	96	903
ZOUBEK ASSOC	3220 BORDENTOWN AVE	96	915
Not reported	3217 BORDENTOWN AV	96	918
EMERY MANOR NURSING	***4 RT 34***	***102***	***950***
Not reported	40 SHELLY RD	102	960
Not reported	40 SHELLEY DR	102	962
CUMBERLAND FARMS	RT 9/RT 34	102	998
SUNOCO SERVICE STATI	RT.34 & CHEESEQUAKE	102	1002
OLD BRIDGE TWP SENIO	RT'S #9 & 34	102	1008
GULF SERVICE STATION	RT#9+RT#34	102	1012
Not reported	1009 RT 9 NORTH	102	1014
Not reported	1007 RT 9 NORTH	102	1027
BEHIND GEORGE RESIDE	180 RT 9 NORTH	102	1034
IN FRONT OF	1001 RTE 9	102	1039
BIRCH HILL SWIM CLUB	***990 RT 9 S***	***102***	***1046***
Not reported	94 BREWSTER CIRCLE	103	1062
PROPERTY OF ABOVE CO	CHEESEQUAKE & PERINE	104	1072
IN ROAD WAY AT	SHELLEY & WATERWORKS	104	1074
Not reported	4 POOR FARMS RD.	104	1078
IN AREA OF MADISON I	WATERWORKS RD	104	1082
MANZO CONTRACTING	WATER WORKS RD	104	1088
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***105***	***1095***
BASF CORP	***570 OLD WATERWORKS R***	***105***	***1104***
RECLAMATION TECHNOLO	***3200 BORDENTOWN AVE***	***105***	***1117***
JOHNNY ON THE SPOT	***3168 BORDENTOWN AVE***	***105***	***1132***
RECLAMATION TECHNOLO	***3200 BORDENTOWN AVE***	***105***	***1135***
RECLAMATION TECHNOLO	***3200 BORDENTOWN AVEN***	***105***	***1139***
JERSEY BILLETS	***3237 BORDENTOWN AVE***	***105***	***1141***

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
MANZO CONSTRUCTION C	WATERWORKS RD	107	1152
CHEESEQUAKE STATE PA	***300 GORDON RD***	***113***	***1165***
MADISON INDUSTRIES I	***554 WATERWORKS RD***	***115***	***1187***
HALLS GULF SERVICE S	***99 RT 70***	***116***	***1225***
OLD BRIDGE GAS STATI	***1499 RT 9***	***119***	***1239***
LORCO PETROLEUM SERV	***RUNTON & CHEESEQUAKE***	***119***	***1242***
9 MICHELLE AVENUE	***9 MICHELLE AVE***	***121***	***1269***

NJ SPILLS: All hazmat known or unknown spills to the ground reported to the DEP's Env. Action Line. The office has not conducted any investigations to determine it's validity or accuracy.

A review of the NJ SPILLS list, as provided by EDR, and dated 05/18/2016 has revealed that there are 74 NJ SPILLS sites within the searched area.

Site	Address	Map ID	Page
NEW WATER REALTY COR Case Number: 02-02-13-1540-47 Facility Id: 91371	60-100 LOUISA ST	13	176
INTERSECTION OF Case Number: 01-12-12-1850-40 Facility Id: 89164	ERNSTONN RD/GONDACK	20	199
AREA OF Case Number: 01-06-23-2125-48 Facility Id: 80512	ROUTE 35 & LORRAINE	20	219
Not reported Case Number: 08-04-15-1634-05 Facility Id: 269725 Incident Status: Terminated	1825 HWY 35	20	227
ROUTE 3519 PETROLEUM Case Number: 00-01-05-1632-29 Facility Id: 55691	1945 RTE 35 SOUTH	20	234
PETROLEUM 19 GAS STA Case Number: 99-10-09-0820-54 Facility Id: 51685	***RT 35/10TH ST***	***20***	***247***
CALIFORNIA MOTEL Case Number: 95-2-10-1803-38 Facility Id: 2000	RT 35 S	20	252
MORGAN AUTO PARTS Case Number: 90-05-04-1157 Facility Id: 5661	1841 RT 35 SOUTH	20	254
BAYSIDE LANDSCAPING/ Case Number: 97-10-4-2114-09 Facility Id: 13898	1831 RT 35	20	256
PETROLEUM 19 Case Number: 99-07-12-1116-21 Facility Id: 46133	1949 HYW#35	20	264
ON ROAD WEST OF RT 9	SOUTH ST	20	266

Case Number: 94-4-21-1318-39 Facility Id: 6641			
RESID Case Number: 96-1-19-1521-00 Facility Id: 885	166 LUKE ST	20	286
AREA OF PUMPING STAT Case Number: 91-5-1-1238-46 Facility Id: 5895	***CHIMNEYRIDGE RD***	***21***	***303***
SUNOCO STATION Case Number: 87-08-20-0931 Facility Id: 5362	RT. 35 AND HAUSSLING	21	319
GETTY SERVICE STATIO Case Number: 15-11-17-0338-45 Facility Id: 580316 Incident Status: Terminated	***1788 RT 35***	***21***	***324***
Not reported Case Number: 10-08-21-1401-45 Facility Id: 363136 Incident Status: Terminated	200 S. FELTON ST	21	342
SAYREVILLE PUMP STAT Case Number: 94-9-26-1516-20 Facility Id: 17434	OLD SPY RD	27	362
IN FRONT OF Case Number: 99-04-18-0840-20 Facility Id: 41736	97 MORGAN AVE	27	365
Not reported Case Number: 05-01-05-1420-56 Facility Id: 127253 Incident Status: Continuous	1707 RT 35	27	377
CARRIAGE HOUSE MANOR Case Number: 99-08-11-1751-30 Facility Id: 47967	***ERSTON RD***	***31***	***398***
CARRIAGE HOUSE MANOR Case Number: 99-03-02-1609-39 Facility Id: 39559	***901 ERNSTON RD***	***31***	***411***
ROADWAY Case Number: 97-10-28-1531-45 Facility Id: 15068	WOODMERE+SANDPIPER	44	436
Not reported Case Number: 10-09-17-0735-09 Facility Id: 365847 Incident Status: Terminated	7 ZAUNEROWICZ RD	46	454
E I DUPONT DE NEMOUR Case Number: 93-6-9-0806-17 Case Number: 94-6-20-1720-04 Case Number: 97-12-8-0915-30 Case Number: 93-8-26-1350-35 Case Number: 95-5-16-1334-35 **Additional key fields are available in the Map Findings section* Facility Id: 9465	***250 CHEESEQUAKE RD***	***52***	***471***

Facility Id: 10829
Facility Id: 16893
Facility Id: 14525
Facility Id: 7227
**Additional key fields are available in the Map Findings section*

Not reported Case Number: 16-04-15-1408-59 Facility Id: 596504 Incident Status: Terminated	8000 GONDEK DR	56	612
MORGAN MARINA INC Case Number: 15-10-22-1206-25 Facility Id: 577673 Incident Status: Terminated	***8000 GONDEK DR***	***56***	***614***
RESIDENCE Case Number: 98-10-19-1227-42 Facility Id: 33378	2213 WESTMINSTER BLV	61	623
E I DUPONT Case Number: 94-3-25-1449-00 Facility Id: 4877	***CHEESEQUAKE RD***	***65***	***647***
IN FRON OF Case Number: 93-7-11-0107-00 Facility Id: 11580	59 DOWNING ST	72	704
U-HAUL LOT Case Number: 98-07-01-0627-47 Facility Id: 27628	RT9N/DOWNING ST	72	707
ROADWAY-NEAR DOWNING Case Number: 94-1-17-1423-45 Facility Id: 702	RT#9 SOUTH	72	709
D.V.WRECKING CORP Case Number: 98-08-07-1507-04 Facility Id: 29637	3143 BORDENTOWN AVE	83	796
BEHIND RESIDENCE AT Case Number: 98-05-28-1317-38 Facility Id: 25664	22 BRANDEIS RD	87	857
INTERSECTION OF Case Number: 95-8-16-1600-54 Facility Id: 13021	CHEESEQUAKE-CLEMSON	94	894
IN ROADWAY IN FRONT Case Number: 91-3-4-0842-53 Facility Id: 2743	3108 BORDENTOWN AVE	96	901
Not reported Case Number: 14-12-23-1359-31 Facility Id: 543464 Incident Status: Terminated	2320 BORDENTOWN AVE	96	906
EASCO ALUMINUM CO Case Number: 88-02-26-1746 Facility Id: 1276	3237 BORDENTOWN AVE	96	908
RACEWAY PETROL GAS S Case Number: 01-09-19-1421-04 Facility Id: 84907	***1300 RTE 9 SOUTH***	***102***	***937***
EMERY MANOR NURSING	***4 RTE 34***	***102***	***952***

Case Number: 96-11-6-1147-05 Facility Id: 17869			
WASTE MANAGEMENT Case Number: 01-02-15-1431-46 Facility Id: 74387	***305 RT 34***	***102***	***955***
IN AREA OF Case Number: 96-1-3-0410-02 Facility Id: 59	RT 9 NO & RT 34	102	964
ON ROAD SURFACE Case Number: 91-5-31-0642-59 Facility Id: 7713	AVERY NEAR AMARA	102	968
Not reported Case Number: 05-11-04-1114-27 Facility Id: 165831 Incident Status: Terminated	1090 RT 9 SOUTH	102	970
Not reported Case Number: 14-05-24-1520-43 Facility Id: 518096 Incident Status: Terminated	1090 RT 9 SB	102	972
Not reported Case Number: 11-10-18-0838-24 Facility Id: 406901 Incident Status: Terminated	1072 RTE 9 SOUTH	102	976
Not reported Case Number: 11-10-18-0836-43 Facility Id: 406900 Incident Status: Terminated	1072 RT 9	102	978
IN AREA OF Case Number: 96-1-3-0559-33 Facility Id: 60	RT 34 & RT 9	102	985
Not reported Case Number: 16-01-14-1355-33 Facility Id: 585750 Incident Status: Terminated	1012 ROUTE 9 SOUTH	102	994
ON ROADWAY Case Number: 89-11-20-1530 Facility Id: 13284	RT 9 S & RT 34	102	996
CUMBERLAND FARMS Case Number: 01-02-27-1113-13 Facility Id: 74813	ROUTE 9 & 34	102	1000
GULF SERVICE STATION Case Number: 98-10-26-1614-12 Facility Id: 33809	RTE 34/RTE 9	102	1004
IN FRONT OF 7-11 STO Case Number: 88-11-16-1515 Facility Id: 10301	RT 34	102	1006
ON ROADWAY Case Number: 00-07-12-1328-44 Facility Id: 64432	RT 34/RT9	102	1010
Not reported	1007 RT 9 NORTH	102	1016

Case Number: 03-08-09-1107-23 Facility Id: 67047 Incident Status: Terminated			
Not reported Case Number: 10-01-26-1031-07 Facility Id: 339320 Incident Status: Terminated	1004 RTE 9	102	1029
Not reported Case Number: 13-04-24-1447-16 Facility Id: 469349 Incident Status: Terminated	1004 RTE 9 SOUTH	102	1031
NORTHVILLE GAS STATI Case Number: 95-3-5-1912-00 Facility Id: 3061	RT 9+POOR FARM RD	102	1042
ROADWAY Case Number: 95-7-28-1254-09 Facility Id: 11822	RT9 & POOR FARM	102	1044
GETTY SERVICE STATIO Case Number: 95-12-18-1420-28 Facility Id: 19907	RT 9/HARTLES LN	102	1050
GETTY MART STATION Case Number: 01-06-07-1005-59 Facility Id: 79545	RTE 9 NORTH/ RTE 34	102	1052
ALONG ROADWAY Case Number: 01-08-08-1009-04 Facility Id: 82875	RTE 9/ POOR FARM RD	102	1054
MANZO CONTRACTING Case Number: 99-08-20-1444-46 Facility Id: 48485	***WATERWORKS RD***	***104***	***1064***
ROADWAY Case Number: 95-2-18-1058-37 Facility Id: 2376	PERINE & CHEESEQUAKE	104	1070
LORCO PETROLEUM Case Number: 97-8-25-1230-04 Facility Id: 11803	WATERWORKS & CHEESEQ	104	1080
IN ROADWAY Case Number: 90-02-09-2048 Facility Id: 1744	CHEEZEQUAKE AND POOR	104	1084
MANZO ASPHALT Case Number: 89-04-22-0211 Facility Id: 3841	CHEEZEQUAKE RD	104	1086
3160 BORDENTOWN AVEN Case Number: 99-02-10-1110-51 Facility Id: 38679	***3160 BORDENTOWN AVE***	***105***	***1121***
CHEESEQUAKE STATE PA Case Number: 98-07-01-1231-39 Facility Id: 27660	***300 GORDON RD***	***113***	***1165***
MADISON INDUSTRIES I Case Number: 00-06-08-1434-19	***554 WATERWORKS RD***	***115***	***1187***

Facility Id: 62595			
NAPPI TRUCKING CORP Case Number: 00-06-29-1020-06 Facility Id: 63796	***305 RT 34***	***118***	***1234***
AREA OF YARD Case Number: 01-02-15-1457-34 Facility Id: 74390	***181 RT 34***	***120***	***1266***
202 ROUTE 34 Case Number: 98-02-06-1425-48 Facility Id: 19663	***202 RT 34***	***122***	***1272***
99 SCHULMEISTER ROAD Case Number: 01-08-14-1447-07 Facility Id: 83208	***99 SCHULMEISTER RD***	***123***	***1275***
24 STEAMBOAT LANDING Case Number: 00-10-20-1158-17 Facility Id: 69657	***24 STEAMBOAT LANDING***	***124***	***1277***

NJ ENG CONTROLS: Legal Document that restricts the use of contaminated property; holds owner(s) to the regulatory/statutory requirements for cleanup.

A review of the NJ ENG CONTROLS list, as provided by EDR, and dated 03/14/2016 has revealed that there is 1 NJ ENG CONTROLS site within the searched area.

Site	Address	Map ID	Page
241 GORDON STREET Site ID: 414381	***241 GORDON ST***	***4***	***132***

NJ INST CONTROL: Sites where engineering and/or institutional controls remain in place as part of a remedial action to address soil and/or groundwater contamination. These restrictions ensure protection of human health and the environment as long as they are maintained.

A review of the NJ INST CONTROL list, as provided by EDR, and dated 05/05/2016 has revealed that there are 11 NJ INST CONTROL sites within the searched area.

Site	Address	Map ID	Page
241 GORDON STREET Facility Id: 414381	***241 GORDON ST***	***4***	***132***
GETTY SERVICE STATIO Facility Id: 5275	***1788 RT 35***	***21***	***324***
MOBIL SERVICE STATIO Facility Id: 45701	***933 RT 9***	***22***	***351***
LEHIGH GAS SERVICE S Facility Id: 5260	***127 ERNSTON RD***	***41***	***429***
DUPONT - PARLIN Facility Id: 15676	***250 CHEESEQUAKE ROAD***	***52***	***596***
GLOBAL LANDFILL RECL	***ERNSTON STATION RD***	***90***	***865***

Facility Id: 66176			
GETTY SERVICE STATIO	***1294 RT 9***	***102***	***943***
Facility Id: 15337			
BASF CORP	***570 OLD WATERWORKS R***	***105***	***1104***
Facility Id: 15963			
CHEESEQUAKE STATE PA	***300 GORDON RD***	***113***	***1165***
Facility Id: 15349			
MADISON INDUSTRIES I	***554 OLD WATERWORKS R***	***115***	***1183***
Facility Id: 15957			
HALLS GULF SERVICE S	***99 RT 70***	***116***	***1225***
Facility Id: 12998			

NJ VCP: Through the VCP, responsible parties, developers, local officials, or individuals may work with the department to remediate non-priority contaminated sites that pose no immediate threat to human health or the environment.

A review of the NJ VCP list, as provided by EDR, and dated 04/06/2016 has revealed that there are 16 NJ VCP sites within the searched area.

Site	Address	Map ID	Page
138 GEORGE STREET	***138 GEORGE ST***	***1***	***121***
Incident Number: 05-03-24-1058-20			
508 LEFFERT STREET	***508 LEFFERT ST***	***5***	***147***
Incident Number: 05-05-05-1119-45			
873 UPPER MAIN STREE	***873 UPPER MAIN ST***	***8***	***157***
Incident Number: 03-07-29-1149-35			
VIKING'S MARINA	1705 1707 RT 35 S	27	381
Incident Number: 07-04-23-1512-33			
38 EUGENE BOULEVARD	***38 EUGENE BLVD***	***28***	***394***
Incident Number: 05-12-21-0954-01			
CARRIAGE HOUSE MANOR	***901 ERNSTON RD***	***31***	***411***
Incident Number: 99-03-02-1609-39			
1064 BORDENTOWN AVEN	***1064 BORDENTOWN AVE***	***33***	***416***
Incident Number: 02-06-21-1345-23			
362 BAYVIEW DRIVE	***362 BAYVIEW DR***	***47***	***459***
Incident Number: 03-11-26-1029-05			
182 CLEVELAND AVENUE	***182 CLEVELAND AVE***	***57***	***617***
Incident Number: 06-08-18-1639-25			
14 HEMLOCK ROAD	14 HEMLOCK RD	60	623
Incident Number: 00-05-23-1303-30			
JOHNNY ON THE SPOT	***3168 BORDENTOWN AVE***	***97***	***933***
MANZO CONTRACTING CO	WATERWORKS & CHEESEQ	105	1114
Incident Number: 99-08-20-1444-46			
RECLAMATION TECHNOLO	***3200 BORDENTOWN AVE***	***105***	***1117***
JOHNNY ON THE SPOT	***3168 BORDENTOWN AVE***	***105***	***1132***
Incident Number: 07-10-13-0452-00			
99 SCHULMEISTER ROAD	***99 SCHULMEISTER RD***	***123***	***1275***

Incident Number: 01-08-14-1447-07			
24 STEAMBOAT LANDING	***24 STEAMBOAT LANDING***	***124***	***1277***
Incident Number: 00-10-20-1158-17			

NJ DRYCLEANERS: A listing of registered drycleaners.

A review of the NJ DRYCLEANERS list, as provided by EDR, and dated 06/06/2016 has revealed that there are 6 NJ DRYCLEANERS sites within the searched area.

Site	Address	Map ID	Page
COIN-OP LAUNDRY & DR Facility Id: L1652	520 ERNSTON ROAD	61	632
MOON CLEANERS Facility Id: L1554	***499 ERNSTON RD***	***61***	***636***
T/A SAYREWOODS DRY C Facility Id: L1630	GATEWAY PLAZA, RT9 S	66	649
MOOREHOUSE SPEEDWELL Facility Id: L1704	***3101 BORDENTOWN AVE***	***75***	***731***
O B CLEANERS Facility Id: L1748	1063 RT 9	102	960
SUNG FRENCH DRY CLEA Facility Id: L1743	***15 RT 9***	***102***	***1033***

NJ BROWNFIELDS: Brownfields are identified as formter or current commmercial or industrial use sites that are presently vacant or underutilized, on which there is suspected to have been a discharge of a contamination to the soil or groundwater at concentra tions greater than applicable cleanup criteria.

A review of the NJ BROWNFIELDS list, as provided by EDR, and dated 07/25/2016 has revealed that there are 12 NJ BROWNFIELDS sites within the searched area.

Site	Address	Map ID	Page
THEOS AUTO REPAIR PStatus: DEP Case	***331 BORDENTOWN AVE***	***4***	***139***
FROG HOLLOW SWIM & T PStatus: DEP Case	***LOUISA ST***	***7***	***154***
MORGAN ORDNANCE DEPO PStatus: DEP Case	***601 ERNSTON RD***	***50***	***467***
E I DUPONT DE NEMOUR PStatus: DEP Case	***250 CHEESEQUAKE RD***	***52***	***471***
SHELL SERVICE STATIO PStatus: DEP Case	***BORDENTOWN AVE & CHE***	***75***	***725***
ROAD DEPARTMENT GARA PStatus: DEP Case	CHEESEQUAKE BROWNTOW	91	878
GETTY SERVICE STATIO	***1294 RT 9***	***102***	***943***

PStatus: DEP Case

MOUNTAINEER CONSTRUC	***WATERWORKS RD***	***105***	***1090***
PStatus: DEP Case			
EVOR PHILLIPS LEASIN	***WATERWORKS RD***	***108***	***1155***
PStatus: DEP Case			
CPS MADISON INDUSTRI	OLD WATERWORKS RD	115	1181
PStatus: DEP Case			
NAPPI TRUCKING CORP	***305 RT 34***	***118***	***1234***
PStatus: DEP Case			
LORCO PETROLEUM SERV	***RUNTON & CHEESEQUAKE***	***119***	***1242***
PStatus: DEP Case			

NJ ISRA: The ISRA process begins with determining if the Act applies to your type of business and transaction. The provisions of ISRA only apply to industrial establishments. What is an industrial establishment? The term "industrial establishment" refers to the type of business operations and transactions that would subject a facility to review under ISRA. An industrial establishment must meet each of the following three criteria: The place of business or real property at which such business is conducted, having a North American Industry Classification System (NAICS) code listed in N.J.A.C. 7:26 B - Appendix C subject to the specified exceptions and limitations. The place of business must have been engaged in operations on or after December 31, 1983; and The place of business must involve the generation, manufacture, refining, transportation, treatment, storage, handling, or disposal of hazardous substances or hazardous wastes.

A review of the NJ ISRA list, as provided by EDR, and dated 03/23/2016 has revealed that there are 6 NJ ISRA sites within the searched area.

Site	Address	Map ID	Page
POWER INSTRUMENT COR	***346 BORDENTOWN AVENU***	***4***	***138***
Pi Number: G000014095			
Case Status: NFA (No Further Action) HISTORIC			
ARNEL INC	3145 BORDENTOWN AVE	83	792
Pi Number: 477798			
Case Status: Assigned to Program			
Case Status: Exempt from ECRA/ISRA			
CIBA SPECIALTY CHEMI	***570 OLD WATERWORKS R***	***105***	***1098***
Pi Number: G000060555			
Case Status: Waiver from ECRA/ISRA			
3160 BORDENTOWN AVEN	***3160 BORDENTOWN AVE***	***105***	***1121***
Pi Number: 032456			
Case Status: Assigned to Program			
Case Status: NFA-E (Unrestricted Use)			
MIDHATTAN WOODWORKIN	3150A BORDENTOWN ROA	105	1128
Pi Number: G000002997			
Pi Number: G000013715			
Case Status: NFA (No Further Action) HISTORIC			
LORCO PETROLEUM SERV	***RUNTON & CHEESEQUAKE***	***119***	***1242***
Pi Number: 013795			
Case Status: Assigned to Program			
Case Status: LSRP Oversight			

EXECUTIVE SUMMARY

NJ NPDES: The NJPDES contains the names, addresses and other information of all permitted New Jersey Pollutant Discharge Elimination Sytem dischargers.

A review of the NJ NPDES list, as provided by EDR, and dated 05/17/2016 has revealed that there are 16 NJ NPDES sites within the searched area.

Site	Address	Map ID	Page
LOCKWOOD BOAT WORKS NJPDES Permit Number: NJ0124630 NJPDES Permit Number: NJG0124630	***1825 HWY 35 MORGAN***	***20***	***224***
VIKINGS MARINA NJPDES Permit Number: NJ0121665 NJPDES Permit Number: NJG0121665	***STATE HIGHWAY RT 35***	***27***	***379***
MORGAN STP NJPDES Permit Number: NJ0023825	OLD SPYE ROAD	27	389
BRIARWOOD-901 ERNSTO NJPDES Permit Number: NJG0232084	***901 ERNSTON ROAD***	***31***	***410***
MORGAN WTP NJPDES Permit Number: NJ0102229	GORDON AVENUE	32	414
MORGAN WTP NJPDES Permit Number: NJ0050245	GORDON AVENUE	32	415
BROWN'S BOAT YARD NJPDES Permit Number: NJG0127531	7 ZAUNEROWICZ RD	46	456
E I DUPONT DE NEMOUR NJPDES Permit Number: NJ0000159 NJPDES Permit Number: NJ0102121	***250 CHEESEQUAKE RD***	***52***	***471***
MORGAN MARINA INC NJPDES Permit Number: NJ0125725	8000 GONDECK DR	56	611
MORGAN MARINA INC NJPDES Permit Number: NJG0125725	8000 GONDEK DR	56	612
D&V WRECKING CORP NJPDES Permit Number: NJ0123897	***3143 BORDENTOWN AVE***	***83***	***800***
OJO TRUCKING CORP NJPDES Permit Number: NJG0123315	***3213 BORDENTOWN AVE***	***96***	***928***
OJO TRUCING CORP NJPDES Permit Number: NJ0123315	3213 BORDENTOWN AVE	96	929
JOHNNY ON THE SPOT NJPDES Permit Number: NJG0127884	***3168 BORDENTOWN AVE***	***97***	***933***
STAVOLA OLD BRIDGE M NJPDES Permit Number: NJ0162434	1 WATER WORKS RD	110	1159
LORCO PETROLEUM SERV NJPDES Permit Number: NJ0065307	***RUNTON & CHEESEQUAKE***	***119***	***1242***

EXECUTIVE SUMMARY

NJ HWS RE-EVAL: The locations were removed from the Known Contaminated Sites list for a variety of reasons. Some of the sites were taken off the list because they were inactive, some were not assigned a case worker and some were no longer contaminated. Inspectors from the DEP are now undertaking a full re-evaluation of each of the locations statewide. That includes visual and environmental tests to see whether contamination still exists.

A review of the NJ HWS RE-EVAL list, as provided by EDR, and dated 09/20/2007 has revealed that there is 1 NJ HWS RE-EVAL site within the searched area.

Site	Address	Map ID	Page
SOMMERS LANDFILL	***CHEESEQUAKE RD & RTE***	***106***	***1151***
Facility Status: Assigned to Lead Bureau.			

NJ GW CONTAM AREAS: This data identifies those sites where groundwater contamination has been identified and, where appropriate, the NJDEP has established a Classification Exception Area (CEA). CEAs are institutional controls in geographically defined areas within which the New Jersey Ground Water Quality Standards (NJGWQS) for specific contaminants have been exceeded. When a CEA is designated for an area, the constituent standards and designated aquifer uses are suspended for the term of the CEA. This data layer contains information about areas in the state which are specified as the Currently Known Extent (CKE) of ground water pollution. CKE areas are geographically defined areas within which the local ground water resources are known to be compromised because the water quality exceeds drinking water and ground water quality standards for specific contaminants.

A review of the NJ GW CONTAM AREAS list, as provided by EDR, and dated 05/13/2016 has revealed that there are 3 NJ GW CONTAM AREAS sites within the searched area.

Site	Address	Map ID	Page
241 GORDON STREET	***241 GORDON ST***	***4***	***132***
GLOBAL SANITARY LAND	ERNSTON RD	90	864
HALLS GULF SERVICE S	***99 RT 70***	***116***	***1225***

NJ NJEMS: NJEMS Sites are points representing sites regulated by NJDEP under one or more regulatory permitting or enforcement programs, or sites that are otherwise of some interest to a NJDEP program. Program interests included in NJEMS are: Air, Communications Center, Discharge Prevention, Exams and Licensing, Fish Game and Wildlife, Green Acres, Hazardous Waste, Lab Certification, Land Use, Landscape Irrigation, Parks and Forestry, Pesticides, Pinelands, Planning, Radiation, Right-to-Know, Site Remediation, Soil Conservation, Solid Waste, TCPA, Water Quality, Water Supply, and Watershed Management.

A review of the NJ NJEMS list, as provided by EDR, and dated 07/16/2016 has revealed that there are 106 NJ NJEMS sites within the searched area.

Site	Address	Map ID	Page
138 GEORGE STREET	***138 GEORGE ST***	***1***	***121***
Site Id: 201347			
873 UPPER MAIN STREE	***873 UPPER MAIN ST***	***8***	***157***
Site Id: 163902			
RENT A WRECK	***916 RT 9***	***17***	***183***
Site Id: 121675			
MILLER INDUSTRIES IN	RT 35 & ERNSTON RD	20	216

Site Id: 20610			
LOCKWOOD BOAT WORKS Site Id: 38762	1825 RT 35	20	222
MATERIALS INTERNATIO Site Id: 85169	1945 RT 35	20	233
MODERN TREND SAYREVI Site Id: 5300	1965 RT 35	20	238
19 PETROLEUM SERVICE Site Id: 5253	1949 RT 35	20	241
CENTRAL JERSEY START Site Id: 23124	1809 RT 35	20	250
MORGAN FRAME SPECIAL Site Id: 5231	1969 RT 35	20	269
CHARLES KOMAR & SONS Site Id: 81258	259 STEVENS AVE	20	271
WAYNES AUTO BODY Site Id: 5285	10TH ST & S PINE AVE	20	276
CANADA LAND CO INC Site Id: 167992	OLD SPYE RD	21	288
SAYREVILLE BORO MORG Site Id: 45697	RT 35 & OLD SPYE RD	21	294
LOCKWOOD MARINA Site Id: 121678	OLD SPYE RD	21	318
OLD SPYE MARINA Site Id: 122759	OLD SPYE RD	21	318
GETTY SERVICE STATIO Site Id: 5275	1788 RT 35	21	324
ARCHIES BOAT TOPS CO Site Id: 26279	1800 RT 35	21	335
240 TYLER STREET Site Id: 169978	240 TYLER ST	21	344
LAWN BUTLER Site Id: 203948	21 MORRIS ST	21	350
NJ TRANSIT AUTH Site Id: 129859	OLD SPYE RD	27	364
JCP&L LAURENCE HARBO Site Id: 298659	RT 35	27	368
ALLIED VAN LINES Site Id: 262581	RT 35 S	27	368
OLD BRIDGE TWP MARGA Site Id: 166044	RT 35	27	369
A&B MARINE Site Id: 260448	RT 35	27	369
VIKINGS MARINA CORP Site Id: 15291	1705 1707 RT 35	27	381
SAYREVILLE BORO MUA	OLD SPYE RD	27	390

Site Id: 5283			
NJ HIGHWAY AUTH #841 Site Id: 309169	ERNSTON RD	31	397
MORGAN MARINA INC Site Id: 53075	ERNSTON RD	31	398
CARRIAGE HOUSE MANOR Site Id: 522516 Site Id: 84196	***901 ERNSTON RD***	***31***	***406***
BRIARWOOD-901 ERNSTO Site Id: 55229	***901 ERNSTON ROAD***	***31***	***410***
901 ERNSTON RD EASTE Site Id: 199151	901 ERNSTON RD	31	414
SAYREVILLE BORO MUA Site Id: 49357	ERNSTON RD	35	420
SAYREVILLE BORO MUA Site Id: 5256	GONDEK DR	36	421
GLOBAL SLF WETLAND M Site Id: 439274	7 GONDEK DR	39	427
GOLDEN AGE DEVELOPME Site Id: 412046	GONDEK DR	40	428
DAVES AUTOMOTIVE Site Id: 147615	***27 BORDENTOWN AVE***	***41***	***432***
SAYREVILLE BORO MUA Site Id: 49356	ERNSTON RD	44	446
MORGAN CREEK BOATWOR Site Id: 358499	MORGAN PLANT RD	46	452
BROWNS BOAT YARD INC Site Id: 5316	ERNSTON RD	46	453
ERNSTON COC Site Id: 177775	***350 ERNSTON RD***	***49***	***461***
AMERICAN INTERNATION Site Id: 369598	10 MOLTEG DR	54	607
14 LAURENCE PARKWAY Site Id: 80137	***14 LAURENCE PKWY***	***55***	***610***
MORGAN MARINA INC Site Id: 5254	***8000 GONDEK DR***	***56***	***614***
182 CLEVELAND AVENUE Site Id: 258649	***182 CLEVELAND AVE***	***57***	***617***
COIN OP LAUNDRY & CL Site Id: 5319	520 ERNSTON RD	61	629
MOON CLEANERS Site Id: 5318	***499 ERNSTON RD***	***61***	***636***
NJ TURNPIKE AUTH Site Id: 437587	GARDEN STATE PKWY MM	64	646
LAMER DEVELOPMENT Site Id: 91303	ERNSTON RD	70	654
R&S STRAUSS @ SAYRE	RT 9 & ERNSTON RD	72	706

Site Id: 46392			
BJS WHOLESALE CLUB # Site Id: 357204	1007 RT 9	72	713
MOOREHOUSE SPEEDWELL Site Id: 5272	***3101 BORDENTOWN AVE***	***75***	***731***
JAN KULA CO Site Id: 161741	42 OAKWOOD DR	76	738
ASHLAND INC Site Id: 15689	***50 S MINISINK AVE***	***79***	***768***
DARON MOTORS INC ACA Site Id: 27292	1101 CHEESEQUAKE BRO	82	790
IF ASSOC INC Site Id: 31623	3145 BORDENTOWN AVE	83	791
ARNEL LABORATORY SER Site Id: 26909	3145 BORDENTOWN AVE	83	792
JOHNNY ON THE SPOT Site Id: 150466	3143 BORDENTOWN AVE	83	794
ALLOY CONCEPTS & FAB Site Id: 25768	3143 BORDENTOWN AVE	83	795
ASPAR CHEMICAL CORP Site Id: 17033	3143 BORDENTOWN AVE	83	799
ALTERNATE DISPOSAL S Site Id: 93899	3141 BORDENTOWN AVE	83	814
1005 WILBUR PLACE Site Id: 78474	***1005 WILBUR PL***	***84***	***815***
PARKWOOD VILLAGE APA Site Id: 16937	1 WESTMINSTER BLVD	85	820
GLOBAL LANDFILL RECL Site Id: 66176	***ERNSTON STATION RD***	***90***	***865***
MIDDLESEX CNTY ROAD Site Id: 50370	CHEESEQUAKE BROWNTOW	91	880
OLD BRIDGE TWP ROAD Site Id: 67586	RT 9	91	881
TSYBULSKYY CONSTRUCT Site Id: 176457	10 PARKWOOD DR	92	886
GP CONTRACTOR CORP Site Id: 383293	19 WESTMINSTER BLVD	92	887
NIEUW AMSTERDAM VILL Site Id: 5741	***1 VAN DELFT DR***	***95***	***896***
GARDEN FRIENDS Site Id: 360914	3018 BORDENTOWN AVE	96	905
ZOUBEK ASSOC INC Site Id: 15318	3220 BORDENTOWN AVE	96	913
OJO TRUCKING CORP Site Id: 38722	***3213 BORDENTOWN AVE***	***96***	***928***
ALTERNATE DISPOSAL S	3200 BORDENTOWN AVE	96	930

Site Id: 5262			
JOHNNY ON THE SPOT Site Id: 341604	***3168 BORDENTOWN AVE***	***97***	***933***
MANZO HOLDINGS Site Id: 177267	WATERWORKS RD	98	934
PHIL VESPIA TIRE CEN Site Id: 23769	1209 CHEESEQUAKE BRO	100	936
GETTY SERVICE STATIO Site Id: 15337	***1294 RT 9***	***102***	***943***
EMERY MANOR NURSING Site Id: 55121	***4 RT 34***	***102***	***950***
LOWES HOME CENTERS I Site Id: 171771	1324 RT 9	102	975
LAMAR CO @ GATEWAY S Site Id: 182004	1054 RT 9	102	982
HOME DEPOT INC #957 Site Id: 58057	1007 RT 9	102	1018
SUNG FRENCH DRY CLEA Site Id: 15260	***15 RT 9***	***102***	***1033***
RACEWAY SERVICE STAT Site Id: 5734	***1300 CHEESEQUAKE BRO***	***102***	***1041***
EMPORIUM GAS SERVICE Site Id: 15373	1299 CHEESEQUAKE BRO	102	1060
INTERTECH CONSTRUCTO Site Id: 151132	8 OLD RD	102	1061
U HAUL CENTER Site Id: 332806	1275 RT 9	102	1062
PJ & DAUGHTERS Site Id: 154956	OLD WATERWORKS RD	104	1076
EVOR PHILIPS LEASING Site Id: 283999	OLD WATER WORKS RD	104	1077
RLT TRUCKING CO Site Id: 226502	OLD WATER WORKS RD	104	1078
MOUNTAINEER CONSTRUC Site Id: 52423	***WATERWORKS RD***	***105***	***1090***
BRIDGE DISPOSAL SERV Site Id: 167296	***586 WATERWORKS RD***	***105***	***1113***
CREATIVE MODULAR HOM Site Id: 155151	WATERWORKS RD	105	1115
JH MONTEATH CO Site Id: 5738	3150 BORDENTOWN AVE	105	1129
CONTINENTAL WOOD PRO Site Id: 76300	3150 BORDENTOWN AVE	105	1130
MIDHATTAN WOODWORKIN Site Id: 5754	3130 BORDENTOWN AVE	105	1144
EASCO ALUMINUM CO JE	3237 BORDENTOWN AVE	105	1151

Site Id: 54916			
OLD BRIDGE TWP SOMME Site Id: 66669	CHEESEQUAKE RD	106	1152
MANZO CONTRACTING CO Site Id: 44362	***CHEESEQUAKE RD***	***109***	***1158***
5 JOSEPH COURT Site Id: 456677	***5 JOSEPH CT***	***112***	***1164***
CHEESEQUAKE STATE PA Site Id: 15349	***300 GORDON RD***	***113***	***1165***
LORCO PETROLEUM SERV Site Id: 5740	***RUNTON & CHEESEQUAKE***	***119***	***1242***
9 MICHELLE AVENUE Site Id: 374610	***9 MICHELLE AVE***	***121***	***1269***
SWANTON FUEL CENTRAL Site Id: 463593	***740 RT 34***	***122***	***1271***
202 ROUTE 34 Site Id: 78928	***202 RT 34***	***122***	***1272***
99 SCHULMEISTER ROAD Site Id: 91694	***99 SCHULMEISTER RD***	***123***	***1275***
MINDING MIRACLES LEA Site Id: 360969	***90 SPRING HILL RD***	***125***	***1280***

EDR PROPRIETARY RECORDS

EDR MGP: The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

A review of the EDR MGP list, as provided by EDR, has revealed that there is 1 EDR MGP site within the searched area.

Site	Address	Map ID	Page
SOUTH AMBOY COAL GAS	GEORGE AND FELTUS ST	5	147

EDR Hist Auto: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk

Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there are 23 EDR Hist Auto sites within the searched area.

Site	Address	Map ID	Page
Not reported	2017 STATE ROUTE 35	18	186
Not reported	253 KATH ST	19	191
Not reported	1965 STATE ROUTE 35	20	239
Not reported	1938 STATE ROUTE 35	20	271
Not reported	187 PARKER ST	20	286
Not reported	1788 STATE ROUTE 35	21	339
Not reported	2301 WESTMINSTER BL	61	623
Not reported	499 ERNSTON RD	61	636
Not reported	1030 US HIGHWAY 9	62	639
Not reported	3112 BORDENTOWN AVE	75	720
Not reported	3105 BORDENTOWN AVE	75	731
Not reported	540 SKYTOP GDNS	76	738
Not reported	5714 WELLS DR	80	784
Not reported	3143 BORDENTOWN AVE	83	798
Not reported	1 WESTMINSTER BLVD	85	820
Not reported	10 PARKWOOD DR	92	886
Not reported	4 PARKWOOD DR	92	887
Not reported	1 PARKWOOD DR	92	887
Not reported	1101 US HIGHWAY 9	102	949
Not reported	1917 US HIGHWAY 9	102	1044
Not reported	590 WATER WORKS RD	105	1114
Not reported	3160 BORDENTOWN AVE	105	1119
Not reported	3237 BORDENTOWN AVE	105	1145

EDR Hist Cleaner: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there are 11 EDR Hist Cleaner sites within the searched area.

Site	Address	Map ID	Page
Not reported	1213 HARBOR CLUB DR	36	425
Not reported	1001 HARBOR CLUB DR	36	425
Not reported	520 ERNSTON RD	61	629
Not reported	520 ERNSTON RD	61	633
Not reported	499 ERNSTON RD	61	633
Not reported	499 ERNSTON RD	61	635
Not reported	26 FELA DR	67	650
Not reported	3101 BORDENTOWN AVE	75	735
Not reported	4702 WELLS DR	80	784
Not reported	1061 US HIGHWAY 9	102	974

Site	Address	Map ID	Page
Not reported	180 US HIGHWAY 9 N	102	1050

NJ RGA HWS: The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the New Jersey Department of Environmental Protection in New Jersey.

A review of the NJ RGA HWS list, as provided by EDR, has revealed that there are 3 NJ RGA HWS sites within the searched area.

Site	Address	Map ID	Page
175 NORTON STREET	175 NORTON ST	20	278
GLOBAL SANITARY LAND	ERNSTON STATION RD	90	877
SATURN DEALERSHIP	955 RT 9	102	1036

NJ RGA LF: The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the New Jersey Department of Environmental Protection in New Jersey.

A review of the NJ RGA LF list, as provided by EDR, has revealed that there is 1 NJ RGA LF site within the searched area.

Site	Address	Map ID	Page
ALTERNATE DISP SYSTE Facility ID: 1209001193	3141 BORDENTOWN AVE	105	1144

NJ RGA LUST: The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the New Jersey Department of Environmental Protection in New Jersey.

A review of the NJ RGA LUST list, as provided by EDR, has revealed that there is 1 NJ RGA LUST site within the searched area.

Site	Address	Map ID	Page
NJ SPORTS & EXPOSITI Facility ID: 540	50 RT 20	102	992

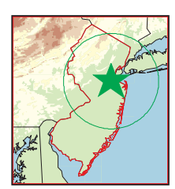
EXECUTIVE SUMMARY

Please refer to the end of the findings report for unmapped orphan sites due to poor or inadequate address information.

EDR DataMap® Well Search

Madison Loop

- Listed Water Wells
- Study Boundary
- Roads
- Major Roads
- Waterways
- Railroads
- Contour Lines
- Fault Lines
- Water
- Superfund Sites
- 100-Yr Flood Zones
- Wetlands



South Amboy, NJ

0 1/2 1

Scale in Miles

EDR Environmental Data Resources, Inc

Copyright © 2016 EDR, Inc. © 2015 TomTom Rel. 2015.

4726085.2w - 15 Sep 16

Madison Loop
South Amboy, NJ 08879

Inquiry Number: 4726085.2w
September 15, 2016

EDR DataMap™ Well Search Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2016 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

GEOCHECK VERSION 2.1
SUMMARY

FEDERAL DATABASE WELL INFORMATION

MAP ID	WELL ID
1	USGS40000815049
3	USGS40000815043
4	USGS40000815041
4	USGS40000815039
4	USGS40000815038
4	USGS40000815037
4	USGS40000810540
7	USGS40000815017
8	USGS40000815019
8	USGS40000815006
8	USGS40000815018
9	USGS40000815016
9	USGS40000815015
10	USGS40000814957
11	USGS40000815007
12	USGS40000815064
13	USGS40000815002
14	USGS40000814999
14	USGS40000814998
15	USGS40000814992
16	USGS40000814993
17	USGS40000814989
18	USGS40000814990
19	USGS40000814982
20	USGS40000814975
20	USGS40000814974
21	USGS40000814985
22	USGS40000814969
22	USGS40000814970
23	USGS40000814967
24	USGS40000814959
25	USGS40000814948
27	USGS40000814931
28	USGS40000814925
28	USGS40000814919
28	USGS40000814918
30	USGS40000814915
32	USGS40000814908
28	USGS40000814907
28	USGS40000814905
28	USGS40000814903
28	USGS40000814902
34	USGS40000814900
35	USGS40000814874
36	USGS40000814897

GEOCHECK VERSION 2.1
SUMMARY

FEDERAL DATABASE WELL INFORMATION

MAP ID	WELL ID
37	USGS40000814893
36	USGS40000814896
36	USGS40000814892
38	USGS40000814885
39	USGS40000814868
40	USGS40000814864
41	USGS40000814862
43	USGS40000814849
44	USGS40000814850

STATE WATER WELL INFORMATION

MAP ID	WELL ID
2	2415
5	2414
6	2413
8	NJ4000000000993
8	NJ4000000000992
9	NJ4000000000959
9	NJ4000000000926
11	NJ4000000001006
22	NJ4000000000890
26	NJ4000000000811
28	NJ4000000000812
28	NJ4000000000829
31	NJ4000000000805
32	NJ4000000000807
28	NJ4000000000826
33	NJ4000000000809
34	NJ4000000000810
28	NJ4000000000808
36	NJ4000000000806
41	NJ4000000000827
42	NJ4000000000879
43	NJ4000000001009
44	NJ4000000001010

PUBLIC WATER SUPPLY SYSTEM INFORMATION

Map ID: 4
PWS ID: NJ1220001
PWS Name: SOUTH AMBOY W DEPT
SOUTH AMBOY W DEPT
1500 RONSON ROAD
ISELIN, NJ 088303020

PWS currently has or had major violation(s) or enforcement:

GEOCHECK VERSION 2.1
SUMMARY

PUBLIC WATER SUPPLY SYSTEM INFORMATION

Map ID: 4
PWS ID: NJ1220001
PWS Name: SOUTH AMBOY W DEPT
SOUTH AMBOY W DEPT
1500 RONSON ROAD
ISELIN, NJ 088303020
PWS currently has or had major violation(s) or enforcement:

Map ID: 4
PWS ID: NJ1220001
PWS Name: SOUTH AMBOY W DEPT
SOUTH AMBOY W DEPT
1500 RONSON ROAD
ISELIN, NJ 088303020
PWS currently has or had major violation(s) or enforcement:

Map ID: 9
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 9
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 29
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

GEOCHECK VERSION 2.1
SUMMARY

PUBLIC WATER SUPPLY SYSTEM INFORMATION

Map ID: 32
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 28
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

Map ID: 36
PWS ID: NJ1219001
PWS Name: SAYREVILLE W DEPT
SAYREVILLE WATER DEPARTMENT
167 MAIN ST
SAYREVILLE, NJ 08872
PWS currently has or had major violation(s) or enforcement:

USGS TOPOGRAPHIC MAP(S)

40074-D2 KEYPORT, NJ NY
40074-D3 SOUTH AMBOY, NJ NY

AREA RADON INFORMATION

GEOCHECK VERSION 2.1
SUMMARY

AREA RADON INFORMATION

State Database: NJ Radon

Radon Test Results

City	Num Tests	# > 4 pCi/L	% > pCi/L
CARTERET BORO	939	20	2.000
CRANBURY TWP	987	124	13.000
DUNELLEN BORO	720	10	1.000
EAST BRUNSWICK TWP	7722	445	6.000
EDISON TWP	5549	705	13.000
HELMETTA BORO	142	13	9.000
HIGHLAND PARK BORO	1757	677	39.000
JAMESBURG BORO	988	161	16.000
METUCHEN BORO	2006	265	13.000
MIDDLESEX BORO	1626	158	10.000
MILLTOWN BORO	912	57	6.000
MONROE TWP	1513	219	14.000
NEW BRUNSWICK CITY	1811	348	19.000
NORTH BRUNSWICK TWP	4154	903	22.000
OLD BRIDGE TWP	2122	61	3.000
PERTH AMBOY CITY	713	10	1.000
PISCATAWAY TWP	4405	1177	27.000
PLAINSBORO TWP	1893	283	15.000
SAYREVILLE BORO	2562	82	3.000
SOUTH AMBOY CITY	503	14	3.000
SOUTH BRUNSWICK TWP	4256	852	20.000
SOUTH PLAINFIELD BOR	1387	152	11.000
SOUTH RIVER BORO	1162	38	3.000
SPOTSWOOD BORO	840	20	2.000
WOODBRIDGE TWP	3945	267	7.000

Federal EPA Radon Zone for MIDDLESEX County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for MIDDLESEX COUNTY, NJ

Number of sites tested: 735

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area	0.850 pCi/L	95%	5%	0%
Basement	1.680 pCi/L	84%	16%	1%

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Water Well Information:

Map ID:	1		
Org. Identifier:	USGS-NJ	Site ID:	USGS40000815049
Formal name:	USGS New Jersey Water Science Center		
Monloc Identifier:	USGS-402904074164801		
Monloc name:	230427-- Discontinued 1		
Monloc type:	Well		
Monloc desc:	SEALED		
Huc code:	02030104	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.4834393
Longitude:	-74.2784794	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	20.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Northern Atlantic Coastal Plain aquifer system		
Formation type:	Old Bridge Sand Member of Magothy Formation		
Aquifer type:	Not Reported		
Construction date:	19220000	Welldepth:	52
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	3		
Org. Identifier:	USGS-NJ	Site ID:	USGS40000815043
Formal name:	USGS New Jersey Water Science Center		
Monloc Identifier:	USGS-402831074171901		
Monloc name:	231366-- MW134		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	02030104	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.4753839
Longitude:	-74.2882019	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	135
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Northern Atlantic Coastal Plain aquifer system		
Formation type:	Old Bridge Sand Member of Magothy Formation		

APPENDIX B
GEOTECHNICAL INVESTIGATION REPORTS

AECOM

SUMMARY OF FINDINGS
GEOTECHNICAL INVESTIGATION FOR
NORTHEAST SUPPLY ENHANCEMENT – MADISON LOOP
Middlesex County, New Jersey
(Dated October 13, 2017)

1. BACKGROUND

Transcontinental Gas Pipe Line Company, LLC (Transco) is planning approximately 3.4 miles of 26-inch looping in Middlesex County, New Jersey designated as Madison Loop (Site) as a part of its Northeast Supply Enhancement project. Site location is presented on **Figure 1**.

Transco previously authorized AECOM to complete geotechnical investigation work to characterize subsurface conditions along the planned pipeline alignment. In this regard, Transco requested AECOM to complete nine borings to provide subsurface information including the information desired by Laney Directional Drilling Company (Laney) to complete the horizontal directional drilling (HDD) design for Transco. AECOM therefore coordinated with Transco and Laney to identify the desired boring locations and sampling requirements, and subsequently completed all borings and associated laboratory testing. Findings of this subsurface investigation are further described below.

2. REGIONAL GEOLOGY

2.1 - Bedrock Geology

The crystalline bedrock basement underlying the Site consists of lower Paleozoic and Precambrian schist and gneiss. The elevation of the bedrock surface ranges from 275 to 325 feet below sea level (Sandberg, 1996) (Reference 1).

2.2 - Surficial Geology

The material overlying basement rock at the Site consists of a discontinuous overburden of Tertiary and Quaternary deposits atop southeast dipping Cretaceous units (members of Magothy and Raritan Formations) which may outcrop at the surface. The units present at the Site are listed below in order of youngest to oldest.

The elevation of the top of the Old Bridge Sand unit ranges from -20 to -30 feet NGVD 1929; the thickness of the Old Bridge Sand unit ranges 65 to 75 feet; and the elevation of the top of the Farrington Sand member is about -180 feet NGVD 1929. Each of the members of the Cliffwood beds, Morgan beds, and Amboy Stoneware Clay may be difficult to distinguish and are at times mapped as a combined undivided Magothy unit. These characteristics of the regional geology are used to identify strata in the borings (References 1 through 5).

- Holocene salt marsh/estuarine deposits - Silt, sand, peat, clay, minor pebble gravel; brown, dark-brown, gray, black; as much as 100 feet thick; contain abundant organic matter

- Holocene and late Pleistocene alluvium – Sand, gravel, silt, minor clay and peat; reddish brown, yellowish brown, brown, gray; as much as 20 feet thick; variable amounts of organic matter
- Middle to late Pleistocene upper stream terrace deposits - Sand and pebble gravel, minor silt and cobble gravel; yellow, reddish yellow, yellowish brown; as much as 20 feet thick
- Pleistocene (locally Miocene and Pliocene) weathered Cretaceous deposits - Exposed sand and clay of Cretaceous formations; includes thin, patchy alluvium and colluvium, and pebbles left from erosion of surficial deposits
- Pliocene Pennsauken Formation - Sand, clayey sand, pebble gravel, minor silt, clay, and cobble gravel; yellow, reddish yellow, white; locally iron-cemented; as much as 140 feet thick.
- Pliocene Glauconitic phase of Pennsauken Formation - Sand, clayey sand, and pebble gravel, minor silt and clay; reddish yellow to yellowish brown; sand typically includes glauconite; as much as 40 feet thick
- Cretaceous Cliffwood beds (Magothy) – Fine to medium quartz sand; white, yellow, gray; interbedded with thin, dark gray, micaceous, carbonaceous silt with pyrite; as much as 40 feet thick
- Cretaceous Morgan beds (Magothy) - Laminated to thinly interbedded clay (light to medium gray, typically carbonaceous) and micaceous quartz sand (white, yellow, and light gray); sand is predominantly fine grained, massive to cross-bedded; as much as 90 feet thick
- Cretaceous Amboy Stoneware Clay (Magothy) - Dark gray to grayish-brown clay and silt which weathers to white; carbonaceous and micaceous with grayish-pink fine quartz sand laminae; as much as 30 feet thick
- Cretaceous Old Bridge Sand unit (Magothy) - Light gray quartz sand weathered to white, yellow and pink with occasional clear mica and lignite; interbedded with dark gray, discontinuous, carbonaceous clay beds as much as 3 feet thick; unit as much as 100 feet thick
- Cretaceous South Amboy Fire Clay (Magothy) - Massive to laminated clay, locally dark gray but typically oxidized to white and red; as much as 30 feet thick
- Cretaceous Sayreville Sand (Raritan) - Fine to medium sand locally thin and clayey; has an average thickness of 35 to 40 feet
- Cretaceous Woodbridge Clay (Raritan) - Dark gray, massive clay and silt unit with mica, fine-grained wood, and pyrite; occasionally interlaminated with light gray to white sand; commonly contains gray to brown siderite; as much as 110 feet thick
- Cretaceous Farrington Sand (Raritan) - White, yellow, red, light gray micaceous quartz sand commonly interbedded with thin gravel beds and thin to thick dark gray silt beds; as much as 50 feet thick (Stanford, 1993).

3. SUBSURFACE INVESTIGATION

Nine geotechnical test borings and laboratory testing were completed as further described below.

3.1 - Test Borings

Subsurface conditions were explored by completing nine (9) geotechnical test borings, designated borings AB-1, AB-2, AB-3, AB-4, CB-1, CB-2, CB-3, MB-1 and MDB-1, at the approximate locations shown on **Figure 2**.

Prior to initiating the test boring work, AECOM obtained NJDEP well permits for the test borings with the termination depth of 50 feet or greater (i.e., all borings except boring MB-1) and completed a utility notification through the New Jersey One-Call system to provide for mark-out of any known public utilities.

Uni-Tech Drilling Co., Inc. of Franklinville, New Jersey completed the test borings under a subcontract to AECOM between September 15, 2016 and August 23, 2017. The borings were drilled using a rubber-tire-mounted CME-750 and a track-mounted CME-55 ATV drill rigs. Key findings of the test borings are summarized in **Table 1** and no bedrock was encountered in any of the nine borings until its termination depth. Logs of the test borings are presented in **Appendix A**.

The test borings were advanced using hollow stem auger (HSA) and rotary wash soil drilling techniques. Within each test boring, representative samples were collected from the encountered overburden soils using a 24-inch-long split-spoon sampler (2-inch O.D.) driven with a 140-pound hammer freely falling 30 inches in accordance with ASTM D-1586 ("Penetration Test and Split-Barrel Sampling of Soils"). In general, representative samples of the soil materials encountered in the test borings were collected at continuous depth intervals to approximately 12 feet below existing ground surface (bgs) and at five-foot depth intervals thereafter.

The collected split-spoon soils samples were preserved and labeled in accordance with industry standards. Soil samples were subsequently transported to the AECOM geotechnical laboratory in Conshohocken, Pennsylvania for further examination and testing.

Organic vapor monitoring was also conducted during the test boring operations by an AECOM field representative using a MiniRAE Photoionization Detector (PID) monitor. Upon completion, each borehole was backfilled with a cement-bentonite grout to original ground surface as an environmental safeguard. The grout was placed using a tremie pipe placed at the bottom of the borehole. All excess soil cuttings and drilling fluids produced from test borings were containerized into drums, staged at each borehole location, and hauled to an onsite drum staging area designated by Transco. All field activities were completed under the full-time technical supervision of an AECOM field professional.

3.2 - Survey of Boring Locations

Transco surveyed the planned and completed locations of each boring. The completed location of each boring is shown on **Figure 2**. Coordinates and ground surface elevations at each boring are provided in **Table 1** and the boring logs in **Appendix A**.

3.3 - Laboratory Testing Program

Geotechnical laboratory testing was completed on representative samples of the encountered soil materials. Results of the testing program are presented in **Appendix B**.

Selected split-spoon soil samples were tested for physical properties including natural moisture content (ASTM D-2216), grain-size distribution (ASTM D-421/422) and plasticity by Atterberg limits (ASTM D-4318) to assist in classifying the encountered soils and evaluating stratigraphical continuity. A table summarizing the soil testing results for these soil samples is presented on pages B-1 through B-3. Grain-size distribution curves are presented on pages B-4 through B-20.

4. SUBSURFACE CONDITIONS

AECOM identified distinct soil strata and apparent stratigraphical conditions as inferred by the soil materials encountered in the test borings and measured in the laboratory. Inferred subsurface profiles were developed and are presented on **Figures 3-1** and **3-2**. Detailed soil descriptions presented in the boring logs of **Appendix A** are summarized below (presented in order of increasing depth):

4.1 Stratum 1 – Fill

Fill materials were only encountered within the upper 2 feet of boring MB-1, consisting predominately of silty sand with gravel. Standard penetration resistance (or N-) value was 21 blows per foot (bpf), which is indicative of very dense conditions.

4.2 Stratum 2 – Undivided Magothy Unit

Stratum 2 was observed in all borings except boring MB-1, consisting predominately of silty sand and silty to sandy clay. This unit was observed to be approximately 32 to 95 feet thick. Stratum 2 starts from ground surface or underlies Stratum 3, Pennsauken Formation described below.

Stratum 2 soils were observed to be typically medium dense to dense (for sandy soils) or stiff to very stiff (for clayey soils). N-values ranged from weight-of-hammer (WOH) to split-spoon refusal (e.g., 50 blows per 3 inches sampling advancement). Gravel content was found to range from approximately zero to 14 percent. Atterberg limit testing indicated liquid limits ranging from 29 to 45 and plasticity indices ranging from 12 to 21, indicating Stratum 2 soils are medium-plastic.

4.3 Stratum 3 – Pennsauken Formation

Stratum 3 was observed in borings AB-2, AB-3 and CB-2, consisting predominately of silty sand with gravel. This unit was observed to be approximately 2 to 39 feet thick. Stratum 3 consistently starts from ground surface and overlies Stratum 2 where encountered.

Stratum 3 soils were observed to be loose to dense and N-values of Stratum 3 soils ranged from 3 to 17 bpf. Gravel content was found to be approximately 15 percent.

4.4 Stratum 4 – Old Bridge Sand

Stratum 4 was observed in borings CB-1, CB-2, CB-3 and MDB-1, consisting predominately of silty sand with interbedded silty clay. This unit was not fully penetrated by any of the four borings above so its thickness is unknown. Stratum 4 consistently underlies Stratum 2 where encountered.

Stratum 4 soils were observed to be medium dense to very dense and N-values of Stratum 4 soils ranged from 11 bpf to split-spoon refusal (e.g., 50 blows per 4 inches sampling advancement). No gravel was encountered in this stratum.

4.5 Stratum 5 – Amboy Stoneware Clay

Stratum 5 soils were encountered within boring MB-1 only, consisting predominately of silty clay. N-values ranged from 4 to 9 bpf. Unconfined compressive strength of these soils, as measured in the field with a pocket penetrometer, ranged from 1.0 to 2.5 tons per square foot (tsf), which indicates a stiff to very stiff consistency.

4.6 Groundwater

Groundwater levels were measured during drilling and were recorded in the boring logs presented in **Appendix A**. Collected groundwater level information is summarized in **Table 1**.

As shown on **Table 1**, groundwater was encountered during drilling with depths ranging from approximately 4 to 55 feet bgs (between approximate elevations 3 and 111 feet). It should be noted that groundwater levels are subject to change due to seasonal conditions and man-made influences.

5. REFERENCES

1) Sandberg, S.K., D.W. Hall, J.A.M. Gronberg, and D.L. Pasicznyk. 1996. Geophysical Investigations of the Potomac-Raritan-Magothy Aquifer System and Underlying Bedrock in Parts of Middlesex and Mercer Counties, New Jersey. New Jersey Geological Survey Report GSR 37.

2) Farlekas, G. M. 1979. Geohydrology and Digital-simulation Model of the Farrington Aquifer in the Northern Coastal Plain of New Jersey. United States Geological Survey Water-Resources Investigations 79-106.

3) Gronberg, JM., A.A. Pucci, Jr., and B.A. Birkelo. 1991. Hydrogeologic Framework of the Potomac-Raritan-Magothy Aquifer System, Northern Coastal Pan of New Jersey. United States Geological Survey Water-Resources Investigations Report 90-4016.

4) New Jersey Department of Environmental Protection. Bureau of GIS. NJ-GeoWEB. Accessed Oct 2017.

5) Sugarman, P.J., S.D. Stanford, J.P. Owens, and G.J. Brenner. 2005. Bedrock Geology of the South Amboy Quadrangle, Middlesex and Monmouth Counties, New Jersey. New Jersey Geological Survey Open File Map OFM 65.

6. LIMITATIONS

The geotechnical investigation work completed by AECOM was performed in accordance with reasonable and accepted engineering practices. No warranty or guarantee, either written or implied, is applicable to this work. The findings presented in this report are based on the assumption that the subsurface conditions do not deviate appreciably from those disclosed by the test borings.

This report has been prepared solely for use by Transcontinental Gas Pipe Line Company, LLC. Any reuse of this report, particular by third parties, without expressing the permission of AECOM is solely at their own risk.

FIGURE 1 - SITE AND BORING LOCATION MAP

NESE Madison Loop, Middlesex County, NJ

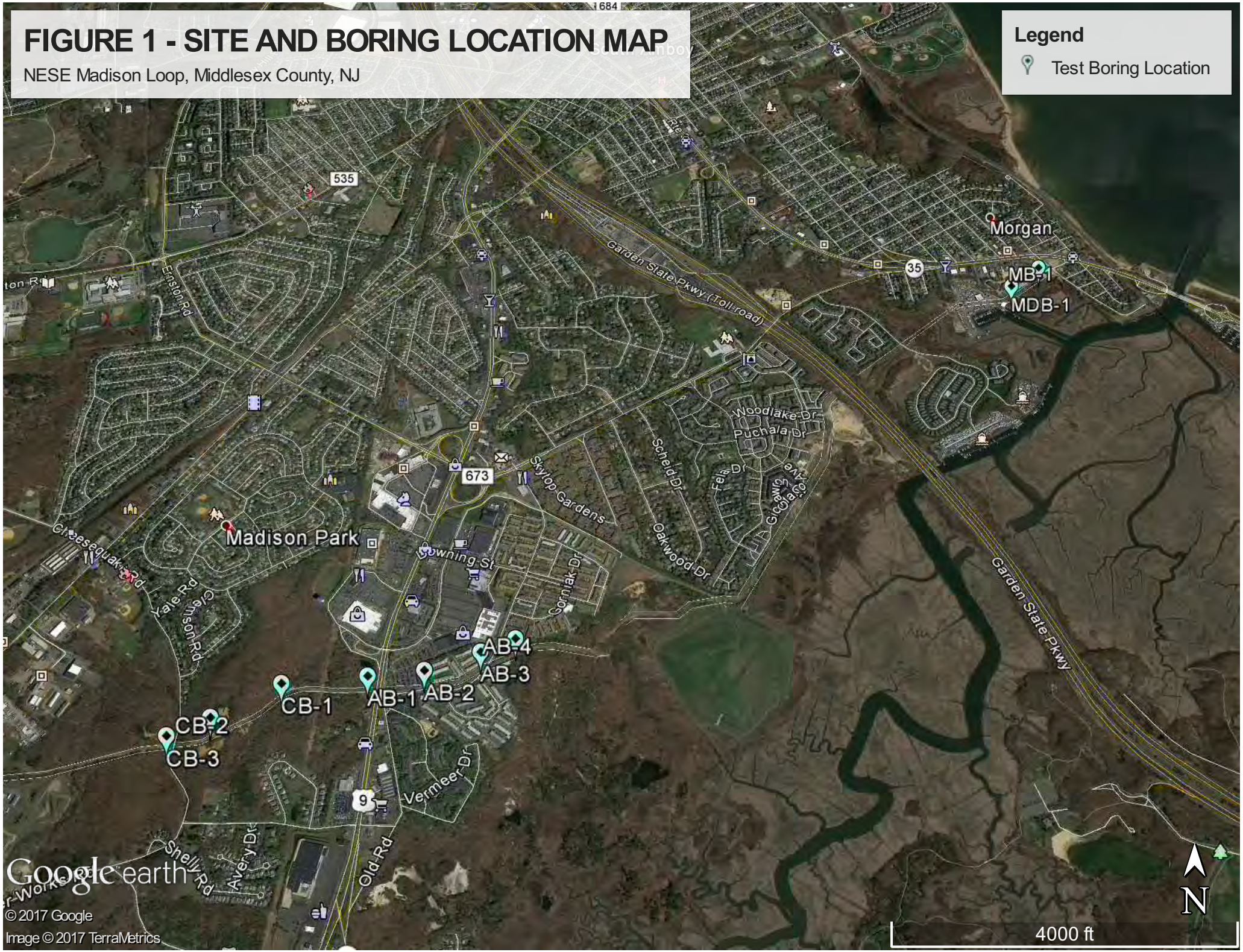


FIGURE 2 - BORING LOCATION PLAN (1 of 2)

NESE Madison Loop, Middlesex County, NJ

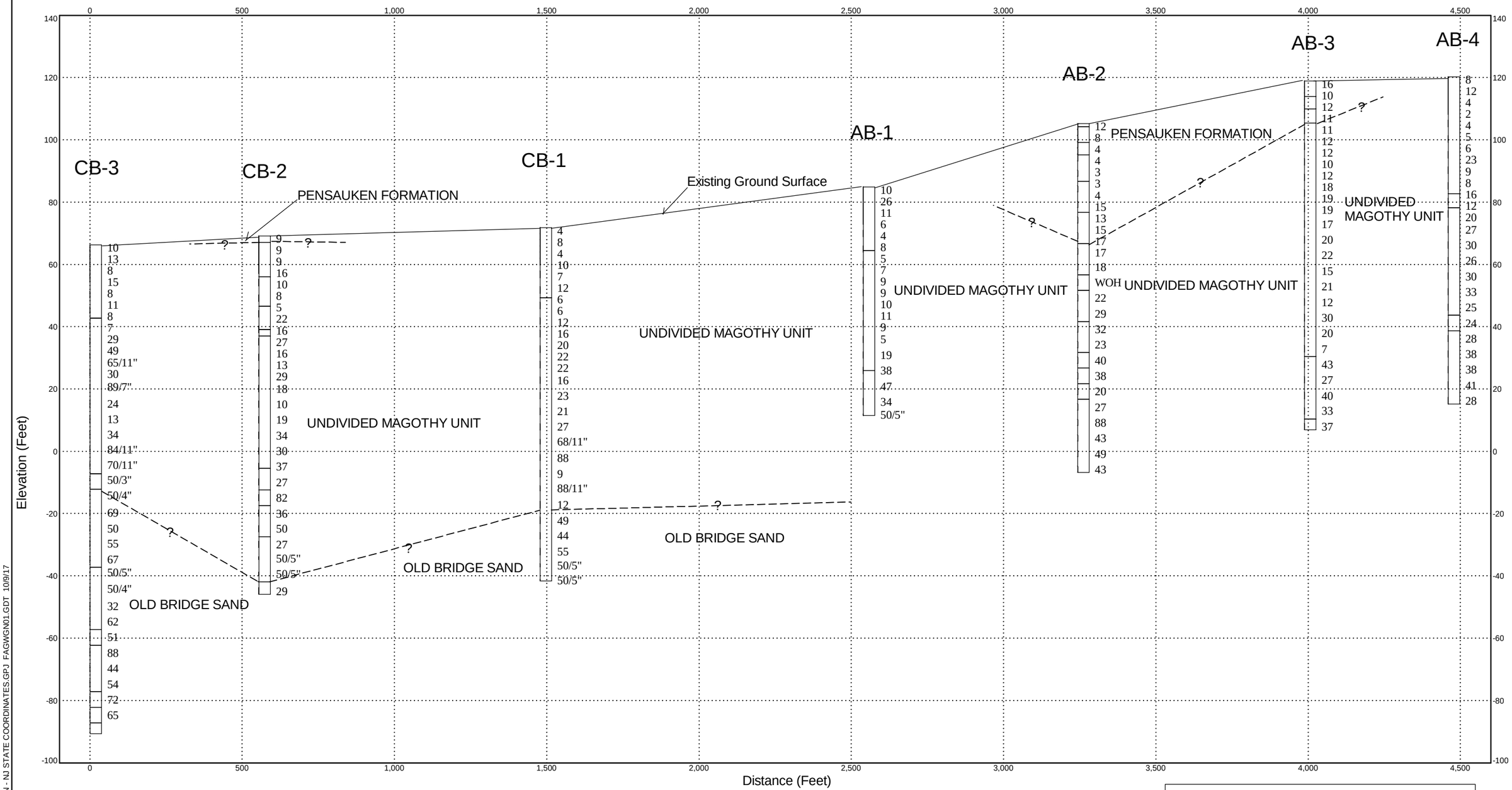


FIGURE 2 - BORING LOCATION PLAN (2 of 2)

NESE Madison Loop, Middlesex County, NJ



AECOM



INFERRED SUBSURFACE PROFILE

Northeast Supply Enhancement - Madison Loop
Middlesex County, New Jersey

PROJECT #	DATE	FIGURE
60515039	Oct-09-17	3-1

WILLIAMS NESE NESE MADISON - NJ STATE COORDINATES.GPJ FAGWGN01.GDT 10/9/17

AECOM

MB-1

FILL

?

21
9
5
7
4
9
7

Existing Ground Surface

AMBOY STONEWARE CLAY

MDB-1

6
12
8
5
5
16
14
7
25
39
24
29
18
11
47
43
24
33
19
31

UNDIVIDED MAGOTHY UNIT

?

OLD BRIDGE SAND

Elevation (Feet)

50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70

-100 0 100 200 300 400 500 600 700

Distance (Feet)

INFERRED SUBSURFACE PROFILE

Northeast Supply Enhancement - Madison Loop
Middlesex County, New Jersey

PROJECT #	DATE	FIGURE
60515039	Oct-09-17	3-2

WILLIAMS NESE NESE MADISON - NJ STATE COORDINATES.GPJ FAGWGN01.GDT 10/9/17

TABLE 1
Summary of Test Borings
Northeast Supply Enhancement - Madison Loop
Middlesex County, New Jersey

Boring ID	Northing	Easting	Termination Depth (ft, bgs)	Ground Surface Elevation (ft)	Estimated Groundwater Depth (ft, bgs)	Estimated Groundwater Elevation (ft)
AB-1	40.4450390	-74.3002870	73.4	84.9	4.5	80.4
AB-2	40.4452552	-74.2977352	112.0	105.2	45.0	60.2
AB-3	40.4459630	-74.2952180	112.0	118.9	55.0	63.9
AB-4	40.4464840	-74.2936500	105.0	120.2	9.6	110.6
CB-1	40.4447580	-74.3041550	113.4	71.8	See Note 1	See Note 1
CB-2	40.4434910	-74.3071260	115.0	69.1	12.9	56.2
CB-3	40.4428202	-74.3089444	157.0	66.3	44.0	22.3
MB-1	40.4635540	-74.2661460	15.0	46.6	NE	NA
MDB-1	40.4625600	-74.2678010	80.0	10.5	7.5	3.0

Notes:
BGS = below ground surface
NE = not encountered
NA = not available
1 = Groundwater level could not be measured due to the drilling method, although groundwater was not encountered until the depth of 31 feet during the drilling (i.e., groundwater level is deeper than 31 feet BGS).

A□ □endi□ A

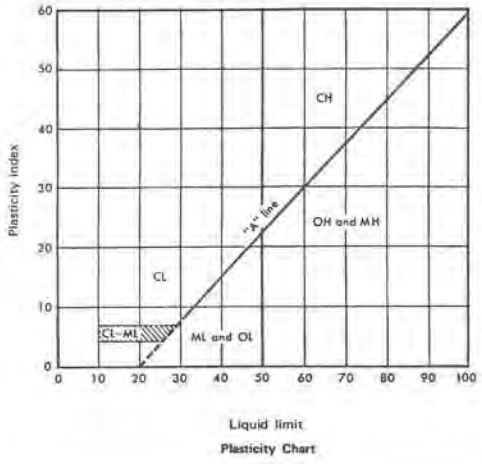
Test Boring Logs

Major Divisions			Group symbols	Typical names	Laboratory classification criteria
Coarse-grained soils (More than half of material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixture, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravels with fines (Appreciable amount of fines)	GM* d	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM* d	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4
			SC	Clayey sands, sand-clay mixtures	Atterberg limits above "A" line with P.I. > than 7
Fine-grained soils (More than half of material is smaller than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity, organic silts	
	Highly organic soils		Pt	Peat and other highly organic soils	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 per cent ..... GW, GP, SW, SP. More than 12 per cent ..... GM, GC, SM, SC. 5 to 12 per cent ..... *Borderline* cases requiring dual symbols**

Above "A" line with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols

Limits plotting in hatched zone with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols.



Plasticity Chart

Particle Size	Sieve Size	Material
mm	<#200	Silt or Clay
<0.074	#200 To #40	Sand
0.074 To 0.42	# 40 To #10	Fine
0.42 To 2.00	# 10 To # 4	Med.
2.00 To 4.76		Coarse

Particle Size mm	Sieve	Material
4.76 To 19.1	#4 To 3/4 In.	Gravel Fine
19.1 To 76.2	3/4 In. To 3 In.	Coarse
76.2 To 304.8	3 In. To 12 In.	Cobbles
304.8 To 914.4	12 In. To 36 In.	Boulders

KEY TO SOIL SYMBOLS AND TERMS

Terms used in this report for describing soils according to their texture or grain size distribution are in accordance with the Unified Soil Classification System, as described in Technical Memorandum No. 3-357, Waterways Experiment Station, March 1953.

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No. 200 sieve): Includes (1) clean gravels and (2) silty or clayey gravels and sands. Condition is rated according to relative density[1] as determined by laboratory tests or standard penetration resistance tests.

Descriptive Term	Relative Density
Very loose	0 to 15%
Loose	15 to 35%
Medium dense	35 to 65%
Dense	65 to 85%
Very dense	85 to 100%

FINE GRAINED SOILS (major portion passing No. 200 sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

Descriptive Term	Unconfined Compression Strength, tons/sq. ft.
Very soft	less than 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very stiff	2.00 to 4.00
Hard	4.00 and higher

TEST AND SAMPLE IDENTIFICATION

15 — 15 – The number of blows (15) of a 140-pound hammer falling 30 inches used to drive a 2" O. D. split-barrel sampler for the last 12 inches of penetration.

50/2 — 50/2 – Number of blows (50) used to drive the split-barrel a certain number of inches (2).

P – Thin-wall tube sample.

P/250 — P250 – Thin-wall tube pushed hydraulically, using a certain pressure (250 psi) to push the last 6 inches.

C_1 – Denison or Pitcher-Type – core-barrel sample.

Ps — Ps – Piston sample.

A – Augar sample.

BX – Rock cored with BX core barrel, which obtains a 1-5/8" diameter core.

NX / 65 — NX – Rock cored with NX core barrel, which obtains a 2-1/8" diameter core.

65% – Percentage (65) of rock core recovered.

20 — 20% – Rock Quality Designation (RQD)[2]

VS — VS – Vane Shear Test.

Sample Recovered

C – Consolidation and specific gravity tests.

D – Maximum & minimum density.

DS – Direct Shear test.

G – Specific gravity test.

K – Permeability test.

M – Mechanical (sieve or hydrometer) analysis.

T – Triaxial compression test

U – Unconfined compression test.

W – Unit weight & natural moisture content.

X – Special tests performed – see Laboratory test results.

Laboratory Test Performed

Sample Not Recovered

*Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

**Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

[2] $RQD = \frac{\sum \text{Core Segments} \geq 4 \text{ inches}}{\text{Core Interval}} \times 100$ Where Segmentation Is Not Caused By Drilling Effects

[1] ASTM 2049-69

LOG of BORING No. AB-1

DATE 8/14/2017 SURFACE ELEVATION 84.9 LOCATION Northing: 40.445039 Easting: -74.300287

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		10	SS	Loose to very dense brown to orange brown silty coarse to fine SAND, trace gravel						
		26	SS							
5		11	SS							
		6	SS							
		4	SS				11.7			M
10		8	SS							
15		5	SS							
20		7	SS		64.4	1.5				
				Stiff to very stiff dark gray silty CLAY, trace sand						
25		9	SS			1.6	28.4			M
30		9	SS			2.5				
		10	SS			1.9				
35										
		11	SS			2.3				
40				(Undivided Magothy Unit)						
		9	SS	(Continued on Sheet 2 of 2)		2.4				

Completion Depth: 73.4 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ft., After ____ hrs.

Project Name: Williams NESE Madison ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. AB-1

DATE 8/14/2017 SURFACE ELEVATION 84.9 LOCATION Northing: 40.445039 Easting: -74.300287

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				- Continuing stiff to very stiff dark gray silty to sandy CLAY						
		5	SS			1.4	27.5	38	23	
50										
		19	SS			2.9				
55										
		38	SS		25.9	2.0	18.7			M
60				Dense to very dense gray to dark gray sandy SILT to silty medium to fine SAND, trace gravel						
		47	SS							
65										
		34	SS							
70				(Undivided Magothy Unit)						
		50/5"	SS		11.5					
75										
				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors. 2. Groundwater level was measured at approximately 4.5 ft below existing ground surface on completion of drilling. 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
80										
85										

Completion Depth: 73.4 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ft., After ____ hrs.

Project Name: Williams NESE Madison ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. AB-2

Sheet 1 of 3

DATE 9/21/2016-9/22/2016 SURFACE ELEVATION 105.2 LOCATION Northing: 40.44525521 Easting: -74.29773516

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		12	SS	TOPSOIL	104.2					
		8	SS	Loose to dense orange brown to brown silty medium to fine SAND with gravel						
5		4	SS		99.2					
		4	SS	Loose orange brown gravelly medium to fine SAND with silt						
		3	SS		95.2					
10		3	SS	Loose orange brown silty medium to fine SAND with gravel						
15		4	SS		86.7					
20		15	SS	Medium dense light brown to reddish brown medium to fine SAND						
25		13	SS		76.7					
30		15	SS	Medium dense orange brown coarse to fine SAND with gravel, trace silt						
35		17	SS	(Pennsauken Formation)	66.7					
40		17	SS	Medium dense orange brown to light gray medium to fine SAND (Undivided Magothy Unit)						

(Continued on Sheet 2 of 3)

Completion Depth: 112.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. AB-2

Sheet 2 of 3

DATE 9/21/2016-9/22/2016 SURFACE ELEVATION 105.2 LOCATION Northing: 40.44525521 Easting: -74.29773516

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45		18	SS	- Continuing medium dense orange brown to light gray medium to fine SAND						
					56.7					
50		WOH	SS	Very loose orange brown to brown silty coarse to fine SAND, some gravel			23.9			M
					51.7					
55		22	SS	Very stiff gray to dark gray SILT with sand			26.8	42	26	M
60		29	SS			2.7	22.6			M
					41.7					
65		32	SS	Medium dense to dense light gray to dark gray silty medium to fine SAND						
70		23	SS				24.4			M
					31.7					
75		40	SS	Very dense gray sandy SILT			21.4			M
					26.7					
80		38	SS	Hard gray CLAY with sand			26.0	35	22	M
					21.7					
85		20	SS	Very stiff gray SILT with sand			24.4			M
				(Undivided Magothy Unit)	16.7					
				(Continued on Sheet 3 of 3)						

Completion Depth: 112.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. AB-2

Sheet 3 of 3

DATE 9/21/2016-9/22/2016 SURFACE ELEVATION 105.2 LOCATION Northing: 40.44525521 Easting: -74.29773516

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90		27	SS	Medium dense to very dense light gray to dark gray silty coarse to fine SAND						
95		88	SS				22.0			M
100		43	SS							
105		49	SS							
110		43	SS	(Undivided Magothy Unit)	-6.8					
115										
120										
125										
130										

Notes:
1. Ground surface elevation at the boring location was surveyed by Williams surveyors.
2. Groundwater levels were measured as shown below:

Date & Time	GW Depth (ft)	GW Elev. (ft)
09/21/16 10:30	45.0	60.2

3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.

Completion Depth: 112.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After ____ hrs.
ft., After ____ hrs.
ft., After ____ hrs.
ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. AB-3

Sheet 1 of 3

DATE 9/22/2016-9/23/2016 SURFACE ELEVATION 118.9 LOCATION Northing: 40.44596302 Easting: -74.29521804

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		16	SS	Dense to very dense brownish gray to orange brown sandy to clayey SILT						
		10	SS							
5		12	SS		113.9					
		11	SS	Medium dense light to reddish brown silty coarse to fine SAND with gravel (Pennsauken Formation)			18.8			M
		11	SS		109.9					
10		12	SS	Very stiff gray to orange brown sandy CLAY		2.7	17.4	34	18	M
					105.4					
15		12	SS	Medium dense light gray to orange brown silty medium to fine SAND						
20		10	SS				12.5			M
25		12	SS							
30		18	SS				8.6			M
35		19	SS							
40		19	SS				12.5			M
				(Undivided Magothy Unit)						

(Continued on Sheet 2 of 3)

Completion Depth: 112.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. AB-3

DATE 9/22/2016-9/23/2016 SURFACE ELEVATION 118.9 LOCATION Northing: 40.44596302 Easting: -74.29521804

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45		17	SS	- Continuing medium dense light gray to orange brown silty medium to fine SAND						
50		20	SS				12.2			M
55		22	SS							
60		15	SS				8.7			M
65		21	SS							
70		12	SS				23.8			M
75		30	SS				12.1			M
80		20	SS				12.0			M
85		7	SS							
				(Undivided Magothy Unit)	30.4					
				(Continued on Sheet 3 of 3)						

Completion Depth: 112.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. AB-3

Sheet 3 of 3

DATE 9/22/2016-9/23/2016 SURFACE ELEVATION 118.9 LOCATION Northing: 40.44596302 Easting: -74.29521804

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90		43	SS	Medium dense to dense dark gray to black SILT to sandy SILT			30.3	45	29	M
95		27	SS				37.9			M
100		40	SS							
105		33	SS							
					10.4					
110		37	SS	Medium dense gray silty fine SAND (Undivided Magothy Unit)	6.9					
115										
120										
125										
130										

Notes:
1. Ground surface elevation at the boring location was surveyed by Williams surveyors.
2. Groundwater levels were measured as shown below:

Date & Time	GW Depth (ft)	GW Elev. (ft)
09/22/16 13:20	71.0	47.9
09/23/16 09:45	55.0	63.9

3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.

Completion Depth: 112.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After ____ hrs.
ft., After ____ hrs.
ft., After ____ hrs.
ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. AB-4

Sheet 1 of 3

DATE 8/21/2017 SURFACE ELEVATION 120.2 LOCATION Northing: 40.446484 Easting: -74.29365

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		8	SS	Loose to dense light gray to orange brown silty medium to fine SAND to medium to fine SAND with silt						
		12	SS							
5		4	SS							
		2	SS							
		4	SS				12.8			M
10		5	SS							
15		6	SS							
20		23	SS							
25		9	SS							
30		8	SS				12.0			M
35		16	SS							
					82.7					
40		12	SS	Firm to stiff light brown to orange brown sandy silty CLAY		0.8	22.6	30	18	
					78.2					
				(Undivided Magothy Unit)						
		20	SS	(Continued on Sheet 2 of 3)						

Completion Depth: 105.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. AB-4

Sheet 2 of 3

DATE 8/21/2017 SURFACE ELEVATION 120.2 LOCATION Northing: 40.446484 Easting: -74.29365

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Medium dense to dense orange brown to dark brown silty medium to fine SAND with clay						
		27	SS							
50										
		30	SS							
55										
		26	SS							
60										
		30	SS							
65										
		33	SS							
70										
		25	SS							
75					43.7					
		24	SS	Stiff to very stiff gray to brown silty sandy CLAY		1.9	28.0	43	22	
80					38.7					
		28	SS	Medium dense to dense grayish brown to orange brown silty medium to fine SAND			17.5			M
85				(Undivided Magothy Unit)						
		38	SS	(Continued on Sheet 3 of 3)						

Completion Depth: 105.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger + Mud Rotary

Water Depth: See Notes ft., After ____ hrs.
ft., After ____ hrs.
ft., After ____ hrs.
ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. AB-4

Sheet 3 of 3

DATE 8/21/2017 SURFACE ELEVATION 120.2 LOCATION Northing: 40.446484 Easting: -74.29365

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90				- Continuing medium dense to dense brown to orange brown silty medium to fine SAND						
95		38	SS							
100		41	SS							
105		28	SS	(Undivided Magothy Unit)	15.2					
110				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors. 2. Groundwater level was measured at approximately 9.6 ft below existing ground surface on completion of drilling. 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
115										
120										
125										
130										

Completion Depth: 105.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger + Mud Rotary

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. CB-1

Sheet 1 of 3

DATE 8/14/2017-8/15/2017 SURFACE ELEVATION 71.8 LOCATION Northing: 40.444758 Easting: -74.304155

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		4	SS	Firm to very stiff dark gray to gray silty to sandy CLAY		1.8				
		8	SS			2.4				
5		4	SS			1.6				
		10	SS			1.9				
		7	SS			1.6				
10		12	SS			1.0				
15		6	SS			1.5				
20		6	SS			1.6				
					49.3					
25		12	SS	Medium dense gray to orange brown silty fine SAND to sandy SILT						
30		16	SS							
35		20	SS							
40		22	SS							
				(Undivided Magothy Unit)						
		22	SS	(Continued on Sheet 2 of 3)						

Completion Depth: 113.4 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ft., After ____ hrs.

Project Name: Williams NESE Madison ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. CB-1

DATE 8/14/2017-8/15/2017 SURFACE ELEVATION 71.8 LOCATION Northing: 40.444758 Easting: -74.304155

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				- Continuing medium dense to very dense gray to orange brown silty medium to fine SAND						
		16	SS							
50										
		23	SS							
55										
		21	SS							
60										
		27	SS							
65										
		68/11"	SS							
70										
		88	SS							
75										
		9	SS	- loose						
80										
		88/11"	SS							
85										
				(Undivided Magothy Unit)						
		12	SS	(Continued on Sheet 3 of 3)						

Completion Depth: 113.4 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. CB-1

Sheet 3 of 3

DATE 8/14/2017-8/15/2017 SURFACE ELEVATION 71.8 LOCATION Northing: 40.444758 Easting: -74.304155

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90				- Continuing very dense light gray to orange brown silty fine SAND to sandy SILT						
		49	SS							
95										
		44	SS							
100										
		55	SS							
105										
		50/5"	SS							
110										
		50/5"	SS	(Old Bridge Sand)	-41.6					
115										
120				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors. 2. Groundwater level could not be measured due to the drilling method. 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
125										
130										

Completion Depth: 113.4 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

AECOM

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

LOG of BORING No. CB-2

Sheet 1 of 3

DATE 8/23/2017 SURFACE ELEVATION 69.1 LOCATION Northing: 40.443491 Easting: -74.307126

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		9	SS	Medium dense orange brown silty coarse to fine SAND with gravel						
		9	SS	(Pennsauken Formation)	67.1					
5		9	SS	Medium dense to dense light brown to orange brown medium to fine SAND with silt			5.6			M
		16	SS							
		10	SS							
10		8	SS							
					56.1					
15		5	SS	Soft to very stiff brownish gray to dark gray clayey SILT to silty CLAY, trace sand		0.3	25.3			M
20		22	SS			4.1				
					46.6					
25		16	SS	Medium dense gray to brown silty fine SAND			22.6			M
30		27	SS		39.1	>4.5	21.2			M
				Very stiff to hard dark gray silty CLAY						
					37.1					
35		16	SS	Medium dense to dense light brown silty medium to fine SAND to medium to fine SAND with silt						
		13	SS							
40				(Undivided Magothy Unit)						
		29	SS	(Continued on Sheet 2 of 3)						

Completion Depth: 115.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

AECOM

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

LOG of BORING No. CB-2

DATE 8/23/2017 SURFACE ELEVATION 69.1 LOCATION Northing: 40.443491 Easting: -74.307126

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				- Continuing medium dense to dense orange brown to light grayish brown silty medium to fine SAND to medium to fine SAND with silt						
		18	SS							
50										
		10	SS							
55										
		19	SS							
60										
		34	SS							
65										
		30	SS	- trace gravel			22.4			M
70										
		37	SS		-5.4	>4.5				
75				Very stiff brownish gray to light brown silty to sandy CLAY						
		27	SS			2.1	20.0			M
80					-12.4					
				Very dense gray silty medium to fine SAND, trace clay						
		82	SS							
85					-17.4					
				(Undivided Magothy Unit)						
		36	SS	(Continued on Sheet 3 of 3)						

Completion Depth: 115.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. CB-2

DATE 8/23/2017 SURFACE ELEVATION 69.1 LOCATION Northing: 40.443491 Easting: -74.307126

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90				Medium dense to dense gray to dark brownish gray sandy to clayey SILT						
95		50	SS	(Undivided Magothy Unit)	-27.4	3.6	28.5			M
100		27	SS	Medium dense to very dense gray to brownish gray silty medium to fine SAND, trace gravel						
105		50/5"	SS							
110		50/5"	SS		-41.9					
115		29	SS	Stiff to very stiff light brown silty CLAY (Old Bridge Sand)	-45.9	1.8				
120				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors. 2. Groundwater level was measured at approximately 12.9 ft below existing ground surface on completion of drilling. 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
125										
130										

Completion Depth: 115.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger + Mud Rotary

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. CB-3

Sheet 1 of 4

DATE 9/15/2016-9/20/2016 SURFACE ELEVATION 66.3 LOCATION Northing: 40.44282019 Easting: -74.30894441

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		10	SS	Loose to medium dense orange brown to light brown silty coarse to fine SAND, trace gravel						
		13	SS							
5		8	SS				16.5			M
		15	SS							
		8	SS							
10		11	SS							
15		8	SS							
20		7	SS				16.7			M
					42.8					
25		29	SS	Medium dense to very dense orange brown to light brown SILT with sand to silty medium to fine SAND						
30		49	SS				5.0			M
35		65/11"	SS				3.7			M
40		30	SS	(Undivided Magothy Unit)						

(Continued on Sheet 2 of 4)

Completion Depth: 157.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. CB-3

DATE 9/15/2016-9/20/2016 SURFACE ELEVATION 66.3 LOCATION Northing: 40.44282019 Easting: -74.30894441

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45		89/7"	SS	- Continuing medium dense to very dense orange brown to light brown SILT with sand to silty medium to fine SAND			20.2			M
50		24	SS							
55		13	SS	- trace gravel			19.1			M
60		34	SS							
65		84/11"	SS				23.0			M
70		70/11"	.ss.							
					-7.2					
75		50/3"	SS	Very stiff to hard light gray to orange brown CLAY with sand (Undivided Magothy Unit)		3.3	16.7	29	17	M
					-12.2					
80		50/4"	SS	Very dense light brown to light gray silty medium to fine SAND			22.4			M
85		69	SS	(Old Bridge Sand) (Continued on Sheet 3 of 4)						

Completion Depth: 157.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ft., After ____ hrs.

Project Name: Williams NESE Madison ft., After ____ hrs.

Drilling Method: Hollow Stem Auger ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. CB-3

Sheet 3 of 4

DATE 9/15/2016-9/20/2016 SURFACE ELEVATION 66.3 LOCATION Northing: 40.44282019 Easting: -74.30894441

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90		50	SS	- Continuing very dense light brown to light gray silty medium to fine SAND			21.0			M
95		55	SS				22.8			M
100		67	SS							
					-37.2					
105		50/5"	SS	Medium dense to very dense light brown to orange brown medium to fine SAND with silt						
110		50/4"	SS				22.7			M
115		32	SS							
120		62	SS							
					-57.2					
125		51	SS	Dense light gray sandy SILT with clay						
					-62.2					
130		88	SS	Dense to very dense light gray to orange brown coarse to fine SAND (Old Bridge Sand)						

(Continued on Sheet 4 of 4)

Completion Depth: 157.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After ____ hrs.
ft., After ____ hrs.
ft., After ____ hrs.
ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. CB-3

DATE 9/15/2016-9/20/2016 SURFACE ELEVATION 66.3 LOCATION Northing: 40.44282019 Easting: -74.30894441

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
135		44	SS	- Continuing dense to very dense light gray to orange brown coarse to fine SAND						
140		54	SS		-77.2					
145		72	SS	Very stiff to hard light gray silty CLAY	-82.2	3.2				
150		65	SS	Dense to very dense dark gray to light brown silty fine SAND, trace clay	-87.2					
155				- no sample taken at 155 to 157 ft (Old Bridge Sand)	-90.7					
160										
165										
170										
175										

Notes:
1. Ground surface elevation at the boring location was surveyed by Williams surveyors.
2. Groundwater levels were measured as shown below:

Date & Time	GW Depth (ft)	GW Elev. (ft)
09/16/16 08:55	42.0	24.3
09/16/16 10:55	40.7	25.6
09/20/16 08:00	44.0	22.3

3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.

Completion Depth: 157.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-1

DATE 9/26/2016-9/27/2016 SURFACE ELEVATION 40.0 LOCATION Northing: 40.45770783 Easting: -74.27776781

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		19	SS	TOPSOIL	39.7					
		10	SS	Very loose to medium dense light brown to orange brown silty medium to fine SAND						
5		4	SS				13.2			M
		4	SS							
		4	SS							
10		4	SS				17.1			M
15		6	SS	- trace gravel			17.3			M
20		6	SS				13.0			M
25		5	SS							
30		3	SS				21.1			M
35		12	SS							
					1.5					
40		10	SS	Stiff to hard gray CLAY, trace sand (Undivided Magothy Unit)	-3.5	>4.5	15.0	34	17	M
				(Continued on Sheet 2 of 3)						

Completion Depth: 122.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-1

DATE 9/26/2016-9/27/2016 SURFACE ELEVATION 40.0 LOCATION Northing: 40.45770783 Easting: -74.27776781

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45		28	SS	Medium dense gray sandy SILT			18.1			M
					-8.5					
50		14	SS	Medium dense to very dense gray to orange brown silty medium to fine SAND			22.1			M
55		16	SS							
60		26	SS							
					-23.5					
65		17	SS	Very stiff gray to brown SILT, trace sand			22.6			M
				(Undivided Magothy Unit)	-28.5					
70		95/11"	SS	Dense to very dense brown to orange brown medium to fine SAND with silt						
75		50/5"	SS							
80		75	SS				21.8			M
85		42	SS							
				(Old Bridge Sand)						

(Continued on Sheet 3 of 3)

Completion Depth: 122.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger ____ ft., After ____ hrs.

AECOM

LOG of BORING No. GB-1

Sheet 3 of 3

DATE 9/26/2016-9/27/2016 SURFACE ELEVATION 40.0 LOCATION Northing: 40.45770783 Easting: -74.27776781

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90		10	SS	- Continuing loose to very dense brown to orange brown medium to fine SAND with silt			21.3			M
95		20	SS							
100		27	SS							
105		34	SS				22.0			M
110		27	SS							
					-73.5					
115		37	SS	Hard gray and light brown silty CLAY with sand		3.6				
					-78.5					
120		50/5"	SS	Very dense orange brown and gray medium to fine SAND (Old Bridge Sand)	-82.0					
125				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors. 2. Groundwater levels were measured as shown below:						
130				Date & Time / GW Depth (ft) / GW Elev. (ft): 09/26/16 10:15 — 31.0 — 9.0; 09/27/16 08:30 — 29.4 — 10.6. 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						

Completion Depth: 122.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ft., After ____ hrs.

Project Name: Williams NESE Madison ft., After ____ hrs.

Drilling Method: Hollow Stem Auger ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-2

Sheet 1 of 3

DATE 8/24/2017 SURFACE ELEVATION 25.5 LOCATION Northing: 40.458656 Easting: -74.276231

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		4	SS	Medium dense light gray to orange brown fine SAND with silt						
		7	SS							
5		7	SS				9.8			
		9	SS							
		8	SS				8.3			M
10		7	SS							
15		8	SS				26.5			M
					8.0					
20		8	SS	Medium dense dark grayish brown to dark gray silty fine SAND			28.9	NP	NP	M
25		14	SS		0.5					
				Medium dense gray silty fine SAND	-2.0					
30		20	SS	Medium dense to dense grayish brown to brown silty coarse to fine SAND with gravel		0.5	16.4	NP	NP	M
					-6.5					
		52	SS	Very dense gray to orange brown fine SAND with silt			24.6			M
35					-11.0					
				Medium dense gray to dark gray sandy SILT						
		22	SS		-13.5	3.5				
40				Very stiff gray to dark gray sandy silty CLAY						
					-16.0					
				(Undivided Magothy Unit)						
		8	SS	(Continued on Sheet 2 of 3)						

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-2

DATE 8/24/2017 SURFACE ELEVATION 25.5 LOCATION Northing: 40.458656 Easting: -74.276231

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Medium dense to very dense gray to orange brown medium to fine SAND with silt						
50		30	SS				24.4			M
55		25	SS							
60		27	SS							
65		38	SS							
70		22	SS	- gravelly						
75		49	SS							
80		55	SS	(Old Bridge Sand)	-54.5					
85				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors.						

(Continued on Sheet 3 of 3)

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

AECOM

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

LOG of BORING No. GB-2

DATE 8/24/2017 SURFACE ELEVATION 25.5 LOCATION Northing: 40.458656 Easting: -74.276231

DEPTH, FT. / SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90			2. Groundwater level is inferred to be present at approximately 12 feet below existing ground surface based on examination of split-spoon samples and moisture content lab test results. (Groundwater level could not be observed/measured in the boring due to the use of mud rotary drilling methods to advance the boring.) 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
95									
100									
105									
110									
115									
120									
125									
130									

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-3

Sheet 1 of 3

DATE 8/22/2017 SURFACE ELEVATION 39.9 LOCATION Northing: 40.45792 Easting: -74.277532

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		15	SS	Dense to very dense brown to orange brown silty coarse to fine SAND with gravel (Fill)	35.9					
		10	SS							
5		7	SS	Loose to medium dense brown to brownish gray silty fine SAND			16.2	NP	NP	M
		9	SS							
		10	SS				17.8			
10		9	SS				13.6			
15		7	SS				13.5	NP	NP	M
20		5	SS				8.2			
25		12	SS				23.3			M
30		9	SS		7.9					
		18	SS	Very stiff to hard gray to dark grayish brown CLAY, trace sand		>4.5	15.1	38	20	M
35										
		34	SS			>4.5				
40					-1.6					
				(Undivided Magothy Unit)						
		19	SS	(Continued on Sheet 2 of 3)						

Completion Depth: 78.4 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-3

DATE 8/22/2017 SURFACE ELEVATION 39.9 LOCATION Northing: 40.45792 Easting: -74.277532

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Medium dense to very dense orange brown to light brown silty fine SAND						
		36	SS				22.5			M
50										
		30	SS							
55										
		24	SS							
60				(Undivided Magothy Unit)	-21.6					
		50/5"	SS	Very dense orange brown to light brown silty coarse to fine SAND						
65										
		50/5"	SS							
70										
		50/5"	SS							
75										
		50/5"	SS	(Old Bridge Sand)	-38.5					
80				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors. 2. Groundwater level is inferred to be present at approximately 22 feet below existing ground surface based on examination of split-spoon samples and moisture content lab test results. (Groundwater level could not be observed/measured in the boring due to the use of mud rotary drilling methods to advance the boring.)						
85				(Continued on Sheet 3 of 3)						

Completion Depth: 78.4 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-3

DATE 8/22/2017 SURFACE ELEVATION 39.9 LOCATION Northing: 40.45792 Easting: -74.277532

DEPTH, FT. / SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90			3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
95									
100									
105									
110									
115									
120									
125									
130									

Completion Depth: 78.4 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-4

Sheet 1 of 2

DATE 8/9/2017 SURFACE ELEVATION 46.1 LOCATION Northing: 40.4579 Easting: -74.2773

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0				Asphalt Pavement	45.6					
				Medium dense orange brown to light brown silty coarse to fine SAND with gravel						
5		5	SS							
		12	SS				9.7	NP	NP	M
10		24	SS	- very dense						
15		15	SS				10.1			M
20		12	SS				16.0	NP	NP	M
25		15	SS				9.5			M
				(Fill)	18.6					
				Loose to medium dense light brown to orange brown silty fine SAND						
30		13	SS				13.3			M
		11	SS							
35										
		12	SS				24.6			M
40										
				(Undivided Magothy Unit)						
		7	SS	(Continued on Sheet 2 of 2)						

Completion Depth: 78.9 ft. Water Depth: See Notes ft., After hrs.

Project No.: 60515039 ft., After hrs.

Project Name: Williams NESE Madison ft., After hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ft., After hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-4

DATE 8/9/2017 SURFACE ELEVATION 46.1 LOCATION Northing: 40.4579 Easting: -74.2773

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				- Continuing medium dense light brown to orange brown silty fine SAND						
50		12	SS							
55		27	SS	(Undivided Magothy Unit)	-10.4					
60		21	SS	Medium dense to very dense orange brown to light brown silty medium to fine SAND						
65		33	SS				19.9			M
70		40	SS							
75		58	SS							
80		50/5"	SS	(Old Bridge Sand)	-32.8					
85				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors. 2. Groundwater level is inferred to be present at approximately 32 feet below existing ground surface based on examination of split-spoon samples and moisture content lab test results. (Groundwater level could not be observed/measured in the boring due to the use of mud rotary drilling methods to advance the boring.)						

Completion Depth: 78.9 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger + Mud Rotary

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-5

Sheet 1 of 3

DATE 9/11/2017 SURFACE ELEVATION 42.3 LOCATION Northing: 40.458 Easting: -74.2772

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0				Asphalt Pavement	41.3					
				Medium dense orange brown to light brown coarse to fine SAND, trace silt and clay	36.3					
5		10	SS	Stiff to very stiff gray silty CLAY, trace sand	35.3	2.8	14.4			
		16	SS	Medium dense orange brown to brown silty coarse to fine SAND, trace gravel			12.0			M
10		12	SS				12.7			M
15		10	SS				13.2	NP	NP	M
20		14	SS		21.3	1.6				
		P	P	Stiff gray silty CLAY, trace sand	17.3					
25		18	SS	Medium dense to dense brown to dark gray silty coarse to fine SAND						
		29	SS				11.9	NP	NP	M
30				(Fill)	10.8					
		9	SS	Medium dense to dense light gray to gray silty medium to fine SAND						
35										
		10	SS				25.4			M
40		P	P	(Undivided Magothy Unit)						
		39	SS	(Continued on Sheet 2 of 3)						

Completion Depth: 78.9 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger + Mud Rotary

Water Depth: See Notes ft., After hrs.

AECOM

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

LOG of BORING No. GB-5

DATE 9/11/2017 SURFACE ELEVATION 42.3 LOCATION Northing: 40.458 Easting: -74.2772

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				- Continuing medium dense to dense light gray to gray silty medium to fine SAND						
		12	SS							
50				(Undivided Magothy Unit)						
		P	P		-9.7					
		35	SS	Dense to very dense light gray to orange brown silty medium to fine SAND						
55										
		39	SS				22.2			M
60										
65										
		70	SS							
70										
75										
		50/5"	SS	(Old Bridge Sand)	-36.6					
80										
				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors.						
85										
				(Continued on Sheet 3 of 3)						

Completion Depth: 78.9 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger + Mud Rotary

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-5

DATE 9/11/2017 SURFACE ELEVATION 42.3 LOCATION Northing: 40.458 Easting: -74.2772

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90				2. Groundwater level is inferred to be present at approximately 31 feet below existing ground surface based on examination of split-spoon samples and moisture content lab test results. (Groundwater level could not be observed/measured in the boring due to the use of mud rotary drilling methods to advance the boring.) 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
95										
100										
105										
110										
115										
120										
125										
130										

Completion Depth: 78.9 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-7

Sheet 1 of 3

DATE 8/8/2017 SURFACE ELEVATION 41.4 LOCATION Northing: 40.4583 Easting: -74.2767

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0				Asphalt Pavement	40.8					
				Medium dense to very dense orange brown to brownish gray silty coarse to fine SAND with gravel						
5		25	SS							
		18	SS				7.9			M
10		22	SS				13.4			
15		15	SS				7.6			
20		16	SS				9.4			M
				(Fill)	18.9					
				Loose to medium dense orange brown to grayish brown silty coarse to fine SAND						
25		8	SS				15.1			M
30		4	SS							
		7	SS				27.0			M
35					4.9					
				Very stiff gray silty CLAY						
		19	SS			3.3				
40					-0.1					
				(Undivided Magothy Unit)						
		13	SS	(Continued on Sheet 2 of 3)						

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-7

Sheet 2 of 3

DATE 8/8/2017 SURFACE ELEVATION 41.4 LOCATION Northing: 40.4583 Easting: -74.2767

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Medium dense to very dense gray to orange brown silty medium to fine SAND						
		20	SS							
50										
		35	SS				19.1			M
55										
		40	SS							
60										
		28	SS							
65				(Undivided Magothy Unit)	-25.1					
		50/5"	SS	Very dense gray to orange brown silty medium to fine SAND						
70										
		50/5"	SS							
75										
		59	SS	(Old Bridge Sand)	-38.6					
80										
				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors.						
85										
				(Continued on Sheet 3 of 3)						

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ft., After ____ hrs.

Project Name: Williams NESE Madison ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. GB-7

DATE 8/8/2017 SURFACE ELEVATION 41.4 LOCATION Northing: 40.4583 Easting: -74.2767

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90				2. Groundwater level is inferred to be present at approximately 27 feet below existing ground surface based on examination of split-spoon samples and moisture content lab test results. (Groundwater level could not be observed/measured in the boring due to the use of mud rotary drilling methods to advance the boring.) 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
95										
100										
105										
110										
115										
120										
125										
130										

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. MB-1

Sheet 1 of 1

DATE 8/16/2017 SURFACE ELEVATION 46.6 LOCATION Northing: 40.463554 Easting: -74.266146

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		21	SS	Topsoil	46.3					
		9	SS	Very dense dark brownish gray to black silty coarse to fine SAND with gravel (Fill)	44.6	1.3				
5		5	SS			2.5				
		7	SS	Stiff to very stiff gray to orange brown silty CLAY		1.0				
		4	SS			1.0				
10		9	SS			1.5				
		7	SS	(Amboy Stoneware Clay)	31.6	2.1				
15										
20										
25										
30										
35										
40										

Notes:
1. Ground surface elevation at the boring location was surveyed by Williams surveyors.
2. Groundwater was not encountered during the drilling.
3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.

Completion Depth: 15.0 ft.
Project No.: 60515039
Project Name: Williams NESE Madison
Drilling Method: Hollow Stem Auger

Water Depth: See Notes ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.
____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

LOG of BORING No. MDB-1

DATE 8/16/2017-8/17/2017 SURFACE ELEVATION 10.5 LOCATION Northing: 40.46256 Easting: -74.267801

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		6	SS	Medium dense to dense gray to orange brown silty medium to fine SAND						
		12	SS							
5		8	SS							
		5	SS							
		5	SS							
10		16	SS		-0.5	4.1	18.8			M
				Stiff to very stiff light gray to orange brown silty CLAY						
15		14	SS			2.9				
					-7.0					
20		7	SS	Medium dense gray to orange brown silty medium to fine SAND			28.4			M
					-12.0					
25		25	SS	Very stiff dark gray to brownish gray silty CLAY		2.8				
30		39	SS	(Undivided Magothy Unit)	-21.5					
				Dense orange brown to brownish gray medium to fine SAND with silt						
35		24	SS				25.6			M
					-26.0					
				Very stiff to hard dark gray silty CLAY						
		29	SS			4.4				
40					-31.0					
				(Old Bridge Sand)						
		18	SS	(Continued on Sheet 2 of 2)						

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

AECOM

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

LOG of BORING No. MDB-1

DATE 8/16/2017-8/17/2017 SURFACE ELEVATION 10.5 LOCATION Northing: 40.46256 Easting: -74.267801

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
45				Medium dense to dense orange brown to gray medium to fine SAND with silt, trace gravel						
		11	SS				25.5			M
50										
		47	SS							
55										
		43	SS							
60					-51.0					
		24	SS	Stiff to very stiff orange brown to gray sandy silty CLAY		2.0	19.6	33	16	
65					-56.0					
		33	SS	Medium dense to dense orange brown to light brown coarse to fine SAND, trace silt						
70										
		19	SS							
75										
		31	SS	(Old Bridge Sand)	-69.5					
80										
				Notes: 1. Ground surface elevation at the boring location was surveyed by Williams surveyors. 2. Groundwater level was measured at approximately 7.5 ft below existing ground surface on completion of drilling. 3. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils.						
85										

Completion Depth: 80.0 ft. Water Depth: See Notes ft., After ____ hrs.

Project No.: 60515039 ____ ft., After ____ hrs.

Project Name: Williams NESE Madison ____ ft., After ____ hrs.

Drilling Method: Hollow Stem Auger + Mud Rotary ____ ft., After ____ hrs.

10/13/17 WILLIAMS NESE NESE MADISON.GPJ

AECOM

Appendix B

Geotechnical Laboratory Testing Results

Project: Williams NESE - Madison
Project No.: 60515039

URS

SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2µ (%)			Stress (psi)	Strain (%)	UU	CIU		
AB-1	8.0-10.0	Brown SILTY SAND	SM	11.7						15									
AB-1	24.0-26.0			28.4						87									
AB-1	48.0-50.0			27.5		38	23												
AB-1	58.0-60.0	Gray SANDY SILT	ML	18.7						57									
AB-2	50.0-52.0	Brown SILTY SAND	SM	23.9						17									
AB-2	55.0-57.0	Dark gray SILT	ML	26.8		42	26			86									
AB-2	60.0-62.0	Dark gray SILT with SAND	ML	22.6						71									
AB-2	70.0-72.0	Gray SILTY SAND	SM	24.4						33									
AB-2	75.0-77.0	Gray SANDY SILT	ML	21.4						54									
AB-2	80.0-82.0	Gray LEAN CLAY with SAND	CL	26.0		35	22			81									
AB-2	85.0-87.0	Gray SILT with SAND	ML	24.4						82									
AB-2	95.0-97.0	Gray SILTY SAND	SM	22.0						19									
AB-3	6.0-8.0	Brown SILTY SAND with GRAVEL	SM	18.8						24									
AB-3	10.0-12.0	Brown SANDY LEAN CLAY	CL	17.4		34	18			60									
AB-3	20.0-22.0	Brown gray SILTY SAND	SM	12.5						30									
AB-3	30.0-32.0	Brown gray SILTY SAND	SM	8.6						16									
AB-3	40.0-42.0	Brown gray SILTY SAND	SM	12.5						25									
AB-3	50.0-52.0	Brown gray SILTY SAND	SM	12.2						27									
AB-3	60.0-62.0	Brown POORLY GRADED SAND with SILT	SP-SM	8.7						11									

Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

* Refer to Laboratory Test Curves

Project: Williams NESE - Madison
Project No.: 60515039

URS

SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2µ (%)			Stress (psi)	Strain (%)	UU	CIU		
AB-3	70.0-72.0	Gray brown SILTY SAND	SM	23.8						19									
AB-3	75.0-77.0	Brown SILTY SAND	SM	12.1						25									
AB-3	80.0-82.0	Brown SILTY SAND	SM	12.0						16									
AB-3	90.0-92.0	Dark gray SILT	ML	30.3		45	29			91									
AB-3	95.0-97.0	Dark gray SANDY SILT	ML	37.9						69									
AB-4	8.0-10.0	Brown SILTY SAND	SM	12.8						17									
AB-4	29.0-31.0	Brown POORLY GRADED SAND with SILT	SP-SM	12.0						12									
AB-4	39.0-41.0			22.6		30	18												
AB-4	78.0-80.0			28.0		43	22												
AB-4	83.0-85.0	Light brown SILTY SAND	SM	17.5						31									
CB-2	4.0-6.0	Brown POORLY GRADED SAND with SILT	SP-SM	5.6						7									
CB-2	14.0-16.0			25.3						45									
CB-2	24.0-26.0	Gray SILTY SAND	SM	22.6						32									
CB-2	29.0-31.0			21.2						71									
CB-2	68.0-70.0	Light brown POORLY GRADED SAND with SILT	SP-SM	22.4						7									
CB-2	78.0-80.0			20.0						65									
CB-2	93.0-95.0			28.5						43									
CB-3	4.0-6.0	Brown gray SILTY SAND	SM	16.5						40									
CB-3	20.0-22.0	Brown SILTY SAND	SM	16.7						19									

Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

* Refer to Laboratory Test Curves

Project: Williams NESE - Madison
Project No.: 60515039

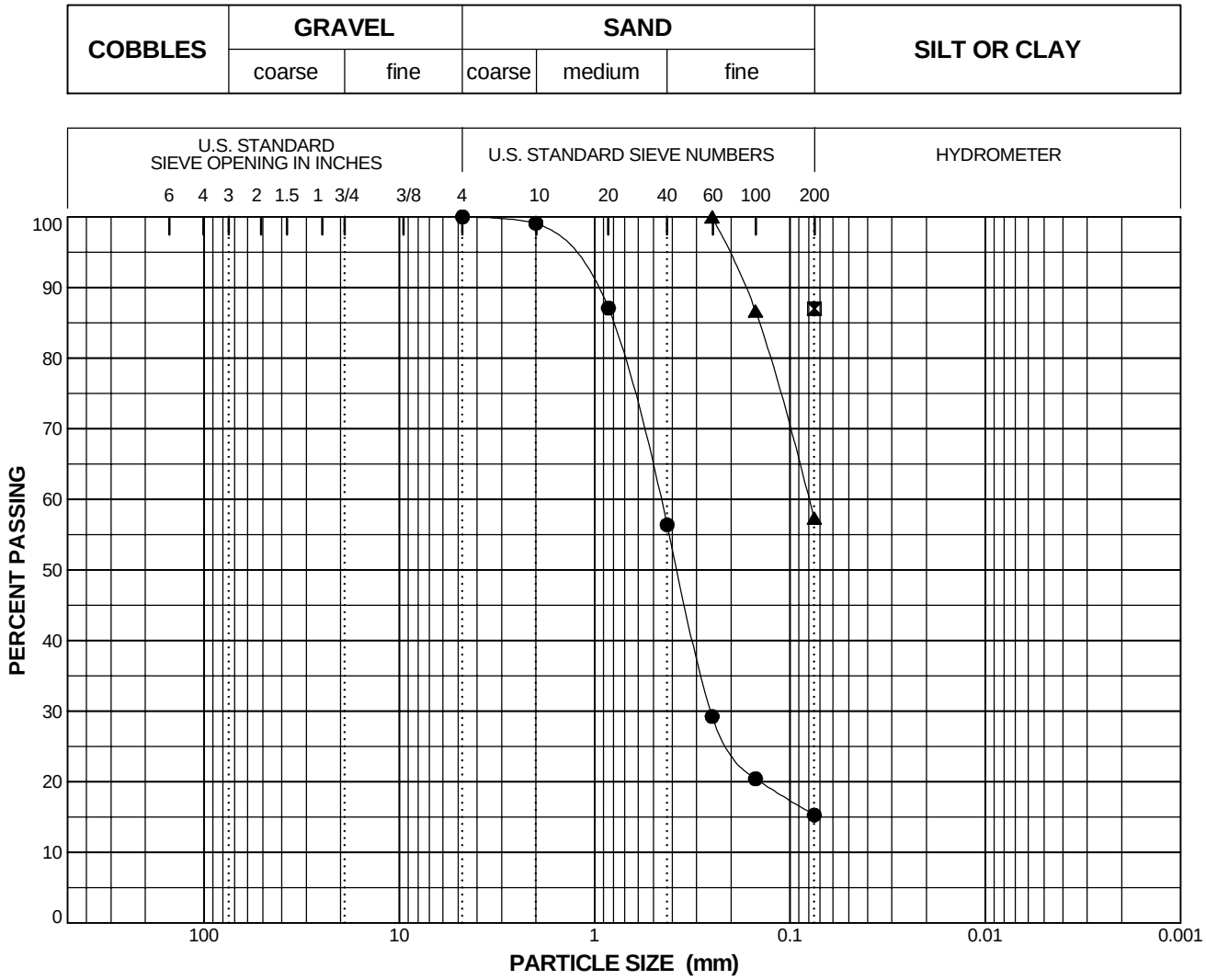
URS

SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2µ (%)			Stress (psi)	Strain (%)	UU	CIU		
CB-3	30.0-32.0	Brown SILT with SAND	ML	5.0						77									
CB-3	35.0-37.0	Brown POORLY GRADED SAND with SILT	SP-SM	3.7						7									
CB-3	45.0-47.0	Brown SILTY SAND	SM	20.2						18									
CB-3	55.0-57.0	Brown SILTY SAND	SM	19.1						23									
CB-3	65.0-67.0	Brown POORLY GRADED SAND with SILT	SP-SM	23.0						9									
CB-3	75.0-77.0	Brown LEAN CLAY with SAND	CL	16.7		29	17			71									
CB-3	80.0-82.0	Brown SILTY SAND	SM	22.4						18									
CB-3	90.0-92.0	Brown POORLY GRADED SAND with SILT	SP-SM	21.0						9									
CB-3	95.0-97.0	Gray SILTY SAND	SM	22.8						48									
CB-3	110.0-112.0	Brown POORLY GRADED SAND with SILT	SP-SM	22.7						8									
MDB-1	10.0-12.0			18.8						55									
MDB-1	19.0-21.0	Brown gray SILTY SAND	SM	28.4						33									
MDB-1	34.0-36.0	Brown POORLY GRADED SAND with SILT	SP-SM	25.6						9									
MDB-1	48.0-50.0	Brown POORLY GRADED SAND with SILT	SP-SM	25.5						7									
MDB-1	63.0-65.0			19.6		33	16												

Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

* Refer to Laboratory Test Curves



SYMBOL	●	⊠	▲
Boring	AB-1	AB-1	AB-1
Sample			
Spec			
Depth (ft)	8.0-10.0	24.0-26.0	58.0-60.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	84.7	0.0	42.7
% Fines	15.3	87.0	57.3
% -2µ			
Cc			
Cu			
LL			
PL			
PI			
USCS	SM		ML
w (%)	11.7	28.4	18.7

Particle Size	PERCENT FINER		
(Sieve #)	●	⊠	▲
3"			
2"			
1"			
3/4"			
1/2"			
3/8"			
4	100.0		
10	99.1		
20	87.1		
40	56.4		
60	29.2		100.0
100	20.4		86.7
200	15.3	87.0	57.3

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SILTY SAND (SM)
⊠	Gray ()
▲	Gray SANDY SILT (ML)

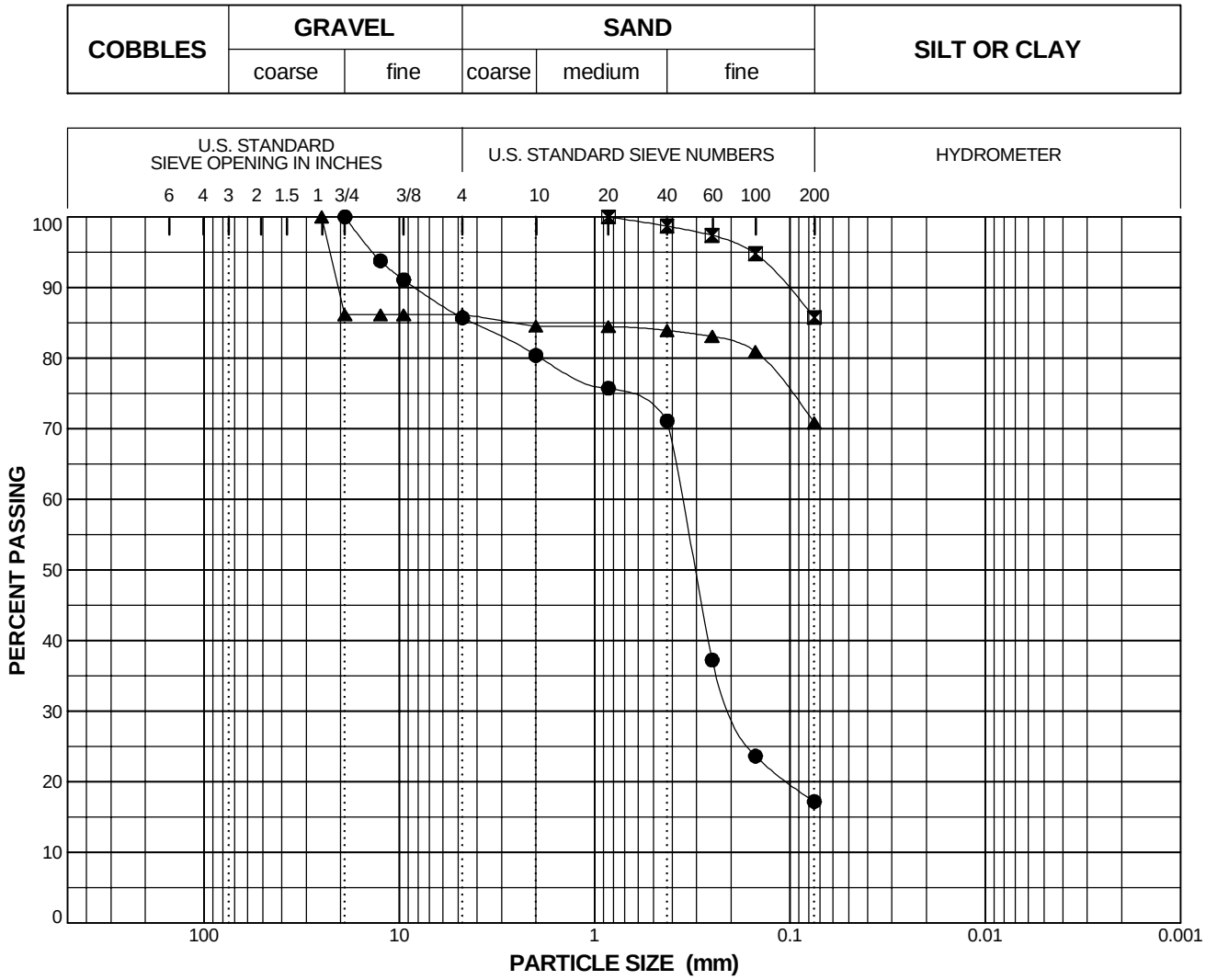
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-4

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	AB-2	AB-2	AB-2
Sample			
Spec			
Depth (ft)	50.0-52.0	55.0-57.0	60.0-62.0
% +3"	0.0	0.0	0.0
% Gravel	14.3	0.0	13.9
% Sand	68.5	14.3	15.3
% Fines	17.2	85.7	70.8
% -2µ			
Cc			
Cu			
LL		42	
PL		26	
PI		16	
USCS	SM	ML	ML
w (%)	23.9	26.8	22.6

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			100.0
3/4"	100.0		86.1
1/2"	93.8		86.1
3/8"	91.1		86.1
4	85.7		86.1
10	80.4		84.5
20	75.7	100.0	84.5
40	71.1	98.7	83.9
60	37.2	97.4	83.1
100	23.6	94.8	80.9
200	17.2	85.7	70.8

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SILTY SAND (SM)
⊠	Dark gray SILT (ML)
▲	Dark gray SILT with SAND (ML)

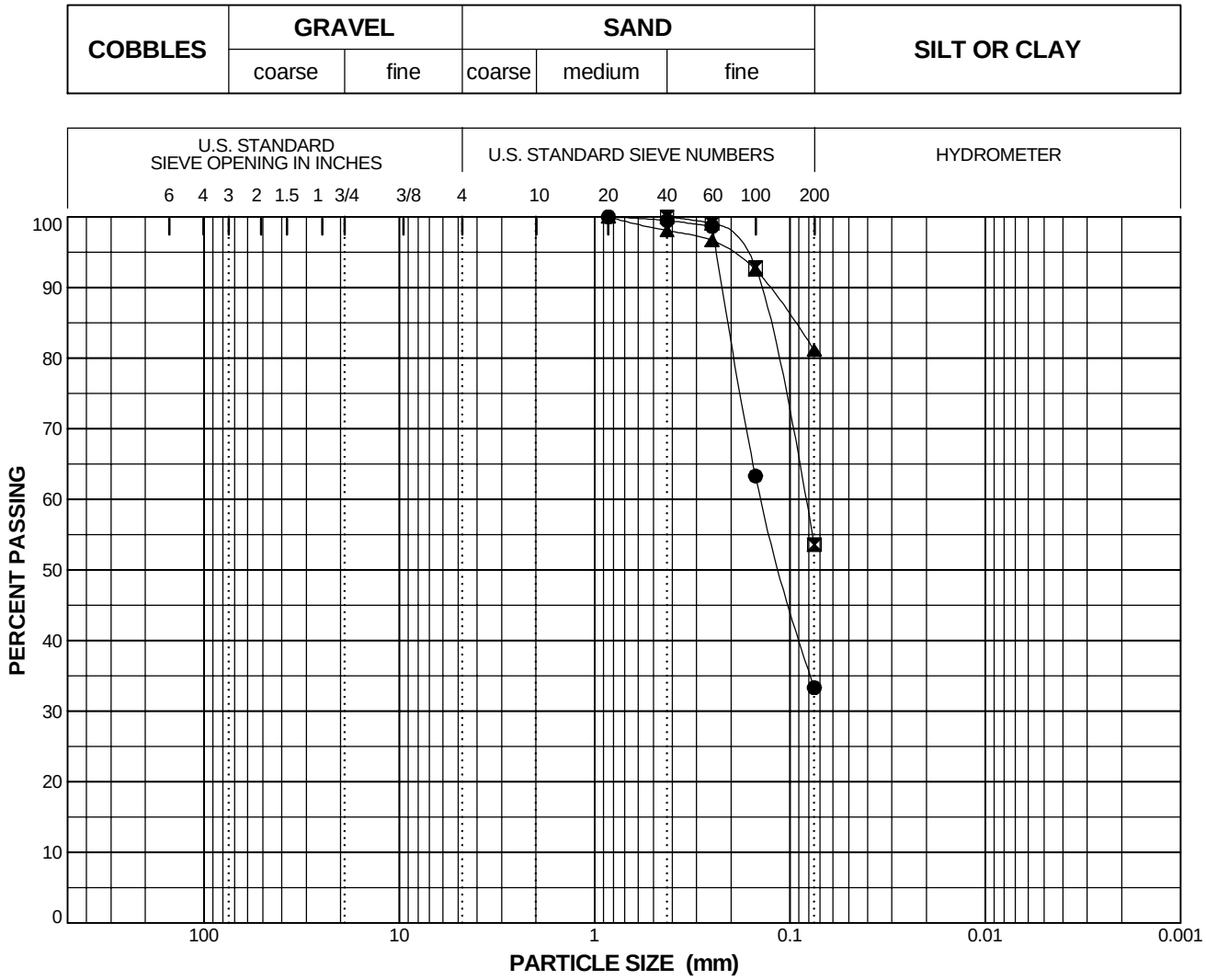
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-5

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	AB-2	AB-2	AB-2
Sample			
Spec			
Depth (ft)	70.0-72.0	75.0-77.0	80.0-82.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	66.7	46.4	18.9
% Fines	33.3	53.6	81.1
% -2µ			
Cc			
Cu			
LL			35
PL			22
PI			13
USCS	SM	ML	CL
w (%)	24.4	21.4	26.0

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			
3/4"			
1/2"			
3/8"			
4			
10			
20	100.0		100.0
40	99.5	100.0	98.1
60	98.6	99.1	96.7
100	63.3	92.9	92.5
200	33.3	53.6	81.1

SYMBOL	DESCRIPTION AND REMARKS
●	Gray SILTY SAND (SM)
⊠	Gray SANDY SILT (ML)
▲	Gray LEAN CLAY with SAND (CL)

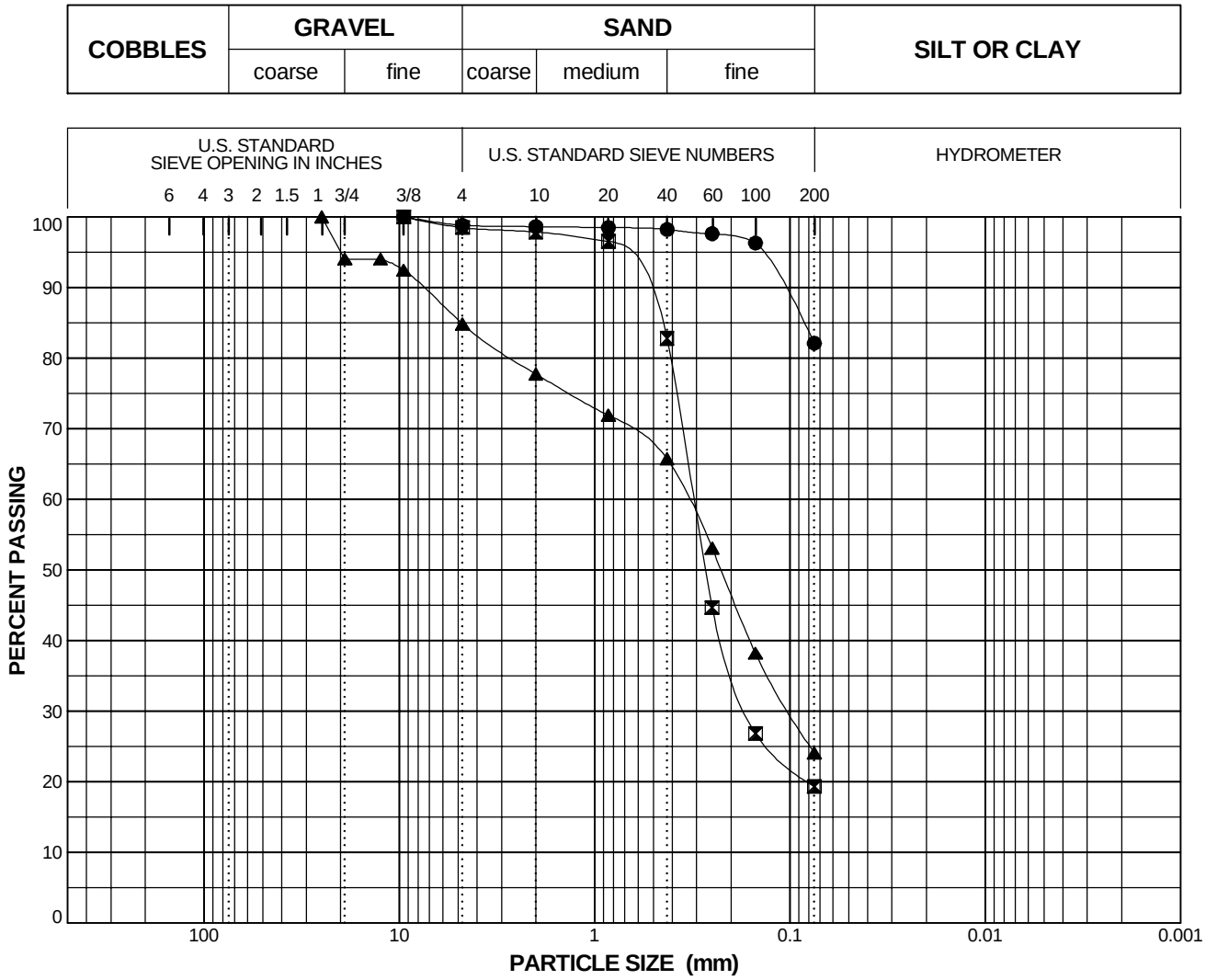
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-6

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	AB-2	AB-2	AB-3
Sample			
Spec			
Depth (ft)	85.0-87.0	95.0-97.0	6.0-8.0
% +3"	0.0	0.0	0.0
% Gravel	1.2	1.5	15.2
% Sand	16.7	79.2	60.7
% Fines	82.1	19.3	24.1
% -2µ			
Cc			
Cu			
LL			
PL			
PI			
USCS	ML	SM	SM
w (%)	24.4	22.0	18.8

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			100.0
3/4"			94.0
1/2"			94.0
3/8"	100.0	100.0	92.5
4	98.8	98.5	84.8
10	98.6	97.9	77.8
20	98.5	96.5	71.9
40	98.2	82.8	65.7
60	97.6	44.7	53.1
100	96.3	26.8	38.2
200	82.1	19.3	24.1

SYMBOL	DESCRIPTION AND REMARKS
●	Gray SILT with SAND (ML)
⊠	Gray SILTY SAND (SM)
▲	Brown SILTY SAND with GRAVEL (SM)

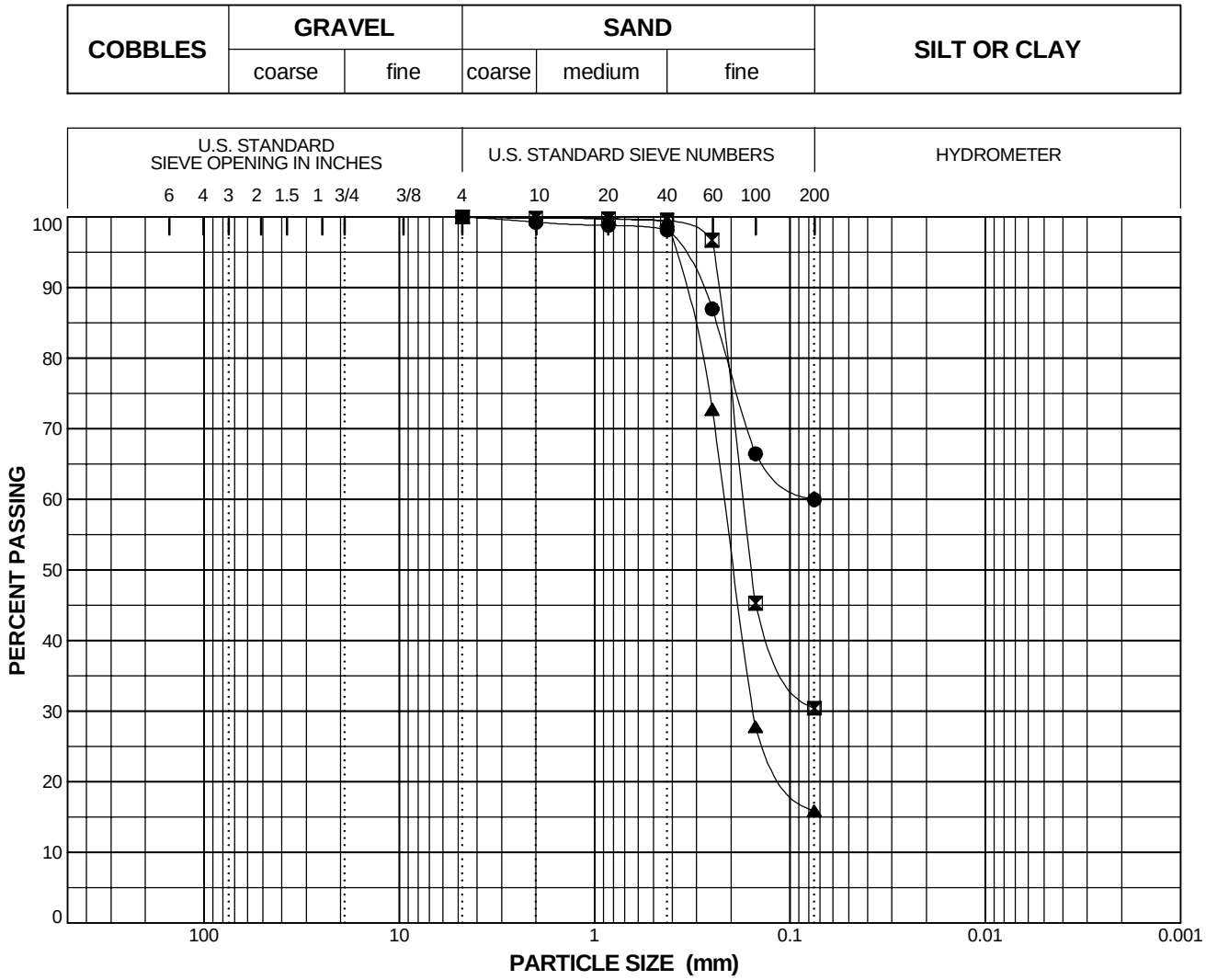
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-7

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	AB-3	AB-3	AB-3
Sample			
Spec			
Depth (ft)	10.0-12.0	20.0-22.0	30.0-32.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	40.0	69.6	84.1
% Fines	60.0	30.4	15.9
% -2µ			
Cc			
Cu			
LL	34		
PL	18		
PI	16		
USCS	CL	SM	SM
w (%)	17.4	12.5	8.6

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			
3/4"			
1/2"			
3/8"			
4	100.0	100.0	100.0
10	99.2	99.8	99.8
20	98.8	99.7	99.7
40	98.2	99.5	99.5
60	87.0	96.7	72.8
100	66.4	45.3	27.8
200	60.0	30.4	15.9

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SANDY LEAN CLAY (CL)
⊠	Brown gray SILTY SAND (SM)
▲	Brown gray SILTY SAND (SM)

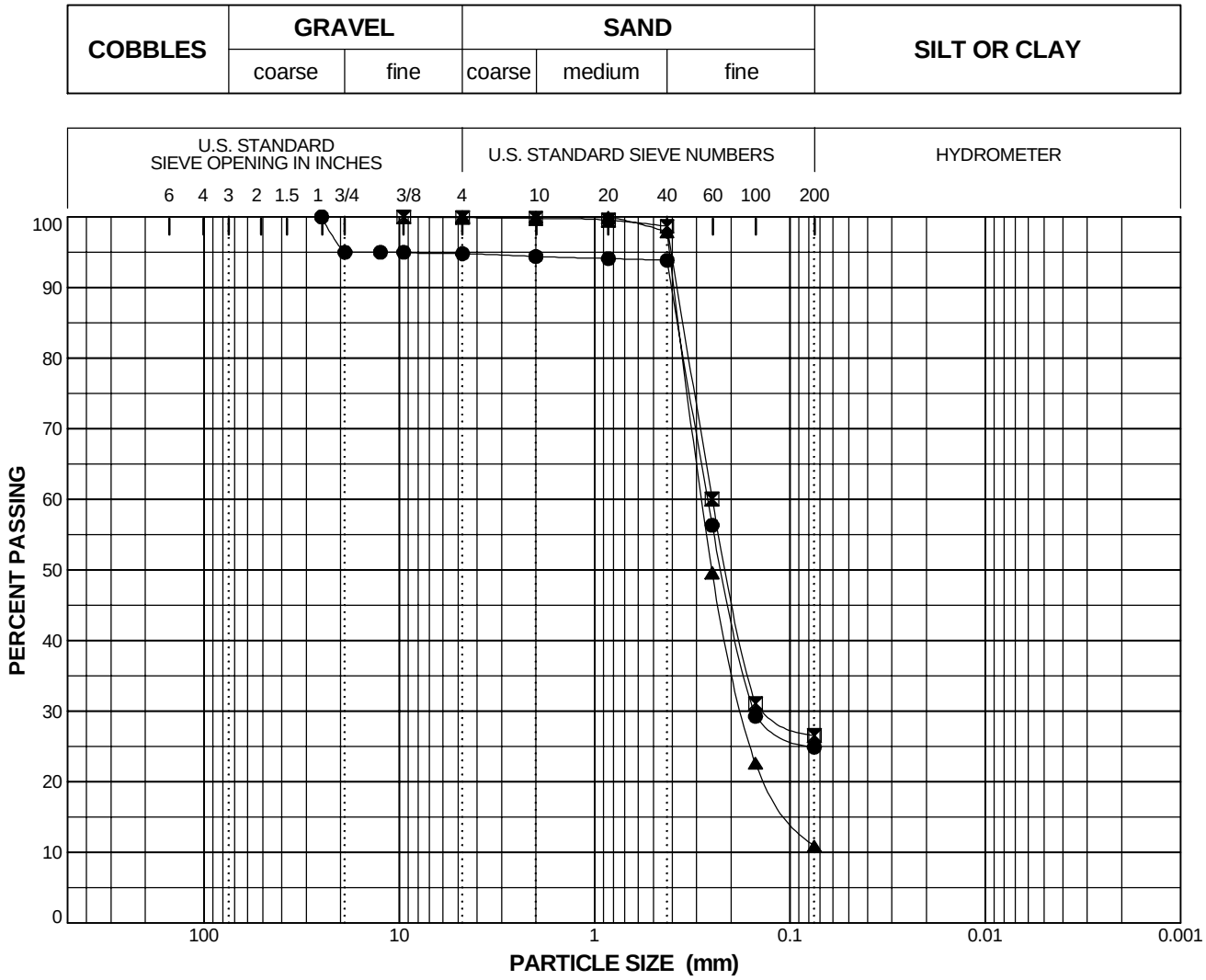
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number 60515039	October 2017	Figure B-8

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	AB-3	AB-3	AB-3
Sample			
Spec			
Depth (ft)	40.0-42.0	50.0-52.0	60.0-62.0
% +3"	0.0	0.0	0.0
% Gravel	5.2	0.1	0.0
% Sand	69.9	73.3	89.1
% Fines	24.9	26.6	10.9
% -2µ			
Cc			1.49
Cu			3.94
LL			
PL			
PI			
USCS	SM	SM	SP-SM
w (%)	12.5	12.2	8.7

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"	100.0		
3/4"	95.0		
1/2"	95.0		
3/8"	95.0	100.0	
4	94.8	99.9	100.0
10	94.4	99.8	100.0
20	94.1	99.5	99.9
40	93.9	98.7	97.9
60	56.3	60.1	49.6
100	29.3	31.1	22.6
200	24.9	26.6	10.9

SYMBOL	DESCRIPTION AND REMARKS
●	Brown gray SILTY SAND (SM)
⊠	Brown gray SILTY SAND (SM)
▲	Brown POORLY GRADED SAND with SILT (SP-SM)

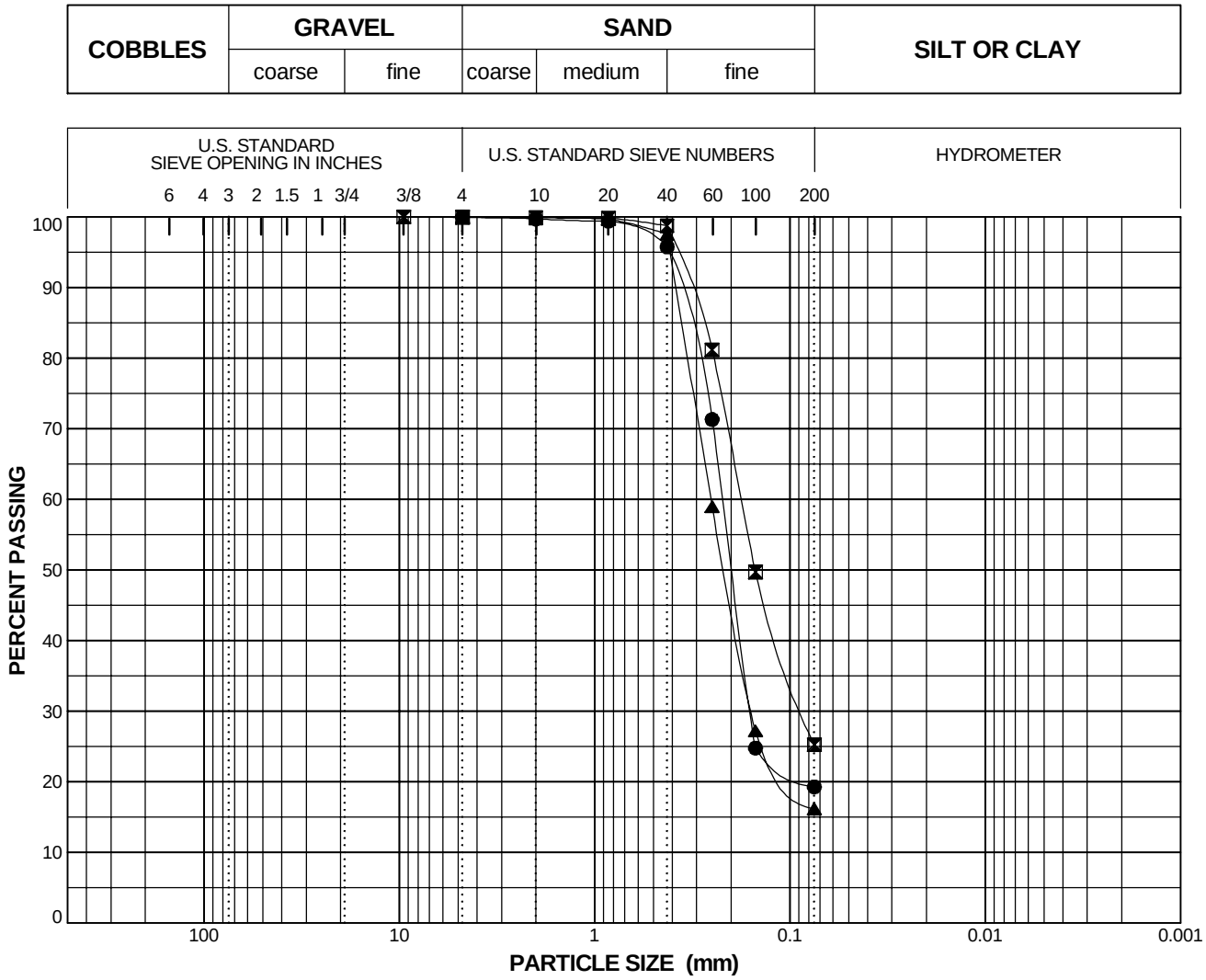
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-9

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	AB-3	AB-3	AB-3
Sample			
Spec			
Depth (ft)	70.0-72.0	75.0-77.0	80.0-82.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.1	0.0
% Sand	80.7	74.7	83.8
% Fines	19.3	25.3	16.2
% -2µ			
Cc			
Cu			
LL			
PL			
PI			
USCS	SM	SM	SM
w (%)	23.8	12.1	12.0

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			
3/4"			
1/2"			
3/8"		100.0	
4	100.0	99.9	100.0
10	99.7	99.9	99.9
20	99.4	99.8	99.7
40	95.7	98.7	97.6
60	71.3	81.2	59.0
100	24.8	49.7	27.2
200	19.3	25.3	16.2

SYMBOL	DESCRIPTION AND REMARKS
●	Gray brown SILTY SAND (SM)
⊠	Brown SILTY SAND (SM)
▲	Brown SILTY SAND (SM)

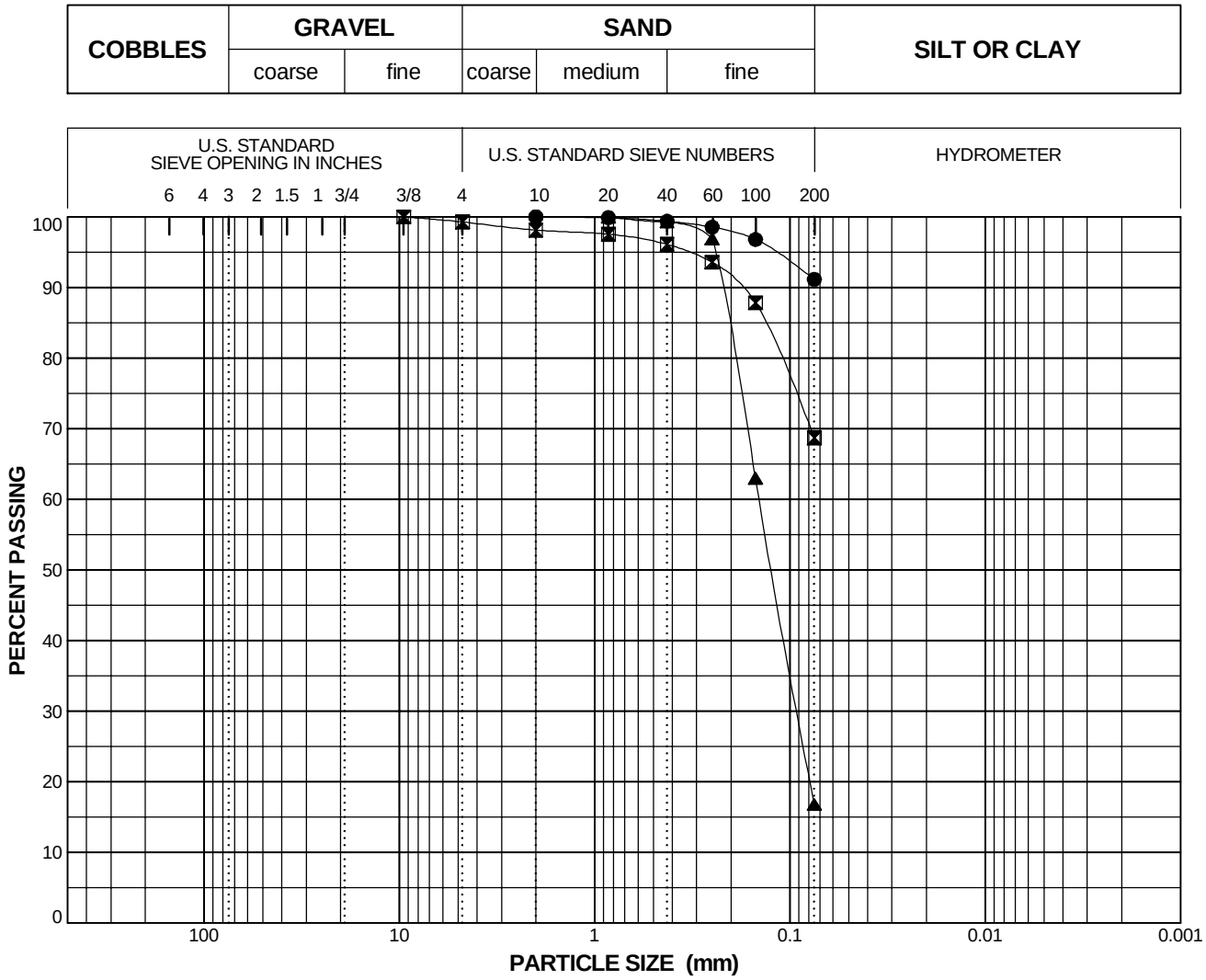
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-10

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	AB-3	AB-3	AB-4
Sample			
Spec			
Depth (ft)	90.0-92.0	95.0-97.0	8.0-10.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.7	0.0
% Sand	8.8	30.6	83.2
% Fines	91.2	68.7	16.8
% -2µ			
Cc			
Cu			
LL	45		
PL	29		
PI	16		
USCS	ML	ML	SM
w (%)	30.3	37.9	12.8

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			
3/4"			
1/2"			
3/8"		100.0	
4		99.3	
10	100.0	98.1	
20	99.9	97.6	100.0
40	99.4	96.1	99.3
60	98.6	93.6	96.9
100	96.8	87.8	63.0
200	91.2	68.7	16.8

SYMBOL	DESCRIPTION AND REMARKS
●	Dark gray SILT (ML)
⊠	Dark gray SANDY SILT (ML)
▲	Brown SILTY SAND (SM)

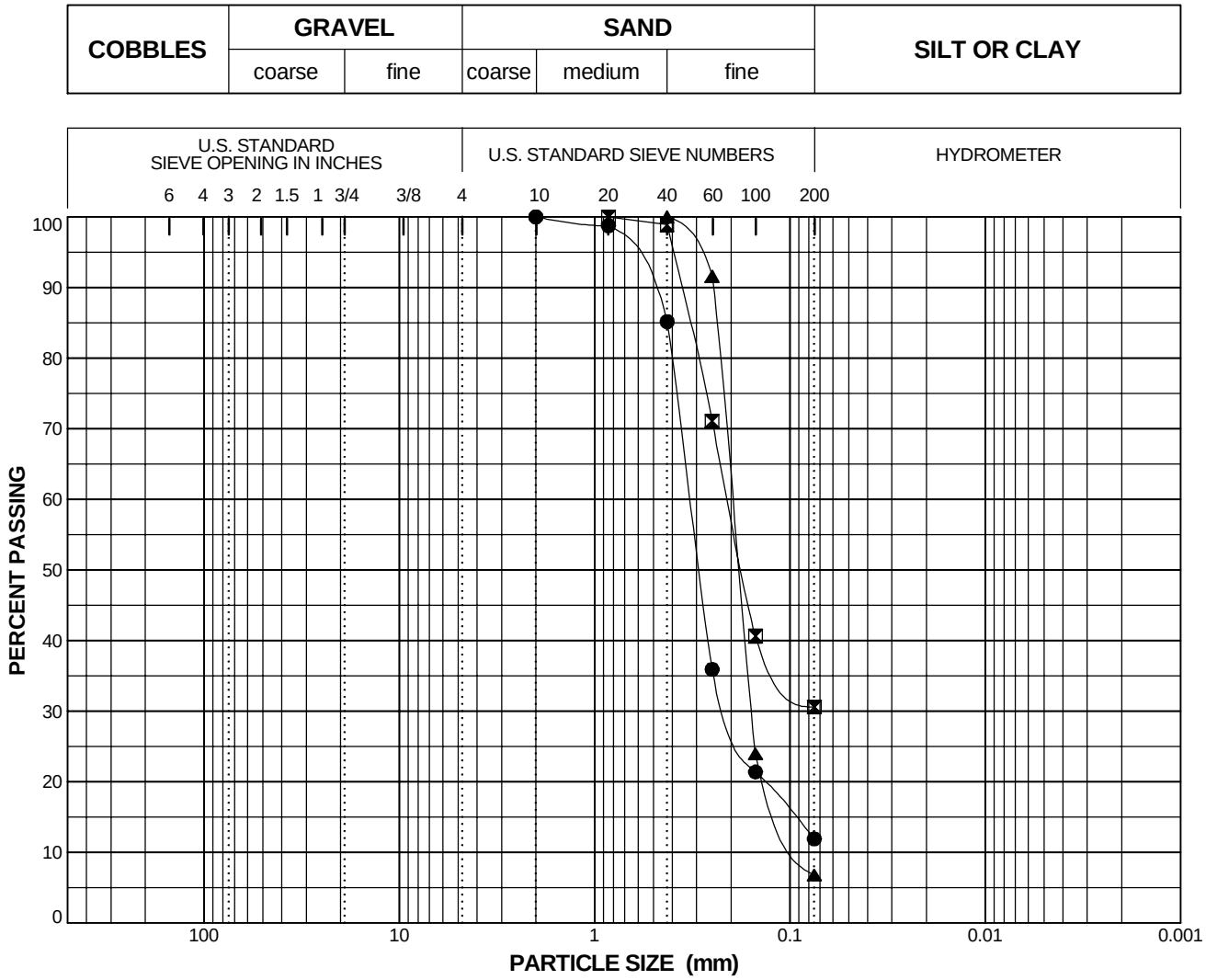
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-11

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	AB-4	AB-4	CB-2
Sample			
Spec			
Depth (ft)	29.0-31.0	83.0-85.0	4.0-6.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	88.1	69.4	93.2
% Fines	11.9	30.6	6.8
% -2µ			
Cc	1.95		1.47
Cu	4.97		2.31
LL			
PL			
PI			
USCS	SP-SM	SM	SP-SM
w (%)	12.0	17.5	5.6

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			
3/4"			
1/2"			
3/8"			
4			
10	100.0		
20	98.8	100.0	
40	85.2	98.9	100.0
60	35.9	71.1	91.6
100	21.4	40.6	24.0
200	11.9	30.6	6.8

SYMBOL	DESCRIPTION AND REMARKS
●	Brown POORLY GRADED SAND with SILT (SP-SM)
⊠	Light brown SILTY SAND (SM)
▲	Brown POORLY GRADED SAND with SILT (SP-SM)

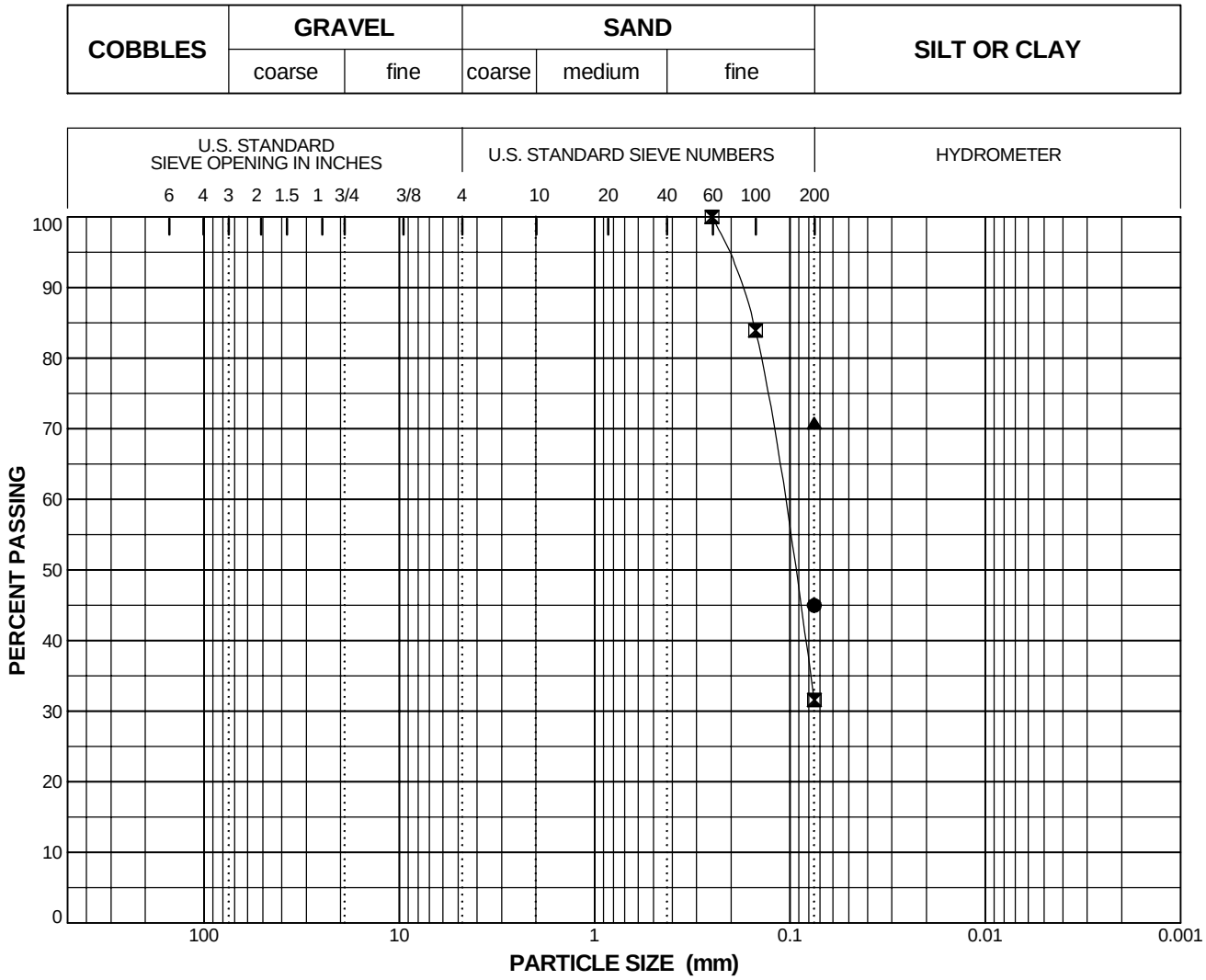
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-12

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	CB-2	CB-2	CB-2
Sample			
Spec			
Depth (ft)	14.0-16.0	24.0-26.0	29.0-31.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	0.0	68.4	0.0
% Fines	45.0	31.6	70.8
% -2µ			
Cc			
Cu			
LL			
PL			
PI			
USCS		SM	
w (%)	25.3	22.6	21.2

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			
3/4"			
1/2"			
3/8"			
4			
10			
20			
40			
60		100.0	
100		83.9	
200	45.0	31.6	70.8

SYMBOL	DESCRIPTION AND REMARKS
●	Gray ()
⊠	Gray SILTY SAND (SM)
▲	Gray ()

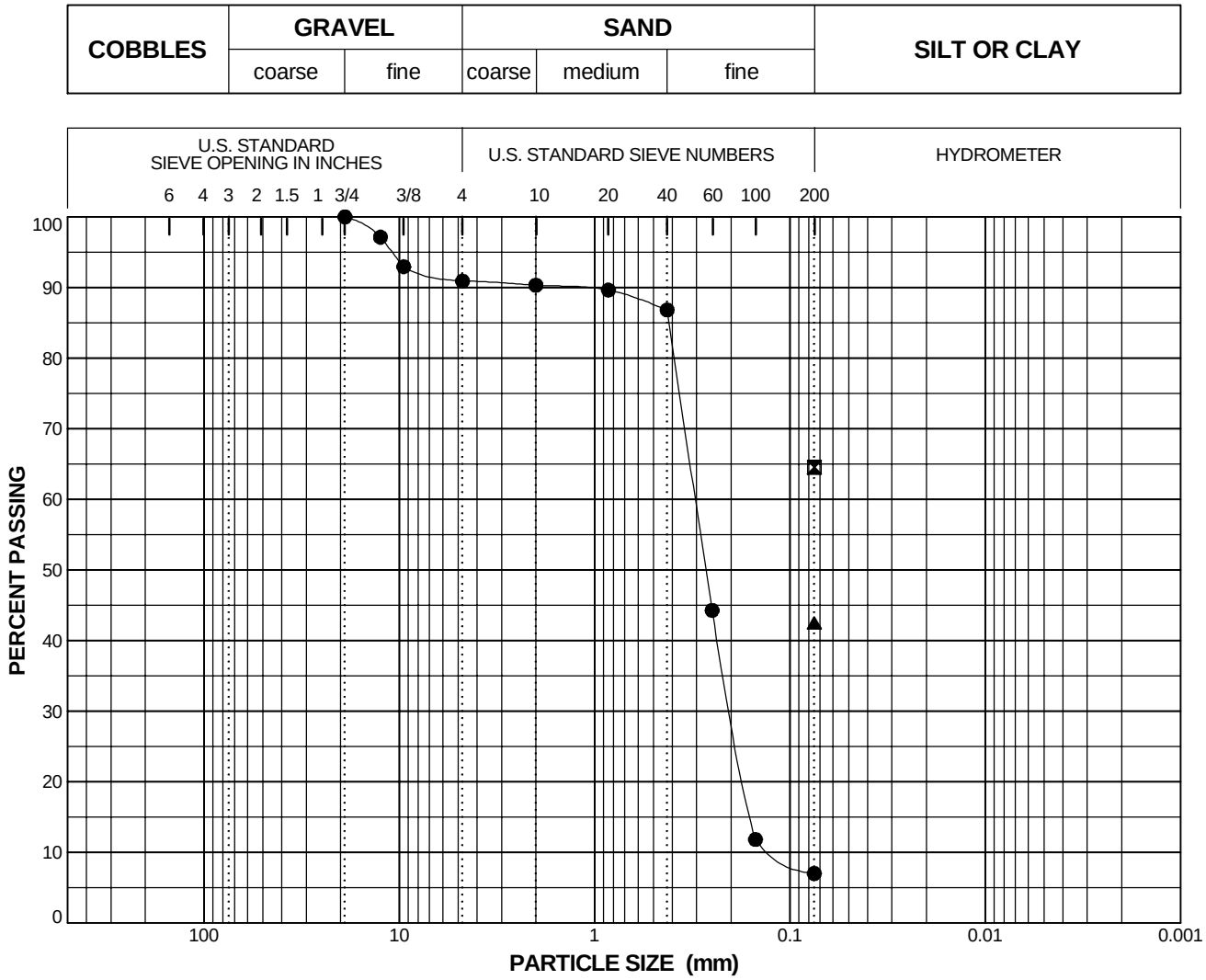
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-13

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	CB-2	CB-2	CB-2
Sample			
Spec			
Depth (ft)	68.0-70.0	78.0-80.0	93.0-95.0
% +3"	0.0	0.0	0.0
% Gravel	9.1	0.0	0.0
% Sand	83.9	0.0	0.0
% Fines	7.0	64.5	42.5
% -2µ			
Cc	1.14		
Cu	2.64		
LL			
PL			
PI			
USCS	SP-SM		
w (%)	22.4	20.0	28.5

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			
3/4"	100.0		
1/2"	97.1		
3/8"	92.9		
4	90.9		
10	90.3		
20	89.6		
40	86.8		
60	44.3		
100	11.8		
200	7.0	64.5	42.5

SYMBOL	DESCRIPTION AND REMARKS
●	Light brown POORLY GRADED SAND with SILT (SP-SM)
⊠	Light brown ()
▲	Gray ()

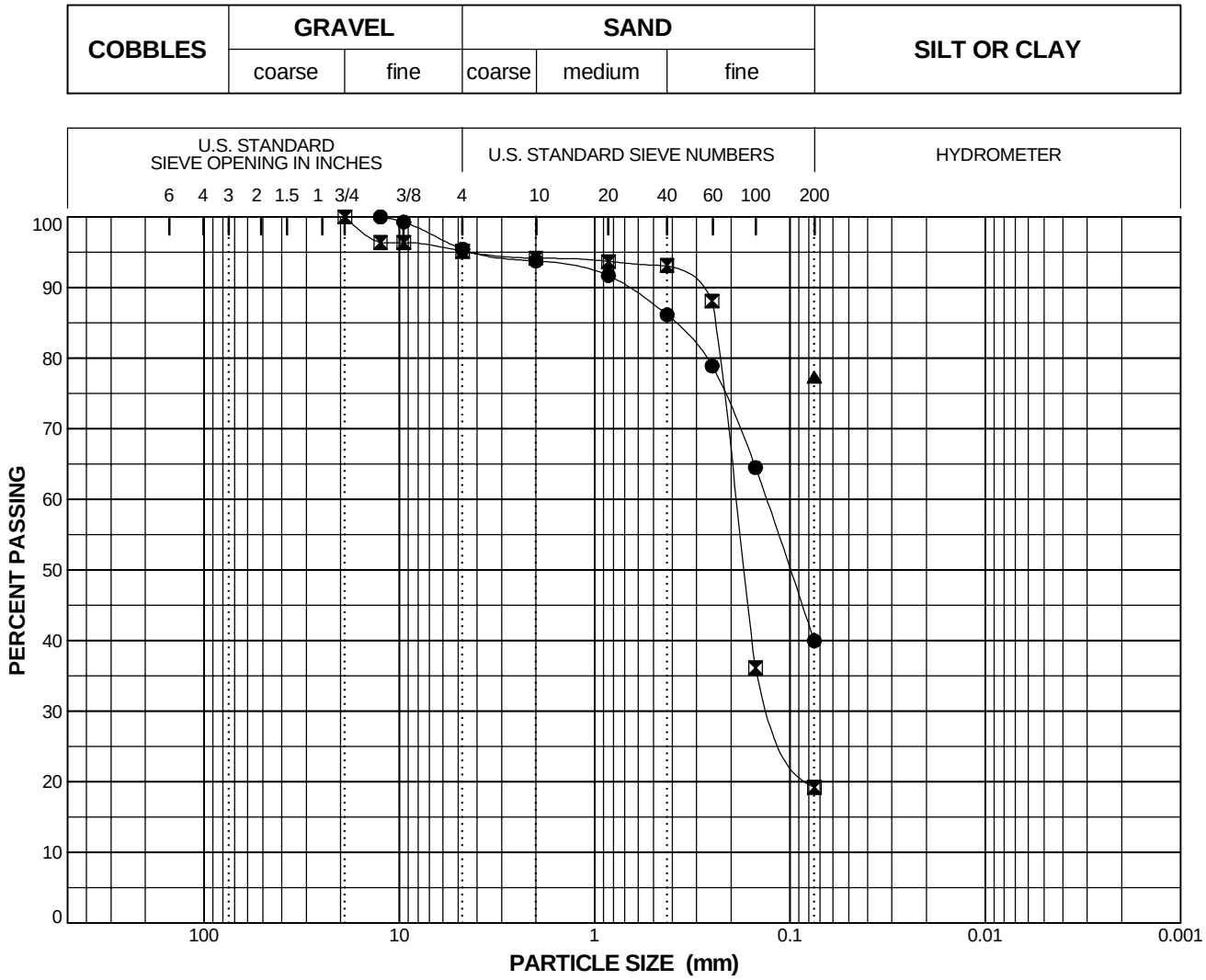
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-14

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	CB-3	CB-3	CB-3
Sample			
Spec			
Depth (ft)	4.0-6.0	20.0-22.0	30.0-32.0
% +3"	0.0	0.0	0.0
% Gravel	4.6	4.9	0.0
% Sand	55.5	75.9	0.0
% Fines	40.0	19.2	77.3
% -2µ			
Cc			
Cu			
LL			
PL			
PI			
USCS	SM	SM	ML
w (%)	16.5	16.7	5.0

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			
3/4"		100.0	
1/2"	100.0	96.4	
3/8"	99.3	96.4	
4	95.4	95.1	
10	93.8	94.2	
20	91.7	93.7	
40	86.1	93.1	
60	78.9	88.1	
100	64.5	36.1	
200	40.0	19.2	77.3

SYMBOL	DESCRIPTION AND REMARKS
●	Brown gray SILTY SAND (SM)
⊠	Brown SILTY SAND (SM)
▲	Brown SILT with SAND (ML)

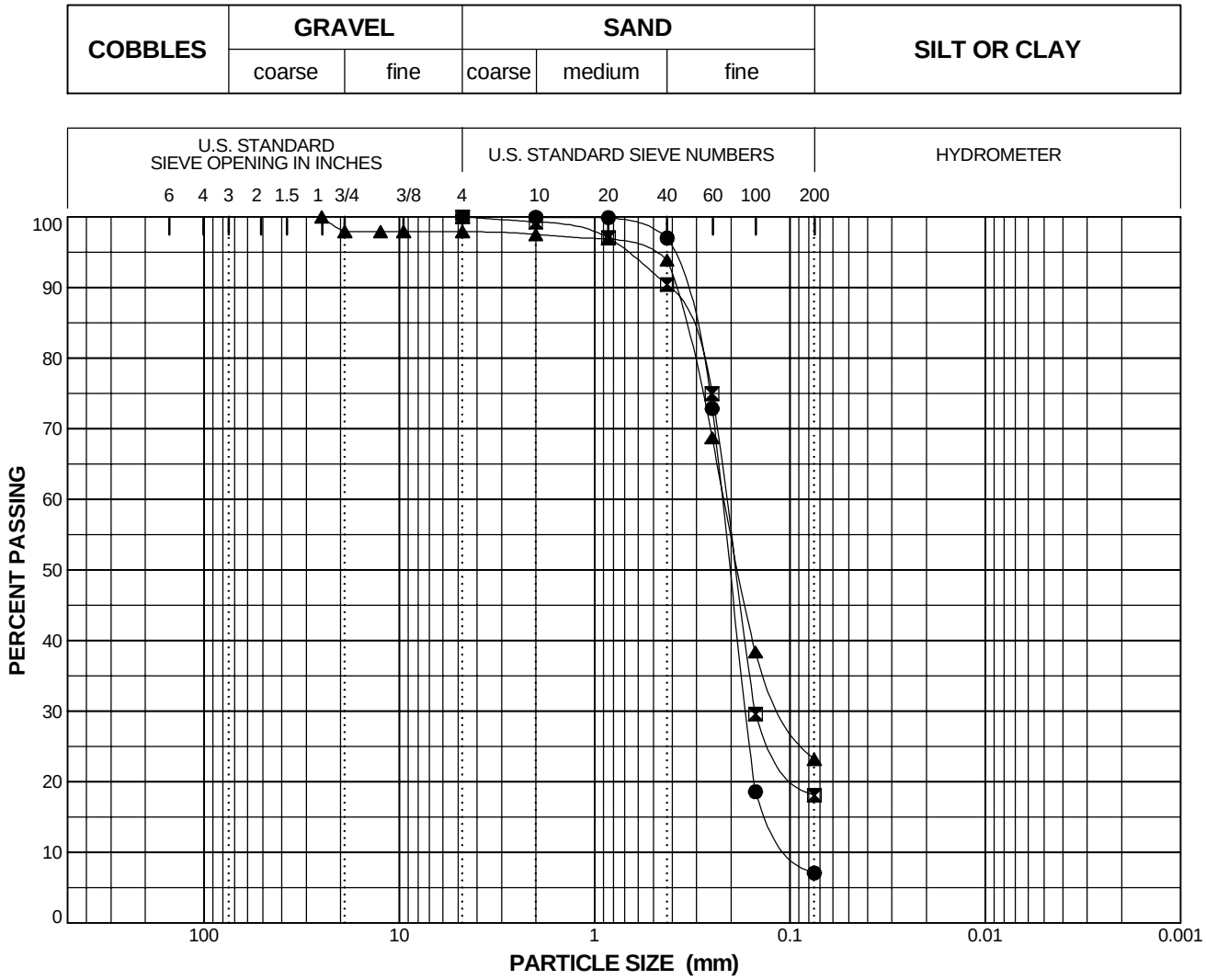
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-15

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	CB-3	CB-3	CB-3
Sample			
Spec			
Depth (ft)	35.0-37.0	45.0-47.0	55.0-57.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	2.1
% Sand	92.9	81.9	74.7
% Fines	7.1	18.1	23.2
% -2µ			
Cc	1.41		
Cu	2.48		
LL			
PL			
PI			
USCS	SP-SM	SM	SM
w (%)	3.7	20.2	19.1

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			100.0
3/4"			97.9
1/2"			97.9
3/8"			97.9
4	100.0	100.0	97.9
10	99.9	99.3	97.5
20	99.9	97.0	96.9
40	97.0	90.4	93.9
60	72.8	75.0	68.7
100	18.6	29.6	38.4
200	7.1	18.1	23.2

SYMBOL	DESCRIPTION AND REMARKS
●	Brown POORLY GRADED SAND with SILT (SP-SM)
⊠	Brown SILTY SAND (SM)
▲	Brown SILTY SAND (SM)

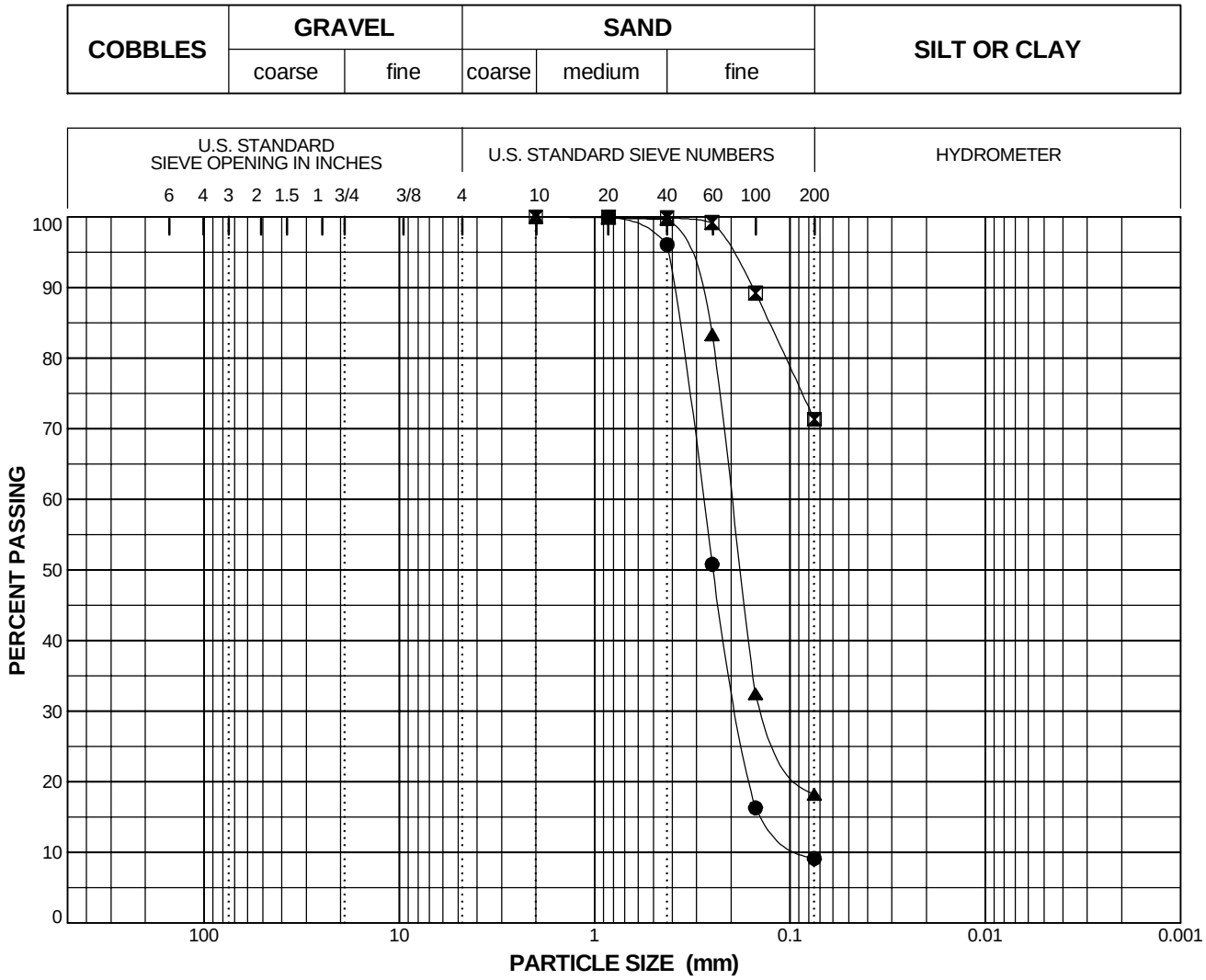
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-16

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	CB-3	CB-3	CB-3
Sample			
Spec			
Depth (ft)	65.0-67.0	75.0-77.0	80.0-82.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	90.9	28.7	81.8
% Fines	9.1	71.3	18.2
% -2µ			
Cc	1.48		
Cu	3.41		
LL		29	
PL		17	
PI		12	
USCS	SP-SM	CL	SM
w (%)	23.0	16.7	22.4

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			
3/4"			
1/2"			
3/8"			
4			
10		100.0	100.0
20	100.0	99.9	99.9
40	96.1	99.9	99.6
60	50.8	99.2	83.3
100	16.3	89.2	32.4
200	9.1	71.3	18.2

SYMBOL	DESCRIPTION AND REMARKS
●	Brown POORLY GRADED SAND with SILT (SP-SM)
⊠	Brown LEAN CLAY with SAND (CL)
▲	Brown SILTY SAND (SM)

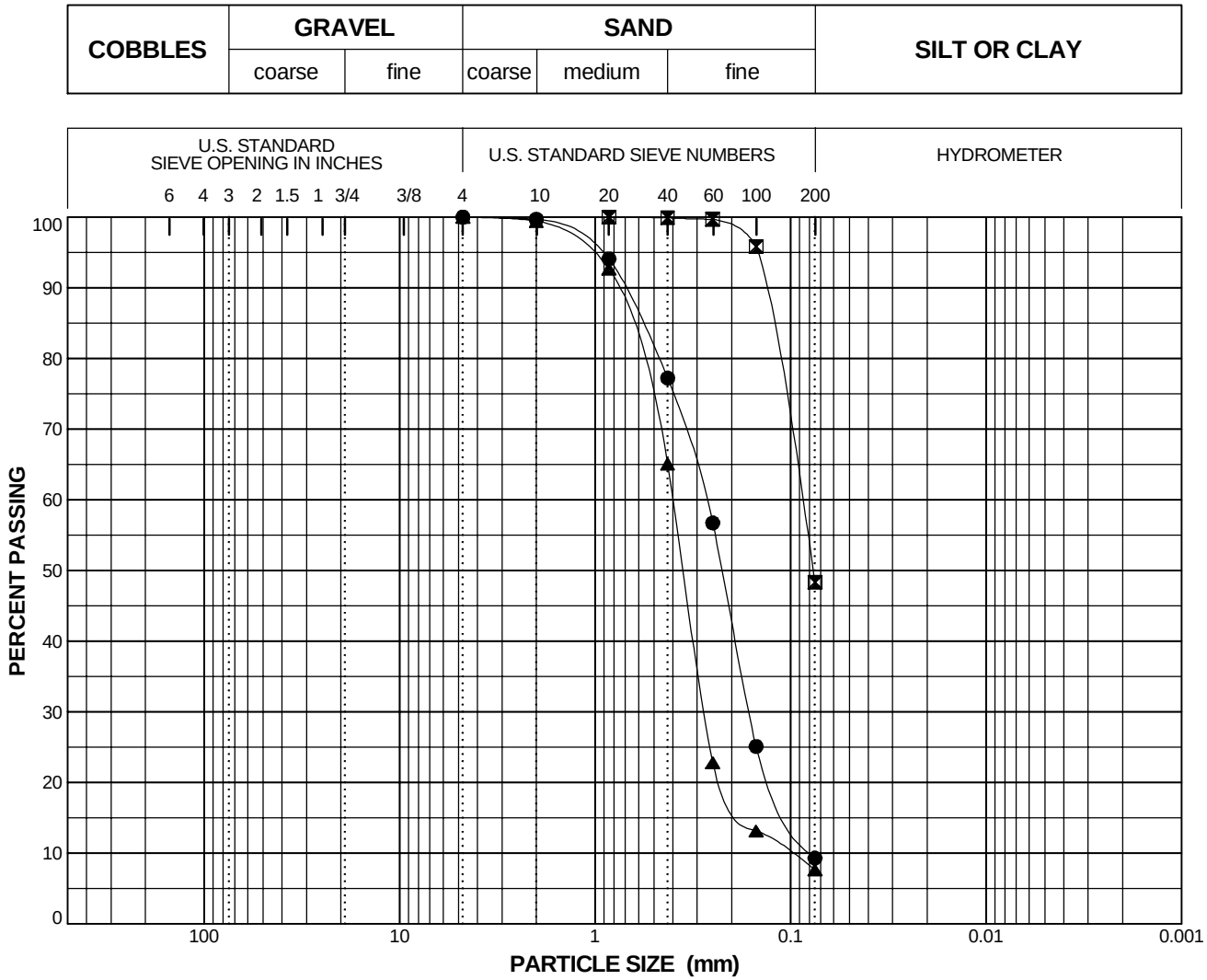
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-17

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	CB-3	CB-3	CB-3
Sample			
Spec			
Depth (ft)	90.0-92.0	95.0-97.0	110.0-112.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	90.7	51.7	92.4
% Fines	9.3	48.4	7.6
% -2µ			
Cc	1.25		1.86
Cu	3.52		3.94
LL			
PL			
PI			
USCS	SP-SM	SM	SP-SM
w (%)	21.0	22.8	22.7

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			
3/4"			
1/2"			
3/8"			
4	100.0		100.0
10	99.7		99.4
20	94.1	100.0	92.7
40	77.2	99.9	65.1
60	56.7	99.7	22.8
100	25.1	95.9	13.1
200	9.3	48.4	7.6

SYMBOL	DESCRIPTION AND REMARKS
●	Brown POORLY GRADED SAND with SILT (SP-SM)
⊠	Gray SILTY SAND (SM)
▲	Brown POORLY GRADED SAND with SILT (SP-SM)

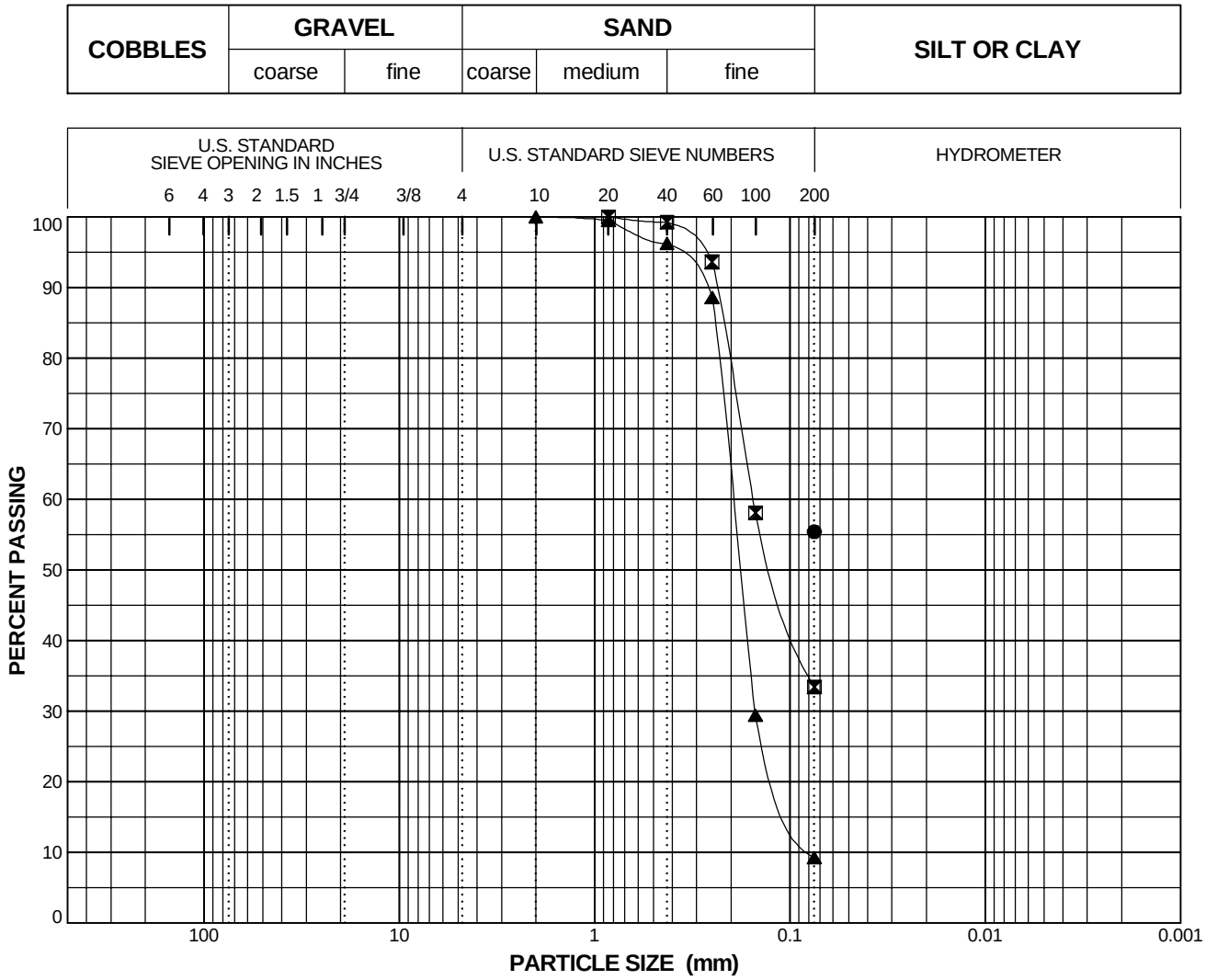
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number		
60515039	October 2017	Figure B-18

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●	⊠	▲
Boring	MDB-1	MDB-1	MDB-1
Sample			
Spec			
Depth (ft)	10.0-12.0	19.0-21.0	34.0-36.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% Sand	0.0	66.6	90.8
% Fines	55.4	33.4	9.2
% -2µ			
Cc			1.51
Cu			2.54
LL			
PL			
PI			
USCS		SM	SP-SM
w (%)	18.8	28.4	25.6

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
3"			
2"			
1"			
3/4"			
1/2"			
3/8"			
4			
10			100.0
20		100.0	99.5
40		99.2	96.2
60		93.6	88.6
100		58.1	29.4
200	55.4	33.4	9.2

SYMBOL	DESCRIPTION AND REMARKS
●	Brown ()
⊠	Brown gray SILTY SAND (SM)
▲	Brown POORLY GRADED SAND with SILT (SP-SM)

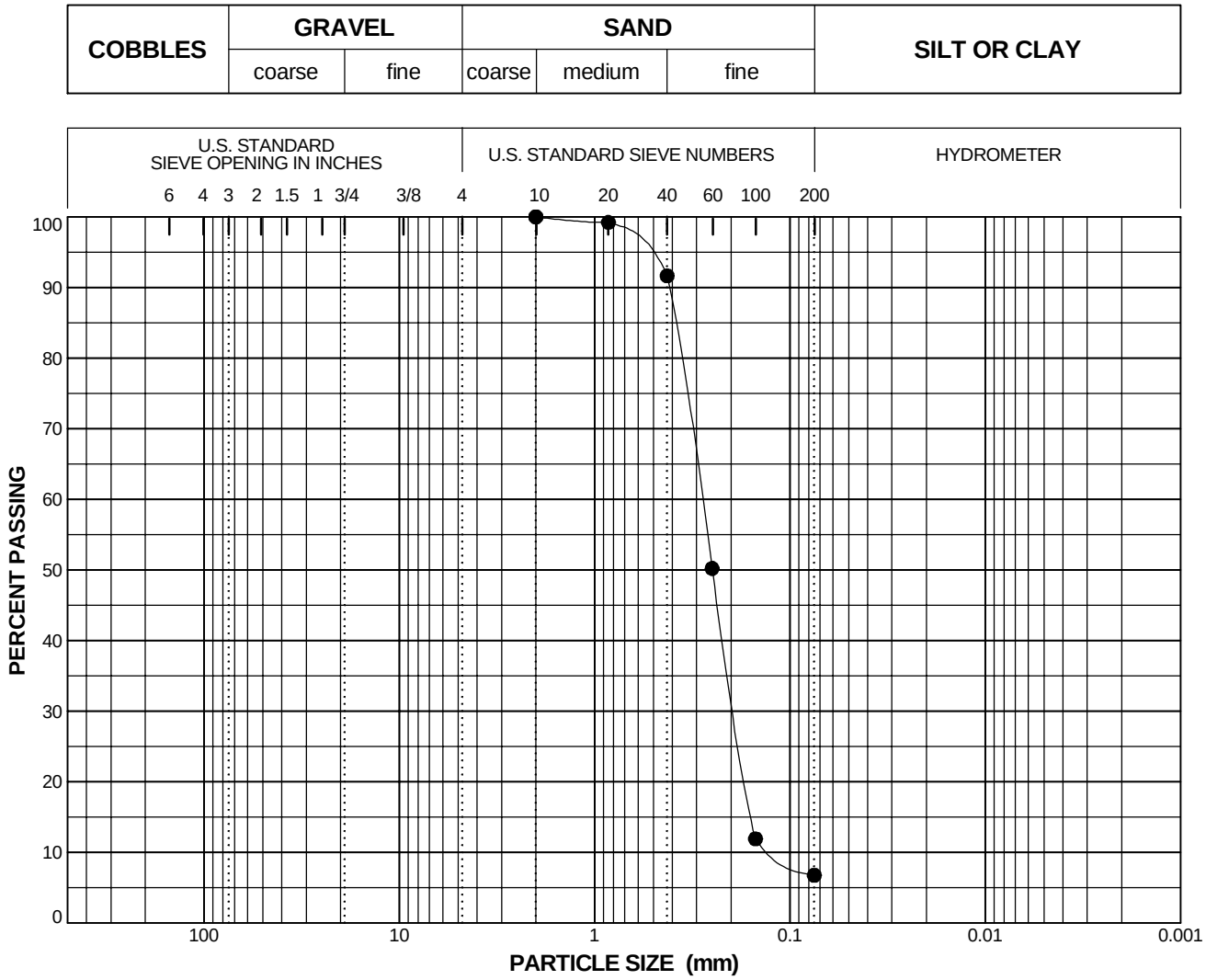
PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number 60515039	October 2017	Figure B-19

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17



SYMBOL	●
Boring	MDB-1
Sample	
Spec	
Depth (ft)	48.0-50.0
% +3"	0.0
% Gravel	0.0
% Sand	93.2
% Fines	6.8
% -2µ	
Cc	1.11
Cu	2.44
LL	
PL	
PI	
USCS	SP-SM
w (%)	25.5

Particle Size (Sieve #)	PERCENT FINER ●
3"	
2"	
1"	
3/4"	
1/2"	
3/8"	
4	
10	100.0
20	99.2
40	91.6
60	50.2
100	11.9
200	6.8

SYMBOL	DESCRIPTION AND REMARKS
●	Brown POORLY GRADED SAND with SILT (SP-SM)

PARTICLE SIZE DISTRIBUTION

Williams NESE - Madison

Project Number 60515039	October 2017	Figure B-20

URS

SIEVE_BLUEBELL_NEW MADISON_LAB.GPJ URS_BLUE.GDT 10/4/17

Doc. Number: NESE-02-GS-RPT-00012

Alpine

Survey Report for
Transcontinental Gas Pipeline Company, LLC

Title:
Williams NESE Geotechnical Boring Survey Field Report

Project:
NESE Project
Raritan Bay and Chapel Hill Channel

Survey Date:
January 2018

Project Number:
1840

Report Status:
Revision 0

Submittal Date:
06 February 2018



EXECUTIVE SUMMARY

Transcontinental Pipeline Company, LLC (Williams) is proposing to install a new natural gas pipeline across Lower New York Harbor between a landing near Morgan, New Jersey and Long Island, New York. Two areas of the pipeline installation, the crossing at Raritan Channel and the crossing at Chapel Hill Channel will be conducted using Horizontal Directional Drilling (HDD). Williams contracted Alpine ocean Seismic Survey Inc, (Alpine) to conduct geotechnical drilling and Cone Penetrometer Testing (CPT) operations in these two areas of the route.

Williams proposed a total of 11 bore sites to be sampled at the two selected channel crossings. Six of the sites are located near the Chapel Hill Channel Crossing and five sites are located near the Raritan Bay Channel Crossing. To acquire sediment samples and CPT data at each site, Alpine chartered the LB *Vision*, owned and operated by Northstar Marine. Alpine used a CME-55 conventional drill rig, operated by Aquifer Drilling & Testing (ADT) to acquire sediment samples using both Split Spoon and Shelby Tube collection techniques. CPT testing was conducted and processed at each site by representatives of ConeTec.

The LB *Vision* was able to set up on the location of each proposed boring site using highly accurate, RTK corrected GPS to ensure samples were collected within specification. Water depths at each site were measured and corrected for tidal variation to MLLW based on the preliminary tide values from the NOAA Water Level Gauge at Sandy Hook, New Jersey.

At each site, all acquired samples were described, recorded and photographed by an Alpine geologist and a representative of Norwegian Geotechnical Institute (NGI). Additional examination of the samples was performed by an onboard representative of INTECSEA or Lake Superior Consulting (LSC). The INTECSEA and LSC consultants were provided by Williams to provide design services for the proposed HDD pipeline installations. Samples from pre-determined intervals throughout each bore were sampled by split spoon, split spoon liners or Shelby Tubes. Samples collected by split spoon were bagged and labeled, samples in Shelby tubes and split spoon liner samples were left in the tubes and securely capped and sealed. All samples were returned to the Alpine office daily using a courier and were further shipped to the NGI laboratory for sample analysis.

Throughout the campaign a total of 13 bores sites were examined and 14 CPT tests were conducted to assess the HDD crossing areas of the Raritan Bay Channel and the Chapel Hill Channel. Along with the original 11 proposed sites, two additional bores were conducted based on CPT data collected at the Raritan Bay Channel. The following field report summarizes operational logistics, bore sampling and CPT procedures and contains all preliminary field logs and sample descriptions.

SERVICE WARRANTY

USE OF THIS REPORT

This field report has been prepared with due care and diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work carried out under the contract and as such the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and unless clearly stated is not a recommendation of any course of action.

Alpine has prepared this report for the client(s) identified on the front cover in fulfilment of its contractual obligations under the contract and the only liabilities Alpine accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk and Alpine recommends that this disclaimer be included in any such distribution.

ALPINE OCEAN SEISMIC SURVEY, INC.
155 Hudson Avenue, Norwood, NJ 07648 USA
Telephone 1 201 768 8000 Fax 1 201 768 5750
www.alpineocean.com

TABLE OF CONTENTS

EXECUTIVE SUMMARY ii
SERVICE WARRANTY iii
TABLE OF CONTENTS iv
LIST OF FIGURES v
LIST OF TABLES v
GLOSSARY OF ABBREVIATIONS vi
1. INTRODUCTION 1
1.1 Description 1
1.2 Purpose 1
1.3 Fieldwork Summary 1
1.4 Time Breakdown - NESE Boring Program 3
2. VESSEL SUMMARY 5
3. SAFETY 7
3.1 Exposure Hours 7
4. CREW LIST 8
5. SAMPLING EQUIPMENT AND METHODS 9
5.1 General 9
5.2 GPS Navigation Installation, Testing, and Configuration 9
5.3 Project Survey Parameters 10
5.3.1 Survey Units 10
5.3.2 Vertical Datum 10
5.4 Sampling Equipment and Collection Methods 11
5.4.1 Vessel Layout 11
5.4.2 CME-55 Track Carrier Auger Drill (Boring Unit) 11
5.4.4 Cone Penetration Testing (CPT) Rod and Sensor. 12
5.4.5 Drilling and Sampling Procedures 13
6. POST SAMPLING RECORDS AND LAB PROCESSING 16
6.1 Sediment Sample Processing 16
6.2 Bore Logs 16

APPENDICES
APPENDIX A NESE Boring Program Daily Progress Reports
APPENDIX B NESE Final Boring and CPT Locations, Water Depths and Elevations
APPENDIX C NESE Boring Program Field Boring Logs

LIST OF FIGURES

Figure 1.1 Bore Location Map
Figure 1.2 Time Breakdown NESE Marine Boring Program
Figure 2.1 Vessel LB *Vision*
Figure 5.1 Vessel layout of LB *Vision*
Figure 5.2 Photo of CME-55 Drill Rig Used During Boring Operations
Figure 5.3 Illustration of drill rig assisted CPT probe used on the project

LIST OF TABLES

Table 1.1 Summary of Field Operations
Table 1.2 Summary of Boring Stations
Table 1.3 Time Breakdown Marine Boring Program
Table 2.1 Vessel Specifications
Table 4.1 Field Personnel
Table 5.1 Navigation Check Results
Table 5.2 Project Geodetic Parameters

GLOSSARY OF ABBREVIATIONS

Abbreviation	Meaning	Typical Use in Documents
BML	Below Mudline	
CPT	Cone Penetrometer Test	
DGPS	Differential Global Positioning System	
DPR	Daily Progress Report	
ft.	Feet	
g	gallons	
HDD	Horizontal Directional Drilling	
HP	Horsepower	
in	inches	
kW	kilowatts	
LB	Lift Boat	
Lat	Latitude	
Long	Longitude	
LNYBL	Lower New York Bay Lateral	
m	Meter	
MLLW	Mean Lower Low Water	
NA	Not Applicable	
NAD83	North American Datum of 1983	
NAVD88	North American Vertical Datum of 1988	
NESE	Northeast Supply Enhancement	
PDOP	Position Dilution of Precision	
QA/QC	Quality Assurance/Quality Control	
RDL	Rockaway Delivery Lateral	
RTK	Real Time Kinematic	
RV	Research Vessel	
SOW	Scope of Work	
USCG	United States Coast Guard	
usft	United States Survey Feet	
UTM	Universal Transverse Mercator Projection	
WD	Water Depth	
WGS84	World Geodetic System 1984	

1. INTRODUCTION

1.1 Description

Williams has proposed to expand its natural gas delivery operations in New York and New Jersey by considering to build a new pipeline. The potential pipeline (referred to as the "Lower New York Bay Lateral B-Line (LNYBL B-Line)") will transport gas from the existing Transco Station 207 which is located approximately 3.42 miles inland from the shoreline at Morgan in Middlesex County, NJ. The LNYBL B-Line will be laid and buried below the seabed across Lower Raritan Bay for a distance of approximately 22 miles and will terminate at the existing subsea Rockaway Delivery Lateral (RDL) valve manifold. The RDL manifold is tied into the existing Transco 26 in LNYBL via a spool with dual hot taps to the 26" Rockaway Delivery Lateral to supply gas onshore at the Rockaway facility in Kings County, NY. Key focus areas for routing consideration are the construction methods and installation of the line, as the area is heavily trafficked by both commercial and personal watercraft, and is currently planned to transect several existing cable crossings.

1.2 Purpose

Alpine was contracted by Williams to conduct geotechnical sampling, provide sediment data for engineering design and environmental analysis Geotechnical data acquisition was conducted using two methods, marine rotary borings and CPT data collection. The marine boring and CPT operations were conducted using a self-propelled jack-up Lift Boat, the LB *Vision*, with an onboard CME-55 Tracked Rotary Boring Unit.

The purpose of boring and CPT operations was to support pipeline design and determine the suitability to conduct Horizontal Directional Drilling (HDD) along two channel crossing areas of the proposed route. One HDD route will carry the pipeline across Chapel Hill Channel and the second HDD route will carry the pipeline across the Raritan Bay Channel. A total of 11 original bore sites were sampled along with 2 additional bore sites at the Raritan Bay Channel location. A CPT was taken at each of the original bore sites except for B-26, B-28 and B-30 as well as at additional bore sites B-31 through B-34. Two additional CPTs were conducted in between site B-23 and B-34 at the Raritan Bay Channel location. The total number of borings and CPTs conducted throughout the campaign were 13 and 14 respectively.

1.3 Fieldwork Summary

The NESE boring and CPT campaign took place between 11-January-2018 and 27-January 2018 on board the LB *Vision*. An itemized summary of events and timelines during the operation can be seen in Table 1.1. Throughout the campaign a total of 13 bore sites were sampled (Figure 1.1). Before commencing with each bore, a boring drill plan was discussed between the drillers, the Alpine geologist and the client representatives as to the sample techniques used at each interval and how far to drill below the mudline. Table 1.2 shows final drill depths in BML and measured water depths reduced to MLLW at each bore site. Overall the project consisted of 360 total hours and a more detailed time breakdown of operations can be seen in Table 1.3 and Figure 1.2. A more detailed description of fieldwork and operations can be seen in the daily progress reports (DPR) in Appendix A.

Table 1.1 Summary of Field Operations

Boring Project Fieldwork Summary	
Survey Vessel	LB *Vision*
Mobilization	11-January-2018 to 12-January-2018
Survey operational	13-January-2018 to 26-January-2018
Demobilization	26-January-2018 to 27-January-2018

Table 1.2 Summary of Boring Stations

Station	Time & Date	Drilling Depth (ft BML)	Seabed Elevation (ft MLLW)
B-20	0730 EST 1-19-18	87 ft.	-17.3 ft
B-21	1345 EST 1-23-18	97 ft.	-32.0 ft
B-22	1240 EST 1-21-18	82 ft.	-43.7 ft
B-23	1450 EST 1-22-18	97 ft.	-20.0 ft
B-24	1310 EST 1-20-18	92 ft.	-16.7 ft
B-25	0800 EST 1-14-18	82 ft.	-23.0 ft
B-26	1615 EST 1-15-18	72 ft.	-27.0 ft
B-27	2045 EST 1-17-18	77 ft.	-34.2 ft
B-28	0340 EST 1-17-18	87 ft.	-28.4 ft
B-29	2310 EST 1-14-18	82 ft.	-26.9 ft
B-30	1105 EST 1-13-18	87 ft.	-18.4 ft
B-32	0730 EST 1-25-18	112 ft.	-15.9 ft
B-33	1900 EST 1-25-18	82 ft.	-34.8 ft

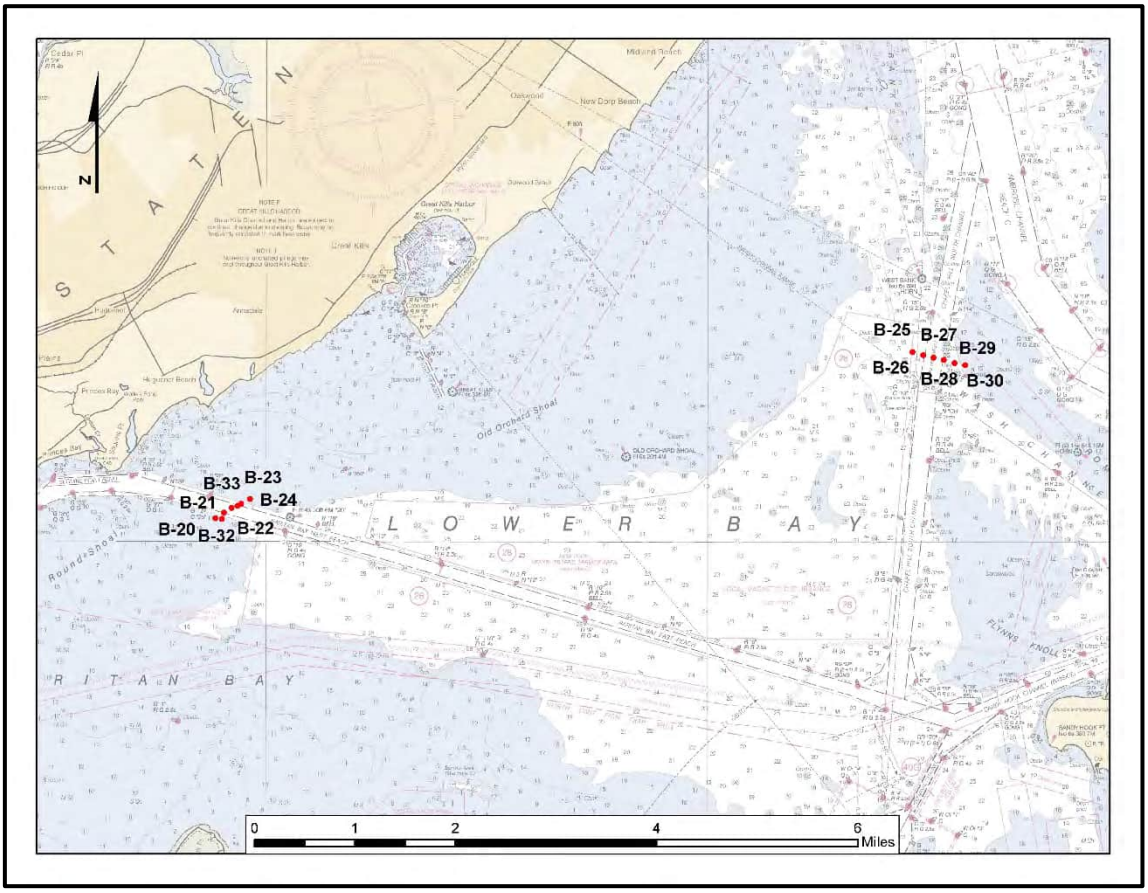


Figure 1.1 Bore Location Map

1.4 Time Breakdown - NESE Boring Program

Table 1.3 Time Breakdown Marine Boring Program

Activity	Project Hours	Percentage of Total
Mobilization / Demobilization	22:00	6.11%
Operational	286:00	79.44%
Weather Standby	22:30	6.25%
Standby on Client	9:30	2.64%
Survey Downtime	20:00	5.56%
Total	**360:00**	**100.00%**

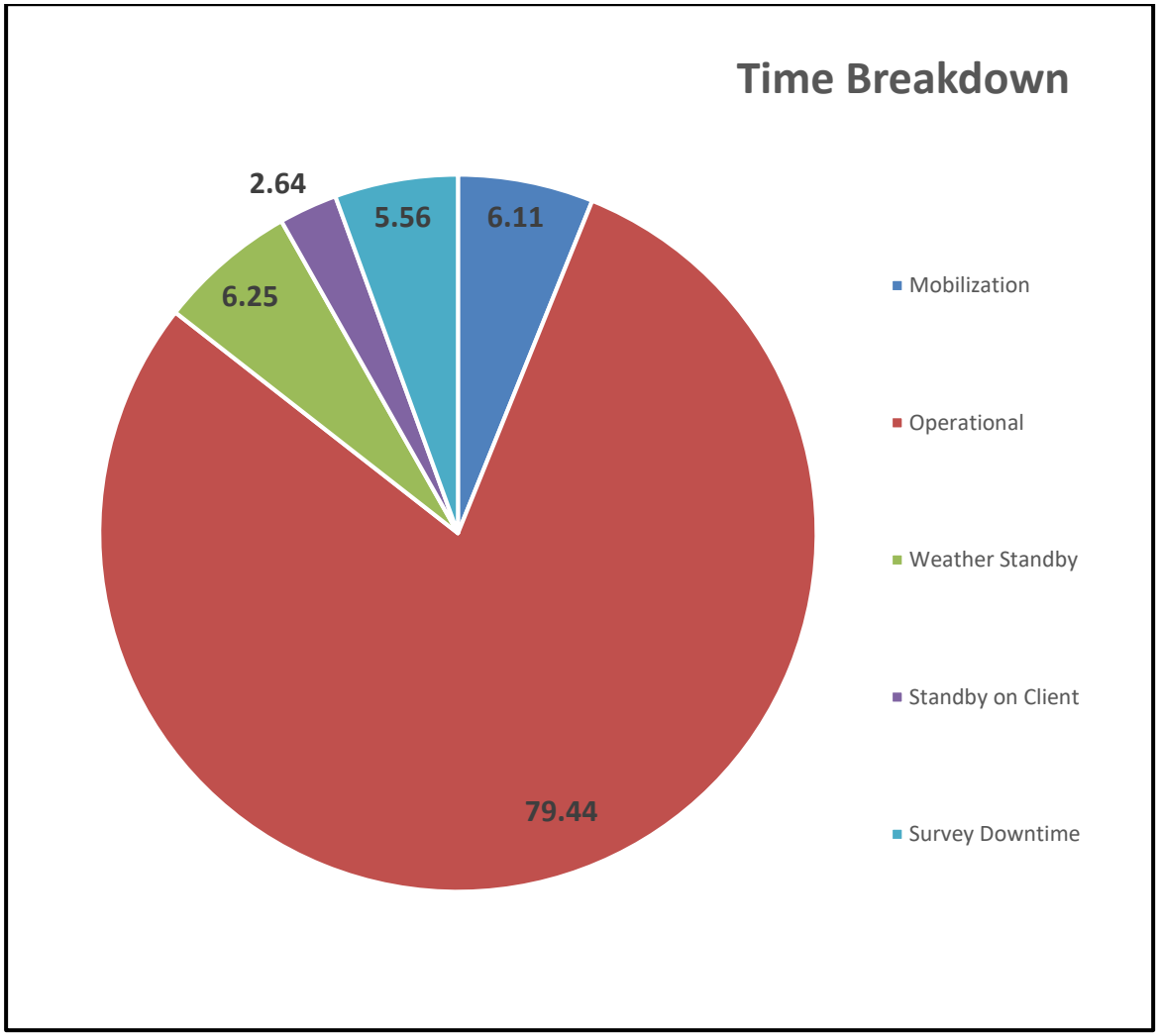


Figure 1.2 Time Breakdown NESE Marine Boring Program

2. VESSEL SUMMARY

The LB *Vision* was used to conduct all project operations during the NESE boring campaign. The LB *Vision* can be seen in Figure 2.1, with the drill rig mounted on the bow of the vessel and secured over a moon pool. The vessel contains two moon-pools on the front deck which can be used for drilling operations. The drill rig is chained and secured during any vessel movement but can be moved to either moon-pool once the vessel is stable. The liftboat utilizes three 95 ft. spuds to stabilize the vessel and lift it above the water surface for drilling operations. A total of four vessel personnel lived aboard the liftboat, 2 captains and 2 deckhands, during operations. The LB *Vision* has a 10 T crane available for any lifting operations necessary throughout the project. Additional specifications about the LB *Vision* can be seen in Table 2.1.



Figure 2.1 Vessel LB *Vision*

Table 2.1 Vessel Specifications

Specifications of LB *Vision*	
Vessel Type	Lift Boat, CL 105
Documentation	626734
Tonnage	Under 100 t
Length, overall	70 ft
Beam	39 ft
Draft	3.5 ft
Main Engines	2 x John Deere 6125 AFM – 400 HP
Generator	2 x John Deere – 40 Kw
Fuel capacity	1700g
Electronics	Furuno Radar, Hemisphere Sat. Compass, GPS Navigator, 3 x Echo sounders, Tilt Alarm, 3 x VHF, Hailer, Exceeds USCG Safety requirements.
Special features	Accommodation for 8, Self-Elevation – 95ft legs, 10t Crane, Drill Pad – 24 x 36 ft & 2 x 10” Drill holes. Billy Pugh Man Lift, Life Raft

3. SAFETY

Safety standards and procedures on board the LB *Vision* adhere to company policy which operates under the guidance of Alpine's Health and Safety Manual for Marine Operations and is administered by the companys Health and Safety Officer and Northstar Marine. The LB *Vision* is also a USCG inspected vessel. To maintain these standards every crew member was given a safety induction upon joining the vessel and regular toolbox meetings were also conducted prior to back deck operations and any new procedure as well as boat to boat transfers when going from the crew boat to the LB *Vision*.

Prior to the start of the NESE Boring Program survey operations onboard the LB *Vision* an "All Hands" safety induction of all vessel and scientific crew was carried out by Alpine's HSE Manager, Williams' HSE representative and the Vessel Master.

Throughout the entire boring campaign, a total of 77 toolbox meetings were completed and 10 safety observation cards were filled out.

3.1 Exposure Hours

The survey and marine crew totaled 17 persons throughout the boring campaign for both shifts, including Williams Company representatives. The total number of exposure hours from onsite mobilization on 11 January-2018 until survey completion on 27 January-2018 was 5,856, during which there were no lost time incidents, no medical/first aid case, no injurious incidents, and no occurrences that resulted in damage to the environment. One hazardous occurrence was observed when the drill rig was unattended during a vessel jack up operation causing the drill casing to be pushed further in to the seafloor by the vessel.

4. CREW LIST

The following personnel were present on board the survey vessel during mobilization and boring operations in Raritan Bay and Chapel Hill Channel.

Table 4.1 Field Personnel

Alpine Geologists		**Shift**	
Field Project Manager / Geologist	Dan Whitesell	1st Shift	06:00 – 18:00
Geologist	Jeff Motti	2nd Shift	18:00 – 06:00
Geotechnical Engineer	Vishal Dantal	1st Shift	06:00 – 18:00
Geotechnical Engineer	Marcus Rasulo	2nd Shift	18:00 – 06:00
Vessel Crew		**Shift**	
Vessel Master	Gary Raffaele	1st Shift	06:00 – 18:00
Watch Capt.	Frank Callio	2nd Shift	18:00 – 06:00
Deckhand	Steve Cummings	1st Shift	06:00 – 18:00
Deckhand	Manuel Vicanos	2nd Shift	18:00 – 06:00
Drilling Team		**Shift**	
ADT Senior Driller	Chris Chaillou	1st Shift	06:00 – 18:00
ADT Helper	Nick Brinson	1st Shift	06:00 – 18:00
ADT Driller	Nick Marmolejo	2nd Shift	18:00 – 06:00
ADT Helper	Scott O'Dwyer	2nd Shift	18:00 – 06:00
CPT Team		**Shift**	
Conetec CPT Engineer	Gary Bryla	1st Shift	06:00 – 18:00
Conetec CPT Engineer	Mark Murdock	2nd Shift	18:00 – 06:00
Client Representatives			
Williams	Alvin hebert	1st Shift	06:00 – 18:00
INTECSEA	Bernard Remmes	1st Shift	06:00 – 18:00
Lake Superior Consulting	Tim Lustig	2nd Shift	18:00 – 06:00
Williams MMO	Carol Hough	1st Shift	06:00 – 18:00

5. SAMPLING EQUIPMENT AND METHODS

5.1 General

The Geotechnical Survey consisted of a performing rotary borings and CPTs at proposed sites near the Raritan Bay and Chapel Hill Channel crossings. A total of 13 borings were conducted, penetrating between 72 to 112 feet BML, depending on the geology at each site. A CPT was performed at 10 of the 13 boring sites and at two additional sites between B-23 and B-34 as well as at B-31 and B-34 where no borings were conducted.

All sediment samples at each interval were examined, photographed and recorded by an Alpine geologist and a geotechnical engineer from NGI. Once examined and secured, the samples were delivered via courier to Alpine's storage facility and further delivered to NGI in Houston, TX for final sample analysis.

The following section of this report describes the sampling equipment used and the sampling procedures followed throughout the boring project.

5.2 GPS Navigation Installation, Testing, and Configuration

GPS positioning was obtained using a C-Nav 3050 DGPS antenna with RTK corrections. The RTK corrections were obtained using Cellular Service Broadcast from the New York State Department of Transportation (NYSNet). A secondary DGPS system, the Hemisphere V113 antenna, was used for vessel heading and backup DGPS solution.

Both navigation systems were installed on the roof of the pilot house of the LB *Vision* and interfaced with the onboard navigation computer. The navigation computer was equipped with Hypack navigation software which continuously provides vessel location and heading to the LB *Vision* captains.

The vessel shape and the offset from the navigation antenna to both moon-pools were shot as nodes with a Hemisphere 321 system and entered in to Hypack to provide an accurate representation of the vessel setup. Using the accurate boat shape, the Captain was able to maneuver the vessel to each proposed borehole location and place the moon-pool over the site using the Hypack software. Once on site and settled, targets could be taken in Hypack at the measured moon-pool node to give accurate GPS location of the actual bore site.

A navigation check was done dockside during mobilization, comparing two separate GPS systems to ensure accurate readings on board the vessel. Table 5.1 shows the results from the navigation check, with the RTK GPS observed coordinates compared with the known. The grid coordinates are in State Plane, NAD83, New York Long Island, US Survey Feet.

Table 5.1 Navigation Check Results

Navigation Check Results State Plane LI US ft.			
	Known	Observed	Δ
Easting	966343.89	966343.78	0.11
Northing	164179.98	164180.47	-0.49

5.3 Project Survey Parameters

Table 5.2 Project Geodetic Parameters

Project Geodesy Geodetic Parameters	
Spheroid	NAD83
Datum	NAD83
Semi-major Axis	6,378,137.00000 m
Semi-Minor Axis	6,356,752.31414 m
Inverse Flattening	298.257222101
Projection Parameters	
Projection	State Plane Coordinate System
Grid	New York Long Island (FIPS 3104)
First Standard Parallel	40.66667° N
Second Standard Parallel	41.03333° N
Central Meridian	74° W
Origin Latitude	40.16667° N
False Northing	0 ft
False Easting	984,250 ft
Scale factor on CM	1
Unit of Measurement	US Survey Feet

5.3.1 Survey Units

All units, measurements, and depths were made in feet throughout the entirety of the boring campaign.

5.3.2 Vertical Datum

The vertical datum for the boring project is MLLW (NAD83). Recorded depths at each site were corrected to MLLW using the NOAA preliminary recorded tides at Sandy Hook, NJ (Station 8531680).

5.4 Sampling Equipment and Collection Methods

5.4.1 Vessel Layout

The LB *Vision* provided the stable platform required to conduct rotary borings in a marine environment. The Lift Boat's front deck was dedicated to a CME-55 Tracked Boring Unit which was installed over the aft moon pool during boring operations and then moved back and secured in a rearward position during transit. A general layout of the LB *Vision* can be seen in Figure 5.1.

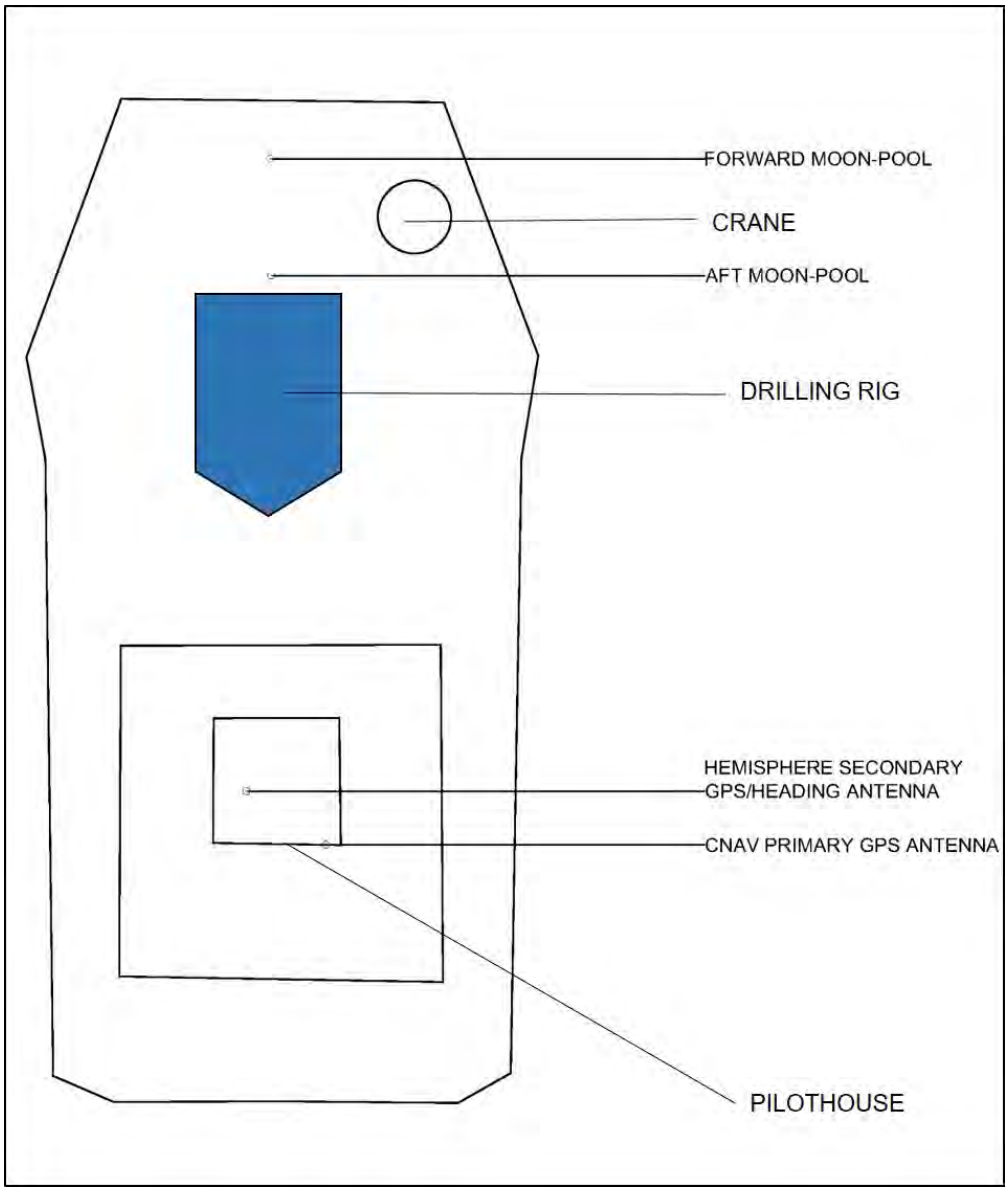


Figure 5.1 Vessel layout of LB *Vision*

5.4.2 CME-55 Track Carrier Auger Drill (Boring Unit)

A CME-55 Track Carrier Auger Drill (Figure 5.2), or boring unit, was used to collect the rotary bores for this project. The CME-55 boring system provides 7,700 foot pounds of torque and a rotary speed of up to 800 rpm. The 140 pound automatic hammer provides extremely consistent and accurate blows meeting all ASTM-D-1586 requirements.



Figure 5.2 Photo of CME-55 Drill Rig Used During Boring Operations

5.4.4 Cone Penetration Testing (CPT) Rod and Sensor.

The CPT system used during this project is a proprietary drill assisted CPT probe (Figure 5.3) that meets ASTM D 5778-12. Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils and ISSMGE (1999, corrected 2001) International Reference Test Procedure for the Cone Penetration Test (PCPT). The drill assisted probe was provided by ConeTec to acquire data on sediment strength at each boring site.

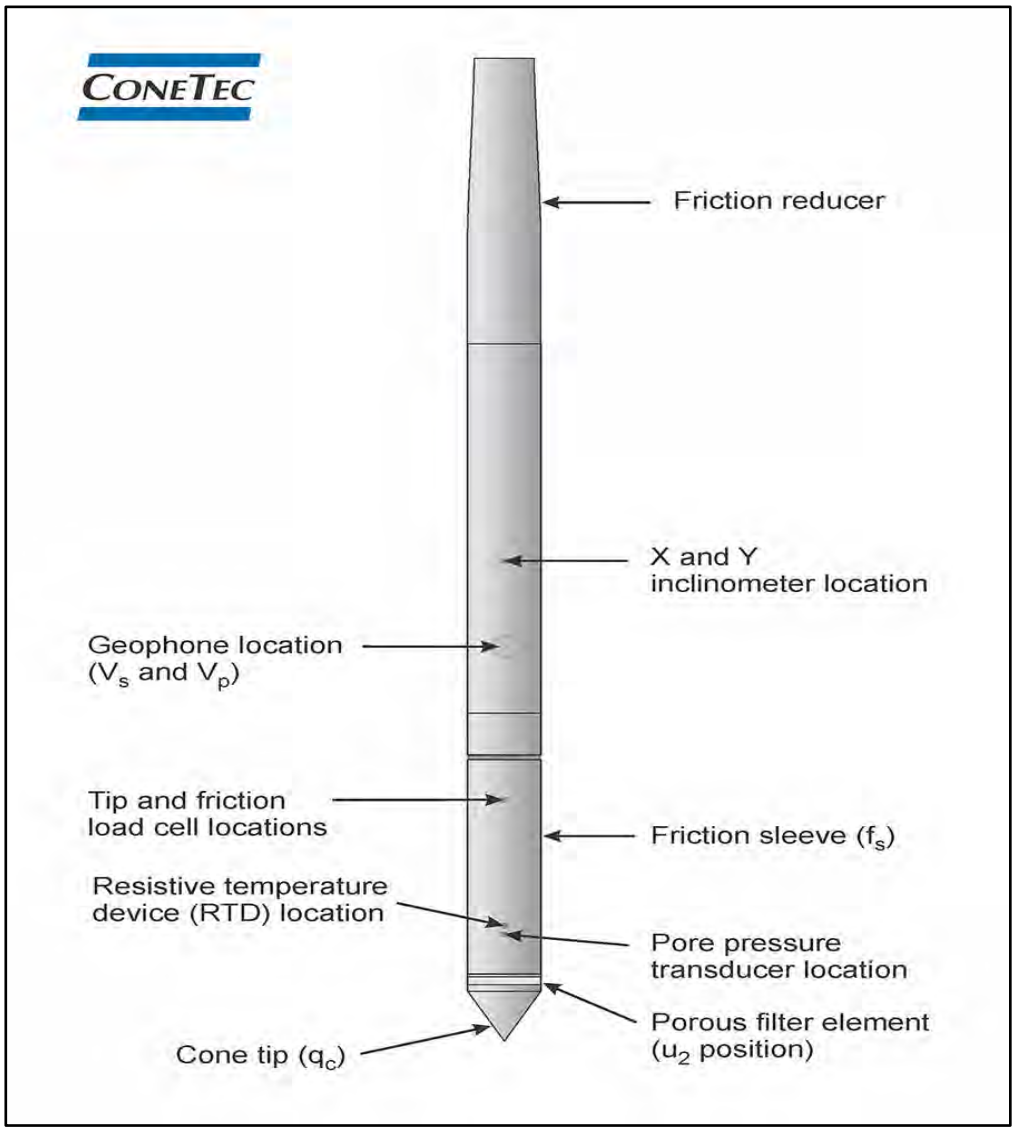


Figure 5.3 Illustration of drill rig assisted CPT probe used on the project

5.4.5 Drilling and Sampling Procedures

At each bore site the Hypack navigation software was used to position the LB *Vision* as close to the proposed bore location as possible. When the LB *Vision* was on station, the vessel would jack up using the vessel's spuds to stabilize the vessel position. Once stabilized, the position of the moon pool was recorded and a target was taken of the actual bore site using the RTK GPS system. The actual positions of all bore sites compared to the proposed sites can be seen in Appendix B. After the vessel is settled and an accurate target for the bore location is taken, the CME-55 drilling rig was moved into position over the moon pool to begin drilling operations and sediment sample collection.

Before all bore sites, a boring plan was written out, discussed and signed by the Alpine geologist, the drillers and the onboard representative from INTECSEA or LSC. Specific sediment sampling intervals were determined by the onboard INTECSEA representative and agreed upon by the Alpine geologist. A majority of the samples were collected using continuous sampling to a certain depth followed by sampling

at five foot intervals. The additional two holes (B-32 and B-32) near Raritan Bay Channel were bored straight to a certain depth and then nominal two foot sampling began based on CPT data acquired previously. Changes and variations to the sampling were made onsite based on the variations in the stratigraphy in each boring, with onboard decisions made between the HDD design team, the Alpine Geologist, and Williams' onboard representatives.

In order to begin boring or CPT operations, the drillers would set casing in to the seafloor surface. The purpose of installing the casing vertically and even is to avoid binding of the drill rods and sampler on the outside of the casing. The drillers had 6" casing available onboard but due to low currents and shallower water depths a 4" casing was used throughout the project.

After the casing was set, the drill assisted CPT probe was installed on the rig and a CPT was conducted at the site. The CPT probe was calibrated and controlled by the onboard CPT representative from ConeTec and pushed to refusal using the drill rig. After hitting refusal, the CPT probe and drill pipe was recovered and the casing removed. After the casing was free and the rig secured, the vessel would swing way from the CPT site to conduct a boring on an area of undisturbed seafloor.

Once the vessel was settled at the boring site, casing was again installed and a sample at the seafloor could be taken. Once the first sample was retrieved, the casing was then advanced to the top of the next sampling interval and the sediments washed out. Once clean, sampling was conducted at the next sample interval. Blow counts were recorded for each six inch interval. This procedure continued as the drillers advanced down the bore at the specified intervals determined in the boring plan.

Sediment samples were collected using either a split spoon sampler, a split spoon liner or a Shelby Tube depending on the sediments encountered. The split spoon was advanced using an auto-hammer which lifted a 140 lb. hammer 30 inches and dropped it onto the top of the drill string. The sampler was normally advanced at least 24 inches during each sampling interval. If a Shelby tube sampler was being used, the sampler was attached to the bottom of the drill string and the hydraulic power of the drill rig was used to push the sampler into the sediments. If Shelby tubes came up with no recovery, four small 6" liners were loaded in to the split spoon to tray and collect the sample.

When a split spoon sample was collected at a section along the bore, a photo was taken of the sample and blow counts, recovery length, sample interval and sediment description were all recorded by the Alpine geologist. All split spoon samples were then stored in plastic ziplock bags, and were labelled with the bore number, sample section number, sample interval relative to depth below sediment surface and date. Samples obtained by Shelby Tube were left in the tube and marked with the bore number, sample interval, date, section number and top or bottom on the tube caps. Photos of the caps and the end of the sample were taken and stored for analysis.

Once the required depth below sea floor had been reached for a given site, and approval obtained from the Williams representative, the drill stem and casing were recovered, and any drilling muds generated at the site were placed in storage drums onboard for later transport and disposal. Once the casing was

completely recovered and stored, the drill rig was secured and the lift boat lowered to the water for movement to the next drilling site.

All Shelby Tubes, split spoon liners and split spoon bag samples to be analyzed were removed from the liftboat daily and taken via courier to Alpine's warehouse. From there they were shipped to NGI for laboratory analysis.

6. POST SAMPLING RECORDS AND LAB PROCESSING

6.1 Sediment Sample Processing

All samples selected by Williams and Lake Superior Consulting for submittal to the geotechnical laboratory were forwarded to NGI, the project geotechnical laboratory. All samples were accompanied by a chain of custody form which specifically listed the analyses to be performed on each sample. Test assignments for each sample delivered to NGI will be generated by INTECSEA and LSC representatives based on data collected in the field.

All laboratory analysis results will be included in a separate technical report.

6.2 Bore Logs

The sample descriptions recorded on the boring logs will be used to generate a GINT form boring log for each bore site. The log includes the blow counts for each sample interval, the depth range for each sample, and the type of sample collected. The bore log also includes the name and location of the boring as determined by RTK GPS targets taken in Hypack navigation software. The preliminary, hand written boring logs can be seen in Appendix C. The final log form will include a cross reference to the actual laboratory results. The field descriptions of the sediment type may be modified to reflect the nomenclature generated by the laboratory.

APPENDICES

APPENDIX A NESE Boring Program Daily Progress Reports

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**12 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**1**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **Reynolds Shipyard** Latitude: **40°37'2.25"N** Longitude: **74° 3'53.12"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00						PC	Harbor conditions
14:00						FOG	Dense Fog
22:00							Dense Fog
06:00						PC	Harbor conditions

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
2nd Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		Analog Eng.	

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
Client Rep.		Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	**4**	CLIENT:	**3**	VESSEL:	**3**	DRILLERS:	**4**	**TOTAL 14**

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS				
Navigation Computer Running Hypack				

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY: INSERT A ROW

From	To	hrs	Code	
6:00	12:00	6:00	M	Start of 24-hour reporting period. 1st Shift begins, 1/12/18 06:00 - Mobilization
12:00	14:00	2:00	M	Project Kickoff Meeting
14:00				Project is Active As of Completion of Kickoff Meeting
14:00	18:00	4:00	W	On Weather due to restricted visability from fog and drifting sea ice.
				All shifts sent home. 1st shift is to arrive in the morning by 06:00am.
18:00	0:00	6:00	W	L/B Vision at Reynolds waiting for conditions to improve
0:00	6:00	6:00	W	L/B Vision at Reynolds waiting for conditions to improve
				End of 24-hour reporting period

EE.	PROJECT DATA:						
E1.	**Time Summary:**						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M			8:00	8:00		33.33
Transit	T						
Calibrations	C						
Operational	O						
Weather Standby	W			16:00	16:00		66.67
Standby on Client	S						
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD						
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL		24:00	24:00		**100.00%**

Hrs. of Daily Operations **24** **Cumulative Hours Check Value=** **24.00**

E2.	**Survey Progress:**						INSERT A ROW
Description	Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs	5.00	Raritan	5.00				
Bores Only	6.00	Chapel Hill	6.00				
TOTALS:	11.00		11.00				

FF.	**SAFETY** (Details & Figures for Vessel and Survey Crews and Client Representatives)				
	Incidents & Drills	Previous Events	Today's Events	Events To Date	
	Project & HSE Briefings		1	1	Project Kickoff Meeting
	Ships Drill, MOB, Fire & Abandon Ship				
	Vessel guided tour		1	1	Show Ops Team the boat
	Medical Treatment / First Aid Cases				
	Tool Box Meetings				
	Incident Reports				
	Near Miss Reports				
	Savety Observation Card (SOB)				
	Observation Card				
	-				
	No. of survey Man-Hours worked since start of project or LTI.		**336:00**	**336:00**	

GG.	**VESSEL ROB's at 24:00hrs**		
	Fuel (T)	Lube Oil (L)	Water (T)
Start of Project			
ROB at 00:00 hrs			
Consumed Today			
Received today			
ROB at 24:00 hrs			

HH. EXPECTED WEATHER NEXT 24 HRS:

Saturday, partly sunny with gusty winds. Saturday night low 11 degrees with deminishing winds waves 2 to 3 feet.

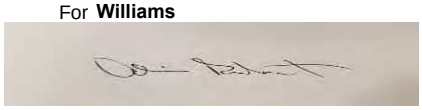
II. ANTICIPATED PROGRAM NEXT 24 HRS:

Transit to Bore B-30 to start operations

JJ. PARTY CHIEF'S COMMENTS: (Optional)

Kickoff meeting complete.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**12 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**001**
		Project:	**2018 Boring/CPT Campaign**		

FIELD NOTES

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**12 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**1**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EDT*** *(GMT -* ***5:00*** *hrs)*

VESSEL LOCATION:

Description: **Reynolds Shipyard**	Latitude: **40°37'2.25"N**	Longitude: **74° 3'53.12"W**

REPRESENTATIVE'S COMMENTS:

The project kickoff meeting was conducted on Friday 1/12/2018 from 12:00 to 14:00 onboard the L/B Vision.
The following personnel attended:

Person	Company
Jack Walden	Alpine
Daniel Whitesell	Alpine
Steve Cummings	Northstar
Mary Eaton	Alpine
Jeff Motti	Alpine
Herman Bechtler	Northstar
Paul Leigh	Williams
Bernie Remmes	INTECSEA
Tim Lustig	LSC
Nick Brinson	ADT
Chris Chaillou	ADT
Gary Bryla	Contec
Rick Pope	Conetec
Chris Martinez	Williams
Alvin Albert	Williams
Ken Johnson	Williams
Marcus Rasulo	NGI
Vishal Dantal	NGI
Scott O'Dwyer	ADT
Nicholas Marmolejo	ADT
Carol Hough	Compass Offshore
Eric Wollet	Contec
Rich Gregory	ADT
Frank Callio	Northstar
Gary Raffaele	Northstar

For ALPINE		For
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**13 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**2**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-30** Latitude: **40.5255°N** Longitude: **74.0347°W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	29.54	16	SSW	2-3	10	broken clouds	Fog lifted at 4:11am, air temp 57F
14:00	29.72	18	NW	2-3	10	Sunny	
22:00	29.30	20	NW	2-3			
06:00	30.59	12	NNW	2			

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		Analog Eng.	

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
Client Rep.		Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	4	CLIENT:	3	VESSEL:	3	DRILLERS:	4	**TOTAL 14**

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS

Navigation Computer Running Hypack

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	8:00	2:00	W	Team on beach, undergoing vessel-to-vessel traing (2 hours Standby on 1st Shift)
8:00	9:40	1:40	O	L/B Vision departs for site B-30
9:40	10:35	0:55	O	Vessel Jacking up
10:35	12:30	1:55	O	Toolbox;Lead lines;Driller prep;Boring plan
12:30	18:00	5:30	O	Boring operations; cleanup; shift handover
18:00	19:00	1:00	O	Toolbox;Lead lines;Driller prep;Boring plan
19:00	0:15	5:15	O	Boring operations
0:15	1:30	1:15	O	Frozen water hoses; Unblocked to continue ops
1:30	4:35	3:05	O	Boring operations; Bore B-30 complete
4:35	6:00	1:25	O	Frozen water hoses; Thawed to continue ops; end 2nd shift

EE.	PROJECT DATA:						
E1.	**Time Summary:**						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		16.67
Transit	T						
Calibrations	C						
Operational	O			22:00	22:00		45.83
Weather Standby	W		16:00	2:00	18:00		37.50
Standby on Client	S						
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD						
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	24:00	24:00	48:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** **48.00**

E2.	**Survey Progress:**							
Description		Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs		5.00	Raritan	5.00				
Bores Only		6.00	Chapel Hill	6.00				
	TOTALS:	11.00	**TOTAL**	11.00				

FF.	**SAFETY** (Details & Figures for Vessel and Survey Crews and Client Representatives)				
	Incidents & Drills	Previous Events	Today's Events	Events To Date	
	Project & HSE Briefings	1	2	3	V-to-V Transfers
	Ships Drill, MOB, Fire & Abandon Ship				
	Vessel guided tour	1	1	2	
	Medical Treatment / First Aid Cases				
	Tool Box Meetings		6	6	start of drilling
	Incident Reports				
	Near Miss Reports				
	Savety Observation Card (SOB)				
	Observation Card				
	-				
	No. of survey Man-Hours worked since start of project or LTI.	336:00	**336:00**	**672:00**	

GG.	**VESSEL ROB's at 24:00hrs**		
	Fuel (T)	Lube Oil (L)	Water (T)
ROB at 00:00 hrs			
Consumed Today			
Received today			
ROB at 24:00 hrs			

HH. EXPECTED WEATHER NEXT 24 HRS:

N winds 10 to 15 kt. Waves 1 to 2 ft. Temperatures in low teens and lower with wind chill.

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Vessel will move to site B-25 and begin drilling operations

JJ. PARTY CHIEF'S COMMENTS: (Optional)

Site B-30 completed

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**13 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**002**
		Project:	**2018 Boring/CPT Campaign**		

FIELD NOTES

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**13 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**2**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

VESSEL LOCATION:

Description: **B-30** Latitude: **40.5255°N** Longitude: **74.0347°W**

REPRESENTATIVE'S COMMENTS:

Mon	NE winds around 10 kt. Waves 1 ft or less.
Tue	SE winds 5 to 10 kt, becoming SW in the afternoon. Waves 1 ft or less
Wed	NW winds 10 to 15 kt. Waves 1 to 2 ft. Chance of snow. vsby 1 to 3 nm.
Thurs	NW winds around 15 kt. Waves around 2 ft.

4:45	6:00	First Shift travel to Reynolds Marina
6:00	8:00	Crew boat inspection, safety meeting, toolbox talks
8:00	9:40	Transit LB Vision to site B-30
9:40	10:35	Vessel lift complete, on-site B-30
10:35	10:50	Toolbox meeting
10:50	11:05	Pb line Wd=18.1' at 11:05
11:05	12:20	Drilling prep, drilling checklist
12:20	12:30	boring plan meeting
12:30	17:30	Drilling ops on site B-30
17:30	18:00	Clean and prep for 2nd shift, 2nd shift arrives
18:00	19:00	2nd shift vessel induction, toolbox, drill inspection, review evening ops.
19:00	19:30	Recover sample 35-37', dark gray, silty fine sand
19:30	20:00	Auto hammer frozen successful fix continue ops
20:00	20:15	Recover sample 40-42', dark gray, silty fine sand
20:15	20:25	Hammer frozen again
20:25	20:45	Recover sample 45-47', dark gray, silty fine sand
20:45	21:00	Added 1 section of 5' casing
21:00	22:00	Recover sample 50-52', dark gray, organic silt and fine sand, trace coarse sand, trace shell frags
22:00	22:30	Set TUBE for sample 52-54' let set for 15 min
22:30	23:00	No recovery for sample 52-54' TUBE, will use SS for same interval
23:00	23:30	Recover sample 52-54', dark gray, clayey silt and trace fine sand, shell frags present
23:30	23:50	Recover sample 55-57', dark brown, fine to medium sand, trace fine gravel
23:50	0:15	Recover sample 60-62', dark gray, fine to medium sand
0:15	1:00	Water pump hose frozen, winterize drill. Caused by low air and water temperature.
1:00	1:30	Water hose operational, Recover sample 65-67', dark gray, medium to coarse sand, trace gravel and fine sand
1:30	2:10	Recover sample 70-72', dark gray, fine to medium sand
2:10	2:30	Recover sample 75-77', dark gray, fine to medium sand, trace coarse sand
2:30	3:20	Recover sample 80-82', dark gray, 80.0-80.7' fine to medium sand with medium gravel 80.7-82.0' fine sand
3:20	3:50	Recover sample 85-87', dark gray, fine sand. Begin recovery of rod and casing. Site complete.

For ALPINE		For
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**14 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**3**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description:	**Site B-25**	Latitude:	40° 31' 38.58	Longitude:	74° 02' 40.71	

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.59	14	NE	2	10	clear	
14:00	30.48	15	NNE	1-2	10		
22:00	30.45	18	NE	1-2			
06:00	30.39	16	ENE	43102	10		

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal	
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo	
Surveyor:		Analog Eng.		

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	4	CLIENT:	4	VESSEL:	3	DRILLERS:	4	**TOTAL 15**

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS				
Navigation Computer Running Hypack				

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	**On Vessel**
Personnel:	**Personnel:** **Carol Hough**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	7:00	1:00	O	Crew transfer; Moved vessel to Site B-25
7:00	9:15	2:15	O	Measure downs; drilling rig preperation; boring plan
9:15	17:15	8:00	O	Drilling operations site B-25
17:15	18:00	0:45	O	Drilling operations complete for 1st shift; end at 67 ft.; cleanup and prep for handover
18:00	18:15	0:15	O	Handover and shift change; drill inspection
18:15	20:30	2:15	O	Drilling operations continue at B-25
20:30	23:00	2:30	O	Site B-25 completed; Vessel moved to Site B-29; Measure downs
23:00	5:00	6:00	O	Drilling operations at Site B-29
5:00	6:00	1:00	O	Drilling ops complete for 2nd shift; cleanup and prep for crew change

EE.	PROJECT DATA:						
E1.	**Time Summary:**						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		11.11
Transit	T						
Calibrations	C						
Operational	O		19:20	24:00	43:20		60.19
Weather Standby	W		20:40		20:40		28.70
Standby on Client	S						
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD						
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	48:00	24:00	72:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** 72.00

E2.	**Survey Progress:**							
Description		Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs		5.00	Raritan	5.00				
Bores Only		4.00	Chapel Hill	6.00	1.00	1.00	2.00	33.33%
	TOTALS:	9.00	**TOTAL**	11.00	1.00	**1.00**	**2.00**	18.18%

FF.	**SAFETY** (Details & Figures for Vessel and Survey Crews and Client Representatives)			
	Incidents & Drills	Previous Events	Today's Events	Events To Date
	Project & HSE Briefings	3		3
	Ships Drill, MOB, Fire & Abandon Ship			
	Vessel guided tour	2	1	3
	Medical Treatment / First Aid Cases			
	Tool Box Meetings	6	7	13
	Incident Reports			
	Near Miss Reports			
	Savety Observation Card (SOB)		3	3
	Observation Card			
	-			
	No. of survey Man-Hours worked since start of project or LTI.	672:00	**360:00**	**1032:00**

GG.	**VESSEL ROB's at 24:00hrs**		
	Fuel (T)	Lube Oil (L)	Water (T)
ROB at 00:00 hrs	3620.00	150.00	1580.00
Consumed Today			
Received today			
ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**

HH. EXPECTED WEATHER NEXT 24 HRS:

Seas 1-2 ft., winds 15-20 kts from the east. Air temperatures 15-20 degrees F

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Continue boring site B-29 and move to site B-26

JJ. PARTY CHIEF'S COMMENTS: (Optional)

During operations between both shifts, the crews were able to complete site B-25 and move on to site B-29. The MMO Carol Hough joined the vessel today and was given a full vessel induction. The second set of samples was handed over to the courier at end of second shift.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**14 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**003**
		Project:	**2018 Boring/CPT Campaign**		

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**15 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**4**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-26** Latitude: **40° 31' 37.25"N** Longitude: **074° 02' 33.59"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.39	13	E	1	10	clear	
14:00	30.41	6	ENE	1-2	10	sunny	
22:00	30.42	8	E	1-2			
06:00	30.46	8	E	1	10	PC	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal	
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo	
Surveyor:		Analog Eng.		

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	**4**	CLIENT:	**4**	VESSEL:	**4**	DRILLERS:	**4**	**TOTAL 16**

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS				
Navigation Computer Running Hypack				

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:** **Manuel V.**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	8:15	2:15	O	1st shift arrives; operations and toolbox meetings; drilling preparation
8:15	13:00	4:45	O	Drilling operations on site B-29 from 42 ft.
13:00	14:15	1:15	O	Site B-29 completed and approved; removed casing from hole
14:15	15:40	1:25	O	Transit to site B-26; jack down vessel; measure downs for water depth
15:40	16:00	0:20	O	prep hole for drilling ops
16:00	17:30	1:30	O	Drilling ops at B-26; stop at 8 ft. for crew change
17:30	18:00	0:30	O	cleanup and await crew transfer
18:00	18:30	0:30	O	crew transfers; slowed down due to icy conditions
18:30	21:05	2:35	SD	drill team unable to make crew boat; drill team diverted to Reynolds for second pickup
21:05	0:35	3:30	O	Drilling operationson site B-26 from 8 ft.
0:35	6:00	5:25	SD	After drilling to 17 ft. worm gear broken on rig pump; standby for repairs

EE.	PROJECT DATA:						
E1.	**Time Summary:**						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		8.33
Transit	T						
Calibrations	C						
Operational	O		43:20	16:00	59:20		61.81
Weather Standby	W		20:40		20:40		21.53
Standby on Client	S						
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD			8:00	8:00		8.33
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	72:00	24:00	96:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** 96.00

E2. Survey Progress:

Description	Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs	5.00	Raritan	5.00				
Bores Only	3.00	Chapel Hill	6.00	2.00	1.00	3.00	50.00%
TOTALS:	8.00	**TOTAL**	11.00	2.00	**1.00**	**3.00**	27.27%

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Project & HSE Briefings	3		3
Ships Drill, MOB, Fire & Abandon Ship			
Vessel guided tour	3		3
Medical Treatment / First Aid Cases			
Tool Box Meetings	13	6	19
Incident Reports			
Near Miss Reports			
Savety Observation Card (SOB)	3		3
Hazardous Occurrence		1	1
-			
No. of survey Man-Hours worked since start of project or LTI.	1032:00	**384:00**	**1416:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (T)	Lube Oil (L)	Water (T)
ROB at 00:00 hrs	3620.00	150.00	1580.00
Consumed Today			
Received today			
ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**

HH. EXPECTED WEATHER NEXT 24 HRS:

Seas 1-2 ft, winds E switching to SE 6-9 kts, air temperatures in the low 30's; some snow or rain expected early Wednesday morning

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Continue at Site B-26 and Move to site B-28

JJ. PARTY CHIEF'S COMMENTS: (Optional)

The boring team finsihed site B-29 and moved to B-26 for the next hole. The 1st shift started hole B-26 and 2nd shift continued to 17 ft. before an ignition switch and rig pump broke at 0035. 2nd shift on standby until replacement parts and repairs can be made. No courier pickup of samples was done today. Hazardous Occurrence is ongoing report related to safety card from previous DPR. 2nd shift drilling team missed vessel transfer due to traffic accident and needed to be picked up at Reynolds Shipyard due to ice at Atlantic highlands.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
Daniel Whitesell		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**15 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**004**
		Project:	**2018 Boring/CPT Campaign**		

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**17 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**5**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-26** Latitude: **40° 31' 37.25"N** Longitude: **074° 02' 33.59"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.46	8	E	1	10	PC	
14:00	NA	NA	NA	NA	NA	NA	No operations
22:00	30.35	12	NNW	2			Rain
06:00	30.34	8	NW	2	1-3	Foggy	Snow and sleet

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		Analog Eng.	

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	4	CLIENT:	4	VESSEL:	4	DRILLERS:	4	**TOTAL 16**

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS

Navigation Computer Running Hypack

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	18:00	12:00	SD	Drill rig needs repairs;Sick drilling crew member, drilling operations on downtime
18:00	1:00	7:00	O	Drilling operations on Site B-26; Hole approved for completion
1:00	3:40	2:40	O	Move vessel to site B-28; trouble getting legs to hold on site; vessel jacked up on site
3:40	4:15	0:35	O	Measure downs; operations meeting
4:15	6:00	1:45	O	Drillers held off from setting the casing too soon before crew change; cleanup and prep

EE.	PROJECT DATA:						
E1.	**Time Summary:**						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		8.33
Transit	T						
Calibrations	C						
Operational	O		43:20	12:00	55:20		57.64
Weather Standby	W		20:40		20:40		21.53
Standby on Client	S						
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD			12:00	12:00		12.50
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	72:00	24:00	96:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** 120.00

E2.	**Survey Progress:**							
Description		Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs		5.00	Raritan	5.00				
Bores Only		2.00	Chapel Hill	6.00	3.00	1.00	4.00	66.67%
	TOTALS:	7.00	**TOTAL**	11.00	2.00	**1.00**	**4.00**	36.36%

FF.	**SAFETY** (Details & Figures for Vessel and Survey Crews and Client Representatives)				
	Incidents & Drills	Previous Events	Today's Events	Events To Date	
	Project & HSE Briefings	3		3	
	Ships Drill, MOB, Fire & Abandon Ship				
	Vessel guided tour	3		3	
	Medical Treatment / First Aid Cases				
	Tool Box Meetings	19	5	24	
	Incident Reports				
	Near Miss Reports				
	Savety Observation Card (SOB)	3	1	4	
	Hazardous Occurrence				
	-				
	No. of survey Man-Hours worked since start of project or LTI.	1032:00	**384:00**	1416:00	

GG.	**VESSEL ROB's at 24:00hrs**		
	Fuel (T)	Lube Oil (L)	Water (T)
ROB at 00:00 hrs	3620.00	150.00	1580.00
Consumed Today			
Received today			
ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**

HH. EXPECTED WEATHER NEXT 24 HRS:

Seas 2 ft.; winds from the W 10-15 kts.Air temperatures in the mid 30's

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Drilling operations on Site B-28; move to B-27 pending allowance by VTS; move to Raritan if B-27 not accessible.

JJ. PARTY CHIEF'S COMMENTS: (Optional)

The drilling rig had a broken pump and ignition switch overnight and a 1st shift driller was sick. With no driller replacement for the 1st shift, the operation went on survey downtime until second shift. During the day, remaining firt shift crew transited to the vessel at 0900 and the senior driller replaced the pump, the ignition switch and a cable. All rig repairs wer finished by 1200 and the crew returned to shore. The 2nd shift team continued drilling operations at 1800 and were able to finish site B-26 and move the vessel to site B-28 and prep for 1st shift to take over. No sample courier was used today as there were fewer samples due to downtime.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
Daniel Whitesell		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**17 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**005**
		Project:	**2018 Boring/CPT Campaign**		

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**17 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**6**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-28** Latitude: **40° 31' 34.57"N** Longitude: **074° 02' 19.28"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.34	8	NW	2	1-3	Foggy	Snow and sleet
14:00	30.32	10	NNW	1	10	cloudy	light snow
22:00	30.32	10	NNW	2			temps below freezing
06:00	30.28	9	NW	2	10	PC	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		Analog Eng.	

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	4	CLIENT:	4	VESSEL:	4	DRILLERS:	4	**TOTAL 16**

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS

Navigation Computer Running Hypack

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	6:30	0:30	O	Stop for safety meeting with all shifts
6:30	8:30	2:00	O	Operations meeting; drill rig checklist; preparation for casing install
8:30	10:15	1:45	O	placed casing; drilling operations on site B-28
10:15	12:05	1:50	W	Stop for weather; snow and impairing drillers vision; waiting for snow to slow down
12:05	17:30	5:25	O	Drilling operations resume on site B-28; took additional sample at 85'-87'
17:30	18:00	0:30	O	Cleanup; await crew change; last spoon left for 2nd shift
18:00	18:45	0:45	O	2nd shift arrives; operations meeting
18:45	19:45	1:00	O	Last sample collected at 87'; site B-27 completed
19:45	21:00	1:15	O	Moved vessel to Site B-27 in the channel
21:00	5:00	8:00	O	Drilling operations on site B-27
5:00	6:00	1:00	O	Site B-27 complete and approved; cleanup and wait for 1st shift

EE. PROJECT DATA:

E1. Time Summary:

Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		8.33
Transit	T						
Calibrations	C						
Operational	O		43:20	22:10	65:30		68.23
Weather Standby	W		20:40	1:50	22:30		23.44
Standby on Client	S						
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD						
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	72:00	24:00	96:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** 144.00

E2. Survey Progress:

Description	Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs	5.00	Raritan	5.00				
Bores Only		Chapel Hill	6.00	4.00	2.00	6.00	100.00%
TOTALS:	5.00	**TOTAL**	11.00	2.00	**2.00**	**6.00**	54.55%

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Project & HSE Briefings	3	1	4
Ships Drill, MOB, Fire & Abandon Ship			
Vessel guided tour	3		3
Medical Treatment / First Aid Cases			
Tool Box Meetings	24	7	31
Incident Reports			
Near Miss Reports			
Savety Observation Card (SOB)	4	2	6
Hazardous Occurrence	1		1
-			
No. of survey Man-Hours worked since start of project or LTI.	1800:00	**384:00**	**2184:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (T)	Lube Oil (L)	Water (T)
ROB at 00:00 hrs	3620.00	150.00	1580.00
Consumed Today			
Received today			
ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**

HH. EXPECTED WEATHER NEXT 24 HRS:

Winds from the west 15 knots; seas 1-2 ft.; air temperature in the high 30's

II. ANTICIPATED PROGRAM NEXT 24 HRS:

CPT operations at 3 sites near Chapel Hill Channel and vessel wil move to Raritan Channel location

JJ. PARTY CHIEF'S COMMENTS: (Optional)

The drill team made very good progress today finishing to boring sites, one on each shift. The team has completed all proposed bore sites at the Chapel Hill channel site. CPT operations at 3 sites chosen by onboard client reps will be conducted on the following shifts before moving to the Raritan Channel location. A stop for safety meeting was given by onboard Alpine PM and was addressed to all operations and vessel crew regarding safety, drill rig incident, equipment stowage and shift handover and recorded as an HSE meeting and toolbox talk. The team contacted VTS and Pilots to confirm a time to conduct boring at site B-22 in Raritan for 1200 on Friday and are awaiting confirmation. The third set of samples were picked up by the courier 0630 17-Jan.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**17 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**006**
		Project:	**2018 Boring/CPT Campaign**		

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**18 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**7**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-20** Latitude: **40° 30' 12.24"N** Longitude: **074° 10' 34.49"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.28	9	NW	2	10	PC	
14:00	30.17	9	NW	1	10	Sunny	
22:00	30.12	14	WNW	2			gusty winds
06:00	30.10	11	W	1	10	PC	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		CPT eng.	Gary Bryla

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	**4**	CLIENT:	**4**	VESSEL:	**4**	DRILLERS:	**4**	**TOTAL 17**
CPT:	1							

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS				
Navigation Computer Running Hypack				

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:** **Gary Bryla**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	8:30	2:30	O	1st shift arrives; vessel induction for CPT crew; operations and drill plan meeting; rig move
8:30	8:45	0:15	O	forward hole on vessel is unsafe; using aft hole; Vessel on CPT-27 site
8:45	10:30	1:45	O	CPT operations site B-27; refusal at 11.1 ft.
10:30	12:00	1:30	O	Moving vessel to site B-29
12:00	14:00	2:00	O	CPT operations on site B-29; refusal @6.7 ft.
14:00	14:40	0:40	O	Move vessel to CPT-25
14:40	16:45	2:05	O	CPT operations on site B-25; refusal @6.8 ft.
16:45	18:40	1:55	O	Move vessel to Site B-20 in Raritan; await crew change
18:40	21:00	2:20	O	Vessel not settling; adjusting vessel for CPT; on site CPT-20
21:00	22:00	1:00	O	Boat settline again; have to recalibrate CPT
22:00	3:45	5:45	O	CPT operations on site B-20
3:45	6:00	2:15	O	Move vessel from CPT hole for drilling ops; boat settling; waiting to set casing for drilling

EE.	PROJECT DATA:						
E1.	**Time Summary:**						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		8.33
Transit	T						
Calibrations	C						
Operational	O		43:20	24:00	67:20		70.14
Weather Standby	W		20:40		20:40		21.53
Standby on Client	S						
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD						
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	72:00	24:00	96:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** **168.00**

E2.	**Survey Progress:**							
Description		Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs		5.00	Raritan	5.00				
Bores Only			Chapel Hill	6.00	6.00		6.00	100.00%
	TOTALS:	5.00	**TOTAL**	11.00	6.00		**6.00**	54.55%

FF.	**SAFETY** (Details & Figures for Vessel and Survey Crews and Client Representatives)				
	Incidents & Drills	Previous Events	Today's Events	Events To Date	
	Project & HSE Briefings	4		4	
	Ships Drill, MOB, Fire & Abandon Ship				
	Vessel guided tour	3	1	4	
	Medical Treatment / First Aid Cases				
	Tool Box Meetings	31	5	36	
	Incident Reports				
	Near Miss Reports				
	Savety Observation Card (SOB)	6	1	7	
	Hazardous Occurrence	1		1	
	-				
	No. of survey Man-Hours worked since start of project or LTI.	2184:00	**408:00**	**2592:00**	

GG.	**VESSEL ROB's at 24:00hrs**			
		Fuel (T)	Lube Oil (L)	Water (T)
	ROB at 00:00 hrs	3620.00	150.00	1580.00
	Consumed Today			
	Received today			
	ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**

HH. EXPECTED WEATHER NEXT 24 HRS:

Winds from the W at 6-8 kts.; seas 1-2 ft.; air temperatures in the mid 30's

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Continue coring operations at site B-20; move to site B-22 pending approval from VTS and Pilots

JJ. PARTY CHIEF'S COMMENTS: (Optional)

The team completed CPT operations at sites B-27, B-29 and B-25 during the day, completing all operations at the Chapel Hill Channel area. The vessel then moved to site B-20 in the Raritan area. The 2nd shift completed a CPT going to 66 ft. and then moved the vessel on to B-20 site for 1st shift arrival. In the Raritan the bottom is soft and the vessel had some difficulty getting settled throughout the night. The crew and drillers monitored the vessel settling while operations were ongoing. The fourth set of samples were picked up by the courier 0630 18-Jan.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
Daniel Whitesell		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**18 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**007**
		Project:	**2018 Boring/CPT Campaign**		

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**19 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**8**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-20** Latitude: **40° 30' 12.24"N** Longitude: **074° 10' 34.49"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.10	11	W	1	10	PC	
14:00	30.08	7	WSW	1	10	Sunny	
22:00	30.06	5	W	1			
06:00	30.05	3	W	1	10	Clear	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		CPT eng.	Gary Bryla

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	**4**	CLIENT:	**4**	VESSEL:	**4**	DRILLERS:	**4**	**TOTAL 17**
CPT:	1							

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS

Navigation Computer Running Hypack

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	7:30	1:30	O	1st shift arrives; waiting for vessel to settle; prep for drilling ops; operations/safety meeting
7:30	8:00	0:30	O	Casing installed; measure down
8:00	17:45	9:45	O	Drilling operations on site B-20; Stopped at 42' with 12 shelby tubes; sample 13 left in
17:45	18:15	0:30	O	Cleanup; await shift change
18:15	18:45	0:30	O	handover; operations meeting; rig inspection
18:45	0:35	5:50	O	Drilling operations on site B-20; site completed and approved
0:35	4:00	3:25	O	vessel jackup; spuds down 30'; difficulty removing spuds
4:00	5:00	1:00	O	Vessel move to site B-24
5:00	6:00	1:00	O	Vessel settling; cleanup and await crew change

EE.	PROJECT DATA:						
E1.	**Time Summary:**						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		4.17
Transit	T						
Calibrations	C						
Operational	O		117:30	24:00	141:30		73.70
Weather Standby	W		22:30		22:30		11.72
Standby on Client	S						
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD		20:00		20:00		10.42
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	168:00	24:00	192:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** 192.00

E2. Survey Progress:

Description	Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs	4.00	Raritan	5.00		1.00	1.00	20.00%
Bores Only		Chapel Hill	6.00	6.00		6.00	100.00%
TOTALS:	4.00	**TOTAL**	11.00	6.00	**1.00**	**7.00**	63.64%

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Project & HSE Briefings	4	1	5
Ships Drill, MOB, Fire & Abandon Ship			
Vessel guided tour	4		4
Medical Treatment / First Aid Cases			
Tool Box Meetings	36	4	40
Incident Reports			
Near Miss Reports			
Savety Observation Card (SOB)	7	1	8
Hazardous Occurrence	1		1
-			
No. of survey Man-Hours worked since start of project or LTI.	2592:00	**408:00**	**3000:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (T)	Lube Oil (L)	Water (T)
ROB at 00:00 hrs	3620.00	150.00	1580.00
Consumed Today			
Received today			
ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**

HH. EXPECTED WEATHER NEXT 24 HRS:

Winds from the W 5-10 kts; Seas less than 1 foot; Air temperatures in the high 40's with wind chills 25-30

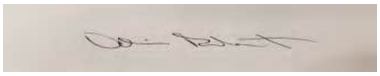
II. ANTICIPATED PROGRAM NEXT 24 HRS:

Continue coring operations at site B-24; move to site B-22 pending approval from VTS and Pilots

JJ. PARTY CHIEF'S COMMENTS: (Optional)

The team completed site B-20 collecting 16 Shelby tubes. The vessel took longer getting the spuds out of the seafloor at this site due to soft seafloor but was able to eventually move to site B-24 and setup for CPT operations for the next shift. The team is still awaiting approveal from VTS and Pilots to conduct operations inside the Raritan Channel at site B-22.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel: **Lift Boat Vision** Project No: **1840 Geotech Borings/CPTs** Date: **19 January 2018**

Client: **Williams** Location: **Raritan & Chapel Hill Channels** Report No. **008**

Project: **2018 Boring/CPT Campaign**

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**20 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**9**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-24** Latitude: **40° 30' 22.45"N** Longitude: **074° 10' 10.84"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.05	3	W	1	10	Clear	
14:00	30.09	25	WNW	2-3	10	Sunny	Gusty winds
22:00	30.10	12	W	2			
06:00	30.10	4	W	1	10	Clear	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		CPT eng.	Gary Bryla

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	**4**	CLIENT:	**4**	VESSEL:	**4**	DRILLERS:	**4**	**TOTAL 17**
CPT:	1							

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS

Navigation Computer Running Hypack

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	8:00	2:00	O	1st shift arrives; operations meeting
8:00	10:45	2:45	O	CPT operations on site B-24
10:45	11:45	1:00	O	Vessel spinning
11:45	12:45	1:00	O	Vessel settling
12:45	17:10	4:25	O	Drilling operations on site B-24
17:10	18:00	0:50	O	Cleanup; left tube in at 20 ft.; awaiting shift
18:00	19:15	1:15	O	Shift change handover; toolbox and rig checks
19:15	2:30	7:15	O	Drilling operations on site B-24
2:30	6:00	3:30	S	Standby awaiting permission from VTS to operate in channel

EE.	PROJECT DATA:						
E1.	**Time Summary:**						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		3.70
Transit	T						
Calibrations	C						
Operational	O		141:30	20:30	162:00		75.00
Weather Standby	W		22:30		22:30		10.42
Standby on Client	S			3:30	3:30		1.62
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD		20:00		20:00		9.26
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	192:00	24:00	216:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** **216.00**

E2.	**Survey Progress:**							
Description		Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs		3.00	Raritan	5.00	1.00	1.00	2.00	40.00%
Bores Only			Chapel Hill	6.00	6.00		6.00	100.00%
	TOTALS:	3.00	**TOTAL**	11.00	6.00	**1.00**	**8.00**	72.73%

FF.	**SAFETY** (Details & Figures for Vessel and Survey Crews and Client Representatives)			
	Incidents & Drills	Previous Events	Today's Events	Events To Date
	Project & HSE Briefings	5		5
	Ships Drill, MOB, Fire & Abandon Ship			
	Vessel guided tour	4		4
	Medical Treatment / First Aid Cases			
	Tool Box Meetings	40	6	46
	Incident Reports			
	Near Miss Reports			
	Savety Observation Card (SOB)	8		8
	Hazardous Occurrence	1		1
	-			
	No. of survey Man-Hours worked since start of project or LTI.	3000:00	**408:00**	**3408:00**

GG.	**VESSEL ROB's at 24:00hrs**			
	Fuel (T)	Lube Oil (L)	Water (T)	
ROB at 00:00 hrs	3620.00	150.00	1580.00	
Consumed Today				
Received today				
ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**	

HH. EXPECTED WEATHER NEXT 24 HRS:

Winds SE 5 kts; seas <1 ft.; Air temperatures in the mid 40's

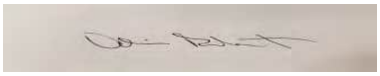
II. ANTICIPATED PROGRAM NEXT 24 HRS:

Drilling operations on B-22

JJ. PARTY CHIEF'S COMMENTS: (Optional)

The drilling team completed site B-24 and are standing by for approval from VTS to operate in the channel on site B-22. Shelby tubes were taken for 10 samples and 8 liner samples were acquired on site B-24. A courier sample pickup was made at 0600.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**20 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**009**
		Project:	**2018 Boring/CPT Campaign**		

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**21 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**10**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-22** Latitude: **40° 30' 22.45"N** Longitude: **074° 10' 10.84"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.10	4	W	1	10	Clear	
14:00	30.08	6	W	<1	10	Sunny	
22:00	30.07	7	SE	1			
06:00	30.04	7	SE	<1	6	fog	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		CPT eng.	Gary Bryla

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	**4**	CLIENT:	**4**	VESSEL:	**4**	DRILLERS:	**4**	**TOTAL 17**
CPT:	1							

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS				
Navigation Computer Running Hypack				

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	8:45	2:45	S	1st shift arrives; standing by for permission to operate in the channel
8:45	11:00	2:15	S	Moving vessel; lifting spuds
11:00	12:00	1:00	S	Standing by for permission to operate in channel
12:00	14:40	2:40	O	Move vessel on to site B-22; CPT operations on site B-22
14:40	15:45	1:05	O	Spinning vessel; Vessel settling
15:45	17:15	1:30	O	Drilling operatons at B-22
17:15	18:00	0:45	O	cleanup and change of shift
18:00	18:45	0:45	O	handover; operations meeting; drill rig check
18:45	1:00	6:15	O	Drilling operations at site B-22
1:00	3:15	2:15	O	Casing broke; recovered and replaced casing
3:15	5:00	1:45	O	Drilling operations at site B-22
5:00	6:00	1:00	O	Cleanup; waiting on shift shift change

EE.	PROJECT DATA:							
E1.	**Time Summary:**							
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		3.33
Transit	T						
Calibrations	C						
Operational	O		162:00	18:00	180:00		75.00
Weather Standby	W		22:30		22:30		9.37
Standby on Client	S		3:30	6:00	9:30		3.96
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD		20:00		20:00		8.33
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	216:00	24:00	240:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** **240.00**

E2.	**Survey Progress:**							
Description		Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs		3.00	Raritan	5.00	2.00		2.00	40.00%
Bores Only			Chapel Hill	6.00	6.00		6.00	100.00%
	TOTALS:	3.00	**TOTAL**	11.00	6.00		**8.00**	72.73%

FF.	**SAFETY** (Details & Figures for Vessel and Survey Crews and Client Representatives)				
	Incidents & Drills	Previous Events	Today's Events	Events To Date	
	Project & HSE Briefings	5		5	
	Ships Drill, MOB, Fire & Abandon Ship		2	2	
	Vessel guided tour	4		4	
	Medical Treatment / First Aid Cases				
	Tool Box Meetings	46	6	52	
	Incident Reports				
	Near Miss Reports				
	Savety Observation Card (SOB)	8		8	
	Hazardous Occurrence	1		1	
	-				
	No. of survey Man-Hours worked since start of project or LTI.	3408:00	**408:00**	**3816:00**	

GG.	**VESSEL ROB's at 24:00hrs**			
	Fuel (T)	Lube Oil (L)	Water (T)	
ROB at 00:00 hrs	3620.00	150.00	1580.00	
Consumed Today				
Received today				
ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**	

HH.	**EXPECTED WEATHER NEXT 24 HRS:**
S winds 15 to 20 kt with gusts up to 25 kt, becoming SW in the afternoon. Waves around 2 ft. Rain showers. Vsby 1 to 3 nm.	

II.	**ANTICIPATED PROGRAM NEXT 24 HRS:**
Operations at B-23 and moving to B-21 after	

JJ.	**PARTY CHIEF'S COMMENTS: (Optional)**
The team had to standby until 1200 awaiting permission from VTS and Pilots to operate in the channel as well as wait on two outbound vessels. CPT and drilling operations commenced at B-22 and carried on through night shift. The drill casing was bent uring night operations and had to be rcovered and replaced. No samples were affected. Site B-23 is the next priority site. Onboard MMO observed one seal greater than 200 meters from the vessel. The seal was seen around the vessel from 1530 to 1715 before leaving the area. It was identified as a Harbor Seal. One sample courier pickup was done at 0600.	

KK.	**REPRESENTATIVE'S COMMENTS: (Optional)**

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**21 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**010**
		Project:	**2018 Boring/CPT Campaign**		

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**22 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**11**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-23** Latitude: **40° 30' 19.90"N** Longitude: **074° 10' 16.75"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.04	7	SE	<1	6	fog	
14:00	30.10	7	SE	1	10	sunny	
22:00	30.12	12	SE	1			
06:00	30.12	10	S	1	1	Fog	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		CPT eng.	Gary Bryla

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	**4**	CLIENT:	**4**	VESSEL:	**4**	DRILLERS:	**4**	**TOTAL 17**
CPT:	1							

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS				
Navigation Computer Running Hypack				

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	7:30	1:30	O	Operations meeting; rig checklist; prep for drilling
7:30	9:00	1:30	O	Drilling operations at site B-22; Drilling ops complete and approved
9:00	10:30	1:30	O	Vessel moving to site B-23
10:30	12:30	2:00	O	CPT operations at site B-23
12:30	13:45	1:15	O	Spinning vessel to drill site
13:45	17:30	3:45	O	Drilling operations at site B-23
17:30	18:00	0:30	O	Cleanup; shift change
18:00	19:00	1:00	O	Operations meeting; rig checklist; prep for drilling
19:00	4:00	9:00	O	Drilling operations at site B-23; Cable snapped needs repair; cleanup; await crew change
4:00	6:00	2:00	O	Cable snapped needs repair; cleanup; await crew change

EE.	PROJECT DATA:						
E1.	**Time Summary:**						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		3.03
Transit	T						
Calibrations	C						
Operational	O		180:00	24:00	204:00		77.27
Weather Standby	W		22:30		22:30		8.52
Standby on Client	S		9:30		9:30		3.60
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD		20:00		20:00		7.58
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	240:00	24:00	264:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** **264.00**

E2.	**Survey Progress:**							
Description		Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs		2.00	Raritan	5.00	2.00	1.00	3.00	60.00%
Bores Only			Chapel Hill	6.00	6.00		6.00	100.00%
	TOTALS:	2.00	**TOTAL**	11.00	6.00	**1.00**	**9.00**	81.82%

FF.	**SAFETY** (Details & Figures for Vessel and Survey Crews and Client Representatives)				
	Incidents & Drills	Previous Events	Today's Events	Events To Date	
	Project & HSE Briefings	5		5	
	Ships Drill, MOB, Fire & Abandon Ship	2		2	
	Vessel guided tour	4		4	
	Medical Treatment / First Aid Cases				
	Tool Box Meetings	52	5	57	
	Incident Reports				
	Near Miss Reports				
	Savety Observation Card (SOB)	8	2	10	
	Hazardous Occurrence	1		1	
	-				
	No. of survey Man-Hours worked since start of project or LTI.	3816:00	**408:00**	**4224:00**	

GG.	**VESSEL ROB's at 24:00hrs**			
	Fuel (T)	Lube Oil (L)	Water (T)	
ROB at 00:00 hrs	3620.00	150.00	1580.00	
Consumed Today				
Received today				
ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**	

HH. EXPECTED WEATHER NEXT 24 HRS:

Winds from the NW 15-20 kts. Seas 2-3 ft. Air temperatures in the mid 40's

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Drilling at location B-21

JJ. PARTY CHIEF'S COMMENTS: (Optional)

The team completed CPT and drilling operations at site B-22 and moved to B-23. Site B-23 is the priority and then the team will move to B-21. Williams has proposed 5 more boring sites near the Raritan Channel and the drilling team will move to those sites pending approval. The onboard MMO had a sighting of 3 seals during the day 100 m from the vessel and Identified them as Harbor Seals. A courier sample pickup was made at 0600.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**22 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**011**
		Project:	**2018 Boring/CPT Campaign**		

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**23 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**12**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-21** Latitude: **40° 30' 14.79"N** Longitude: **074° 10' 28.58"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.12	10	S	1	1	Fog	
14:00	29.61	8	NW	1	8	cloudy	rain
22:00	29.78	9	NW	1			
06:00	29.86	12	NW	1-2	10	clear	

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		CPT eng.	Gary Bryla

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	**4**	CLIENT:	**4**	VESSEL:	**4**	DRILLERS:	**4**	**TOTAL 17**
CPT:	1							

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS				
Navigation Computer Running Hypack				

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	8:00	2:00	O	Crew change; cable fix; operations meeting; rig check
8:00	11:30	3:30	O	Drilling ops on site B-23; Site completed and approved
11:30	13:45	2:15	O	Moving vessel to site B-21
13:45	16:00	2:15	O	CPT operations at site B-21
16:00	17:15	1:15	O	Spinning vessel to bore site
17:15	18:00	0:45	O	Vessel on site for crew change; cleanup; 2nd shift arrives
18:00	19:15	1:15	O	Crew change; operations meeting; rig check
19:15	5:00	9:45	O	Drilling ops on site B-21; stopped at 72 ft.
5:00	6:00	1:00	O	Vessel on site for crew change; cleanup; 1st shift arrives

EE.	PROJECT DATA:						
E1.	**Time Summary:**						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		2.78
Transit	T						
Calibrations	C						
Operational	O		204:00	24:00	228:00		79.17
Weather Standby	W		22:30		22:30		7.81
Standby on Client	S		9:30		9:30		3.30
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD		20:00		20:00		6.94
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	264:00	24:00	288:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** **288.00**

E2.	**Survey Progress:**							
Description		Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs		1.00	Raritan	5.00	3.00	1.00	4.00	80.00%
Bores Only			Chapel Hill	6.00	6.00		6.00	100.00%
Additional Bores		5.00	Raritan	5.00				
Additional CPTs		5.00	Raritan	5.00				
	TOTALS:	11.00	**TOTAL**	21.00	6.00	**1.00**	**10.00**	47.62%

FF.	**SAFETY** (Details & Figures for Vessel and Survey Crews and Client Representatives)				
	Incidents & Drills	Previous Events	Today's Events	Events To Date	
	Project & HSE Briefings	5		5	
	Ships Drill, MOB, Fire & Abandon Ship	2		2	
	Vessel guided tour	4		4	
	Medical Treatment / First Aid Cases				
	Tool Box Meetings	57	5	62	
	Incident Reports				
	Near Miss Reports				
	Savety Observation Card (SOB)	10		10	
	Hazardous Occurrence	1		1	
	-				
	No. of survey Man-Hours worked since start of project or LTI.	4224:00	**408:00**	**4632:00**	

GG.	**VESSEL ROB's at 24:00hrs**			
		Fuel (T)	Lube Oil (L)	Water (T)
	ROB at 00:00 hrs	3620.00	150.00	1580.00
	Consumed Today			
	Received today			
	ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**

HH. EXPECTED WEATHER NEXT 24 HRS:

Winds 10-15 kts from the NW; Seas 1 foot or less; Air temperatures in the mid 30's

II. ANTICIPATED PROGRAM NEXT 24 HRS:

CPT operations on additional boring sites starting at B-34

JJ. PARTY CHIEF'S COMMENTS: (Optional)

The drilling team completed the 10th boring at site B-23. The Vessel moved to the last boring at B-21 and expect to complete the site in the morning of the 24th. There are 5 additional bore sites proposed and the team is awaiting approval from SHPO. Additional sites have been added to the look ahead reports and section E2 of the DPR. CPT operations will be conducted on those sites in the meantime. A sample courier pickup was made at 0600. No CPT was was being conducted at night so night shift CPT worker was held back from the vessel.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**23 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**012**
		Project:	**2018 Boring/CPT Campaign**		

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**24 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**13**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-34** Latitude: **40° 30' 14.79"N** Longitude: **074° 10' 21.34"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	29.86	12	NW	1-2	10	clear	
14:00	29.85	12	NW	2	10		
22:00	30.15	8	W	2			
06:00	30.26	7	W	2	10		

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		CPT eng.	Gary Bryla

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	**4**	CLIENT:	**4**	VESSEL:	**4**	DRILLERS:	**4**	**TOTAL 17**
CPT:	1							

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS

Navigation Computer Running Hypack

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	7:30	1:30	O	Crew change; cable fix; operations meeting; rig check
7:30	11:00	3:30	O	Drilling ops on site B-21; Site completed and approved
11:00	12:30	1:30	O	Moving vessel to site B-34
12:30	15:15	2:45	O	CPT operations at site B-34
15:15	15:45	0:30	O	Mving vessel to site B-32
15:45	17:15	1:30	O	CPT operations at site B-32
17:15	18:00	0:45	O	Cleanup; await crew change
18:00	19:00	1:00	O	Crew change; cable fix; operations meeting; rig check
19:00	21:55	2:55	O	CPT operations at site B-31
21:55	23:55	2:00	O	Moving vessel to site B-33; waiting for channel to clear of traffic
23:55	2:45	2:50	O	CPT ops on B-33
2:45	5:00	2:15	O	Move to site B-32 for drilling ops; Vessel settling
5:00	6:00	1:00	O	Cleanup; await crew change

EE. PROJECT DATA:

E1. Time Summary:

Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		2.56
Transit	T						
Calibrations	C						
Operational	O		228:00	24:00	252:00		80.77
Weather Standby	W		22:30		22:30		7.21
Standby on Client	S		9:30		9:30		3.04
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD		20:00		20:00		6.41
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	288:00	24:00	312:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** 312.00

E2. Survey Progress:

Description	Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs		Raritan	5.00	4.00	1.00	5.00	100.00%
Bores Only		Chapel Hill	6.00	6.00		6.00	100.00%
Additional Bores	5.00	Raritan	5.00				
Additional CPTs	1.00	Raritan	5.00		4.00	4.00	80.00%
TOTALS:	6.00	**TOTAL**	21.00	6.00	**5.00**	**15.00**	71.43%

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Project & HSE Briefings	5		5
Ships Drill, MOB, Fire & Abandon Ship	2		2
Vessel guided tour	4		4
Medical Treatment / First Aid Cases			
Tool Box Meetings	62	5	67
Incident Reports			
Near Miss Reports			
Savety Observation Card (SOB)	10		10
Hazardous Occurrence	1		1
-			
No. of survey Man-Hours worked since start of project or LTI.	4632:00	**408:00**	**5040:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (T)	Lube Oil (L)	Water (T)
ROB at 00:00 hrs	3620.00	150.00	1580.00
Consumed Today			
Received today			
ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**

HH. EXPECTED WEATHER NEXT 24 HRS:

Winds 10-15 kts. From the NW ; Seas 2 ft. Air temperatures in the high 20's

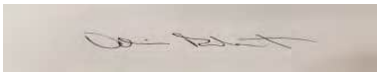
II. ANTICIPATED PROGRAM NEXT 24 HRS:

Drilling operations on site B-32

JJ. PARTY CHIEF'S COMMENTS: (Optional)

The team completed the final bore site of the originally proposed locations. 5 additional sites were added to the plan and CPTs were done at 4 of those additional locations. The drill team wil move on to drilling operations at site B-32 following CPT ops. A courier sample pickup was made at 0600.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel: **Lift Boat Vision** Project No: **1840 Geotech Borings/CPTs** Date: **24 January 2018**

Client: **Williams** Location: **Raritan & Chapel Hill Channels** Report No. **013**

Project: **2018 Boring/CPT Campaign**

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**25 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**14**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **B-33** Latitude: **40° 30' 18.61"N** Longitude: **074° 10' 19.33"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.26	7	W	2	10	sunny	
14:00	30.27	6	WNW	1	10	sunny	
22:00	30.32	4	WNW	1			
06:00	30.33	5	W	1	10		

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		CPT eng.	Gary Bryla

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	**4**	CLIENT:	**4**	VESSEL:	**4**	DRILLERS:	**4**	**TOTAL 17**
CPT:	1							

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS				
Navigation Computer Running Hypack				

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	7:30	1:30	O	Crew change; operations meeting; rig check
7:30	17:15	9:45	O	Drilling ops on site B-32; Site completed and approved
17:15	18:00	0:45	O	Moving vessel to site B-33
18:00	19:00	1:00	O	Crew change; operations meeting; rig check
19:00	3:00	8:00	O	Drilling operations at site B-33
3:00	6:00	3:00	O	jacking up and moving vesel

EE.	PROJECT DATA:						
E1.	**Time Summary:**						
Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00		8:00		2.38
Transit	T						
Calibrations	C						
Operational	O		252:00	24:00	276:00		82.14
Weather Standby	W		22:30		22:30		6.70
Standby on Client	S		9:30		9:30		2.83
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD		20:00		20:00		5.95
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	312:00	24:00	336:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** **336.00**

E2.	**Survey Progress:**							
Description		Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs			Raritan	5.00	5.00		5.00	100.00%
Bores Only			Chapel Hill	6.00	6.00		6.00	100.00%
Additional Bores			Raritan	2.00		2.00	2.00	100.00%
Additional CPTs		2.00	Raritan	6.00	4.00		4.00	66.67%
	TOTALS:	2.00	**TOTAL**	19.00	6.00	**2.00**	**17.00**	89.47%

FF.	**SAFETY** (Details & Figures for Vessel and Survey Crews and Client Representatives)				
	Incidents & Drills	Previous Events	Today's Events	Events To Date	
	Project & HSE Briefings	5		5	
	Ships Drill, MOB, Fire & Abandon Ship	2		2	
	Vessel guided tour	4		4	
	Medical Treatment / First Aid Cases				
	Tool Box Meetings	67	5	72	
	Incident Reports				
	Near Miss Reports				
	Savety Observation Card (SOB)	10		10	
	Hazardous Occurrence	1		1	
	-				
	No. of survey Man-Hours worked since start of project or LTI.	5040:00	**408:00**	**5448:00**	

GG.	**VESSEL ROB's at 24:00hrs**			
		Fuel (T)	Lube Oil (L)	Water (T)
	ROB at 00:00 hrs	3620.00	150.00	1580.00
	Consumed Today			
	Received today			
	ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**

HH.	**EXPECTED WEATHER NEXT 24 HRS:**
winds from the SW 10-15 kts.; Seas 1 foot; air temperatures in the low 40's	

II.	**ANTICIPATED PROGRAM NEXT 24 HRS:**
Finish final two CPT sites and demobilize the vessel	

JJ.	**PARTY CHIEF'S COMMENTS: (Optional)**
The drilling team completed 2 additional bores at site B-32 and B-33. The vessel will conduct 2 additional CPTs before the completion of all operations. The vessel plans to demobilize on Saturday 27-January. No CPT personnel were onboard for day shift during day 14 operations. A sample courier pickup was made at 0600.	

KK.	**REPRESENTATIVE'S COMMENTS: (Optional)**

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**25 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**014**
		Project:	**2018 Boring/CPT Campaign**		

DAILY REPORT

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**
Client:	**Williams**	Todays Date:	**26 January 2018**
Location:	**Raritan & Chapel Hill Channels**	Report No:	**15**
Project:	**2018 Boring/CPT Campaign**	Start Date:	**12 January 2018**

All times are ***EST*** *(GMT -* ***5:00*** *hrs)*

AA. VESSEL LOCATION AT 18:00 HRS:

Description: **Reynolds Shipyard** Latitude: **40°37'2.25"N** Longitude: **74° 3'53.12"W**

BB. WEATHER:

Time (Local)	BAROM in Hg	WIND Speed mph	WIND Dir	WAVE HEIGHT ft	VISIB. nmi	SKY CONDS	REMARKS
06:00	30.33	5	W	1	10		
14:00	30.34	3	W	<1	10	Sunny	
22:00							Harbor Conditions
06:00							Harbor Conditions

CC. PERSONNEL & EQUIPMENT:

C1. Alpine OSS Personnel:

Party Chief:	Dan Whitesell, 1st Shift	Geo QA/QC:	Vishal Dantal
Shift Supervisor:	Jeff Motti, 2nd Shift	Geo QA/QC:	Marcus Rasulo
Surveyor:		CPT eng.	Gary Bryla

C2. Additional Personnel

Vision Crew: Capt Gary Raffaele, Night Capt Frank Callio, Mate Steve Cummings; Mate Manuel V.

1st Shift Drillers - Sr Driller Chris Chaillou, Drill Helper Nick Brinson; 2nd Shift Drillers Nick Marmolejo, Scott O'Dwyer

C3. Client Personnel:

Client Rep.	Alvin Hebert, Williams	Client Rep.	Bernard Remmes, INTECSEA	Client Rep.	Tim Lustig, LSC
MMO	Carol Hough	Client Rep.		Client Rep.	

C4. Personnel On Board:

ALPINE:	**4**	CLIENT:	**4**	VESSEL:	**4**	DRILLERS:	**4**	**TOTAL 17**
CPT:	1							

C5. ALPINE'S Equipment:

RTK system with C-NAV GPS				
Navigation Computer Running Hypack				

C6. Additional Equipment

LB *Vision*

ADT Drill Rig

C7. Project Variations (include notices of changes of personnel / equipment)

Off Vessel	On Vessel
Personnel:	**Personnel:**
Equipment:	**Equipment:**

DD. DIARY OF EVENTS TODAY:

From	To	hrs	Code	
6:00	7:30	1:30	O	Crew change; operations meeting; rig check
7:30	9:45	2:15	O	CPT ops on site CPT-36; Site completed and approved
9:45	11:00	1:15	O	Moving vessel to site CPT-37
11:00	12:40	1:40	O	CPT ops on site CPT-37; Site completed and approved
12:40	14:00	1:20	O	Cleanup; Await crew boat
14:00	16:00	2:00	O	LB vision travels to Reynolds Shipyard for demobilization
16:00	6:00	14:00	M	Demobilization

EE. PROJECT DATA:

E1. Time Summary:

Rate	Code		Previous Hours	Today Hours	Total Hours		Percent of Total
Mobilization	M		8:00	14:00	22:00		6.11
Transit	T						
Calibrations	C						
Operational	O		276:00	10:00	286:00		79.44
Weather Standby	W		22:30		22:30		6.25
Standby on Client	S		9:30		9:30		2.64
Vessel Downtime	VD						
Port Standby	PS						
Survey Downtime	SD		20:00		20:00		5.56
Maintenance time	MT						
Disputed Time	DT						
MMO Shutdown	MMO						
		TOTAL	336:00	24:00	360:00		**100.00%**

Hrs. of Daily Operations 24 **Cumulative Hours Check Value=** 360.00

E2. Survey Progress:

Description	Bores Left	Area	Total Bores	Bores Prev	Today Bores	Bores To Date	% Completed
Bores and CPTs		Raritan	5.00	5.00		5.00	100.00%
Bores Only		Chapel Hill	6.00	6.00		6.00	100.00%
Additional Bores		Raritan	2.00	2.00		2.00	100.00%
Additional CPTs		Raritan	6.00	4.00	2.00	6.00	100.00%
TOTALS:		**TOTAL**	19.00	6.00	**2.00**	**19.00**	100.00%

FF. SAFETY (Details & Figures for Vessel and Survey Crews and Client Representatives)

Incidents & Drills	Previous Events	Today's Events	Events To Date
Project & HSE Briefings	5		5
Ships Drill, MOB, Fire & Abandon Ship	2		2
Vessel guided tour	4		4
Medical Treatment / First Aid Cases			
Tool Box Meetings	72	5	77
Incident Reports			
Near Miss Reports			
Savety Observation Card (SOB)	10		10
Hazardous Occurrence	1		1
-			
No. of survey Man-Hours worked since start of project or LTI.	5448:00	**408:00**	**5856:00**

GG. VESSEL ROB's at 24:00hrs

	Fuel (T)	Lube Oil (L)	Water (T)
ROB at 00:00 hrs	3620.00	150.00	1580.00
Consumed Today			
Received today			
ROB at 24:00 hrs	**3620.00**	**150.00**	**1580.00**

HH. EXPECTED WEATHER NEXT 24 HRS:

Harbor Conditions

II. ANTICIPATED PROGRAM NEXT 24 HRS:

Project completed

JJ. PARTY CHIEF'S COMMENTS: (Optional)

The team completed the final two CPTs at CPT-36 and CPT-37 and returned to Reynolds Shipyard. Demobilization was conducted and the project is complete.

KK. REPRESENTATIVE'S COMMENTS: (Optional)

For ALPINE		For **Williams**
		
Dan Whitesell, 1st Shift (Survey Party Chief)		**Alvin Hebert, Williams** (Client Representative)

Vessel:	**Lift Boat Vision**	Project No:	**1840 Geotech Borings/CPTs**	Date:	**26 January 2018**
Client:	**Williams**	Location:	**Raritan & Chapel Hill Channels**	Report No.	**015**
		Project:	**2018 Boring/CPT Campaign**		

APPENDIX B NESE Final Boring and CPT Locations, Water Depths and Elevations

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT			Geographical Position dd.ddd		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-20	0730 EST 1-19-18	*Proposed*	87.00 ft	*Proposed*	935235.30 ft	122728.30 ft	40.503400315°N	74.176249537°W	21.8 ft	7:30	4.5 ft	-17.3 ft
		Actual	87.00 ft	*Actual*	935228.21 ft	122733.21 ft	40.503413753°N	74.176275068°W				
		Delta	*0.00 ft*	*Delta*	*7.09 ft*	*-4.91 ft*	*-0.000013438°*	*-0.000025531°*				

8.624163728 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-21	1345 EST 1-23-18	*Proposed*	87.00 ft	Proposed	935692.63 ft	122985.74 ft	40.504109343°N	74.174607004°W	36.7 ft	13:45	4.7 ft	-32.0 ft
		Actual	97.00 ft	Actual	935695.00 ft	122990.06 ft	40.504121324°N	74.174598405°W				
		Delta	*10.00 ft*	*Delta*	*-2.37 ft*	*-4.32 ft*	*-0.000011981°*	*0.000008599°*				

4.927402967 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-22	1240 EST 1-21-18	*Proposed*	72.00 ft	Proposed	936150.11 ft	123243.31 ft	40.504818899°N	74.172963719°W	46.8 ft	12:40	3.1 ft	-43.7 ft
		Actual	82.00 ft	Actual	936154.95 ft	123245.09 ft	40.504823838°N	74.172946291°W				
		Delta	*10.00 ft*	*Delta*	*-4.84 ft*	*-1.78 ft*	*-0.000004939°*	*0.000017428°*				

5.156937075 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-23	1450 EST 1-22-18	*Proposed*	87.00 ft	Proposed	936607.59 ft	123500.87 ft	40.505528431°N	74.171320398°W	22.0 ft	14:50	2.0 ft	-20.0 ft
		Actual	97.00 ft	Actual	936605.75 ft	123502.49 ft	40.505532785°N	74.171327062°W				
		Delta(+ more/-less)	*10.00 ft*	*Delta*	*1.84 ft*	*-1.62 ft*	*-0.000004354°*	*-0.000006664°*				

2.451530134 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-24	1310 EST 1-20-18	*Proposed*	87.00 ft	Proposed	937064.44 ft	123758.29 ft	40.506237386°N	74.169679558°W	18.5 ft	13:10	1.8 ft	-16.7 ft
		Actual	92.00 ft	Actual	937070.64 ft	123756.19 ft	40.506231628°N	74.169657105°W				
		Delta	*5.00 ft*	*Delta*	*-6.20 ft*	*2.10 ft*	*0.000005758°*	*0.000022453°*				

6.54599114 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-25	0800 EST 1-14-18	*Proposed*	82.00 ft	Proposed	971839.22 ft	131420.37 ft	40.527385206°N	74.044643368°W	26.5 ft	8:00	3.5 ft	-23.0 ft
		Actual	82.00 ft	Actual	971836.64 ft	131425.42 ft	40.527398981°N	74.044652586°W				
		Delta	*0.00 ft*	*Delta*	*2.58 ft*	*-5.05 ft*	*-0.000013775°*	*-0.000009218°*				

5.670881766 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-26	1615 EST 1-15-18	*Proposed*	72.00 ft	Proposed	972388.73 ft	131285.37 ft	40.527015407°N	74.042666504°W	30.0 ft	16:15	3.1 ft	-26.9 ft
		Actual	72.00 ft	Actual	972379.35 ft	131287.17 ft	40.527020253°N	74.042700140°W				
		Delta	*0.00 ft*	*Delta*	*9.38 ft*	*-1.80 ft*	*-0.000004846°*	*-0.000033636°*				

9.551146528 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-27	2045 EST 1-17-18	*Proposed*	77.00 ft	Proposed	972941.75 ft	131149.50 ft	40.526643109°N	74.040676711°W	38.6 ft	20:45	4.4 ft	-34.2 ft
		Actual	77.00 ft	Actual	972946.62 ft	131148.62 ft	40.526640700°N	74.040659372°W				
		Delta	*0.00 ft*	*Delta*	*-4.87 ft*	*0.88 ft*	*0.000002409°*	*0.000017339°*				

4.948868558 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-28	0340 EST 1-17-18	*Proposed*	77.00 ft	Proposed	973494.16 ft	131013.78 ft	40.526271325°N	74.038689458°W	30.4 ft	3:40	2.1 ft	-28.4 ft
		Actual	87.00 ft	Actual	973496.75 ft	131016.57 ft	40.526278931°N	74.038680290°W				
		Delta	*10.00 ft*	*Delta*	*-2.59 ft*	*-2.79 ft*	*-0.000007606°*	*0.000009168°*				

3.806862225 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-29	2310 EST 1-14-18	*Proposed*	82.00 ft	Proposed	974047.45 ft	130877.85 ft	40.525898958°N	74.036698990°W	27.7 ft	23:10	0.8 ft	-26.9 ft
		Actual	82.00 ft	Actual	974040.34 ft	130881.58 ft	40.525909051°N	74.036724751°W				
		Delta	0.00 ft	*Delta*	*7.11 ft*	*-3.73 ft*	*-0.000010093°*	*-0.000025761°*				

8.029009902 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-30	1105 EST 1-13-18	*Proposed*	87.00 ft	Proposed	974599.05 ft	130733.24 ft	40.525502400°N	74.034714647°W	18.1 ft	11:05	-0.3 ft	-18.4 ft
		Actual	87.00 ft	Actual	974603.26 ft	130727.53 ft	40.525486842°N	74.034699675°W				
		Delta	0.00 ft	*Delta*	*-4.21 ft*	*5.71 ft*	*0.000015558°*	*0.000014972°*				

7.094237098 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-32	0730 EST 1-25-18	*Proposed*	87.00 ft	Proposed	935567.66 ft	122703.89 ft	40.50333514°N	74.175054250°W	16.0 ft	7:30	0.1 ft	-15.9 ft
		Actual	112.00 ft	Actual	935573.64 ft	122703.27 ft	40.503333474°N	74.175032741°W				
		Delta	25.00 ft	*Delta*	*-5.98 ft*	*0.62 ft*	*0.000001666°*	*0.000021509°*				

6.012054557 Actual distance off

Station	Date & Time	Drilling Depth		New York State Plane, LI NAD 83 FT					Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Drill Depth	*Feet BML*	*Position Type*	*Easting (x)*	*Northing (y)*	*Latitude*	*Longitude*	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
B-33	1900 EST 1-25-18	*Proposed*	82.00 ft	Proposed	936407.80 ft	123371.40 ft	40.505171900°N	74.172037990°W	34.9 ft	19:00	0.1 ft	-34.8 ft
		Actual	82.00 ft	Actual	936408.99 ft	123376.98 ft	40.505187225°N	74.172033716°W				
		Delta	0.00 ft	*Delta*	*-1.19 ft*	*-5.58 ft*	*-0.000015325°*	*0.000004274°*				

5.705479822 Actual distance off

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-20	2100 EST 1-18-18	935236.60 ft.	122723.70 ft.	21.3 ft	21:00	4.4 ft	-16.9 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-21	1345 EST 1-23-18	935684.47 ft.	122994.62 ft.	36.7 ft	13:45	4.7 ft	-32.0 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-22	1240 EST 1-21-18	936149.47 ft.	123236.95	46.8 ft	12:40	3.2 ft	-43.6 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-23	1040 EST 1-22-18	936620.39 ft.	123496.95 ft.	27.8 ft	10:40	5.1 ft	-22.7 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-24	0830 EST 1-20-18	937071.26 ft.	123760.91 ft.	22.0 ft	8:30	4.9 ft	-17.1 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-25	1445 EST 1-18-18	971831.43 ft.	131436.08 ft.	29.0 ft	14:45	0.2 ft	-28.8 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-27	0855 EST 1-18-18	972943.65 ft.	131159.40 ft.	39.5 ft	8:55	5.2 ft	-34.3 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-29	1210 EST 1-18-18	974051.78 ft.	130891.96 ft.	28.5 ft	12:10	2.2 ft	-26.3 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-31	1905 EST 1-24-18	934930.44 ft.	122339.41 ft.	16.9 ft	19:05	-0.2 ft	-17.1 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-32	1600 EST 1-24-18	935568.54 ft.	122706.46 ft.	19.0 ft	16:00	1.5 ft	-17.5 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-33	0010 EST 1-25-18	936404.40 ft.	123370.73 ft.	39.0 ft	0:10	3.9 ft	-35.1 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-34	1230 EST 1-24-18	936876.63 ft.	123646.96 ft.	21.4 ft	12:30	3.9 ft	-17.5 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-36	0825 EST 1-26-18	936741.94 ft.	123575.35 ft.	18.5 ft	8:25	0.0 ft	-18.5 ft

Station	Date & Time	New York State Plane, LI NAD 83 FT		Water Depth	Time	Tide Level	Calculated Seabed Elevation
		Easting	Northing	*Ft*	*Local*	*Ft MLLW*	*Ft MLLW*
CPT-37	1120 EST 1-26-18	936808.73 ft.	123613.03 ft.	19.0 ft	11:20	1.5 ft	-17.5 ft

APPENDIX C NESE Boring Program Field Boring Logs

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.	Boring No. B-20		Page No.
155 Hudson Avenue	Date 1/14/18 - 1/20/18		
Norwood, New Jersey	Grid Position:	Easting	Northing
Job No. 1840	NY State Plane	985228.21	122733.21
Client **Williams, NESE**	Geographic Position:	Latitude	Longitude
	NAD83	40 30 12.2895 N	74 10 34.5902 W

	Sample Depth	Sampler	Blows	Recovery	Description
1	0'-2'	Tube	0 piston	2 ft	Dark gray soft Clay
2	3'-5'	tube	0 piston	2' 6"	Dark gray soft Clay
3	6'-8'	tube	0 piston	1 ft. 11'	Dark gray soft Clay
4	9'-11'	tube	0 piston	2 ft	Dark gray soft Clay
5	12-14'	Tube	0 piston	2 ft	Dark gray Soft Clay / some shell Fragments
6	15-17'	Tube	0 piston	2 ft	Dark gray medium clay
7	18-20'	Tube	0 piston	2 ft	Dark gray medium clay
8	23-23'	Tube	0 piston	2 ft	Dark gray medium clay
9	25'-27'	Tube	0 piston	2 ft	Dark gray medium clay
10	30'-32'	Tube	0 piston	2 ft	Dark gray medium clay
11	35'-37'	Tube	0 piston	2' 1"	Dark gray medium clay w/ shell Fragments
12	40'-42'	Tube	0 piston	1' 11"	Dark gray firm clay
13	45-47'	Tube	0 piston	2.0'	Dark gray firm clay CL-CH
14	50-52'	Tube	0 piston	2' 2.5"	Dark gray stiff clay CL-CH
15	55-57'	Tube	0 Piston	2.0'	Dark gray stiff clay CL-CH
16	60-62'	Tube	0 piston	2.0'	Dark gray sandy clay / shell frags
17	65-67	SS	10,14,22,27	1.5'	Dark gray 65.0-65.5' sandy med-fine gravel Light gray 65.5-66.5' firm sand
18	70-72'	SS	11,14,30,33	1.8'	Dark to light gray fine sand, Layers to fine gravel layers @ 70.5'
19	75-77'	SS	15,22,27,27	2.0'	Light gray fine sand Thin med gravel 75-75.5'
20	80-82	SS	13,22,22,22	1.4'	Light grey fine sand
21	85-87	SS	5,5,7,24	1.0'	Dark to light grey; fine sand
	END				

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.	Boring No. B-21		Page No.
155 Hudson Avenue	Date 1/23/18		
Norwood, New Jersey	Grid Position:	Easting	Northing
Job No. 1840	NY State Plane	935695.00	122990.06
Client **Williams, NESE**	Geographic Position:	Latitude	Longitude
	NAD83	40 30 14.8368 N	74 10 26.5542 W

	Sample Depth	Sampler	Blows	Recovery	Description
1	0-2'	Tube	WOR	23.0"	Black organic rich silt, soft
2	3-5'	Liner	WOR	6" six	Black organic rich silt, soft
3	6-8'	Tube	WOR	23.0"	Black organic rich silt, soft
4	9-11'	Liner	WOR	25.0"	Black organic rich silt, very soft
5	12-14'	Tube	WOR	17.0"	Dark gray, soft clay
6	15-17'	Liner	WOR	18.0"	Dark gray, soft clay. Upper material likely pickup
7	18-20'	Tube	WOR	19.0"	Dark gray, soft clay, shell frags
8	35-37'	SS	WOR	1.5'	Dark gray, firm clay, shell frags @ 36.5'
9	40-42'	SS	WOR	2.0'	Dark gray, 40-41.3' firm clay, shell frags 41.3-42' clayey fine sand
10	45-47'	SS	WOR WOR 4,12	1.5'	Dark gray, clayey fine sand 45-46.5' fine to coarse sand and fine to med gravel 46.5-47'
11	~~47-49~~ 47-52	SS	32, 50/3	1.1'	Brown, coarse to fine sand and fine to med gravel
12	50-52'	SS	31, 50, 5"/2	1.0'	Very light gray, dense silt
13	55-57'	SS	6, 9, 9, 20	1.4'	Light gray, sandy silt
14	60-62'	SS	13, 18, 18, 14	1.8'	Light gray, sandy fine silt, silty clay @ 62' 60-61.5' silt, 61.5-62.0 silty clay
15	65-67'	SS	1, 1, 3, 7	1.4'	Gray, 65-65.6' clay 65.6-66.0 interbedded sandy silty w/ clay lenses
16	70-72'	SS	11, 11, 11, 11	1 ft	Light gray medium sand
17	75-77	SS	13-22-22-23	1 FT	Light gray medium sand
18	85-87	SS	23-23-20-19	9"	Light brown coarse sand
19	95-97	SS	6-8-10-11	8"	Light gray coarse sand, w/ organics
20	105-107	SS	7-6-10-16	8"	Light gray medium sand

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.			Boring No. B-22		Page No. 1	
155 Hudson Avenue			Date 1-21-18			
Norwood, New Jersey			Grid Position:	Easting	Northing	
Job No. 1840			NY State Plane	936154.95	123245.09	
Client **Williams, NESE**			Geographic Position:	Latitude	Longitude	
			NAD83	40 30 17.3458 N	74 10 22.6067 W	

	Sample Depth	Sampler	Blows	Recovery	Description
1	0'-2'	Tube	0	NR	
1	0'-2'	SS	0	2"	Dark organic
2	3-5'	Tube	0	17.5"	Organic rich silt, Black
3	6-8'	Tube	0	NR	
4	9-11'	Liner	0	NR	
5	12-14'	Tube	0	23.25"	Black soft clay organic odor
6	15-17'	Liner	WOR	24"	Dark grey/Black Top- loose clay, Btm firm clay
7	18-20'	Tube	WOR	24.5"	Dark grey firm clay
8	21-23'	Tube	0, 0, Push, Push	25.0"	Dark grey firm clay
9	25-27	Liner	WOR	24.0"	Dark grey firm clay top & btm
10	30-32'	Tube	0, 0, Push, Push	28.5"	Dark grey firm clay
11	35-37'	SS	WOR	1.9'	Dark grey firm clay
12	40-42'	SS	6, 8, 10, 13	1.8'	Dark gray fine sand
13	45-47'	SS	4, 13, 15, 15	1.6'	Dark gray fine sand
14	50-52'	SS	15, 23, 27, 27	2.0'	Dark gray fine sand
15	55-57	SS	16, 17, 22, 23	0.4'	Dark gray fine to mud sand, trace coarse sand
16	60-62'	SS	WOR	2ft.	Dark gray medium clay w/ lenses of peat
17	70-72'	SS	WOR	2ft.	Dark gray medium clay
18	80'-82'	SS	7-14-18-23	1'4"	Dark brown coarse to medium sand

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.	Boring No. B-23		Page No. 1
155 Hudson Avenue	Date 1-22-18		
Norwood, New Jersey	Grid Position:	Easting	Northing
Job No. 1840	NY State Plane	936605.75	123502.49
Client **Williams, NESE**	Geographic Position:	Latitude	Longitude
	NAD83	40 30 19.9150 N	74 10 16.7774 W

	Sample Depth	Sampler	Blows	Recovery	Description
1	0'-2'	Tube	0	2ft	Black organic
2	3'-5'	Tube	0	2ft	Dark gray soft clay
3	6'-8'	Tube	0	1'10"	Dark gray medium / soft clay
4	9'-11'	Tube	0	23"	Dark gray med clay
5	12-14'	Tube	0	NR	
6	15-17	Tube	Push	18.5"	Dark gray, loose clay
7	18-20'	Tube	Push	NR	
8	21-23'	Liner	WOR	24"	Dark gray, soft clay
9	25-27'	Tube	WOR	28"	Dark gray, soft clay
10	30-32'	Liner	WOR	24"	Dark gray, soft to firm clay
11	35-37'	SS	WOR	24"	Dark gray, soft to firm clay
12	40-42'	SS	WOR	24"	Dark gray, firm clay
13	45-47'	Tube	WOR	18"	Dark gray, firm sandy clay, shell frags
14	50-52'	Tube	WOR	NR	
15	55-57'	SS	WOR	24"	Dark gray sandy clay, shell frags
16	60-62'	SS	WOH" 1,4,4,1	0.8'	Dark gray fine sand trace silt, clay lenses
17	65-67'	SS	WOR-3,5	1.3'	Dark gray fine sand, few clay stringers
18	70-72'	SS	3,3,4,4	1.6'	Dark gray fine sand
19	75-77'	SS	5,2,1,1	2.0'	Dark gray 75.0-75.6' fine sand, 75.6-77.0' lean clay fiberous organic (root)
20	80-82'	SS	WH-Fell'	2.0'	Dark gray lean clay, fibrous organics throughout
21	85-87'	SS	1,1,1,2	2'	Dark gray medium clay w/ lenses of peat
22	90'-92'	SS	0	2'	Dark gray medium clay
23	95'-97'	SS	0	1.9'	Dark gray med clay

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.	Boring No. B-24		Page No. 1
155 Hudson Avenue	Date 1/20/18		
Norwood, New Jersey	Grid Position:	Easting	Northing
Job No. 1840	NY State Plane	937070.64	123756.19
Client **Williams, NESE**	Geographic Position:	Latitude	Longitude
	NAD83	40 30 22.4339 N	74 10 10.7656 W

	Sample Depth	Sampler	Blows	Recovery	Description
1	0'-2'	Tube	0	NR	Swith to SS
2	0-2'	SS	0-0-0	2 ft	Dark gray soft clay w/ shell fragments
2	3'-5'	Tube	0	2 ft	Dark gray soft clay
3	6'-8'	Tube	0	2 ft	Dark gray soft clay
4	9'-11'	Liner	0	1'7"	Dark grey soft clay
5	12'-14'	Liner	0	1'8"	Dark grey soft clay
6	15'-17	Tube	0	1'9"	Dark gray medium clay
7	18'-20'	Tube	0	NR	
8	21-23'	Tube	0	2.0'	Dark gray, lean clay
9	25-27'	Tube	0	1.9'	Dark gray, firm clay
10	30-32'	Liner	WOR	2.0'	Dark gray, firm clay All ends (Liner)
11	35-37	~~Tube SS~~	WOR	2.0'	Dark gray, firm clay All ends (Liner)
12	40-42'	Tube	WOR	28"	Dark gray, lean clay
13	45-47'	Tube	WOR	28"	Dark gray, silty clay, trace shell frags
14	50-52'	Liner	WOR	24"	Dark gray, firm clay
15	55-57'	Liner	WOR	24"	Dark gray, lean clay
16	60-62'	Liner	WOR	24"	Dark gray, lean clay
17	65-67'	Liner	WOR	24"	Dark grey, soft clay
18	70-72	Tube	WOR	22"	Dark grey firm clay
19	75-77'	SS	7,6,7	24"	Dark gray firm clay, shell frags, fibrous organics
20	80-82'	SS	WOR	24"	Dark gray firm clay
21	85-87'	SS	WOR	1.8'	Dark grey firm clay, trace organics
x2	90-92'	SS	WOR	2.0'	Dark gray firm clay
	END				

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.	Boring No. B-25		Page No. 1
155 Hudson Avenue	Date 1-14-18		
Norwood, New Jersey	Grid Position:	Easting	Northing
Job No. 1840	NY State Plane	971836.64	131425.42
Client **Williams, NESE**	Geographic Position:	Latitude	Longitude
	NAD83	40 31 35.6363 N	74 02 40.7493 W

	Sample Depth	Sampler	Blows	Recovery	Description
0					
1	0'-2'	SS	0	3ft	Dark grey silt
(ML) 2	3'-5'	SS	0	7"	Dark grey silt
5.5					
(SM) 3	6'-8'	SS	4.4.3.2	1'2"	Dark grey silty sand; shell fragments
4	9'-11'	SS	1.2.2.3	1'	light grey/dk brown ~~Medium~~ to Coarse to medium sand
10 5	12'-14'	SS	3.5.6.9	2ft	dark brown coarse sand; pea sized gravel
6	15'-17'	SS	11.13.9.10	1ft 2"	light brown coarse sand; pea sized gravel
7	18-20	SS	8.12.12.12	1ft	light brown coarse sand; pea sized gravel
8	21-23'	SS	10.12.14.15	1'6"	light brown coarse gravel changing to coarse sand
9	25'-27	SS	15.15.18.22	1'5"	light brown coarse sand w/ pea sized gravel; small layer of 2" of gravel layer
10	30'-32'	SS	13.16.19.17	1'6"	light brown Coarse Sand
11	35'-37'	SS	10-14-18-19	2ft	light brown coarse sand changing to fine sand
12	40'-42'	SS	11.14.14.17	1'9"	light brown medium to fine sand
(SP) 13	45'-47'	SS	8-10-13-15	2ft	light brown coarse to fine sand; 5% gravel
14	50'-52'	SS	4.9.10.10	1'4"	light brown fine sand
15	55'-57'	SS	7-10-12-13	1'4"	light brown fine sand
16	60'-62'	SS	6-10-16-16	2ft	light brown fine to coarse sand 7" Fine, 1'5" coarse
17	65'-67	SS	12-14-16-18	1.3'	light brown, fine to medium sand above 1.3' sediment 'pickup'
18	70-72'	SS	10 11 11 11	1.2'	light brown fine to medium sand
19	75-77'	SS	17.19.22.23	2.0'	light brown fine to medium sand, coarse material above - pickup
20	80-82'	SS	15.16.18.18	2.0'	light brown fine to medium sand, trace fine to medium gravel subrounded
	END				

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.			Boring No. B-26		Page No. 1
155 Hudson Avenue			Date 1-15-18 - 1-16-18		
Norwood, New Jersey			Grid Position:	Easting	Northing
Job No. 1840			NY State Plane	972379.35	131287.17
Client **Williams, NESE**			Geographic Position:	Latitude	Longitude
			NAD83	40 51 37.2729 N	74 02 33.7205 W

	Sample Depth	Sampler	Blows	Recovery	Description
1	0'-2'	SS	0	2ft	Organic / Black with small pockets of sand
2	3'-5'	SS	46-55	2Ft	Black organic changing to dark gray fine sand 6"
3	6'-8'	SS	2,2,4,5	1.3'	Dark gray/black silty fine sand
4	9-11'	SS	6,8,10,10	1.2'	Brown fine to med sand, washout @ cuttings
5	12-14'	SS	15,23,26,33	1.5'	Brown fine to med sand, trace med gravel
6	15-17'	SS	26,38,42,49	1.9'	Brown ~~0.9-1.0'~~ med to coarse sand, trace gravel from 15.0-15.9. Med sand 15.9-16.9'
7	~~16-20~~	~~SS~~	~~4,4,6,7~~	~~1.3'~~	
7	18-20'	SS	4,4,6,7	1.8'	Light brown fine to med sand w/ gravel
8	21-23'	SS	6,5,5,6	1.7'	Light brown fine to med sand, coarse sand and fine gravel @ 22' x 0.1' lense
9	25-27'	SS	3,2,2,5	1.0'	Light brown med to coarse sand, clay and coarse sand @ 25'
10	30-32'	SS	11,12,15,17	1.3'	Light brown fine to med sand
11	35-37'	SS	10,15,16,17	1.5'	Dark brown fine to med sand trace fine gravel
12	40-42'	SS	8,10,15,16	1.0'	Dark brown fine to med sand - gravel = pickup -
13	45-47'	SS	9,9,9,12	1.1'	Dark brown fine to med sand
14	50-52'	SS	8,10,10,11	1.5'	Brown fine to med sand
15	55-57'	SS	6,11,11,15	1.2'	Brown fine to med sand
16	60-62'	SS	8,15,15,15	1.4'	Brown fine to med sand
17	65-67'	SS	6,7,8,9	1.0'	Brown fine to med sand
18	70-72'	SS	10,11,9,11	1.3'	Brown fine to med sand
	END				

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.	Boring No. B-27		Page No.
155 Hudson Avenue	Date 1/17/18		
Norwood, New Jersey	Grid Position:	Easting	Northing
Job No. 1840	NY State Plane	972946.62	181148.62
Client **Williams, NESE**	Geographic Position:	Latitude	Longitude
	NAD83	40 31 35.4065 N	74 02 26.3737 W

	Sample Depth	Sampler	Blows	Recovery	Description
1	0-2'	SS	~~14~~ 14 10 9	2.0'	Dark grey sandy silt, shell hash at surface → SM OL
2	3-5'	SS	11,7,15,21	2.0'	Dark grey 3.0-4.3' sandy silt w shell hash 4.3-5.0 silty sand - organic odor
3	6-8'	SS	WOR	2.0'	Dark brown 6.0-7.0' organic silt, 7.0-8.0' organic silty sand
4	8-10'	Tube	15min	2.0'	Dark grey Top: silty sand Btm - silty sand
5	10-12'	SS	7,10,12,11	1.9'	Light grey 10.0-10.5 silty sand, 10.5-11.3 clay, 11.3-11.9' sandy silt w/ thin clay lenses.
6	12-14'	SS	8,14,25,27	1.4'	Light grey sandy silt from 12.0-13.0' Brown fine sand from 13.0-14.0'
7	15-17'	SS	14,15,22,17	1.5'	Brown fine to med sand
8	18-20'	SS	17,16,17,25	1.0'	Brown silty fine sand. Pick up 1' and above trace fine gravel
9	21-23'	SS	9,11,16,16	1.2'	Brown fine to med sand. 21.8-22.2 coarse sand
10	25-27'	SS	10,15,17,17	1.7'	Brown fine to med sand
11	30-32'	SS	15,16,18,30	2.0'	Brown med to coarse sand
12	35-37'	SS	10,15,16,18	1.0'	Brown fine to med sand
13	40-42'	SS	5,5,8,8	1.0'	Brown fine sand
14	45-47'	SS	8,9,9,10	1.0'	Brown fine sand
15	50-52'	SS	8,10,15,16	1.5'	Light brown 50.0-50.9' silt 50.9-52.0 silty fine sand
16	55-57'	SS	9,12,13,15	0.9'	Brown fine sand
17	60-62'	SS	10,11,11,14	1.1'	Light brown fine sand
18	65-67'	SS	12,12,17,17	1.3'	Light brown fine sand
19	70-72'	SS	8,11,13,16	1.2'	Light brown fine sand
20	75-77'	SS	10,13,13,16	1.3'	Brown fine sand

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.	Boring No. B5-28		Page No.
155 Hudson Avenue	Date 1/16/18 - 1/17/18		
Norwood, New Jersey	Grid Position:	Easting	Northing
Job No. 1840	NY State Plane	973496.75	131016.57
Client **Williams, NESE**	Geographic Position:	Latitude	Longitude
	NAD83	40 51 34.6042 N	74 02 19.2490 W

	Sample Depth	Sampler	Blows	Recovery	Description
1	0'-2'	SS	4-5-5-6	1ft 7"	Dark gray coarse sand w/ layer of organic mud/shell fragments
2	3'-5'	SS	2-4-5-8	1ft 7"	Dark gray coarse sand w/ 5" of fine sand and shell fragments
3	6'-8'	SS	6-8-10-13	1ft 3"	4" dark gray fine sand; 1" lens of dk gray silt; coarse sand
4	9'-11	SS	5-9-11-11	1ft 2"	Dark gray coarse sand w/ shell fragments + 6" fine sand
5	12'-14'	SS	4-2-3-2	1ft 6"	Dark gray coarse fine silty sand w/ shell fragments
6	15-17'	SS	3-3-4-7	9"	Dark gray coarse sand w/ shell fragments and less than 5% gravel
7	18-20'	SS	6-7-10-15	1ft 1"	Dark brown coarse sand w/ 4" fine gravel layer 10%
8	21-23'	SS	3-3-3-7	5"	Dark gray coarse sand w/ gravel 10%
9	25-27'	SS	4-6-7-11	1ft 2"	light gray coarse sand
10	30-32'	SS	8-8-10-11	1ft	Dark brown coarse sand
11	35-37'	SS	5-7-10-12	1ft 6"	light brown silt
12	40-42'	SS	8-14-14-15	1ft.	Dark brown coarse sand; < 1% gravel
13	45-47'	SS	8-9-14-13	11"	Dark brown Coarse sand
14	50'-52'	SS	6-10-13-15	1ft 2"	Dark brown Coarse sand
15	55-57'	SS	11-12-13-15	1ft 2"	Dark to light Coarse to medium sand
16	60'-62'	SS	6-9-10-11	1ft 2"	Dark brown Coarse sand
17	65-67'	SS	7-7-12-11	1ft	light brown coarse to medium sand
18	70'-72'	SS	11-16-18-13	1ft 2"	light to dark brown Coarse to medium Sand
19	75'-77'	SS	9-10-11-10	1ft.	Dark brown coarse sand
20	85'87'	CS	6-7-8-12	1.0'	light brown fine to med sand
	END				

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.	Boring No. B-29		Page No.
155 Hudson Avenue	Date 1/14/18		
Norwood, New Jersey	Grid Position:	Easting	Northing
Job No. 1840	(ft) NY State Plane	974040.34	130881.58
Client **Williams, NESE**	Geographic Position:	Latitude	Longitude
	NAD83	40 31 33.2726 N	74 02 12.2091 W

	Sample Depth	Sampler	Blows	Recovery	Description
1	0-2'	SS	WOR	1/2	
2	3-5'	SS	WOR, 1, 1	2.0'	Dark gray 2-3.5' silty sand, trace shell frags 3.5-5.0' sandy silt, trace shell frags
3	6-8'	SS	WOR, 2, 25, 68	2.0'	Dark gray 6.0-7.4' sandy silt, trace shell frags Light gray 7.4-8.0' silty fine sand
4	9-11'	SS	11, 14, 19, 22	1.1'	Light gray fine sand, shell hash @ 9.1'
5	12-14	SS	5, 5, 6, 7	1.3'	Light gray fine sand, trace shell frags
6	15-17	SS	10, 11, 11, 16	1.5'	Dark gray fine sand, few shell frags
7	18-20	SS	11, 13, 16, 16	1.9'	Dark gray fine sand, few shell frags
8	21-23	SS	5, 5, 5, 13	1.0'	Dark gray fine sand
9	25-27	SS	5, 8, 4, 10	2.0'	Dark gray silty fine sand, shell frags - few
TO	30-32'	SS	[redacted]		12 fossil @ 29' → Drive spoon
10	29-31	SS	104	0.6	Light gray silt stone below dense organics (wood) fine to med trace gravel
11	35-37	SS	9, 10, 10, 10	1.4	Light gray silty fine sand
12	40-42	SS	*58-8-7	1' 4"	Dark gray fine sand -4": Dark gray coarse sand 1'
13	45-47'	SS	5-9-10-12	1 Ft	Dark gray coarse sand
14	50'-52'	SS	5-7-9-11	1 Ft	Dark gray coarse sand
15	55'-57'	SS	4-7-8-7	11"	Dark gray coarse sand
16	60'-62'	SS	4-7-8-10	8"	[redacted] gray coarse sand
17	65-67'	SS	4-6-7-6	10"	Light gray coarse sand
18	70'-72'	SS	6-7-11-13	10"	Light gray coarse sand 4" to fine sand 6"
19	75-77'	SS	6-7-7-9	10"	Light gray medium to fine sand
20	80-82'	SS	9-10-11-12	1'6"	Light gray coarse sand changing to dark brown fine sand

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.	Boring No. B-30		Page No. 1
155 Hudson Avenue	Date 1/13/18		
Norwood, New Jersey	Grid Position:	Easting	Northing
Job No. 1840	NY State Plane	974603.3	130727.5
Client **Williams, NESE**	Geographic Position:	Latitude	Longitude
	NAD83	40 31 31.7526 N	74 02 04.9188 W

	Sample Depth	Sampler	Blows	Recovery	Description
1	0" - 2'	SS	6-5-4-2	7"	Dark grey fine sand; shell hash; 3 mussels
2	3' - 5'	SS	2-2-2-2	2ft	Dark grey coarse to medium sand; shell fragments
3	6' - 8'	SS	7-10-13-12	1'8"	Dark grey coarse to medium sand; large shell fragments
SP 4	9' - 11'	SS	6-7-6-7	1ft	Dark grey coarse to medium sand; shell fragments
5	12' - 14'	SS	3-1-1-2	10"	Dark grey fine sand; shell fragments
6	15 - 17'	SS	4-4-4-6	1'3"	Dark grey fine to medium sand; shell fragments
7	18' - 20'	SS	11-12-13-17	1'6"	light grey fine to medium Sand
sp 8	21-23'	SS	6-11-15-~~20~~	1'6"	light grey fine to medium Sand
sm 9	25'-27	SS	8-9-18-20	1'6"	light grey fine to medium Sand
sm 10	30'-32'	SS	3-5-7-14	1'8"	Light grey fine to medium Sand; shell fragments
11	35'-37'	SS	7-8-9-5	1.6'	Dark grey silty fine sand
12	40-42'	SS	5-5-6-6	0.5'	Dark grey silty fine sand
13	45-47'	SS	7-8-11-13	1.8'	Dark grey silty fine sand
sm 14	50-52'	SS	WOR	2.0'	Dark grey organic silt and fine sand, trace coarse sand, shell frags. clay in cutter @ 51.9' CL-ML
	52-54'	SHELBY	WOR 15min	NRO'	No recovery
15	52-54'	SS	WOR	2.0'	Dark grey clayey silt w/ trace fine sand, few shell frags throughout section
sp 16	55-57'	SS	7 8 12 13	1.0'	Dark brown, fine to medium sand, trace fine gravel
sp 17	60-62'	SS	2 2 3 4	1.1'	Dark grey fine to medium sand
sp 18	65-67'	SS	17 20 23 24	2.0'	Dark grey medium to coarse sand, trace fine gravel, trace fine sand
	~~70-72~~	~~SS~~	~~4,8,15,18~~		
sp 19	70-72'	SS	8, 8, 15, 18	~~2.0'~~ 1.8'	Dark grey fine to medium sand
sp 20	75-77'	SS	9, 9, 9, 10		Dark grey fine to medium sand, trace coarse sand
sp 21	80-82'	SS	10 12 13 14	2.0'	Dark grey ~~80.7-82~~ ~~82-84.3'~~ Fine sand, ~~80.0-80.7'~~ ~~84.3-87.0~~ Fine to medium sand with medium gravel sharp contact.
sp 22	85-87'	SS	7, 7, 12, 12	~~2.0'~~ 1.6'	Dark grey ~~85.0-85.2' medium to coarse sand~~ ~~85.2-87.0 Fine sand~~ 85-86.6' Fine sand. Upper coarse material pick up not included
	END				

80.0-80.7 Fine to medium sand with medium gravel sharp contact

80.7-82 Fine sand

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.	Boring No. B-32		Page No. 1
155 Hudson Avenue	Date 1-25-18		
Norwood, New Jersey	Grid Position:	Easting	Northing
Job No. : 1840	NY State Plane	935573.64	122703.27
Client **Williams, NESE**	Geographic Position:	Latitude	Longitude
	NAD83	N	W

	Sample Depth	Sampler	Blows	Recovery	Description
1	0'-2'	Tube	~~3~~ 0	18"	Dark gray medium clay
2	40'-42'	SS	WOR	2ft	Dark gray medium clay
3	45'-47'	SS	WOR	2 ft	Dark gray medium clay
4	50-52'	SS	WOR	2Ft	Dark gray medium clay
5	55-57'	SS	WOR	2 Ft	Dark gray stiff clay w/ shell fragments
6	60'-62'	SS	WOR	3"	Dark gray soft clay
7	65-67'	SS	0-0-24-38	1'5"	Dark gray stiff clay 9" to light gray soft silt stone 8"
8	~~70-72~~	~~SS~~	~~12-10-15-20~~		nodules - possibly calcium carbonate
8	70-72	SS	12-10-15-20	1'9"	light gray fine sand
9	75-77	SS	10-11-16-17	1'4"	light gray to dark brown medium sand
10	80'-82'	SS	5-6-11-18	10"	dark brown coarse sand
11	85-87'	SS	15-24-17-18	10"	light gray coarse sand
12	90-92'	SS	8-19-27-42	1 ft	light gray coarse to light brown coarse sand
13	95-97	SS	20-23-25-22	1'1"	light gray fine sand
14	100-102	SS	25-28-31-4	11'3"	light gray coarse sand
15	110-112	SS	17-19-19-24	1 ft	light gray coarse sand

Geotechnical Boring Log

Alpine Ocean Seismic Survey, Inc.	Boring No. B-33		Page No.
155 Hudson Avenue	Date 1/25/18		
Norwood, New Jersey	Grid Position:	Easting	Northing
Job No. 1840	NY State Plane	936408.99	12376.98
Client **Williams, NESE**	Geographic Position:	Latitude	Longitude
	NAD83	40 30 18.6740 N	74 10 19.3214 W

	Sample Depth	Sampler	Blows	Recovery	Description
1	0-2'	Tube	WOR	18.0"	Dark gray very soft clay, black organics
2	30-32'	SS	WOR	24.0"	Dark gray clayey fine to med sand, shell frags
3	35-37'	SS	0,0,0,2	0.5'	Dark gray fine sand - above = pick up
4	40-42'	SS	0,3,5,5	1.0'	Dark gray fine sand
5	45-47'	SS	6,6,6,9	2.0'	Dark gray 45-46.5' fine sand, 46.5-47.0 coarse to fine sand, clay lenses @ 47'
6	~~50-52'~~	~~SS~~	~~1,2,2,1~~		
6	50-52'	SS	1,2,2,1	0.8'	Dark gray fine to med sand, trace shell frags
7	60-62'	SS	WOR	2.0'	Dark gray clay, fibrous organics. Hit clay @ 55'
8	70-72'	SS	WOR	2.0'	Dark gray clay, fibrous organics
9	80-82'	SS	0,1,1,1	2.0'	Dark gray clay, fibrous organics
	END				

Survey Report for
Transcontinental Gas Pipeline Company, LLC

Title:
Vibracore Sampling Survey Technical Report

Project:
NESE Project
Raritan Bay & New York Harbor

Survey Date:
November – December 2016
May – June 2017

Project Number:
1794

Report Status:
Revision 3

Submittal Data:
22 August 2017

EXECUTIVE SUMMARY

Transcontinental Pipeline Company, LLC (Williams) is planning to install a new natural gas pipeline across Lower New York Harbor between landings at Morgan, New Jersey and Long Island, New York. The pipe will be installed along the majority of the route by placing the pipe in a trench excavated to between 12 and 20 feet below sea floor. The design and permitting of this portion of the pipeline installation required geotechnical and environmental sampling. The portions of the route between the HDD sections have been sampled by a Vibracore and grab sampler and this report presents the methods and results of that portion of the overall survey. Two portions of the installation, the New Jersey landing and the crossing of Ambrose Channel, will be installed using Horizontal Directional Drilling (HDD). Williams contracted Alpine to conduct geotechnical drilling in the HDD installation sections of the route and the results of that portion of the work have been submitted under separate cover.

Alpine utilized the RV *Shearwater*, a 110 foot research vessel owned and operated by Alpine, to conduct the survey operations for the geotechnical and environmental analyses of the project, which included sampling at 87 sites, plus three duplicate chemical core sites. Alpine determined the location of each sample using RTK corrected GPS signals. Water depths at each site were measured and corrected for tidal variation based on the NOAA Water Level Gauge at Sandy Hook, New Jersey.

Four types of samples were collected at each site, including a Vibracore sample for chemical analyses of sediments, a Vibracore sample for geotechnical analysis of the sediments, along with three grab samples for benthic analysis and one CTD cast to characterize the water column.

This report includes a discussion of the field procedures and schedule of operations, along with results of the chemical and geotechnical testing of the samples, logs for each of the geotechnical Vibracores, color photographs of the geotechnical cores, a table of the CTD data and tables of the benthic sample analyses. The results of the sampling program have been forwarded to all parties for their use in the design of the trenching and permitting for the excavation, including the various options for the disposal of the excavated sediments.

Discussions of the variation in geology along the route are being prepared by others, based on the results of the geophysical survey which will be correlated with the stratigraphy found along the route in the Vibracores.

During the period 17 May 2017 – 6 June 2017 Alpine returned to the project site to collect additional vibratory cores at 27 of the original 87 stations for supplementary testing. During this campaign 6 additional stations were added. This new stations were located near the pipeline route landing at Morgan, NJ in Raritan Bay. The additional campaign program is outlined under Appendix L.

PROFESSIONAL AUTHORSHIP

This report was prepared and written by the following Alpine personnel:

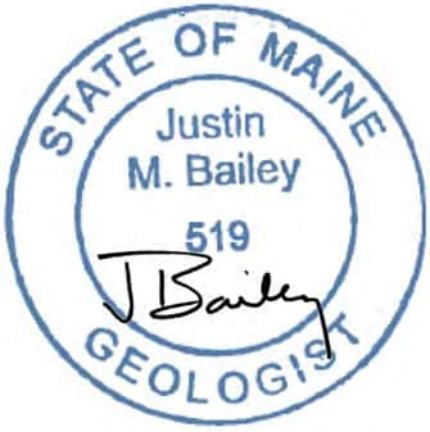
Officer–In-Charge
Mark L. Kosakowski, Vice President



Chief Geologist
Charles (Chuck) Dill, Sr. Project Manager



Professional Geologist
Justin Bailey, P.G., Sr. Project Manager



SERVICE WARRANTY

USE OF THIS REPORT

This report has been prepared with due care and diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work carried out under the contract and as such the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and unless clearly stated is not a recommendation of any course of action.

Alpine has prepared this report for the client(s) identified on the front cover in fulfilment of its contractual obligations under the contract and the only liabilities Alpine accept are those contained therein.

Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk and Alpine recommends that this disclaimer be included in any such distribution.

ALPINE OCEAN SEISMIC SURVEY, INC.
155 Hudson Avenue, Norwood, NJ 07648 USA
Telephone 1 201 768 8000 Fax 1 201 768 5750
www.alpineocean.com

TABLE OF CONTENTS

EXECUTIVE SUMMARY ii
PROFESSIONAL AUTHORSHIP iii
SERVICE WARRANTY iv
TABLE OF CONTENTS v
LIST OF FIGURES vi
LIST OF TABLES vi
GLOSSARY OF ABBREVIATIONS vii
1. INTRODUCTION 1
1.1 Description 1
1.2 Purpose 1
1.3 Fieldwork Summary 2
2. VESSEL SUMMARY 5
3. SAFETY 6
3.1 Exposure Hours 6
4. CREW LIST 7
5. SURVEY PROCEDURES 8
5.1 General 8
5.2 Project Survey Parameters 10
5.3 Survey Units 10
5.4 Vertical Datum 10
5.5 Equipment Installation, Testing, and Configuration 11
5.6 Survey Equipment and Methods 11
5.6.1 Vessel Layout 11
5.6.2 Vessel and Equipment Navigation 13
5.6.3 Alpine Model P Vibracore 13
5.6.4 Procedures 14
6. POST SAMPLING ACTIVITIES 18
6.1 Sediment Sample Processing 18
6.1.1 Grab Samples 18
6.1.2 Chemical Analysis Samples 18
6.1.3 Geotechnical Analysis Samples 18
6.2 Geological Logs 23

APPENDICES
APPENDIX A Station Locations
APPENDIX B NESE Boring Program gINT Logs
APPENDIX C Vibracore Penetration Graphs
APPENDIX D Color Photographs of Cores
APPENDIX E TerraSense Laboratory Results
APPENDIX F NGI Laboratory Results
APPENDIX G Benthic Analysis Results, Normandeau
APPENDIX H Benthic Analysis Results, ESS
APPENDIX I Benthic Sample Grain Size Analysis Results
APPENDIX J Chemical Analysis Results of Core Samples
APPENDIX K CTD Water Column Sampling Results
APPENDIX L Additional Sediment Sampling Campaign

LIST OF FIGURES

Figure 1.1 Location Map
Figure 2.1 RV *Shearwater*
Figure 5.1 Alpine Model P Vibracore
Figure 5.2 SeaBird SBE 19 Plus
Figure 5.3 Modified Day Grab
Figure 6.1 TerraSense Accreditation USACE Letter
Figure 6.2 GINT Abbreviations and Symbology

LIST OF TABLES

Table 4.1 Field Personnel
Table 5.1 Project Geodetics
Table 5.2 Navigation Check Results
Table 6.1 Tests used to support the Williams Program by TerraSense
Table 6.2 Tests used to support the Williams Program by NGI

GLOSSARY OF ABBREVIATIONS

Abbreviation	Meaning
BML	Below Mudline
cfm	Cubic feet per minute
CIU	Consolidated-Isotropically Undrained (Triaxial Test)
CTD	Conductivity-Temperature-Depth Profile
DGPS	Differential Global Positioning System
ft	feet
g	gallon
HDD	Horizontal Directional Drilling
HP	Horsepower
HSE	Health, Safety, and Environment
in	inch
kW	Kilowatt
LB	Lift Boat
m	meter
mL	Milliliters
MLLW	Mean Lower Low Water
mm	Millimeter
NAD83	North American Datum of 1983
NESE	Northeast Supply Enhancement
NJ	New Jersey
NOAA	National Oceanic and Atmospheric Administration
NY	New York
NYSNet	New York State Network
oz.	ounce
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEP	Project Execution Plan
pH	Potential of hydrogen
QA/QC	Quality Assurance/Quality Control
RTK	Real Time Kinematic
RV	Research Vessel
t	ton
TOC	Total Organic Carbons
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
usft	United States Survey Feet
UU	Unconsolidated Undrained (Test)
VC	Vibracore
WD	Water Depth
WGS84	World Geodetic System 1984

1. INTRODUCTION

1.1 Description

Williams proposes to expand the reliability and flexibility of its natural gas delivery operations in New York and New Jersey by considering to build, own and operate a new pipeline (referred to as the "Lower New York Bay Lateral B-Line (LNYBL B-Line) to transport gas from the existing Transco Station 207, located approximately 3.42 miles inland from the shoreline at Morgan in Middlesex County, NJ, to Long Island, NY. The LNYBL B-Line will be laid and buried below the seabed across Lower Raritan Bay for a distance of approximately 22 miles and will terminate at the existing subsea Rockaway Delivery Lateral (RDL) valve manifold. The RDL manifold is tied into the existing Transco 26-in Lower New York Bay Lateral (LNYBL) via a spool with dual hot taps to the 26" Rockaway Delivery Lateral to supply gas onshore at the Rockaway facility in Kings County, NY. Key focus areas for routing consideration are the construction methods and installation of the line, as the area is heavily trafficked by both commercial and personal watercraft, and is currently planned to transect several existing cable crossings.

1.2 Purpose

Alpine Ocean Seismic Survey, Inc. (Alpine) was retained by Williams to conduct geotechnical sampling, provide sediment data for engineering design and environmental analysis, and collect additional ancillary data for biological assessment. The geotechnical data collection effort was divided into two types; 1) marine rotary borings and 2) vibratory coring. Each "type" was conducted as a separate field operation using a dedicated field team, equipment, and vessel. The marine boring operations were conducted using a self-propelled jack-up Lift Boat, the LB *Vision*, with an on board CME-55 Tracked Rotary Boring Unit. The vibratory coring was conducted using the RV *Shearwater* and a team of marine scientists and geotechnical specialists utilizing a pneumatic vibracore rig. This report details the vibratory coring program. The geotechnical rotary boring campaign has been summarized under separate cover.

The Vibracore sampling project was designed to provide geotechnical and environmental samples as needed to permit and design the portions of the project which were to be installed using excavation and burial of the pipeline. As part of this analysis, a set of 18 stations were sampled along an alternative section of the route in lower Raritan Bay to determine which potential route option posed the least environmental obstacles.

1.3 Fieldwork Summary

Table 1.1 Summary of Field Operations

Date	Tasks Accomplished
Nov. 17-18, 2016	Mobilize RV *Shearwater* at Liberty Landing Marina and steam to work site
Nov. 19, 2016	Complete sampling at sites VC-78, 79 and 80
Nov. 20, 2016	Standby; anchored on site due to high winds and seas in work area
Nov. 21, 2016	Standby; anchored on site due to high winds and seas in work area
Nov. 22, 2016	Standby; anchored on site due to high winds and seas in work area
Nov. 23, 2016	Complete sampling at sites VC-81, 82 and 74
Nov. 24, 2016	Complete sampling at sites, VC-76, 75, 77 and 73
Nov. 25, 2016	Complete sampling at sites VC-11, 12, 13 and 14
Nov. 26, 2016	Complete sampling at sites VC-15, 16, 17, 18 and 19
Nov. 27, 2016	Complete sampling at sites VC-20, 21, 22, 23, 24 and 25
Nov. 28, 2016	Complete sampling at sites VC-07, 06, 70, 71 and 84 ALT; transit to Liberty Landing to start port call.
Nov.29, 2016	Continue port call; offload all Geotech core samples plus benthic samples and chem lab samples
Nov. 30, 2016	Continue port call; take on fuel; steam to work site, but standby for weather after arrival on site
Dec. 1, 2016	Complete sampling at sites VC-10, 9, 72 and 83
Dec. 2, 2016	Complete sampling at VC-5 and 8; then standby for weather due to high winds
Dec. 3, 2016	Standby; anchored on site due to high winds in work area
Dec. 4, 2016	Complete sampling at VC-85, 4, 86 Alt, 87 and 26
Dec. 5, 2016	Complete sampling at VC-2, 28, 3, 2, 29 and 30
Dec. 6, 2016	Complete sampling at VC-31. 32, 33, 34, 35 and 36
Dec. 7, 2016	Complete CTD, three grabs and chem sample at VC-37; then down for weather due to swells in work area
Dec. 8, 2016	Complete sampling at VC-37, 38, 39 and 40
Dec. 9, 2016	Too windy to work; transit to Millers Launch and offload cores and grab samples
Dec. 10, 2016	Complete sampling at VC-41ALT, 42,43 and 44
Dec 11, 2016	Complete sampling at VC-45ALT, 46, 47, 50, 51 and 52

Dec. 12, 2016	Standby; anchored on site due to swells and sea conditions at work area
Dec.13, 2016	Complete sampling at VC-49,54, 54B, 58, 57, 56 and 53, except for Geotech core at 53
Dec. 14, 2016	Complete sampling at VC1 Alt and VC 1 B- Alt; VC59; conduct grabs and CTD ops at VC-60, 61 ALT, 62, 63,64, 65, 66, 67, 68 and 60ALT
Dec. 15, 2016	Standby; anchored on site due to swells and sea conditions at work area
Dec. 16, 2016	Complete VC60 and 61; do grabs and CTD for 48ALT
Dec. 17, 2016	Complete sampling at VC-62, 63, 64m 65, 66 and 67
Dec.18, 2016	Standby; anchored on site due to swells and sea conditions at work area
Dec.19, 2016	Complete sampling at VC-68, 69 ALT, 48 ALT and 53; conduct grabs at VC-53 and 55
Dec.20, 20116	Modify Vibracore for 30 foot samples; complete sampling at VC-55 and 55B; transit to Liberty Landing to start demobilization
Dec. 21, 2016	Offload cores and other samples at Liberty Landing; end of field work

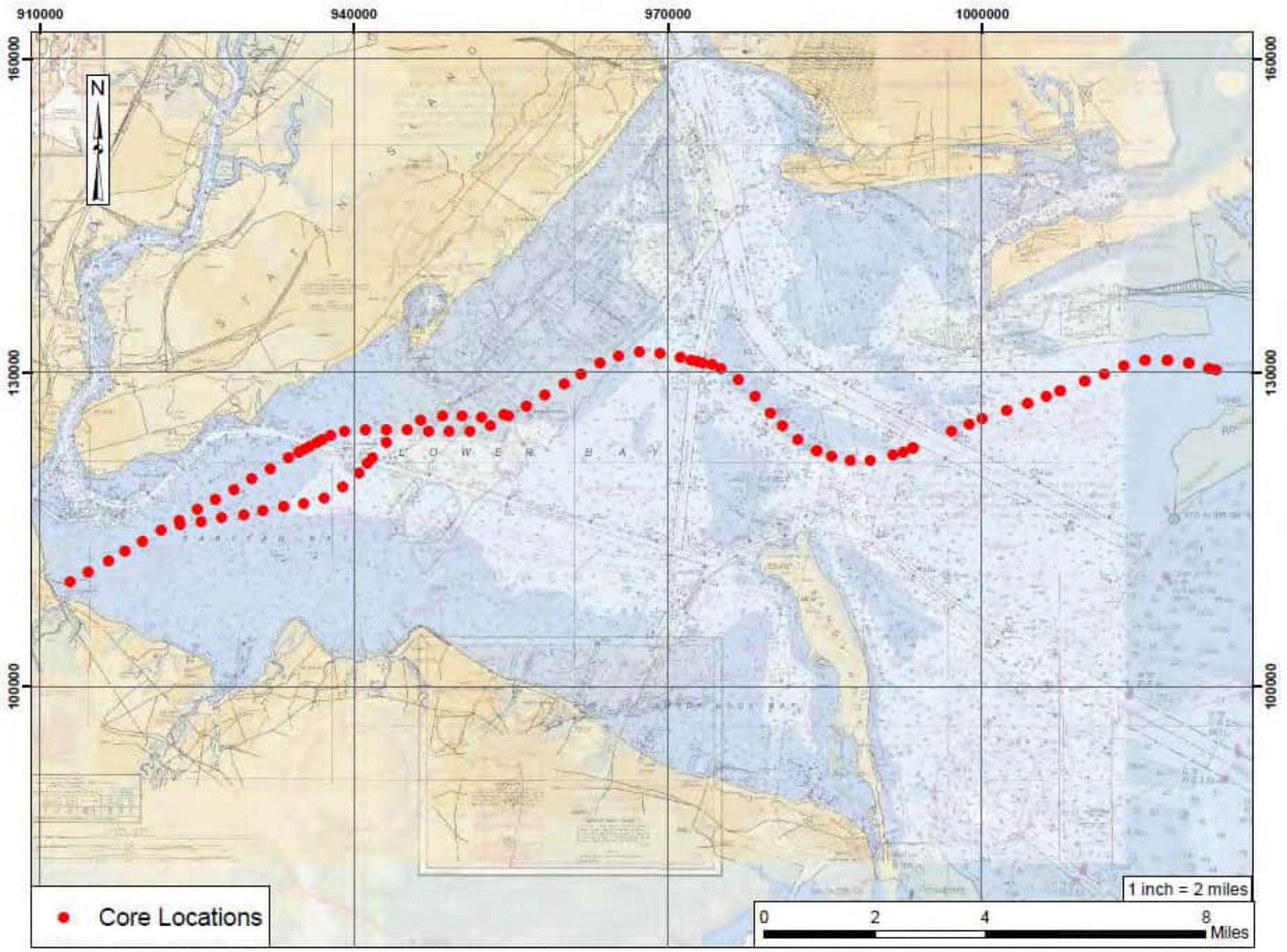


Figure 1.1 Location Map

2. VESSEL SUMMARY

The RV *Shearwater* was used for the Vibracore sampling program. The Vibracore was deployed from an A-frame located on rear of the starboard side of the vessel. The Vibracore was deployed using both a dedicated winch and the vessel's "cherry picker" crane. The grab sampler was also deployed using the "cherry picker" between core sites. The CTD sampler was deployed by hand over the starboard side of the vessel. The Shearwater is powered by a pair of independently controlled omni-directional thrusters. Using these, and the bow thruster when needed, the vessel can be maneuvered to and held on station during all sampling operations without anchoring. The vessel sleeps up to 22 personnel, including ship's crew, allowing it to stay on site overnight.



Figure 2.1 RV *Shearwater*

Table 2.1 Specifications of RV Shearwater

Vessel Type	Multi-Role Survey
Tonnage	Under 200 t
Length, overall	110 ft
Beam	39 ft
Draft	9 ft
Main Engines	2 x John Deere 6125 AFM – 526 HP each
Generator	2 x John Deere – 135 kW each
Bow Thruster	Thrustmaster 100 HP
Fuel capacity	13800 g
Fresh Water Storage	5000 g
Desalination System	Up to 900 gallons per day
Electronics	Furuno Radar, Applanix POS MV GPS, Heading and IMU, 2 x Echo sounders, VHF Comms- 2x Icom IC-M504; Sat. Phone – Intellian v80G VSAT
Special features	Accommodation for 20; 2 moon pools; 14 Ton Max capacity crane; 5 ton fixed A-frame ; Survey equipment winch -2500 m capacity at 11mm diameter; 2 x Life Raft

3. SAFETY

Safety standards and procedures on board the RV *Shearwater* adhere to company policy which operates under the guidance of Alpine's Health and Safety Manual for Marine Operations and is administered by the company's Health and Safety Officer. To maintain these standards every crew member was given a safety induction upon joining the vessel and regular toolbox meetings were also conducted prior to back deck operations, equipment deployment and recovery.

Prior to the start of the NESE Program survey operations onboard the *RV Shearwater*, an "All Hands" safety induction of all vessel and scientific crew was carried out by Alpine's HSE Manager and the Vessel Master.

During the entire survey operation a total of 26 toolbox meetings were completed.

3.1 Exposure Hours

The survey and marine crew together totaled 16 persons for the majority of the Vibracore operations, including Williams on board representatives. The total number of exposure hours starting with the onsite mobilization on 17 November 2016 until the survey was complete on 20 December, 2016 was 6308 hours. During this time there were no lost time incidents, no injurious incidents, and no occurrences that resulted in damage to the environment.

4. CREW LIST

The following personnel were present on board the survey vessel during mobilization and survey operations.

Table 4.1 Field Personnel

Alpine Scientists	
Party Chief / Chief Geologist	Chuck Dill
Deck Ops Manager	Matt Slusher
Vessel Crew	
Master	Wayne Porter
Second Captain	Mike Porter
Engineer	Sean Kelleher
Deck Hand	Various
Vibracore Team (Alpine personnel)	
Rob Vietri	Ovidio Hernandez
Marcus Kwasek	Bill Rottner
Williams and INTECSEA Team	
Williams	Alvin Hebert
E&E	Gene Florentino
INTECSEA	Ronald Eckardt
PSO Team	
Compass	Carol Hough
Compass	Steve Olson

5. SURVEY PROCEDURES

5.1 General

The survey consisted of performing Vibracore sampling, benthic sediment grabs and CTD casts at each of the 87 sites. In addition, a duplicate core for chemical analysis was conducted at three sites. In general, the tasks taken at each station were in the following order;

1. The CTD cast was conducted first at each site. The CTD profile was positioned to be on the centerline at the proposed sample station.
2. The surficial sediment grabs were collected next. Three sediment grabs were collected at each station. One grab was located nominally 30 feet to the right of the centerline, the second grab was on the centerline and the third grab nominally 30 feet to the left of the centerline. Prior to sieving the sediment samples, two 100 ml aliquots of sediment were collected from the top of the center grab sample. The first 100 ml sample of sediment was used for grain size analysis while the other 100 ml sediment sample was used for Total Organic Carbon analysis.
3. Collection of the chemical Vibracore followed the grab sampling. One core was collected from each station (at three stations a second chemical core was collected for QA/QC purposes).
4. Collection of the geotechnical Vibracore followed the collection of the chemical core. The geotechnical core was offset approximately 10 feet from the location of the chemical core in order to avoid influencing the sedimentary stratigraphy between sampling runs.

The Vibracores were advanced to between 12 and 20 feet below the mudline (BML), depending on analysis required. A pair of 30 foot long Vibracores were also conducted. These “long” cores were collected at Station VC-55 (which is the HDD pipe pit site located on the northeast side of Ambrose channel). The rate and depth of penetration of all the Vibracores were monitored in real time on deck using the Alpine Corelog system. Some of the cores collected east of Ambrose Channel encountered refusal on dense sand and gravel at depths of less than 10 feet.

The chemical Vibracore sample was collected first. For most of the chemical samples, a 6 millimeter thick soft polyethylene “sausage liner” material was used to hold the sample. This soft liner material was retained in the barrel by the core cutting edge and core retainer ring along with a core catcher. These components were decontaminated prior to use based on a strict cleaning procedure. The decontamination procedure consisted of a salt water rinse to remove any loose sediment, followed by a soap and water wash, a rinse with deionized water, a rinse with 10% Nitric acid, and a final rinse with deionized water. After a quick air dry the components were ready for use. A new core catcher was used for each sample.

When ready, the rigged and prepared Vibracoring apparatus was lowered over the side, following a strict marine wildlife mitigation procedure, and the sample was collected. The rig was then returned to the surface and secured alongside the vessel. After being secured, the cutting edge was removed from the bottom of the core pipe along with the core retainer. The "filled" soft liner (or tube) was then removed by manually pulling it out of the steel core pipe. Following the tubes removal from the core pipe it was measured and tied off in three foot sections. The sectioned off tube of sediment was then moved to the bow of the Shearwater for logging, processing and sampling. Alpine abandoned the use of the soft liner and switched to standard hard lexan tubing, with 0.125 inch wall thickness (which was used for all geotechnical cores) , when the sediments changed from being composed of mostly soft silty material to the harder sands and sands with significant percentages of gravel and small stone. The sands and gravels caused the soft liner to jam in the steel core pipe, resisting removal. This occurred mostly in the samples collected east of Chapel Hill Channel. The handling procedures on deck for the samples collected in the soft liner verses the hard lexan tubing was generally the same. The only real difference was that a small saw was needed to open the lexan verses a razor knife for the soft tubing.

The chemical cores were opened and processed immediately upon retrieval. The cores were measured for length of recovered section, divided into three foot long sections and described for basic sediment types present. These sections were then sampled by the Alpine staff according to the protocols presented in the Project Execution Plan (PEP). All samples collected on board were labeled and placed in refrigerators on the vessel prior to being transferred to the Miller's Launch dock by crew boat on a daily basis (when possible), using iced coolers. A lab courier took possession of the samples at the dock and transported them to the lab.

The geotechnical Vibracore was collected immediately following the completion of the chemical core at each station. The coring rig was re-loaded using a new solid clear lexan liner. The same core cutting edge, retainer and catcher from the chemical core was reused (after completing the geotechnical core the core cutting edge, retainer and catcher were cycled through the decontamination procedure for reuse the next day). When the Vibracore was ready for deployment, the vessel was offset 10-feet from the location of the chemical core and the rig lowered to the bottom and a sample collected and then return to the side of the vessel. Once the Vibracore was secured, the core liner was removed and placed in a special sample support shelf. The geotechnical core was then cut into three foot long sections which were capped, sealed, labeled and stored onboard in a vertical orientation. These sections were removed from the survey vessel periodically during weather downtime and sent to the Alpine office for processing.

The benthic biological samples collected as part of the grab sampling operations were transferred from the vessel back to Alpine's office when opportunity allowed. This occurred during each of the two Port Calls and at the end of the project. The samples were driven to the primary benthic biological laboratory by Alpine under chain of custody. The geotechnical

cores were initially processed at the Alpine office and samples were then delivered to TerraSense, Alpine's primary geotechnical laboratory, with a list of the appropriate analyses for each sample.

The geological data obtained by Alpine's geologist during the initial in house processing was entered into a gINT log format and the geotechnical lab analyses were added. These logs are included with this report. All cores were photographed in color at one foot intervals.

5.2 Project Survey Parameters

Table 5.1 Project Geodetics

Project Geodesy		
Geodetic Parameters	Spheroid	NAD83
	Datum	NAD83
	Semi-major Axis	6,378,137.00000 m
	Semi-Minor Axis	6,356,752.31414 m
	Inverse Flattening	298.257222101
Projection Parameter	Projection	State Plane Coordinate System
	Grid	New York Long Island (FIPS 3104)
	First Standard Parallel	40.66667° N
	Second Standard Parallel	41.03333° N
	Central Meridian	74 ° W
	Origin Latitude	40.16667° N
	False Northing	0 ft
	False Easting	984,250 ft
	Scale factor on CM	1
	Unit of Measurement	US Survey Feet

5.3 Survey Units

All units, measurements, and depths were made in feet.

5.4 Vertical Datum

The vertical datum for this project is MLLW (NAD83). Recorded depths will be corrected using the NOAA recorded tides at Sandy Hook, NJ (Station 8531680).

5.5 Equipment Installation, Testing, and Configuration

The navigation antenna was installed above the bridge of the RV *Shearwater*. The GPS antenna was then interfaced to the onboard navigational computer, which was equipped with Hypack software and continuously provided location and vessel heading to the steering console of the *Shearwater*. The vessel shape and the offset from the navigation antenna to the A-frame used to deploy the Vibracore were entered into Hypack to provide an accurate representation of the vessel setup. The captain was then able to maneuver the vessel to each proposed sampling location, whether it be a Vibracore or a grab sample.

GPS positioning was obtained using a C-Nav 3050 DGPS System. RTK corrections were obtained using Cellular Service Broadcast from the New York State Department of Transportation (NYSNet).

The following table includes the results from the navigation check, with the RTK GPS observed coordinates compared with the known. The grid coordinates are in State Plane, NAD83, New York Long Island, US Survey Feet.

Table 5.2 Navigation Check Results

Navigation Check Results			
	Known	Observed	Δ
Latitude	40 59 46.95464 N	40 59 46.95378 N	
Longitude	73 56 55.15758 W	73 56 55.15800 W	
Grid – N	302290.72’	302290.86’	-0.14’
Grid - E	998423.72’	998423.69’	0.03’

5.6 Survey Equipment and Methods

5.6.1 Vessel Layout

The RV *Shearwater* provided a suitable platform for the project. The maneuverability of the vessel with the ability to efficiently deploy and recover the various sampling tools along with adequate space and sleeping quarters for the personnel made the *Shearwater* a perfect partner for the operation. The Vibracore activity and grab sampling were both conducted off the starboard side A-frame. Core processing took place up front on the bow for the chemical cores and along the side for the geotechnical cores. The grabs were processed on the back deck where raw water hoses were used to help wash the sediment though the sieves.

All chemical samples retained from the chemical cores were placed in appropriate jars, capped and sealed and held in the vessel refrigerators until transferred in coolers to shore on a daily basis (as allowed by weather).

The geotechnical cores were measured, labeled, cut and capped on deck and then stored in an upright orientation. During cold weather, all stored core tubes were moved into the vessel so that they would not freeze.

5.6.2 Vessel and Equipment Navigation

An Applanix POS MV was used as the primary positioning system. RTK corrections were provided by NYSNet over a cellular data connection. A secondary Hemisphere VS110 DGPS Compass received differential corrections from the USCG and acted as a backup positioning system. Both the primary and secondary positions were input into Alpine's Hypack navigational software. All position fixes were recorded in Hypack and were output as target files.

Prior to installation on the *Shearwater*, the primary positioning system was calibrated and checked against a known benchmark, as highlighted in Section 5.5.

5.6.3 Alpine Model P Vibracore



Figure 5.1 Alpine Model P Vibracore

A pneumatically powered Alpine Vibracore system, configured to collect 20 feet long cores, was used to obtain the chemical and geotechnical sediment samples during the Williams project. The system is powered by a 375 cfm air compressor via a set of three air hoses, as shown in Figure 5.1.

The rate and depth of penetration of each core was monitored and recorded on deck at each sample site using the Alpine CoreLog system. This system uses an underwater sensor

mounted on the Vibracore head to determine the depth of penetration. The underwater sensor is connected to an onboard computer via a seven conductor data cable. The penetration data is combined with the computer's clock to generate a graph of rate of penetration measured in seconds per foot. The header of the graph contains sample location in Latitude-Longitude and local state grid X-Y coordinates, along with time of start and end of sampling, depth of penetration and water depth. Changes in the rate of penetration with depth are a measure of changes in sediment density and are useful in determining the actual depth below sea floor to significant sediment changes seen in the core.

5.6.4 Procedures

5.6.4.1 CTD Sampling

The CTDs were collected using a SeaBird 19 Plus unit, shown in Figure 5.2. The SeaBird used for this project was equipped with a Dissolved Oxygen sensor, a turbidity sensor and a pH sensor, in addition to the standard conductivity, temperature and depth sensors.

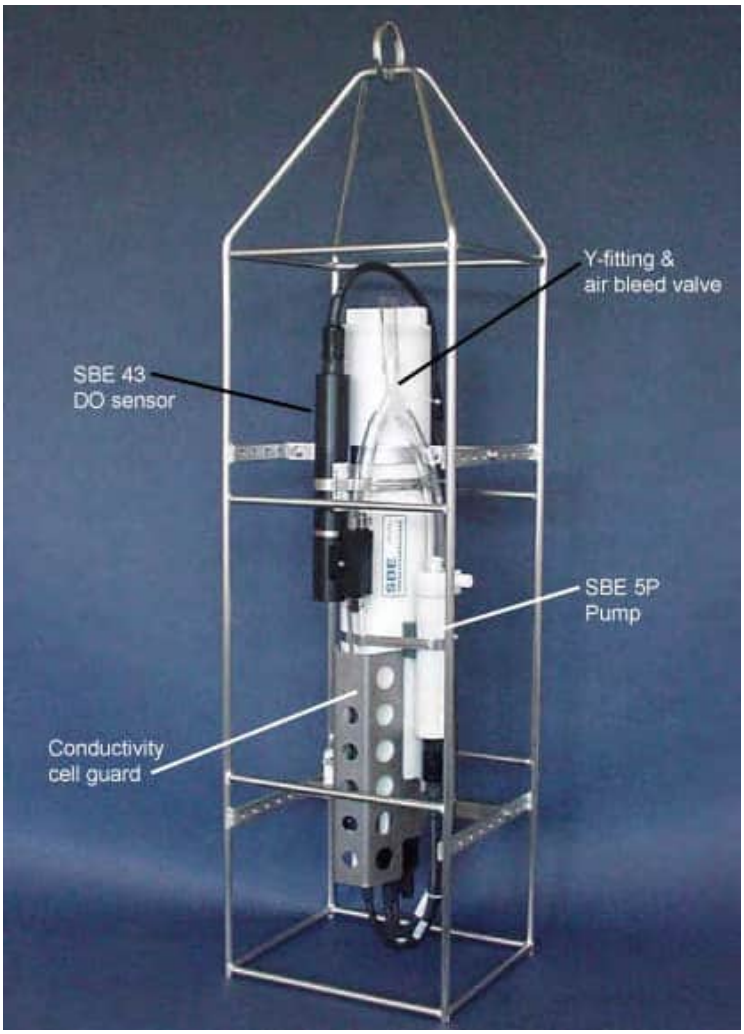


Figure 5.2 SeaBird SBE 19 Plus

To collect a cast the unit was lowered to the water until submerged, and held near the surface for at least one minute to equilibrate. At the end of the equilibration period, a navigation fix (or target) was collected before the unit was lowered to collect a profile. To collect a profile the SeaBird was first raised to the water's surface and then lowered at a slow steady rate (less than 1 foot per second) until it reached bottom. When the unit reached the bottom it was raised slightly and held for a few seconds before being returned to the surface.

Once on deck, the SeaBird was downloaded via RS-232 and the data saved with the RTK GPS position fix. The downloaded data was reviewed to assure recovery of good data. If necessary, a second cast was taken at a given site.

The CTD data obtained at each site are presented in Appendix J of this report.

5.6.4.2 Grab Sampling

Once the CTD cast was reviewed and approved, the vessel was maneuvered to a point approximately 30 feet to one side of the route, where the first of three grab samples was collected using a Modified Day Grab sampler (shown in Figure 5.3).

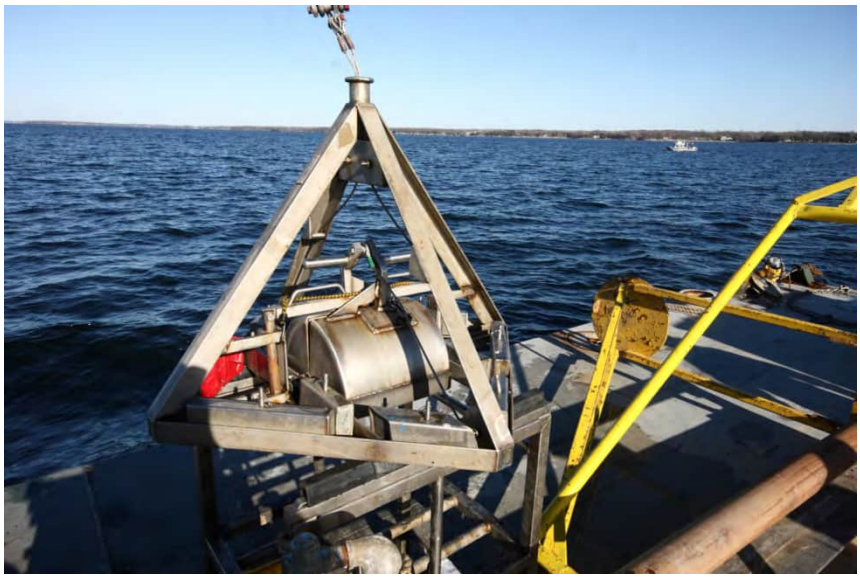


Figure 5.3 Modified Day Grab

The grab sampler was lowered and raised using the cherry picker crane. A second grab was taken at an individual position if the initial sample recovery was less than 75% full. When the sampler was returned to the vessel deck, it was placed in the sample recovery stand. Each grab was discharged into an individual clean plastic tray for processing.

The next grab was taken near the center of sampling station, and a third was taken at a point approximately 30 feet on the opposite side of the route from the first grab. All three grabs were then individually washed through a 500 micron sieve using a fine raw seawater spray.

Once all the sediment in a given grab had been sieved, all the material remaining on the sieve screen was placed in one liter plastic containers which were labeled with sample site number. The samples were preserved on board by adding 100 ml of 10% buffered formalin solution. In addition, a small amount of Rose Bengal, a red dye which assists in marking biological material, was added to each sample jar. Where there was a significant amount of sample remaining on a sieve after washing, the entire sample was divided into a number of plastic containers which were all labeled with site number. All the sample containers were placed in large boxes on deck (or inside during cold weather) and these boxes were forwarded to the Alpine office during port calls.

In addition to the benthic analyses, two separate samples, each 100 ml in size, of the unwashed sediment were collected from the grab taken at the middle location. These two 100 ml jars were labeled with the station number and placed in a cooler onboard the Shearwater. One sample was submitted under chain of custody to the geotechnical laboratory for grain size analysis and the other was submitted under chain of custody to the chemical laboratory for Total Organic Carbon analysis.

5.6.4.3 On Board Chemical Subsampling

Adequate new sample containers were provided by the chemical laboratory for all analytical procedures along with clean coolers and “blue ice” for transport. Each chemical core was divided into 3-foot sections. Each 3-foot section was sampled using three separate TerraCore plunge samplers to collect samples for volatile organic compound analysis. Then a representative sample from the length of each three foot section was obtained and homogenized in a clean stainless steel bowl to obtain a representative composite sample. Two samples were collected from the composite, with one being an 8 oz. sample for dioxin analysis and the other being a 16 oz. sample to be analyzed for total metals, semi-volatile organic compounds, PAH compounds, PCB’s and Organic Pesticides. All samples collected for chemical analysis were placed in appropriate containers as supplied by the laboratory, labeled with the sample number and other required information, and placed in a freezer on board the survey vessel. Due to the fact that the proposed pipeline route passes through waters of two states (New Jersey and New York) and that various installation and burial techniques will be used, different chemical analyses were required for different parts of the route. Care was taken on board to ensure that each core sample was identified with the sampling procedure to be used on the sediments.

The refrigerated samples were transferred to shore by a crew boat on a daily basis using coolers all under chain of custody, when sea conditions allowed. The coolers were then picked up at the dock by the courier for the lab and transferred to the Alpha Analytical facility where the sample containers were logged in for analysis.

5.6.4.4 On Board Geotechnical Analysis

The Vibracore samples collected for geotechnical analysis were cut into three foot long sections onboard. A small sample from each end cut was observed by the Alpine Geologist

and the grain size and color recorded. Where the sediments were cohesive, a hand torvane reading was taken at each cut end and recorded. The end cuts were then securely capped, sealed and labeled with the core number and depth below sea floor.

The capped and labeled core sections were then stored onboard until the next port call, at which time all the core sections on board were transferred off the *Shearwater* and moved to the Alpine office in Norwood New Jersey where they were stored vertically pending further analysis, as described in section 6.1.3.

6. POST SAMPLING ACTIVITIES

6.1 Sediment Sample Processing

6.1.1 Grab Samples

At the end of the project, all the sample containers were transported by Alpine to the Normandeau facility in New Hampshire under chain of custody, where the actual benthic analysis of each sample was conducted. The results are presented in Appendix F of this report. The grain size data from the analyses conducted on the sample from the centrally located grab are presented in Appendices H and results of the TOC analyses are included in Appendix I.

As a QA/QC check, 10% of the total number of samples were sent to a secondary benthic biological laboratory for assemblage conformation. For this project, the results from 27 random stations were sent to ESS Group in East Providence for analysis.

6.1.2 Chemical Analysis Samples

The sediment samples which were collected for chemical analysis were all processed by Alpha Analytical. The methods used for the various analyses are presented in Appendices I along with the results of the analyses.

6.1.3 Geotechnical Analysis Samples

All of the Vibracores collected for geotechnical analysis were transported to the Alpine office for processing. Williams and INTECSEA set up a specific set of analyses for each section of each core. The Vibracore samples collected for geotechnical analysis were logged, sampled and photographed in the office on the basis of the recovered length of the core. In almost all cases, the recovered length was equal to or slightly less than the penetrated depth. In a few cases, the recovered length was more than penetrated depth. This occurred in some of the dense sandy core sites, where the sands tend to dilate or expand up the core tube during extended periods of vibration required to achieve the desired depth of penetration. This was the case at Core VC-55, where the Vibracore encountered refusal at a depth of less than 24 feet below sea floor, but the recovered core length was 29 feet. The sediments in the core were logged by depth below the top of the core. The sediments in the core were all very similar, namely medium to coarse sand with frequent lenses of fine to medium gravel. These sediments were very similar to those encountered in BHA-18, which was taken in the same area.

Once the cores were ready to be processed, the first priority was to determine which cores contained a loose shell hash layer on the sea floor surface. The top section of each core was opened and described. Where a distinct loose shell hash layer was observed, a section of core tube containing that shell hash layer was cut off, capped and labeled and forwarded to the lab for determination of the density of the shell hash layer.

Following the initial examination for shell hash, the upper three feet of each core was cut into one foot sections for analysis, in accordance with the list provided by Williams and INTECSEA. Where the analyses requested required an intact core section, the one foot sections were capped, sealed and labeled and set aside to be forwarded to the TerraSense geotechnical lab for the appropriate analyses. Where the analyses did not require an intact sample, the one foot sections were split longitudinally, described and photographed. Where the sample section had been split in half and only one half was needed for analyses, the remaining half of each section was wrapped in a clear plastic sleeve which was labeled with the core number and depth below sea floor at each end. These samples will be archived by Alpine at our office.

These one foot samples were forwarded to TerraSense, the project geotechnical laboratory. The samples were accompanied by a chain of custody form which specifically listed the analyses to be performed on each sample.

Due to delays in getting samples through the analysis chain, it was decide to engage a second geotechnical laboratory to meet the project time line. A total of 110 of the original unsplit core samples were sent to the NGI laboratory in Houston, TX under chain of custody. These samples were then processed for a variety of analyses, as per the list provided by Williams and INTECSEA. The results of the NGI analyses are presented in a report which is included in Appendix F of this report. The index data received from NGI were also entered into the gINT log forms for the samples analyzed at NGI.

No split samples were sent to NGI.

All laboratory analysis results from the sample processed by TerraSense are provided in Appendix D.

TerraSense, LLC., 45H Commerce Way, Totowa, NJ 07512, is a certified sediment laboratory in the State of New Jersey and is accredited for the following soil methodologies, as indicated;

Soil - accredited since 12/5/2008
R58, T88, T89, T90, T99, T100, T180, T208, T216, T236, T265, T296, T297, D421, D422, D698, D854, D1140, D1557, D2166, D2216, D2435, D2850, D3080, D4318, D4767, D5084, D7012.

DEPARTMENT OF THE ARMY
ENGINEER RESEARCH AND DEVELOPMENT CENTER, CORPS OF ENGINEERS
GEOTECHNICAL AND STRUCTURES LABORATORY
WATERWAYS EXPERIMENT STATION, 3909 HALLS FERRY ROAD
VICKSBURG, MISSISSIPPI 39180-6199

April 3, 2015

Reply to the Attention of:
Concrete and Materials Branch

Greg Thomas
TerraSense, LLC
45H Commerce Way
Totowa, NJ 07512

Dear Mr. Thomas:

In reference to your check no. 1560, dated March 25, 2015, and audit agreement, dated March 30, 2015, an audit based on your AASHTO Accreditation was performed on documents submitted by your laboratory. We examined the AMRL On-site Assessment Report No. 208A, dated January 8, 2013 and the AASHTO accreditation certificate effective April 3, 2015.

Your Quality System meets the requirements of the U.S. Army Corps of Engineers. The material test methods that you are validated to perform for the U.S. Army Corps of Engineers were determined from the inspection reports from AASHTO and are as follows:

Soil Tests: ASTM D422, D698, D854, D1557, D2166, D2216, D2435, D2850, D3080, D3740, D4318, D4767, D4832, D5084, D7012, and E329.

We will add your laboratory to the list of commercial laboratories qualified to conduct material tests for the U.S. Army Corps of Engineers; see the Materials Testing Center homepage at http://www.erdc.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/9254/Article/476661/materials-testing-center.aspx. All Corps offices will be notified of this decision and will have the opportunity to use your services. TerraSense, LLC, Totowa, NJ will remain on our list of laboratories qualified to conduct material tests until **April 3, 2017** two (2) years from the date of the audit. In the event your AASHTO accreditation is suspended in whole or part, TerraSense, LLC, Totowa, NJ is to notify the Materials Testing Center immediately to perform a re-evaluation of your laboratory's validation. Failure to notify the Materials Testing Center will result in immediate suspension of your U.S. Army Corps of Engineers validation.

Sincerely,

Alfred B. Crawley, PE
Director
Materials Testing Center

Copy Furnished:
Ralph Tinari / New York District

Figure 6.1 TerraSense Accreditation USACE Letter

Table 6.1 Tests used to support the Williams Program by TerraSense

Williams NESE Offshore Geotechnical Lab Test Program (TerraSense)

The Lab Test program consisted of index and strength tests. The following procedures were used:

Test Description	Procedure
Water Content	ASTM D2216
Liquid and Plastic Limit - multi-point test	ASTM D4318
Sieve Analysis; Std. sieve set, with D1140 wet wash	ASTM D422
Combined Sieve and Hydrometer Analysis	ASTM D422
Organic Content by burn-off (includes water content)	ASTM D2974
Total (Bulk) Unit Weight from Intact sample (with Water Content)	ASTM D7263
UU - Unconsolidated-Undrained Triaxial	ASTM D2850
CIU' - Consolidated-Isotropically Undrained Triaxial with backpressure and pore water pressure measurements on saturated specimen	ASTM D4767

During the geotechnical sediment analysis, TerraSense had to modify the test procedures used for determining densities when dealing with samples which had been split. These modified procedures did not meet ASTM codes. Because of this, an add-on coring campaign was added to the project. Cores at Stations VC-25, VC-26, VC-28, VC-30, VC-33, VC-34, VC-42, VC-43, VC-46, VC-47, VC49, VC-50, VC-51, VC-52, VC-53, VC-55, VC-56, VC-58, VC-59, VC-60, VC-61, VC-62, VC-64, VC-66, VC-67, and VC68 were all resamples and retested for density. Consequentially, the density and moisture testing results reported by TerraSense (Appendix E) for these stations should not be used for engineering design.

NGI has been in operation since 2001. The lab was acquired from C&C Technologies in September, 2016. The lab is not certified by any State Agency but has participated in the annual proficiency testing program through AASHTO/AMRL each year since 2003, which included particle size analysis, Atterberg Limits and Specific Gravity of soil, and has consistently received high ratings each year.

The NGI lab has been shown to be highly proficient (score 5 of 5 in year 2016) in the following tests: T88, T89, T90, T100, D422, D854 and D4318. None of the other tests run by NGI for this project were included in the AASHTO assessment.

Table 6.2 Tests used to support the Williams Program by NGI

Williams NESE Offshore Geotechnical Lab Test Program (NGI)

Test Description	Procedure
Water Content	ASTM D2216
Liquid and Plastic Limit - multi-point test	ASTM D4318
Sieve Analysis; Std. sieve set, with D1140 wet wash	ASTM D422
Combined Sieve and Hydrometer Analysis	ASTM D422
Organic Content by burn-off (includes water content)	ASTM D2974
Soil pH	ASTM D-4972
Soluble Sulfate*	ASTM D-516
Percent Calcium Carbonate	ASTM D-4373
Total (Bulk) Unit Weight from Intact sample (with Water Content)	ASTM D7263
Miniature Vane, Undisturbed	ASTM D4648
Miniature Vane, Remolded	ASTM D4448
Consolidated Undrained Triaxial Compression (CIU-Triaxial)	ASTM D-4767

NOTE: The soluble Sulfate tests were performed by others for NGI and a copy of that lab's report is included in the NGI report.

The results of the tests performed by NGI are presented in their report which is included in Appendix E of this report.

6.2 Geological Logs

The geological descriptions developed at the Alpine office were used to generate a gINT form boring log for each Vibracore. The log includes the rate of penetration for each sample interval, the depth range for each sample, and the type of sample collected. The final log form includes a cross reference to the actual laboratory results. The initial geological descriptions of the sediment type have also been modified as required, to reflect the nomenclature generated by the laboratory. The bore log includes the location of the boring as determined by RTK GPS in the field, along with the corrected water depth and bottom elevation for the site. Figure 6.2, below, is a key to the abbreviations and symbols used in the gINT logs.

MAJOR DIVISION			GROUP SYMBOL	LETTER SYMBOL	GROUP NAME
COARSE GRAINED SOILS CONTAINS MORE THAN 50% FINES	**GRAVEL AND GRAVELLY SOILS** MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVEL WITH * 5% FINES		GW	Well-graded GRAVEL
				GP	Poorly graded GRAVEL
		GRAVEL WITH BETWEEN 5% AND 15% FINES		GW-GM	Well-graded GRAVEL with silt
				GW-GC	Well-graded GRAVEL with clay
				GP-GM	Poorly graded GRAVEL with silt
				GP-GC	Poorly graded GRAVEL with clay
		GRAVEL WITH ≥ 15% FINES		GM	Silty GRAVEL
				GC	Clayey GRAVEL
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SAND WITH * 5% FINES		SW	Well-graded SAND
				SP	Poorly graded SAND
		SAND WITH BETWEEN 5% AND 15% FINES		SW-SM	Well-graded SAND with silt
				SW-SC	Well-graded SAND with clay
				SP-SM	Poorly graded SAND with silt
				SP-SC	Poorly graded SAND with clay
		SAND WITH ≥ 15% FINES		SM	Silty SAND
				SC	Clayey SAND
FINE GRAINED SOILS CONTAINS MORE THAN 50% FINES	SILT AND CLAY	LIQUID LIMIT LESS THAN 50		ML	Inorganic SILT with low plasticity
				CL	Lean inorganic CLAY with low plasticity
				OL	Organic SILT with low plasticity
		LIQUID LIMIT GREATER THAN 50		MH	Elastic inorganic SILT with moderate to high plasticity
				CH	Fat inorganic CLAY with moderate to high plasticity
				OH	Organic SILT or CLAY with moderate to high plasticity
HIGHLY ORGANIC SOILS				PT	PEAT soils with high organic contents

Figure 6.2 GINT Abbreviations and Symbology

When the lithology identities that a material is “fine” it is referring to sediment that will pass a 200 mesh sieve.

APPENDICES

APPENDIX A Station Locations

1. Table of Final As-Cored Locations
2. Table of Grab Sample Locations
3. Table of CTD Profile Locations
4. Station Charts

1. Table of Final As Cored Locations

2. Table of Grab Sample Locations

3. Table of CTD Profile locations

4. Station Charts

APPENDIX B NESE Boring Program gINT Logs

APPENDIX C Vibracore Penetration Graphs

APPENDIX D Color Photographs of Cores

APPENDIX E TerraSense Laboratory Results

APPENDIX F NGI Laboratory Results

APPENDIX G Benthic Analysis Results, Normandeau

APPENDIX H Benthic Analysis Results, ESS

APPENDIX I Benthic Sample Grain Size Analysis Results

APPENDIX J Chemical Analysis Results of Core Samples

APPENDIX K CTD Water Column Sampling Results

APPENDIX L

Additional Sediment Sampling Campaign Vibracore Sampling Survey Technical Report NESE Project Raritan Bay & New York Harbor

APPENDIX C
PRE-CONSTRUCTION SEDIMENT SAMPLING RESULTS SUMMARY

7.4.2 Offshore Facilities

New Jersey and New York

Raritan Bay Loop

As mentioned above in Section 7.4.1.2.2 for groundwater, the Raritan Bay Slag EPA NPL site cleanup Areas 7 and 11 (Jetty Sector) are located within the offshore Project workspaces in the New Jersey portion of Raritan Bay (EPA 2016a). Contamination associated with Areas 7 and 11 may be present in the Raritan Bay sediment crossed by the offshore Project route, including the Morgan Shore Approach HDD.

Transco conducted sediment sampling in late 2016 to identify any potentially contaminated sediments along the offshore portion of the Raritan Bay Loop. A summary of the sediment chemistry analyses is presented below. Complete tables of the sediment chemistry testing results are provided in Appendix 1D of RR 1. The Project-specific Sampling and Analysis Plan/Quality Assurance Project Plan for offshore sediment sampling is provided in Appendix 1C of RR 1. *(A complete offshore environmental sampling report will be provided in a supplemental filing in the 2nd quarter of 2017.)*

As mentioned in Section 7.2.2, Transco conducted sediment sampling at 69 sites along the Raritan Bay Loop in the fall of 2016. Once samples were retrieved, sediments were collected from the core and shipped to an onshore laboratory for chemical analysis. Separate sample sets were generally collected from each 3-foot interval. The list of chemical analyses performed was based upon New York State Department of Environmental Conservation's (NYSDEC) Technical and Operational Guidance Series (TOGS) 5.1.9 *In-Water and Riparian Management of Sediment and Dredged Material* (2004), NSYDEC's Screening and Assessment of Contaminated Sediment (2014), NJDEP's *The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters* (1997), the USACE/EPA document titled *Guidance for Performing Tests on Dredged Material Proposed for Ocean Disposal* (2016), and input from NJDEP and NYSDEC staff. Upon completion of the analyses, positive results were evaluated and compared with the TOGS and NJDEP Site Remediation Program (SRP) criteria. In New Jersey, these criteria are the Effects Range Low (ER-L) and Effects Range Median (ER-M) Ecological Screening Criteria (ESC). The ESC presented are not promulgated, and are intended as screening values for ecological assessments. In New York, sediments that meet Class A standards are considered to have no appreciable contamination and dredging and in-water placement at approved locations can generally proceed. Sediments

that exceed Class A standards may be considered for dredging with several restrictions (Class B) or may have stringent requirements for dredging and disposal (Class C). A selection of analytes detected throughout the study corridor and the number of times the SGVs (Sediment Guidance Values) and ESC were exceeded in both states is presented in Table 7.4-2.

Sample sites within the offshore study area were organized into five geographic groups based upon the sediment composition of grab samples (Table 7.4-3). *Information regarding composition of vibracores and sediment contamination results will be provided in a supplemental filing in the 2nd quarter of 2017.*

Table 7.4-2
Summary of Analytical Results for Sediment Samples

Analyte	Frequency of Detection (%)	Maximum Result	Location of Maximum Result	Count of Exceedances Throughout Study Area[a]			
				NJDEP ER-L	NYSDEC Class A	NJDEP ER-M	NYSDEC Class B
Total BTEX (µg/kg)	4.29	9.8	VC16-D9-12E	N/A	0.0	N/A	0.0
Total PAHs (µg/kg)	49.34	21,900	VC38-D0-3E	24.0	24	0	0
Dioxins and Furans Total Toxicity Equivalency Factor (pg/g)	92.19	39.7	VC17-D6-9E	70	55	N/A	0
Chlordane (µg/kg)	0	N/A	N/A	0	0	0	0
Dieldrin (µg/kg)	0.33	1.8	VC1-ALT-D3-6E	0	0	0	0
Endrin (µg/kg)	0.59	0.736	VC38-D0-3E	0	0	0	0
Heptachlor (µg/kg)	0	N/A	N/A	0	0	N/A	0.0
Mirex (µg/kg)	0	N/A	N/A	0	0	0	0
Sum of DDT + DDE + DDD (µg/kg)	7.57	99.0	VC6-D0-3E	0	19	0	0
Total PCB Congeners (pg/g)	77.99	2,000,000	VC16-D9-12E	14	12	0	0
Total PCB Aroclors (µg/kg)	6.29	1,140	VC1B-ALT-D0-3E	0	65	124	59
Aluminum (mg/kg)	100.00	18,000	VC16-D0-3E	0	N/A	N/A	N/A
Antimony (mg/kg)	7.59	15.8	VC6-D0-3E	1	N/A	N/A	N/A
Arsenic (mg/kg)	100	108	VC1-ALT-D3-6E	80	80	3	3
Barium (mg/kg)	95.38	135	VC1B-ALT-D0-3E	17	N/A	N/A	N/A
Cadmium (mg/kg)	45.87	3.49	VC16-D6-9E	12	12	0	0
Chromium, Total (mg/kg)	94.06	202	VC16-D6-9E	14	14	0	0
Cobalt (mg/kg)	99.67	16.3	VC16-D6-9E	44	N/A	N/A	N/A
Copper (mg/kg)	89.11	504	VC1B-ALT-D0-3E	20	20	2	2

Table 7.4-2
Summary of Analytical Results for Sediment Samples

Analyte	Frequency of Detection (%)	Maximum Result	Location of Maximum Result	Count of Exceedances Throughout Study Area[a]			
				NJDEP ER-L	NYSDEC Class A	NJDEP ER-M	NYSDEC Class B
Lead (mg/kg)	100	285	VC16-D6-9E	20	20	4	4
Manganese (mg/kg)	100	906	VC16-D6-9E	89	N/A	N/A	N/A
Nickel (mg/kg)	95.71	53.5	VC16-D6-9E	81	81	1	1.0
Selenium (mg/kg)	53.80	18.6	VC1-ALT-D3-6E	140	N/A	N/A	N/A
Silver (mg/kg)	11.22	8.52	VC16-D9-12E	10	10	8	8
Vanadium (mg/kg)	88.78	94.4	VC22-D9-12E	6	N/A	N/A	N/A
Zinc (mg/kg)	85.48	494	VC16-D6-9E	15	15	3	3
Mercury (mg/kg)	62.05	5.28	VC1B-ALT-D0-3E	0	14	21	21
Cyanide, Amenable (mg/kg)	0	N/A	N/A	N/A	N/A	N/A	N/A
Cyanide, Total (mg/kg)	8.24	1.5	VC1-ALT-D3-6E	N/A	N/A	N/A	N/A

Sources: NJDEP 2009, NYSDEC 2004, 2014c.

[a] All measured concentrations of analytes detected in samples from New Jersey and New York were compared to both the SGVs and ESC.

Key:
DDD = dichloro-diphenyl-dichloroethane
DDE = dichloro-diphenyl-dichloroethylene
DDT = dichloro-diphenyl-trichloroethane
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
PCBs = polychlorinated biphenyls
pg/g = picogram/gram
N/A = not applicable

Table 7.4-3
Geographic Sediment Sample Groups

Group ID	Mileposts	Included Sample(s)	State(s)	Predominantly sand, gravel or rock?
A	12.53 – 12.90	VC1-ALT, VC2	NJ	Yes
B	13.32 – 19.34	VC3-ALT to VC23	NJ, NY	No
C	19.72 – 24.27	VC24 to VC36	NY	Yes
D	24.65 – 25.24	VC37 to VC41-ALT	NY	No
E	25.41 – 35.44	VC42 to VC69-ALT	NJ, NY	Yes

Metals

Each sediment sample was analyzed for metals (see Appendix 1D to RR 1 for a complete list of these metals). Positive results were obtained for all of these metals in at least one sample. Thresholds for New York and New Jersey are presented in Table 7.4-4.

All metals were detected in the samples from New Jersey and 13 of the metals were detected at concentrations that exceeded either the ER-L or ER-M threshold. In sample Group A, barium, cadmium, chromium, copper, lead, silver, zinc, and mercury were detected at concentrations that exceeded the most conservative NJDEP threshold for each metal at VC1-ALT from 0-6 feet. Mercury also exceeded the ER-M threshold at VC1-ALT within the 6-9 feet depth interval. Arsenic and nickel exceeded the ER-L threshold for the entire depth of the sample taken at VC1-ALT. Arsenic also exceeded the ER-L threshold within two depth intervals at VC2 (0-3 feet and 6-9 feet). Cobalt exceeded the ER-M threshold in three depth intervals in VC1-ALT (3-6 feet, 12-15 feet, and 15-16 feet), with concentrations ranging from 10.7 mg/kg to 11.6 mg/kg. Manganese exceeded the ER-M threshold at VC1-ALT in the depth intervals spanning 3 feet to 15 feet, with concentrations ranging from 274 mg/kg to 361 mg/kg. Selenium exceeded the ER-M threshold at all depths sampled for VC1-ALT and VC2, with the exception of the 6-9 feet depth interval at VC2, with concentrations ranging from 1.22 mg/kg to 18.6 mg/kg. The only metal not detected in this group was antimony.

For samples collected in Group A, the ranges of concentrations of metals that exceeded the NJDEP thresholds are presented below:

- Arsenic - 8.37 mg/kg to 108 mg/kg
- Barium - 82.5 mg/kg to 135 mg/kg
- Cadmium - 1.62 mg/kg to 2.36 mg/kg
- Chromium - 97.6 mg/kg to 145 mg/kg
- Copper - 237.0 mg/kg to 504.0 mg/kg
- Lead - 185.0 mg/kg to 235.0 mg/kg
- Nickel - 24.3 mg/kg to 40.7 mg/kg
- Silver - 3.06 mg/kg to 4.58 mg/kg
- Zinc - 227 mg/kg to 336 mg/kg
- Mercury - 0.32 mg/kg to 5.28 mg/kg

For New Jersey samples from Group B, seven metals were detected at concentrations that exceeded the ER-L or ER-M thresholds and are presented below

- Arsenic exceeded the ER-L threshold at all depths sampled for VC3 and VC4, with concentrations ranging from 10.7 mg/kg to 17.5 mg/kg.
- Cobalt exceeded the ER-M threshold at VC3 at depths deeper than 6 feet and at VC4 at depths shallower than 6 feet, with concentrations ranging from 10 mg/kg to 11 mg/kg.
- Lead exceeded the ER-L threshold at VC4 from 0-3 feet (47.4 mg/kg).
- Manganese exceeded the ER-M threshold at all depths sampled for VC3 and VC4, with concentrations ranging from 372 mg/kg to 436 mg/kg.
- Nickel exceeded the ER-L threshold at all depths sampled for VC3 and VC4, with concentrations ranging from 24.6 mg/kg to 29.3 mg/kg.
- Selenium exceeded the ER-M threshold at all depths sampled for VC3 and VC4, with concentrations ranging from 8.36 mg/kg to 13.1 mg/kg.
- Mercury exceeded the ER-L threshold at VC4 from 0-3 feet (0.294 mg/kg).

For New Jersey samples from Group E, three metals (nickel, selenium, and mercury) exceeded NJDEP ER-L and ER-M thresholds. Two metals (antimony and molybdenum) were not detected in any of the sediment samples collected. Nickel exceeded the ER-L threshold only in the 9-12 feet interval at VC47. Selenium exceeded the ER-M threshold at VC46 (0-3 feet), VC47 (9-12 feet), VC50 (0-12 feet), VC51 (0-12 feet), and VC52 (3-9 feet), with concentrations ranging from 1.01 mg/kg to 2.12 mg/kg. Mercury exceeded the ER-L threshold at VC47 (0-3 feet) and VC54 (3-9 feet). The concentrations of mercury that exceeded the NJDEP thresholds ranged from 0.19 mg/kg to 0.51 mg/kg.

In New York samples from Group B, arsenic, cadmium, chromium, copper, lead, nickel, silver, zinc, and mercury exceeded the Class A thresholds, and six of these nine metals (arsenic, lead, nickel, silver, zinc, and mercury) also exceeded the Class B thresholds. Samples from three sites (VC6, VC7, and VC16) contained concentrations that exceeded the Class A/B thresholds for the nine metals listed above, and VC17 contained concentrations that exceeded the same thresholds for the same metals, excluding cadmium. At VC6, and VC7, all nine metals were detected between 0-3 feet at concentrations that exceeded the Class A/B thresholds, and the number of metals exceeding these thresholds decreased as depth increased. At VC16 and VC17 these exceedances were detected between 3-12 feet and 6-15 feet, respectively, and are as follows:

- Concentrations of arsenic that exceeded the NYSDEC thresholds ranged from 8.27 mg/kg to 87.8 mg/kg.

- Concentrations of cadmium that exceeded the Class A threshold ranged from 1.3 mg/kg to 3.5 mg/kg.
- Concentrations of chromium that exceeded the Class A threshold ranged from 86.5 mg/kg to 202.0 mg/kg.
- Concentrations of copper that exceeded the Class A threshold ranged from 36.4 mg/kg to 265.0 mg/kg.
- Concentrations of lead that exceeded the NYSDEC thresholds ranged from 47.4 mg/kg to 285 mg/kg.
- Concentrations of silver that exceeded the NYSDEC thresholds ranged from 1.22 mg/kg to 8.52 mg/kg.
- Concentrations of zinc that exceeded the NYSDEC thresholds ranged from 150 mg/kg to 494 mg/kg.
- Concentrations of mercury that exceeded the NYSDEC thresholds ranged from 0.19 mg/kg to 4.22 mg/kg.

In Group C, 26 metals were detected and two exceeded the Class A thresholds. The only metal not detected was silver, while the two metals that exceeded their Class A threshold, arsenic and nickel, were detected at all depths within each of the 18 sample locations. Arsenic exceeded the Class A threshold only at VC25 within the 9-11.5 feet depth interval at a concentration of 8.9 mg/kg. Nickel exceeded the Class A threshold from 0-6 feet at VC27, and within the 9-12 feet depth interval at VC29, at concentrations ranging from 29.1 mg/kg to 39.7 mg/kg.

In Group D, all 27 metals were detected and seven exceeded the Class A thresholds. Arsenic, copper and lead, and mercury exceeded their Class A threshold at locations VC37 and VC38 in the 0-3 feet intervals. The concentrations in exceedance of Class A thresholds at VC37 and VC38 for these four metals were: 12.8 mg/kg and 25.6 mg/kg for arsenic; 37.3 mg/kg and 73.7 mg/kg for copper; 89.8 mg/kg and 130 mg/kg for lead; and 3.51 mg/kg and 2.72 mg/kg for mercury, respectively. Nickel (23.8 mg/kg), silver (1.06 mg/kg), and zinc (154 mg/kg) also exceeded the Class A threshold at VC38 from 0-3 feet. Mercury (0.368 mg/kg) also exceeded the Class A threshold at location VC41-ALT from 0-3 feet.

In New York samples from Group E, 26 metals were detected and six exceeded the Class A thresholds. Arsenic, copper, lead, zinc, and mercury exceeded the Class A thresholds at VC42 (3-6 feet) and VC60 (0-3 feet). The concentrations in exceedance of Class A thresholds at VC42 and VC60 for these five metals were: 27.8 mg/kg and 8.27 mg/kg for

arsenic; 70.9 mg/kg and 43.1 mg/kg for copper; 172 mg/kg and 86.3 mg/kg for lead; 157 mg/kg and 69 mg/kg for zinc; and 3.83 mg/kg and 0.231 mg/kg for mercury, respectively. Nickel exceeded the Class A thresholds at VC42 (3-6 feet) and at VC47 (9-12 feet) with concentrations of 22.9 mg/kg and 23 mg/kg, respectively. Zinc (157 mg/kg) exceeded the Class A threshold at VC42 (3-6 feet). Mercury exceeded the Class A threshold at VC42 (6-9 feet) and VC60 (0-3 feet), with concentrations of 0.285 mg/kg and 0.231 mg/kg, respectively. Mercury also exceeded the Class B threshold at VC42 (3-6 feet) with a concentration of 3.83 mg/kg. Antimony was not detected in any of the sediment samples collected.

Cyanide

In New Jersey, total cyanide and cyanide amenable to chlorination was measured. Total cyanide was detected within samples collected from one sampling location in Group A (VC1-ALT [0-6 feet]) and three sampling locations in Group E (VC48-ALT [6-9.7 feet], VC51 [9-12 feet], and VC55 [3-9 feet]). Cyanide was not detected in any samples collected from Group B in New Jersey. Total cyanide concentrations ranged from 0.17 mg/kg to 1.5 mg/kg. A standard or guidance value for cyanide is not available in New Jersey.

In New York, total cyanide was detected in samples collected from three sampling locations in Group B (VC7 [0-3 feet]), VC16 [9-12 feet], and VC17 [9-12 feet]) and two sampling locations in Group C VC35 [3-6 feet] and VC36 [3-6 feet and 9-12 feet]). Cyanide was not tested for in any samples in Group D and Group E in New York. Total cyanide concentrations ranged from 0.25 mg/kg to 0.97 mg/kg. A standard or guidance value for cyanide is not available.

Pesticides

Pesticides were tested for in sediment samples (see Appendix 1D to RR1 for a complete list of these pesticides). Of these, only 13 have an existing standard or guidance value. All existing standards or guidance values for New York and New Jersey that are exceeded are presented in Table 7.4-4.

Table 7.4-4
Summary of Sediment Chemistry Tests and Screening Criteria

Test Description	EPA Method	Unit	NYSDEC Required Method Detection Limits	NJDEP or USACE Required Reporting Limits[a]	NJDEP Effects Range Low (ER-L)[b]	NJDEP Effects Range-Median (ER-M)[c]	NYSDEC Class A	NYSDEC Class C
Arsenic	EPA 6020A	mg/kg	3^	1	8.2	70	8.2	70
Barium	EPA 6020A	mg/kg	N/A	40	N/A	48	N/A	N/A
Cadmium	EPA 6020A	mg/kg	1	1	1.2	9.6	1.2	9.6
Chromium	EPA 6020A	mg/kg	N/A	1	81	370	N/A	N/A
Cobalt	EPA 6020A	mg/kg	N/A	10	N/A	10	N/A	N/A
Copper	EPA 6020A	mg/kg	5^	1	34	270	34	270
Lead	EPA 6020A	mg/kg	2^	0.6	47	218	47	220
Manganese	EPA 6020A	mg/kg	N/A	3	N/A	260	N/A	N/A
Mercury	EPA 7474	mg/kg	0.2^	0.1	0.15	0.71	0.15	0.71
Nickel	EPA 6020A	mg/kg	N/A	1	21	52	21	52
Selenium	EPA 6020A	mg/kg	N/A	1	N/A	1	N/A	N/A
Silver	EPA 6020A	mg/kg	N/A	1	1	3.7	1	3.7
Zinc	EPA 6020A	mg/kg	N/A	4	150	410	150	410
Benzene	EPA 8260C	µg/kg	0.3	10	340	N/A	460	1400
Total BTEX (Benzene, Toluene, Xylene)	EPA 8260C	µg/kg	0.8	10	N/A	N/A	960	5900
Fluorene	EPA 8270D	µg/kg	N/A	0.1	19	540	N/A	N/A
Total PAHs (sum of Target Compound List PAH)	EPA 8270D	µg/kg	330	N/A	4000	45000	4000	45000
Endrin	EPA 8081B	µg/kg	N/A	0.0036	3	130000	6	96
Sum of DDT+DDE+DDD	EPA 8081B	µg/kg	3.3	N/A	1.6	46	44	5700
PCBs (sum of Aroclors)	EPA 8082A	µg/kg	33	<100	23	180	100	1000

Table 7.4-4
Summary of Sediment Chemistry Tests and Screening Criteria

Test Description	EPA Method	Unit	NYSDEC Required Method Detection Limits	NJDEP or USACE Required Reporting Limits[a]	NJDEP Effects Range Low (ER-L)[b]	NJDEP Effects Range-Median (ER-M)[c]	NYSDEC Class A	NYSDEC Class C
PCBs (sum of congeners)	EPA 1668C	µg/kg	N/A	N/A	23	180	100	1000
Dioxins/Furans - Total Toxicity Equivalency Factor	EPA 1613B	pg/g	2000	N/A	N/A	3.65	4.5	50

[a] Unshaded cells present reporting limits from USACE/EPA *Guidance for Performing Tests on Dredged Material Proposed for Ocean Disposal* (2014). Shaded Cells present reporting limits from *The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters* (1997). If both documents provide reporting limits, only the lowest is shown here.

[b] NJDEP Ecological Screening Criteria (2009)

[c] Threshold values from NYS *Screening and Assessment of Contaminated Sediment* (2014), except values for total BTEX and dioxins/furans from NYS TOGS 5.1.9 (2004).

Key:

^Use the laboratory reporting limit if the value is less than the method detection limit shown in the table

N/A= Not available

In New Jersey, pesticides were not detected in any sediment samples collected from Group B and Group E. In Group A, a total of seven pesticides were detected in samples from VC1-ALT and three of these exceeded the ER-L threshold. The sum of the concentrations of DDD + DDE + DDT exceeded the ER-L threshold value from 6-12 feet and exceeded the ER-M threshold from 0-6 feet. The sum of the concentrations of DDD + DDE + DDT that exceeded these thresholds ranged from 14.21 µg/kg to 92.57 µg/kg. No pesticides were detected in samples from VC2 at concentrations that exceeded the NJDEP thresholds.

In New York, pesticides were not detected in any sediment samples collected from Group C. A total of seven pesticides were detected across six of the sample sites in Group B, located in New York. The sum of DDT + DDE + DDD was detected in exceedance of the Class A criteria within the 0-3 feet depth interval at VC6, and VC7 and within the entirety of VC16 and VC17. The sum of the concentrations of DDD + DDE + DDT that exceeded the Class A threshold ranged from 8.7 µg/kg to 99.0 µg/kg.

In Group D, positive results were obtained for five pesticides (aldrin, endrin, O,P'-DDE, P,P'-DDD, and P,P'-DDE) between VC38 (0-3 feet.) and VC41-ALT (0-6 feet.). The detected concentration of endrin did not exceed the Class A threshold and there are no standard or guidance values available for the other detected pesticides. The sum of DDT + DDE + DDD for location VC41-ALT in interval 0-3 feet (9.002 µg/kg) exceeded the Class A threshold. For samples in Group E and in New York, six pesticides (O,P'-DDD, O,P'-DDE, P,P'-DDD, P,P'-DDE, P,P'-DDT, and trans-chlordane) were detected in the 0-3 feet depth interval at VC63. A standard or guidance value is not available for any of the pesticides detected. The sum of the concentrations of DDT + DDE + DDD detected at VC63 in the 0-3 feet interval was 3.56 µg/kg, which did not exceed the Class A threshold.

Polychlorinated Biphenyls (PCBs)

PCBs were tested for as the sum of Aroclor compounds in sample locations in both New Jersey and New York. PCBs were also tested for as the sum of congeners in samples from locations in New Jersey and in samples from locations in New York where clamshell dredging may occur. A complete list of the PCB Aroclor compounds and congeners included in the analysis is provided in Appendix 1D to RR1. Thresholds for New York and New Jersey that are presented in Table 7.4-4.

For Group A, PCBs expressed as the sum of Aroclor compounds and the sum of congeners were detected and exceeded the ER-M threshold from 0-9 feet at VC1-ALT.

Concentrations of the sum of Aroclor compounds ranged from 291.6 µg/kg to 1,140.5 µg/kg. Concentrations of the sum of congeners ranged from 44,124 pg/kg to 1,597,166 pg/kg. For samples from Group B in New Jersey, PCBs expressed as the sum of Aroclor compounds were not detected in any sediment samples collected. PCBs expressed as the sum of congeners were detected in all sample sites at all depths. However, no sample locations contained concentrations exceeding the New Jersey ER-L threshold for total PCB congeners. For samples from Group E in New Jersey, PCBs expressed as the sum of Aroclor compounds were detected and exceeded the NJDEP thresholds at VC48 (0-9.7 feet) and VC55 (0-24 feet), with concentrations ranging from 61.9 µg/kg to 67.2 µg/kg and 109 µg/kg to 125 µg/kg, respectively. The sum of congeners were not detected in exceedance of the ER-L threshold.

For samples from Group B in New York, PCBs expressed as the sum of Aroclor compounds, were detected at concentrations that exceeded the Class A threshold within the 0-3 feet depth interval at VC6 and VC7 and within the entire depth of the samples from VC16 and VC17. Concentrations that exceeded the Class A threshold ranged from 161.0 ug/kg to 945.5 ug/kg. PCBs, expressed as the sum of congeners, were detected at all depths at VC5 through VC10 and VC15 through VC18 and exceeded the Class A threshold within VC6 (0-3 feet) and VC7 (0-3 feet), the entire depth of VC16, and VC17 (0-15 feet). The concentrations at these four sites ranged from 149,000 pg/g to 2,000,000 pg/g.

In Groups C and D, PCBs, expressed as the sum of Aroclor compounds, were not detected in any sediment samples. In Group C, PCBs expressed as the sum of congeners were detected at all depths sampled at VC35 and VC36. PCBs expressed as the sum of congeners did not exceed the Class A threshold within any of the sample locations. In Group D, PCBs expressed as the sum of congeners were detected at all depths at all locations, with the exception of VC39 at depths greater than 9 feet, but the concentrations did not exceed the Class A threshold in any of the samples. For samples collected from Group E in New York, PCBs expressed as the sum of Aroclors were detected at three sample locations but did not exceed the Class A threshold.

Volatile Organic Compounds (VOCs)

The following VOCs were tested for in sediment samples: benzene, ethylbenzene, m,p-Xylene, o-Xylene, xylenes, toluene, total benzene, toluene, ethylbenzene, and xylene (BTEX). In New Jersey, VOCs were detected in samples from one location in Group A and one location in Group E, but no VOCs were detected at a concentration that exceeded the ER-L threshold.

In New York, VOCs were detected in samples from two locations in Group B and one location in Group E, but no VOCs were detected at a concentration that exceeded the Class A threshold.

Semi-Volatile Organic Compounds (SVOCs), including Polycyclic Aromatic Hydrocarbons (PAHs)

Sediment samples were tested for SVOCs, including 15 PAHs (see Appendix 1D to RR1 for a complete list of these SVOCs). Thresholds for New York and New Jersey that are presented in Table 7.4-4.

In New Jersey, 31 SVOCs were detected at one sampling location in Group A, 19 SVOCs were detected at one sampling location in Group B, and 24 SVOCs were detected at six sampling locations in Group E. Of the SVOCs detected at the Group A location (VC1-ALT [0-9 feet]), 19 were detected at concentrations that exceeded the ER-L or ER-M thresholds. The concentrations of total PAHs that exceeded the ER-L threshold ranged from 4,225 µg/kg to 6,999 µg/kg. Of the SVOCs detected in Group B (VC4 [0-3 feet]), only fluorene (a PAH) was detected at concentrations that exceeded the ER-L threshold. The concentrations of fluorene that exceeded the ER-L threshold ranged from 21 µg/kg to 78.1 µg/kg. Of the SVOCs detected in Group E, 14 were detected at concentrations that exceeded the ER-L thresholds at VC54 (0-9 feet). The concentrations of total PAHs that exceeded the ER-L threshold ranged from 10,400 µg/kg to 15,400 µg/kg.

In New York, 29 SVOCs were detected across all sample locations in Group B; 18 PAHs were detected across all locations in Group C; 24 SVOCs were detected across all sample locations in Group D; and 18 SVOCs were detected across 12 sample locations in Group E. Of the SVOCs detected in Group B, total PAHs detected exceeded the Class A threshold at two sampling locations (VC16 [0-12 feet] and VC17 [0-12 feet]), with concentrations ranging from 4,540.0 µg/kg to 8,330 µg/kg. Of the PAHs detected in Group C, the concentrations of all individual PAHs and total PAHs were below the Class A thresholds at all sampling locations. Of the SVOCs measured in Group D, the concentration of total PAHS exceeded the Class A threshold at two sampling locations (VC37 [0-3 feet] and VC38 [0-3 feet]), with concentrations of 15,394 µg/kg and 21,861 µg/kg. Of the SVOCs detected in Group E, the concentration of total PAHs exceeded the Class A threshold at four sampling locations (VC42 [3-9 feet], VC62 [3-5 feet], VC63 [6-7 feet], and VC64 [3-6.1 feet]), with concentrations ranged from 4,813 µg/kg to 19,790 µg/kg.

Dioxins/Furans

Sediment samples were tested for a total of 7 dioxins and 10 furans (see Appendix 1D to RR1 for a complete list of these dioxins and furans). Of these, only one dioxin has an existing standard or guidance value. The total toxicity equivalence factor for dioxins and furans has existing standards in both New Jersey and New York, and is presented in Table 7.4-4.

In Group A, the total toxicity equivalency factor exceeded the ER-M threshold at VC1 (0-9 feet and 12-15 feet) and the entire depth of VC2, with concentrations ranged from 4.12 pg/g to 81.5 pg/g. For samples from Group B in New Jersey, the total toxicity equivalency factor exceeded the ER-M threshold at all sampling locations at all depths sampled, with concentrations ranging from 9.4 pg/g to 11.9 pg/g. For samples from Group E in New Jersey, the total toxicity equivalency factor exceeded the ER-M threshold at all depths for VC45-ALT, VC46, VC47, VC50, VC51, and VC52. The total toxicity equivalency factor also exceeded the ER-M threshold at VC54 from 6-9 feet. Concentrations in exceedance of the ER-M threshold at these seven sampling sites ranged from 5.83 pg/g to 9.94 pg/g.

For samples from Group B in New York, the total toxicity equivalency factor exceeded the Class A threshold at nine sampling locations, with concentrations ranging from 4.6 pg/g to 39.7 pg/g. In Group C, the total toxicity equivalency factor did not exceeded the Class A threshold at any sampling location. In Group D, the total toxicity equivalency factor exceeded the Class A threshold at VC37 (0-3 feet) and VC39 (3-6 feet), at concentrations of 4.7 pg/g and 6.2 pg/g, respectively. For samples from Group E in New York, the total toxicity equivalency factor was detected and did not exceed the Class A threshold.

APPENDIX D
OFFSHORE HORIZONTAL DIRECTIONAL DRILL CONTINGENCY PLAN



Transcontinental Gas Pipe Line Company, LLC

APPENDIX 1B TO RESOURCE REPORT 1

GENERAL PROJECT DESCRIPTION

ATTACHMENT 4B

OFFSHORE HORIZONTAL DIRECTIONAL DRILL CONTINGENCY PLAN

NORTHEAST SUPPLY ENHANCEMENT PROJECT

MARCH 2017

This page intentionally left blank.

TABLE OF CONTENTS

1 INTRODUCTION 1
2 HDD PROCESSES AND POTENTIAL CAUSES OF FAILURE 3
2.1 PILOT HOLE DRILLING 3
2.2 HOLE REAMING 4
2.3 PULLBACK PROCESS 5
2.4 MECHANICAL FAILURES 6
3 SEALING ABANDONED HDD BOREHOLES 7
4 REDUCING THE RISK OF INADVERTENT DRILLING FLUID RETURNS 8
5 CONTINGENCY PLAN FOR DRILLING FLUID RELEASE AND MITIGATION 10
5.1 DRILLING FLUID CONTAINMENT, COLLECTION SUPPLIES, AND EQUIPMENT 10
5.2 MITIGATION OF INADVERTENT DRILLING FLUID RETURNS 10
5.2.1 Onshore Returns 10
5.2.2 Offshore Returns 12
6 ENVIRONMENTAL INSPECTION AND TRAINING 14
7 CONTACT INFORMATION 15

LIST OF APPENDICES

Appendix A Environmental Incident Report

LIST OF ACRONYMS AND ABBREVIATIONS

EI	Environmental Inspector
EPA	U.S. Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
HDD	horizontal directional drill
NJDEP	New Jersey Department of Environmental Protection
PADEP	Pennsylvania Department of Environmental Protection
PFBC	Pennsylvania Fish and Boat Commission
Plan	Horizontal Directional Drill Contingency Plan
Transco	Transcontinental Gas Pipe Line Company, LLC.
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

1 INTRODUCTION

Transcontinental Gas Pipe Line Company, LLC. (Transco) is proposing to use horizontal directional drill (HDD) construction methods as an alternative crossing method at two offshore locations throughout the Northeast Supply Enhancement Project (Project). Transco conducted geotechnical studies at each proposed HDD crossing to evaluate the risks inherent in using HDD crossing methods and determined that each proposed HDD crossing is feasible. Transco has developed this Horizontal Directional Drill Contingency Plan (Plan) to establish procedures for handling these inherent risks, e.g., abandoned HDD drill holes, crossing contingency methods if the drill is abandoned, and to address potential impacts associated with inadvertent releases of drilling fluid returns during the HDD process. This Plan identifies operational procedures and responsibilities for abandoning HDD drill holes, and the prevention, containment, and clean-up of drilling fluids that have ponded on the ground surface or within a water body in response to an inadvertent release of drilling fluid event during HDD operations. The specific objectives of this Plan include:

- Defining the HDD process and how to identify when the HDD has failed and should be abandoned;
- Identifying the procedures that will be followed when an HDD drill hole has to be abandoned;
- Minimizing the potential for an inadvertent release of drilling fluids;
- Identifying the timely detection of an inadvertent release of drilling fluids;
- Providing for environmental protection of waterbodies and associated habitats, in the event an inadvertent release occurs;
- Establishing response procedures to address containment and clean-up of an inadvertent release of fluids; and
- Providing for notifying the appropriate parties and regulatory agencies, in the event an inadvertent release of fluids.

Transco will ensure that all contractors comply with the methods outlined herein during construction, restoration, and operation of the Project. Contractors will be trained on the requirements of this Plan during mandatory pre-construction environmental training. Compliance with these requirements will be documented in the field by Environmental Inspectors (EIs) in weekly construction inspection reports, which will be submitted to the Federal

Energy Regulatory Commission (FERC) for review and comment. This Plan is subject to revision based on new data or on agency recommendations.

2 HDD PROCESSES AND POTENTIAL CAUSES OF FAILURE

There are three basic steps to install a pipeline crossing using HDD:

1. Pilot hole drilling;
2. Hole reaming; and
3. Pipe pullback.

This section briefly describes the HDD process and some potential causes of failure associated with each installation step.

2.1 PILOT HOLE DRILLING

The first step in the HDD sequence is to drill the initial hole beneath the proposed crossing along a predetermined alignment. The pilot hole is drilled using either a downhole displacement mud motor connected to a tri-cone rotary bit or a jetting assembly. Drilling fluid pumped through the annulus of the drill pipe helps to expedite the mud motor or jetting assembly in cutting the soil, sediment, or rock strata. The drilling fluid also helps lubricate the drill stem, suspends and carries the drilled cuttings to the surface, and forms a wall cake to keep the hole open. The HDD drilling fluid is composed primarily of fresh water and bentonite, a naturally occurring, nonhazardous clay that serves as a viscosifier. If needed to manipulate the rheological properties for optimized drilling operations, the drilling fluid may also be augmented with starch, cellulose, non-toxic polymers, and/or crystalline silica. Control of the drill bit is achieved by using a non-rotating drill string with an asymmetrical leading edge. This leading edge creates a steering bias that is held in a precise position during drilling.

A successful pilot hole provides pertinent data that helps to determine the potential success of the crossing. Data obtained from the pilot hole includes the rate of penetration to be expected and confirmation of the geologic strata. The HDD contractor can then confirm a plan for enlarging the hole to the required diameter. The diameter required to install the pipeline will vary depending on the confirmed geologic strata and the HDD contractor's judgment.

Failure during the Pilot Hole Process

The failure mode that may occur during the pilot hole drilling is the hole collapsing on the drill pipe string. This is typically caused by either not being able to maintain hole stability or unfavorable drilling strata that contain non-cohesive alluvial material, e.g., gravel and/or cobbles. If the hole collapses on the drill pipe and creates high friction on the drill pipe surface, the torque required to rotate the drill pipe will likely increase. The increased friction may either

bind the drill pipe in such a way that it cannot be moved or, if the torque applied to the drill pipe by the drill rig exceeds the strength of the drill pipe, the force may cause the drill pipe to either shear or twist into two or more pieces. The longer the drill length, the more probability there is of this type of failure if non-cohesive alluvial materials are present. Typically, HDD installation will be considered a failure if there are two unsuccessful attempts at completing the pilot hole. If this happens, Transco will review an alternate crossing profile or location for the HDD.

2.2 HOLE REAMING

The second step consists of one or more hole-reaming passes. There are two types of tools that enlarge the pilot hole:

- Flycutters, used for most soil and sediment formations.
- Rock hole-opening tools, used for very dense soil, sediment, or rock formations.

Typically, the hole-opening tool is attached to the drill pipe string that drills the pilot hole and is then rotated and pulled back towards the drill rig from the exit point. The number of reaming passes varies depending on the soil/sediment conditions and carrier pipe size. Depending on the stability of the hole, the HDD contractor may use a barrel reamer, typically several inches smaller than the outside diameter of the final hole-opening tool, and pull it through the hole immediately prior to pullback. This is typically referred to as a swab pass. The purpose of the swab pass is to ensure the establishment of a good drilling fluid wall cake, a clean hole, and a hole full of drilling fluid with the proper density. Drilling through rock formations typically requires multiple passes, with each pass increasing the diameter of the hole until the desired diameter is achieved. Drill pipe is typically added behind the tool at the exit to keep the drill pipe in the hole for the entire length of the crossing.

A significant length of time may be needed to enlarge the hole to the required diameter. As the length of time to complete this process increases, the probability of failure also increases. This is especially true when drilling in a soil/sediment stratum that is loose or unstable (gravel or cobbles). At times, the loose material can be drilled very quickly, but maintaining an open hole through the unstable soil/sediment strata over an extended period of time can be very difficult.

Failure during the Hole Reaming Process

The main reason for failure during hole reaming is material collapsing into the hole, which in turn has been caused by a lack of an adequate bentonite wall cake. With each reaming pass, the large volume of drilling fluid being dispersed through the tool tends to expand

into voids in the annulus of the drilled hole. Because of the inability to support the soils/sediments, the hole becomes unstable and can lead to diminished drilling fluid returns. If the drilling fluid is no longer able to carry the drilled cuttings out of the hole, an excessive amount of cuttings would remain in the hole. The cuttings would slowly build up in the bottom of the hole, increasing the friction on the drill pipe and creating additional stress on the drill pipe. The increased friction can cause the drill pipe to slow or stop rotation to a point where the drill rig cannot supply enough torque to continue reaming without causing drill pipe failure. The two main types of failure in rock formations are the reaming tool breaking apart due to excessive wear on the tool and weathered rock or cobbles collapsing into the hole.

If the penetration rates are extremely slow, excessive stress can occur on the arms holding the roller cutting cones. If the wear is too excessive, the roller cones can separate from the tool, leaving the tool unable to cut or rotate. If the tool can still be removed from the hole, and the missing pieces retrieved from the hole, the hole opening pass may resume with different downhole tools.

HDD installation would be considered a failure after two unsuccessful attempt at retrieving tools or equipment downhole and if it has been determined that the hole reaming operation cannot be completed. If failure occurs, the HDD contractor shall then demobilize and remove the equipment from the site after approval from Transco. If this happens, Transco will review an alternate crossing profile of location for the HDD.

2.3 PULLBACK PROCESS

The last step to complete a successful installation is the pullback of the prefabricated pipeline into the enlarged hole. A reinforced pullhead is attached to the leading end of the pipe and to a swivel that is connected to the drill pipe. The swivel is placed between the drill pipe string and the carrier pipe to minimize rotation and torsion from being transferred to the pipeline.

The pipeline may be buoyant in the drilling fluid during the pullback process and may require the pipe to be filled with a calculated amount of water to keep the pipeline as close to neutral buoyancy as possible. The following problems could occur if the pipe is not allowed to remain neutrally buoyant in the hole during the pullback process:

- Skin friction of the pipeline will increase, which will then increase the load that the drill rig has to pull. The pipeline could be damaged if an excessive amount of pull tension has to be applied to the pipe to continue the pullback process.

- The leading edge of the pullhead could dislodge a cobble or rock fragment, binding the pipeline and making it impossible to move in either direction.
- The external coating could be damaged by sharp and/or protruding material and highly abrasive material (coarse sands).

The pull section is also supported with a combination of roller stands, pipe-handling equipment, and/or a floatation ditch to further minimize excessive tension on the pipe and prevent the carrier pipe from being damaged during the pullback process. The HDD pipe will be coated with an abrasion-resistant overlay to prevent pipeline damage.

Failure During the Pullback Process

Failure of the pullback process occurs when the pipe becomes lodged in the hole and is unable to be moved in either direction. If this occurs, Transco and the contractor will assess the situation and determine the appropriate course of action. Transco will, based on site-specific conditions, conduct agency consultation if needed.

2.4 MECHANICAL FAILURES

This type of failure occurs if there is a major mechanical breakdown. If the drill pipe remains idle for an extended time, the material in the drilled hole annulus can seize the drill pipe string in place and prevent further movement such that the drill pipe may not continue to rotate or move in either direction. If this occurs during pilot hole drilling, the contractor will be required to change the alignment of the crossing to miss the abandoned hole and start the drilling process from the beginning.

HDD installation method may be considered a failure if after either repairing or replacing the broken drilling rig or vital piece of ancillary equipment, the drill pipe, hole-opening tool, or pipeline cannot be rotated or pulled. If failure occurs, the HDD contractor shall then demobilize and remove the equipment from the site after approval from Transco. If this happens, Transco will review an alternate crossing profile of location for the HDD.

3 SEALING ABANDONED HDD BOREHOLES

If for any reason an HDD hole must be abandoned, the HDD contractor will fill the abandoned hole with grout to completely seal it off. The HDD contractor will grout the top 5 vertical feet of the abandoned hole at the onshore entry side of the crossing by inserting a grout tremie pipe into the drilled hole annulus. The grout will be a cement-type grout. As the grout is pressured into the drilled hole annulus, the tremie pipe will be extracted from the hole so the grout mixture is allowed to sufficiently displace any drilling fluid that may have remained within the hole. The top 12 inches of the hole will be backfilled with the native material, and the HDD contractor will not demobilize until Transco approval has been received.

For offshore entry/exit holes, the minimum extent of grouting will be to completely seal and fill the upper 30 feet of the hole entirely with grout. The top 5 feet of the hole will be backfilled with native material. In the event native material is not available, Transco will use a clean, compatible material to backfill the hole. If deemed necessary by Transco, the HDD contractor may be required to complete grouting up to and including the entire abandoned hole to reduce the risk of inadvertent drilling fluid returns from adjacent HDD alignments, or to comply with applicable regulatory requirements or other Project conditions.

The cement grout mixture used to abandon a borehole will be pumped downhole through the drill pipe used to drill/ream the hole. The grout mix will be designed generally for each HDD location based on the geologic formation(s) along the abandoned portion of the hole. Additional modifiers, such as those used in structural concrete, may be used to modify the viscosity and/or set time of the grout. To grout the abandoned hole, the HDD contractor will extract all cutting tools (i.e., reamer and cutting heads) from the hole, advance the drill pipe into the hole to the required grout depth, and begin pumping the grout mixture while the drill pipe is extracted from the hole. The rate at which the drill pipe is extracted during grouting operations will be regulated to match the rate of grout placement.

4 REDUCING THE RISK OF INADVERTENT DRILLING FLUID RETURNS

Drilling fluids have several functions that support an HDD installation. The primary functions include:

- Cooling and lubrication of drilling tools, drill pipe, and the carrier pipe.
- Rotation of the drill bit (using a positive displacement mud motor in bedrock installations).
- Suspension of cuttings within the drilling fluid/slurry mixture.
- Removal of soil/sediment/bedrock cuttings from the bore during each phase of the installation process.
- Providing a hydrostatic fluid pressure in the bore that offsets natural groundwater formation pressures.
- Stabilizing the bore and preventing raveling of surrounding soil/sediment/bedrock materials. Stabilization of the bore is provided from the combination of developing a low-permeability bentonite filter cake along the bore walls and applying a positive fluid pressure to the surrounding bore walls. This supporting pressure is derived from the presence of the column of drilling fluid within the bore.

Prior to beginning construction, a specific scope of work will be developed for each trenchless crossing, and the contractor will be required to address all of the requirements in the specifications, plans, and scope of work. Transco's HDD contractor will be required to maintain a certified and approved drilling fluids engineer/technician on-site during all phases of the HDD installation process to assist the HDD contractor with managing and optimizing drilling fluid functions.

The HDD profiles will be designed to provide sufficient depth of cover to reduce the potential for inadvertent drilling fluid returns. During HDD installation, the HDD contractor will make every effort to maintain drilling fluid circulation and reduce the potential for inadvertent drilling fluid returns. The efforts may include but will not be limited to:

- Proper drilling fluids management.
- Daily inspection and repair of equipment components (e.g., drilling equipment, hydraulic hoses, and pumps).
- Using special downhole monitoring equipment to monitor fluid pressure.

- Using best management practices to remove cuttings from the hole and maintaining an open flow path from the downhole tooling to the drill rig.
- Using casing as needed to reduce the potential for inadvertent drilling fluid returns near the entry or exit points.
- Maintaining adequate drilling fluid flow rates and penetration rates.

If drilling fluid returns to the drill rig are lost during HDD operations, the HDD contractor will cease drilling operations and visually inspect the water surfaces along the HDD alignment for inadvertent returns. The HDD contractor will make reasonable attempts to restore drilling fluid circulation, which may include:

- Extracting the downhole drill pipe string and tooling until drilling fluid returns are restored.
- Manipulating drilling fluid properties, consulting with the on-site drilling fluid engineer/technician.
- Installing small-diameter casing over the downhole drill pipe string through overburden soils.

If the integrity of the drilled hole or the HDD profile geometry is compromised through attempts to restore drilling fluid returns, the HDD contractor will notify Transco or the authorized representative. If it is determined that further attempts to restore drilling fluid returns may compromise the HDD installation or are unlikely to be successful, the HDD contractor will proceed with modified drilling procedures to reduce the risk of inadvertent drilling fluid returns. These procedures may include slowing the rate of penetration, drilling or reaming the hole from the other direction, or using large-diameter casing, if necessary.

5 CONTINGENCY PLAN FOR DRILLING FLUID RELEASE AND MITIGATION

5.1 DRILLING FLUID CONTAINMENT, COLLECTION SUPPLIES, AND EQUIPMENT

The HDD contractor will monitor the HDD alignment for signs of inadvertent drilling fluid returns and will keep adequate spill containment and collection equipment and supplies on-site at all times to contain and collect any release of drilling fluids to the ocean. All areas contaminated by drilling fluid migration and release will be cleaned up and restored to the original condition, according to applicable regulatory agency requirements, or as accepted by Transco and FERC. Equipment stored on-site for immediate response may include, but is not limited to:

- Several 5-gallon buckets and plastic sheeting;
- Several 55-gallon drums;
- Portable spill containment booms, absorbent pads, turbidity curtains or other portable spill containment kits;
- Leak-free hoses and portable pumps; and
- Underwater boom and curtain.

5.2 MITIGATION OF INADVERTENT DRILLING FLUID RETURNS

If inadvertent drilling fluid returns are observed, the HDD contractor will immediately disengage the high pressure drilling fluid pumps, suspend drilling operations, and notify the EI(s) and Transco or their authorized representative. Transco or their authorized representative will notify all concerned parties and regulatory agencies. A complete list of appropriate regulatory agencies and their contact information will be prepared and distributed prior to construction.

5.2.1 Onshore Returns

If inadvertent drilling fluid returns are detected onshore, the drilling crew will take immediate corrective action. For the duration of drilling operations, the drilling personnel will be aware of what containment materials would be needed when responding to an onshore release of drilling fluid and will have these items available on-site. Since inadvertent drilling fluid returns can be easily controlled onshore, these materials will be stored in the entry site work area along with spill kits. Containment items may include lumber for temporary shoring, sand bags, portable pumps, hand tools, silt fencing, and hay bales. The HDD contractor will also keep heavy equipment that can be used to control and clean up the drilling fluids (e.g., excavators and backhoes) in accessible locations. Transfer pumps, hoses, and possibly vacuum trucks

may be used if necessary for transferring any inadvertent drilling fluid released onshore. After removal of the released drilling fluid, the release area will be returned as close to the original condition as feasible. It may be necessary to store the drilling fluid on-site before disposal.

In the event of an inadvertent return onshore the HDD contractor will:

- Take immediate measures to contain the inadvertent drilling fluid returns to the extent practicable.
- Collect the inadvertent drilling fluid returns using pumps and/or vacuum trucks, if of sufficient volume.
- Document the size and impacts of the drilling fluids with photographs.
- Follow the direction of the on-site EI for cleanup and mitigation requirements.
- Remove the drilling fluids and restore the site to pre-existing conditions. Clean-up work will be performed by hand to the maximum extent possible. All collected materials will be disposed of at an approved location or processed through the drilling fluid-separation plant.
- Document the cleanup procedures, changes made to the drilling fluid properties or drilling process to prevent future releases, and photograph the conditions of the cleaned up area.
- Adjust drilling fluid properties to inhibit further flow through the leak origin, clear potential blockages in the HDD bore by extracting several or all drill pipe joints and tooling, and/or allow the area to sit or rest for a suitable period to allow the cracked pathway to naturally close.
- Evaluate any further steps that may increase the potential for regaining returns to entry/exit points. This may include advancing the tools in the opposite direction in an attempt to regain drilling fluid returns.
- Once the inadvertent drilling fluid returns are contained and collected, the HDD contractor may resume drilling operations using modified drilling techniques. These modified techniques will be used to reduce further inadvertent drilling fluid returns while maintaining full-time monitoring of the inadvertent drilling fluid returns area to ensure that containment and collection measures are sufficient to handle any additional inadvertent returns that may result from resuming operations.

If the inadvertent returns are observed in an environmentally or culturally sensitive area, the HDD contractor will, in addition to the measures listed above, contain the inadvertent returns with straw bales or sand bags, if practical without additional disturbance, if possible.

In addition to the measures noted above, Transco will:

- Notify the appropriate regulatory agencies and the property owner representative regarding their next course of action(s) to protect the sensitive resource.
- If the release becomes excessively large, a spill response team will be called in to contain and clean up excess drilling mud. Phone numbers of spill response teams in the area will be on-site.

After the inadvertent drilling fluid return has been assessed, the HDD contractor and Transco will make every effort to determine why the seepage occurred. Once the cause of the drilling fluid release has been determined, measures will be developed to control the factors causing the seepage and to minimize the chance of recurrence. Developing the corrective measure will be a joint effort of Transco and the HDD contractor and will be site- and problem-specific.

5.2.2 Offshore Returns

A significant inadvertent return occurring offshore may be detected by a visible plume. Minor seepage, however, may be difficult to detect because of currents and the high specific gravity of the drilling fluid. If an inadvertent drilling fluid release is detected offshore, outside of the exit pit, it will be monitored and documented. Drilling activities may be temporarily suspended to evaluate possible implementation of mitigation measures to regain hole integrity. Drilling activities will not be suspended unless the volume of inadvertent drilling fluid returns creates an immediate threat to public health and safety. If an extended shutdown were required to try to reduce the turbidity or amount of drilling fluid being released, it could lead to a hole collapse and, ultimately, a failure in the HDD. This could require drilling a new hole and would therefore extend the duration of the Project.

Removal of drilling fluid surfacing offshore is not feasible because of the strong currents in the area. The exit pit is designed to contain the exiting fluid and cuttings. Drilling fluid returns and cuttings entering the exit pit will be left to naturally dissipate or settle into the excavated pit. Any inadvertent leakage would be expected to disperse naturally with the currents.

In the event an inadvertent return is observed offshore the following actions will be taken:

- The magnitude of the offshore return will be qualitatively determined.
- If warranted by the volume of the drilling fluid return, drilling fluid pumps will be stopped.
- The Transco representative will be notified and will contact the appropriate agencies.
- Drilling fluid properties will be adjusted to inhibit further flow through the leak origin; potential blockages in the HDD bore will be cleared by extracting several or all drill pipe joints and tooling; and/or the area will be left to sit or rest for a suitable period to allow the cracked pathway to naturally close.
- Any further steps that may increase the potential for regaining returns to entry/exit points will be evaluated. This may include tripping the tools in the opposite direction in an attempt to regain drilling fluid returns.

After the inadvertent drilling fluid return has been assessed, the HDD contractor and Transco will make every effort to determine why the seepage occurred. Once the cause of the drilling fluid release has been determined, measures will be developed to control the factors causing the seepage and to minimize the chance of recurrence. Developing the corrective measure will be a joint effort of Transco and the HDD contractor and will be site- and problem-specific.

6 ENVIRONMENTAL INSPECTION AND TRAINING

An EI experienced in HDD and associated environmental protection measures will work with the contractor to verify that the proper equipment and materials are available on-site at all times and that the necessary procedures are followed on a daily basis. Prior to the start of construction, the EI will conduct a training session with all key HDD contractors, drilling, and inspection personnel. All such personnel will be thoroughly trained in the applicable inadvertent release of drilling fluid contingency plan procedures. On-site safety and environmental protection meetings will provide ongoing communications and awareness measures regarding prevention, mitigation, and response associated with potential inadvertent drilling fluid releases.

Visual observations along the land and water portions of the HDD alignment will be completed on a regular basis throughout the drilling program. The frequency of these observations will be greatest during the pilot bore and initial reaming passes where the probability of an inadvertent release of drilling fluid event occurring is the highest.

7 CONTACT INFORMATION

Transco will provide a technical consultant on-site during the HDD process to keep adequate documentation such as daily progress reports, as-built information, etc., describing the events leading up to the failure. Transco will then submit this documentation to the necessary agencies for their review and approval that the drill has failed at the present alignment. The HDD contractor will not demobilize until Transco approval has been received.

The following Project representatives will be notified in the event of an inadvertent release of drilling fluids:

Transco

Joseph Dean
Manager, Environmental Permitting
2800 Post Oak Blvd
Houston, TX 77056
Phone: 713-215-3427

The following regulatory agency representatives will be notified in the event of an inadvertent release of drilling fluids:

FERC

Christine Allen
Project Manager
Federal Energy Regulatory Commission
888 First Street NE
Washington DC, 20426
Phone: 202-502-8056

Additional Agencies for Notification

- U.S. Army Corps of Engineers (USACE) – *(Contact information to be provided prior to construction)*
- U.S. Fish and Wildlife Service (USFWS) - *(Contact information to be provided prior to construction)*
- U.S. Coast Guard (offshore only) - *(Contact information to be provided prior to construction)*
- New Jersey Department of Environmental Protection (NJDEP) - *(Contact information to be provided prior to construction)*
- New York State Department of Environmental Conservation (NYSDEC) – *(Contact information to be provided prior to construction)*

An incident report (see Appendix A) should be prepared for hazardous waste releases and submitted as soon as possible but not later than 15 days after the spill. The report should include, at a minimum:

- an updated listing of all the information provided in the verbal notification;
- actions taken to respond to and contain the release;
- any known or anticipated acute or chronic health risks associated with the release;
- a summary of all actions taken by the owner or operator to prevent a recurrence; and
- other information as may be required.

APPENDIX A

ENVIRONMENTAL INCIDENT REPORT

Environmental Incident Report	
Location (Facility/Specific Location):	
Date Incident Occurred:	
Time Incident Occurred:	
Type of Incident (Check all that apply):	
☐ Contaminated Groundwater/Soil ☐ Fish Kill ☐ Hazardous Substance Spill/Release ☐ Migratory Bird ☐ Other _____	☐ Oil Spill ☐ PCB Spill ☐ Storage Tank (leak or other problem) ☐ Wildlife Concern
If Spill:	
Type of Substance:	
Origin of Substance:	
Amount (if known):	
Spill On (floor, ground, water):	
Oil Spill to Water or Storm Drain (If any selection is entered, written notice to EPA is due within 60 days)	☐ Spill greater than 1,000 gallons ☐ Two spills > 42 gal. within a 12-month period Date of Previous Spill _____
Description of Incident (include cause, if known, specific location, amount, duration, and impact on environment)	

Immediate Action/Cleanup Procedures			
Action Taken or Planned to Prevent Recurrence			
Notifications Made			
	Name	Date	Time
Emergency Response Coordinator			
Other facility Personnel			
Environmental Services			
State Agency			
National Response Center			
Other (i.e., Local Agency)			

Regulatory Personnel on the Scene (Name and Agency)	
Site Contact for Additional Information (Name and Title)	**Telephone Number** (With Area Code)
Incident Reported By (Name and Title)	**Telephone Number** (With Area Code)
Form Completed By (Signature)	**Date** (MM/DD/YYYY)

This page intentionally left blank.

APPENDIX E
CLEAN FILL CERTIFICATION TEMPLATE

GAS PIPE LINE – TRANSCO
99 Farber Road
Princeton, N.J. 08540
(609) 936-2400
Fax: (609) 936-2430

CERTIFICATION OF CLEAN FILL

This certificate is being provided as required in NJAC 7:26E-6.4(b) 2iv to document that the quality of the fill being used to backfill and/or cap this site is virgin material from a commercial or noncommercial source or decontaminated recycled soil. The following information is related to the material being provided for the project in question.

Name of Material Supplier:_____

Relationship to the Source of Fill:_____

Location Where Fill was Obtained:_____

Street:_____ Town:_____ State:_____

Lot:_____ Block:_____ County:_____

Brief History of the Source of Fill:

_____
_____
_____
_____
_____
_____

*"To the best of my knowledge and belief, the fill provided for this project is **NOT** contaminated pursuant to any applicable remediation standards"*

Signature: _____

Name: _____ Company: _____

Title: _____ Date: _____

This page intentionally left blank.