Results you can rely on

New York
Linear Construction Project Report
Spectra Energy NJ-NY Expansion Project

Prepared for:

Spectra Energy
890 Winter Street
Suite 300
Waltham, MA 02451

Prepared by:

TRC Environmental Corporation
57 East Willow Street
Millburn, New Jersey 07041

February 2014

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 Project Description and Background

Spectra Energy Corp ("Spectra Energy") has expanded and modified its existing natural gas pipeline systems in New Jersey, New York, and Connecticut to serve high-growth markets in the tri-state area, including a new direct pipeline connection in the Borough of Manhattan, New York to meet residential and commercial demands for energy. To accomplish this, Spectra Energy pipeline companies, Texas Eastern Transmission, LP ("Texas Eastern") and Algonquin Gas Transmission, LLC ("Algonquin") jointly filed an application for Certificates of Public Convenience and Necessity ("Certificates") from the Federal Energy Regulatory Commission ("FERC"). Texas Eastern and Algonquin obtained authorization on May 21, 2012 to construct and operate the New Jersey-New York Expansion Project ("NJ-NY Project" or "Project") to expand their existing pipeline systems located in New Jersey, New York, and Connecticut under Section 7(c) of the Natural Gas Act ("NGA"); and to abandon certain facilities under Section 7(b) of the NGA. Refer to Figure 1 for a map of the Project which shows an overview of the locations of new facilities and their association with pre-existing pipeline facilities.

The NJ-NY Project was developed in response to market demands in New York City and the New Jersey Metropolitan Area, and interest from shippers that require transportation capacity to accommodate increased receipts of natural gas at the east end of the Texas Eastern and Algonquin systems. The Project is to provide three non-jurisdictional facilities operated by Consolidated Edison Company's ("Con Edison") in Manhattan and Staten Island, New York, Public Service Electric and Gas Company ("PSEG") and the International-Matex Tank Terminals ("iMTT") in Bayonne, New Jersey with access to diverse natural gas supplies from liquefied natural gas ("LNG") and Canadian gas supplies via Algonquin's system; access to supplies from the Gulf Coast, Midcontinent, and Rockies through Texas Eastern's system; and access to the growing supply of natural gas from the Marcellus Shale Basin via both pipeline systems.

The Con Edison facilities would deliver gas from the NJ-NY Project pipeline into Con Edison's existing system for distribution to Con Edison customers in New York City. The connection has been made in an underground vault on the east side of State Route 9A (West Street) along 10th Avenue between Gansevoort Street and West 15th Street. The non-jurisdictional facilities would become part of Con Edison's natural gas pipeline distribution system, which is regulated under an existing franchise agreement by the New York State Public Service Commission ("NYSPSC").

The PSE&G facilities involve an approximately 280-foot-long, 12-inch-diameter pipeline connection between the proposed Project pipeline at the proposed Bayonne M&R Station, and an existing 12-inch-diameter PSE&G distribution line that runs along Centre Street, adjacent to the M&R station. The iMTT facilities include a 350-foot-long, 8-inch-diameter pipeline connection between the iMTT M&R Station outlet and the existing Morris Energy co-generation plant facilities.

As part of the modifications to existing pipeline facilities and construction of new facilities, the Project has included:

- Construction and operation of 20.3 miles of new and replacement 42- and 30-inch diameter pipeline;
- Abandonment of 8.95 miles of existing pipelines;
- Construction and operation of seven (7) new metering and regulating ("M&R") stations;
- Modification of four existing compressor stations;
- Installation of above ground over-pressure protection regulation at one existing M&R station;
- Installation of three (3) pig launchers and two (2) pig receivers, relocation of four (4) pig receivers, and removal of two (2) pig launchers;
- Installation of four (4) mainline and three (3) tap valves along the pipeline facilities; and,
- Installation of a block valve and blind flange to accommodate a temporary pig receiver.

1.2 Environmental Impacts and Mitigation

The Project has traversed a variety of soil types and conditions, many of which have been disturbed by human activity. In addition, multiple areas of known soil contamination have been encountered during construction activities. In order to minimize general construction-related impacts on soils and groundwater, an Erosion and Sedimentation Control Plan ("E&SCP") was implemented along with a Spill Prevention, Control, and Countermeasure Plan ("SPCC Plan") to reduce the likelihood of a spill and to contain and cleanup a spill should one occur.

To identify and characterize existing contamination in Project areas, a soil and groundwater sampling program was implemented. Extensive research was conducted prior to construction into the condition of soils and groundwater that would be encountered along the NJ-NY Expansion pipeline route. Files were reviewed for over 250 sites in the cities of Linden, Bayonne and Jersey City, New Jersey and in the boroughs of Staten Island and Manhattan, New York. A comprehensive database was created that included a graphical representation of critical environmental parameters.

Due to the industrial history of the area, the soil and groundwater have been impacted with a broad suite of contaminants. The contaminants that are present along the pipeline facilities include:

- Volatile organic compounds ("VOCs") – including those present in petroleum products (such as benzene, toluene, ethylbenzene and xylenes) and chlorinated solvents (such as trichloroethene, tetrachloroethene, and trichloroethane);
- PAHs – typically found in petroleum fuels, asphalt and coal;
- Free petroleum product including gasoline, fuel oil and other liquids and tars;
- Polychlorinated biphenyls ("PCBs");
- Pesticides; and,
- Metals including but not limited to lead, arsenic, cadmium, and chromium.

In addition to the chemicals associated with past and present industrial practices, the material that was used to fill in wetland areas often contained contaminants due to the use of coal cinders and ash, construction debris, and other waste materials as fill. Typical contaminants associated with this "historic fill" include PAHs and metals.

In response to the historical contamination identified during the pre-construction due diligence, an Excavation Management Plan ("EMP") was developed for handling regulated soil and groundwater generated during construction activities. The EMP was submitted to the New York State Department of Environmental Conservation ("NYSDEC") for their review and consultation in March 2012.

Following the EMP approval by the NYSDEC, a pre-characterization boring program was implemented to verify the locations and extent of petroleum impacts and potentially hazardous materials along the proposed pipeline route, and to characterize the soil and groundwater along the route for proper disposal. At each boring location, geological descriptions of soils were recorded in boring logs and soil samples were collected for chemical analysis. At selected borings, temporary monitoring wells were installed to evaluate groundwater conditions along the pipeline route. Short-term pumping tests were performed to provide data regarding the hydraulic properties of the soils below the water table. Hydraulic data was used to estimate the rate of groundwater inflow to the trench at various sections of the route.

At the completion of anticipated construction activities, a Final Linear Construction Report was prepared and subdivided into two reports describing the portions of the project in New Jersey and New York separately. The New York portion of the Final Linear Construction Report has been submitted to the NYSDEC for their review and files. The Scope of the Final Linear Construction Report is limited to contaminated Sites and properties that are under the jurisdiction of a program of the NYSDEC Division of Environmental Remediation.

The principal Standards, Criteria, and Guidance ("SCG") that are applicable, relevant and appropriate that were considered as part of the Linear Construction Project through the New York portion of the project include the following:

- 6 New York Code of Rules and Regulations ("NYCRR") Part 375-6 Soil Cleanup Objectives;
- New York State Groundwater Quality Standards – 6 NYCRR Part 703;
- NYSDEC Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations – Division of Water Technical and Operational Guidance Series ("TOGS") 1.1.1;
- NYSDEC Draft Department of Environmental Remediation Technical Guidance for Site Investigation and Remediation ("DER-10") – May 2010;
- NYSDOH Generic Community Air Monitoring Plan ("CAMP"); and,
- New Jersey Department of Environmental Protection Linear Construction Technical Guidance ("NJDEP LCP") – January 2012.

Additional regulations and guidance are applicable, relevant, and appropriate (such as 6 NYCRR Part 360, Solid Waste Management Facilities; 6 NYCRR Part 364, Waste Transporter Permits; 6 NYCRR Part 613, Handling and Storage of Petroleum, etc.), and were complied with during construction.

2.0 PRE-CONSTRUCTION DUE DILIGENCE

Prior to construction activities, a review of properties along the pipeline route was completed. Publicly available files were reviewed to determine the location of contaminated sites along the proposed pipeline route in New York from files obtained from the NYSDEC and the U.S. Environmental Protection Agency ("USEPA")-Region 2. The information obtained from these files has been compiled in an interactive database that provided Spectra with an initial understanding of the types and magnitude of potential soil and groundwater contamination along the proposed route. A summary of the information obtained from the file reviews is presented in Tables 1 and in Appendix A.

2.1 Project Area Description

The Project alignment runs through a portion of the New York Metropolitan Area that has been heavily industrialized for more than a century. Many of the properties that were traversed are in varying stages of environmental study and cleanup, with several having completed cleanup prior to the commencement of construction activities. The entire route transects low-lying properties located near the complex of waterways that made New York Harbor a natural stage for industrial development. The Arthur Kill, the Kill van Kull, and the Hudson River provided shorelines and harbors for the development of rail hubs, petroleum refineries and storage facilities, chemical plants and shipping facilities.

The route goes through and near current refineries and industrial facilities, but the route was more heavily industrialized in the early and middle 20th century. Several vacant properties along the route today were formerly active, with uses including petroleum refining and storage facilities and ship yards. Many sections of the proposed route run through areas that were formerly marshy or under water, and were filled in to create shoreline property that could be developed. This filling started in the 19th century and continued into the middle of the 20th century.

2.1.1 Topography

Topography along the pipeline route is nearly level to gently sloping, with slopes ranging from 0 to 8 percent. Elevations range from sea level to 34 feet above mean sea level (amsl). The majority of the Project is located within the Piedmont physiographic province, which is characterized by a low rolling plain divided by a series of ridges. The terminus of the proposed pipeline in the Borough of Manhattan is located within the New England Uplands section of the New England physiographic province. This area is characterized by a maturely dissected plateau with narrow valleys (Dalton, 2006; FWS, 1997a). A topographic map of the Project Area through the New York portion of the Project is provided as Figure 2.

2.1.2 Surface Water

Surface water resources in the majority of the Project area were identified during field surveys conducted throughout 2010. Environmental information was also obtained from U.S. Geological Survey ("USGS") topographic mapping, aerial photography, visual observations, and other available Geographic Information System ("GIS")-based information. As reported in the Project Final Environmental Impact Statement submitted to the FERC in March 2012, 18 waterbody crossings were identified as required for the Project. Thirteen of these 18 are tidal waterbodies, five are perennial waterbodies, one is an intermittent waterbody, and two are ponds. Additionally, the pipeline crosses three major, perennial tidal waterbodies that straddle the state boundary between New Jersey and New York. These are the Arthur Kill, Kill Van Kull, and Hudson River.

2.1.3 Regional Geology

Bedrock in the Project area is dominated by Triassic-age sedimentary units of sandstone, mudstone, siltstone, and shale and Jurassic-age extrusive and intrusive igneous rocks deposited within the Newark Basin. The Newark Basin is an early Mesozoic-age (Triassic) tectonic rift valley extending from southern New York, across New Jersey and into southeastern Pennsylvania. Early Triassic rifting created the formation of half graben-type valleys in which the Newark Basin sedimentary and igneous rocks were deposited. The basin bedrock units are in contact with a regional basin border fault (the Ramapo Fault) along its western margin where Precambrian-age metamorphic and igneous rocks (e.g., gneiss and granite) and with Cambrian-age serpentinite bedrock along the eastern margins of the basin. Refer to Figure 3 for a geological map of the Project Area.

The bedrock underlying the surficial deposits includes the Passaic Formation (reddish brown to gray siltstone and shale), the Palisades Sill (diabase), the Stockton Formation (arkosic sandstone, mudstone and shale), the Lockatong Formation (interbeded layers of argillite, siltstone and sandstone), all of the Newark Supergroup and the Manhattan Schist. With the exception of the Manhattan Schist, these formations generally strike northeast and dip gently toward the northwest. A map of the surficial geology of the Project Area is provided on Figure 4.

The surficial geology of the New York City area consists of glacial drift (Pleistocene epoch) and post-glacial deposits (Sirkin, 1996). The Harbor Hill terminal moraine makes up the backbone of Queens, Brooklyn and Staten Island. Lower and Mid-Manhattan are dominated by the Manhattan Schist formation (pre-Cambrian). Staten Island bedrock geology consists of the Newark Supergroup formation (Triassic), Palisade Diabase formation (Triassic), a serpentinite body (pre-Cambrian) and the Raritan Formation (Cretaceous).

2.1.4 Project Geology

The landscape of the Project has been shaped by multiple glacial events. The predominant unconsolidated surficial geologic units in the Project area are late Wisconsin-age glacial till and more recent salt marsh/estuarine deposits. Glacial deltaic deposits, lacustrine deposits, eolian deposits, and artificial fill also occur at the surface in the Project Area.

Much of the route was marsh or under water 200 years ago, and has been filled to raise the land to its current grade with historic fill, made up of reworked soil and debris that includes brick, wood, concrete, glass, coal ash, cinders, and other man-made materials and wastes. The thickness of historic fill ranges from 0 to more than 30 feet below ground surface (bgs) along the route. The artificial fill throughout the New York portion of the Project consists of placed sand, silt, clay, rock, and man-made materials (e.g., brick, ash, wood, metal, and trash) of variable color but generally gray to dark brown/black.

Underlying the historic fill, the regional surficial geology of the area consists mainly of glacial till that was deposited during the most recent Wisconsinan glaciation. The thickness of the glacial till along the Project alignment is generally less than 50 feet (Standford, S.D.; Witte, R.W.; and Harper, D.P. 1990) and consists primarily of material that was deposited at the base of the glacier. The matrix of the till (fine grained reddish brown silt and clay) largely reflects the composition of the underlying bedrock (reddish brown siltstone and shale). The till contains varying percentages of gravel and boulders within the reddish brown silt and clay matrix. The lithology of the gravel and boulders varies widely depending on their origin. Other glacial deposits in the area consist of clay, silt and fine sand that was deposited in lakes and streams that formed as the glacier melted. These glacial outwash deposits are better sorted than the basal till due to their fluvial origin.

Surficial deposits of non-glacial origin also exist to a lesser extent in the Project area. Near present-day streams and estuaries, more recent deposits of alluvium, marsh deposits (peat), and estuarine silt and clay overlie the glacial sediments. The New York Till consists of variable textures (boulders to clay), and is usually poorly sorted.

2.1.5 Hydrogeology

The water table along most of the route is in the range of 4 to 12 feet bgs. The ground water quality has low-grade impacts along much of the route due to contact with contaminants present in historic fill. In some locations, more significant impacts were encountered, including highly contaminated ground water and/or petroleum product floating on the water table.

The permeability of the glacial till deposits is low due to the matrix of silt and clay. The glacial deposits of fluvial origin tend to be better sorted and stratified, and have a higher permeability. Horizontal flow of the shallow groundwater is largely controlled by ground surface and bedrock surface topography, as well as the presence of the higher permeability stratified deposits. Shallow groundwater discharges to area surface water bodies. Major surface water bodies include the Hudson River, the Kill van Kull, the Arthur Kill, and Newark Bay. Vertical migration of shallow ground water is inhibited by the low permeability of the glacial till.

2.2 Project Area History

2.2.1 Past Uses and Ownership

Information regarding the Project route and vicinity's historical uses was obtained from various publicly available and practically reviewable sources including: aerial photographs, an environmental database report, NYSDEC and USEPA site files, and Sanborn Fire Insurance Maps, as necessary.

Currently the route goes through and near various commercial and industrial facilities, but was even more heavily industrialized in the early and middle 20th century. Several vacant properties along the route were formerly active, with uses including petroleum refining and storage facilities and ship yards. Many sections of the proposed route run through areas that were formerly marsh or under water, and were filled in to create shoreline property that could be developed. This filling started in the 19th century and continued into the middle of the 20th century. Several properties along the route through Staten Island are in the process of redevelopment for commercial use as intermodal facilities. An intermodal facility is defined as a facility where cargo transported by ship is transferred to intermediate and final destinations via train or truck.

2.2.2 EDR Database Search

Various databases provided by Environmental Data Resources, Inc. of Milford, Connecticut ("EDR"), were reviewed for information regarding documented and/or suspected releases of regulated hazardous substances and/or petroleum products on or near the Site. TRC also reviewed the "unmappable" (also referred to as "orphan") listings within the database reports, cross-referencing available address information and facility names. Unmappable sites are listings that cannot be plotted with confidence, but are identified as being located within the general area of the Site based on the partial street address, city name, or zip code. In general, a listing cannot be mapped due to inaccurate or incomplete address information in the database that was supplied by the corresponding regulatory agency. Any listings from the unmappable summary that were identified by TRC as a result of the area reconnaissance and/or cross-referencing to mapped listings are included in the corresponding database discussion within this section. TRC obtained from EDR a corridor study database search report that identified properties listed on state and federal databases within a 200-foot buffer of the proposed pipeline route right-of-way study area. This information is included in Appendix A.

2.2.3 Historical Aerial Photographs and Sanborn Fire Insurance Maps

TRC reviewed aerial photographs and Sandborn Fire Insurance Maps of properties along the pipeline route and surrounding areas provided by EDR in order to identify historical land uses that may have involved hazardous substances and petroleum products. The dates of the photographs reviewed ranged from 1931 to 2011. Copies of reproducible aerial photographs and Sandborn Fire Insurance Maps are included in Appendix A**.**

2.2.4 NYSDEC File Review

TRC indexed contaminated and potentially contaminated sites based on the EDR corridor study, potentially contaminated sites identified on historical aerial photographs and Sanborn Fire Insurance Maps, and a search of the NYSDEC Remedial Site Database Search. TRC submitted approximately 56 Freedom of Information Law ("FOIL") requests to the NYSDEC for file review. TRC conducted on-site file reviews of the identified records for the indexed sites at the NYSDEC Region 2 office in December 2009. An additional 138 FOIL requests were subsequently submitted based on pipeline reroutes and site visits/area reconnaissance. TRC conducted additional on-site file reviews at the NYSDEC in 2010. Site maps, analytical results, utility maps, cap details, etc. were compiled and catalogued by TRC and assigned NY Site IDs.

2.3 Identified Contaminated Properties

2.3.1 Database

Several properties were identified in the database search with potentially contaminated soils which are located within or extend immediately adjacent to Project areas through the New York portion of the Project. A total of 39 contaminated sites were identified in New York based on a review of agency files and an environmental database search. The database search report that identified properties listed on state and federal databases within a 200-foot buffer of the proposed pipeline route was obtained from EDR and is included in Appendix A.

Properties were selected for file review based on proximity to the proposed pipeline route, above ground facilities, and areas of additional workspace. The file reviews and database searches also included properties potentially encountered if alternative locations of aboveground facilities, workspaces and any variations in the pipeline route were selected. Of the 39 properties included in the file review and database searches, 11 properties have been identified for this report as having the greatest potential to impact soil and groundwater encountered during construction activities. The 11 properties identified in the file review are listed in Table 1.

2.3.2 Contaminated Site Summaries

For each identified contaminated or potentially contaminated site, TRC produced a Site Summary Report (included in Appendix A). Each Site Summary report includes the following information:

- NYSDEC site name, any alternate names, and identifying case numbers;
- Regulatory status and case manager information;
- Summary of the site history, including the operational and environmental investigative activities;
- Site address and the block and lot;
- Available subsurface data including depth to groundwater, groundwater flow direction, soil description and permeability, location of buried utilities, and depth of present historic fill;
- Results of environmental investigations such as description of the type, extent, and depth of soil and/or groundwater contamination, presence of product, current or former USTs/ASTs, any other impacted media, or if engineering controls, Deed Notice, or CEA is or formerly was related to the site; and,
- A brief narrative regarding potential issues related to the pipeline installation, including but not limited to presence of contamination, utilities, engineering controls, etc.

Additionally, TRC created a database containing georeferenced layers of the following potential Areas Of Concerns ("AOCs") along the pipeline route: current and historic structures including Aboveground Storage Tanks ("ASTs") and Underground Storage Tanks ("USTs"), utilities, historic canals, railroad lines, dry cleaners, gasoline stations, landfills, and petroleum storage facilities; engineering controls such as recovery trenches, sheet piles, slurry walls, deed notices, soil caps, and CEAs; soil and groundwater data including depth to groundwater, excavations, presence of coal tar, petroleum-impacted soil (current and historic, including free-phase product), VOC concentrations in soil and groundwater, PCB concentrations in soil, sediment impact and surface water impact. Figures were created depicting the potential AOCs included in the database created by TRC. The following Figure Sets have been generated based on information obtained from a review of NYSDEC files: Figure set 5 shows areas where product was identified, and Figure set 6 shows the locations of historic structures, USTs, and ASTs. No sites were identified along or adjacent to the pipeline route in New York with engineering controls in the form of capped contaminated soils.

3.0 PRE-CONSTRUCTION SAMPLING

3.1 Pre-characterization Soil Sampling Plan

TRC implemented a pre-characterization boring program to verify the locations and extent of petroleum impacts and hazardous materials along the proposed pipeline route, and to characterize the soil and groundwater along the route for proper disposal. Soil samples were field screened and sampled as per NYSDEC DER-10. The pre-characterization program began in late 2010 and was completed in January 2013.

3.2 Pre-Characterization Soil Sampling

To characterize soils along the pipeline route, soil borings were advanced at approximately 300-foot intervals. In locations where contamination was encountered or suspected, this interval was reduced to 150 feet in order to delineate the extent of contamination. Figure set 7 shows the locations of the soil borings advanced as part of the pre-characterization sampling program. Land, Air, Water Environmental Services. Inc. ("LAWES") of Center Moriches, New York and Warren-George, Inc. of Jersey City, New Jersey were retained as subcontractors by TRC for drilling services.

Each boring location was hand-cleared to 6 feet bgs to verify that no utilities were present. An air or water knife with vacuum collection was used during pre-clearing to loosen soils. At each 1 foot interval, a hand auger was used to collect a relatively undisturbed volume of soil. Direct push drilling methods, utilizing mobile direct drive equipment, were then used to advance the soil boring from 6 feet bgs to the terminal depth required to characterize soils. In the locations where above ground structures were to be constructed (e.g., M&R Stations, valve sites, HDD exit/entrance points), geotechnical borings were advanced utilizing mud rotary drilling methods to assess the physical properties of soil and rock.

Soil samples were collected and screened for evidence of contamination in the field continuously from the ground surface to the boring completion depth in either 3- or 5-foot long, 2-inch diameter macro-core samplers lined with acetate sleeves. At each boring location, the geological descriptions of the soil were logged per the Burmeister classification system. The soil was examined for evidence of contamination (e.g., staining, discoloration, odors, and historic fill) and was screened in the field for the presence of volatile organic compounds ("VOCs") with a photoionization detector ("PID"). The soil boring logs are presented in Appendix B.

In general, two soil samples were collected from each location and submitted for laboratory analysis. Samples were collected from discrete 6-inch intervals biased towards the highest PID readings or where other evidence of environmental impacts was noted. In the event that none of the screened intervals exhibited evidence of contamination, soil samples were collected at the appropriate intervals required to address the Project objectives (in general, one from the upper 4 feet and one from the 4- to 8-foot bgs interval).

Soil samples collected as part of the pre-characterization program were analyzed for the following parameters:

- VOCs
- SVOCs
- Total Metals
- Organic Pesticides/Herbicides
- Pesticides / PCBs
- EPH

Tables summarizing the results of the Pre-characterization sampling results can be found in Appendix C.

3.3 Waste Classification Sampling

Waste characterization sampling was performed to establish whether soils were acceptable for on-site reuse, and to select appropriate disposal facilities for soil to be removed. Waste characterization sampling was also conducted to minimize material handling and soil stockpiling requirements. These samples were collected from locations where project specifications required the excavated area to be backfilled with imported fill of known geotechnical properties (e.g., city streets, commercial parking lots). In addition, waste characterization samples were also collected from areas where soils and/or materials were deemed unsuitable for use as backfill due to the presence of construction debris, other oversize material, or excess moisture.

The sampling frequency was based on site history, anticipated soil disposal volume, and disposal facility requirements. Soil samples were collected in 4-foot depth intervals from existing grade to the maximum depth of soil disturbance anticipated by construction activities. At boring locations where pre-characterization sampling was performed, waste characterization samples were collected from the 0- to 4-foot interval and the 4- to 8-foot interval. At locations where no pre-characterization sampling was performed, a grab was collected at each 1-foot interval, homogenized and submitted for laboratory analysis as a composite sample. Each composite sample was homogenized by thoroughly mixing in a clean aluminum pan using a Teflon® sampling tool. Analyses for VOCs were performed on the single grab sample from each interval that exhibited the highest apparent contamination.

Soil samples collected for waste classification purposes were analyzed for waste classification parameters, which included the following:

- TCL VOCs, TCL SVOCs, and TAL Metals (not conducted if the sample was already analyzed for reuse);
- Ignitability, Corrosivity, and Reactivity;
- Toxicity Characteristic Leaching Procedure (“TCLP”);
- Paint Filter Test;
- Total Petroleum Hydrocarbons;
- Total Organic Halides (“TOX”); and,
- Moisture Content.

Tables summarizing the results of the waste classification sampling results can be found in Appendix C.

3.3.1 Findings

3.3.1.1 Contaminated Sites

Soil and groundwater samples collected on contaminated sites were consistent with the findings of the pre-construction due diligence. The contaminants that were identified during the pre-characterization sampling are as follows:

- VOCs – including those present in petroleum products (such as benzene, toluene, ethylbenzene and xylenes) and chlorinated solvents (such as trichloroethene, tetrachloroethene, and trichloroethane);
- PAHs – typically found in petroleum fuels, asphalt and coal;
- Free petroleum product including gasoline, fuel oil and other liquids and tars;
- Polychlorinated biphenyls ("PCBs");
- Pesticides; and,
- Metals including but not limited to lead, arsenic, cadmium, and chromium.

The majority of contaminants detected during the pre-characterization and waste classification sampling events are attributable to the artificial fill encountered along the Project route. The artificial fill throughout the New York portion of the Project consists of placed sand, silt, clay, rock, and man-made materials (e.g., brick ash, wood, metal, and trash) of variable color but generally gray to dark brown/black. Figure 8 depicts the areas identified as containing free product.

3.3.1.2 Hazardous Materials

No soils that are subject to USDOT and USEPA hazardous waste shipping and disposal regulations were identified along the pipeline route through New York.

3.4 Groundwater

3.4.1 Sampling Plan

At selected boring locations, temporary monitoring wells were installed utilizing hollow stem auguring techniques. Groundwater samples were collected from these temporary wells to provide data regarding groundwater quality. Groundwater samples were collected and analyzed for the following:

- VOCs
- SVOCs
- Total Metals
- Organic Pesticides/Herbicides
- PCBs
- EPH
- Nitrate/Nitrite
- Sulfate
- BOD
- COD
- TDS
- TSS

Monitoring wells were installed and groundwater samples were collected at approximately 900-foot intervals. The temporary monitoring wells extended to a maximum depth of 25 feet bgs. The temporary monitoring wells were biased toward areas of concern and the locations of proposed road bore pits and horizontal directional drilling (HDD) entry and exit points.

3.4.2 Aquifer Testing

Slug and/or short-term pumping tests were performed on the temporary monitoring wells, depending on well recharge observed during well development. Water-level changes were monitored using Micro-Diver sensors and manual readings. Data were then analyzed to determine the hydraulic properties of the soils below the water table. The hydraulic data were used to estimate the anticipated rate of groundwater inflow to the trench at various sections of the route.

3.4.2.1 Findings

Historical information and the pre-characterization program identified contaminants likely to be encountered in groundwater along the Project alignment. These contaminants include free-phase petroleum product (and potentially other separate-phase product), dissolved total petroleum hydrocarbons ("TPH"), dissolved petroleum VOCs, dissolved chlorinated VOCs, and dissolved metals. Refer to Appendix D for the groundwater laboratory Analytical Results.

Data obtained from the slug and/or short-term pumping tests performed along the pipeline route through New York resulted in hydraulic conductivities below 10 feet per day throughout the majority of Staten Island. This is consistent with the information obtained from soil borings, which indicated the majority of soil throughout Staten Island, consisted of fine to medium sand and silt. Higher hydraulic conductivities were obtain from areas close to major waterways and in wetland areas where localized geology consisted primarily of medium to fine sand and historic fill composed of large debris. Data obtained from the slug/pumping tests performed in Manhattan indicated a high hydraulic conductivity. This was expected due to the alignments proximity to the Hudson River and the large stone and debris used for fill near the river. Estimated groundwater infiltration rates are listed in Table 2 and the calculations are located in Appendix E.

3.5 Governing Documents

3.5.1 Health and Safety Plan

A Health and Safety Plan ("HASP") was prepared by TRC on behalf of Spectra Energy to establish requirements for protecting the health and safety of personnel from possible exposure to potentially hazardous substances during construction activities. The provisions of the HASP covered TRC employees, Spectra personnel present in the construction work zone, and contractors hired directly by Spectra or TRC. Work performed as part of the Project was in full compliance with governmental requirements, including Site-specific and worker safety requirements mandated by the federal

Occupational Safety and Health Administration ("OSHA"). The HASP prepared and implemented by TRC during construction is included as Appendix F.

The HASP prepared by TRC was not intended to cover workers employed by the pipeline contractors or any of their subcontractors. The construction contractors prepared their own HASPs related to their specific on-Site assignments. The contractors were solely responsible for preparing, implementing, and enforcing their own HASP. The contractors were also solely responsible for complying with all applicable OSHA requirements and all other federal, state, and local safety requirements.

3.5.2 Excavation Management Plan

An EMP was prepared for the Project that describes the procedures for handling soil and groundwater encountered during construction activities. The EMP was prepared to provide a defined set of procedures to be implemented when contaminated soil and groundwater were encountered during pipeline construction activities. It also served as a proactive mechanism for communicating the responsibilities of the parties involved in the construction of the pipeline and related facilities.

Key components of the EMP included:

- Soil management procedures;
- Dewatering fluid management procedures;
- Health and safety procedures;
- Compliance with federal and state codes and standards; and,
- Emergency response procedures.

Soils and groundwater generated during pipeline trench excavation and installation of aboveground facilities along the pipeline was managed in accordance with the EMP. The EMP was prepared following the NYCRR Part 375 Soil Cleanup Objectives and NYSDEC DER-10 (May 2010) and the NJDEP Linear Construction Guidance (January 2012). Conformance and compliance with the provisions of NYSDEC regulations and guidelines was achieved through the implementation of Project-specific, and site-specific soil management, groundwater management and health and safety plans. The Groundwater Management Plan ("GMP") and the Soil Management Plan ("SMP") are included in the EMP. The EMP is included as Appendix G.

3.5.3 Soil Management Plan

Prior to the commencement of construction, it was proposed that all excess soils excavated during the NJ-NY Project be reused whenever possible. To accomplish this, a Soil Management Plan ("SMP") was created outlining procedures for handling soils generated as a result of construction activities. Excess excavated materials to be reused included soils, historic fill, concrete, and asphalt millings. All areas where materials were reused were located within the NJ-NY Expansion Project route. In areas where potentially contaminated soils were reused, engineering controls were implemented that included construction of a clean soil cap at the surface. Structurally/geotechnically suitable materials were used as backfill with the following provisions:

- Excess excavated materials that were generated in areas of known VOC contamination were proposed to be placed on site beneath the pavement areas, but not beneath building footprints to limit the potential for indoor vapor intrusion issues in the future.
- Excess excavated materials with analytical results that indicate the presence of VOCs or mercury in leachable concentrations within one-half the Toxicity Characteristic Leaching Procedure (TCLP) regulatory level were not reused.
- Excess excavated materials that were generated in areas of known VOC contamination and those materials with analytical results that indicated the presence of VOCs or mercury in leachable concentrations within one-half the TCLP regulatory level were not placed for reuse under non-impermeable surfaces (e.g., beneath landscaped areas) to reduce the potential for migration of these mobile contaminants into the shallow aquifer via rain infiltration through the landscaped cap.
- Excess excavated materials that were generated in areas where VOCs were known to be present and materials with analytical results that indicate the presence of VOCs or mercury in leachable concentrations within one-half the TCLP regulatory level were not placed for reuse at an elevation that would cause it to be within the saturated zone or capillary fringe, to reduce the potential for migration of these mobile contaminants into the shallow aquifer through direct contact with the shallow groundwater.
- Concrete/masonry that were characterized as non-hazardous waste could have been crushed and reused along the route as aggregate base beneath concrete or bituminous paved areas, provided that VOCs and/or mercury were not present at levels described above.
- Fill imported along the route that did not meet the most stringent NJDEP/NYSDEC remedial standards could have been used, provided the soil/fill reuse proposal was prepared by the entity responsible for the source of the soil/fill, and the fill was approved by NJDEP/NYSDEC under an Alternative Use Determination ("AUD") or Beneficial Use Determination ("BUD") for reuse. Documentation for imported fill materials that meet the most stringent NJDEP remedial standards will be the responsibility of the source of the material.
- Imported fill that did not meet the most stringent NJDEP/NYSDEC remedial standards and approved for beneficial reuse on-site could have been placed anywhere along the route above the water table.
- The Contractor was responsible for documenting the source location and reuse location/depth for materials reused as fill along the route. The Contractor was responsible for documenting the location/depth of any materials imported that do not meet the most stringent NJDEP/NYSCEC remediation standards.

Generally, 6 inches of clean fill, or other suitable capping material (asphalt or concrete material), were placed at the surface to prevent direct contact exposure. The primary objective is that contamination not be left at the ground surface where there is either human health or environmental exposure concerns. The SMP is included within the EMP as Appendix G.

3.6 Permits

3.6.1 Groundwater

A New York State Pollutant Discharge Elimination System ("SPDES") Permit is required for wastewater discharges directly to a body of water or to the ground. For the New York portion of the Project, a SPDES Permit was obtained that allowed the discharge of treated dewatering effluents to specific locations identified in the Permit in Staten Island and Manhattan. Table 3 lists the approved surface water discharge locations. The SPDES Permit set discharge limits for a select group of parameters. Refer to Appendix H for the SPDES Permit.

The permitted dewatering fluids generated during dewatering activities were discharged to surface water locations or to tanker trucks for transport to a permitted facility. Specific dewatering guidelines are contained in Appendix A of the GMP.

4.0 CONSTRUCTION

4.1 Trenching

Trenching was completed using a backhoe or excavator to provide the minimum cover as required by Title 49 CFR Part 192 of the DOT specifications. Typically, the trench was excavated to a sufficient depth (approximately 7 feet deep for the 42-inch-diameter pipeline and 6 feet deep for the 30-inch-diameter pipeline) to provide a minimum of 3 feet of cover over the pipeline. In areas with consolidated rock, the minimum cover was 18 inches. In certain areas, a greater depth was required to avoid existing utilities and other obstructions.

Bedrock was not encountered during trenching along the pipeline route through New York except where the pipeline was installed using the HDD method (see additional discussion of this method in Section 4.2). Where the HDD method was used, the pipeline was installed deep below the ground surface and the bedrock was removed using mechanical cutters.

4.2 HDDs

Horizontal Directional Drilling ("HDD") is a method that typically involves establishing land-based staging areas on both sides of a proposed feature(s) crossing(s) and confining the work and equipment to these areas. In the case of the Hudson River HDD, staging areas were established within the Hudson River. Before drilling began, surface casings were installed to isolate the drilling fluid from the surrounding soil. After the casings were installed, the process began by drilling a pilot hole in an arced path beneath the feature (e.g., waterbody, wetland, or other resource) using a drill rig typically positioned on the entry side of the crossing. The maximum depth of each drill varied depending on the specific location and design, but typically ranged between 55 and 200 feet below ground level. When the pilot hole was completed, reamers are attached and used in one or more passes to enlarge the hole until its diameter is sufficient to complete the pullback (installation) of the pipeline. As the hole was being reamed, the pullback sections were fabricated (staged and welded) on one side of the crossing (typically the exit side). When the reaming was complete, the prefabricated pipe sections were hydrostatically tested and pulled back through the pre-reamed hole to the entry side.

Throughout the drilling process, a slurry of non-toxic, bentonite clay and water was pressurized and pumped through the drilling head to lubricate the drill bit, remove drill cuttings, and hold the hole open. This slurry, referred to as drilling mud or drilling fluid, has the potential to be inadvertently released to the surface if fractures, fissures, or other conduits to the surface are encountered. The potential for an inadvertent release is generally the greatest during the drilling of the pilot hole when the pressurized drilling mud is seeking the path of least resistance. The path of least resistance is typically back along the path of the drilled pilot hole. However, if the drill path becomes temporarily blocked or large fractures or fissures that lead to the surface are crossed, then an inadvertent release could occur. During the HDD operation, the pipeline route and the circulation of drilling mud was monitored throughout the HDD operation for indications of an inadvertent drilling mud release.

At certain HDD locations, contamination was present within surficial soils or shallow groundwater. Several of the HDD entry and exit locations are located on or adjacent to known soil or groundwater impacted areas. The vertical migration of contamination into a lower aquifer was avoided by the use of steel casing that was installed with the drill rig or a pipe thruster at each of the HDD entry and exit points. The steel casing extends through the overburden to the interface with the underlying bedrock (the Hudson River HDD did not intersect the underlying bedrock). In addition to the casing, the mud pits at each onshore HDD entry/exit location were lined with bentonite prior to commencing drilling operations. This bentonite lining isolated the recirculating drill mud from surficial contaminated soil and/or groundwater, and prevented the migration of contaminants into the drilled hole and lower aquifers.

4.3 Backfilling

After the pipe was lowered into the trench and final tie-in welds were made and inspected, the trench was backfilled. All suitable material excavated during trenching was redeposited into the trench using bladed equipment or backhoes. Excavated soils were field-screened to determine whether or not the material was suitable for on-site reuse or required additional chemical analyses to determine the level of contamination and appropriate disposal measures as outlined in the EMP. Where the previously excavated material contained large rocks or other materials that could damage the pipe and coating, padding consisting of relatively rock-free material was placed around the pipe prior to backfilling. The location of the pipeline was designated using 24-inch-wide bright yellow warning tape installed in the trench 12 inches below the ground surface. The tape consists of a warning notice indicating the presence of a high pressure natural gas pipeline and provides Texas Eastern's toll free number for contact.

When construction occurred in roadways and other paved areas, the backfill used consisted of either a flowable fill or a Controlled Density Fill ("CDF"). The backfill was compacted properly to reduce stresses on the pipeline and to ensure the roadway supports the traffic load without settling.

4.4 Cleaning and Hydrostatic Testing

After burial, the pipeline was cleaned to remove any dirt, water, or debris that was inadvertently collected within the pipeline during installation. A manifold was installed on one end of a long pipeline section and a cleaning "pig" (typically a large soft plug used to swab the inside of the pipeline) was propelled by compressed air through the pipeline.

After cleaning, the pipe was hydrostatically tested to ensure that the system is capable of withstanding the operating pressure for which it was designed. Hydrostatic testing involves filling the pipeline with water and pressurizing the water in the pipeline for several hours to confirm the pipeline's integrity. The testing was completed in pipeline segments according to the Project and DOT requirements and DOT specifications (Title 49 CFR Part 192).

4.5 Discharge of Hydrostatic Test Water

Water for hydrostatic testing of the pipeline through the Manhattan and Staten Island portions of the Project was obtained from municipal water sources. Following hydrostatic testing, the municipal water was discharged into dewatering structures located in upland areas within the construction work area. The integrity of the aboveground facility work was also hydrostatically tested prior to installation at each site.

Following the testing of the pipeline, water obtained from municipal water sources was discharged through energy dissipation devices at a rate ranging from 150 gallons per minute ("gpm") to 900 gpm into dewatering structures located in upland areas within the construction work area. The location and approximate volume of hydrostatic testing water discharge is given below. Refer to Figure 9 for the locations of the approved surface water discharge locations.

Volumes of Hydrostatic Test Water Discharged

Date of Discharge	HDD	Volume Discharge (gal)	Outfall Location
05-09-13 to 05-17-13	Goethals Bridge Exit	310,000	3
07-20-13	Hudson River	100,000	9 and 10
08-08-13 to 08-09-13	Goethals Bridge Exit	100,000	3
09-11-13 to 09-18-13	Arthur Kill Exit	1,900,000	1

4.6 Waste Management

4.6.1 Soil

As part of the pre-construction planning, areas were identified where excavated soil was to be placed back into the trench after pipe installation. Other areas, designated "load and go", were identified where all excavated materials was to be transferred to trucks, transported for off-site disposal, and the excavation backfilled with imported select fill to ensure adequate compaction after pipe installation. In addition to the pre-characterization sampling, additional soil samples were collected in "load and go" areas to meet waste classification sampling frequencies and obtain pre-excavation approvals from appropriate disposal sites.

Excavated materials from the NY-NJ Project were classified and managed in accordance with the following procedures:

- Review of existing environmental studies and regulatory files performed by others to date;
- Pre-characterization of soil and groundwater along the pipeline alignment;
- Supplemental sampling for waste classification to meet disposal acceptance criteria; and,
- Performance of SMP activities to address known and unknown soil contamination disturbed during excavation work in accordance with appropriate soil management procedures as specified herein.

Excavated material was placed back into the trench in the sequence it was removed whenever possible. Excavated materials that contained free or residual product and/or hazardous materials were deemed unsuitable for use as backfill within the pipeline trench and required off-site disposal. In some areas (e.g., city streets, commercial parking lots), the trench was backfilled with imported fill of known geotechnical properties within the excavated trench; as a result, excess material was generated that required management. In certain instances during construction, materials were determined to be unsuitable for use as backfill due to the presence of construction debris, other oversize material, or excess moisture.

4.6.2 Description of Disposal Facilities

Waste soils and other materials generated during the Project were disposed of at the permitted facilities described below.

Soil Safe of Logan Township:

Soil Safe is a Class B Recycling Facility authorized to accept and process petroleum-contaminated soil. The recycling center produces Soil Cement (petroleum-contaminated soil and cement) and Blended Soil Product (soil cement and Delaware River Maintenance Dredge Material) utilized in the site improvement for three brownfield sites: the Bridgeport Land Development Parcel (a.k.a. Birch Creek Property), the Gloucester County Improvement Authority Equine Park, and the Gloucester County Improvement Authority County Park.

Bayshore Recycling and Soils Management:

Bayshore Soils Management provides thermal treatment of petroleum-contaminated soils by low-temperature thermal desorption. This process is capable of decontaminating non-hazardous ID-27 soils contaminated with gasoline, kerosene, jet fuel, #1 through #6 fuel oils, used oils, coal tars, and polycyclic aromatic compounds ("PAHs").

Bayshore Recycling is a Class B Recycling Facility capable of recycling concrete, asphalt, and brick. Bayshore Recycling is also permitted to accept block, slag, glass cullet, untreated wood, water treatment plant residual, carbon filtration media, and street sweepings. All aggregate materials are screen processed into marketable products such as clean crushed stone of variable sizes, dense graded aggregate ("DGA"), recycled concrete aggregate ("RCA"), and other products approved for heavy highway and road construction.

Clean Earth of Carteret:

Clean Earth of Carteret ("CEC") is a non-hazardous soil treatment, processing and recycling facility. CEC is only permitted to accept non-hazardous petroleum-contaminated soil and street sweepings for treatment that contain no free product. The TPH limit for soils is 15 times the New Jersey non-residential cleanup criterion of 10,000 ppm.

Petroleum-contaminated soil is brought on-Site into the processing and storage building. From there, incoming soils are screened and sampled to ensure compliance with the acceptance criteria and are then segregated into piles with similar contamination. Bacteria are then added to the piles based on the type of petroleum contamination and are left inside the facility for approximately one week. The batch piles are then sampled to ensure the level of contaminants is acceptable based on the end use of the soils.

Clean Earth of North Jersey:

Clean Earth of North Jersey ("CENJ") is a RCRA Part B Permitted transfer, storage, and disposal facility ("TSDF") that can accept hazardous and industrial waste.

The facility conducts the following operations:

- Fuels Blending: CENJ receives organic aqueous wastes that are offloaded into one of two RCRA-permitted storage tanks, blended as necessary to achieve product specification requirements, and then shipped offsite to cement kilns as wastes derived fuel.
- Consolidation of aqueous wastes: Lean hazardous and nonhazardous aqueous wastes are consolidated separately onsite and shipped offsite to a wastewater treatment plant. Oily mixtures are sent offsite for treatment or recycling.
- Stabilization: Hazardous solids are stabilized via chemical fixation on-Site. Compatible wastes are placed in one of four stabilization cells until a treatment batch size from 100 to 200 tons is attained. A stabilizing reagent, such as cement kiln dust, is then added to the batch and mixed with the waste by an excavator or front end loader. When the treatment is complete (based on onsite analyses), the entire batch is tested for TCLP metals and shipped offsite for landfill disposal at a RCRA Subtitle D landfill. At the present time only characteristic hazardous wastes are at the facility.
- Other: Some incoming drums are transferred in a drum-in/drum-out fashion. Also, lab packs are de-packed onsite. Friable asbestos is handled onsite. The asbestos comes to the site pre-bagged and wetted. The bags are moved to a large trailer for shipment offsite to an approved landfill.

Clean Waters of NY:

Clean Waters of New York operates a water treatment facility with a capacity to treat 4,000,000 gallons of contaminated water at a processing flow rate of 250 gallons per minute. Clean Waters specializes in barge cleaning, waste oil removal, oily water processing, and maritime solid waste removal.

4.6.3 Waste Characterization and Soil Disposal

Refer to Section 3.2 and 3.3 for a description of the methods used to collect pre-characterization and waste classification samples. The results of the waste classification sampling were submitted to potential disposal outlets for review and approval. Manifests and bills of lading are included in Appendix I.

Table 4 summarizes the total quantities of material removed from the Project. Manifests and/or bills of lading accompanied each load of material that was transported from Project areas. Transporter licenses and waste hauling permits were confirmed prior to vehicles departing a Project Area. The destination facilities and types of soil that were exported from the Project are summarized as follows:

Summary of Destination Facilities and Types of Soil Disposed

Facility Name (Location)	Soil Type and Waste Disposed of (Tons)					Total Weight (Tons)
	Petroleum-Contaminated Soil	Non-Regulated Material (ID27)	HDD Drilling Mud And Cuttings	Debris	ProAct Waste (Filter Media/PCSS)	
Soil Safe (Logan, NJ)	6,944.36	--	180.43	--	--	7,124.79
Bayshore Soil Management	6,390.96	--	484.97	--	85.14	6,875.93
Clean Earth (Carteret, NJ)	3,636.47	--	--	20.00	--	3,636.47
Clean Earth of North Jersey (South Kearny, NJ)	--	119.61	83.66	--	16.12	223.27
Total (Tons)	16,971.79	119.61	749.06	20.00	101.26	**17,860.44**

Soil requiring off-site disposal was directly loaded into trucks, to the extent practical. Trucks used to transport the soil held valid 6 NYCRR Part 364 Waste Transporter Permits.

4.6.4 Description of Disposed Wastes

During the installation of the pipeline, several different waste streams were generated. The pre-characterization and waste classification programs were designed to classify these waste streams prior to their generation and to also establish procedures for their management.

Hazardous waste is a waste that poses substantial or potential threats to public health or the environment. In the United States, the treatment, storage and disposal of hazardous waste is regulated under the Resource Conservation and Recovery Act ("RCRA"). Hazardous wastes are divided into two categories: listed wastes and characteristic wastes. Soils and groundwater are considered hazardous when they exhibit one or more of the four characteristics defined in 40 CFR Part 261 Subpart C - ignitability (D001), corrosivity (D002), reactivity (D003), and toxicity (D004 - D043). No hazardous wastes were generated as a result of construction activities in the New York portion of the Project.

Non-hazardous soils and groundwater, which are considered solid wastes, are not subject to RCRA Subtitle C regulations. The non-hazardous waste category can be subdivided into municipal solid waste and industrial waste. Municipal solid waste is commonly known as trash or garbage. Industrial waste is made up of a wide variety of non-hazardous materials that result from the production of goods and products.

The non-hazardous wastes generated as a result of construction activities included:

- Petroleum-impacted and non-impacted soil;
- Petroleum-contaminated and distressed groundwater;
- HDD drilling mud and cuttings;
- Investigation-derived waste;

- Water treatment media (e.g., granulated carbon, clay used for adsorption, filter bags); and,
- Construction debris (e.g., non-impacted concrete, cleared vegetation, wood debris, miscellaneous trash).

4.6.5 Stockpiling/Temporary Storage

The pre-characterization and waste classification sampling programs were designed to collect data required to obtain disposal facility approvals and acceptances. The majority of the material requiring off-site disposal was transported directly to the disposal site with no additional sampling needed. In some instances (e.g., greater volumes excavated than had been pre-classified, excavated soils that differed from the pre-characterization results), it was necessary to transport excess soils to a temporary storage location for further sampling and classification prior to disposal.

When working in Project areas with constricted workspaces (e.g., roadways), excavated soils were transported to a temporary staging location when sidecasting of soils was not feasible. At the temporary staging location, soils were segregated by respective location and either returned to the same portion of the trench from which they were excavated or shipped directly to an approved disposal facility. When feasible, soils were returned in the reverse order from which they were excavated; that is, last and deepest soils excavated returned first to the deepest part of the trench. Manifests and/or bills of lading accompanied each load of material that was transported from Project areas over public roadways, and can be found in Appendix I.

4.6.6 Groundwater

In excavations that extended below the water table, dewatering was required. Submersible pumps were used to extract groundwater from gravel-lined sumps in the excavations and/or a system of extraction wells were used for dewatering. Extracted groundwater was conveyed to a treatment system prior to discharge to the surface water at permitted outfalls in accordance with the SPDES permit obtained for the Project. The treatment system included settling tanks, an oil-water separator, particulate filters, and activated carbon units. Effluent discharge compliance sampling was performed in accordance with permit requirements. Based on the range of contaminants identified during the pre-characterization program, Spectra retained ProAct Services Corporation (“ProAct”) to provide and operate treatment equipment capable of meeting the applicable discharge standards. Refer to Appendix H for a copy of the SPDES permit.

4.6.6.1 Discharge Locations

All liquids removed from the Project, including excavation dewatering fluids and groundwater monitoring well purge and development waters, were handled, transported and disposed of in accordance with applicable federal and state regulations. Dewatering fluids generated during dewatering activities were discharged to surface waters (e.g., rivers, streams, drainage ditches, wetlands) or to tanker trucks to be transported to a permitted facility. Groundwater generated was discharged to the ten approved locations shown on Page 7 and Page 8 of the SPDES Discharge Permit NY0276634. The locations of the approved discharge outfalls as specified in the SPDES Permit are shown on Figure 9.

4.6.6.2 Permit Modifications

On May 01, 2012, the NYSDEC issued a SPDES permit (NY 0276634) for the NJ/NY Expansion Project allowing for the discharge of water to designated outfall locations. On October 16, 2012, the NYSDEC approved a modification to the approved SPDES permit that changed the design flow rate from the originally approved 500 GPM to 2,000 GPM and the location of Outfall 010. The approved modification also changed the layout of the barge and outfall 010 and outlined, in a diagram, the barge-mounted treatment system. On January 25, 2013, the NJSDEC approved a final modification which included a new latitude and longitude for Outfall 001 with an updated location map. The approved modification to the SPDES Permit can be found in Appendix J.

4.6.6.3 Receiving Facilities

The following table summarizes the destination of liquids that were either treated and discharged to or exported from the New York Portion of the Project.

Summary of Destination Facilities and Types of Liquids Disposed

Facility Name	On-Site Pre-Treatment Facility	Clean Water of New York, Inc.
Location	**Permitted SPDES Outfalls**	**Staten Island, NY**
Activity	**Gallons**	**Gallons**
SPDES Discharge	9,284,812	--
Oil/Water Mixture from trenching activities	--	414,400
Total (Gallons)		**9,699,212**

The Discharge Monitoring Reports that give the volume of water treated are included in Appendix K. Manifests and bills of lading for groundwater sent off-site for disposal are included in Appendix L.

4.6.7 Product

Free product refers to an immiscible non-aqueous phase liquid ("NAPL") that is present as a liquid in surface or sub-surface soil, surface water or groundwater in a potentially mobile state. For soils and other media to be considered grossly contaminated, the soil, sediment, surface water or groundwater must contain sources or substantial quantities of mobile contamination in the form of NAPL that is identifiable either visually, through strong odor, by elevated contaminant vapor levels, or is otherwise readily detectable without laboratory analysis (see 6 NYCRR 375-1.2(u)). No free product was encountered during construction activities along the New York portion of the Project.

4.6.7.1 Plugs

Where a potential existed for contaminants or free product to migrate along preferential pathways created by the pipeline and backfill material, impervious seals, known as trench plugs, are installed within the pipeline trench at specific locations along the installed pipeline. Decisions regarding which areas along the pipeline route that require these seals are made based on the data gathered in file reviews, characterization sampling data, field screening results, and field observations. Also considered were the depth to groundwater at a given location with respect to the depth of the pipeline and groundwater quality data gathered during reviews of available historical information and pre-characterization data. As the need did not arise, there were no trench plugs installed along the New York portion of the Project.

4.7 Clean Fill

Clean fill is defined in New York State as fill that has been tested at a frequency defined in NYSDEC DER-10 Table 5.4(e) 10 and found not to contain concentrations of compounds exceeding corresponding 6 NYCRR Part 375 Soil Cleanup Objectives ("SCOs"). The NYSDEC allows historic fill materials with low-level contamination to be placed back in the excavation from which it was derived. The NYSDEC has indicated that contaminated material used as backfill must be capped with 1 foot of clean soil or other material in industrial and commercial areas.

For the New York portion of the project, the clean fill used for restoration and as backfill was imported from both virgin and non-virgin sources. For virgin sources, a minimum of one representative sample (consisting of two VOC grabs and one composite) was collected and analyzed for the following parameters:

- Full Target Compound List ("TCL");
- Full Target Analyte List ("TAL");
- Hexavalent Chromium; and,
- Sulfate, Chloride, and Conductivity (Spectra construction requirements).

The laboratory analytical results (Full TCL, Full TAL, and Hexavalent Chromium) were compared to the NYSDEC Division of Environmental Remediation "Technical Guidance for Site Investigation and Remediation" ("DER-10") Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil and NYSDEC Commissioner Policy 51 "Soil Cleanup Guidance" Soil Cleanup Guidance ("CP-51") Table 1 Supplemental Soil Cleanup Objectives.

Imported Clean Fill that was non-virgin material (i.e., not mined from an undisturbed geologic medium) was sampled as described in NYSDEC DER 10 Technical Guidance for Site Investigation and Remediation Table 5.4(e)10 Recommended Number of Soil Samples for Soil Imported To or Exported From a Site.

Clean Fill Sample Frequency

NYSDEC DER-10 Table 5.4(e)10 Recommended Number of Soil Samples Imported To or Exported From a Site			
Contaminant	**VOCs**	**SVOCs, Inorganics & PCBs/Pesticides**	
Soil Quantity (Cubic Yards)	Discrete Samples	Composite	Discrete Samples/Composite
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
➢1000	Add an additional two VOC and one composite for each additional 1000 cubic yards or Consult the DER		

Gravel, stone consisting of virgin material from a permitted mine or quarry was used as backfill without chemical testing. In addition to the imported fill requirements identified in DER-10 and CP-51, Project-specific requirements on select physico-chemical parameters were considered when fill was placed directly around the pipe. The National Association of Corrosion Engineers *Corrosion Engineers Reference Book* has identified certain parameters as contributing factors in the increased rate of corrosion of steel and as a potential to damage the outer coating of the pipe. The following are the descriptions and the recommended limits established according to NACE, American Concrete Institute, and National Institute of Standards and Technology.

Chloride:

Limits: 0 ppm to 500 ppm

Description:

Chloride ions participate directly in anodic dissolution reactions of metals and their presence tends to decrease the soil resistivity. Chloride ions are often found naturally in soils as a result of brackish groundwater and historical geological sea beds (some waters encountered in drilling mine shafts have chloride ion levels comparable to sea water) or from external sources such as de-icing salts applied to roadways. The chloride ion concentration in the corrosive aqueous soil electrolyte will vary, as soil conditions alternate between wet and dry.

Sulfate:

Limits: 0 ppm to 150 ppm

Description:

Compared to the corrosive effects of chloride ion levels, sulfates are generally considered to be more benign in their corrosive action towards metallic materials. However, concrete may be attacked as a result of high sulfate levels. The presence of sulfates creates a major risk for metallic materials when sulfates are reduced by anaerobic bacteria and converted to highly corrosive sulfides.

pH:
Limits: 6.5 to 7.5
Description:

Soils typically have a pH range of 5-8. In this range, pH is generally not considered to be the dominant variable affecting corrosion rates. More acidic soils represent a greater risk of corrosion to common construction materials such as steel, cast iron, and zinc coatings. Soil acidity is produced by mineral leaching, decomposition of acidic plants (for example coniferous tree needles), industrial wastes, acid rain and certain forms of micro-biological activity. Alkaline soils tend to have high sodium, potassium, magnesium and calcium contents. The latter two elements tend to form calcareous deposits on buried structures with protective properties against corrosion. The pH level can affect the solubility of corrosion products and also the nature of microbiological activity.

4.7.1 Sources

In total, there were three non-virgin sources and four virgin sources approved for use as select fill along the NY portion of the Project. A copy of the clean fill tickets can be found in Appendix M. The amounts of select fill utilized to meet the Project requirements are summarized as follows:

Summary of Imported Select Fill Volume Used		
Facility Name (Location)	**Source Location**	**Total Weight (Tons)**
Amboy Aggregates	Amboy Aggregate, 415 Main Street, South Amboy, NJ, 08879	1,003.49
Tilcon Stone Fines	Mt. Hope Quarry, 625 Mount Hope Road, Wharton, New Jersey, 07885	689.8
Clayton Flowable Fill	Clayton Block Co, 1025 Route 1 South, Edison, NJ 08837	15,753.66
Total (Tons)		**17,446.95**

4.7.2 Due Diligence and Sampling Results

TRC evaluated eleven (11) sources of potential Clean Fill for use as fill in the New York portion of the Project. TRC reviewed existing laboratory data (if provided) or collected and submitted soil samples of the source material for laboratory analysis. TRC reviewed the laboratory analytical data and compared the data to the NYSDEC DER-10 Appendix 5 Allowable Constituent Levels for Imported Fill or Soil - Commercial or Industrial Use and CP-51 Soil Cleanup Guidance Table 1 Supplemental SCOs for

Industrial Use criteria. The analytical results for the sampling of clean fill sources are included as Appendix N.

4.8 Site Restoration/Capping

In general, final cleanup (including final grading) and installation of permanent erosion control measures were completed within 20 days after the trench was backfilled. In conjunction with backfilling operations, construction debris and any wooden materials were removed from the ROW. The ROW was then fine-graded to prepare for restoration. Permanent slope breakers or diversion berms were constructed and maintained in accordance with the FERC Plan. Fences, sidewalks, driveways, stone walls and other structures were restored or repaired as necessary.

Revegetation was completed in accordance with state and municipal permit requirements and written recommendations on seeding mixes, rates, and dates obtained from the local soil conservation authority or other duly authorized agency. The ROW was seeded within 6 working days following final grading, weather and soil conditions permitting. Alternative seed mixes specifically requested by the landowner or required by agencies were used when applicable. Any soil disturbance that occurred outside the permanent seeding season or any bare soil left unstabilized by vegetation was mulched in accordance with the FERC Plan. Every effort was made to restore the excavated areas to pre-construction conditions with respect to topography, hydrology, and vegetation.

4.9 Well Closures

During construction, groundwater monitoring wells were identified within the Right of Way, the centerline of trenching activities, or within the approved workspace. Monitoring wells were properly abandoned or modified if the well was likely to be compromised during excavation or interfered with construction tasks. The table below lists the monitoring wells that were abandoned/replaced and their respective locations.

Summary of Well Closures and Replacements

Summary of Well Closures and Replacements			
Well ID	**Location**	**Date Closed/Modified**	**Date Replaced**
PRW-13	Port Authority Port Ivory	05/01/2013	08/20/2013
PRW-14	Port Authority Port Ivory	05/01/2013	08/20/2013

After construction activities were concluded and the property restored, monitoring wells that were abandoned were reinstalled outside of the permanent easement in a location designated by the landowner. The location of each monitoring well was surveyed by a licensed New York surveyor. For documentation of well abandonments and replacements please refer to Appendix O.

4.10 Reported Spills and Remediation

The NYSDEC, under Article 12 of NYS Navigation Law and the Petroleum Bulk Storage Regulations (6 NYCRR Part 613.8), requires the reporting of petroleum releases to the New York State Spill Hotline within 2 hours of the discharge. In certain specific instances petroleum discharges do not have to be reported to the NYSDEC if all of the following criteria are met:

- The quantity is known to be less than five (5) gallons;
- The spill is contained and under the control of the spiller;
- The spill has not and will not reach the State's water or any land; and
- The spill is cleaned up within 2 hours of discovery.

Petroleum discharges that occurred during the Project typically consisted of hydraulic oil releases when hydraulic lines ruptured on heavy equipment or when overfilling occurred during equipment refueling. In these instances, the petroleum releases were all less the 5 gallons, immediately cleaned up when discovered, and did not impact any waterways or storm sewers.

During construction one (1) spill was reported to the NYSDEC and was assigned a spill case number. A total of 1 gallon of diesel fuel was observed to be leaking from the fuel tank from an excavator onto an impervious surface. The area where the spill occurred was over excavated and impacted soils were disposed at an off-Site location.

Table 1
Contaminated Sites within the Linear Construction Project
Linear Construction Project Report
Spectra NJ/NY Expansion Project

Municipality	Site Name	Site Address	Direct (D)/ Adjacent (A)	Mile Marker	TRC ID No.	Current Facility Type	Soil Contamination Summary Based on Review of Regulatory Files and Available Databases	Presence of Cap or Deed Notice
Staten Island	Former GATX Terminal	500 Western Avenue	D	3.57R-3.64R & 4.10R-4.13R	NY 17	Vacant (former petroleum bulk storage facility)	Residual/low concentrations of VOCs, SVOCs and metals may be present in soil and sediment at the Site. A portion of the proposed pipeline is located in a wetland/canal area with petroleum-contaminated soil and free-phase product which is currently being remediated.	The placement of a minimum of 3 feet of clean NYSDEC-approved fill is proposed at the Site to raise the property elevation to a 100-year flood level and to cover residual-contaminated soil; this area includes the proposed pipeline route. A site-wide Conservation Easement/deed restriction will likely be issued.
	Texas Eastern Transportation Co.	425 Western Ave	D	4.71R	NY 8	Natural Gas Compressor Station	Mercury was visually observed in soils surrounding the on-site building. Approximately 19.5 cubic yards of mercury-impacted soils were removed from the Site in 1993 (excavation location unknown). Residual mercury in the soil (concentrations less than the "cleanup level") are limited to the area adjacent to the on-site building (max = 16.6 ppm), approximately 170 feet from the proposed pipeline.	N/A
	Procter & Gamble Manufacturing Company	40 Western Avenue	D	4.74R	NY 6	Container terminal and intermodal facility	LNAPL and elevated concentrations of PHCs and metals above their respective standards were detected in the northeastern and southwestern portions of the Site; these areas are transected by the proposed pipeline. HFM is expected to be encountered during pipeline installation activities at/near the Site. The Port Authority is currently remediating LNAPL and other petroleum impacts.	A site-wide Deed Notice and a 1-foot thick soil cap have been proposed for this property.
	Coca Cola Enterprises	400 Western Avenue	A	4.84R	NY 7	Coca Cola Enterprise warehouse and distribution facility	Previous UST-related soil contamination; according to information in the Site file, "no residual soils contamination" remains at the Site.	N/A
	Former A&A Landfill	278, 280, and 290 South Avenue and 331 Western Ave	D	4.9R to 4.773R	NY 113	Former landfill	The Site is part of a property formerly known as Arlington Yards, used by CSXT and its predecessors as a railroad repair, maintenance and storage yard in the 1940s. Illegal landfilling by lessees of the property occurred in 1988, resulting in the placement of over 500,000 cubic yards of fill in two waste mounds in the western and eastern portions of the Site ("West and East Plateaus"). Two ponds containing GW and stormwater are present in the western and eastern portions of the Site ("Western and Eastern Ponds"). Goethals Pond and associated wetlands are located adjacent and south of the Site. In 2005, the Staten Island Railroad constructed railroad tracks along the northern portion of the Site (operations commenced in 2007); these railroad tracks transect the proposed pipeline. The Site is not listed on the USEPA NPL database. Records from the NYCDEP Division of Emergency Response and Technical Assessment indicate that battery fluid, transformer oil, and combustive liquid (transformer oil) are stored on-site.	No information regarding the cap location or further information regarding cap construction was included in the Site file; however, the cap likely covers the West and East Plateaus which are located more than 2,000 feet east of the proposed pipeline. According to the Arcadis reports, the "Closure Report" for the landfill, outlining cap installation, was prepared by Gannett Flemming (2005); this report was not included in the Site file.
	Mariners Marsh Park	3417 Richmond Terrace	D	5.37 to 5.5	NY 15	Former recreational area	Surface and subsurface soil samples were collected for VOC, SVOC, TAL metals, and PCB analyses from four of the ten borings in the "recreational area"; SVOCs (primarily PAHs) were detected in the surface and subsurface soil samples at concentrations above their respective standards (max [identified in surface soil samples, 0.5 to 1.0 feet bg] = 83 ppm). Metals were also detected in surface and subsurface soil samples at concentrations above their respective standards including arsenic (max = 32.3 ppm); barium (max = 1,100 ppm); beryllium (max = 0.44 ppm); total chromium (max = 53.9 ppm); copper (max = 399 ppm); iron (max = 70,100 ppm); lead (max = 1,950 ppm); mercury (max = 4.3 ppm); nickel (max = 60.6 ppm); selenium (max = 2 ppm); and zinc (max = 1,560 ppm) – max concentrations were detected in the surface soil samples collected from the 0.5 to 1 feet bg interval.	Potential land use restrictions and institutional controls may have been instituted as indicated in the City of NY Draft Cleanup Proposal, although no further information was available in the Site file.

Table 1
Contaminated Sites within the Linear Construction Project
Linear Construction Project Report
Spectra NJ/NY Expansion Project

Municipality	Site Name	Site Address	Direct (D)/ Adjacent (A)	Mile Marker	TRC ID No.	Current Facility Type	Soil Contamination Summary Based on Review of Regulatory Files and Available Databases	Presence of Cap or Deed Notice
							No VOCs or PCBs were detected at concentrations above their respective standards.	
	NYSDOT Richmond Terrace	3551 Richmond Terrace	D	5.505 to 5.745	NY 12	NYSDOT General Services storage yard.	Several USTs were removed from the Site c. 1995, although the location of the USTs was not identified; impacted soil was excavated; no GW impact was detected. A regulatory agency database report indicates remediation was completed; the Site was “closed” September 16, 1999; on-site monitoring wells were abandoned; and “no further action” was warranted. The proposed pipeline may transect these area(s).	N/A
Manhattan	DSNY Gansevoort Destructor Plant	427 Gansevoort Street, 119 Gansevoort Street and 2 Bloomfield Street	D	20.04	NY 19	Department of sanitation sanitation-truck storage/maintenance yard, and salt storage	There is one NYSDEC spill case assigned to the Site: Two 2,000-gallon diesel USTs and contaminated soil were removed from the Site. GW exhibiting a sheen was observed in the UST excavation at approximately 8 feet bg. Soil and GW samples were collected from the excavation. VOCs were not detected in the samples collected and “some SVOCs” (specific SVOCs unknown) were detected in side-wall samples; laboratory analytical results were unavailable. The NYSDEC Spill Report Form indicates there is “minimal contamination” at the Site, but does not elaborate; and does not discuss monitoring well installation. The NYSDEC closed the spill case in January 2008.	N/A
	Superior Printing Ink Co.	394-400 West 12th Street, 58-70 Bethune Street and 469-485 West Street	A	20.04	NY 22	15-story residential building	Several SVOCs and metals typical of HFM (including chromium, copper, iron, nickel, zinc, beryllium, mercury, calcium and magnesium) were detected throughout the Site at concentrations above their respective standards. Total chromium was detected at the Site at elevated concentrations above the RSCO in 21 soil samples (max = 47.1 ppm).	N/A
	383 West 12th Street	384 West 12th Street	A	20.04	NY 24	Seven-story apartment building	Approximately two gallons of #4 fuel oil was released onto soil in an excavation in the northeastern portion of the Site (exact location unknown). Oil was not observed elsewhere on-site by the NYSDEC. No further information was included in the Site file.	N/A
	777-781 Washington Street	777-781 Washington Street	A	20.04	NY 107	Vacant lot (development of three-story residential building proposed)	Based on a 2008 soil boring figure, petroleum odors and free product was observed in soil borings that extended from the western Site boundary to at least the central portion of the Site.	N/A

Abbreviations

bg = Below grade
BN = Base neutral detectable organic compound
COC = Contaminant of concern
COPR = Chromite Ore Processing Residue
CVOC = Chlorinated Volatile Organic Compound
DCA = Dichloroethane
DCE = Dichloroethene
DRO = Diesel Range Organics
GW = Ground water
GWQS = Ground Water Quality Standard
HDPE = High Density Polyethylene
HFM = Historic fill material
LNAPL = Light non-aqueous-phase liquid
max = maximum
mm = millimeter
MTBE = Methyl tert-butyl ether
NFA = No Further Action
NJDEP = New Jersey Department of Environmental Protection
NYSDEC = New York State Department of Environmental Conservation
NRD = Non-residential
PAH = Polycyclic Aromatic Hydrocarbon
PCB = Polychlorinated biphenyl
1,1,2,2-PCA = Tetrachloroethane
PCE = Tetrachloroethene
PHC = Petroleum hydrocarbon
PID = Photoionization detector
ppm = Parts per million
RDCSCC = Residential Direct Contact Soil Cleanup Criteria
ROW = Right-of-way
RSCO = Recommended Soil Cleanup Objective
SCC = Soil Cleanup Criteria
SVOC = Semi-Volatile Organic Compound
TAL+30 = Target Analyte List (plus 30 compound library search)
TBA = Tertiary butyl alcohol
TCE = Trichloroethene
UST = Underground Storage Tank
VC = Vinyl Chloride
VOC = Volatile Organic Compound

TABLE 1
SPECTRA NY/NJ EXPANSION PROJECT
New York Contaminated Sites

Table 2
Estimated Groundwater Infiltration Rates
Linear Construction Project Report
Spectra NJ/NY Expansion Project

Well No.	Depth to Ground Water in feet below surface	Slug Test (ft/d)		Pump Test (ft/d)	K_{AVG}	Volume of Existing Ground Water in Excavation in gallons (based on porosity)	Average Predicted Infiltration Rate over time Excavation is open in gpm (assuming 4 hours)	Volume of Ground Water seeping into Excavation in gallons (includes 1.5 safety factor)	Total Ground Water to Manage in gallons (existing water plus seepage)
		K_{in}	K_{out}	K	ft/d				
RCH-2-ENV-3W	2.53			0.0320	**0.03**	4,583	0.15	36	4,618
RCH-3-ENV-2W	12.64								
RCH-4-ENV-20W	3.6	2.99	2.66	2.70	**2.78**	3,686	10.36	2,487	6,173
RCH-4H-ENV-2W	2.3	1.88	1.67	0.755	**1.44**	4,775	67	16,001	20,777
RCH-4-ENV-25W	2.72	20.63	20.99	36.02	**25.88**	4,423	115.61	27,747	32,170
RCH-4H-ENV-5W	1.65			4.18	**4.18**	5,320	22	5,390	10,710
RCH-4-ENV-29W	1.74	1.51	0.95		**1.23**	5,244	6.51	1,563	6,808
RCH-4-ENV-33W	5.24	*11.31*	*14.6*	3.82	**3.82**	2,312	8.92	2,141	4,453
RCH-5H-ENV-1W	6.83	0.20	0.46		**0.33**	980	0.3	78	1,059
RCH-5H-ENV-3W	6.89	0.42	5.72		**3.07**	930	2.9	692	1,622
RCH-5H-ENV-6.1W	5.46	0.45	1.25		**0.85**	2,128	1.8	438	2,566
RCH-6-ENV-2W	2.3	*84.91*	13.02	14.63	**13.83**	4,775	67	16,001	20,777
RCH-6-ENV-5W	1.64	*10.30*	4.81		**4.81**	5,328	26	6,212	11,540
NYC-2-ENV-1W	6.78			104.59	**104.59**	1,022	108	25,910	26,932

= DTW below bottom of trench
K values in *italics* not used in average
Assumed trench dimensions:

L=	40	ft
W=	8	ft
D=	8	ft

Range of infiltration rates
< 5 gpm
5 to 15 gpm
15 to 70 gpm
>70 gpm

Table 3
Approved Surface Water Discharge Locations
Linear Construction Project Report
Spectra NJ/NY Expansion Project

Outfall No.	Design Flow Rate (GPM)	Latitude	Longitude	Receiving Water	Water Class	Water Index Number
001	500 – 2.4MG	40˚37' 25.6" N	74˚ 11' 54.80" W	Wetland	GA/SD	GW/Trib AR-42 (SI-W1A)
002	500 – 2.4MG	40˚37' 32.6" N	74˚ 11' 45.2" W	Wetland	GA/SD	GW/Trib AR-42 (SI-W1A)
003	500 – 2.4MG	40˚37' 24.2" N	74˚ 11' 34.7" W	Wetland	GA/SD	GW/Trib AR-42 (SI-W1A)
004	500 – 2.4MG	40˚37' 50.62" N	74˚ 11' 7.1" W	Wetland/ Bridge Creek	GA/SD	GW/Trib AR-42 (SI-W11)
005	500 – 2.4MG	40˚37' 55.9" N	74˚ 11' 1.8" W	Bridge Creek	SD	Trib AK (SI-W7-S1)
006	500 – 2.4MG	40˚38' 1.2" N	74˚10' 55.94" W	Unnamed Creek	SD	Trib A (SI-W8-S1)
007	500 – 5.4MG	40˚38' 27.32" N	74˚10' 40.28" W	Wetland	GA/SD	GW/Trib (SI-W9)
008	500 – 5.4MG	40˚38' 31.40" N	74˚10' 21.43" W	Wetland	GA/SD	GW/Trib (SI-W10)
009	2000 – 345.6MG	40˚44' 21.89" N	74˚00'41.67" W	Hudson River	I	H
010	2000 – 345.6MG	40°44'20.44"N	74° 0'39.29"W	Hudson River	I	H

Table 4
Management of Soils by Property
Linear Construction Project Report
Spectra NJ/NY Expansion Project

TRC Site Number	Site Name	Municipality	Mile Marker		Facility	App. Ton.	APPROXIMATE SITE TONNAGE
			Start	Stop			
NY 17	Former GATX Terminal	Staten Island	3.56	4.46	Bayshore Soil Management LLC	484.97	688.24
					Clean Earth North Jersey	203.27	
NY 8	Texas Eastern Transportation Co.	Staten Island	4.742	4.85	No Material Shipped		
NY 6	Procter & Gamble Manufacturing Company	Staten Island	4.788	5.37	Bayshore Soil Management LLC	243.68	5,727.00
					Clean Earth Carteret	2,278.62	
					Soil Safe Logan	3,204.70	
NY 7	Coca Cola Enterprises	Staten Island	OFF	OFF	No Material Shipped		
NY 113	Former A&A Landfill	Staten Island	4.57	4.788	Bayshore Soil Management LLC	1,608.61	1,608.61
NY 15	Mariners Marsh Park	Staten Island	5.37	5.5	Soil Safe Logan	2,464.78	2,464.78
NY 12	NYSDOT Richmond Terrace	Staten Island	5.5	5.745	Soil Safe Logan	2,958.37	2,958.37
NY 19	DSNY Gansevoort Destructor Plant	Manhattan	19.85	20.00	Bayshore Soil Management LLC	3,015.25	3,030.25
					Clean Earth North Jersey	15.00	
NY 19A	DSNY Gansevoort Destructor Plant	Manhattan	20.00	20.04	Bayshore Soil Management LLC	1,175.84	1,181.19
					Clean Earth North Jersey	5.35	
NY 19B	DSNY Gansevoort Destructor Plant	Manhattan	20.04	20.05	Bayshore Soil Management LLC	201.00	202.00
					Clean Earth North Jersey	1.00	
NY 22	Superior Printing Ink Co.	Manhattan	OFF	OFF	No Material Shipped		
NY 24	383 West 12th Street	Manhattan	OFF	OFF	No Material Shipped		
NY 107	777-781 Washington Street	Manhattan	OFF	OFF	No Material Shipped		

Disposal Facility	Tonnage to Facility from Listed TRC
Bayshore Soil Management LLC	6,729.35
Clean Earth Carteret	2,278.62
Clean Earth North Jersey	224.62
Soil Safe Logan	8,627.85

Total Tonnage Shipped from Listed TRC Sites: **17,860.44**

FIGURE 1

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		K	GAL		ADDED LOCATION & CALL-OUT TAG FOR M&R 187 SITE – 12/03/2010
		J	GAL		REVISED CALL-OUT TAGS, LINE ROUTE & RELOCATED BAYONNE M&R SITE – 11/30/2010
		H	GAL		REVISED LEGEND & COMP. STA. SYMBOLS FOR VICINITY MAP – 9/09/2010
		G	GAL		REVISED LEGEND, CALL-OUT TAG FOR CROMWELL & COMP. STA. SYMBOLS – 8/24/2010
		F	GAL		REVISED/ADDED CALL-OUT TAGS & LEGEND – 7/27/2010
		D	GAL		REMOVED JERSEY CITY PROPOSED M&R SITE – 6/10/2010

ENGINEERING APPROVALS

TITLE	BID SIGNATURE	BID DATE	CONSTRUCTION SIGNATURE	CONSTRUCTION DATE
DRAWN BY:				
PROJECT MANAGER				
DESIGN ENGINEER				
DESIGN CHECKER				

NJ-NY EXPANSION PROJECT

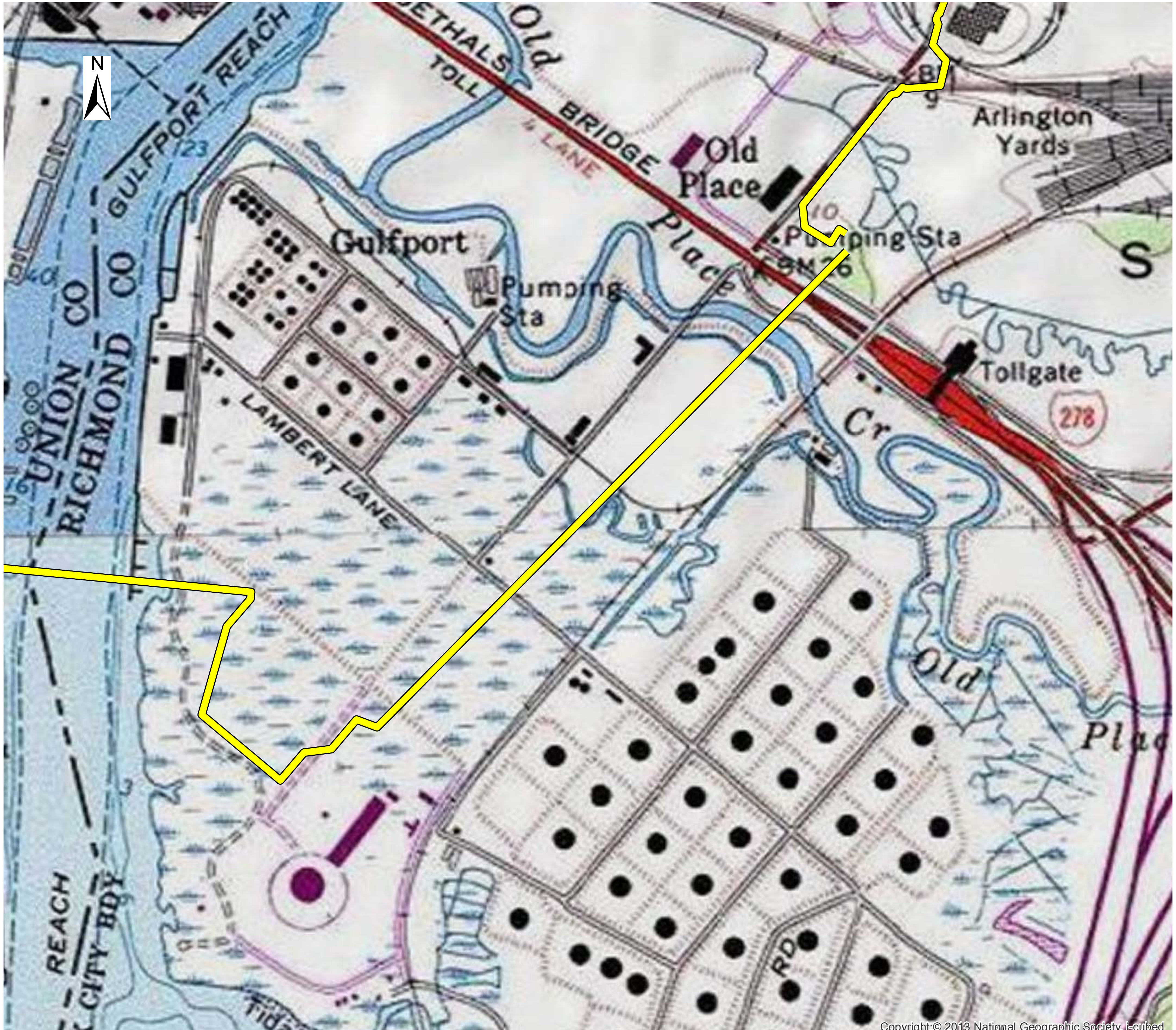
OVERVIEW MAP

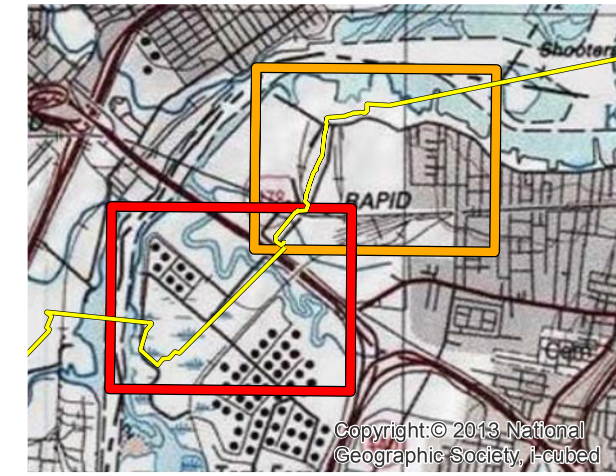
LOC. NEW JERSEY & NEW YORK

YEAR: 2010 | W.O. 076115750 (NJ) 076115751 (NY) | SCALE: N.T.S. | DWG. SHEET 1 OF 1 | REV. K

Spectra Energy

Texas Eastern Transmission, LP
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400





Legend

Constructed Pipeline

Source: ArcGIS Map Service
Name: USA_Topo_Maps
USGS Quadrangles: Elizabeth and Jersey City Quadrangles, NJ-NJ (1981), 7.5 minutes series.

0 700 Feet

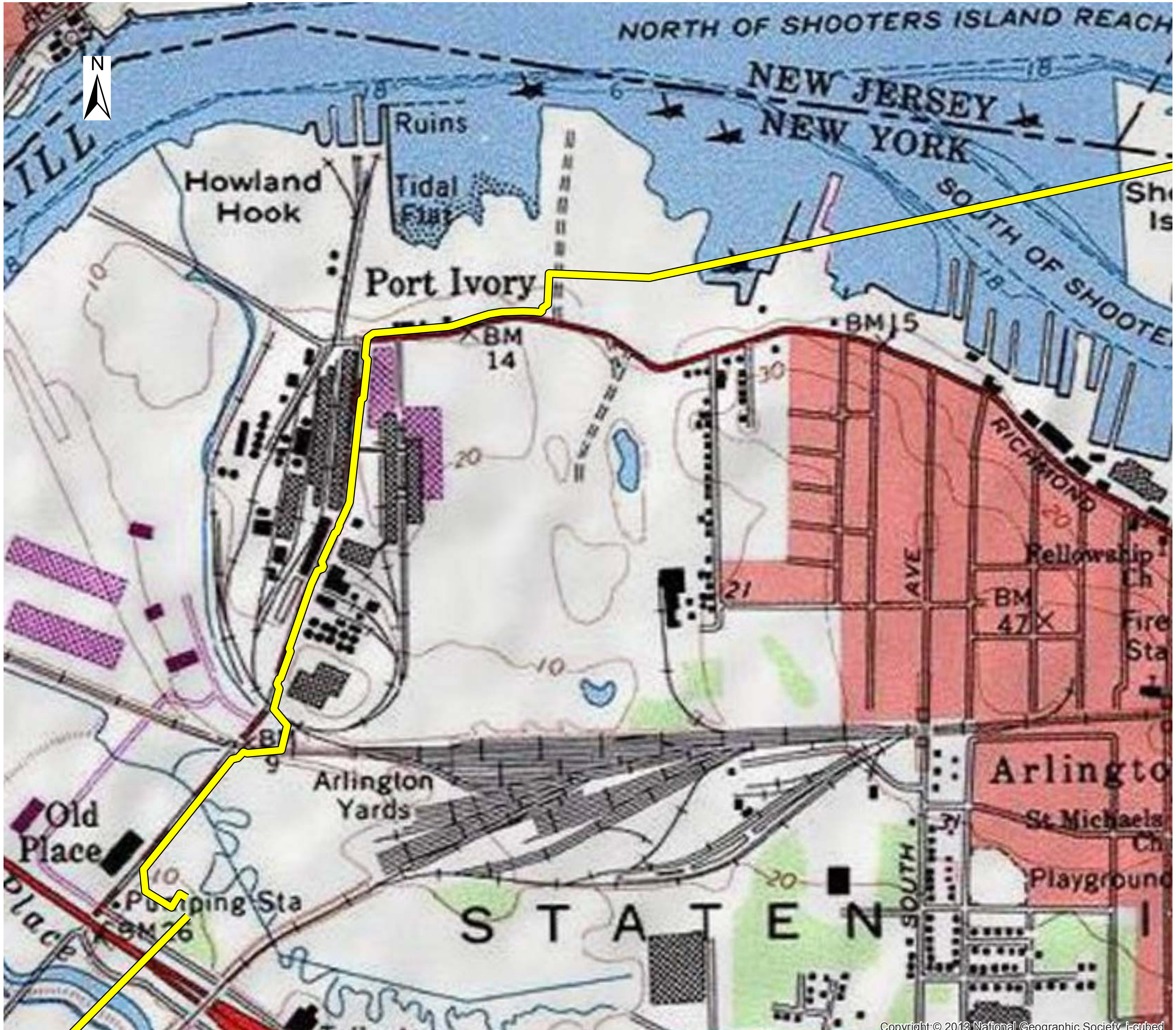
Spectra Energy

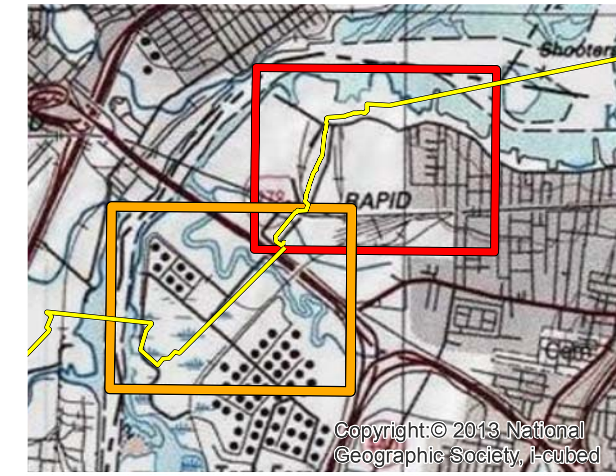
SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
TOPOGRAPHIC MAP OF PROJECT AREA
STATEN ISLAND, NY

FIGURE 2 - MAP 1

Created by: TRC **Date: December 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\Final Report\Figure 2\Staten Island_2.mxd





Legend

Constructed Pipeline

Source: ArcGIS Map Service
Name: USA_Topo_Maps
USGS Quadrangles: Elizabeth and Jersey City Quadrangles, NJ-NJ (1981), 7.5 minutes series.

0 700 Feet

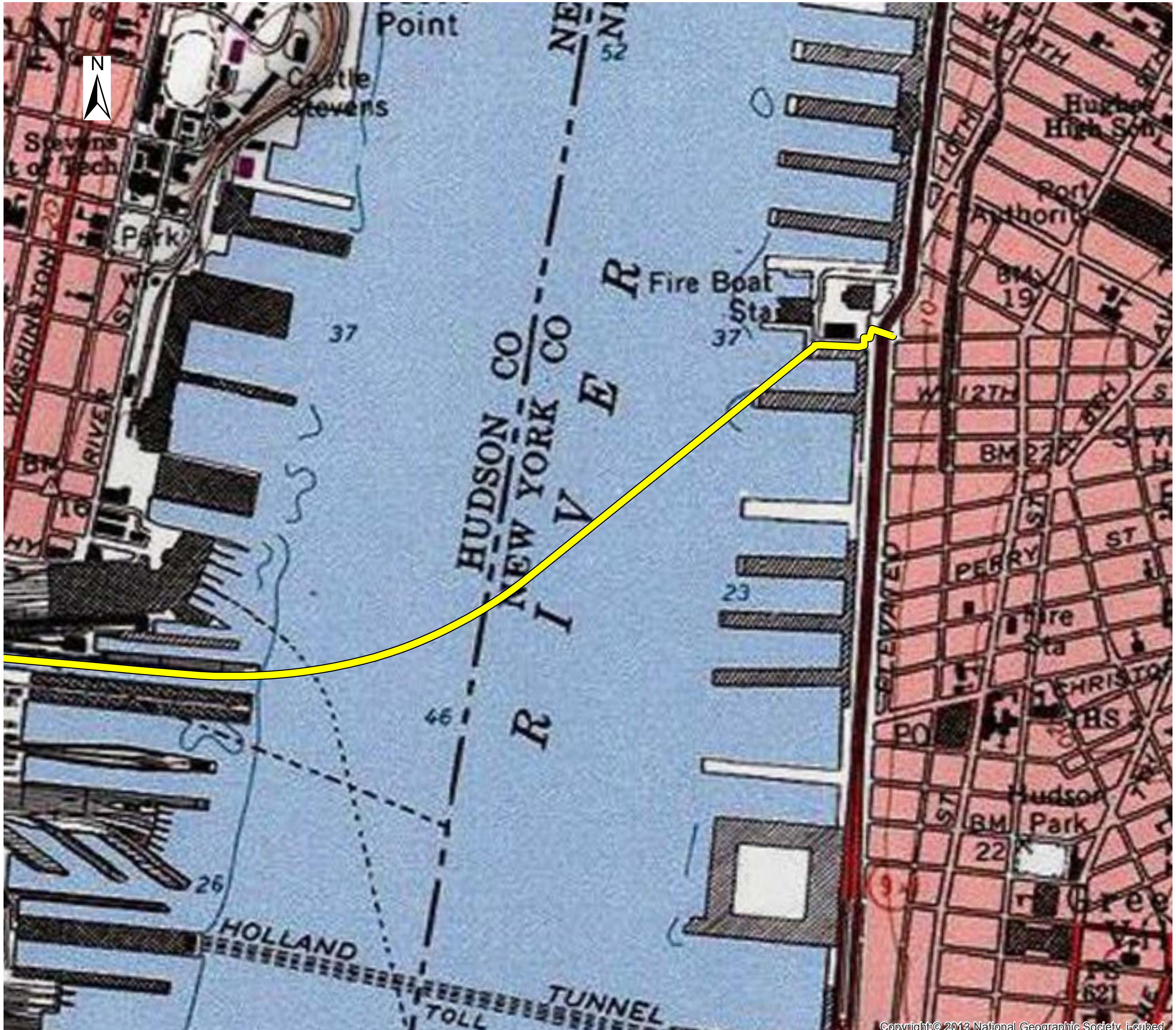
Spectra Energy

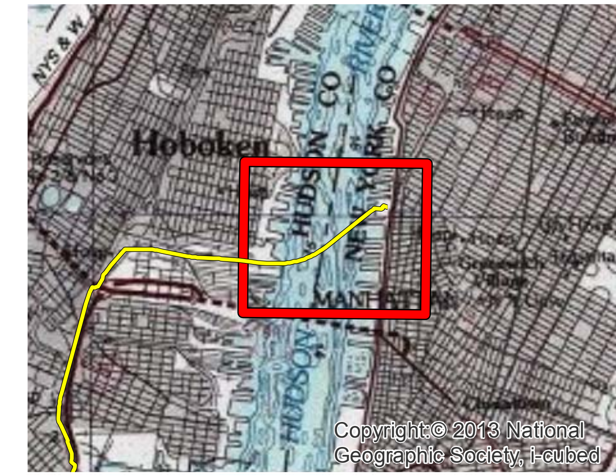
SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
TOPOGRAPHIC MAP OF PROJECT AREA
STATEN ISLAND, NY

FIGURE 2 - MAP 2

Created by: TRC Date: December 2013

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\Final Report\Figure 2\Staten Island_1.mxd





Legend

Constructed Pipeline

Source: ArcGIS Map Service
Name: USA_Topo_Maps
USGS Quadrangles: Elizabeth and Jersey City Quadrangles, NJ-NJ (1981), 7.5 minutes series.

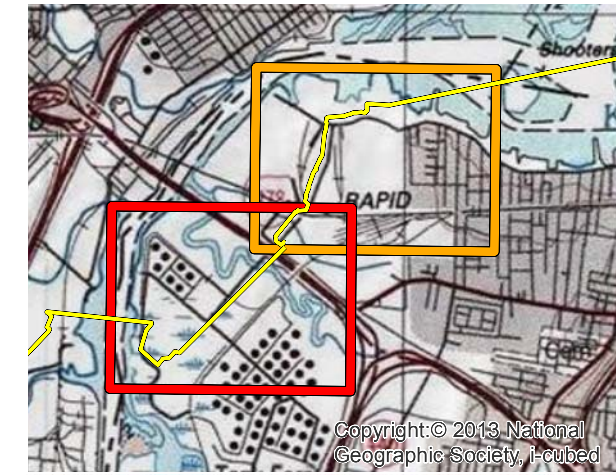
0 700
Feet

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
TOPOGRAPHIC MAP OF PROJECT AREA
MANHATTAN, NY

FIGURE 2 - MAP 3

Created by: TRC **Date: December 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\Final Report\Figure 2\Manhattan_1.mxd



Legend

Constructed Pipeline

Bedrock Geology

Trp - Palisade Diabase sill

Source:
Originator: NYS Museum / NYS Geological Survey
Publication_Date: 19990714
Title: Statewide Bedrock Geology

0 700
Feet

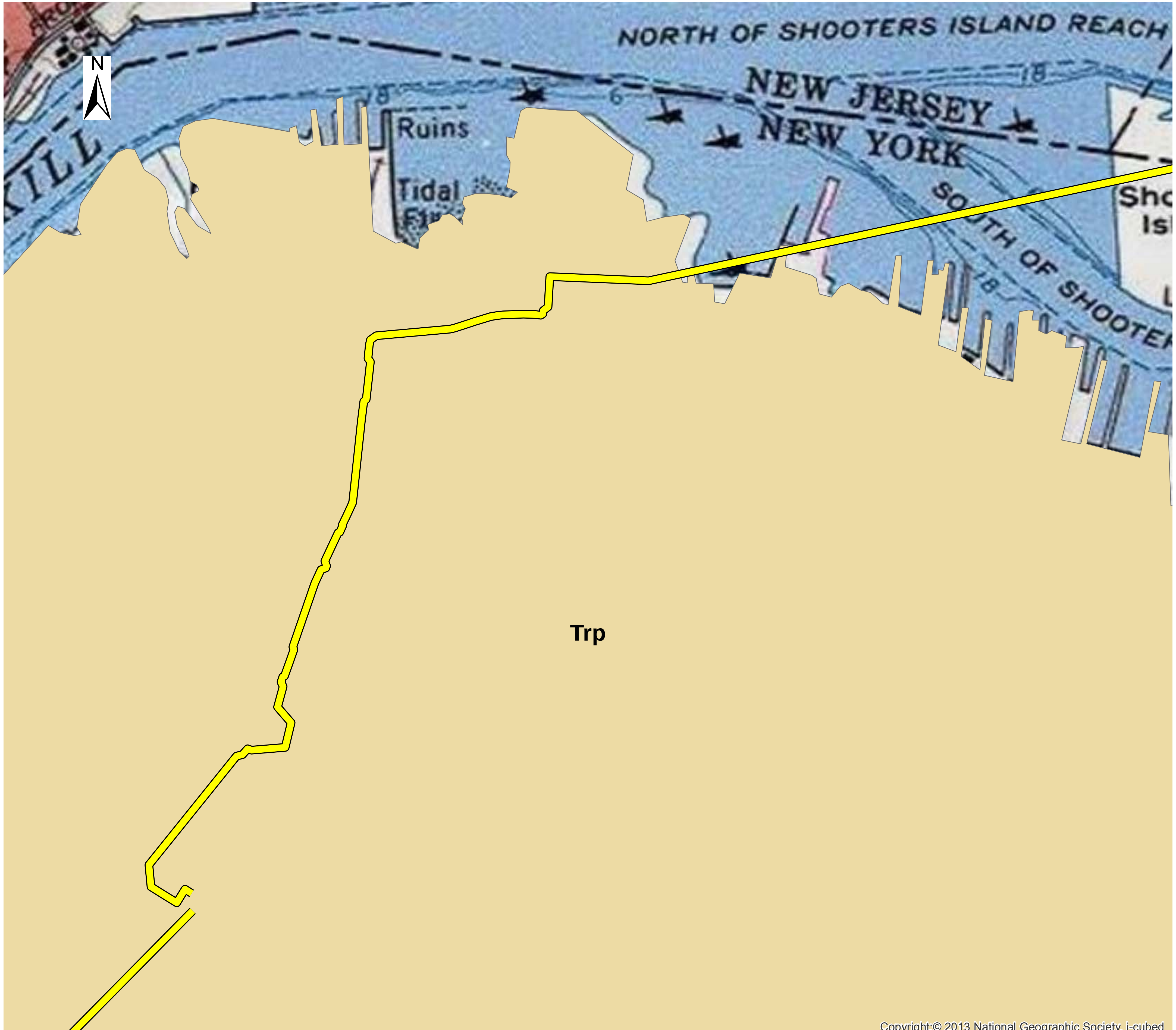
Spectra Energy

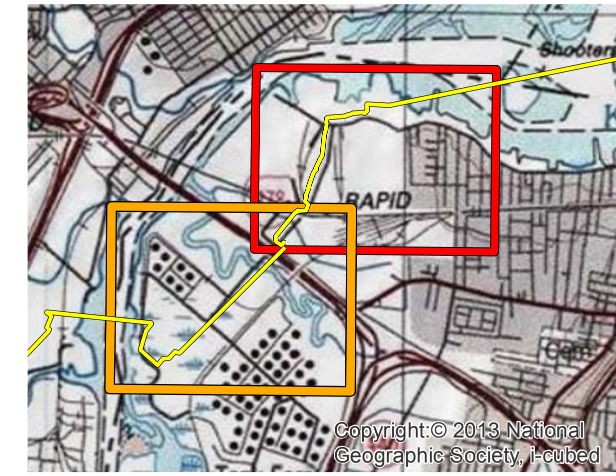
SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
BEDROCK GEOLOGY MAP OF PROJECT AREA
STATEN ISLAND, NY

FIGURE 3 - MAP 1

Created by: TRC **Date: December 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\Final Report\Figure 3\Staten Island_2.mxd





Legend

Constructed Pipeline

Bedrock Geology

Trp - Palisade Diabase sill

Source:
Originator: NYS Museum / NYS Geological Survey
Publication_Date: 19990714
Title: Statewide Bedrock Geology

0 700 Feet

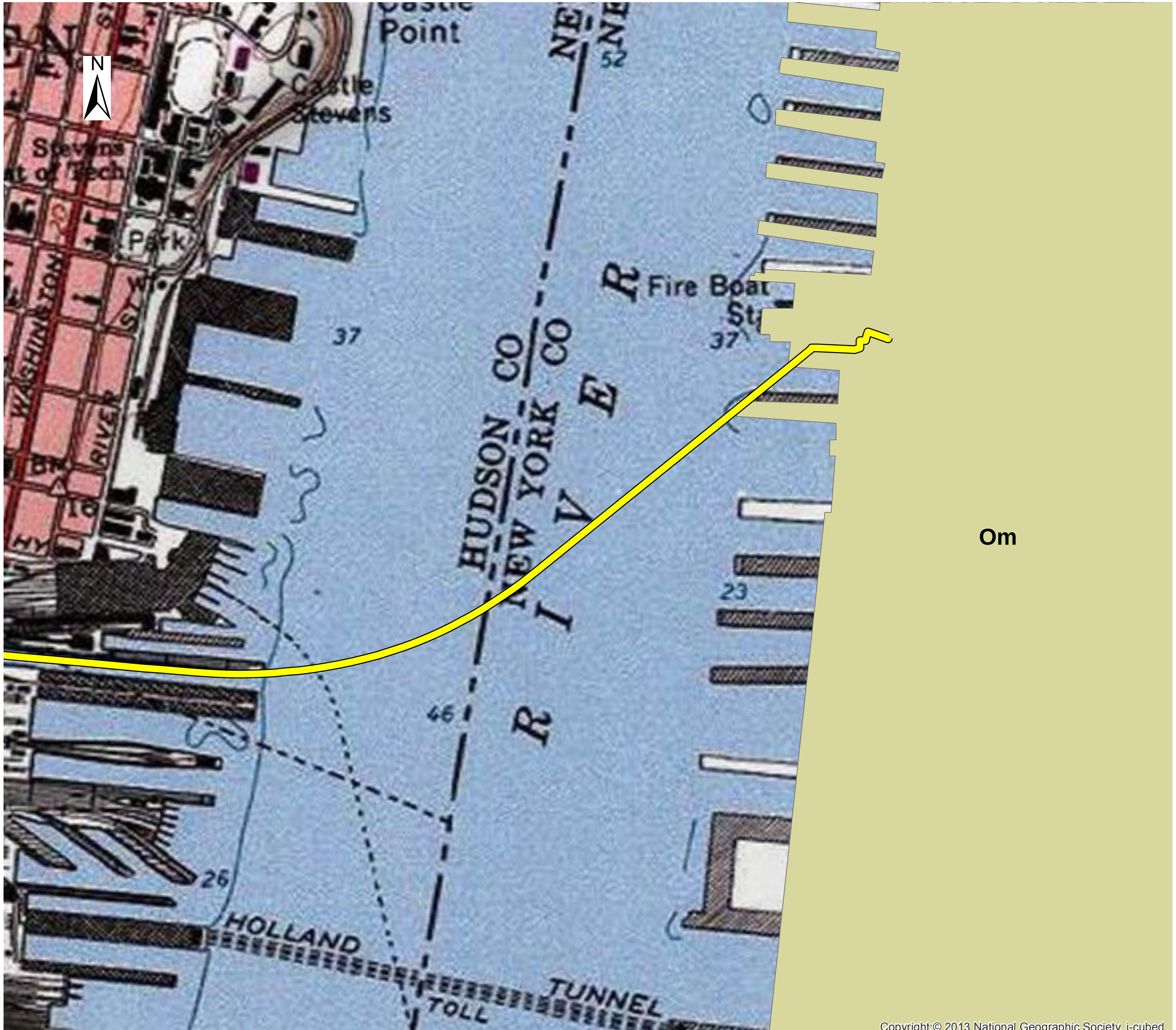
Spectra Energy

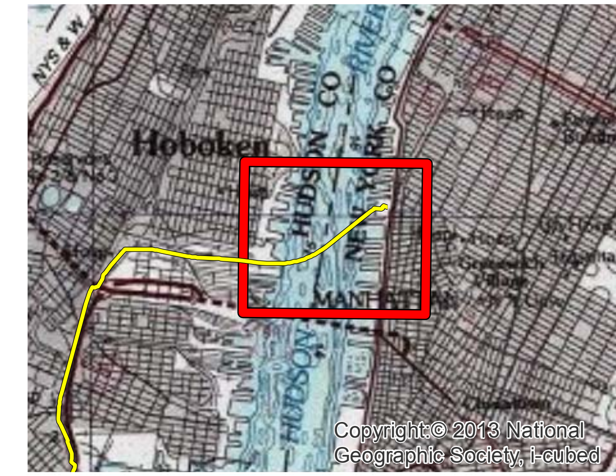
SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
BEDROCK GEOLOGY MAP OF PROJECT AREA
STATEN ISLAND, NY

FIGURE 3 - MAP 2

Created by: TRC **Date: December 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\Final Report\Figure 3\Staten Island_1.mxd





Legend

Constructed Pipeline

Bedrock Geology

Om - Manhattan Formation

Source:
Originator: NYS Museum / NYS Geological Survey
Publication_Date: 19990714
Title: Statewide Bedrock Geology

0 700 Feet

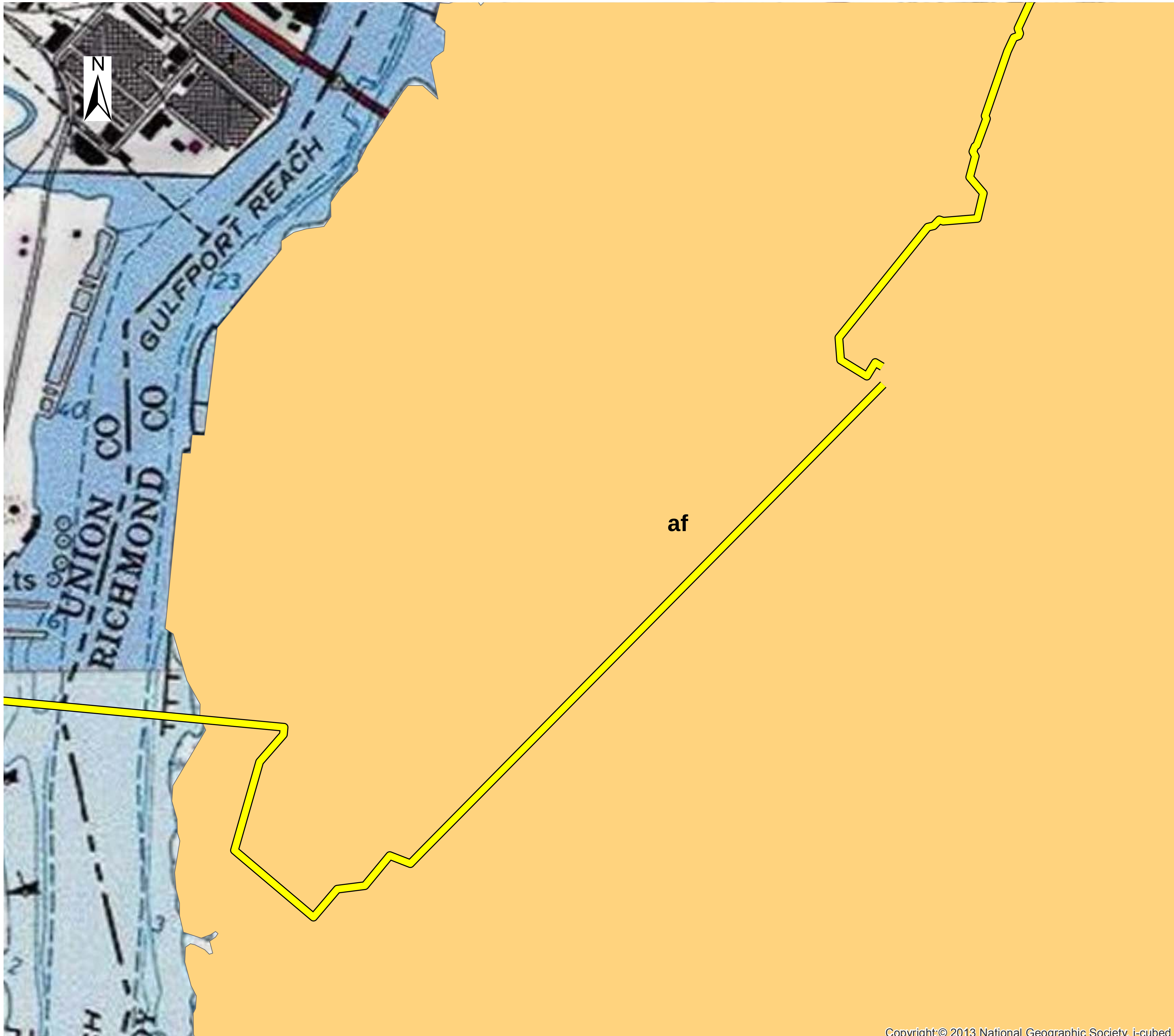
Spectra Energy

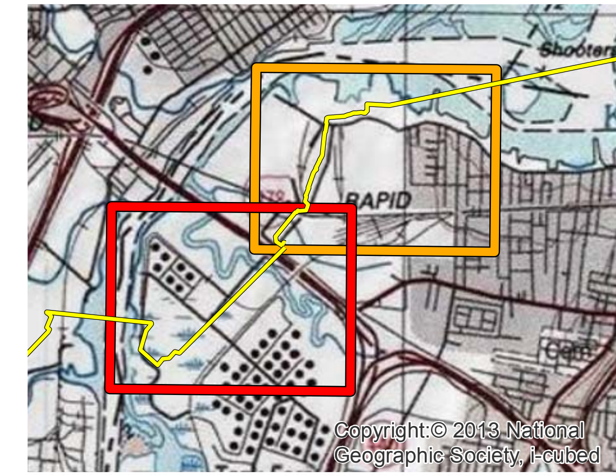
SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
BEDROCK GEOLOGY MAP OF PROJECT AREA
MANHATTAN, NY

FIGURE 3 - MAP 3

Created by: TRC **Date: December 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\Final Report\Figure 3\Manhattan_1.mxd





Legend

Constructed Pipeline

Surficial Geology

af - Recent alluvium

Source:
Originator: NYS Museum / NYS Geological Survey
Publication_Date: 19990222
Title: Surficial Geology

0 700
Feet

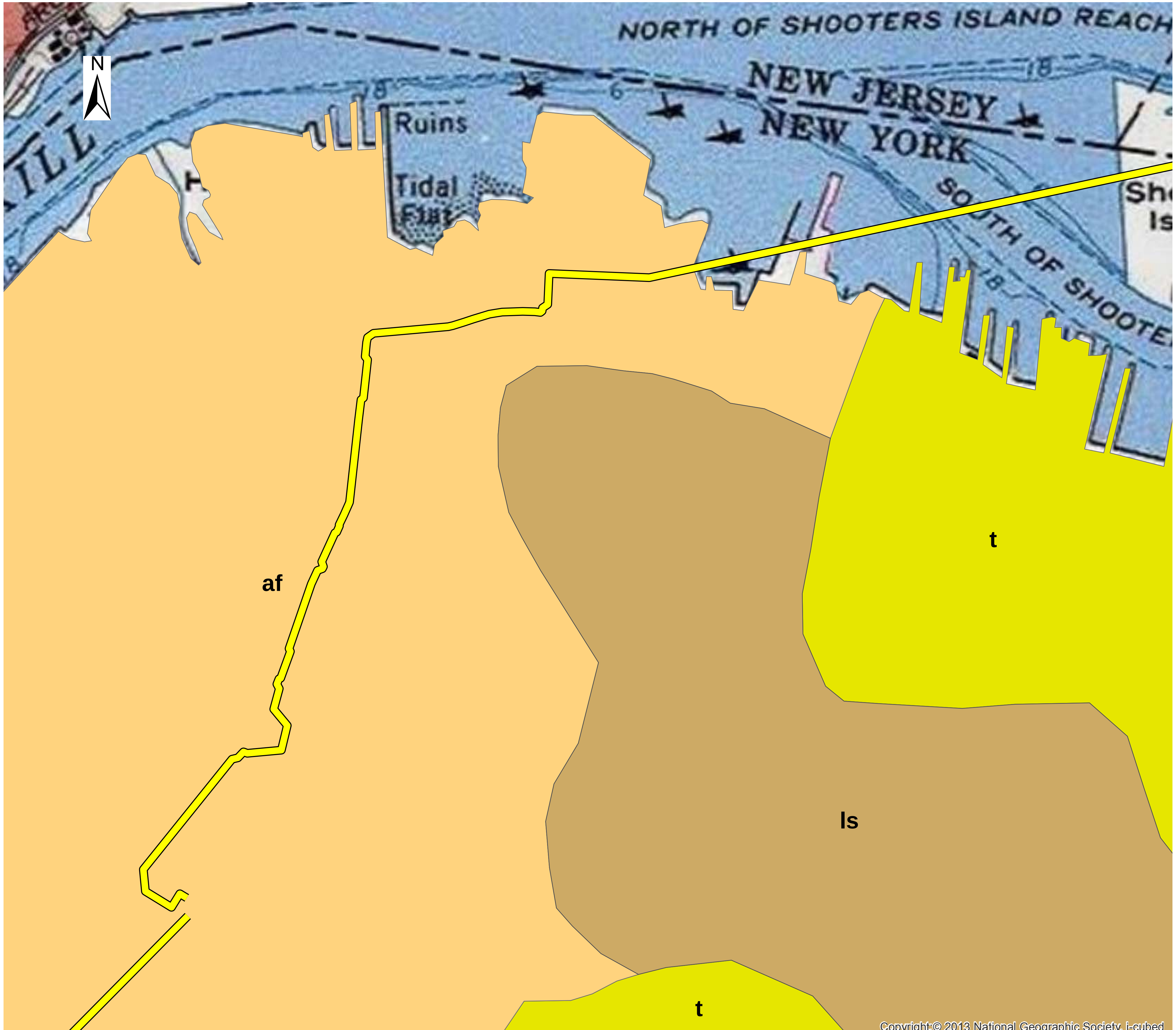
Spectra Energy

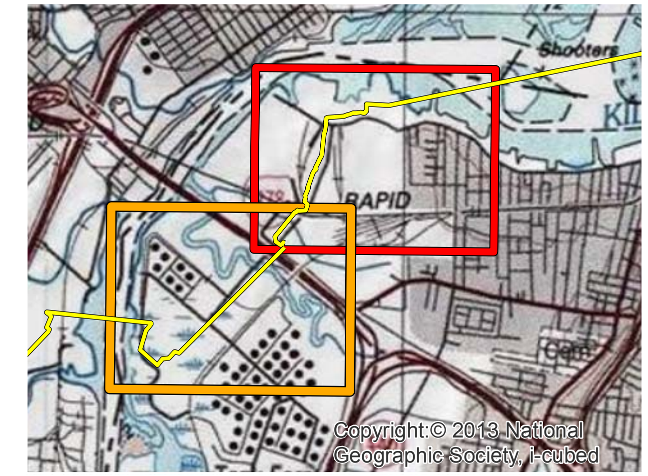
SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
SURFICIAL GEOLOGY MAP OF PROJECT AREA
STATEN ISLAND, NY

FIGURE 4 - MAP 1

Created by: TRC **Date: December 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\Final Report\Figure 4\Staten Island_2.mxd





Legend

Constructed Pipeline

Surficial Geology

af - Recent alluvium

ls - Undifferentiated marine and lacustrine sand

t - Till

Source:
Originator: NYS Museum / NYS Geological Survey
Publication_Date: 19990222
Title: Surficial Geology

0 700 Feet

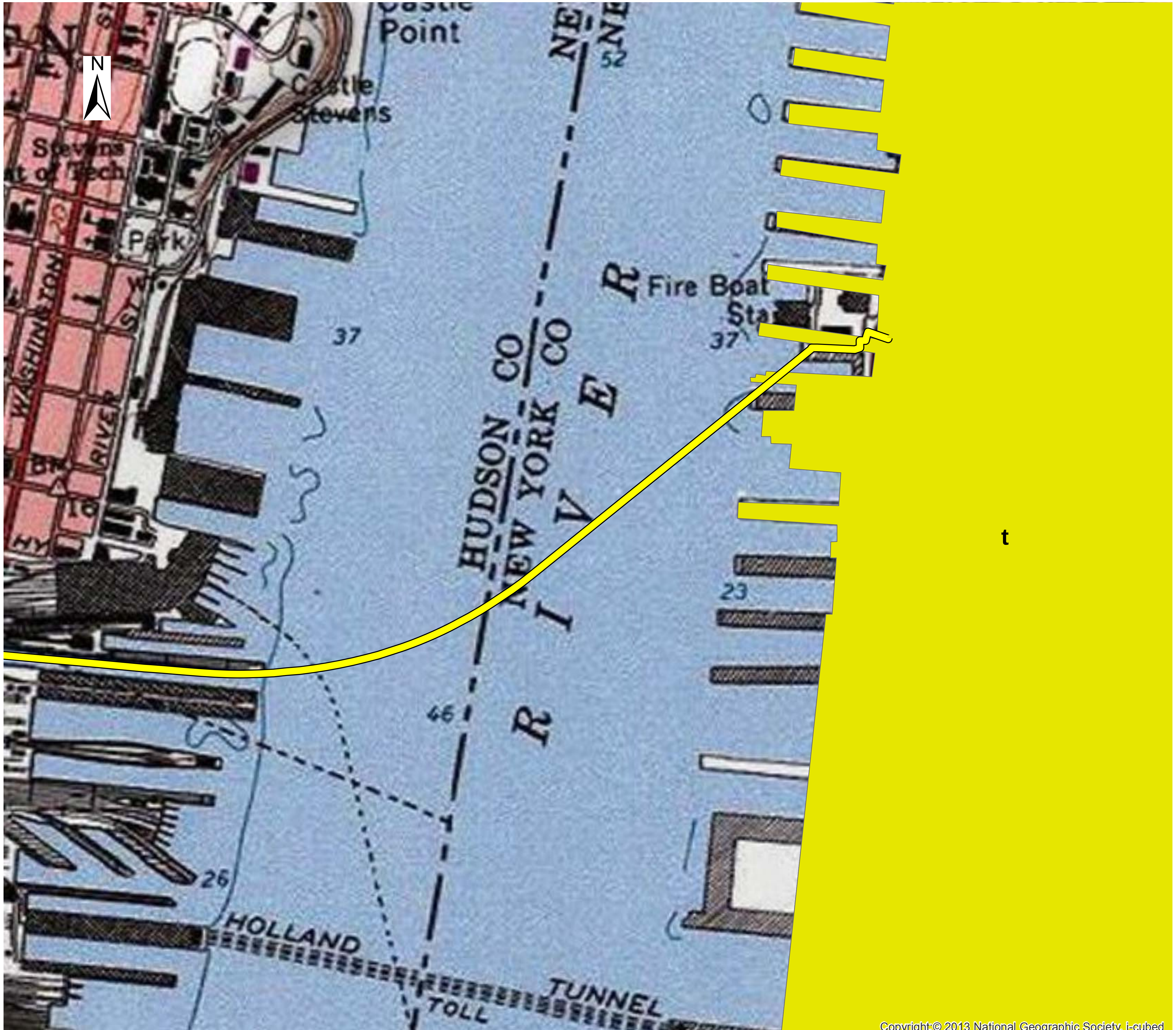
Spectra Energy

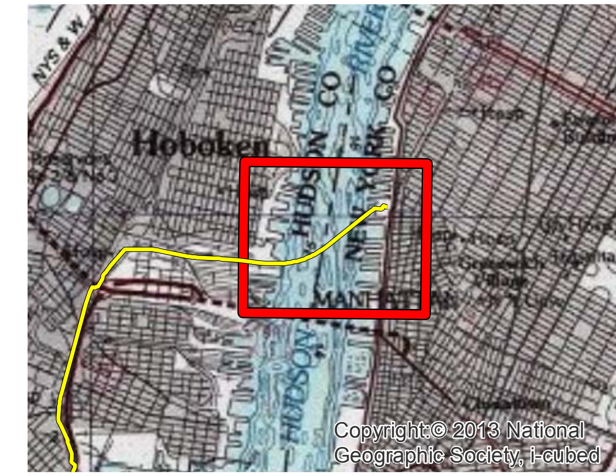
SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
SURFICIAL GEOLOGY MAP OF PROJECT AREA
STATEN ISLAND, NY

FIGURE 4 - MAP 2

Created by: TRC **Date: December 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\Final Report\Figure 4\Staten Island_1.mxd





Legend

Constructed Pipeline

Surficial Geology

t - Till

Source:
Originator: NYS Museum / NYS Geological Survey
Publication_Date: 19990222
Title: Surficial Geology

0 700 Feet

Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
SURFICIAL GEOLOGY MAP OF PROJECT AREA
MANHATTAN, NY

FIGURE 4 - MAP 3

Created by: TRC **Date: December 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\Final Report\Figure 4\Manhattan_1.mxd

Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Former Free-Phase Product (from Phase I file review)
- Current Free-Phase Product (from Phase I file review)

0 300 Feet

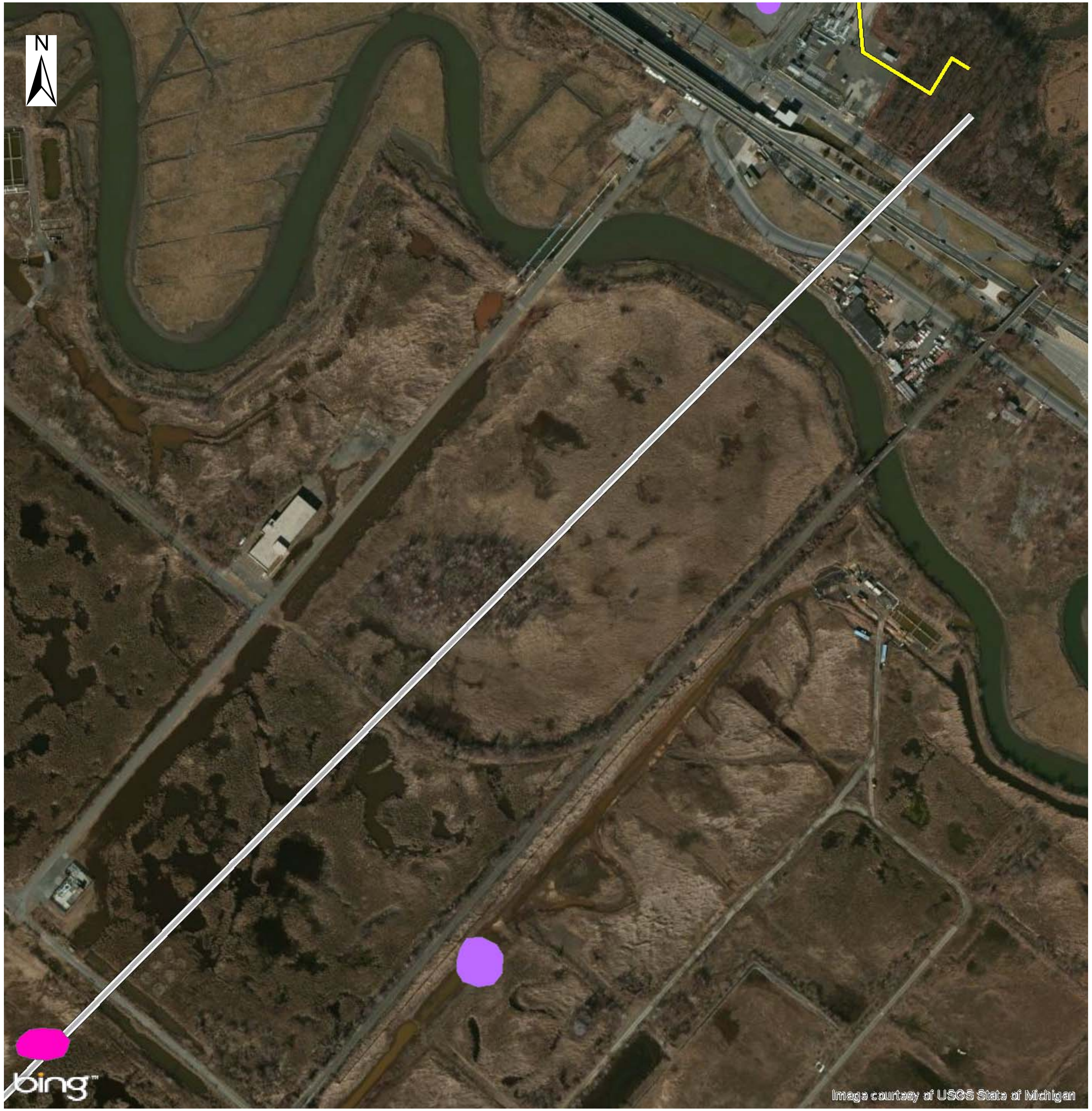
Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
AREAS OF PRODUCT FROM REVIEWED NYSDEC FILES
STATEN ISLAND, NY

FIGURE 5 - MAP 1

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 5\Map_4_NY.mxd Date: 11/1/2013

Created by: TRC **Date: August 2013**



Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Former Free-Phase Product (from Phase I file review)
- Current Free-Phase Product (from Phase I file review)

0 300 Feet

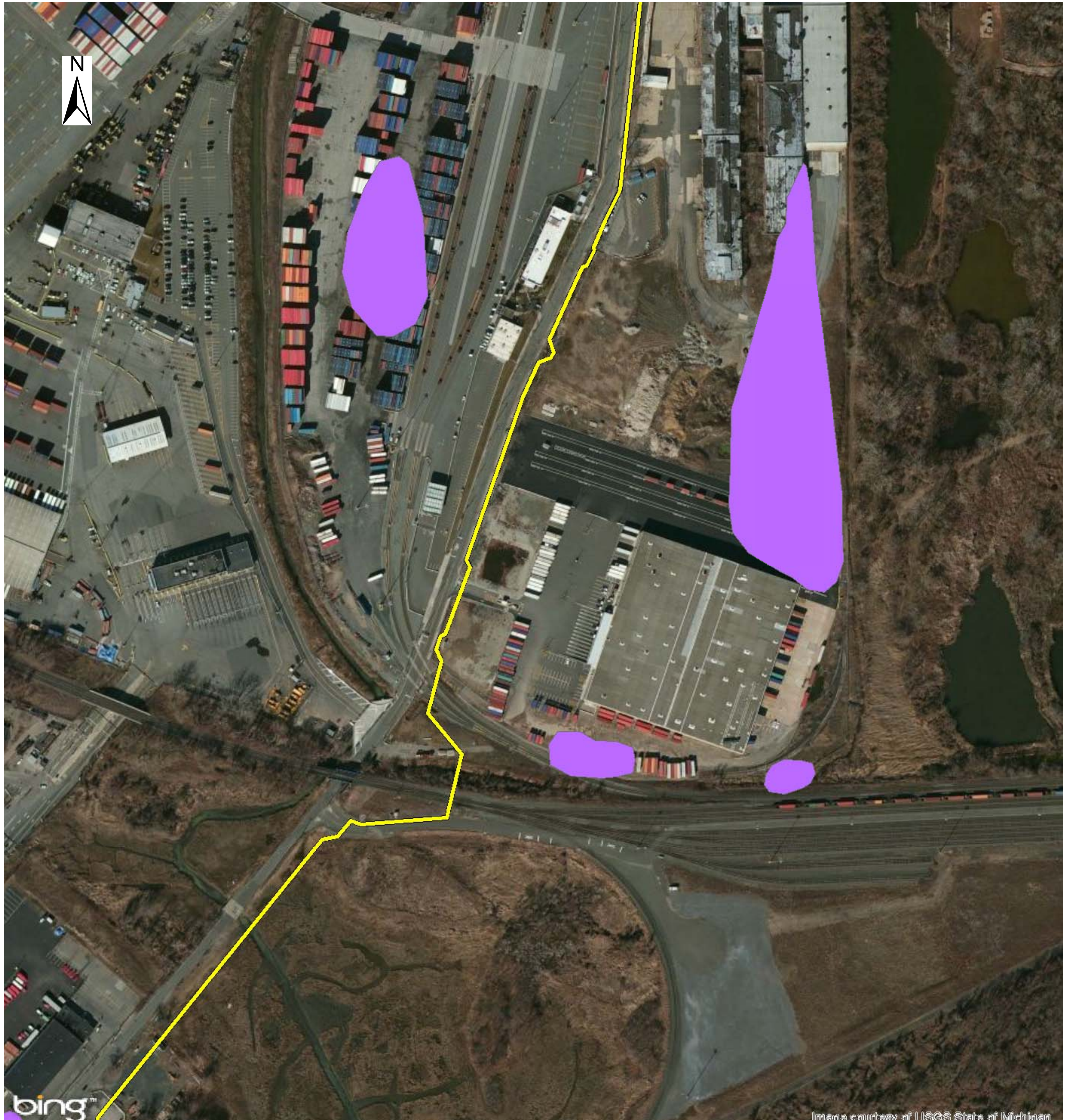
Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
AREAS OF PRODUCT FROM REVIEWED NYSDEC FILES
STATEN ISLAND, NY

FIGURE 5 - MAP 2

Created by: TRC **Date: August 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 5\Map_5.mxd Date: 11/1/2013



Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Former Free-Phase Product (from Phase I file review)
- Current Free-Phase Product (from Phase I file review)

0 300 Feet

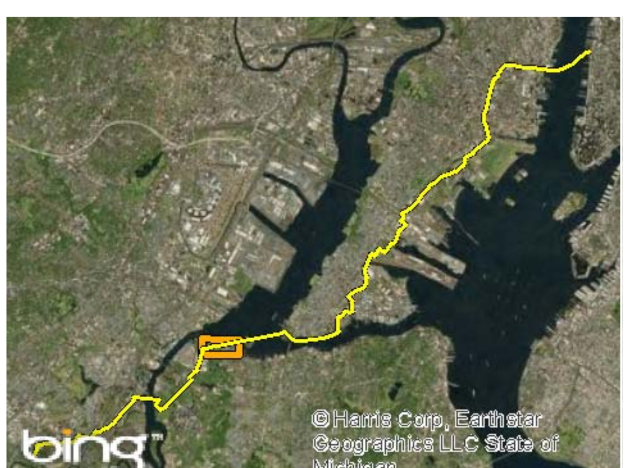
Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
AREAS OF PRODUCT FROM REVIEWED NYSDEC FILES
STATEN ISLAND, NY

FIGURE 5 - MAP 3

Created by: TRC Date: August 2013

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 5\Map_6.mxd Date: 11/1/2013



Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Former Free-Phase Product (from Phase I file review)
- Current Free-Phase Product (from Phase I file review)

Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
AREAS OF PRODUCT FROM REVIEWED NYSDEC FILES
STATEN ISLAND, NY

FIGURE 5 - MAP 4

Created by: TRC **Date: August 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 5\Map_7.mxd Date: 11/1/2013

0 300
Feet

Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Former Free-Phase Product (from Phase I file review)
- Current Free-Phase Product (from Phase I file review)

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
AREAS OF PRODUCT FROM REVIEWED NYSDEC FILES
MANHATTAN, NY

FIGURE 5 - MAP 5

Created by: TRC **Date: August 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 5\Map_23.mxd Date: 11/1/2013

Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- ASTs (current)
- ASTs (historic)
- USTs (current)
- USTs (historic)
- Other Historic Structure
- Other Historic Structure (line)

0 300 Feet

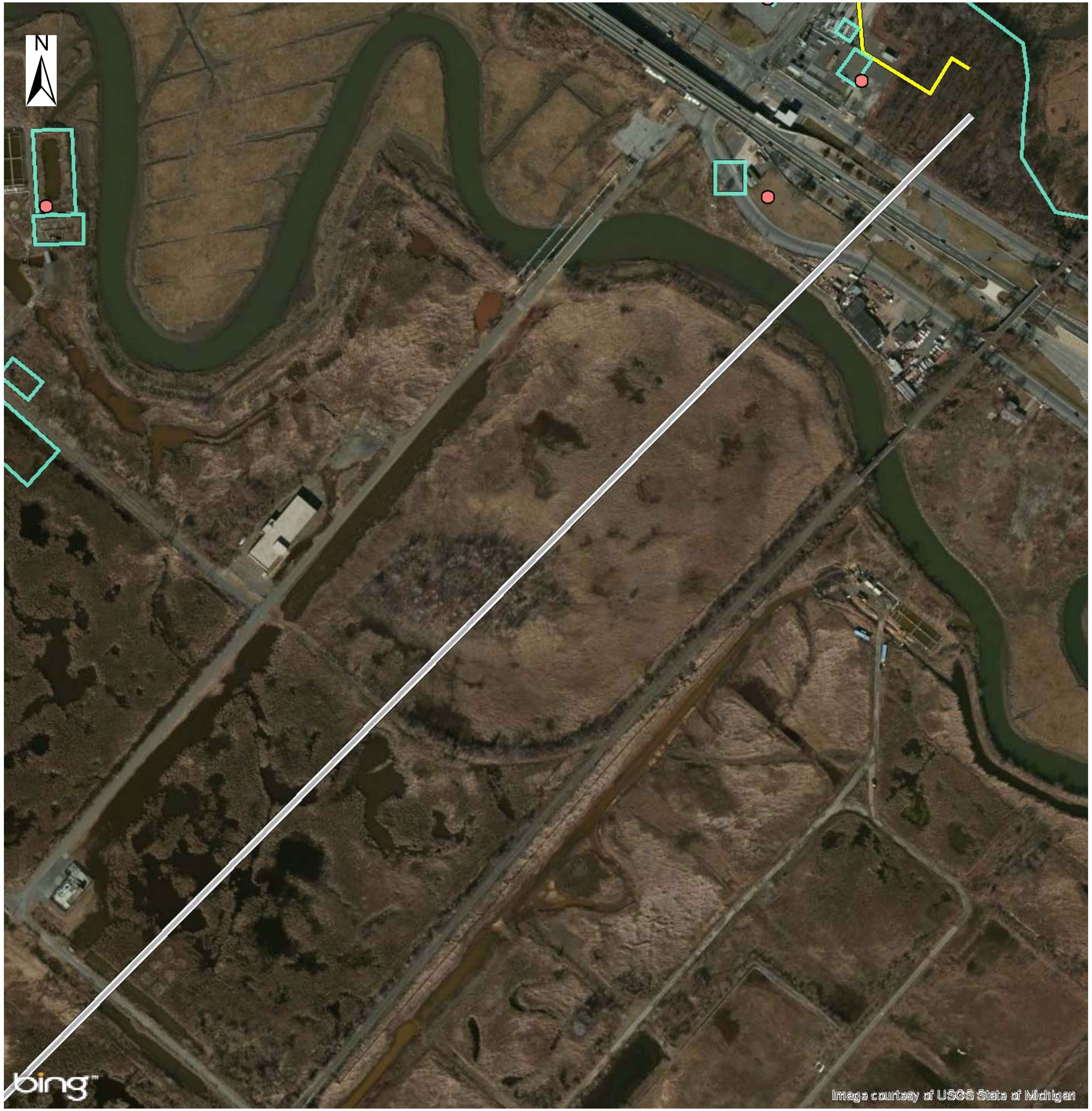
Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
HISTORIC STRUCTURES, USTS, AND ASTS
FROM REVIEWED NYSDEC FILES
STATEN ISLAND, NY

FIGURE 6 - MAP 1

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 7\Map_4_NY.mxd Date: 11/1/2013

Created by: TRC **Date: August 2013**



Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- ASTs (current)
- ASTs (historic)
- USTs (current)
- USTs (historic)
- Other Historic Structure
- Other Historic Structure (line)

0 300 Feet

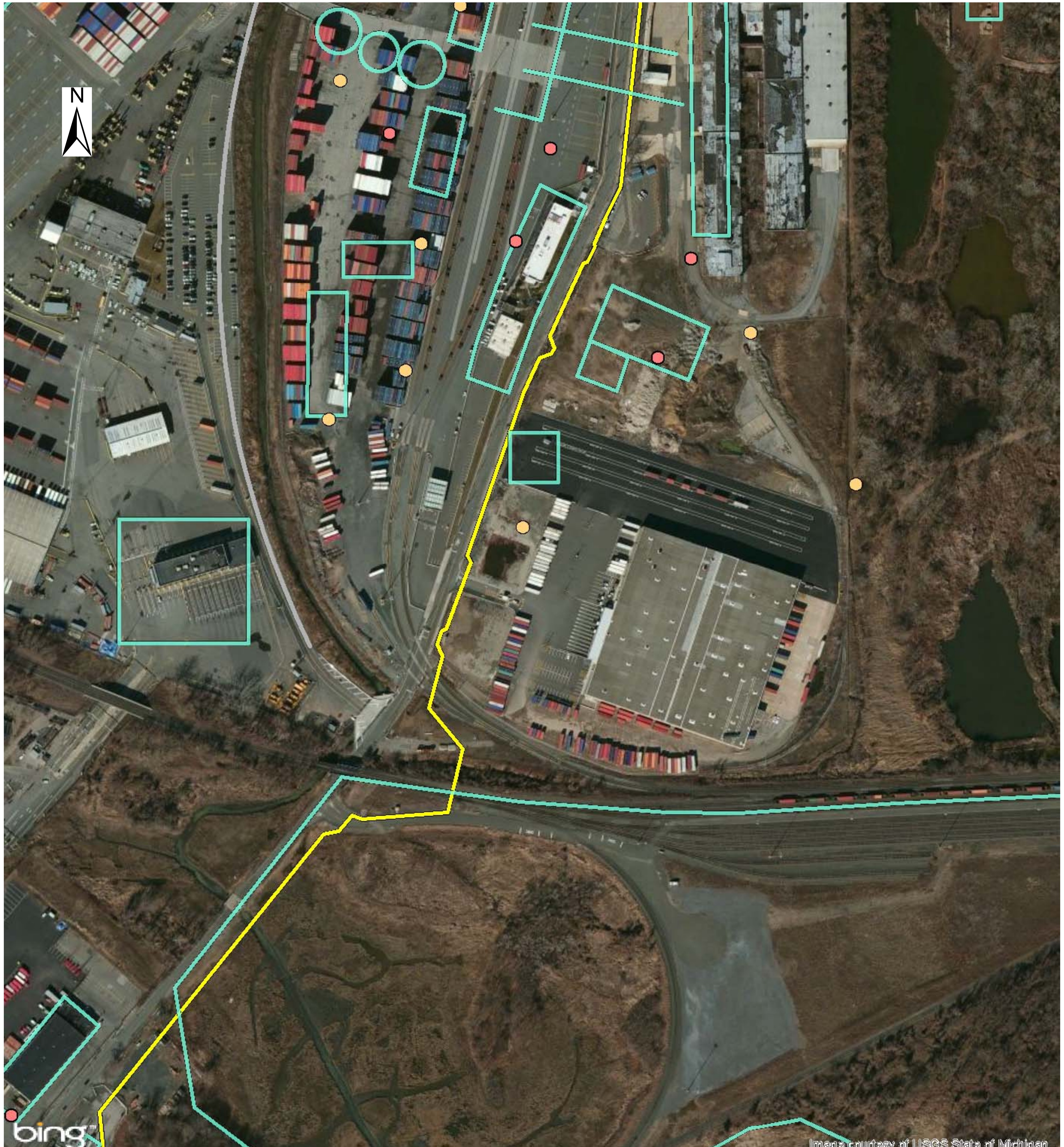
Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
HISTORIC STRUCTURES, USTS, AND ASTS
FROM REVIEWED NYSDEC FILES
STATEN ISLAND, NY

FIGURE 6 - MAP 2

Created by: TRC Date: August 2013

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 7\Map_5.mxd Date: 11/1/2013



Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- ASTs (current)
- ASTs (historic)
- USTs (current)
- USTs (historic)
- Other Historic Structure
- Other Historic Structure (line)

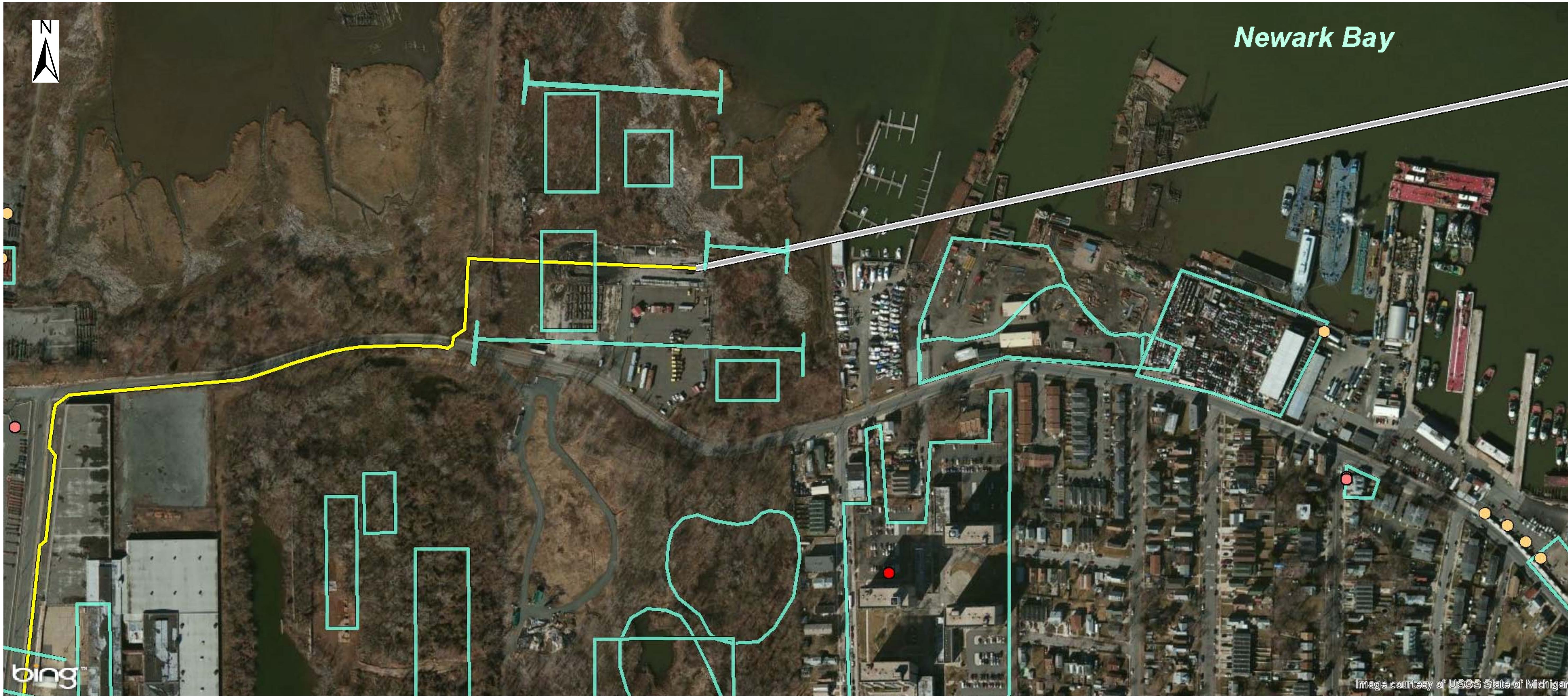
0 300 Feet

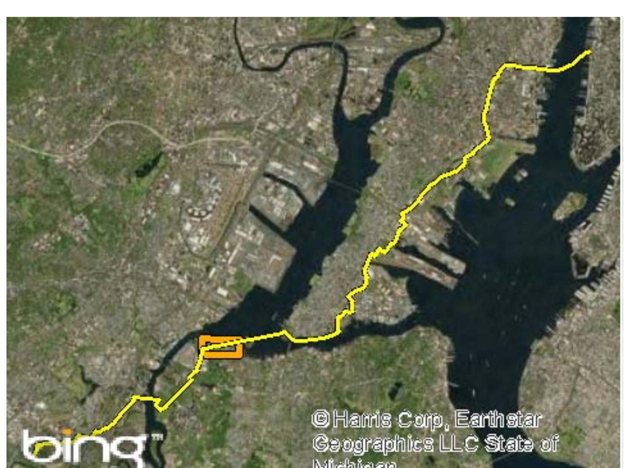
SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
HISTORIC STRUCTURES, USTS, AND ASTS
FROM REVIEWED NYSDEC FILES
STATEN ISLAND, NY

FIGURE 6 - MAP 3

Created by: Date: August 2013

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 7\Map_6.mxd Date: 11/1/2013





Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- ASTs (current)
- ASTs (historic)
- USTs (current)
- USTs (historic)
- Other Historic Structure
- Other Historic Structure (line)

Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
HISTORIC STRUCTURES, USTS, AND ASTS
FROM REVIEWED NYSDEC FILES
STATEN ISLAND, NY

FIGURE 6 - MAP 4

Created by: TRC **Date: August 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 7\Map_7.mxd Date: 11/1/2013

0 300 Feet

Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- ASTs (current)
- ASTs (historic)
- USTs (current)
- USTs (historic)
- Other Historic Structure
- Other Historic Structure (line)

Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
HISTORIC STRUCTURES, USTS, AND ASTS
FROM REVIEWED NYSDEC FILES
MANHATTAN, NY

FIGURE 6 - MAP 5

Created by: TRC Date: August 2013

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 7\Map_23.mxd Date: 11/20/2013

Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Temporary Well Location
- Soil Boring Location

0 300
Feet

Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
PRE-CHARACTERIZATION SOIL BORING AND
TEMPORARY MONITORING WELL LOCATIONS
STATEN ISLAND, NY

FIGURE 7 - MAP 1

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 8\Map_4_NY.mxd Date: 11/1/2013

Created by: TRC **Date: August 2013**

Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Temporary Well Location
- Soil Boring Location

0 300 Feet

Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
PRE-CHARACTERIZATION SOIL BORING AND TEMPORARY MONITORING WELL LOCATIONS
STATEN ISLAND, NY

FIGURE 7 - MAP 2

Created by: TRC **Date: August 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 8\Map_5.mxd Date: 11/1/2013

Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Temporary Well Location
- Soil Boring Location

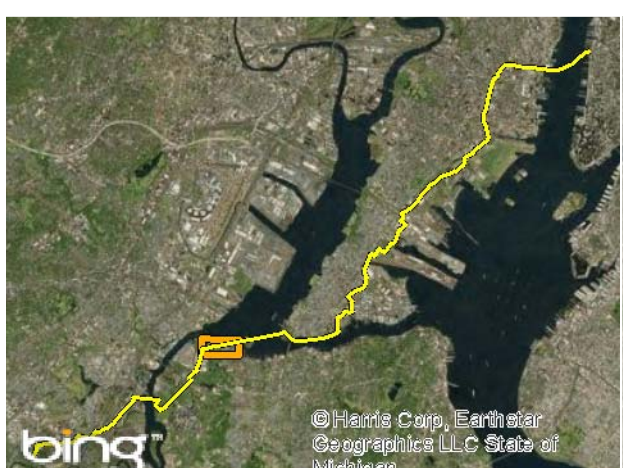
0 300 Feet

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
PRE-CHARACTERIZATION SOIL BORING AND
TEMPORARY MONITORING WELL LOCATIONS
STATEN ISLAND, NY

FIGURE 7 - MAP 3

Created by: TRC Date: August 2013

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 8\Map_6.mxd Date: 11/1/2013



Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Temporary Well Location
- Soil Boring Location

Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
PRE-CHARACTERIZATION SOIL BORING AND TEMPORARY MONITORING WELL LOCATIONS
STATEN ISLAND, NY

FIGURE 7 - MAP 4

Created by: TRC **Date: August 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 8\Map_7.mxd Date: 11/1/2013

0 300
Feet

Legend

Constructed Pipeline

Horizontal Directional Drill (HDD)

Temporary Well Location

Soil Boring Location

Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
PRE-CHARACTERIZATION SOIL BORING AND TEMPORARY MONITORING WELL LOCATIONS
MANHATTAN, NY

FIGURE 7 - MAP 5

Created by: TRC **Date: August 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 8\Map_23.mxd Date: 11/20/2013

0 300 Feet

Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Product encountered during Phase II Work - Load and Go Due to Product

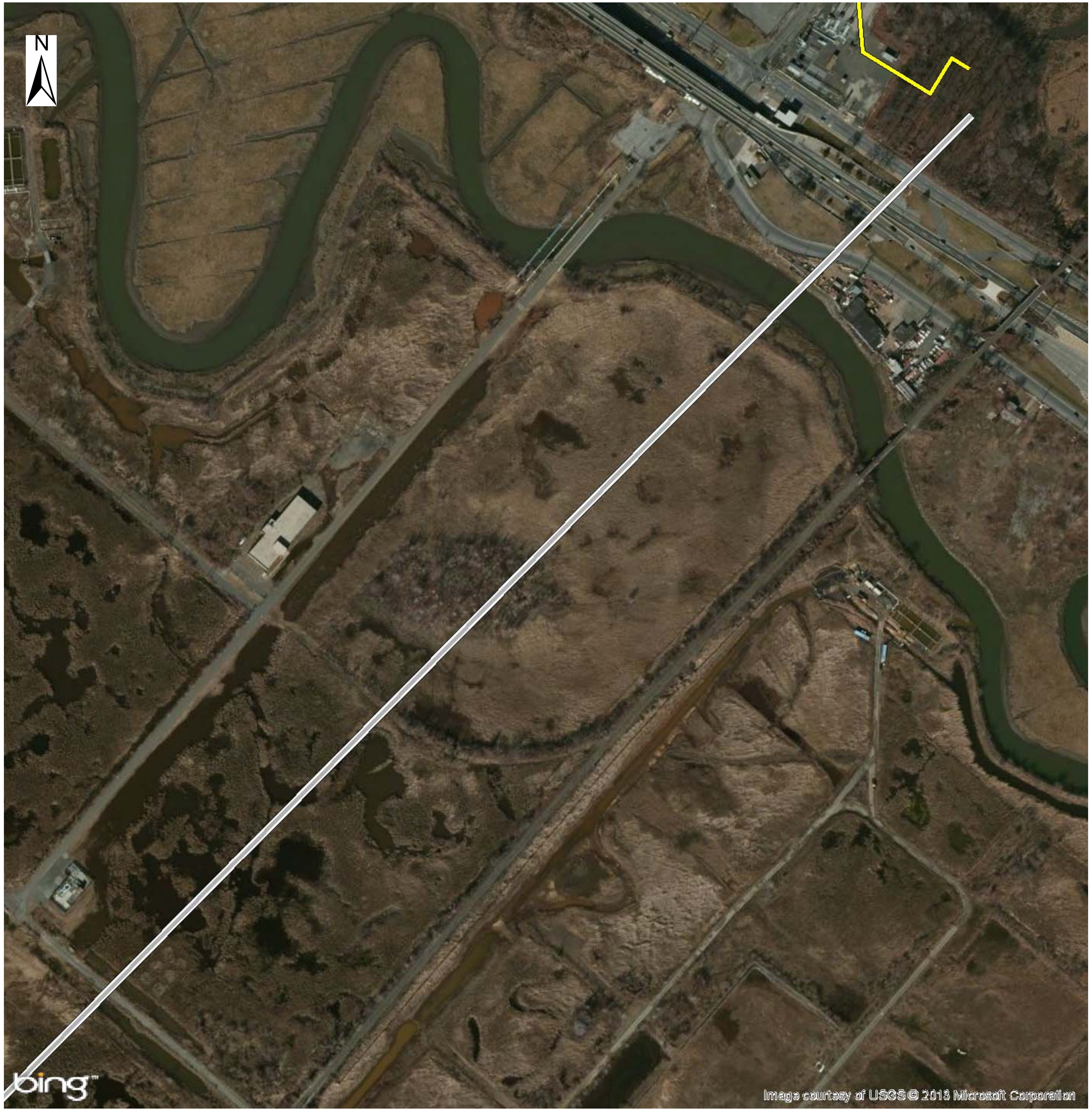
Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
AREAS OF PRODUCT
STATEN ISLAND, NY

FIGURE 8 - MAP 1

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 9\Map_4_NY.mxd Date: 8/23/2013

Created by: TRC **Date: August 2013**



Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Product encountered during Phase II Work - Load and Go Due to Product

0 300 Feet

Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
AREAS OF PRODUCT
STATEN ISLAND, NY

FIGURE 8 - MAP 2

Created by: TRC Date: August 2013

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 9\Map_5.mxd Date: 8/23/2013

Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Product encountered during Phase II Work - Load and Go Due to Product

0 300 Feet

Spectra Energy

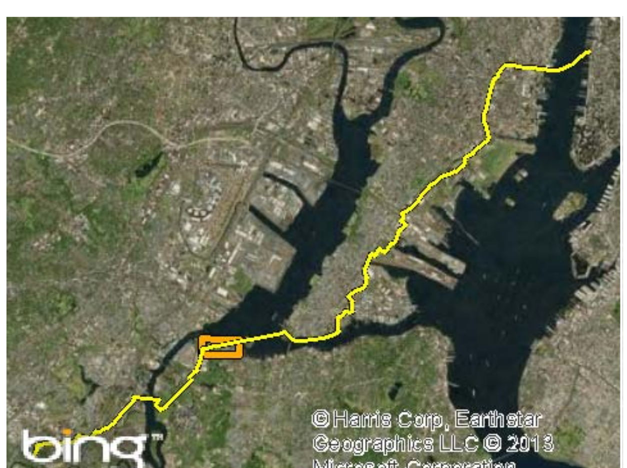
SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
AREAS OF PRODUCT
STATEN ISLAND, NY

FIGURE 8 - MAP 3

Created by: TRC Date: August 2013

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 9\Map_6.mxd Date: 8/23/2013

0 300
Feet



Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Product encountered during Phase II Work - Load and Go Due to Product

Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
AREAS OF PRODUCT
STATEN ISLAND, NY

FIGURE 8 - MAP 4

Created by: TRC **Date: August 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 9\Map_7.mxd Date: 8/23/2013

0 300 Feet

Legend

- Constructed Pipeline
- Horizontal Directional Drill (HDD)
- Product encountered during Phase II Work - Load and Go Due to Product

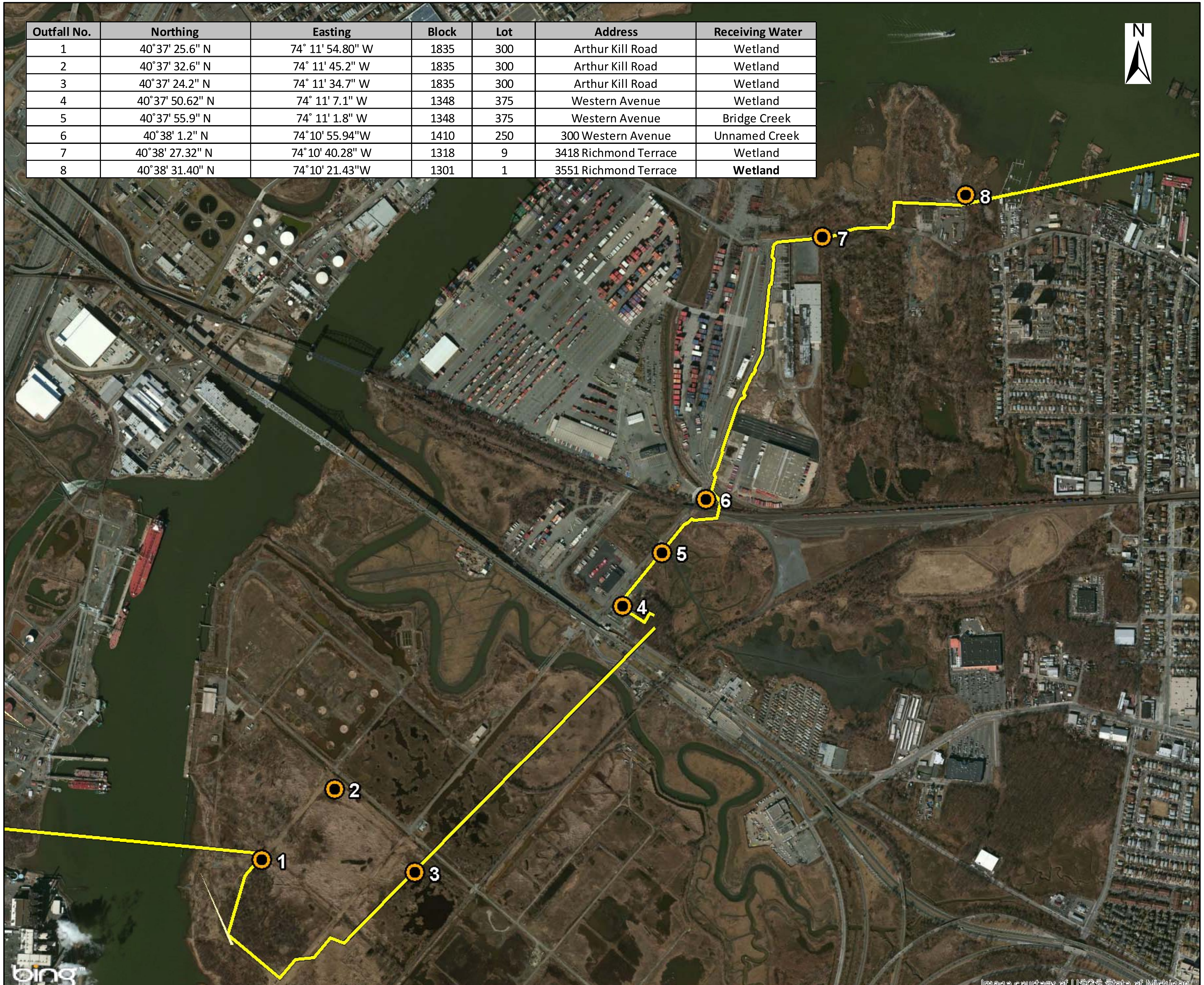
Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
AREAS OF PRODUCT
MANHATTAN, NY

FIGURE 8 - MAP 5

Created by: TRC **Date: August 2013**

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\For Contractors\August 2013\Figure 9\Map_23.mxd Date: 8/23/2013



Outfall No.	Northing	Easting	Block	Lot	Address	Receiving Water
1	40°37' 25.6" N	74° 11' 54.80" W	1835	300	Arthur Kill Road	Wetland
2	40°37' 32.6" N	74° 11' 45.2" W	1835	300	Arthur Kill Road	Wetland
3	40°37' 24.2" N	74° 11' 34.7" W	1835	300	Arthur Kill Road	Wetland
4	40°37' 50.62" N	74° 11' 7.1" W	1348	375	Western Avenue	Wetland
5	40°37' 55.9" N	74° 11' 1.8" W	1348	375	Western Avenue	Bridge Creek
6	40°38' 1.2" N	74°10' 55.94"W	1410	250	300 Western Avenue	Unnamed Creek
7	40°38' 27.32" N	74°10' 40.28" W	1318	9	3418 Richmond Terrace	Wetland
8	40°38' 31.40" N	74°10' 21.43"W	1301	1	3551 Richmond Terrace	**Wetland**

Legend

Pipeline

1 Outfall Location and Identification Number

0 1,000 Feet

Spectra Energy

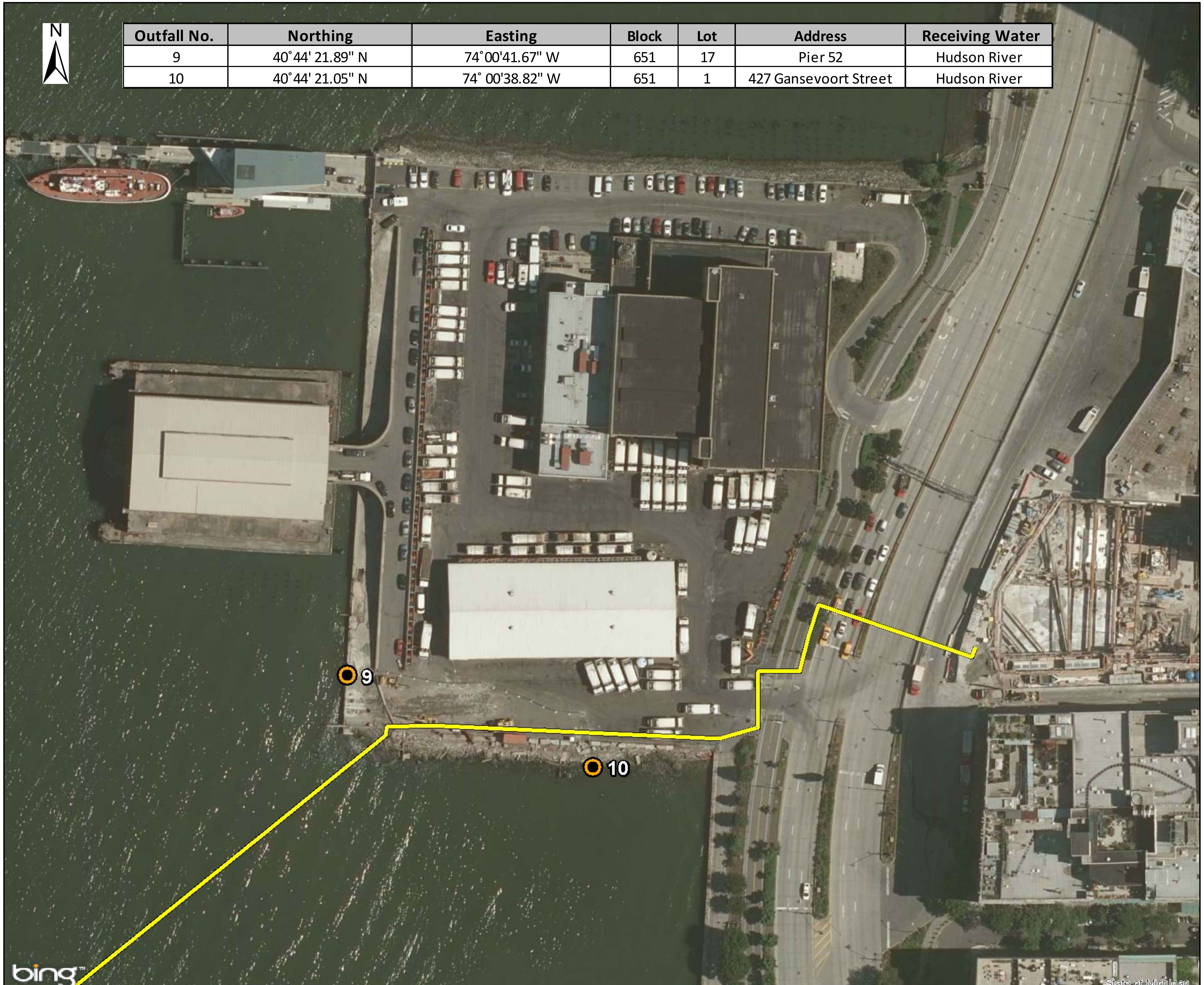
SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
APPROVED SURFACE WATER DISCHARGE LOCATIONS
STATEN ISLAND, NY

FIGURE 9 - MAP 1

Created by: TRC Date: December 2013

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\Final Report\Figure 9 NY\Figure 1_2.mxd

Outfall No.	Northing	Easting	Block	Lot	Address	Receiving Water
9	40˚44' 21.89" N	74˚00'41.67" W	651	17	Pier 52	Hudson River
10	40˚44' 21.05" N	74˚ 00'38.82" W	651	1	427 Gansevoort Street	Hudson River



Legend

Pipeline

10 Outfall Location and Identification Number

0 100 Feet

Spectra Energy

SPECTRA ENERGY - TEXAS EASTERN TRANSMISSION, LP
APPROVED SURFACE WATER DISCHARGE LOCATIONS
MANHATTAN, NY

FIGURE 9 - MAP 2

Created by: TRC Date: December 2013

Path: M:\ArcGIS Files\168217\Spectra Expansion\Figures\Final Report\Figure 9 NY\Figure 2_2.mxd