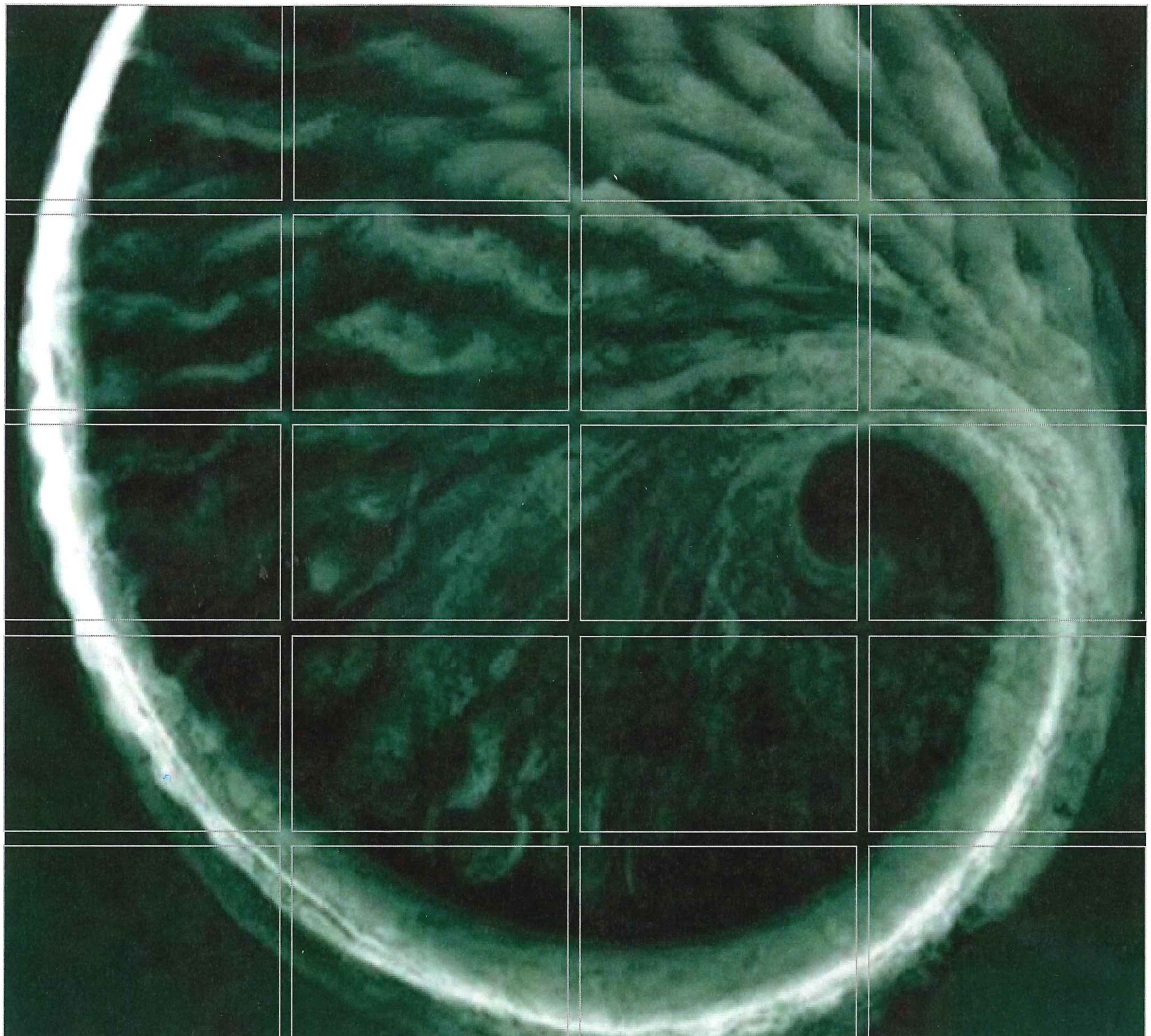

STATE OF NEW YORK
JOHN PAUL MOHLIN
LICENSED PROFESSIONAL ENGINEER

New York Twist Drill

OU-2 Off-Site Feasibility Study

Prepared for:
Respondents
Order on Consent
Index Number W1-0998-04-04

September 2014

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I, John Mohlin, certify that I am currently a NYS registered professional engineer and that this report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

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1.0 INTRODUCTION

This Feasibility Study (FS) documents the development, evaluation and recommendation of a remedial alternatives and a Preferred Remedial Action to address environmental impacts in Operable Unit -2 (OU-2, Off-Site Groundwater) which previously migrated from the New York Twist Drill Site (NYTD "Site"). The NYTD Site is located at 25 Melville Park Road, Melville, Suffolk County, New York. This FS has been prepared by ERM Consulting & Engineering, Inc. (ERM) on behalf of the Respondents pursuant to the Order on Consent Index Number W1-0998-04 04. The recommendation to prepare the FS was presented in the draft "Remedial Investigation Report of OU-2 for the New York Twist Drill Site, Melville, Suffolk County, New York" (RIR) submitted to NYSDEC on or about March, 2014, and the revised final RIR dated July, 2014 (ERM, 2014), both prepared by ERM.

1.1 PURPOSE

The FS has been prepared in accordance with the applicable portions of Title 6 of the New York Code of Rules and Regulations Part 375 for remedial action selection as well as the NYSDEC's "Division of Environmental Remediation, DER-10, Technical Guidance for Site Investigation and Remediation" dated May, 2010 (DER-10).

The purpose of this FS Report is to present relevant Site information, Site requirements, and an assessment of remedial action alternatives to form a basis for selecting the Preferred Remedial Action to address affected media in OU-2 to a degree consistent with the contemplated use of this area. The primary objectives of the FS Report are to:

- develop, screen, and evaluate remedial alternatives for addressing affected off-Site ground water in OU-2; and
- based on a detailed analysis of the alternatives, select a preferred remedial alternative that protects human health and the environment in a cost-effective manner.

The FS process begins with the establishment of remedial action objectives (RAOs) to address the risks posed by the presence of contaminants at concentrations in excess of the cleanup objectives and cleanup levels established for the Site, NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (groundwater), USEPA guidance document entitled "Use of Monitored Natural Attenuation (MNA) at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites" and, NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006).

General response actions (GRAs) are then developed for the impacted media that can address the RAOs. The identification and screening of technologies applicable to each GRA is the next step in the FS process. Following the identification of process options for the retained technologies, representative process options are combined to form a remedial alternative. The remedial alternatives are screened to determine which alternatives are candidates for detailed evaluation consistent with the guidelines established in DER-10. The detailed evaluation is conducted by applying the following criteria:

- Overall protection of public health and the environment;
- Compliance with Standards, Criteria and Guidelines (SCGs);
- Short-term effectiveness;
- Long-term effectiveness;
- Reduction of toxicity, mobility or volume through treatment;
- Implementability;
- Cost; and
- Land use.

An additional criterion – community acceptance – will be evaluated after the public review of the remedy selection process. The results of this FS will be used for the selection of a final remedial action for OU-2, the preparation of a Record of Decision (ROD) by the NYSDEC, and the preparation of a remedial design, as described in the Order on Consent.

1.2 REPORT ORGANIZATION

This FS Report is comprised of eight sections and was organized in accordance with Section 4.4(b) of DER-10 "Remedy Selection Reporting Requirements". The organization and content of the report are as follows:

- **Section 1 – Introduction:** This Section describes the scope of this report, and Site Background information such as Site features, location, and relevant historical information such as previous Site investigations. In addition, this Section will summarize the on-going remediation of the source areas at 25 Melville Park Road to demonstrate that groundwater leaving the NYTD Site (OU-1) does not contain chlorinated volatile organic compounds (CVOCs) above New York State Class GA Groundwater Standards.
- **Section 2 – Summary of Remedial Investigation and Exposure Assessment**: This section summarizes the remedial investigation study (including contaminants of concern and area extent) and potential exposures to contaminated media.

- **Section 3 – Remedial Goals and Remedial Action Objectives:** This section lists the objectives of the remedial alternatives evaluated for the affected media in OU-2.
- **Section 4 – General Response Actions**: This section describes the general types of remedial actions that were evaluated for OU-2.
- **Section 5 – Technology Identification and Screening:** This section lists potential remedial technologies that met the general response actions and presents a preliminary evaluation of each technology with regard to effectiveness, implementability and cost.
- **Section 6 – Remedial Alternatives Development and Analysis:** This section includes a description of the remedial alternatives retained for further evaluation from the technology screening and an evaluation of each remedial alternative with regard to the evaluation criteria in DER-10.
- **Section 7 - Recommended Strategy:** This section describes the remedial alternative recommended for implementation in OU-2 and the basis for the recommendation.
- **Section 8 - References:** This section lists references cited in this FS Report.

1.3 NYTD SITE BACKGROUND INFORMATION

Information regarding the NYTD site is presented in the sections that follow. The OU-2 RI focused on off-Site groundwater impacts, and it is important to understand site characteristics and setting so as to be able develop a Conceptual Model of the migration of contaminants from the NYTD Site. The actual movement of contaminants off-Site are influenced not only by remedial activities on the NYTD Site but also by area wide conditions including:

- local pumpage; and
- other contaminant sources.

1.3.1 Site Location

The former NYTD site is located at 25 Melville Park Road in a large industrial/commercial area in Melville, Suffolk County, New York ("NYTD Site").

1.3.2 NYTD Site Description

This six-acre NYTD Site is currently being, and has been since 1985, used as a multi-tenant office building, as are many of the nearby properties in this portion of the industrial area. The NYTD Site is located slightly east of Route 110 and is located on the north side of Melville Park Road, the first east-west street, south of the South Service Road for the Long Island Expressway. The IW Industries, Inc. inactive hazardous waste disposal site (Site Number 1-52-102) is adjacent to the NYTD Site along the eastern property border. A site location map is presented in Figure 1.

1.3.3 NYTD Site History

NYTD operated the NYTD Site from 1966 (when the building was originally constructed) to 1984. NYTD manufactured carbon steel and other hardened metal twist drills. After NYTD vacated the building in 1985, the building was gutted and converted into a two-story office complex. The former manufacturing area for NYTD was an approximately 63 by 103-foot area located in the northeast corner of the original building. This area is directly north of the east loading dock and extends northward to the north wall of the building. Figure 2 shows the location of the former manufacturing area and Site Configuration.

The process of manufacturing twist drills consisted of heat treating and milling steel bars, which ranged from 1/4-inch to 2-inches in diameter. After the bars were cut, they were thermally tempered, degreased with a chlorinated solvent in a vapor degreaser, ground and pointed, finished, packaged and shipped.

A 116-foot deep diffusion well was located in the former manufacturing area. This well was reportedly used to discharge cooling water under a State Pollutant Discharge Elimination System (SPDES) permit between 1966 and 1981. Also, a former underground storage tank used to hold waste oils was reportedly connected to a floor drain in the manufacturing area. Since the former NYTD building was completely gutted and converted and the NYTD Site was completely renovated commencing in 1985, the exact source of the environmental contamination has been difficult to ascertain. Other industrial areas in the vicinity of the Site include:

- Radiation Dynamics, 316 South Service Road, Melville, NY
- Photocircuits, 320-322 South Service Road, Melville, NY
- Henlopen Manufacturing, 20 Melville Park Road, Melville, NY
- 70 Maxess Road, Melville, NY

1.3.4 Previous Investigations – 25 Melville Park Road

Investigations conducted at the NYTD Site have revealed the presence of soil and groundwater contaminated by volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). The on-Site contamination at the NYTD Site is referred to as OU-1. The primary VOC of concern on-Site is tetrachloroethene (perchloroethene [PCE]). Other chlorinated hydrocarbon solvents including trichloroethene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA) have also been detected on-site. Petroleum related hydrocarbons including the VOCs ethylbenzene, toluene and xylenes and the SVOCs 1,2,4-

trimethylbenzene, 1,3,5-trimethylbenzene and 2-methylnaphthalene were also detected.

Groundwater samples, collected in July, 1996, on-Site in the southeast corner of the former manufacturing area, contained PCE at 30,500,000 micrograms per liter (µg/L [ppb]), TCE at 498,300 ppb and 1,1,1-TCA at 142,700 ppb (ERI, Inc. Additional Investigation Update August 1996). Based on comparison of these concentrations with United States Environmental Protection Agency (USEPA) guidance for evaluation of the presence of non-aqueous phase liquids (NAPLs), the presence of NAPL on the NYTD Site was strongly suggested. NAPL was detected on-Site in 1999 in some injection and monitoring wells after completion of pilot testing of a potential remedial alternative (Secor 1998).

In 1996, on-Site groundwater contamination extended to the southern property border where 9,800 ppb of PCE, 100 ppb of TCE and 30 ppb of 1,1,1-TCA were detected at 76-feet below land surface (bls) (ERI). Because groundwater flow is dynamic, it was believed that VOC contamination extended off-Site. The potential off-Site extent of groundwater contamination has been designated OU-2 for the NYTD Site.

1.3.5 Previous Remedial Actions

No remedial actions have been conducted in the FS study area (off-NYTD Site Ground Water). Since 2003, remediation of the NYTD Site has been carried out by the Site owner(s) [1]. There are two parts of the remediation:

- removal of NAPL by hand bailing, and
- Enhanced Reductive Dechlorination (ERD) of dissolved contaminants.

As previously discussed in the RI Report, PCE can undergo both biotic and abiotic natural reductive dechlorination in the subsurface as a result of the presence of:

- soil bacteria that can utilize PCE and its degradation products as an energy source (direct degradation by PCE degrading bacteria);
- soil bacteria that use other sources of organic carbon as an energy source, these bacteria deplete oxygen in the subsurface producing a reducing environment in which PCE and its daughter products are dechlorinated indirectly (indirect dechlorination); and

[1] WHCS Melville, LLC conveyed the property at 25 Melville Park Road from 25 MPR, LLC to BP Moby Holdings LLC. BP Moby Holdings LLC is now the fee owner of the property. BP Moby Holdings LLC requested of NYSDEC that it be added as a Co-Volunteer pursuant to the Agreement.

- soil bacteria that reduce naturally occurring soil minerals to oxidation states that can chemically dechlorinate PCE and its daughter products (abiotic degradation).

The Enhanced Reductive Dechlorination (ERD) remediation of dissolved PCE and daughter products at the NYTD Site relies on the creation of an "anaerobic in-situ reductive zone (IRZ)" through the injection of molasses (Arcadis, 2009). There was also a one-time injection whey and molasses near the NAPL area to further enhance the ERD process. The reducing zone is maintained by continued injection of the molasses into the subsurface. The molasses is used as a carbon source by soil bacteria. As the bacteria consume the molasses, oxygen is depleted lowering the oxidation/reduction potential (ORP) in the injection area, creating the IRZ. As the ORP and oxygen content of the subsurface decreases, dechlorination of PCE/TCE increases (indirect dechlorination). Because PCE degrading bacteria are also anaerobic (direct dechlorination), the anaerobic subsurface environment created by the molasses injections can also stimulate growth of this class of bacteria (if present) that would dechlorinate PCE directly (for example dehalococcoides). Finally, the low ORP and oxygen content of the subsurface can lead to the reduction of native minerals to species capable of reducing PCE and daughter products.

As discussed above, the ERD at the NYTD Site was designed to remediate:

- on-Site sources of chlorinated hydrocarbons (CVOCs) that contamination on-Site groundwater and are the source of the downgradient plume;
- enhance dense non-aqueous liquid (DNAPL) dissolution; and
- indirectly shrink the extent of the downgradient plume by elimination of the movement of CVOCs off the NYTD Site.

The use of ERD at the NYTD Site has been on-going since 2003 and during that time there have been additional investigations designed to:

- better define the source(s) of contamination on the NYTD Site;
- better understand the subsurface geology and its control of migration of CVOCs off the NYTD Site; and
- refine the area where the molasses is injected and tailor the configuration of the IRZ to maximize dechlorination of CVOCs.

These activities have maximized the efficiency of the IRZ in dechlorinating PCE and its daughter products and have controlled and stabilized the movement of CVOCs off the NYTD Site. Review of the groundwater monitoring data collected as part of on-Site remedial activities reveals that the concentration of CVOCs leaving the NYTD Site do not exceed NY State Class GA groundwater standards.

Review of OU-2 (off-Site) groundwater monitoring data (presented in Section 2.1) indicate that the IRZ created on the NYTD Site was effective in reducing the concentrations of PCE/TCE leaving the Site to levels below the standards. The 2012 groundwater sampling event did not detect NYTD Site containments of concern (which are CVOCs) in the monitoring wells installed on Melville Park Road, downgradient and across from the NYTD Site (see Table 3).

The groundwater monitoring data collected in monitoring wells installed in Transect 1 show decreasing concentrations of PCE, TCE and *cis*-1,2,-DCE since the initial sampling round conducted in 2007. In 2007, *cis*-1,2,-DCE was the VOC observed at highest concentrations in ERM-MW-01 and ERM-MW-02D (Transect 1). Since 2007, the concentration of *cis*-1,2,-DCE has decreased two orders of magnitude in these two wells. The VOC detected in ERM-MW-02 at highest concentration in 2007 was *trans*-1,2,-DCE, which has decreased an order of magnitude as revealed during the 2012 sampling event. As indicated above, CVOC concentrations in Transect 1 are currently below applicable standards, indicating that remedial activities on the NYTD Site are controlling off-Site migration of compounds of concern.

1.4 SUMMARY OF PHYSICAL CHARACTERISTICS

1.4.1 Topography

The NYTD Site, located in Melville, NY, is at an elevation of approximately 120-feet mean sea level (msl). The surrounding area is generally flat with ground surface elevations deceasing approximately 20 feet (to 99-feet msl) per mile to the south-southeast and south-southwest.

1.4.2 Land Use

Land use in the area of the NYTD Site includes commercial and light industrial uses. The abutting properties and nearby land uses include:

- North: South Service Road Properties including 316 South Service Road (former Radiation Dynamics) and 320-322 South Service Road, (former Photocircuits);
- South: Melville Park Road and the 10 Melville Park Road (Office Building);
- East: 35 Melville Park Road (former IW Industries Site); and
- West: 425 Broadhollow Road (a commercial building).

1.4.3 Water Supply

The NYTD Site is located in the South Huntington Water District. The nearest Public Supply well(s) belong to the East Farmingdale Water District located 2 miles to the south-southwest of the Site. The location of these wells is cross-gradient to the observed direction of groundwater flow, i.e., south-southeast.

1.4.4 Storm Water and Surface Water

A review of wetlands information compiled by the U.S. Fish and Wildlife Service did not identify any wetlands on or near the NYTD Site. Additionally, according to the FEMA (Federal Emergency Management Agency) flood zone data provided by Environmental Data Resources (EDR), the NYTD Site is not located within a 100 year flood zone. Site personnel were unaware of any flooding at the NYTD Site.

1.4.5 Geology

The Huntington – Smithtown area is in north-central Long Island which is the partly submerged northeastern extension of the Atlantic Coastal Plain. The physiographic features, which are largely of glacial origin, may be grouped into five morphologic units from north to south: (1) the headlands and bays along the margin of the Long Island Sound; (2) the Harbor Hill end moraine, (3) an intermorainal belt, (4) the Ronkonkoma terminal moraine with contiguous clusters of hills, and (5) a southward-sloping glacial outwash plain.

The Huntington – Smithtown area is underlain by 400 to 1,300 feet of unconsolidated deposits for Cretaceous, Tertiary and Quaternary ages resting upon a surface of southeast-sloping bedrock. The bedrock is probably of igneous and metamorphic origin and of Precambrian to early Paleozoic age rest unconformably upon the bedrock surface.

The Raritan formation of Late Cretaceous age is the oldest unconsolidated deposit. This formation is divided into a basal Lloyd sand member and an upper clay member, which is generally overlain by the Magothy formation, also of Late Cretaceous age. Pliocene deposits are represented by the Mannetto gravel, remnants of which lie on the Magothy formation chiefly in the Mannetto Hills of eastern Nassau County and in the West Hills of the Town of Huntington.

Deposits of Pleistocene age belonging to one or more glacial stages and one interglacial stage have been recognized in Long Island, but not all these have been identified in the Huntington – Smithtown area. The Jameco gravel, an early glacial-outwash deposit of pre-Wisconsin age, is widely distributed in western Long Island, it is encountered entirely in well logs. It may also be present in some of the deeper buried valleys of the Huntington – Smithtown area but has not been positively identified. An interglacial shallow marine deposit, the Gardiners clay, has also been characterized in western and central Long Island. This formation, also of pre-Wisconsin age, was deposited around the margins of Long Island when sea level was about 50 feet lower than it is now. The Gardiners or its non-marine equivalent may be present is some deep buried valleys of the project area, but it has not been identified separately in well logs because of its lithological similarity to younger clay of probable glaciolacustrine origin. Glacial deposits of the Wisconsin stage, also termed upper Pleistocene deposits in this report, constitute the bulk of the Pleistocene sequence. These deposits generally rest directly on the deposits of Cretaceous age and locally on the Mannetto gravel of Pliocene age or on undifferentiated deposits of Pleistocene age.

The glacial origin of the surficial Pleistocene deposits is indicated by two morainal ridges, which traverse the length of the project area. The Ronkonkoma terminal moraine in the south marks the maximum advance and its northern counterpart, the Harbor Hill end moraine, mark a second position of an ice sheet, which covered much of Long Island during the Wisconsin glacial stage. In the Huntington – Smithtown area, the stratification and morphology of the deposits in these ridges indicate that they are chiefly coalescing kame-type structures formed along a relatively stationary ice front. In Huntington, the Ronkonkoma moraine lies on the northern fringe of the West Hills and rests on the Mannetto gravel. A surficial till is common on upland surfaces of the project area north of the Harbor Hill moraine. Surficial deposits of sand and gravel, laid down by melt-water streams issuing from the ice front, form a pitted outwash plain in the intermorainal belt between the ridges formed by the Harbor Hill and Ronkonkoma moraines and a relatively smooth south-sloping outwash plain south of the Ronkonkoma moraine. Deposits of recent age are thin and are limited chiefly to shoreline areas.

The stratigraphy of the geology at the Site is related closest to southward-sloping glacial outwash plain. Previous bore hole logging was conducted at the Site and further confirms that the Site area is a glacial outwash plain. The top layer of sediments are a fine to coarse sand and gravel that extends from the land surface to 80 feet below ground surface (bgs). The second layer of sediments are a fine to coarse sand with some clay or interbedded sand and clay that extends from 80 feet bgs to 120 feet bgs. The third layer of sediments is a fine to coarse sand (i.e., fine grained sand with a high silt content) that extends from 120 feet bgs to 180 feet bgs. The fourth layer of sediments is a muddy sand that extends from 180 feet bgs to 280 feet bgs. These units are relatively consistent across the Site.

1.4.6 Hydrogeology

Water level gradients are relatively flat, but generally indicate regional groundwater flow to the south southeast. Local water table elevations vary over time, and can indicate southward or south southeast gradients for groundwater flow at times. Rather than a homogenous sand unit, the sediments in the Site area have very different vertical and horizontal flow (and therefore migration) characteristics. There is a relatively continuous zone of medium sand noted generally between 150 and 200 feet bgs. This sand layer is generally underlain by less permeable materials. While downward vertical gradients are present in shallow groundwater, review of the available data for the NYTD Site indicates that downward migration of a plume, on the NYTD Site and downgradient of the NYTD Site, is limited by the presence of clay layers or other low permeability materials.

These observations can assist in understanding and interpreting the chemical concentration profiles observed in the vertical profile wells that were installed off-Site, within OU-2. Plumes within a relatively transmissive zone are likely to stay within that zone and migrate horizontally, rather than migrate vertically across a less permeable layer to greater depth simply because groundwater will flow in the path of least resistance. When contamination is observed at depth (below several less permeable layers), inferences on the source can be made.

1.4.7 Ecology

The area contains primarily commercial and industrial properties, but still provides habitats such as smalls woodlands and farmlands.

1.4.8 Climate

Melville, NY, is located in the humid continental climate zone. The summers are generally warm to hot and humid and warm to cold winters. Precipitation is relatively well distributed year round within this climate. The source of precipitation in the summer months comes from thunderstorms and infrequent tropical systems and in the winter months it comes from nor'easters and western storm fronts. The predominant wind direction is from the west. A main factor affecting Long Island's humid continental climate is the fact that Long Island is surrounded by water on all sides, which moderates the temperature in winter and summer.

2.0 *SUMMARY OF REMEDIAL INVESTIGATION AND EXPOSURE ASSESSMENT*

The RI scope of work was set forth in the 2005 RI Work Plan. The goals of the work plan were as follows:

- to conduct an RI of OU-2 (off-NYTD site Groundwater); and
- to complete a FS for OU-2 which supports an informed decision regarding which remedial option is the most appropriate, cost effective and protective of public health and the environment based on the findings of the RI.

The RI focused on identifying off-Site groundwater impacts that posed a threat to public health or the environment. The specific objectives of the RI were to:

- characterize the nature and extent of off-Site impacts resulting from historic on-Site releases, including the:
  - media affected;
  - extent, direction and speed of constituent migration including the horizontal and vertical movement of impacted groundwater in the Upper Glacial and Magothy aquifers;
  - complicating factors influencing movement; and
  - concentration profile.
- determine actual and potential threats of releases from the Site to human health and/or the environment, if any, in both the short and long term; and
- gather necessary data to support an FS.

The off-site RI included:

- Installation of vertical profile borings along four transects arranged perpendicular to the direction of groundwater flow with collection of groundwater samples to characterize off-Site groundwater quality/impacts (i.e. determination of the vertical and horizontal extent of the off-Site migration of Site-related contaminants);
- Installation of groundwater monitoring wells at the location of completed groundwater profile borings with screen zone settings based on groundwater profile sampling results;
- Sampling of newly installed wells with analysis for VOCs;
- Surveying at the completion of field sampling activities by a New York State licensed surveyor establishing the location of each profile boring and the elevation and location of all monitoring wells;
- Sampling of sub-slab soil gas and indoor air to assess potential vapor intrusion of contaminated vapors at 10 Melville Park Road;

- Identification and sampling of public and private wells and any existing public or private monitoring, observation, industrial, or irrigation wells or piezometers within 1-mile radius downgradient of the Site; and
- Data usability validation of all analytical data to determine whether the data meets the Site/project specific data quality objectives and data use as specified in the DER10 Technical Guidance for Site Investigation and Remediation by an ERM Quality Assurance/Quality Control (QA/QC) officer.

2.1 GROUND WATER

2.1.1 Scope of Work

Vertical Profile Borings (VPB) were installed along four transects of the projected off-Site contaminant plume. Figure 3 and 4 show the transects and all the vertical groundwater profiling locations, respectively. Vertical profile locations were selected to transect the interpolated plume. Nine vertical profile locations were identified and 17 monitoring wells were installed following completion of the vertical profile borings.

Installation of the VPB and confirmatory monitoring wells along each transect was carried out in a stepwise manner. That is, the profile borings in the transect closest to the Site were installed first. Groundwater sampling was carried out from the water table to the interpolated depth of the plume at the transect location. Groundwater samples from each vertical profile were sent to an analytical laboratory for analysis for VOCs. After the groundwater data were received and evaluated, the elevation of the screen zones of the monitoring wells to be installed was determined. The NYSDEC was consulted during the decision making process. Monitoring wells were then installed in the completed VPBs, the elevations of the monitoring wells surveyed and a round of groundwater elevation data collected from the new wells and appropriate on-Site monitoring wells. These data were used to prepare revised groundwater flow maps. The maps were used to prepare a new interpolated plume map and refine the locations of the next set of VPBs. This process was then repeated along the second, third and fourth transects shown in Figure 3.

Groundwater samples from the VPBs were collected every 10-feet starting at the water table to the interpolated depth of the plume at all but one location. Groundwater samples were collected using a Waterloo Profiler with a hybrid drive platform. A modified profiling was used at ERM-MW-10 and VP-09. At these locations, a HydroPunch, rather than the Waterloo Profiler, was used to collect the groundwater samples.

Multiple data sets were acquired at each vertical profile location during installation. Parameters measured at the VPBs installed using the Waterloo Profiler included:

- the analytical chemistry of the contaminants;
- continuous index of hydraulic conductivity (iK) so that zones of high conductivity were identified for future monitoring;
- hydraulic head at each sample depth;
- dissolved oxygen;
- reduction/oxidation potential;
- pH;
- specific conductance; and
- rate of penetration, which revealed stratigraphic changes that may affect contaminant transport, IRM or remedial design. Specific aquifer characteristics obtained from the Waterloo Groundwater Profiler data can be found on Figure 5.

At the VPB and monitoring well installed using HydroPunch sampling, the following items were collected:

- groundwater samples every 10-feet; and
- natural gamma logs.

Groundwater samples obtained from the VPBs were analyzed by an ELAP-certified laboratory for Target Compound List (TCL) VOCs using USEPA SW-846 Method 8260.

A total of 17 permanent monitoring wells were installed at the location of each of the VPBs. Each monitoring well was installed to confirm results of the vertical profile boring groundwater sampling results and to gauge water table elevations to determine groundwater flow direction. The screen zone settings for each of the 17 monitoring wells was determined after review of the geologic and chemistry data obtained from the Groundwater Profiler, the results of the laboratory analyses and discussions with the NYSDEC. Generally, monitoring wells were screened at the interval corresponding to the zone of greatest observed groundwater impact. Table 1 summarizes casing elevations, total depth, and screen elevations for each of the monitoring wells. Monitoring well locations are presented on Figure 6.

Following the completion of the permanent off-Site monitoring well installations, each monitoring well was developed prior to groundwater sampling. A New York State-licensed surveyor surveyed the horizontal location and vertical elevation of each well.

2.1.2 Ground Water Investigations Results

2.1.2.1 Ground Water Flow

Horizontal Flow

The horizontal groundwater gradient was calculated from data collected in 2007 through 2012 over the course of the off-Site investigation using monitoring wells installed in the VPBs.

An example of the water configuration based on data collected from ERM-MW 1 though ERM-MW-09 is shown on Figure 7. As show on this figure, the direction of groundwater flow is generally to the southeast.

Groundwater flow maps, constructed from data collected from monitoring wells installed at the top of the water table, were prepared in 2011 and 2012. These maps are presented on Figures 8 and 9 respectively. As shown on these figures, the 2011 direction of groundwater flow is to the southeast with a variation of 10° (from the NYTD Drill site) depending on the water table wells used to prepare the flow map. The 2012 groundwater flow map shows groundwater flow to the south-southeast with a variation of 4.5°.

In summary, the direction of groundwater flow in the off-Site study area is variable, from south to southeast. The source of the variable flow direction is not well understood. Air conditioning supply wells were identified in the study area, however, pumpage of these wells is limited to the summer months and in these air conditioning systems, the amount of groundwater extracted is equal to the amount recharged and therefore the impact on the localized potential elevation of the groundwater is minimal.

The data used to calculate the horizontal gradient and horizontal groundwater velocity are presented in the table below.

Horizontal Gradient		
11/21/2012	0.001	MW-02/MW-12S
8/26/2011	0.001	MW-2D/MW-11S
	0.001	MW-01/MW-07
9/29/2010	0.001	MW-2D/MW-11S
	0.002	MW-01/MW-07
4/24/2009	0.001	MW-01/MW-07
7/13/2007	0.001	MW-01/MW-07
5/4/2007	0.001	MW-01/MW-07
4/27/2007	0.001	MW-01/MW-07
Average	0.001	

The permeability data of the Upper Glacial Aquifer used in the calculation of the horizontal groundwater velocity were taken from "Hydrogeology of the Huntington-Smithtown Area Suffolk County, New York by E. R. Lubke Geologic Survey Water-Supply Paper 1669-D 1964."

	Permeability (gpd/sq. ft)	ft/day
Pleistocene (Upper Glacial)	900	
	1500	
	900	
	1200	
	1000	
	750	
Average	**1042**	**140**

Based on the average permeability calculated from the data reported in the Lubke paper, the average horizontal gradient and assuming a porosity of 30-percent, the horizontal groundwater velocity in the Upper Glacial Aquifer is 0.46 feet per day.

Vertical Flow

Vertical elevation differences were measured in the following monitoring well pairs: ERM-MW-2 and ERM-MW-2D, ERM-MW-7 and ERM-MW-7D, ERM-MW-11S and ERM-MW-11D, and ERM-MW-12S and ERM-MW-12M. The calculated vertical gradients between the well pairs listed above are shown in the table below.

Vertical Gradient

	MW-2/MW-2D	**MW-7/MW-7D**	**MW-11S/MW-11D**	**MW-12S/MW-12M**
3/16/2007	-0.001			
4/27/2007	-0.001	-0.005		
5/4/2007	-0.001	-0.001		
7/8/2008	0.000	N/A		
4/24/2009	-0.002	-0.003		
9/29/2010	0.000	-0.004		
8/26/2011	0.000	-0.005	-0.009	
11/21/2012	0.000	-0.002	-0.002	-0.002
Average	-0.001	-0.003	-0.005	-0.002
Overall Average	-0.003			

The negative value of the gradient indicates that groundwater is flowing downward, i.e. recharging the deeper aquifer. This is consistent with the location of the site as being in the "Deep Flow Recharge Zone" as defined by the Nassau-Suffolk 208 Study (July 1978)

The permeability data of the Magothy Aquifer used in the calculation of the vertical groundwater velocity were taken from "Hydrogeology of the

Huntington-Smithtown Area Suffolk County, New York by E. R. Lubke Geologic Survey Water-Supply Paper 1669-D 1964."

		Permeability (gpd/sq. ft)	ft/day
Magothy		550	
		450	
		750	
		650	
		450	
		650	
	Average	**583**	**78**

The average vertical velocity in the Magothy Aquifer, calculated using the Lubke data, the average vertical gradient (above) and a porosity of 25-percent is -0.9 feet per day (downward).

However, as seen from the IK data collected by Stone Environmental, the Magothy Aquifer is made up of layers of more permeable material interbedded with less permeable material and it is likely that the vertical velocity estimated above is too large, i.e., over-estimates the vertical groundwater velocity especially in the Magothy Aquifer (see Figure 10).

An alternative approach to estimating the velocity of the groundwater from the NYTD Site would be to use the greatest observed extent of the plume and the years that NYTD operated. As indicated in Section 1.3, NYTD operated at 25 Melville Park Road between 1966 and 1984. Vertical Profile Boring VP-09 is approximately 4300-feet from the NYTD Site and contamination attributable to NYTD was detected to a depth of about 238-feet bgs (in other words, the hypotenuse of the triangle formed by the horizontal distance to VP-09 and the vertical distance to the interval with the highest contamination, 238-feet bgs is the actual distance traveled). Contaminants released at the Site would, therefore, have traveled 4310 feet from the ground surface at NYTD to the 238-feet bgs interval at VP-09. The travel time for contaminants to cover this distance ranges from 29 to 47 years. Using these data, groundwater velocities of -0.25 to -0.4 feet/day may be estimated (negative values are used for these velocities because the estimated velocities include, both horizontal and vertical velocity components). These values are less than the purely vertical velocity of -0.9 feet per day estimated from the Lubke data and may reflect the effects of both horizontal and vertical anisotropy of the aquifer materials, the differences in flow rates between the Upper Glacial Aquifer and the Magothy Aquifer or the effects of contaminant retardation due to interaction with aquifer materials as dissolved contaminants flow downgradient.

2.1.2.2 Stratigraphic Characterization

A stratigraphic characterization was developed by using the index of hydraulic conductivity logs and gamma logs collected from the Vertical Profile investigations. The index of hydraulic conductivity is a unit-less value that allows the evaluator to determine the relative rate at which water can move through a permeable median. The gamma logs are one of the most widely used geophysical logs in groundwater applications that are used primarily to identify changes in lithology.

Vertical Profiles VP-02 and VP-04 are located toward the northern end of the investigations area; VP-02 was installed closest to NYTD where the contaminants of concern where released to the environment. VP-02 has a lower index of hydraulic conductivity value when compared to VP-04. VP-02 and VP-04 are located in a fine to coarse sand and gravel, muddy sand and sandy or silty clay. Based upon the vertical profile cross section analysis, one can observe at a depth of 40 feet below mean sea level (msl) the lithology changes from a fine to coarse sand and gravel to a sandy or silty clay. At a depth of 50 feet below msl the lithology changes from a sandy or silty clay to a silty sand.

Vertical Profiles VP-05, VP-06, VP-07 and VP-08 are located in the center of the cross section. After analyzing the developed index of hydraulic conductivity logs noticeable changes in the lithology of the substrate are observed. VP-05 – VP-08 are located in an area that has a fine to coarse sand and gravel from 100 feet above msl to ~20 feet above msl, a fine to coarse sand from ~ 20 feet above msl to ~110 feet below msl and a sand with clay from ~110 feet below msl to ~275 feet below msl. The most noticeable boundary change between lithology is observed between 25 feet above msl and 15 feet above msl.

The gamma log, collected after the installation of Vertical Profile VP-09 was also plotted to determine the major changes in lithology in this portion of the plume. The gamma log values were scaled and plotted on the cross section at the same scale as the index of hydraulic conductivity logs to identify the major changes in lithology across the site cross section. VP-09 is located in an area that has a fine to coarse sand and gravel from 100 feet above msl to ~20 above msl, a fine to coarse sand with some clay or interbedded sand and clay from ~20 above msl to 300 below msl. A cross section prepared using these data is presented on Figure 10.

2.1.2.3 Ground Water Analytical Results

<u>Vertical Profile Boring Results</u>

Nine VPBs (VP-01 through VP-09) were installed at the locations shown on Figure 4. Locations were chosen based on groundwater flow maps from previous data and were installed to cut across and define the plume. VPBs VP-01 through VP-08 were installed and sampled using Waterloo Profile sampling methodology, whereas groundwater samples from VP-09 were collected using HydroPunch methodology. Figure 5 presents the physical parameters at each borehole. Shown on the graphs are the hydraulic conductivity values for VP-01 through VP-08 from the waterloo profiling, and the gamma log is shown inversely for VP-09. The analytical (chlorinated volatile organics [CVOCs]) results of the profile sampling shown on Figure 11 and in Table 2.

As can be seen on Figure 11, groundwater contamination consisting of PCE, TCE and cis-DCE was detected in the VPBs installed in Transects 1 and 2 (VP-01, VP-02, VP-03 and VP-04, see Figure 4). Transects 1 and 2 are located approximately 200 and 600-feet, respectively from the site. The interpolated vertical extent of the VOC contamination in these Vertical Profiles was from the water table (approximately 45-feet bgs) and 175-feet bgs. Monitoring wells installed in these Vertical Profiles ranged in depth from 58 to 170.5- feet in depth. Methyl ethyl ketone (2-butanone [MEK]) was detected in the 167-feet bgs sample collected from VP-02 at a concentration of 2,041 micrograms per liter (µg/L). The concentration is almost 10 times greater than the highest chlorinated VOC (CVOC) concentration. According to the Arcadis Report entitled " Site Status and Technology Evaluation Summary Report for Groundwater 2003 through 2008 – 25 Melville Park Road" dated April 2009, only low part per billion concentrations of MEK in a limited number of samples were detected in the "deep" interval monitoring wells (130-185-feet bgs). The density of MEK is only 0.8 grams per milliliter and MEK is therefore not a dense non-aqueous liquid (DNAPL). The estimated vertical gradient is only -0.003, suggesting that transport of MEK, to a depth of 167-feet bgs over the short distance from the site VP-02, is highly unlikely. This suggests that the MEK, detected at this depth, is likely not related to releases on the Twist Drill site.

Vertical Profiles VP-05 and VP-06 were installed on Maxess Road approximately 2,000 and 2,140-feet, respectively from the Site boundary. The NYSDEC approved the locations of these two vertical profiles. The highest concentrations of VOCs were detected in these two VPBs between 275 and 350-feet bgs, approximately 100-feet deeper than in the closest upgradient VPB VP-03 (the distance between VP-03 and VP-05 is approximately 1360 feet). If the vertical gradient is -0.003 feet/feet, a contaminant would theoretically only move 4.2-feet vertically downward over that interval). TCE, rather than PCE, was the VOC detected in VP-05 and in some intervals in VP-06 at highest concentration. Two monitoring wells were installed in VP-05, one at the water table and the other screened between 280-290 feet bgs. Only one well was installed in VP-06, screened from 285-295 feet bgs. The concentration of TCE in each of these two wells exceeded the concentration of PCE. These observations, i.e., TCE at concentrations in the deep wells greater than PCE, the greater depth of the impacted zone (more than 100-feet deeper than at VP-03/VP-04, which are only 800 to 1100-feet from the wells in Transect 2) and the presence of 1,1,1-TCA at depth[2] suggest that the contamination in these two Vertical Profiles detected below 250 bgs was from another source.

A Vertical Profile boring (VP-07) was installed to the west of VP-05/VP-06, and more in the groundwater flow direction downgradient from VP-03/VP-04. VP-07 was installed approximately 1500-feet from the NYTD site (Figure 4). The highest concentration VOC observed in this profile was PCE at depths ranging from 150 – 215 feet bgs. This depth range is well above the depth of the VOC contamination observed in VP-05/VP-06 and consistent with the thickness (100-125 feet thick) and depth of the contamination observed in VP-01 though VP-04. The predominance of PCE in this location was also consistent with the data collected from VP-01 through VP-04. PCE was also detected in the samples collected at the water-table in this VPB and has also been detected in ERM-MW-03 (a water-table piezometer installed in Baylis Road (approximately 800-feet southeast). The aerial photographs from 1966 shows that the area where VPB-07 was installed to be vacant farmland. In the 1976 aerial photograph, the Huntington Quadrangle 2 Buildings (occupancy in 1973) are at the location of VP-07. Huntington Quadrangle is office space. However, the distance from the NYTD Site and shallow depth of this PCE contamination indicates that the shallow contamination is not from the NYTD Site. There is no obvious source of the PCE detected in the shallow groundwater at these locations. ERM-MW-10 was installed on Baylis Road (Figure 6), approximately 800-feet south of VP-7 (adjacent to the location of ERM-MW-03) and approximately 2200 feet from the NYTD site. The location was selected to help define the western edge of the plume. The well was installed using mud rotary drilling and groundwater samples were collected using a HydroPunch, with groundwater samples collected every 10-feet starting at 160-feet bgs and ending at 230-feet bgs. CVOCs were not detected during the installation of ERM-MW-10 in the four intervals that were sampled.

A VPB (VP-8) was then installed (using the Waterloo Profiler) at the southeast corner of Maxess Drive and Baylis Road (Figure 4), approximately 2600 feet southeast from the NYTD site. The Vertical Profile was sampled from the water table to 350-feet bgs. Two zones of VOC contamination were detected, a shallower zone from approximately 175-feet bgs, extending to approximately 230-feet bgs and a deeper zone extending from about 230 to 340-feet bgs. In each of these zones, PCE was the predominant VOC with lower concentrations of TCE and 1,2-DCE. 1,1,1-TCA was also detected in the deep contaminant zone at this location. CVOC contamination at this location extends over a greater

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[2] The highest 1,1,1-TCA concentration in VP-04 (in the plume) was observed at 107-feet bgs. In VP-05 and VP-06 the highest TCE concentration was detected at 255-280-feet bgs. Even though 1,1,1-TCA was detected on site, it was observed at highest concentration in the shallow (45-60-foot) and intermediate (60-90-foot) zones. The vertical gradient discussed in Section 2.1.2.1 (above) doesn't explain 1,1,1-TCA presence at depth.

interval (160-feet) than in any of the previously installed VPBs. The estimated vertical gradient of -0.003 does not provide the mechanism for the movement of contaminants over this interval. It is therefore difficult to determine if the contamination at VP-8 are only derived from contaminants released at the NYTD Site or if there are other sources contributing to the CVOCs detected at this location. The groundwater data below 230-feet bgs are inconclusive as to the origin of the contamination.

The final VPB (VP-9) not originally identified in the RI Work Plan, but installed at the suggestion of the DEC, was installed at a location on Ruland Road, approximately 4,600-feet southeast of the NYTD Site (see Figure 4). The Vertical Profile was installed using mud rotary drilling and groundwater samples were collected using a HydroPunch and was sampled from the water table to 440-feet bgs. Two zones of VOC contamination were observed (Figure 11) - a shallower, lower concentration zone from approximately 150 – 325 feet bgs with PCE as the predominant VOC and a high concentration zone extending from approximately 340-425-feet bgs, where TCE was the highest concentration VOC observed. The concentration of TCE at the bottom of this Vertical Profile was 740 ppb. The PCE at this depth was 23 ppb, again suggesting a source other than NYTD (See Figure 14A).

<u>Monitoring Well Results</u>

Five rounds of groundwater sampling were carried out: 2007, 2008, 2010, 2011 and 2012. The number of wells sampled in each round varied as additional monitoring wells were installed. Table 3 contains the data from all sampling rounds (detected concentrations only) and Figures 12-A through Figure 12-E present maps of the total VOC contamination detected in each of these years. Groundwater sampling of monitoring wells was carried out using passive diffusion sampling.

The 2007 round of groundwater sampling included ERM-MW-01, ERM-MW-02, ERM-MW-02D, ERM-MW-03, ERM-MW-04, ERM-MW-05 and ERM-MW-06. The principal VOC detected included PCE and its degradation products TCE and *cis*-1,2-DCE. PCE concentrations ranged from non-detect to 86, ppb, and TCE concentrations from non-detect to 164 ppb and *cis*-1,2-DCE from non-detect to 499 ppb. *trans*-1,2,-DCE was also detected in five out the eight monitoring wells sampled. The presence of PCE and its degradation products is consistent with the remedy being applied on the NYTD Site to soil and groundwater contaminated with PCE. An in-situ biologically mediated reduction remedy was being carried out at the time of the sampling and the *cis*-1,2-DCE detected in monitoring wells ERM-MW-01, ERM-MW-02D, ERM-MW-05 and ERM-MW-06 was a result of the in-situ reduction of PCE occurring at the NYTD Site. Sub-surface conditions at the NYTD Site, such as the presence of ferrous iron (FeII)-containing compounds, are likely responsible for the chemical reduction of TCE to *trans*-1,2,-DCE. Finally, the presence of PCE in ERM-MW-03, a water table well located on Baylis Road suggested the presence of a shallow PCE source between ERM-MW-05 and ERM-MW-06 and Baylis Road. The distribution of VOCs discussed above is shown on Figure 12-A

In 2008, eight monitoring wells were sampled. PCE and its degradation products were again the principal VOC contaminants detected. The distribution of contaminants in the 2008 sampling is shown on Figure 12-B. As can be seen on that figure, the highest observed concentrations of VOCs have moved downgradient to the south-southeast. Concentrations of PCE and daughter products in monitoring wells close to NYTD, i.e., in Transects 1 and 2, were only 19 ppb of PCE, 40 ppb TCE and 189 ppb *cis*-1,2-DCE. Concentrations of PCE, TCE and *cis*-1,2-DCE in ERM-MW-09, the next downgradient well along the centerline of the plume, were 188, 155 and 99 ppb, respectively. In Transects 1 and 2 and ERM-MW-09 in Transect 3, *trans*-1,2,-DCE again served as a marker of the chemical reducing conditions under the NYTD Site possibly as a result of the remedial activities at the NYTD Site.

VP-05 (ERM-MW-07D) and VP-06 (ERM-MW-08) were installed as part of Transect 3. During the installation of these Profile Borings, the concentration of TCE was observed to be greater than PCE in VP-05 (15 out of 19 intervals sampled) and in a number of intervals in VP-06 (7 out of 18). The concentrations of TCE and PCE were reversed, i.e., the concentration of TCE exceeded the concentration of PCE in the samples collected from ERM-MW-07D and ERM-MW-08 in 2008. Specifically, in 2008 TCE was detected at a concentration of 348 ppb and 279 ppb in ERM-MW-07D and ERM-MW-08, respectively. PCE was detected at concentrations of 129 ppb and 91 ppb, respectively in these same wells. Finally, PCE was again detected in water table well ERM-MW-03 at a concentration of 41 ppb.

In 2010, 11 monitoring wells were sampled, VOC concentrations decreased in Transects 1 and 2 (five wells sampled) indicated by the low concentrations of PCE and TCE detected which show that PCE was only present in one monitoring well (ERM-MW-05) at a concentration of 2.4 ppb. Dichloroethenes, (i.e., daughter products of reductive dechlorination) both *cis*- and *trans*-, were detected in two wells in Transects 1 and 2 ranging in concentration from 9 to 33 ppb. Downgradient concentrations (Transects 3 and 4, 4 wells sampled) of PCE and TCE ranged from 7 to 67 ppb and 4 to 144 ppb, respectively (see Figure 12-C).

In 2011, nine monitoring wells were sampled, the concentration of PCE and TCE in Transect 3 (ERM-MW-07D, ERM-MW-08 and ERM-MW-09) ranged from 4 to 38 ppb and 12 to 192 ppb, respectively. In the 2011 sampling round, the highest VOC concentrations were observed in ERM-MW11 cluster, located on the southeast side of the Baylis/Maxess Road intersection (see Figure 12-D). PCE and TCE concentrations ranged from 166 and 91 ppb in ERM-MW-11S (190-200 feet bgs), respectively, to 107 and 122 ppb in ERM-MW-11D (285-295 feet bgs), respectively.

In 2012, 17 monitoring wells were sampled, the highest VOC concentrations observed in the plume were still centered on the ERM-MW-11 cluster. PCE concentrations ranged from 125 to 211 ppb in the three wells in the cluster, with the highest concentration of PCE detected in ERM-MW-11S (195 feet bgs). The concentration of TCE ranged from 155 to 205 ppb, with the highest concentration detected in the deep well ERM-MW-11M (245 feet bgs). The concentration of TCE exceeded the concentration of PCE in the intermediate and deep wells suggesting contributions from the other sources such as observed in ERM-ME-07D and ERM-MW-08. The concentration of *cis*-DCE ranged from 91 to 286 ppb in this well cluster in the 2012 sample event. (see Figure 12-E)

In 2012, in monitoring well ERM-MW-12M, the concentration of PCE was 23 ppb and TCE 18 ppb (see Figure 13).

2.1.2.4 Compound Specific Isotope Analysis of VP-08 Sources

The sampling results from the first two transects defined a vertical zone of PCE and degradation product compound contamination (TCE and *cis*-DCE) extending from approximately 65 feet bgs to 175 –feet bgs. The ratio of TCE/PCE in the first two transects was less than < 1. The analytical results from the next two vertical profiles (VP-05 and VP-06, Transect 3) indicated that the contamination was much deeper (225-325 – feet bgs) than previously observed. In VP-05, TCE rather than PCE was the dominant groundwater contaminant. In VP-06, TCE was the dominant groundwater contaminant in certain intervals, in others PCE; the ratio of the concentrations of PCE and TCE was close to 1. These data suggested that another source may be contributing TCE to the groundwater plume at these locations. In VP-07, the third VPB installed in Transect 3, contamination was detected from 150 to 225 –feet bgs and PCE was the dominant VOC.

The results from the vertical profile (VP-08 [ERM-MW-11 cluster]) installed as part of Transect 4, indicated that groundwater contamination was distributed over a much greater vertical interval (175 to 335 – feet bgs) than previously observed and that the contamination was as deep as observed in VP-05 and VP-06 in Transect 3. Compound Specific Isotope Analysis (CSIA) was used to help define source/zone contributions to the contamination observed in VP-08. The PCE/TCE distribution in VP-08 is shown on Figure 11.

Prior to CSIA analysis, a round of groundwater sampling was carried out to determine which monitoring wells contained PCE and TCE at concentrations sufficient for CSIA analysis. Six wells contained PCE, TCE and *cis*-DCE at sufficient concentrations for CSIA analysis. The table below presents the VOC analysis results in mg/l.

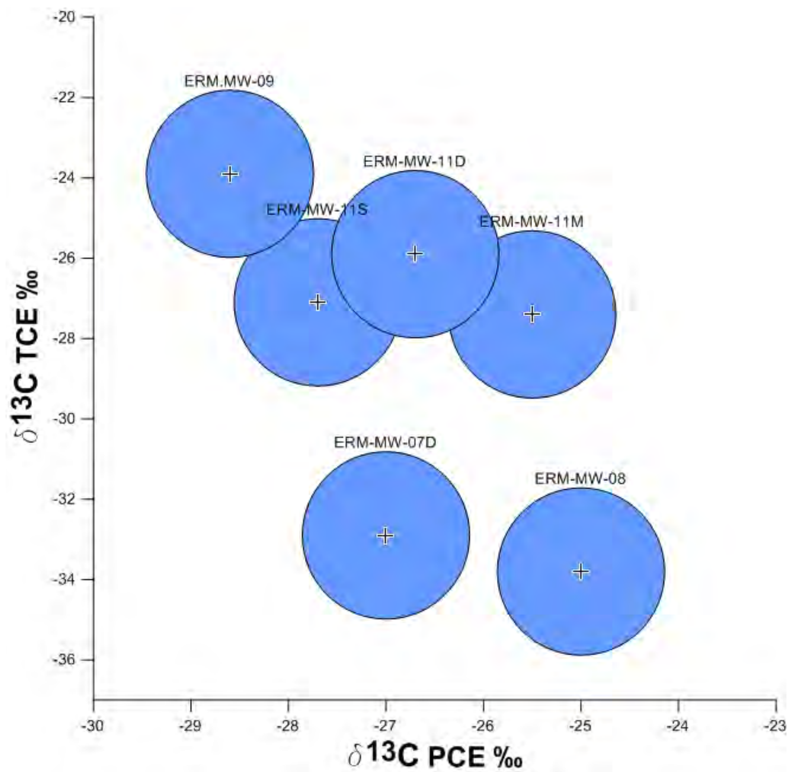
Monitoring Well	PCE	TCE	cis-DCE
ERM- MW-11S	166	91.4	97.8
ERM-MW-11M	78.9	26.9	ND
ERM-MW-07D	4.3	12	ND
ERM-MW-08	11.9	192	4.2
ERM-MW-09	37.9	19.4	27.9
ERM-MW-11D	107	122	164

The CSIA were carried out by Zymax Forensics in Escondido California. The CSIA analyses are:

	δ ^{13}C cis-DCE	**δ^{13}C TCE**	**δ ^{13}C PCE**	**δ ^{2}H cis-DCE**	**δ ^{2}H TCE**
ERM-MW-11S	-31.2	-27.1	-27.7	-63	-56
ERM-MW-11M	-32.8	-27.4	-25.5	-51	-63
ERM-MW-07D	ND	-32.9	-27	ND	-56
ERM-MW-08	ND	-33.8	-25	ND	95
ERM-MW-09	-31	-23.9	-28.6	-56	-58
ERM-MW-11D	-34.9	-25.9	-26.7	-51	-56

Kinetic isotope effects result in changes in the isotopic composition of PCE/TCE/*cis*-DCE as they are biologically or chemically decomposed. This phenomenon is due to faster reaction of ^{12}C as compared to ^{13}C, in other words, as PCE is biologically transformed to TCE, the PCE molecules that contain ^{12}C will react faster and the remaining PCE will become enriched in ^{13}C (the per mil value will become less negative). As the degradation progresses, ^{13}C molecules react and as the process i.e., nears completion, the isotopic signatures of the PCE and TCE will become equivalent because the isotopic composition, that is the percentage of ^{13}C must ultimately be the same in both PCE or TCE. Therefore, evaluation of the difference in the CSIA signature of PCE and TCE can be used to: confirm that degradation is on-going and; to measure the extent of degradation. Examination of the CSIA signatures shown in the table above indicates that the *cis*-1,2-DCE signature, in monitoring well ERM-MW-11S, ERM-MW-11M, ERM-MW-11D and ERM-MW-09, is enriched (more negative) in ^{12}C in all these wells. This suggests that a degradatory process is heterogeneous and active at several locations. It must be noted that δ^{13}C values reported in the table for PCE and TCE above are representative of undegraded material.

A plot of δ^{13}C PCE versus δ^{13}C TCE was constructed to determine if there are multiple sources contributing to the contamination detected in the site groundwater plume (note that the "bubbles" surrounding the data points represent three times the standard deviations on the analytical precision determined for these analyses). The figure below presents that plot.



As the above figure illustrates, the $\delta^{13}C$ PCE/ $\delta^{13}C$ TCE signature of the PCE/TCE in ERM-MW-09 and the wells in the ERM-MW-11 cluster are similar and are therefore likely from the same source. The $\delta^{13}C$ PCE/ $\delta^{13}C$ TCE signatures of the PCE/TCE in monitoring wells ERM-MW-07D and ERM-MW-08 are statistically different from the signature observed in ERM-MW-09 and the wells in the ERM MW-11 cluster, suggesting that there are different sources of PCE and/ or TCE contributing to the contamination detected in ERM-MW-07D, ERM-MW-08, and ERM-MW-09 and the ERM-MW-11 clusters. The $\delta^{13}C$ TCE value is less negative or heavier when compared to the $\delta^{13}C$ PCE value in monitoring wells ERM-MW-09, ERM-MW-11S and ERM-MW-11D which is suggestive of degradation. It also should be noted that the $\delta^{13}C$ PCE/ $\delta^{13}C$ TCE for ERM-MW-09 and ERM-MW-11M and ERM-MW-11D are also dissimilar. It is not possible to determine from the CSIA data, because the concentrations of *cis*-DCE in monitoring wells ERM-MW-07D and ERM-MW-08 were below the concentration necessary for CSIA analysis, if the *cis*-DCE observed in each of the wells in the ERM-MW-11 cluster is derived from the NYTD source and mixing from other sources including the potential source(s) identified in ERM-MW-07D and ERM-MW-08.

As discussed in the OU-2 Remedial Investigation Report, the VOC contamination observed in VP-08 (the ERM-MW-11 cluster) extended over a larger vertical interval then observed in any of the VPBs installed in Transect 3. There does not appear to be local pumpage (the air conditioning pumping well at 100 Baylis is located south of the ERM-MW-11 cluster and the diffusion well is to the southeast of the pumping well) or confirmed geological unit(s) (clay or low permeability units) in the immediate vicinity of VP-08 that could be responsible for the spreading of the VOC contamination at this location. Based on the $\delta^{13}C$ PCE/$\delta^{13}C$ TCE signatures presented in the table and figure for ERM-MW-07D, ERM-MW-08 and ERM-MW-09 above, it could be expected that the $\delta^{13}C$ signatures of either PCE and/or TCE and *cis*-DCE would be different in ERM-11S, ERM-MW-11M and ERM-MW-11D because of the absence of a strong vertical gradient or pumpage, which would cause vertical transport of PCE, TCE and *cis*-DCE in the 460 – 1,100-feet between the Transect 3 VPBs and VPB-08, which could result in the mixing the CSIA signatures. Without the *cis*-1,2-DCE $\delta^{13}C$ signature, the identification of the source(s) of the PCE/TCE/*cis*-DCE in the ERM-MW-11 cluster is difficult and complicates determination of the area to be remediated. However, based on the δ^{13} CSIA data from ERM-MW-07D and ERM-MW-08 there appears to be other contributors to the contamination detected in the ERM-MW-11 cluster.

2.1.3 Ground Water Investigations Summary and Conclusions

As shown in Figures 7, 8, and 9 the direction of groundwater flow in the off-Site study area is variable, from south to southeast. The source of the variable flow direction is not well understood. Air conditioning supply wells were identified in the study area, however, pumpage of these wells is limited to the summer months and in these air conditioning systems the amount of groundwater extracted is equal to the amount recharged and therefore the impact on the localized potential elevation of the groundwater minimal.

- The horizontal groundwater velocity in the Upper Glacial Aquifer is 0.46 feet per day.

- The vertical groundwater velocity in the Magothy Aquifer, calculated using the Lubke data is -0.9 feet per day (downward). However, this method tends to overestimate the vertical velocity and an alternate approach was evaluated using the greatest observed extent of the plume and the years that NYTD operated. Using this method, it has been confirmed that the vertical velocity is estimated between -0.25 to -0.4 feet/day (downward).

- Horizontal Plume Cross-Section: As shown on Figure 12A to 12E, the center of the highest observed concentration of VOCs was detected at the MW-11 cluster. The 2012 cross section shows the center of the plume located in the vicinity of Transect 4 (100 Baylis Road). Results from the installation of VP-09 (Ruland Road) installed in late 2012 closed the definition of the plume to the south. i.e., CVOC concentrations in the VP-09 at Ruland Road (Transect 5) were lower than observed in the upgradient VP-08 at Baylis/Maxess Road (Transect 4).

- Vertical Plume Cross-Section: The Vertical Plume Cross Section (Figure 14A) shows that the plume initially started out in the Upper Glacial Aquifer, migrated into the Magothy between Transect 2 (VP-03 and VP-04) and Transect 3 (VP-07 on Figure 4). As the plume migrates downgradient south of Transect 3, the plume migrates vertically to the vertical zone between 175 to 300 feet bgs. Figure 14 B depicts the vertical plume cross-section based on the most recent monitoring well data (December 2012).

- Review of OU-2 groundwater monitoring data indicates that the IRZ created on the NYTD Site was effective in reducing the concentrations of PCE/TCE leaving the NYTD Site. Specifically, in April 2007, (the first round of groundwater sampling) *cis*-1,2,-DCE was the VOC detected at highest concentration in ERM-MW-01 and ERM-MW-2D, the monitoring well installed immediately across Melville Park Road from the NYTD Site. This observation suggested that the IRZ was effective in the dechlorination of PCE/TCE to *cis*-DCE, but complete dechlorination had not yet occurred. In contrast, in 2006, when the vertical profiles in which these wells were installed, PCE was the VOC detected at highest concentration. Over time, the concentrations of the parent compounds (PCE/TCE) and daughter products has decreased on-Site and "clean" i.e., non-impacted groundwater is leaving the NYTD Site and replacing contaminated groundwater, and therefore, the extent of the plume is decreasing. By 2011, PCE and daughter products were no longer detected in Transect 1 (Melville Park Road, see Figure-12B). In 2010, the highest concentrations of VOCs in the plume were centered around Transect 3 on Maxess Road and in 2011 the highest VOC concentrations were observed in the vicinity of 100 Baylis Road. The cleanup of the plume is the result of:
  - replacement of contaminated groundwater by "clean" groundwater from the NYTD Site;
  - dechlorination of PCE/TCE downgradient of the NYTD Site by in-situ bacteria using the carbon source injected on-NYTD Site (closer to Site)

and/or organic carbon-containing material known to be present in the Magothy Aquifer; and
- o natural dilution/dispersion.

As shown on Figure 5, dissolved oxygen (DO) and oxidation/reduction potentials (ORP) were recorded during the installation of VP-01 through VP-08. As discussed above, PCE (as wells as TCE and *cis*-1,2-DCE) can be reductively dechlorinated under anaerobic conditions. This process is being used at the NYTD site to remediate contaminated groundwater and soil by injecting molasses to simulate the growth of soil bacteria. As the soil bacteria population increases, DO (normally approximately 5.6 mg/L in Long Island groundwater and ORP (normally 150-200 millivolts [mv]) fall, resulting in an anaerobic environment with a reducing conditions. The anaerobic environment allows growth of anaerobic bacteria, some of which metabolize PCE (genera *Dehalococcoides*). These bacteria also metabolize PCE daughter products and in time can effectively remediate PCE released to the environment. In summary, reduced DO and low ORP values are conditions that favor reductive dechlorination of PCE and daughter products. The table below presents a summary of these values that were measured across the investigation area when VPS were installed. As shown, low DO concentrations and low ORP values are observed in profile intervals where PCE and daughter products are observed, suggesting that reductive dechlorination is an on-going process in several locations within the plume.

VPB	DO (mg/L)	ORP (mv)
VP-01	< 1mg/L	100 to 150 mv
VP-02	< 1 mg/L	-100 mv in intervals containing CVOCs
VP-03	~4 mg/L	200 mv
VP-04	Variable < 2 mg/L in VOC-impacted intervals	-200 mv
VP-05	Extremely variable	-200 to 50 mv
VP-06	2-4 mg/L below 200-feet bgs	-150 to -100 mv below 200-feet bgs
VP-07	< 2 mg/L from 100 t0 225-feet bgs	200 to 300 mv
VP-08	< 2mg/L at depth	50 to 100 mv

Dissolved oxygen (DO) concentrations of < 0.5 mg/L and ORP values < 50 mV are favorable conditions for the reductive removal of PCE/TCE/DCE. For example, a plot of ORP vs. DO presented by Harkness (Harkness, et. al. 1998 in Chlorinated and Recalcitrant Compounds published by the Battelle Press [pp 177-182]) show DO concentrations in the 0 to 1.5 mg/L range when ORP values range from 0 to 150 mV.

- In the groundwater sampling round carried out in 2012, ethene and ethane, the final end products of dechlorination, were detected in groundwater throughout the plume and this finding is indicative that a microbial population, capable of complete reductive dechlorination is present in the footprint of the plume (see Table 4). These data are another line of evidence that natural attenuation is reducing the volume of contaminated groundwater. The concentration of ethene and ethane upgradient of Transect 2 (VP-05) strongly suggest that the reductive dechlorination of PCE and daughter products is occurring. The high concentration of ethene/ethane observed in Transect 1 and 2, may reflect an influence by on-Site activities. Downgradient of Transect 2, ethene/ethane concentrations are lower, which suggests some biodegradation is occurring in Transects 3, 4 and 5. The evidence of biodegradation in these other transects is supported by the low DO concentrations and ORP observed in some of the transect wells (see table above). The natural attenuation of the VOCs in the plume will continue through both biodegradation and dilution as relatively "clean" groundwater from upgradient locations migrates to downgradient portions of the aquifer and bacterial activity naturally degrades the VOC presence. Source removal should accelerate restoration of the aquifer to prerelease conditions. Restoration of the aquifer system is also supported by the concentration trend data shown on Figure 15, which shows decreasing CVOC concentrations in almost all wells.

- The $\delta^{13}C$ PCE/$\delta^{13}C$ TCE ratios from the CIS analysis suggest that there are at least three different sources of PCE and/ or TCE contributing to the contamination detected in ERM-MW-07D, ERM-MW-08, and ER-MW-09 and the ERM-MW-11 clusters.

2.2 *SOIL VAPOR*

2.2.1 Scope of Work

Sub-slab soil vapors, one outdoor air sample, and a ground floor indoor air sample, were collected from 10 Melville Park Road (Marcum, LLP), an office building located on the south side of Melville Park Road from NYTD. The purpose of the sampling was to assess potential impacts to indoor air and the potential for future impacts from VOCs volatilizing from the contaminant plume as contaminants migrate southward from NYTD.

10 Melville Park was selected because it is located immediately across the street from the NYTD Site, where the groundwater contamination is shallowest and would likely represent the greatest potential for vapor intrusion.

The 10 Melville Park building, which is slab on grade construction, has a very small footprint actually resting on the ground surface. The portion of the building that rests on the ground surface is the building lobby, elevator shafts and reception area, with the remainder of the tenant space on floors two and three above the lobby/reception area. In essence the building resembles a "T" with the small vertical arm resting on the ground surface. A parking area is located under the first floor at grade level. The sub-slab soil vapor samples were collected from beneath the ground floor slab in a closet and a storage room. The ground floor indoor air sample was collected from with the lobby area. An ambient air sample was collected outside of the building under the overhang of the canopy.

Two rounds of sampling were conducted. The first on March 19, 2007, and the second on January 18, 2014. The sampling was carried out using the methodologies presented in the New York State Department of Health document entitled Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October, 2006.

Sub-slab soil gas, indoor air and ambient air samples were collected over a 24-hour period. Sampling locations can be found on Figure 16. All work was carried out per NYSDOH requirements.

All samples were analyzed by an ELAP certified laboratory for VOCs using USEPA Method TO-15.

2.2.2 Results

Sub-slab vapor, indoor air and ambient air samples were collected at 10 Melville Park Road to assess the potential impacts of vapor intrusion from the groundwater plume. 10 Melville Park was selected because it is located immediately across the street from the NYTD Site, where the groundwater contamination is shallowest and there would be the greatest potential for vapor intrusion.

The first round of sampling was conducted on March 19, 2007, and samples were sent to United Chemists for analysis using Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air Method TO-15. The results of the analyses are presented on Table 5. VOCs were not detected in indoor air. PCE was detected in both sub-slab samples and TCE was only detected in sub-slab sample SS-02. The sub-slab concentrations of PCE exceed the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York Matrix 2 values and the sub-slab concentration of TCE exceeded the Matrix

1 Guidance values. NYSDEC requested follow-up sampling to evaluate the need for mitigation.

An additional round of vapor intrusion sampling was carried out in January, 2014. Acetone, chloromethane, methylene chloride, ethanol, Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane), Freon 12 (dichlorodifluoromethane), Freon 11 (Trichlorofluoromethane) and isopropanol were detected in indoor air. TCE was not detected in the sub-slab samples and PCE was detected at concentrations of 32 and 74 μg/m^3 in the two sub-slab samples. TCE and PCE concentrations in the sub-slab samples were below the NYSDOH Soil Vapor Intrusion Matrix 1 and Matrix 2 values, respectively. TCE and PCE were not detected in the indoor air sample. Results from this additional round of sampling are presented in Table 5.

2.2.3 Summary

VOCs were not detected in indoor air in 2007. In 2014, acetone, chloromethane, methylene chloride, ethanol, Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane), Freon 12 (dichlorodifluoromethane), Freon 11 (Trichlorofluoromethane) and isopropanol were detected in indoor air. PCE was detected in both sub-slab samples in 2007 and 2014 and TCE was only detected in sub-slab sample SS-02 in 2007. In 2007, the sub-slab concentrations of PCE exceeded the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York Matrix 2 value and the sub-slab concentration of TCE (2007) exceeded the Matrix 1 Guidance value. In 2014, sub-slab concentrations were below the applicable NYSDOH guidance values which could trigger a requirement for mitigation or monitoring. The results of the analyses are presented on Table 5

2.3 POTABLE AND EXISTING MONITORING WELL SEARCH EVALUATION OF SUPPLY WELL IMPACTS

2.3.1 Scope of Work

In July 2010, ERM conducted a well search at the NYSDEC Region 1, Stony Brook Office by reviewing groundwater well records (location maps, boring logs, completion and abandonment reports).

2.3.2 Results

Salient points are summarized below:

- At least eighty-four (84) wells (including the five public supply wells identified below) were located within an approximate 1.5-mile radius from the New York Twist Drill (NYTD) site (Figure-17);

- Five (5) public supply wells were identified within the approximate 1.5-mile radius from the NYTD Site (three of these wells are upgradient of NYTD, north of the Long Island Expressway, and two are west-southwest of NYTD, cross gradient to the direction of groundwater flow);
- The wells in the 1.5 mile radius were installed in various periods from 1953 until 2002;
- The usage of the non-public wells includes agricultural (10), air conditioning/industrial supply/diffusion, cooling/AC (39), other (14), and unknown (13); and
- Of the 84wells identified, there are 20 wells located downgradient of NYTD (see table below). None of these wells are used for potable water supply.

WELL NUMBER	DATE INSTALLED	LOCATION	USE	STATUS
S-17229	1959	Ruland Road	irrigation	unknown
S-28267	1970	25 Melville Park Road	air conditioning	unknown
S-57666	1976	Maxess Road & Duryea Road (136 Duryea Road – Henry Schein, Inc.)	air conditioning	In use during warm weather months
S-64774	1979	Maxess Road & Duryea Road (136 Duryea Road – Henry Schein, Inc.)	air conditioning	In use warm weather months
S-88697D	1988	Maxess Road & Duryea Road (136 Duryea Road – Henry Schein, Inc.)	diffusion	In use during warm weather months
S-57991D	1976	Maxess Road & Duryea Road (136 Duryea Road – Henry Schein, Inc.)	diffusion	Unknown, potentially In use during warm weather months
S-65527D	1979	Maxess Road & Duryea Road (136 Duryea Road – Henry Schein, Inc.)	diffusion	Unknown potentially In use during warm weather months
S-58535	1977	100 Baylis Road	air conditioning	Air conditioning system supply well, in use summer months
S-72566	1982	100 Baylis Road	diffusion	Air conditioning system diffusion well, in use summer months
S-59538D	1977	100 Baylis Road	diffusion	Unknown, potentially an air conditioning system diffusion well, in use summer months

WELL NUMBER	DATE INSTALLED	LOCATION	USE	STATUS
S-59539D	1977	100 Baylis Road	diffusion	Unknown, potentially an air conditioning system diffusion well, in use summer months
S-73846T	1983	East of Maxess Road (Old Sod Farm Road	supply (test)	Unknown
S-74228D	1983	East of Maxess Road (Old Sod Farm Road	air conditioning	Unknown
S-74239D	1983	East of Maxess Road (Old Sod Farm Road	air conditioning	Unknown
S-80593	1989	Route 110 & Duryea Road	supply/diffusion	closed 1996?
S-80594	1989	Route 110 & Duryea Road	supply/diffusion	closed 1996?
S-80595	1989	Route 110 & Duryea Road	supply/diffusion	closed 1996?
S-80596	1989	Route 110 & Duryea Road	supply/diffusion	closed 1996?
S-80597	1989	Route 110 & Duryea Road	supply/diffusion	closed 1996?
S-80598	1989	Route 110 & Duryea Road	supply/diffusion	closed 1996?

Samples were collected from the open loop air conditioning system wells that are part of the HVAC system at 100 Baylis Road. These wells are pumped seasonally, depending on the ambient temperature, typically from May to September (four to five months). The supply is permitted to pump at 400-gallons per minute and in 2012, pumped approximately 40 to 50 million gallons. These wells are located downgradient from the ERM-MW-11 cluster (on the opposite side of the building) and are potentially impacted by the NYTD plume. There are two wells, a supply well S-58535 (screened from 240 to 270 feet bgs) and a diffusion well S-72566 (screened from 86 to 100-feet bgs). Samples were collected in May, 2011, and in October, 2012. On both dates, samples were collected from valves located near the supply and diffusion wells. The groundwater samples from these wells contained PCE, TCE and *cis*-DCE. Concentrations ranged from 19 to 130 ppb PCE, 8 to 58 ppb TCE and 17 to 40 ppb *cis*-DCE (see Table 6).

The other set of air conditioning wells (identified above) are located in a building across Maxess Road from the 100 Baylis Road System (discussed in the preceding paragraph). The two wells in this system (believed to be associated with 136 Duryea Road) are the Supply Well S-57666 screened from 240 – 270 – feet bgs and the diffusion well S-88697D screened from 142 – 197 – feet bgs. According to the well completion report, the supply well is rated at 325 gallons per minute (gpm). As indicated above, these wells are part of an air conditioning system and, the system only operates during the warm weather months. As in the system at 100 Baylis Road, the quantity of groundwater extracted equals the quantity of groundwater recharged. Therefore, the pumping of these wells will have a minimal impact on groundwater flow. In addition, the air conditioning wells at 136 Duryea Road are located west of ERM-MW-10 (based on the well completion reports) and therefore outside of the plume and are not expected to be impacted by CVOCs. These wells have not been sampled because access could not be obtained.

2.3.3 Summary and Conclusions

There are 5 public supply wells within the 1.5-mile radius, but all of those are upgradient or cross-gradient from the Site. Therefore the pathway from the NYTD Site to the public supply wells is incomplete.

Additionally, two of the East Farmingdale Public supply wells are located south/southwest of the NYTD Site on Gazza Boulevard approximately 2.1 miles from the Site. As indicated in Section 2.1.2, groundwater flow from NYTD is to the south/southeast. The principal contaminant detected in the East Farmingdale Well Field is TCE, the source of which has been identified as the Circuitron Site at 82 Milbar Boulevard, Farmingdale, NY. Circuitron is 1,600 feet upgradient of the East Farmingdale Field and is a known source of TCE. ERM-MW-10 was installed to monitor the western edge of the NYTD Plume and based on groundwater monitoring data, i.e., the absence of TCE in ERM-MW-10, contaminants from the NYTD Site have not impacted that well field.

Two additional East Farmingdale supply wells (New Highway Well Field [S-66556 and S-79105]) are located on New Highway approximately 4.1 miles south of the NYTD site. Each of the wells is 728-feet deep. An air stripper is located at the well field. Based on the modeling done for the Long Island Source Water Assessment Report (New York State Department of Health 2003), the travel time for water from the NYTD site to the New Highway Well Field is 100-years. The zone of contribution for S-66556 is mapped as just east of NYTD intersecting the off-Site plume. The mapped zone of contribution for S-79105 intersects both the NYTD Site and the off-Site plume. As indicated above, the travel time from groundwater from these locations is 100-years, however, the movement of PCE and daughter products in groundwater is retarded (slowed) as compared to a molecule of water. PCE retardation factors are greater than 2 times that of water, i.e., PCE would take twice as long as a molecule of groundwater from the NYTD Site to reach the wells in the New Highway Well Field. That would take more than 200-years and biotransformation and dilution would likely have reduced concentrations to below detectable levels in that period.

2.4 QUALITATIVE HEALTH EXPOSURE ASSESSMENT

Two environmental media were investigated in the off-site RI: groundwater, and air (both soil vapor and indoor air).

During the off-Site RI, off-Site soil samples were not collected because during the preparation of the off-Site RI Work Plan, no potential sources of off-Site soil contamination were identified. There are, therefore, no exposure pathways for off-site surface and off-Site subsurface soil.

Potential exposure pathways for each of these media identified above have been summarized as Pathways A through E (described below). The details surrounding these potential exposure pathways include: (1) contaminant source (environmental media), (2) contaminant release and transport mechanisms, (3) point of exposure, (4) route of exposure, and (5) receptor population.

To perform the qualitative exposure assessment, the exposure pathway details, along with the site characterization data associated with identified chemicals of potential concern, are used to determine if an exposure pathway may be classified as complete or incomplete. When the five elements outlined above are present, the exposure pathway is classified as complete; however, if any of the five elements do not exist and will never exist, then the exposure pathway may be classified as incomplete and not warranting any further evaluation.

Chemicals of potential concern (COPC) for each exposure medium were identified based on detection of an analyte above the Unrestricted Use Soil Cleanup Objectives (URSCOs), 6 NYCRR Part 703.5 Class GA Groundwater Standards or NYSDOH Matrices 1 and 2 Guidance Values. Those analytes exceeding the URSCOs, the Ground Water Standards or the Vapor Intrusion Guidance Values were retained for further evaluation as COPCs in the HHEA (Human Health Exposure Assessment). The table below presents the analysis.

COMPOUNDS OF POTENTIAL CONCERN		
	GROUNDWATER	**SOIL VAPOR/INDOOR AIR**
VOCS	Tetrachloroethene Trichloroethene *cis*-1,2-Dichloroethene	Tetrachloroethene Trichloroethene

2.4.1 Summary

Soil Pathways

During the off-site RI, off-Site soil samples were not collected because during the preparation of the off-Site RI Work Plan, no potential sources of off-Site soil contamination were identified. Further, the depth to groundwater is 50-feet bgs and water and sewer piping in normally around-4-feet bgs, which would preclude contact with affected groundwater during construction activities. There are, therefore, no exposure pathways for off-Site surface and off-Site subsurface soil.

Groundwater Pathways

Pathway A: Current and Future Off-Site Worker (or Nearby Receptor) Ingestion of Contaminated Groundwater

There are no private drinking water wells in the off-Site study area. As a result, this is an incomplete exposure pathway for ingestion of groundwater for current and future off-Site workers or nearby receptors

Pathway B: Current and Future Off-Site Commercial Worker Direct Contact with Volatile Organic Compounds in Groundwater

Current and Future off-Site Commercial Workers can come into contact with VOC contaminated groundwater in the unlikely event they undertake intrusive work beneath the water-table in the off-Site study area. Direct contact with groundwater is unlikely since it is greater than 100 feet below the ground surface and VOC concentrations are expected to decrease with time. However, workers doing maintenance work on air conditioning units cooled by groundwater in the area may come into contact with contaminated groundwater.

Air Pathways

Pathway C: Current Off-Site Worker Exposure to Volatile Organic Compounds in Indoor Air

The most recent vapor intrusion investigation conducted in the 10 Melville Park Road building in January 2014 did not detect VOCs in the indoor air and sub-slab detections were below mitigation or monitoring values Therefore, inhalation of site related chemicals via soil vapor intrusion is not currently occurring at this structure. Therefore, this pathway is incomplete based on current data.

Pathway D: Future Off-Site Worker Exposure to Volatile Organic Compounds in Indoor Air

The results of the vapor intrusion investigation conducted in the 10 Melville Park Building did not detect VOCs in the indoor air in any of the two sampling events conducted in 2007 and 2014. Sub-slab samples collected in 2014 were at levels below mitigation or monitoring recommendations reflecting the presence of clean groundwater beneath the building. Although the vapor intrusion investigation conducted at 10 Melville Park Road did not detect volatile organic compounds in the indoor air, sub-slab vapor sampling indicates that, at a minimum, the potential for soil vapor intrusion should be monitored. Therefore, inhalation of site-related chemicals via soil vapor intrusion is a potential pathway.

Note that the use of groundwater as cooling water currently does not represent a significant impact for soil vapor exposure as existing cooling systems are "closed" systems, i.e., potentially contaminated ground water used as a heat transfer medium is collected at 240 feet bgs, pumped through the building within closed loop piping, and then discharged 40 feet below the water table. In other words, there is 40 feet of clean water inhibiting migration of CVOCs into the soil vapor.

Pathway E: Current and Future Off-Site Commercial Worker/Utility Worker Exposure to Volatile Organic Compounds in Soil Vapor

VOCs were detected in sub-surface soil vapor samples collected beneath the 10 Melville Park Building in 2007. In 2012 EA, Inc. (EA, 2012) detected VOCs in soil vapor samples collected north and south of NYTD. Soil gas sampling results for PCE, TCE and 1,2-DCE were low with only one PCE concentration suggestive of a source of PCE in the subsurface (120 $\mu g/m^3$ [Figure 18]). This sample was collected at 70 Maxess Road, a property located at the east end of Melville Park Road. The sub-slab concentrations of PCE and TCE were above the NYSDOH Air Guidelines in 2007 (but below those guidelines in 2014) and the 2012 EA data indicate that VOCs are still present in soil vapor, albeit at very low concentration. Therefore, unless off-site workers are working in a confined space while trenching near the site, it is unlikely that anyone would be exposed to soil vapors at a level of concern. This pathway is incomplete.

3.0 REMEDIAL GOALS AND REMEDIAL ACTION OBJECTIVES

This section discusses the development of Remedial Action Objectives (RAOs) based on Standards, Criteria and Guidance (SCGs) and other regulations and guidance such as To Be Considered (TBC) issues. General response actions (GRAs) to address the RAOs are then identified.

The NYSDEC remedial program identifies the goal for site remediation under 6 NYCRR Sub-Part 375-2.8(a) as "…restore that site to pre-disposal conditions, to the extent feasible. At a minimum, the remedy selected shall eliminate or mitigate all significant threats to the public health and to the environment presented by contaminants disposed at the site through the proper application of scientific and engineering principles and in a manner not inconsistent with the national oil and hazardous substances pollution contingency plan as set forth in section 105 of CERCLA, as amended as by SARA."

3.1 STANDARDS, CRITERIA, GUIDELINES

In accordance with the New York Code of Rules and Regulations (6 NYCRR 375-1), NYSDEC-issued permits are not required for environmental remediation activities conducted in OU-2. Rather, the activities are evaluated and implemented based on the substantive elements of the applicable and relevant and appropriate state environmental laws and regulations. Federal applicable, relevant and appropriate requirements (ARARs) must be complied with fully, including the requirements to obtain permits, if necessary. Since New York State does not have ARARs in its statute, these State environmental laws and regulations, in conjunction with the Federal environmental laws and regulations, are collectively referred to as Standards, Criteria and Guidelines (SCGs).

SCGs are defined in DER-10. Standards and Criteria are New York State regulations or statutes which dictate the cleanup standards and other substantive environmental protection requirements, criteria, or limitations which are generally applicable, consistently applied, officially promulgated and are directly applicable to a remedial action. Guidance are non-promulgated criteria and guidance that are not legal requirements; however, those responsible for investigation and/or remediation of the Site should consider guidance that, based on professional judgment, are applicable. SCGs may be applicable to the constituent(s) of interest (chemical specific), location of the remedial action (location specific), or the type of remedial action (action specific). Unless otherwise indicated for good cause, the expectation in the development of remedial alternatives is that they would comply with SCGs.

Based on the RI and Qualitative Risk Assessment presented in previous sections, the main site-specific SCGs applied to OU-2 are:

- DER-10: Technical Guidance for Site Investigation and Remediation (May 2010)
- 6 NYCRR 375-1: General Remedial Program Requirements,
- 6 NYCRR 375-2: Inactive Hazardous Waste Disposal Site Remedial Program,
- 6 NYCRR Part 703 Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations
- NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (June 1998) (groundwater).
- NYSDOH Guidance for Evaluating Soil Vapor Intrusion (Matrices 1 and 2 Guidance Values) (October 2006).

Table 7, presents a detailed analysis of all applicable site-specific SCGs.

3.2 REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs), as stated in the NYSDEC Technical Guidance for Site Investigation and Remediation (DER-10), are medium-specific cleanup objectives for the protection of public health and the environment and are developed based on contaminant-specific criteria applicable to the site. The conclusions of the site investigation work are the primary basis for development of the RAOs. RAOs are developed based on contaminant-specific SCGs to address contamination identified at a site. In the case of protection of human health, RAOs usually reflect the concentration of chemicals of potential concern (COPC) and the potential exposure route. Protection may be achieved by reducing potential exposure (e.g., use restrictions, limiting access) as well as by reducing concentrations.

Two environmental media were identified during the RI conducted by ERM between 2007 and 2012 and are evaluated below as potential media of interest requiring RAOs: groundwater and soil vapor.

COPCs for each exposure medium were identified based on detection of an analyte above the applicable SCGs, URSCOs, 6 NYCRR Part 703.5 Class GA Groundwater Standards for Ground water media or NYSDOH Matrices 1 and 2 Guidance Values for soil vapor media. The table below presents the analysis.

	GROUNDWATER	SOIL VAPOR/INDOOR AIR
VOCS	Tetrachloroethene Trichloroethene *cis*-1,2-Dichloroethene	Tetrachloroethene Trichloroethene

A detailed evaluation of all RAOs to be considered per DER-10 can be found in Table 8. The following paragraphs list the applicable RAOs for the Site.

3.2.1 Groundwater Remedial Action Objectives (GWRAOs)

Protection of Public Health

GWRAO1 - Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.

GWRAO2 - Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

Environmental Protection

GWRAO3 - Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.

3.2.2 Soil Vapor Remedial Action Objectives (SVRAOs)

Protection of Public Health

SVRAO1 - Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

4.0 GENERAL RESPONSE ACTIONS

General response actions are broad categories of remedial response that may meet the remedial action objectives and provide technologies applicable to site-specific characteristics. The general response actions discussed below will be evaluated as means of achieving the RAOs. A brief description of the general response action and example technologies are presented below.

4.1 NO ACTION

The no action general response action would not include any future activity or continuation of any existing activities (e.g., institutional controls) except as already occurring on the NYTD Site. No action is typically retained as a baseline for comparison with other alternatives and is retained as such for this FS.

4.2 LIMITED ACTION

The limited action general response action would include institutional controls (i.e., environmental easement) that would be a mechanism for implementation of various restrictions in OU-2 (e.g., potential future use of groundwater) and periodic groundwater monitoring. Institutional controls are response actions that minimize the potential for human exposures to the contaminated media by establishing legal and administrative actions on the future use of groundwater in the area. Types of institutional controls may include access controls, environmental easements, and established procedures for managing future ground-intrusive activities and mechanism for future vapor intrusion control, if buildings were to be constructed (e.g., Site Management Plan, Health and Safety Plans, etc.).

Institutional controls will also establish protection of engineering controls that may be part of the remedy and restrict the use of groundwater in OU-2.

Institutional controls and groundwater monitoring are retained in this FS because they can be a component of many alternatives as well as a stand-alone alternative. Institutional controls, such as environmental easements, will only be placed on the actual NYTD Site and will not be placed on off-Site properties. However, property owners within the OU-2 study area will be notified of the presence of groundwater contamination.

4.3 TREATMENT

Treatment alters the physical and/or chemical nature of the medium to produce a reduction in contaminant mass, mobility, or toxicity. Treatment can be accomplished in-situ or ex-situ and can involve physical, chemical, thermal and/or biological processes. Examples of in-situ treatment technologies include chemical oxidation or reduction, soil vapor extraction, bioremediation, electrical resistance heating, and solidification. In situ treatment would be applicable to source materials, soils and groundwater.

Ex-situ treatment first requires the removal of the contaminated medium prior to any type of treatment or disposal. The process options for treatment technologies that are included are reuse/recycling, solidification, thermal desorption, incineration, vitrification, phytoremediation, biodegradation, soil washing and soil vapor extraction.

Treatment technologies are applicable to both affected media (groundwater and soil vapor) and therefore are retained for consideration.

4.4 CONTAINMENT

Containment alternatives include control, isolation and encapsulation technologies. Containment technologies provide protection of public health and the environment by reducing mobility of contaminants and/or eliminating pathways of exposure. The containment technologies applicable to the OU-2 would consist of barriers or systems that isolate the migration of impacted groundwater. These technologies can include sheet pile and other subsurface barriers such as slurry trench cut-off walls. Barriers also are response actions that minimize the potential for human exposures to the contaminated media by implementing physical barriers to prevent contact with the impacted media and/or migration of contaminants to potential receptors. Examples of these barriers include asphalt or concrete pavement, soil caps or geosynthetic liners. Engineering controls would require monitoring and maintenance to maintain its protectiveness. Periodic certifications would be required to document the effectiveness of the engineering controls. Barrier walls are not considered to be applicable in OU-2 as the RAOs are focused on removing the source of groundwater contamination and preventing contact with impacted soil and groundwater rather than on controlling migration. Further, there is no confining layer present which would allow for a barrier wall to be keyed into minimizing migration. This GRA is therefore not retained for further consideration.

4.5 *REMOVAL*

The general response of removal typically involves active management of contaminated media, such as excavation of source materials like soil, sediment and NAPL. This general response action is not retained for further evaluation because source materials like soil, sediments and NAPL, are not present in OU-2.

4.6 *EXTRACTION*

This response action consists of the removal of contaminated media using recovery wells or collection trenches with associated pumps and piping (i.e. Pump and Treat Systems for ground water media and SSD systems for control of sub-slab vapors if required). This response action would be applicable to soil vapor media and it is retained for further evaluation.

4.7 *DISPOSAL*

The general response action of disposal involves the means by which contaminated materials (soils or groundwater) are managed in accordance with relevant treatment standards. For example, disposal for soil may include landfilling at a permitted facility. In the case of groundwater, disposal would involve discharge of treated groundwater to the environment in accordance with relevant treatment standards. Typical discharge options include reinjection to groundwater, discharge to surface waters, or discharge to a publicly owned treatment works. Disposal is a necessary component of extraction technologies, such as those that may be used to control sub-slab vapors, and therefore, is retained for further analysis in this FS.

5.0 TECHNOLOGY IDENTIFICATION AND SCREENING

As described in Section 4, the following general response actions have been retained for OU-2:

- No action
- No further action with monitoring/ Institutional Controls (On-Site (former NYTD property) only)
- Treatment
- Extraction
- Disposal

This section screens a variety of remedial technologies for each media of interest that may be employed individually or in combination to achieve the RAOs in OU-2 Site media of interest. Remedial technologies that pass the evaluation process are organized into remedial alternatives. The remedial action alternatives for OU-2 are then are presented and evaluated in detail in Section 6.0.

The considered technologies were identified through a review of NYSDEC information, USEPA guidelines, relevant literature, off-Site conditions, and experience in developing feasibility studies and remedial action plans for similar types of environmental conditions.

Table 9 presents the technologies considered within each of these general response actions (except for no action, which does not have associated technologies). In addition, Table 9 presents a summary of the screening of these technologies against the criteria of effectiveness, implementability and cost, as a means to generate a list of practicable technologies to be used in the development of alternatives.

Effectiveness considers how a technology would impact OU-2 in the short-term during its use and its ability to meet the RAOs in the long-term. Protection of human health and the environment considers potential positive and adverse impacts that may result from the use of a particular technology. This evaluation incorporates elements of the NYSDEC guidance documents DER-10 and the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA, 1988).

The evaluation of implementability focused on institutional aspects associated with use of the remedial technology, along with constructability and O&M requirements. These subcategories are consistent with the approach for remedial alternative evaluation in DER-10. Institutional aspects involve permits or access approvals for on-Site use, off-Site work, and off-Site treatment, storage and disposal services. Constructability, or technical feasibility, refers to the ability to construct, reliably operate and meet technical specifications or criteria, and the availability of specific equipment and technical specialty personnel to operate necessary process units.

The cost criteria is used as a balancing factor among technologies of similar effectiveness and implementability. Cost is evaluated on a relative scale (i.e., low, moderate, or high by comparison to other similar technologies).

The evaluation of effectiveness, implementability, and cost further reduced the list of remedial technologies. Those exhibiting more favorable characteristics in the evaluated areas were carried forward. As shown in Table 9, after applying the above three screening criteria, the following technologies have been retained for consideration in developing alternatives:

General Response Action	**Technology/Control**
Limited Action	Institutional Controls - Access and Use Restrictions of Site Ground Water
No Further Action with Monitoring	Ground Water Monitoring with institutional controls on the NYTD Site
Limited Action	Soil Vapor Monitoring
Extraction	Sub-Slab Depressurization (SSD)
In-Situ Treatment	In-Situ Chemical Reduction (ISCR)and Enhanced Bioremediation Treatment via Carbon Substrate Emulsion

6.0 *REMEDIAL ALTERNATIVE DEVELOPMENT AND EVALUATION*

This section presents the remedial alternatives developed from the retained remedial technologies detailed in Section 5 of this Report. Each remedial alternative was further defined by remedial components with respect to the criteria set forth in 6 NYCRR Subpart 375-2.8(c)(1) per NYCRR Subpart 375-1.8(f).

Each of the remedial alternatives was then evaluated using the eight (8) criteria set forth in DER-10, Section 4.2, in conjunction with the criteria set forth in NYCRR Subpart 375-1.8(f). Using the eight criteria listed below, the remedial alternatives retained after the screening in Table 9 are fully described and evaluated in accordance with the following criteria:

- overall protection of human health and the environment;
- compliance with SCGs;
- long-term effectiveness and permanence;
- reduction of toxicity, mobility or volume;
- short-term effectiveness;
- implementability;
- land use;
- cost; and
- community acceptance.

The first two criteria, overall protection of human health and the environment and compliance with SCGs, are considered threshold criteria. Consequently, there is an expectation that each selected remedial action alternative would achieve these two criteria.

The next six evaluation criteria are referred to as balancing criteria. They offer a basis to compare the remedial action alternatives as part of the decision-making process that results in a recommended remedial action alternative.

Detailed descriptions of the relative criteria to this FS are provided below:

<u>Overall Protectiveness of Public Health and the Environment</u>

This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing if risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, engineering controls or institutional controls. It evaluates the remedy's ability to achieve each of the RAOs identified in Section 3.2. The overall assessment of protection overlaps with, and is based on, assessments performed under other evaluation criteria, particularly long-term effectiveness and permanence, short-term effectiveness, and compliance with SCGs.

Compliance with Standards, Criteria, and Guidance (SCG)

This criterion is an evaluation of the remedy's ability to comply with SCGs and determines whether a remedy will meet applicable environmental laws, regulations, standards, and guidance. SCGs for OU-2 will be evaluated to determine whether the remedy will achieve compliance. For those SCGs that are not met, an evaluation of the impacts of each and whether waivers are necessary will be performed.

Reduction of Toxicity, Mobility, or Volume with Treatment

This criterion evaluates the remedy's ability to reduce the toxicity, mobility or volume of OU-2 contamination. The evaluation focuses on the following specific factors for a particular remedial alternative:

- The amount of contaminated materials that will be destroyed or treated;
- The degree of expected reduction in toxicity, mobility, or volume;
- The degree to which the treatment will be irreversible; and
- The type and quantity of treatment residuals that will remain following treatment.

Preference should be given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes in OU-2.

Short-Term Impacts and Effectiveness

This criterion evaluates the potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during the construction and/or implementation. The evaluation includes how identified adverse impacts and health risks to the community or workers, if any, at the Site will be controlled, and the effectiveness of the controls. Further, this criterion considers engineering controls that will be used to mitigate short-term impacts (e.g., dust control measures). The length of time needed to achieve the remedial objectives is estimated and included in the evaluation.

Long-Term Effectiveness and Permanence

This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain in OU-2 after the selected remedy has been implemented, the following items are evaluated:

- The magnitude of the remaining risks (i.e., will there be any significant threats, exposure pathways, or risks to the community and environment);
- The adequacy of the engineering and institutional controls intended to limit the risk;
- The reliability of these controls; and
- The ability of the remedy to continue to meet RAOs in the future.

Implementability

This criterion evaluates the technical and administrative feasibility of implementing the remedy. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. Administrative feasibility includes the availability of the necessary personnel and material along with potential difficulties in obtaining specific operating approvals, access for construction, permits, etc. for remedy implementation.

Cost Effectiveness

This criterion includes an evaluation of the capital, operation, maintenance and monitoring costs. These costs are developed and presented on a present worth basis for comparison purposes. The associated costs for the alternatives are conceptual design cost estimates. Changes in the quantities of the media requiring remediation (e.g., extent of affected ground water), detailed engineering, as well as other factors not foreseen at the time this report was prepared, could increase costs by as much as 50 percent or decrease costs by as much as 30 percent, as defined in Section 5.2.3.7 of Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988). An inflation rate of two percent (2%) was used to determine future costs and an interest rate of 4.25% (current prime rate of 3.25% plus an additional 1%) was used to compute the present worth of all future costs. The inflation rate is consistent with the US Department of Labor Consumer Price Index (CPI) change between 2011 and 2012 (www.bls.gov).

A contingency of 10% was applied to address unforeseen costs and account for uncertainty.

Land Use

This criterion includes an evaluation of the current, intended and reasonably anticipated future use of the land in OU-2 and its surroundings, as it relates to the alternative or remedy, when unrestricted levels would not be achieved.

Community Acceptance

This criterion is evaluated after the public review of the remedy selection process as part of the final DER selection/approval of a remedy for a site.

Descriptions of the Common Actions and remedial action alternatives are provided in Sections 6.1 through 6.7. An evaluation of each of the above criterion for the remedial action alternatives is provided with the remedial action alternative descriptions.

List of Common Actions Considered for OU-2:

- Common Action 1: Existing Institutional Controls
- Common Action 2: Contingency - Soil Vapor Monitoring
- Common Action 3: Contingency – Appropriate Control of Sub-Slab Vapors

The alternatives undergoing detailed evaluation are:

- Alternative 1: No Action
- Alternative 2: Common Actions 1-3 (Existing Institutional Controls, Contingency Soil Vapor Monitoring, Contingency -Appropriate Control of Sub-Slab Vapors) and No Further Action + Ground Water Monitoring
- Alternative 3: Common Action 1-3, Focused In-Situ Chemical Reduction via Organic Substrate Emulsion Injections + Ground Water Monitoring
- Alternative 4: Common Action 1-3, Site-wide In-Situ Chemical Reduction via Organic Substrate Emulsion Injections + Ground Water Monitoring

Common Action 1, Institutional Controls were retained in Table 9 as a viable technology to be carried forward. This common action will rely on the existing Environmental Easement filed at the NYTD Site and the existing sanitary code to meet GWRAO1 and GWRAO2. Property owners within the OU-2 study area will be notified of the presence of groundwater contamination.

Common Actions 2 and 3, were also retained in Table 9 as viable technologies to meet GWRAO2 and SVRAO1. They are both contingent technologies in so far as under current conditions, there are no complete soil vapor exposure pathways. Common Action 2 will be triggered should groundwater sampling results and identification of private wells within the plume, together with such other relevant factors, indicate such activities might be necessary. Common Action 3 would be triggered based on the soil vapor investigation results, subsequent vapor intrusion sampling, and therefore, installation of any vapor mitigation system(s) will be assessed at that time.

Two technologies were carried forward in Table 9 to meet GWRAO3:

- Groundwater Monitoring: this technology is already being implemented at the Site to monitor the plume's groundwater quality.
- In-Situ Chemical Reduction via Organic Substrate Emulsion Injections: this technology has also been carried forward to assess its cost effectiveness in comparison with Ground Water monitoring given the existing conditions.

Alternatives 2, 3 and 4 combine all the viable technologies carried forward from Table 9 with the objective of meeting the Remedial Action Objectives. A more in-depth discussion and assessment of each Common Action and Alternative is provided in the Sections below.

6.1 COMMON ACTIONS

As discussed above, remedial action alternatives would be developed for soil and indoor air/soil vapor in OU-2. Common Actions have been developed that address one or more of these two media. Each of the remedial action alternatives evaluated in Sections 6.2 through 6.7, with the exception of No Action alternatives incorporates Common Actions. These Common Actions are designed to provide at least the minimum required protection of human health and the environment.

6.1.1 Common Action No. 1 – Existing Institutional Controls

OU-2 is located in Melville, New York. The drinking water in this part of Melville is supplied by the South Huntington Water District. The New York State Sanitary Code limits a property owner's ability to create a separate water supply in areas that are served by a public water supply system. Therefore enforcement of this section of the State Sanitary Code (10 NYCRR § 5 Subpart 5-1.31) would provide protection of human health. To prevent contact with groundwater, an environmental easement has been placed at the NYTD Site. Environmental easements or deed restrictions will not be placed on off-Site properties. Property owners within the OU-2 study area will be notified of the presence of groundwater contamination.

6.1.2 Common Action No. 2 – Contingency - Soil Vapor Monitoring

As noted in Section 2.4, although unlikely, the pathway for soil vapor exposure may exists in future scenarios.

Soil vapor investigations at future locations will be completed on a contingent basis based on groundwater sampling results and future identification of private wells within the plume. In such cases, soil vapor and indoor air sampling would be conducted at these future locations to evaluate the potential for indoor and soil vapor impacts. This entails collection and analysis of the following samples for VOCs via EPA Method TO-15:

- sub-slab soil gas samples;
- indoor air samples;
- soil gas samples at the property boundary; and
- outdoor ambient air samples.

The analytical results will be compared to the NYSDOH Decision Matrices, and appropriate action will be taken in consultation with NYSDEC and NYSDOH.

Costs associated with this common action have been included as contingent O&M costs for cost-estimation purposes in the applicable cost-tables.

6.1.3 Common Action No. 3 – Contingency - Appropriate Control of Sub-Slab Vapors

Common Action 3 would be triggered in the event that Common Action 2 soil vapor investigation results, and subsequent vapor intrusion sampling, along with other relevant factors, indicate the need for mitigation at future locations.

Therefore, if necessary, appropriate control of sub-slab vapors would be implemented based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) will be used. Generally, the mitigation would involve sealing potential infiltration points and actively manipulating the pressure differential between the building's interior and exterior. In accordance with the NYSDOH Guidance, it is anticipated that the final remedy would consist of one or more of the following technologies:

- Floor sealing;
- Modification of the building HVAC system;
- Building pressurization;
- Installation of a vapor barrier;
- Sub-slab depressurization; and
- Sub-membrane depressurization.

At the time that vapor mitigation is deemed necessary, available details on the building construction would be evaluated in conjunction with the sampling results to select a final remedy (if necessary) in consultation with NYSDEC and NYSDOH.

6.2 ALTERNATIVE 1 – NO ACTION

6.2.1 Description

The evaluation of the No Action alternative is required by CERCLA as a baseline for comparison with other remedial alternatives. The No Action alternative evaluates the adverse (or beneficial) site changes that may occur in the absence of a proposed remedial action.

Under this Alternative, no remedial actions would be implemented at or within OU-2. No actions would be taken to monitor groundwater, prevent human contact, prevent contaminant migration, or mitigate the contaminants. This alternative was retained as a baseline for comparison with other alternatives.

6.2.2 Evaluation

6.2.2.1 Overall Protection of Human Health and the Environment

The No Action Alternative would not be protective of human health and the environment in the short term, because the potential risks associated with OU-2 media would not be reduced or monitored, either through treatment, institutional controls, or groundwater monitoring. The only protection to human health would be the continued enforcement of 10 NYCRR Part 5-1.31 of the State Sanitary Code, which prevents establishing a separate water supply source in areas that are served by a public water supply system. This would prevent potable water consumption of affected groundwater. However, this regulation does allow for exceptions in which a separate water source may be established.

Therefore, the No Action alternative would not ensure that GWRAO1 is met, and GWRAO3 would only be met partially over time.

6.2.2.2 Compliance with SCGs

The No Action Alternative does not meet chemical-specific SCGs. As discussed in Section 2.1, VOCs concentrations already exceed the NYSDEC Class GA ambient groundwater quality standards (TOGS-1.1.1; NYSDEC 1998), and although it is expected that those concentrations will eventually decrease to levels below SCGs due to natural processes, the No Action Alternative does not include provisions for monitoring the progress of natural attenuation and compliance with these chemical-specific SCGs.

6.2.2.3 Reduction of Toxicity, Volume and Mobility

Through the biodegradation of chlorinated solvents that is currently occurring within the off-NYTD Site ground water plume, this alternative would result in a decrease in the toxicity, mobility and volume of these chemicals in groundwater. However, this alternative provides no means to monitor that natural attenuation that is occurring and will continue to occur to demonstrate that there is an overall reduction in VOC concentrations at the NYTD site.

6.2.2.4 Short-Term Impacts and Effectiveness

There are no short-term effects associated with this alternative since there are no actions included with this alternative.

6.2.2.5 Long-Term Effectiveness and Permanence

The No Action Alternative does not provide long-term effectiveness and permanence because there is no provision for monitoring and therefore no means of evaluating residual risk of the effectiveness of the natural attenuation processes. Therefore, the No Action alternative is not considered to be effective at addressing GWRAO2, GWRAO3 and SVRAO1. As noted in Section 6.2.2.1, the only protection to human health would be the mandatory enforcement of 10 NYCRR Part 5-1.31 of the State Sanitary Code, which would help with, but not ensure, compliance with GWRAO1.

6.2.2.6 Implementability

As there are no specific actions related to this alternative, it would be readily implementable.

6.2.2.7 Land Use

This alternative would have the least impact on the existing land use.

6.2.2.8 Cost

There are no actions taken under this alternative. As such, there are no costs associated with the implementation of Alternative 1.

6.2.2.9 Community Acceptance

As discussed in DER-10 Section 4.2(j), this criterion will be evaluated after the public review of the remedy selection process as part of the final NYSDEC selection/approval of a remedy for the site.

6.3 ALTERNATIVE 2: NO FURTHER ACTION WITH GROUNDWATER MONITORING

6.3.1 Description

This Alternative would include the following remedial tasks:

- Common Action 1: Existing Institutional Controls
- Common Action 2: Contingency - Soil Vapor Monitoring
- Common Action 3: Contingency - Appropriate Control of Sub-Slab Vapors
- Groundwater Monitoring

As discussed in Section 2.1, in the groundwater sampling round carried out in 2012, ethene and ethane, the final end products of dechlorination, were detected in most of the groundwater within the plume and this finding is indicative that a microbial population, capable of complete reductive dechlorination is present in the footprint of the plume. Source removal on the former NYTD Site, accelerated restoration of the aquifer to prerelease conditions. Restoration of the aquifer system is also supported by the concentration trend data shown on Figure 15, which shows decreasing CVOC concentrations in almost all wells.

In addition to Common Actions 1-3 described in Section 6.1, under this remedial action, additional groundwater sampling will be conducted in OU-2. Two new monitoring wells will be installed as needed to delineate the horizontal extent of the plume at Transect 5 (Ruland Road. Figure 19 depicts the approximate proposed location of the new wells. Samples will be analyzed for Site-specific VOCs and selected natural attenuation parameters annually (for cost estimation purposes the groundwater monitoring will be conducted for 10 years). After each groundwater sampling event, the results will be presented to the NYSDEC in a report. The annual groundwater monitoring report will also evaluate the effectiveness of the remedial actions and natural attenuation processes on ground water quality.

6.3.2 Evaluation

6.3.2.1 Overall Protection of Human Health and the Environment

This Alternative would provide protection of Human Health and the environment because the potential risks associated with OU-2 media will be reduced or monitored, either through appropriate control of sub-slab vapors, if needed, institutional controls, or groundwater monitoring.

All potable water is supplied to the OU-2 area by the South Huntington Water District public water supply system. The South Huntington Water District supply wells are all up-gradient of the NYTD Site and OU-2. As noted in Section 2.3 and 2.4, there are no private drinking water wells at the Site or in the area surrounding the Site and, as a result, this is an incomplete exposure pathway. Common Action No. 1- Existing Institutional Controls, via mandatory enforcement of Part 5 of the NYSDOH State Sanitary Code, and the existing environmental easement at the NYTD Site, along with notification of property owners within the OU-2 study area, would prevent potable water consumption of affected groundwater and prevent direct contact pathways for off-Site workers, achieving GWRAO 1 and GWRAO2.

Soil Vapor Monitoring and appropriate control of sub-slab vapors, if needed (Common Action 2 and 3) would protect human health from risks of soil vapor media, achieving GWRAO2 and SVRAO1.

There is evidence of natural attenuation in most of the plume and there are no sensitive environmental receptors. As noted in Sections 2.3 and 2.4, the VOC groundwater plume associated with the NYTD Site does not approach the location of any active drinking water wells and groundwater currently migrating from the NYTD Site is currently below Class GA standards.

Therefore, the annual groundwater sampling and reporting program will monitor the progress of the existing natural attenuation to confirm it is occurring, allowing for the assessment of residual risks to the environment or off-Site wells, achieving GWRAO3.

6.3.2.2 Compliance with SCGs

The proposed remedial action is designed to meet the SCGs identified in Table 7. Table 10 shows an evaluation of compliance of all proposed Alternatives with the applicable Site SCGs.

Alternative No. 2 complies with the action-specific SCGs (NYSDOH) regarding monitoring and contingent action for the soil vapor media via Common Actions 2 and 3. If necessary, appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) will be used. If required based on the results of the Soil Vapor testing, the remedy selected to control sub-slab vapors will achieve the applicable remedial action objectives SVRAO1 and GWRAO2.

Regarding chemical-specific SCGs, as discussed in Section 2.1, VOC concentrations already exceed the NYSDEC Class GA ambient groundwater quality standards (TOGS-1.1.1; NYSDEC 1998), and those concentrations should eventually decrease to levels below SCGs due to natural processes already occurring without adversely impacting any potable water wells. The additional groundwater monitoring provided in this Alternative would allow for confirmation of the timeframes of such occurrence.

Furthermore, the groundwater monitoring proposed for this remedial option meets criteria established by the United States Environmental Protection Agency ("Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites" [OSWER Directive Number 9200.4-17P, 1999, at pp 17-18]). EPA recommends that:

> [T]he most important considerations regarding the suitability of MNA as a remedy include: whether the contaminants are likely to be effectively addressed by natural attenuation processes, the stability of the groundwater contaminant plume and its potential for migration, and the potential for unacceptable risks to human health or environmental resources by the contamination. MNA should not be used where such an approach would result in either plume migration or impacts to environmental resources that would be unacceptable to the overseeing regulatory authority. Therefore, sites where the contaminant plumes are no longer increasing in extent, or are shrinking,

would be the most appropriate candidates for MNA remedies.

Alternative 2 meets the three criteria identified by EPA as most important when deciding to use monitoring. In addition, the seven other criteria used by EPA (OSWER Directive 9200.4-17P at 17-18) are also satisfied:

- Whether the contaminants present in soil or groundwater can be effectively remediated by natural attenuation processes;

  Since 2009, groundwater monitoring data collected on the NYTD Site has indicated that groundwater at the downgradient boundary of the NYTD Site was "clean'" i.e., does not contain PCE, TCE and *cis*-1,2,-DCE. These data support the conclusion that on-Site cleanup activities, such as establishment of an anaerobic IRZ, have been effective in cleaning up soil and groundwater contamination on the NYTD Site.

  The groundwater monitoring water collected in Transect 1 and 2 show decreasing concentrations of PCE, TCE and *cis*-1,2,-DCE since the initial sampling round conducted in 2007. In Transect 1, *cis*-1,2,-DCE was the VOC observed at highest concentrations in ERM-MW-01 and ERM-MW-02D. Since 2007, the concentrations of *cis*-1,2,-DCE have decreased two orders of magnitude in these two wells. The VOC detected in ERM-MW-02 at highest concentration was *trans*-1,2,-DCE, which has decreased an order of magnitude. VOC concentrations in Transect 1 are currently below applicable standards.

- Whether or not the contaminant plume is stable and the potential for the environmental conditions that influence plume stability to change over time;

  Concentrations of PCE, TCE and *cis*-1,2,-DCE have decreased to levels below applicable standards in Transect 1 since the initial sampling conducted in 2007. VOC concentrations in Transect 2 have decreased to below applicable standards in ERM-MW-06 (Transect 2) since the initial 2007 sampling round. Except for *cis*-1,2,-DCE, VOC concentrations in ERM-MW-05 the second monitoring well in Transect 2 have decreased to below applicable standards and *cis*-1,2,-DCE concentrations have decreased almost 2 fold. Since 2007, CVOC concentrations in ERM-MW-09, the westernmost monitoring well in Transect 3, in which the VOC are related to the NYTD Site, have decreased from 3 to 12 times. Based on the Transect 1, 2 and 3 VOC data, it can be concluded that the NYTD plume is shrinking.

- Whether human health, drinking water supplies, other groundwaters, surface waters, ecosystems, sediments, air, or other environmental resources could be adversely impacted as a consequence of selecting no further action with monitoring as the remediation option;

  The OU-2 plume impacts only groundwater. Drinking water in the vicinity of the plume is supplied by the South Huntington Water District and their wells are upgradient of the Plume. Groundwater is used for irrigation near the plume and air conditioning within the footprint of the plume. The irrigation well is not within the plume and therefore not impacted. The existing air conditioning extraction well intersects the plume. If repairs are needed, or additional wells are installed in the future that may intersect the plume, workers may come into contact with contaminated groundwater. However, this potential pathway can be mitigated by prior notification of property owners of groundwater contamination, and implementation of appropriate health and safety measures.

- Current and projected demand for the affected resource over the time period that the remedy will remain in effect;

  The estimated time of cleanup of the plume is from 10-15 years and if during this period, usage of deep groundwater within the plume is required, the in-place institutional controls will protect Human Health and the Environment.

- Whether the contamination, either by itself or as an accumulation with other nearby sources (on-Site or off-Site), will exert a long-term detrimental impact on available water supplies or other environmental resources;

  The travel time to the nearest Public Supply wells from the OU-2 plume and from other potential near-by sources is from 75 to 100 years. It is expected that the VOCs in the plume will be degraded within that period. In addition, there is a packed tower aeration system at the site of the potentially impacted public supply well that could be used, as a contingency, to treat any impacted groundwater reaching the wells if degradation does not occur.

- Whether the estimated timeframe of remediation is reasonable (see section on "Reasonable Timeframe for Remediation") compared to timeframes required for other more active methods (including the anticipated effectiveness of various remedial approaches on different portions of the contaminated soil and/or groundwater);

  Considering the depth of the plume and the fact that groundwater within the plume footprint is only used for air conditioning purposes, the cleanup time is reasonable because there will not be an impact on its usage. During that estimated MNA period, it is anticipated that the remediation of the on-Site contaminants will also likely been completed.

- The nature and distribution of sources of contamination and whether these sources have been, or can be, adequately controlled;

  Containment of the impacted groundwater is not required because the travel time to the nearest receptors (i.e., East Farmingdale Water District supply wells on New Highway) is over 100-years. During this period, natural attenuation will degrade the VOCs in the plume.

- Whether the resulting transformation products present a greater risk, due to increased toxicity and/or mobility, than do the parent contaminants;

  Using a natural attenuation remedy will not result in the buildup of toxic transformation products because the extent of the anaerobic zone where PCE and TCE is transformed will be limited and VC will be transported to an aerobic zone within a short distance and decomposed.

- The impact of existing and proposed active remediation measures upon the MNA component of the remedy, or the impact of remediation measures or other operations/activities (e.g., pumping wells) in close proximity to the site;

> This is not applicable because the remedies being used to address on-Site soil and groundwater contamination are conducted upgradient of the OU-2 plume and any carbon substrate released from the Site will aid natural attenuation.

and

• Whether reliable site-specific mechanisms for implementing institutional controls (e.g., zoning ordinances) are available, and if an institution responsible for their monitoring and enforcement can be identified.

> NYSDEC participation will be required to help implement the institutional controls.

In sum, Alternative 2 is recommended because: it meets the EPA's criteria for using monitoring only; the impact upon occupants of buildings within OU-2 plume footprint is significantly less than those that would be caused by drilling and injection activities that are part of Alternatives 3 and 4; issues relating to obtaining property access to implement Alternatives 3 or 4 are largely eliminated if Alternative 2 is selected; and the cost of Alternative 2 when compared with the cost of Alternatives 3 and 4 is dramatically lower.

6.3.2.3 Reduction of Toxicity, Volume and Mobility

There is evidence that natural attenuation is occurring in most of the plume (see Section 6.3.2.2 regarding details of reductions in contaminant concentrations). Through the biodegradation of chlorinated solvents that is currently occurring, this alternative would result in a decrease in the toxicity, mobility and volume of these chemicals in groundwater. The routine monitoring component of this Alternative would provide confirmation that natural attenuation will continue to occur and that there is an overall reduction in VOC concentrations at this site.

In the future, if soil vapor monitoring is needed and the results of soil vapor testing, among other relevant factors, indicate that control of sub-slab vapors is required, appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) will reduce the mobility of soil vapors that are identified by preventing the migration of VOCs in soil vapor into the building.

6.3.2.4 Short-Term Impacts and Effectiveness

There are no noteworthy short-term effects anticipated with groundwater and soil vapor monitoring. Should the soil vapor monitoring results indicate the need for additional mitigation in any of the office buildings to be monitored, the installation of an appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) would have an immediate effectiveness in achieving GWRAO2 and SVRAO1. Efforts would be needed to reduce disruption to the building occupants during the installation process.

6.3.2.5 Long-Term Effectiveness and Permanence

This Alternative relies on the existing and proven natural attenuation processes (as described in Sections 1.3.5 and 6.3.2.2), coupled with the removal of the contamination source on the NYTD site by the current property owners, to provide long term reduction of VOCs to pre-release conditions. Based on findings discussed in Section 2.1, there is ample evidence to support these natural attenuation processes. With the continuing removal of source material at the NYTD Site, natural attenuation processes will continue to reduce mass. Biodegradation and volatilization will result in permanent VOC removal, whereas other processes such as sorption have the potential to be reversible. The long-term effectiveness of this process will be continually evaluated via routine groundwater monitoring. There are no known soil contamination sources to OU-2 groundwater. Therefore, Alternative 2 addresses GWRAO3 in the long-term. However, this effectiveness is contingent upon the continuing control of the NYTD Site source.

Using a first order linear regression model (see Appendix A) with historical data for MW-09 (representative well with sufficient historical data), it is estimated that remaining VOC concentrations in the plume will fall below groundwater standards within 10-15 years.

Residual risks to human health from the OU-2 plume are being addressed in this Alternative by Common Actions 1-3. All three common actions combined are considered to be effective at addressing GWRAO1, GWRAO2 and SVRAO1 in the long term. If control of sub-slab vapors is required, application of appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) will provide effective long term protection, as long as the control(s) remain in place. A Site Management Plan (SMP) would provide for annual certifications that the control(s) are performing as intended. Therefore, this remedy will be effective over the long term.

Overall, Alternative 2 would continue to be effective in the long term in the attainment of the established RAOs for OU-2.

6.3.2.6 Implementability

The main components of this alternative are implementable from a technical point of view although there are some access concerns. OU-2 groundwater status will be monitored through the use of existing wells and new wells to be installed to further define Transect 5 (Ruland Road) horizontally. Some access issues related to this Alternative are anticipated. Although dependent on the final scope, it is anticipated that a contingent potential remedy selected to control sub-slab soil vapors can be completed within six months of NYSDEC approval should this be required by the results of soil vapor monitoring at contingent future locations. Groundwater monitoring, and limited annual OM&M activities (if control of sub-slab soil vapors is needed) would continue.

An Environmental Easement has currently been established at the NYTD Site but Environmental Easements or deed restrictions will not be placed on off-Site properties. Property owners within the OU-2 study area will be notified of the presence of groundwater contamination.

In summary, there are anticipated to be some implementability concerns associated with this alternative, particularly related to access for well installation.

6.3.2.7 Land Use

The on-Site property and the property within the off-Site plume are currently being used commercially. Alternative 2 remedial tasks would have a minimal impact on the existing land use.

6.3.2.8 Cost

Costs associated with Alternative 2 are presented in Table 11.

6.3.2.9 Community Acceptance

As discussed in DER-10 Section 4.2(j), this criterion will be evaluated after the public review of the remedy selection process as part of the final NYSDEC selection/approval of a remedy for the Site.

6.4 ALTERNATIVE 3: FOCUSED ISCR VIA ORGANIC SUBSTRATE EMULSION + GROUNDWATER MONITORING

6.4.1 Description

This Alternative would include the following remedial tasks:

- Common Action 1: Existing Institutional Controls

- Common Action 2: Contingency - Soil Vapor Monitoring
- Common Action 3: Contingency – Appropriate Control of Sub-slab Soil Vapor
- Focused ISCR of MW-11 Area via Organic Substrate Emulsion + Groundwater Monitoring

In addition to the remedial tasks discussed in Alternative 2, Alternative 3 would include enhanced bioremediation of the plume in the vicinity of MW-11, which corresponds to the center of the plume and the highest VOC concentrations. Anaerobic bioremediation would be enhanced with the injection of an organic substrate emulsion designed to quickly stimulate microbial activity while providing long-term nourishment to enhance anaerobic bioremediation of chlorinated solvents.

The organic substrate emulsion would be injected as a barrier in the vicinity of MW-11, which corresponds to the 600 ug/l isoconcentration contour line in Figure 12-E, located at the center of the plume, which yields the highest isoconcentration found at the studied plume. The organic substrate will be distributed through approximately 40 temporary injection points (based on an estimated 10-foot injection radius) over several barriers as depicted in Figure 20. The target treatment interval will be approximately 125-340 feet bgs. For cost estimating purposes, the treatment interval associated with the known contamination as presented in the Remedial Investigation has been considered. This Alternative includes reinjection of 50% of the treated area 3-5 years after the initial injection.

6.4.2 Evaluation

6.4.2.1 Overall Protection of Human Health and the Environment

This Alternative would provide protection of human health and the environment because the potential risks associated with OU-2 media will be reduced or monitored, either through treatment, appropriate control of sub-slab vapors (if needed), institutional controls, or groundwater monitoring.

All potable water is supplied to the OU-2 area by the South Huntington Water District public water supply system, which is up-gradient of the NYTD Site and OU-2. As noted in Section 2.3 and 2.4, there are no private drinking water wells at the Site or in the area surrounding the Site and, as a result, this is an incomplete exposure pathway. Common Action No. 1- Existing Institutional Controls, via mandatory enforcement of Part 5 of the NYSDOH State Sanitary Code (Common Action No. 1), and the existing Environmental Easement at the NYTD Site, along with notification of property owners within the OU-2 study area, would prevent potable water consumption off affected groundwater and prevent direct contact of affected groundwater pathways, achieving GWRAO 1 and GWRAO2.

Soil Vapor Monitoring and appropriate control of sub-slab vapors if needed (Common Action 2 and 3) would protect human health from risks of soil vapor media, achieving GWRAO1 and SVRAO1.

In addition to the natural attenuation already occurring in most areas within the plume, the focused In-Situ Chemical Reduction (ISCR) via organic substrate injection over a barrier area in the vicinity of MW-11 is expected to remediate the highest concentration of VOCs within the plume in the short term, while providing conditions to continue natural attenuation in both the treated area and groundwater leaving the treated area. As noted in Sections 2.3 and 2.4, the VOC groundwater plume does not approach the location of any active drinking water wells. Therefore, the application of one treatment barrier plus the routine groundwater sampling and reporting program will achieve GWRAO3, and will also have positive effects towards the rest of the soil vapor-related remedial goals, reducing risks of soil vapor exposure.

6.4.2.2 Compliance with SCGs

The proposed remedial action is designed to meet these SCGs. Table 10 shows an evaluation of compliance of all proposed Alternatives with the applicable SCGs.

Alternative No. 3 complies with the action specific SCGs (NYSDOH) regarding monitoring and contingent action for the soil vapor media via Common Actions 2 and 3. If control of sub-slab vapors is required, application of appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) will achieve the applicable remedial action objectives SRAO1 and GWRAO2.

Regarding chemical-specific SCGs, as discussed in Section 2.1, VOCs concentrations already exceed the NYSDEC Class GA ambient groundwater quality standards (TOGS-1.1.1; NYSDEC 1998), and those concentrations could eventually decrease to levels below SCGs due to natural processes already occurring. The treatment barrier in the MW-11 area would contribute to reduce the timeframe of chemical-specific SCGs compliance, although remediation would largely rely in natural attenuation for the long term. The additional groundwater monitoring provided in this Alternative would allow for confirmation of the timeframes of such occurrence.

6.4.2.3 Reduction of Toxicity, Volume and Mobility

There is ample evidence that natural attenuation is occurring throughout the plume. Through the biodegradation of chlorinated solvents that is currently occurring, this alternative would result in a decrease in the toxicity, mobility and volume of these chemicals in ground water. Additional barrier treatment in the MW-11 would result in reduction of toxicity and volume of the highest VOC concentrations within the plume, although it may be accompanied by an increase in toxicity due to the potential for generation of daughter products, especially vinyl chloride, from the biodegradation of TCE and PCE. This treatment will also accelerate the natural attenuation process, and therefore, overall toxicity and mobility. The routine monitoring component of this Alternative would provide confirmation that natural attenuation will continue to occur (confirming the presence of ethene and ethane, which have already been observed) and that there is an overall reduction in VOC concentrations at this site.

In the future, if soil vapor monitoring is needed and the results of soil vapor testing, along with other relevant factors, indicate that control of sub-slab vapors is required, appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) will reduce the mobility of soil vapors that are identified by preventing the migration of VOCs in soil vapor into the building.

6.4.2.4 Short-Term Impacts and Effectiveness

VOCs concentrations in the actively treated barrier area (+50 to 100 feet downgradient) are expected to drop within a short timeframe (1-2 years). This treatment could result in an increase in toxicity due to the potential for generation of daughter products, especially vinyl chloride, from the biodegradation of TCE and PCE. There are no short-term effects associated with this alternative in the remainder of the plume, as most positive impacts in the remainder of the plume would be observed in the long term and discussed in the Section below.

There will be a considerable amount of construction during temporary injections well installation (40 injection wells initially and 20 injection wells after 3-5 years), large equipment would have to be mobilized (drilling and storage frac tanks), which will occupy a large area of the existing parking lot. These activities will cause short term impacts such as reduction of parking space and noise impacts to tenants at 80 and 100 Baylis Road for the duration of the injection activities (approximately 2-4 months).

In the future, should the potential soil vapor monitoring results, along with other relevant factors indicate the need for additional mitigation in any of the office buildings to be monitored, the installation of an appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) would have an immediate short term impact and effectiveness in protecting human health. Efforts would be needed to reduce disruption to the building occupants during the installation process.

6.4.2.5 Long-Term Effectiveness and Permanence

This Alternative relies on one ISCR barrier treatment area in the middle of the plume and existing natural attenuation processes to provide permanent, long term reduction of VOCs to pre-release conditions. ISCR via organic substrate injections to enhance anaerobic biodegradation of VOCs in ground water media is a widely used and proven technology that has been used in multiple small and large scale Sites.

The ISCR treatment proposed in Alternative 3 would enhance these long term natural attenuation processes, especially in the central portion of the existing plume. The expected permanence of the product in the aquifer is 3-5 years. Additionally, during these 3-5 years, aided by reinjection in 50% of the initial treated area after 3-5 years, the emulsion would create conditions to enhance anaerobic natural attenuation. The long-term effectiveness of this process will be continually evaluated via routine ground water monitoring. There are no known soil contamination sources to OU-2 groundwater, therefore, Alternative 2 addresses GWRAO3 in the long-term. However, this effectiveness is contingent upon the continuing control of the NYTD Site source.

Through the focused ISCR implementation, compliance with GWRAO3 might be expected within 5-10 years. However, as understood from NYTD Site remedial activities, the sub-surface in OU-2 is very heterogeneous. Therefore, delivery of the enhancement agent and contact with dissolved constituents in fine-grained material will be limited and it is unknown whether Alternative 4 will actually shorten the time to achieve groundwater standards.

Residual risks to human health from the OU-2 plume are being addressed in this Alternative by Common Actions 1-3. All three common actions combined are considered to be effective at addressing GWRAO1, GWRAO2 and SVRAO1 in the long term. If control of sub-slab vapors is required, application of appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) will provide effective long term protection, as long as the control(s) remain in place. A Site Management Plan (SMP) would provide for annual certifications that the control(s) are performing as intended. Therefore, this remedy will be effective over the long term.

Overall, Alternative 3 would continue to be effective in the long term in the attainment of the established RAOs for OU-2.

6.4.2.6 Implementability

The main components of this alternative are implementable from a technical point of view although access issues are also a concern. Oil/Water emulsion injections the area of MW-11 can commence with a pilot test and scaled up based on pilot test results. The pilot test can be implemented within 12 months of NYSDEC approval and scale up process can be then implemented within 12 months of pilot test data. The emulsion is injected into the aquifer with a pump and hoses attached either to a well, series of wells or direct push points. A minimum of 40 injection points (followed by 20 re-injection points after 3-5 years) will be needed to effectively treat this area, which is located north of the parking lot area (Figure 20). Also, large equipment would have to be mobilized (drilling and storage frac tanks), which will occupy a large area of the existing parking lot(s) north of the office building(s) and may disturb tenant activities.

Given the greater impact of this alternative, considerable access issues are anticipated due to the larger scope of the drilling activities as part of this Alternative in the form of temporary injection well installations (40+20).

Although dependent on the final scope, it is anticipated that a contingent potential remedy selected to control sub-slab soil vapors could be completed within six months of NYSDEC approval should this be required by the results of soil vapor monitoring. Groundwater monitoring, and limited annual OM&M activities (if appropriate control of sub-slab soil vapors is needed) would continue. An Environmental Easement has currently been established at the NYTD Site. Environmental Easements or deed restrictions will not be placed on off-Site properties. Property owners within the OU-2 study area will be notified of the presence of groundwater contamination.

6.4.2.7 Land Use

The on-Site property and the property within the off-Site plume are currently being used commercially. Alternative 3 remedial tasks would have a low impact on the existing land use.

6.4.2.8 Cost

Costs associated with Alternative 3 are presented in Table 12.

6.4.2.9 Community Acceptance

As discussed in DER-10 Section 4.2(j), this criterion will be evaluated after the public review of the remedy selection process as part of the final NYSDEC selection/approval of a remedy for the Site.

6.5 *ALTERNATIVE 4: SITE WIDE ISCR VIA ORGANIC SUBSTRATE EMULSION + GROUNDWATER MONITORING*

6.5.1 Description

This Alternative would include the following remedial tasks:

- Common Action 1: Existing Institutional Controls
- Common Action 2: Contingency - Soil Vapor Monitoring
- Common Action 3: Contingency – Appropriate Control of Sub-slab Soil Vapor
- Site-Wide ISCR via Organic Substrate Emulsion Injection + Groundwater Monitoring

In addition to the remedial tasks discussed in Alternative 3, Alternative 4 would include enhanced bioremediation barriers for treatment in selected areas within the plume. Anaerobic bioremediation would be enhanced with the injection of an organic substrate emulsion designed to quickly stimulate microbial activity while providing long-term nourishment to enhance anaerobic bioremediation of chlorinated solvents.

In addition to the treatment barrier in the center of the plume immediately downgradient of MW-11 discussed in Alternative 3, selected treatment barriers would be established throughout the plume to act as both barrier and treatment areas. The organic substrate will be distributed through approximately 110 injection points (temporary wells). The target treatment interval will be approximately 125-340 feet bgs. For cost estimating purposes, the treatment interval associated with the known contamination as presented in the Remedial Investigation has been considered. The actual target interval will vary for each barrier to treat specific contaminant depths within the plume. This Alternative includes reinjection of 50% of the treated area 3 years after the initial injection. A conceptual design for the initial treatment barriers is depicted in Figure 21.

6.5.2 Evaluation

6.5.2.1 Overall Protection of Human Health and the Environment

This Alternative would provide protection of human health and the environment because the potential risks associated with OU-2 media will be reduced or monitored, either through treatment, appropriate control of soil vapor(if needed), institutional controls, or groundwater monitoring.

All potable water is supplied to the Site by the South Huntington Water District public water supply system, which is up-gradient from OU-2. As noted in

Section 2.3 and 2.4, there are no private drinking water wells at the Site or in the area surrounding the Site and, as a result, this is an incomplete exposure pathway. Common Action No. 1- Existing Institutional Controls, via mandatory enforcement of Part 5 of the NYSDOH State Sanitary Code (Common Action No. 1), and the existing Environmental Easement at the NYTD Site, along with notification of property owners within the OU-2 study area, would prevent potable water consumption of affected groundwater and prevent direct contact of affected groundwater pathways, achieving GWRAO 1 and GWRAO2.

Contingent Soil Vapor Monitoring and contingent appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) Common Action 2 and 3) would protect human health from risks of soil vapor media, achieving GWRAO1 and SVRAO1.

In addition to the natural attenuation already occurring at OU-2, the focused In-Situ Chemical Reduction (ISCR) via organic substrate injection over a barrier area in the vicinity of MW-11 is expected to remediate the highest concentration of VOCs within the plume in the short term, while providing conditions to continue natural attenuation in both the treated area and groundwater leaving the treated area. Furthermore, additional Site-wide treatment barriers considered for this alternative would prevent further migration of the plume and provide active treatment in the all areas of the plume. Therefore, this alternative will achieve GWRAO3, and will also have positive effects towards the rest of the soil vapor-related remedial goals, reducing risks of soil vapor exposure.

6.5.2.2 Compliance with SCGs

The proposed remedial action is designed to meet these SCGs. Table 10 shows an evaluation of compliance of all proposed Alternatives with the applicable Site SCGs.

Alternative No. 4 complies with the action specific SCGs (NYSDOH) regarding monitoring and contingent action for the soil vapor media via Common Actions 2 and 3. If necessary, an appropriate system for controlling sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) will be installed which will achieve the applicable remedial action objectives SRAO1 and GWRAO2.

Regarding chemical-specific SCGs, as discussed in Section 2.1, VOCs concentrations already exceed the NYSDEC Class GA ambient groundwater quality standards (TOGS-1.1.1; NYSDEC 1998), and those concentrations could eventually decrease to levels below SCGs due to natural processes already occurring. The enhanced natural attenuation via organic substrate injection in the MW-11 area and additional site-wide barriers within the plume would contribute to reduce the timeframe of chemical-specific SCGs compliance. The additional groundwater monitoring provided in this Alternative would allow for confirmation of the timeframes of such occurrence.

6.5.2.3 Reduction of Toxicity, Volume and Mobility

There is evidence that natural attenuation is occurring throughout the plume. Through the biodegradation of chlorinated solvents that is currently occurring, this alternative would result in a decrease in the toxicity, mobility and volume of these chemicals in ground water. Additional barrier treatment in the MW-11 area would result in reduction of toxicity and volume of the highest VOC concentrations within the plume. Furthermore, additional Site-wide treatment barriers within the plume would reduce mobility of the plume as well as toxicity and volume. These treatments may be accompanied by an increase in toxicity due to the potential for generation of daughter products, especially vinyl chloride, from the biodegradation of TCE and PCE. This treatment will also accelerate the natural attenuation process, and therefore, overall toxicity, volume and mobility. The routine monitoring component of this Alternative would provide confirmation that natural attenuation will continue to occur and that there is an overall reduction in VOC concentrations in OU-2.

In the locations, if soil vapor potential monitoring is required and if the results of soil vapor testing, along with other relevant factors, indicate that control of sub-slab vapors is required, appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) would reduce the mobility of soil vapors that are identified by preventing the migration of VOCs in soil vapor into the building.

6.5.2.4 Short-Term Impacts and Effectiveness

VOCs concentrations in the proposed treated barrier areas are expected to drop considerably within a short timeframe 1-2 years. This treatment could result in a short-term increase in toxicity due to the potential for generation of daughter products, especially vinyl chloride, from the biodegradation of TCE and PCE.

There will be a considerable amount of construction during temporary well injection activities (110 injection wells initially and 55 injection wells after 3 years), large equipment would have to be mobilized (drilling and storage frac tanks), which will occupy a large area of the existing parking lot. These activities which will cause severe short term impacts such as reduction of parking space and noise impacts to tenants at 80 and 100 Baylis Road and 2 Huntington Quadrangle for the duration of the injection activities (approximately 6-12 months).

In the future, if soil vapor monitoring results, along with other relevant factors, indicate the need for additional mitigation in any of the office buildings to be monitored, the installation of appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) would have an immediate short term impact and effectiveness in protecting human health. Sizeable efforts would be needed to reduce disruption to the building occupants during the installation process.

6.5.2.5 Long-Term Effectiveness and Permanence

This Alternative relies in two main ISCR barrier treatment areas in (middle of the plume and further downgradient) and in existing natural attenuation processes to provide permanent long term reduction of VOCs to pre-release conditions. ISCR via organic substrate injections to enhance anaerobic biodegradation of VOCs in groundwater media is a widely used and proven technology that has been used in multiple small and large scale Sites.

The ISCR treatment proposed in Alternative 4 would enhance these long term natural attenuation processes, especially in the central portion of the existing plume. The expected permanence of the product in the aquifer is 3-5 years, additionally, during these 3-5 years, aided by reinjection in 50% of the initial treated area after 3 years, the emulsion creates conditions to enhance anaerobic natural attenuation. The long-term effectiveness of this process will be continually evaluated via routine groundwater monitoring. There are no known soil contamination sources to the OU-2 plume, therefore, Alternative 2 addresses GWRAO3 in the long-term. However, this effectiveness is contingent upon the continuing control of the NYTD Site source.

The location and organic substrate dosages of the ISCR Treatment Barriers for this alternative have been designed taking into account the expected organic substrate permanence (3-5 years) and the pre remedial design and desired post-remedial design concentrations (NYSDEC Class GA ambient groundwater quality standards) for the main contaminants. Through the focused ISCR implementation, compliance with GWRAO3 might be expected within 2-5 years. However, as understood from NYTD Site remedial activities, the sub-surface in OU-2 is very heterogeneous. Therefore, delivery of the enhancement agent and contact with dissolved constituents in fine-grained material will be limited and it is unknown whether Alternative 4 will actually shorten the time to achieve groundwater standards.

Residual risks to human health from the OU-2 plume are being addressed in this Alternative by Common Actions 1-3, all three common actions combined are considered to be effective at addressing GWRAO1, GWRAO2 and SVRAO1 in the long term. If control of sub-slab vapors is required, application of appropriate control of sub-slab vapors based on the options set out in Section 4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) would provide effective long term protection, as long as the control(s) remain in place. A Site Management Plan (SMP) would provide for annual certifications that the control(s) are performing as intended. Therefore, this remedy will be effective over the long term.

Overall, Alternative 4 would continue to be effective in the long term in the attainment of the established RAOs for OU-2.

6.5.2.6 Implementability

The main components of this alternative are implementable from a technical point of view although access issues are a concern. Oil/Water emulsion injections in area MW-11 can commence with a pilot test and easily scaled up based on pilot test results. The pilot test can be implemented within 12 months of NYSDEC approval and scale up process can be then implemented within 12 months of pilot test data. The emulsion is injected into the aquifer with a pump and hoses attached either to a well, series of wells or direct push points. A minimum of 110 injection points (followed by 55 re-injection points after 3 years of the original injection) will be needed to effectively treat this area, which is located throughout the plume (Figure 21). Also, large equipment would have to be mobilized (drilling and storage frac tanks), which will occupy large areas of the existing parking lots that will disturb tenant activities.

Given the greater impact of this alternative, severe access issues are anticipated due to the large scope of drilling activities as part of this Alternative, primarily in the form of temporary injection well installations (110+55).

Although dependent on the final scope, it is anticipated that a contingent potential remedy selected to control sub-slab soil vapors can be completed within six months of NYSDEC approval should this be required by the results of soil vapor monitoring. Groundwater monitoring, and limited annual OM&M activities (if appropriate control of sub-slab soil vapors is needed) would continue. An Environmental Easement has currently been established at the NYTD Site. Environmental Easements or deed restrictions will not be placed on off-Site properties. Property owners within the OU-2 study area will be notified of the presence of groundwater contamination.

6.5.2.7 Land Use

Alternative 4 remedial tasks would have a low impact on the existing land use.

6.5.2.8 Cost

Costs associated with Alternative 4 are presented in Table 13.

6.5.2.9 Community Acceptance

As discussed in DER-10 Section 4.2(j), this criterion will be evaluated after the public review of the remedy selection process as part of the final NYSDEC selection/approval of a remedy for the Site.

6.6 COMPARATIVE ANALYSIS

After individual evaluation of each alternative based on nine of the criteria, comparative analyses are conducted to evaluate the relative performance of each alternative. The purpose of the analyses is to identify the advantages and disadvantages of each alternative relative to the others so that key tradeoffs that must be balanced could be identified. Overall protection of human health and the environment and compliance with SCGs must be met by any selected alternative. Tradeoffs among the alternatives are related to five criteria: long-term effectiveness and permanence; reduction of toxicity, mobility and volume; short-term effectiveness; implementability; and cost. State and community acceptance would be addressed following regulatory review and a public comment period after a remedy has been recommended.

6.6.1 Overall protection of Human Health and the Environment

Alternative 1 would not be protective of human health and the environment since Institutional Controls would not be implemented to prevent contact with affected groundwater. Additionally, the "no action" alternative provides no means to monitor existing natural attenuation processes.

Alternatives 2, 3 and 4 are all protective of human health and environment.

6.6.2 Compliance with SCGs

As seen in Table 10, Alternative 1 does not comply with most applicable SCGs. Alternatives 2, 3 and 4 fully comply with all SCGs.

6.6.3 Reduction of Toxicity, Volume and Mobility

Alternative 1 (no action) will achieve reduction of toxicity and volume through existing natural attenuation; however, this alternative does not include measures to monitor this reduction, or to ensure that the mobility and/or volume of contaminated groundwater does not increase.

Alternative 2 will achieve reduction of toxicity and volume through existing natural attenuation processes. Alternative 2 also includes measures to monitor this reduction, and to ensure that the mobility and/or volume of contaminated groundwater do not increase.

Alternatives 3 and 4 are expected to effectively reduce the toxicity, mobility and volume (TMV) of contaminated groundwater at the Site through ISCR via organic substrate emulsion injections and natural attenuation. Alternative 3 is expected to be more effective than Alternative 2 in reducing contaminant TMV, due to the expanded nature of the treatment. Alternative 4 is expected to be more effective than Alternative 3 in reducing contaminant TMV, due to the expanded nature of the treatment.

For Alternatives 2, 3, and 4, the appropriate controls on soil vapor, if needed, will reduce the mobility of VOCs in sub-slab soil vapor.

6.6.4 Short-Term Impacts and Effectiveness

Alternative 1 would not create new short-term impacts, as no actions are being conducted. Alternative 1 would be the least effective in the short term.

Short-term impacts in Alternative 2 are minimal with respect to the remaining viable Alternatives as intrusive activities would be minimal (installation of 2-4 additional monitoring wells, as needed). Additionally, RI data indicate there is complete degradation of VOCs in OU-2 and therefore, there is no increase of toxic intermediates in this Alternative.

Alternatives 3 and 4 would be the most effective in the short-term but also have the largest impacts to workers and property owners, as both involve a sizeable amount of drilling activities. However, with Alternatives 3 and 4, active treatment could result in a short-term increase in toxicity due to the potential for generation of toxic daughter products, especially vinyl chloride, from the biodegradation of TCE and PCE there is a potential for the increase.

6.6.5 Long-Term Effectiveness and Permanence

Alternative 1 does not provide long-term effectiveness, since no measures are taken to reduce or monitor concentrations of VOCs in groundwater.

Alternatives 2, 3 and 4 all provide long term protectiveness, since all alternatives will permanently reduce VOCs concentrations and achieve RAOs.

Alternative 2 is expected to achieve the RAOs within the longest timeframe at 10-15 years. Alternative 3 is expected to achieve RAOs within 5-10 years. Alternative 4 is expected to achieve RAOs within the shortest timeframe at 3-5 years. However, as understood from NYTD Site remedial activities, the sub-surface in OU-2 is very heterogeneous. Therefore, delivery of the enhancement agent and contact with dissolved constituents in fine-grained material will be limited and it is unknown whether Alternatives 3 and 4 will actually shorten the time to achieve groundwater standards.

6.6.6 *Implementability*

Alternative 1 is the easiest alternative to implement, as it requires no action. Of the active alternatives, Alternative 2 is the most implementable, as it does not involve intense drilling activities for injection. Appropriate control of sub-slab soil vapors, if needed, is a contingent common measure to Alternatives 2, 3 and 4, and it is also readily implementable, although there may be difficulty obtaining appropriate property access from property owners.

Alternatives 3 and 4 primarily involve the gravity/pressure fed injection of an organic substrate, and, given the depth of the interval treatment (150-340 feet bgs approximately), it will require mobilization of heavy equipment during a large period of time. Both are more difficult to implement than Alternative 2.

All three active remedies (Alternatives 2 through 4) would involve a similar level of difficulty in establishing the institutional controls on the OU-2 properties.

6.6.7 *Land Use*

All presented alternatives are expected to have a low impact on land use.

6.6.8 *Cost*

Following is a summary of the estimated costs for the three alternatives. The detailed cost estimates are provided in Tables 11, 12 and 13.

	Capital Costs	**O&M Costs**	**Contingency (10%)**	**Total Costs**
Alternative 1	$ -	$ -	$ -	$ -
Alternative 2	$ 119,720	$ 257,978	$ 37,770	$ 415,467
Alternative 3	$2,743,945	$1,457,375	$420,132	$4,621,452
Alternative 4	$7,218,006	$3,323,398	$1,054,140	$11,595,545

6.6.9 *Community Acceptance*

As discussed in DER-10 Section 4.2(j), this criterion will be evaluated after the public review of the remedy selection process as part of the final NYSDEC selection/approval of a remedy for OU-2.

7.0 RECOMMENDED STRATEGY

Alternative 1 is the least expensive alternative; however, this alternative is not protective of the human health and environment and does not meet the Site-specific SCGs. Therefore, this alternative will not be considered further.

Alternatives 2, 3 and 4 are all protective of human health and the environment and meet the Site specific SCGs. The primary differences between these three alternatives are the length of time needed to achieve the remedial objectives, reduction of TMV, likelihood of implementing, and cost. Alternative 2 is expected to meet the RAOs in 10-15 years, and is the most cost-effective alternative. Alternative 3 is eleven times more costly than Alternative 2 but is expected to meet the RAOs within 5-10 years, as it includes partial treatment of the plume with a carbon substrate emulsion. Alternative 4 is expected to meet the RAOs within 3-5 years, however, this alternative is 28 times the cost of Alternative 2 as it involves site wide treatment via carbon substrate emulsion injections.

Alternatives 3 and 4 will have considerable implementability issues (access issues) and short term impacts (noise, traffic disruption, reduced parking space, given the sizeable amount of construction equipment to be mobilized to the Site, installation of 40 or more wells, and the duration of the project). There is the potential for increase of toxic intermediate degradation products in Alternative 3 and 4 because metabolism of the carbon substrate emulsion will result in widespread anaerobic conditions in the aquifer. VC, the most toxic degradation byproduct of PCE and TCE, is degraded aerobically and, therefore, there is greater potential for VC buildup in Alternatives 3 and 4. Alternative 4 will have more issues than Alternative 3 as it involves more injection points (at least 110). Finally, as understood from NYTD Site remedial activities, the sub-surface in OU-2 is very heterogeneous. Therefore, delivery of the enhancement agent and contact with dissolved constituents in fine-grained material will be limited and it is unknown whether Alternatives 3 and 4 will actually shorten the time to achieve groundwater standards. Alternative 2 only entails installation of 2-4 new wells, and has the least significant implementability and short term impact issues.

Alternative 2 is the Preferred Remedial Action because it satisfies the remedy-selection evaluation criteria and addresses the impacted groundwater in the most cost-effective way (five to eleven times less than Alternatives 3 and 4), and involves the least disruption to the surrounding community. To prevent contact with affected groundwater and VOCs in soil vapor, Alternative 2 includes institutional controls, soil-vapor sampling and groundwater monitoring (with provisions to complete soil vapor sampling in the and to install an appropriate system to control sub-slab soil vapors if soil vapor sampling, along with other relevant factors, indicates need for mitigation efforts). Alternative 2 relies mainly on the existing, effective and proven natural attenuation processes to reduce the plume's VOC levels below groundwater standards within a reasonable timeframe (10-15 years). Groundwater monitoring would be conducted on an annual basis to ensure the effectiveness of the selected remedy. Projected Institutional Controls have already been implemented (Environmental Easement at the NYTD Site). In addition, property owners will be notified of the presence of existing groundwater contamination in the OU-2 study area. However, it is necessary for the other sources contributing to the OU-2 plume to be identified and controlled before final cleanup to groundwater standards can be achieved. This remains in the control of the NYSDEC.

8.0 REFERENCES

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FIGURES

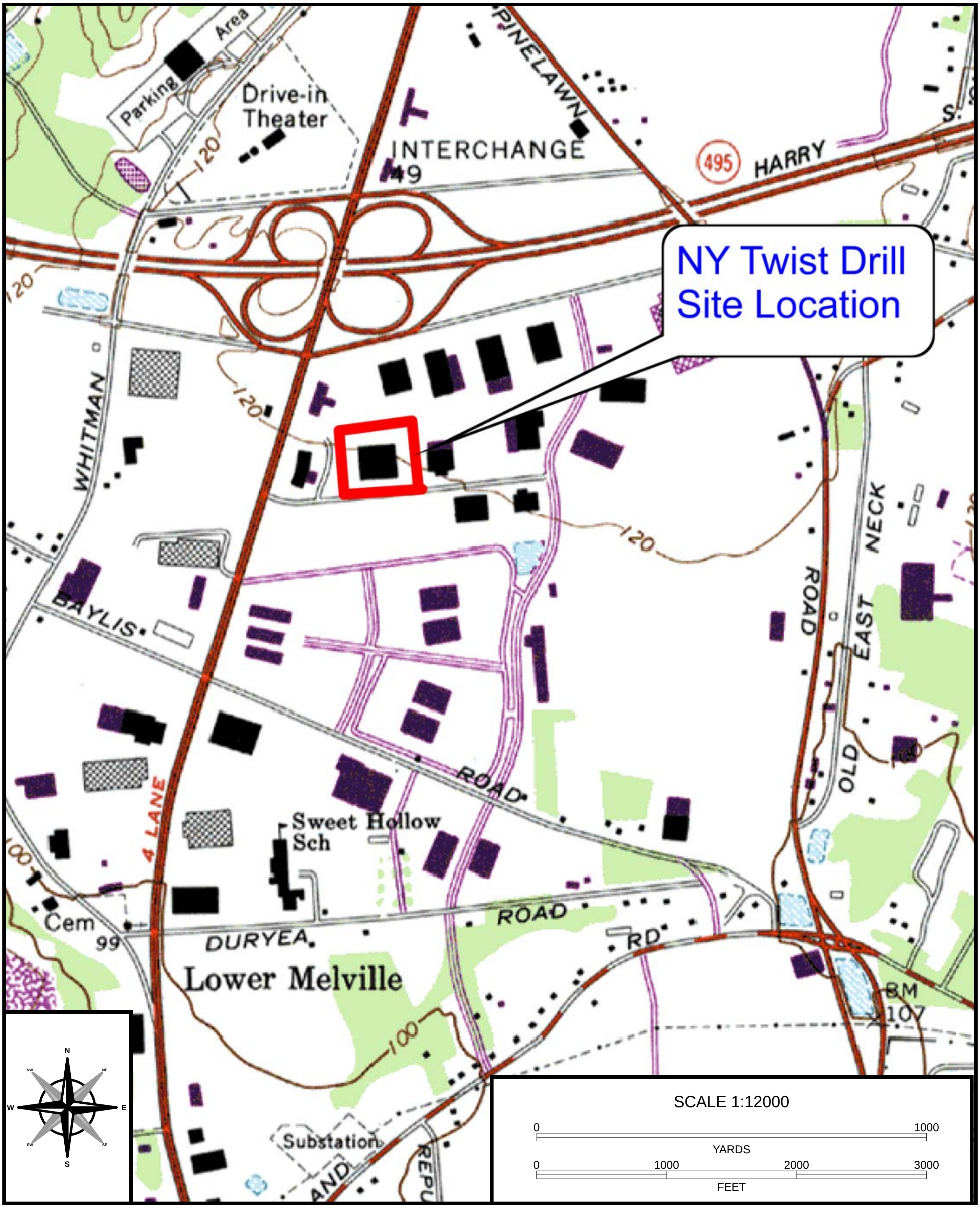
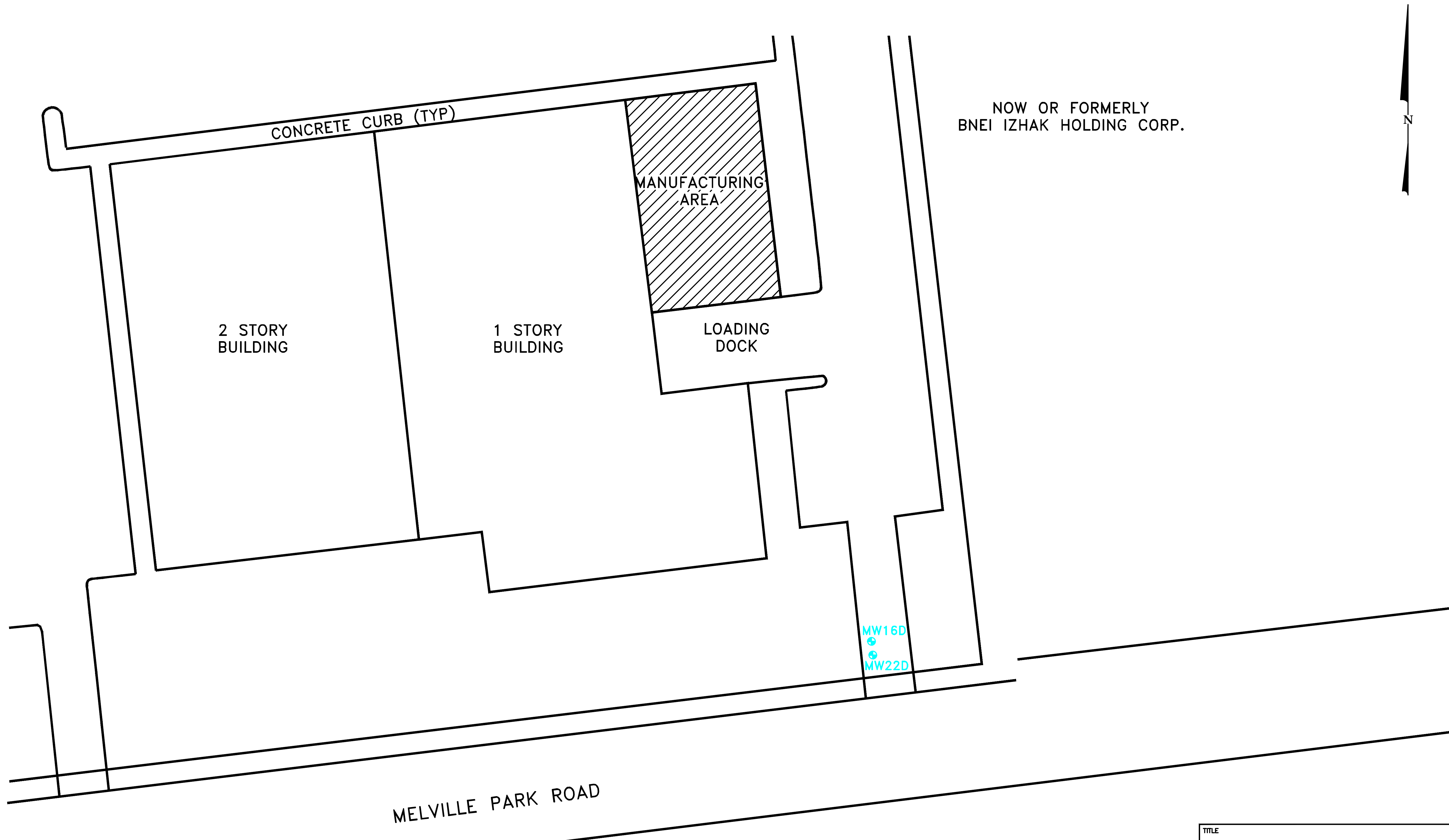


Figure 1 - Site Location Map
New York Twist Drill
25 Melville Park Road, Melville, NY
05/02/13
Prepared For: Respondants Order On Consent
NO. W1-0998-04-04

Map Name: HUNTINGTON

Date Published: 1967

ERM



LEGEND

MW16D MW DESIGNATION

0 50 100

GRAPHIC SCALE IN FEET

TITLE

SITE CONFIGURATION MAP

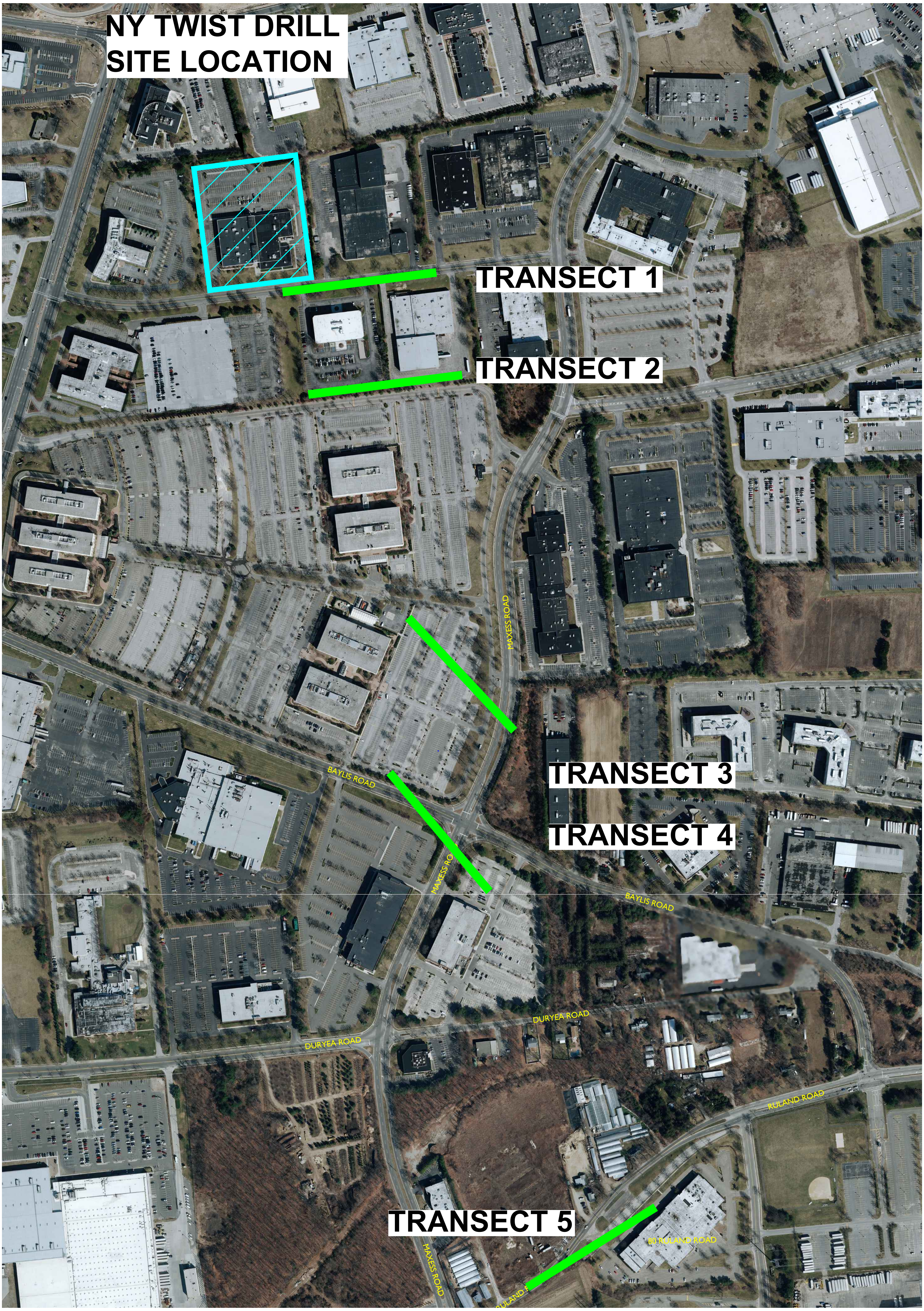
PREPARED FOR

RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

DRAWN BY	SCALE	DATE	JOB NO.	FIGURE
EMF	GRAPHIC	11/22/13	0025381	2

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2005-06-20 - NY Twist Drill - 0025381-00-002.dwg (11/22/2013 - 1:41pm Melville)



0 400' 800'

GRAPHIC SCALE IN FEET

N

TITLE

TRANSECT LOCATIONS

PREPARED FOR

RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

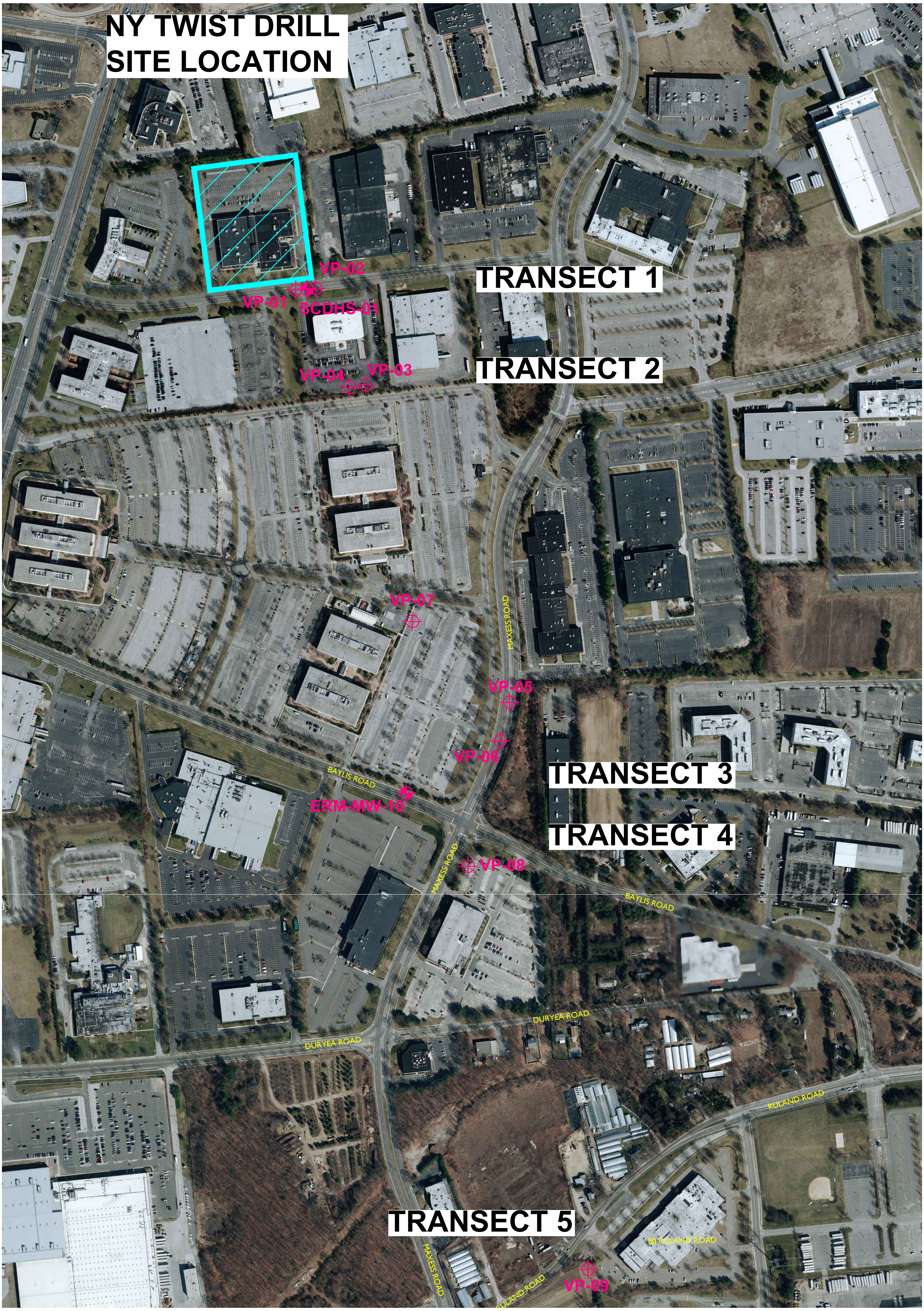
ERM Environmental Resources Management

FIGURE

3

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	AS SHOWN	11/06/13	0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-05-02 - NY Twist Drill - Tr□sect Loc□tio□s.dwg (11/22/2013 - 1:43pm Melville)



N

0 400' 800'

GRAPHIC SCALE IN FEET

TITLE

□ERTICAL PROFILE
□ORING LOCATIONS

PREPARED FOR

RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

DRAWN BY	SCALE	DATE	JOB NO.	FIGURE
GKS/EMF	AS SHOWN	11/06/13	0025381	4

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-05-02 - NY Twist Drill - □ertic□l Pro□le Loc□tio□s.dwg (11/22/2013 - 1:46pm Melville)

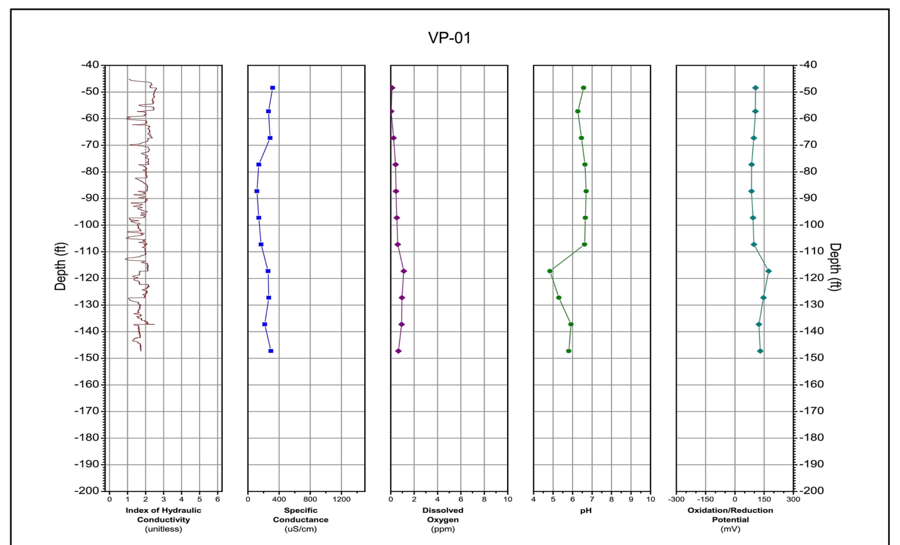


FIGURE VP-01, I_K RECORD AND PHYSICO-CHEMICAL PARAMETERS
Dates Sampled : 2/28/2006-3/2/06
ERM / Melville, Ny

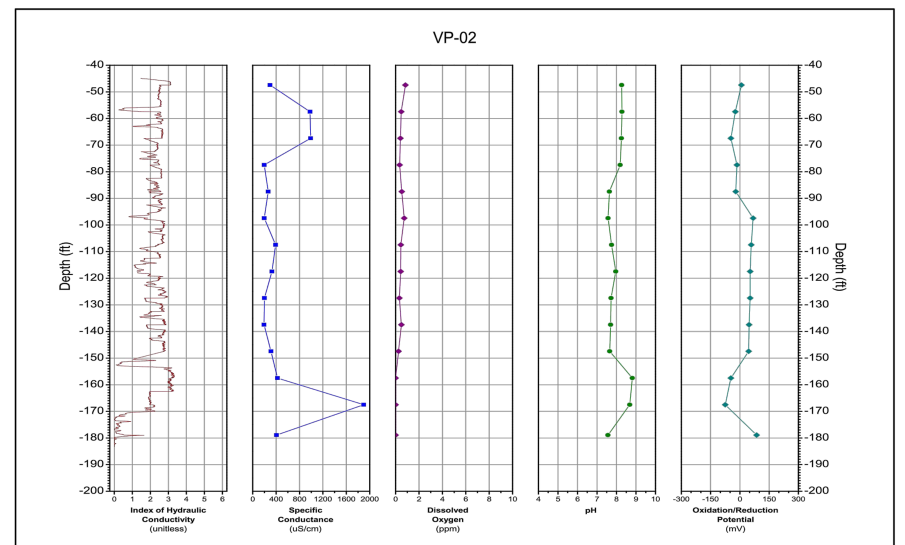


FIGURE VP-02, I_K RECORD AND PHYSICO-CHEMICAL PARAMETERS
Dates Sampled : 3/7/2006 - 3/14/06
ERM / Melville, Ny

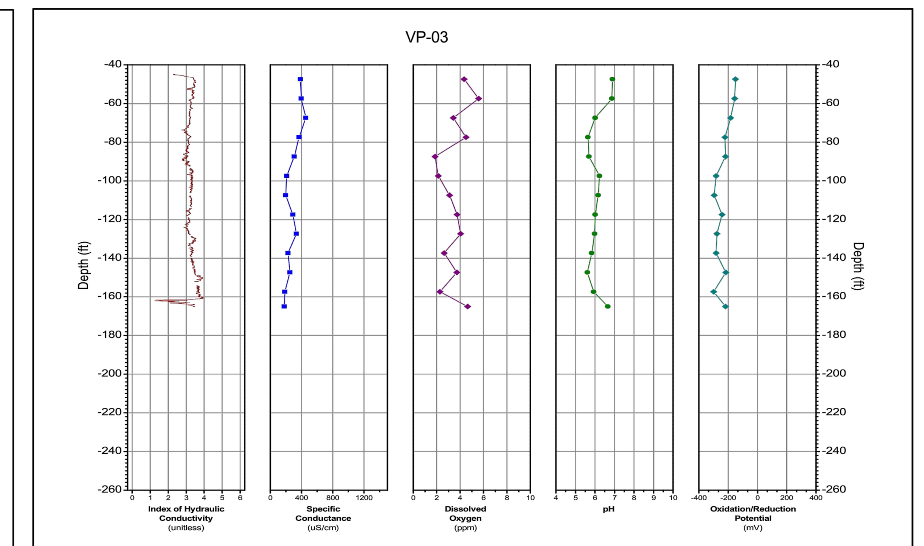


FIGURE VP-03, I_K RECORD AND PHYSICO-CHEMICAL PARAMETERS
Dates Sampled : 2/20 - 2/22/2007
ERM Melville, NY / 07-1884

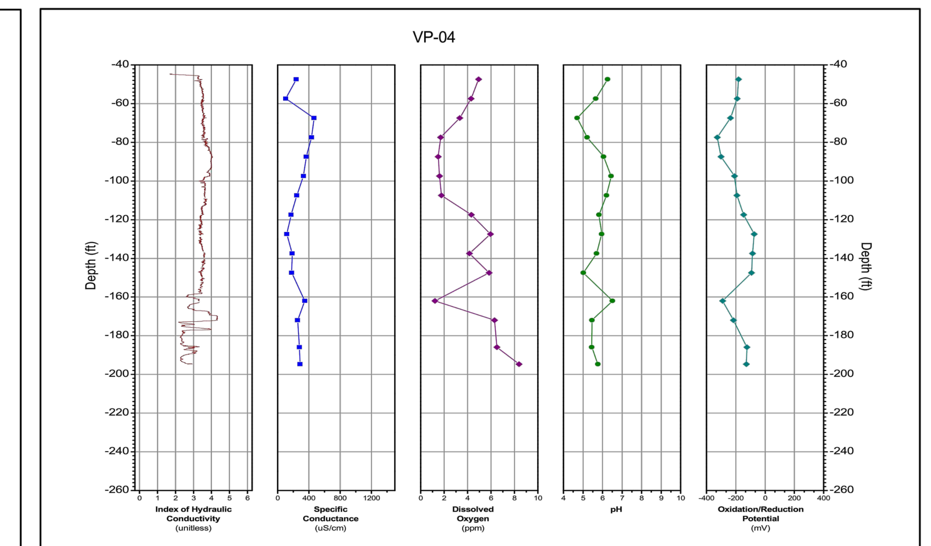
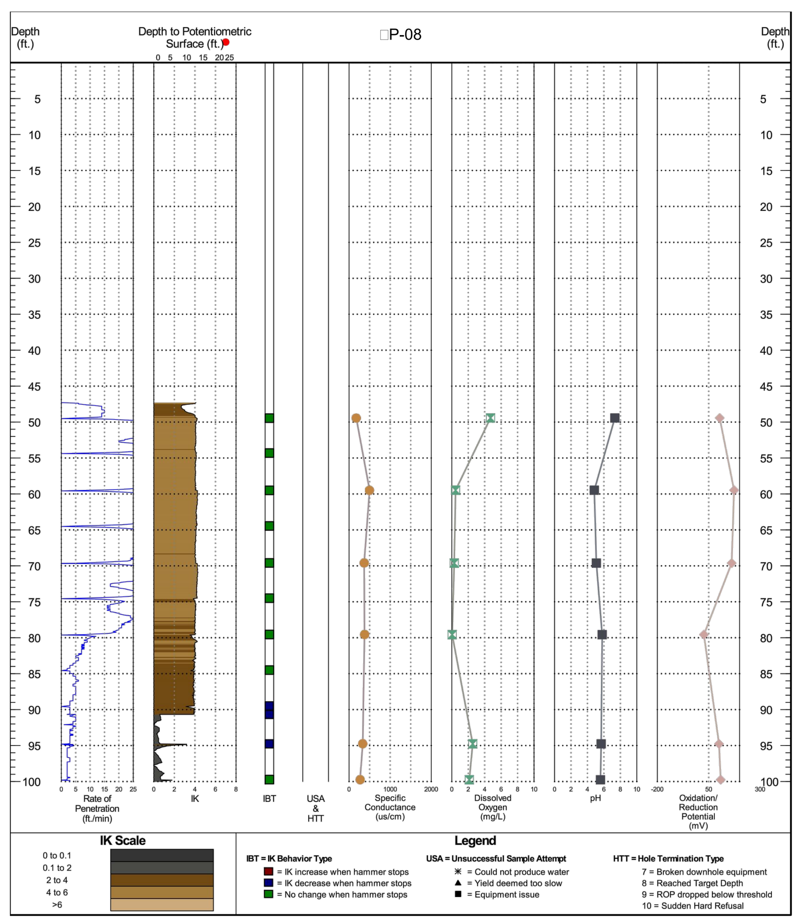
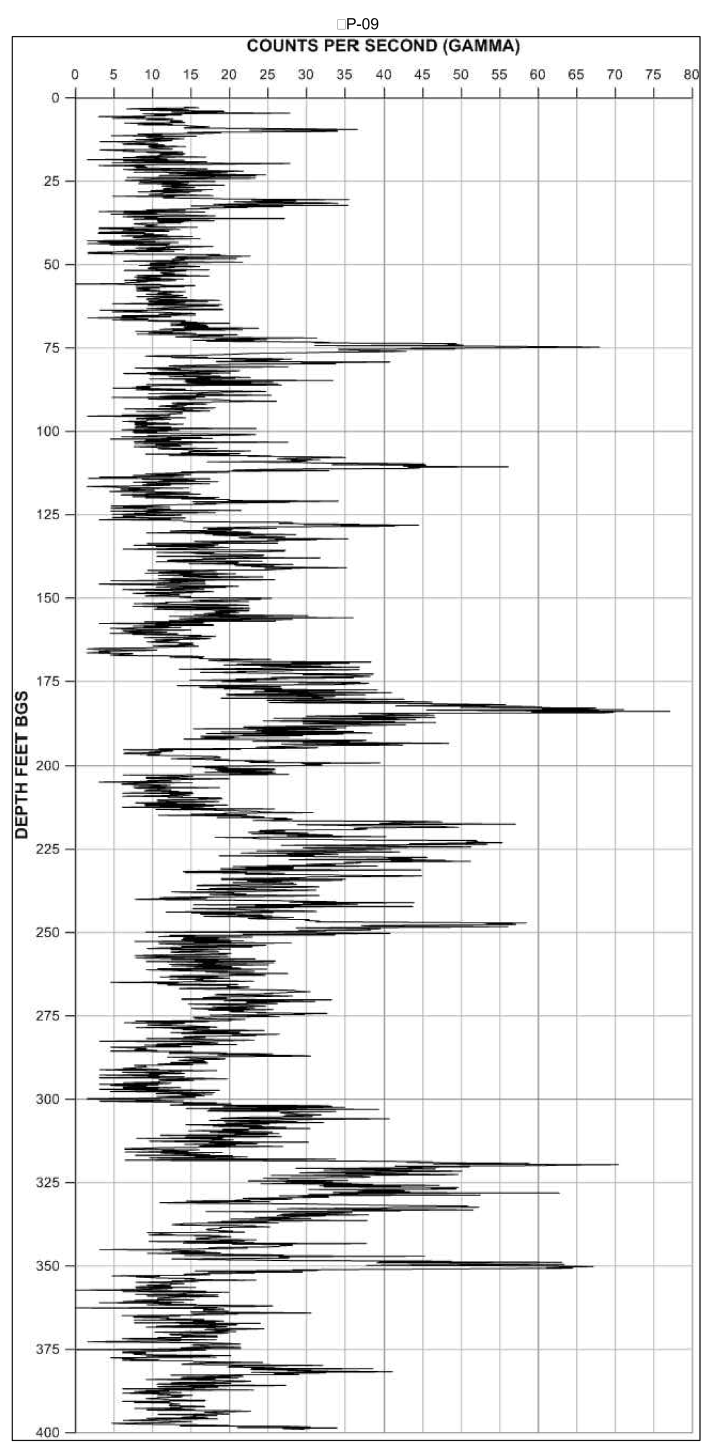


FIGURE VP-04, I_K RECORD AND PHYSICO-CHEMICAL PARAMETERS
Dates Sampled : 3/5 - 3/9/2007
ERM Melville, NY / 07-1884





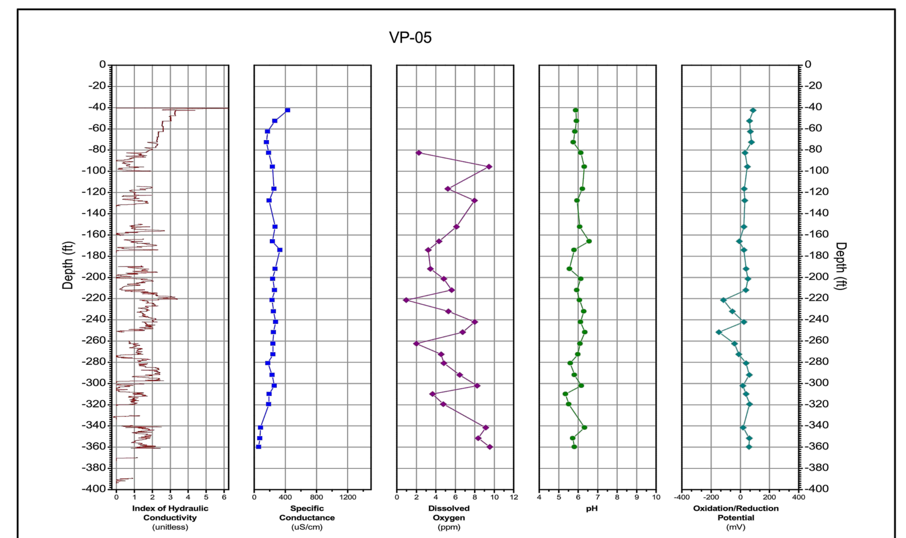


FIGURE VP-05, I_K RECORD AND PHYSICO-CHEMICAL PARAMETERS
Dates Sampled : 3/20/2007-4/9/2007
ERM / 07-1884

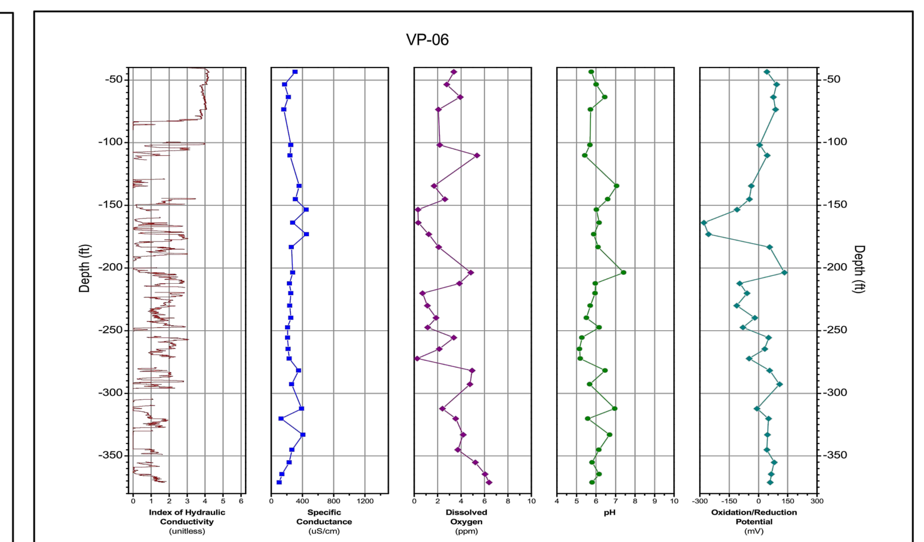


FIGURE VP-06, I_K RECORD AND PHYSICO-CHEMICAL PARAMETERS
Dates Sampled : 4/26/07 - 5/17/07
ERM / Melville, NY

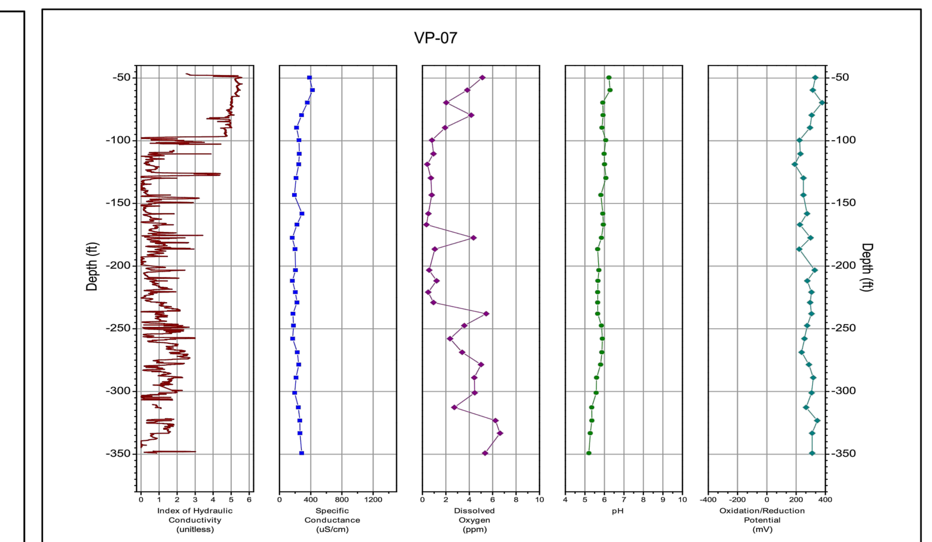
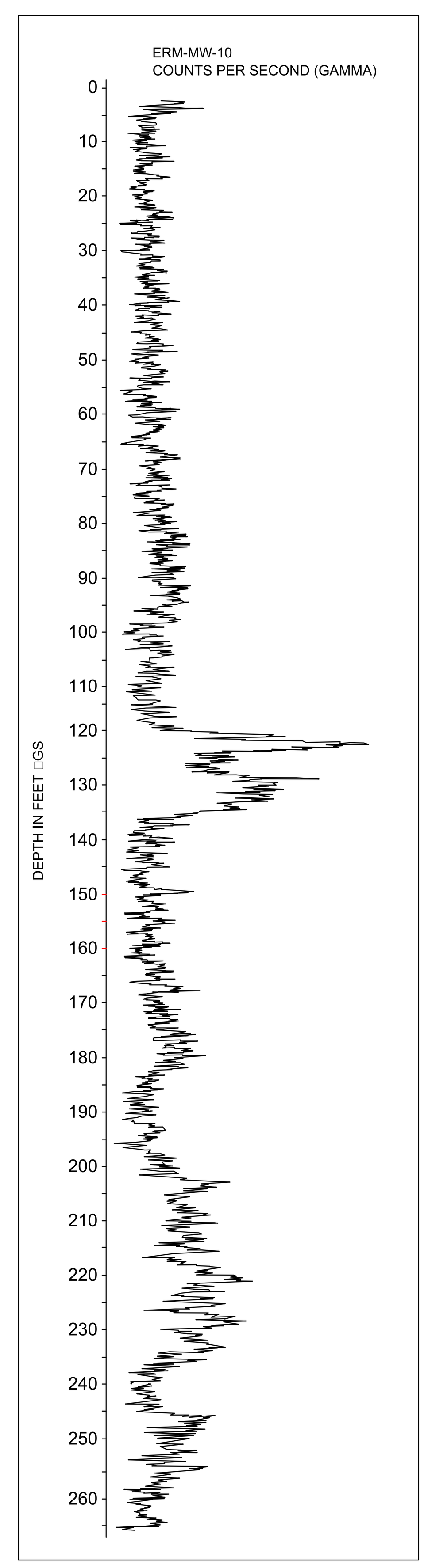


FIGURE VP-07, I_K RECORD AND PHYSICO-CHEMICAL PARAMETERS
Dates Sampled : 5/14/2008 - 6/02/2008
ERM / Melville, NY



TITLE

PHYSICAL CHARACTERISTICS FOR ERTICAL PROFILES

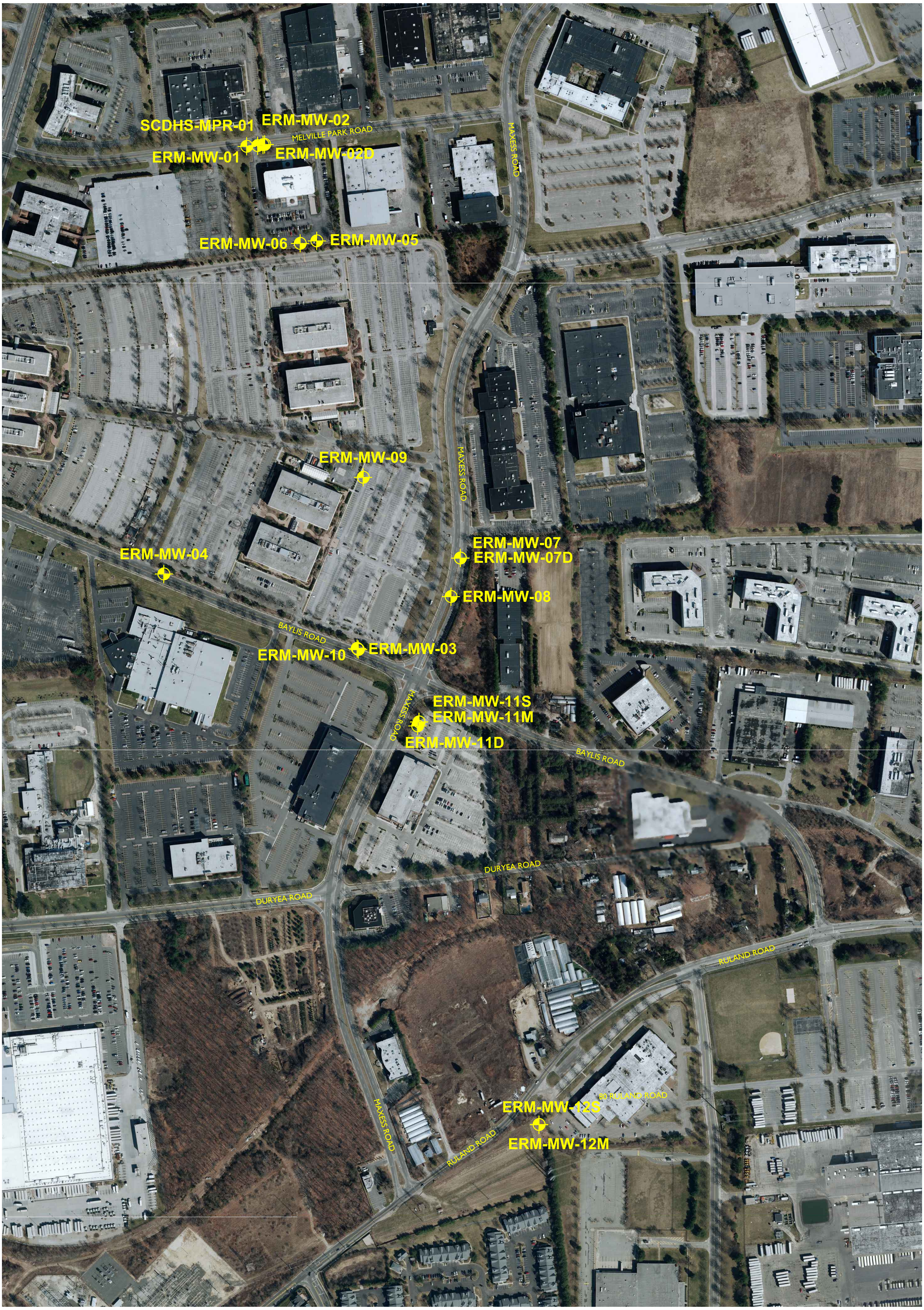
PREPARED FOR

RESPONDANTS NYTD ORDER ON CONSENT
NO. W1-0998-04-04

Environmental Resources Management

DRAWN BY	SCALE	DATE	JOB NO.	FIGURE
GKS/EMF	AS SHOWN	07/09/14	025381	5

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-05-03 - NY Twist Drill -P sic C r cteristics or P ori gs.dwg (07/09/2014 - 11:49



Legend

Monitoring Well Location

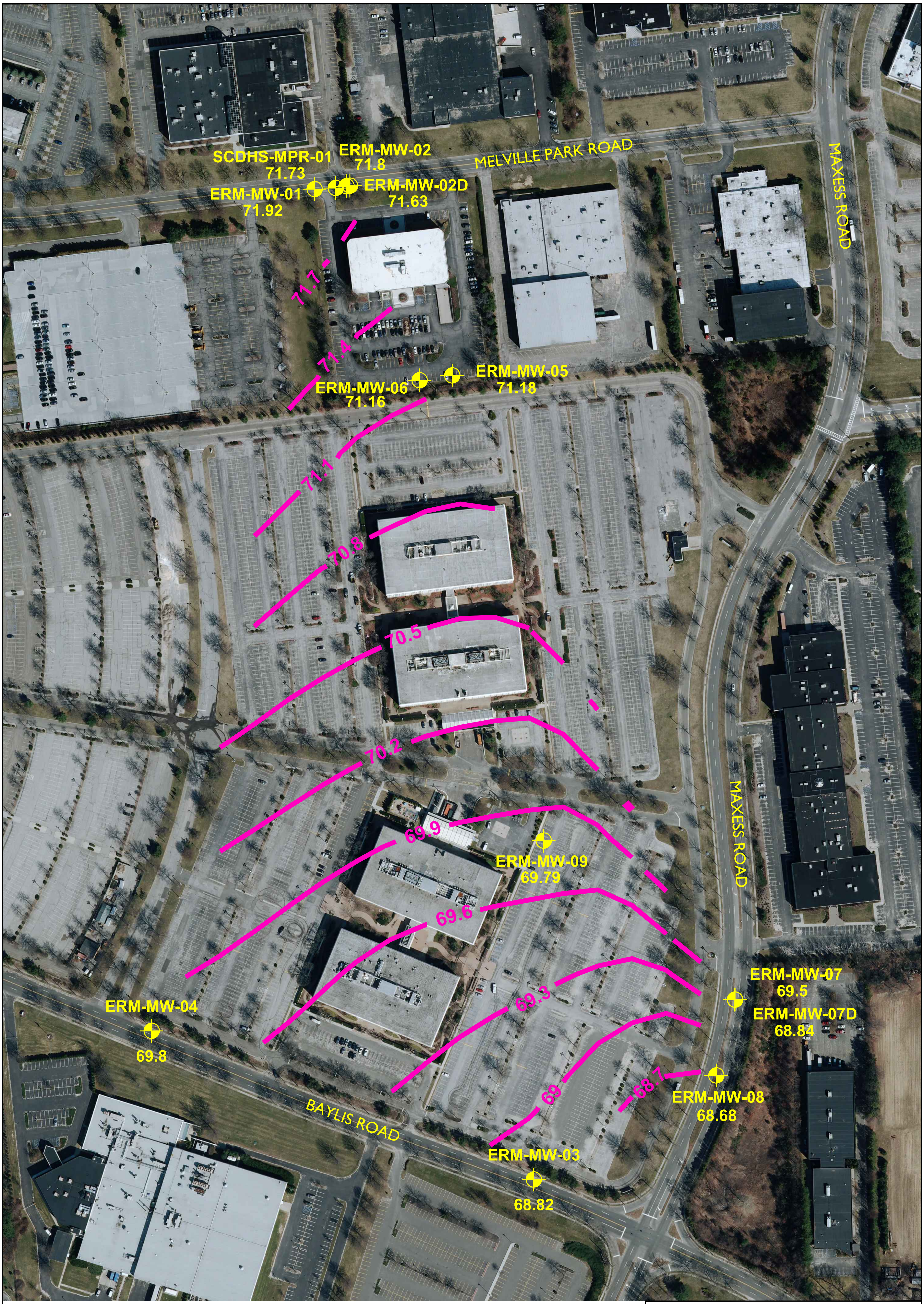
N

0 400' 800'

GRAPHIC SCALE IN FEET

TITLE			
GROUNDWATER MONITORING WELL LOCATIONS			
PREPARED FOR: RESPONDANTS ORDER ON CONSENT NO. W1-0998-04-04			
ERM Environmental Resources Management			FIGURE 6
DRAWN BY: GKS/EMF	SCALE: AS SHOWN	DATE: 11/22/13	JOB NO. 0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2012-09-14 - NY Twist Drill - 0025381-00-006C.dwg (11/22/2013 - 1:54pm Melville)



Legend

Monitoring Well Location

69.50 Water Table Elevation - April 2009

69.6 Water Table Elevation Contour - April 2009

North American Datum 1983 (NAD 83)

0 200' 400'

GRAPHIC SCALE IN FEET

N

TITLE

ELE□ATION OF THE WATER TA□LE
APRIL 2009

PREPARED FOR

RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

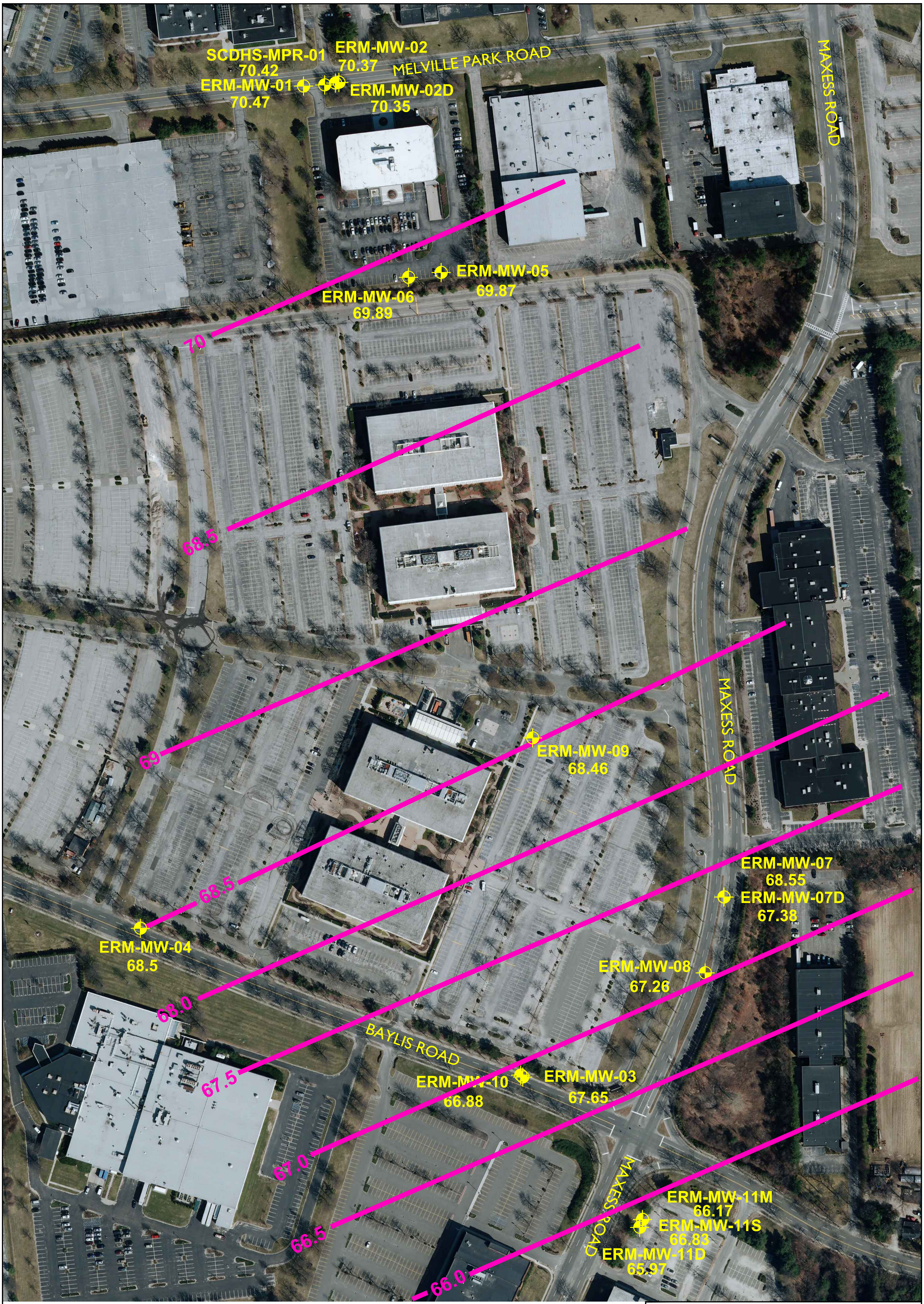
ERM Environmental Resources Management

FIGURE

7

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	GRAPHIC	11/22/13	0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2007-07-18 - NY Twist Drill - April 2009 WTE - v02.dwg (11/22/2013 - 1:57pm Melville)



Legend

- Monitoring Well Location
- 68.5 — Water Table Elevation - August 2011
- 68.5 — Water Table Elevation Contour - August 2011

North American Datum 1983 (NAD 83)

0 200' 400'

GRAPHIC SCALE IN FEET

N

TITLE

ELE□ATION OF THE WATER TA□LE
AUGUST 2011

PREPARED FOR

RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

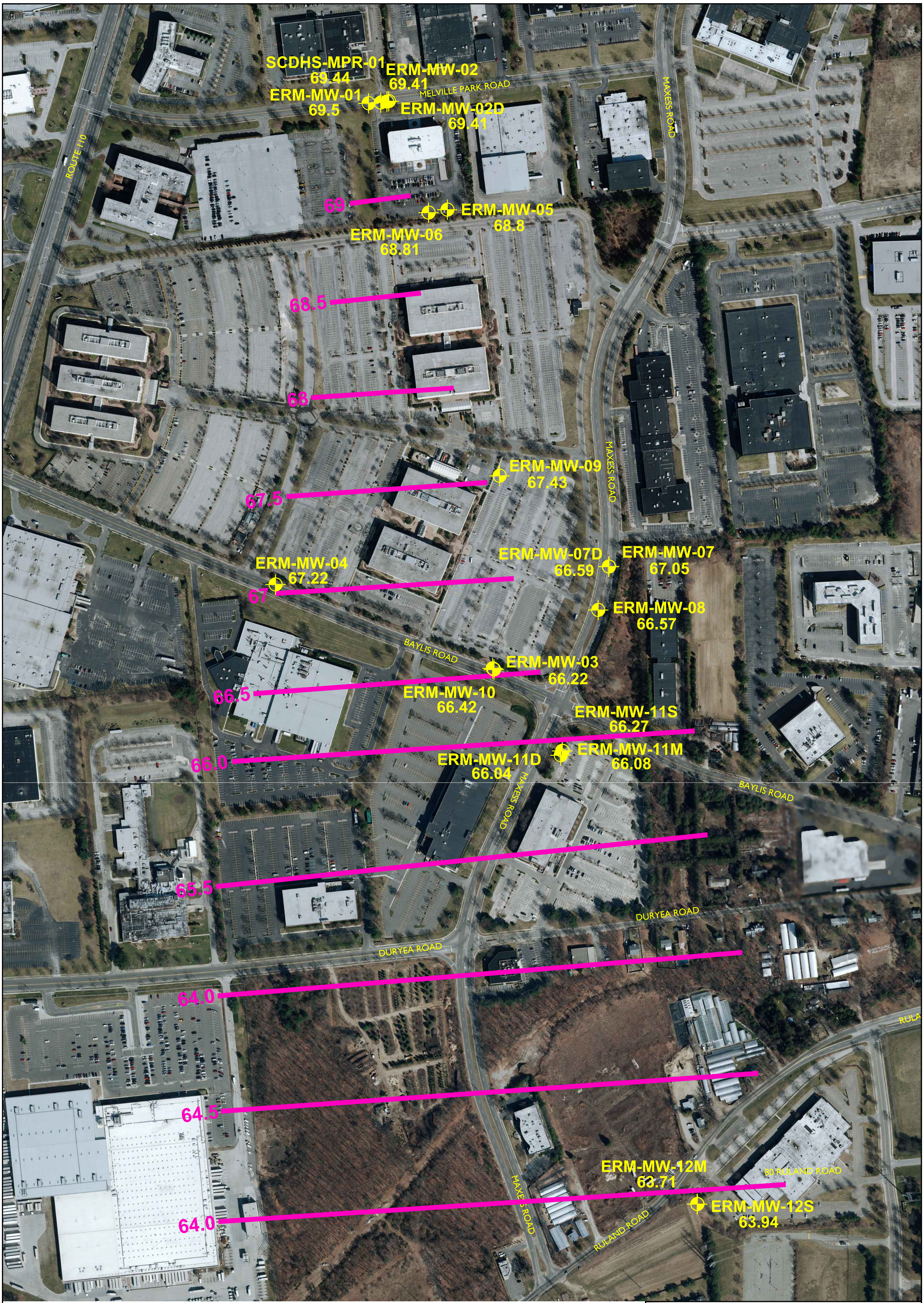
ERM Environmental Resources Management

FIGURE

8

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	GRAPHIC	11/22/13	0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-05-02 - NY Twist Drill - August 2011 WTE - v01.dwg (11/22/2013 - 2:15pm Melville)



Legend

Monitoring Well Location

66.08 — Water Table Elevation - November 2012

68.5 — Water Table Elevation Contour - November 2012

North American Datum 1983 (NAD83)

0 350' 700'

GRAPHIC SCALE IN FEET

N

TITLE

ELE□ATION OF THE WATER TA□LE
NO□EM□ER 2012

PREPARED FOR

RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

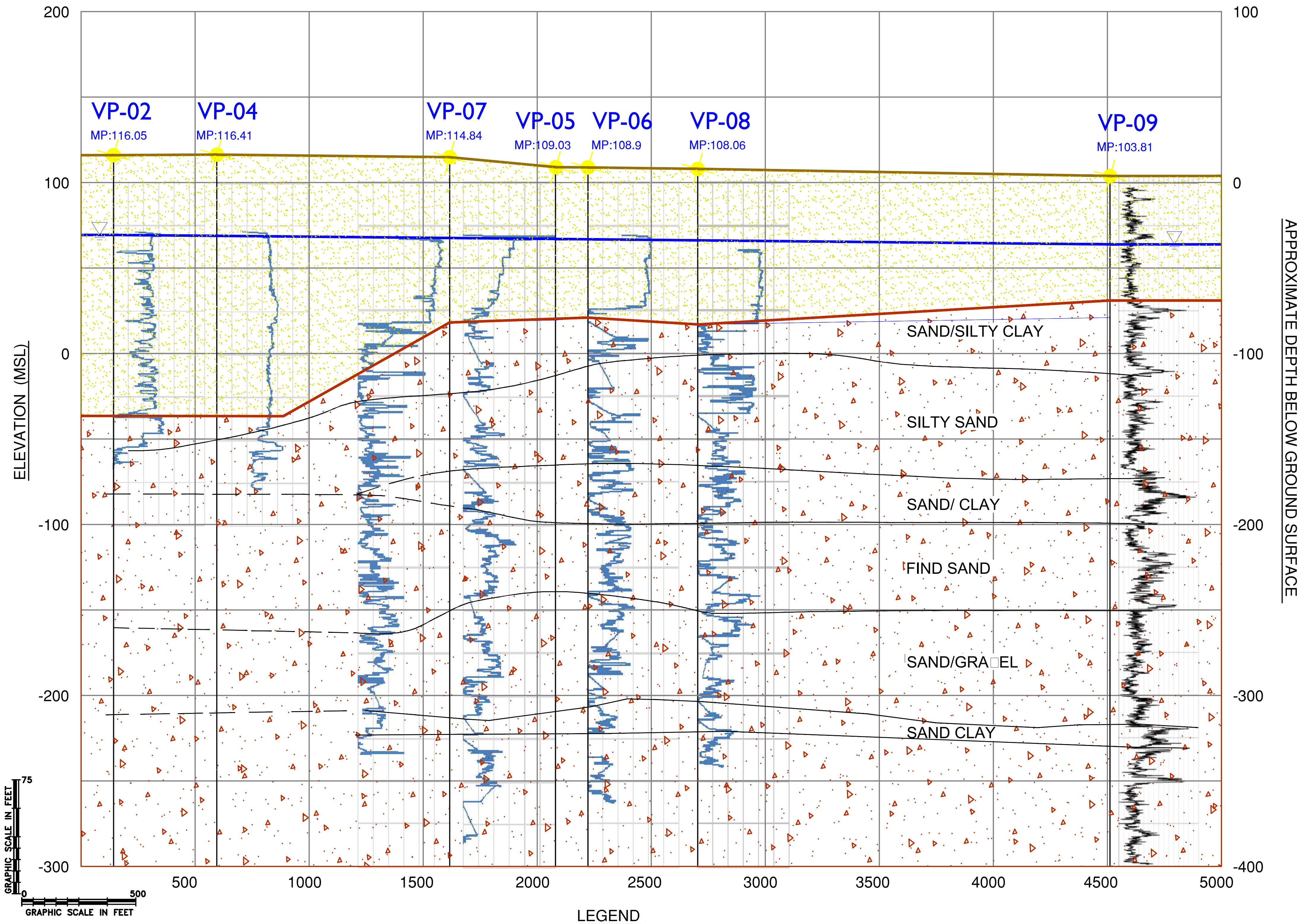
ERM Environmental Resources Management

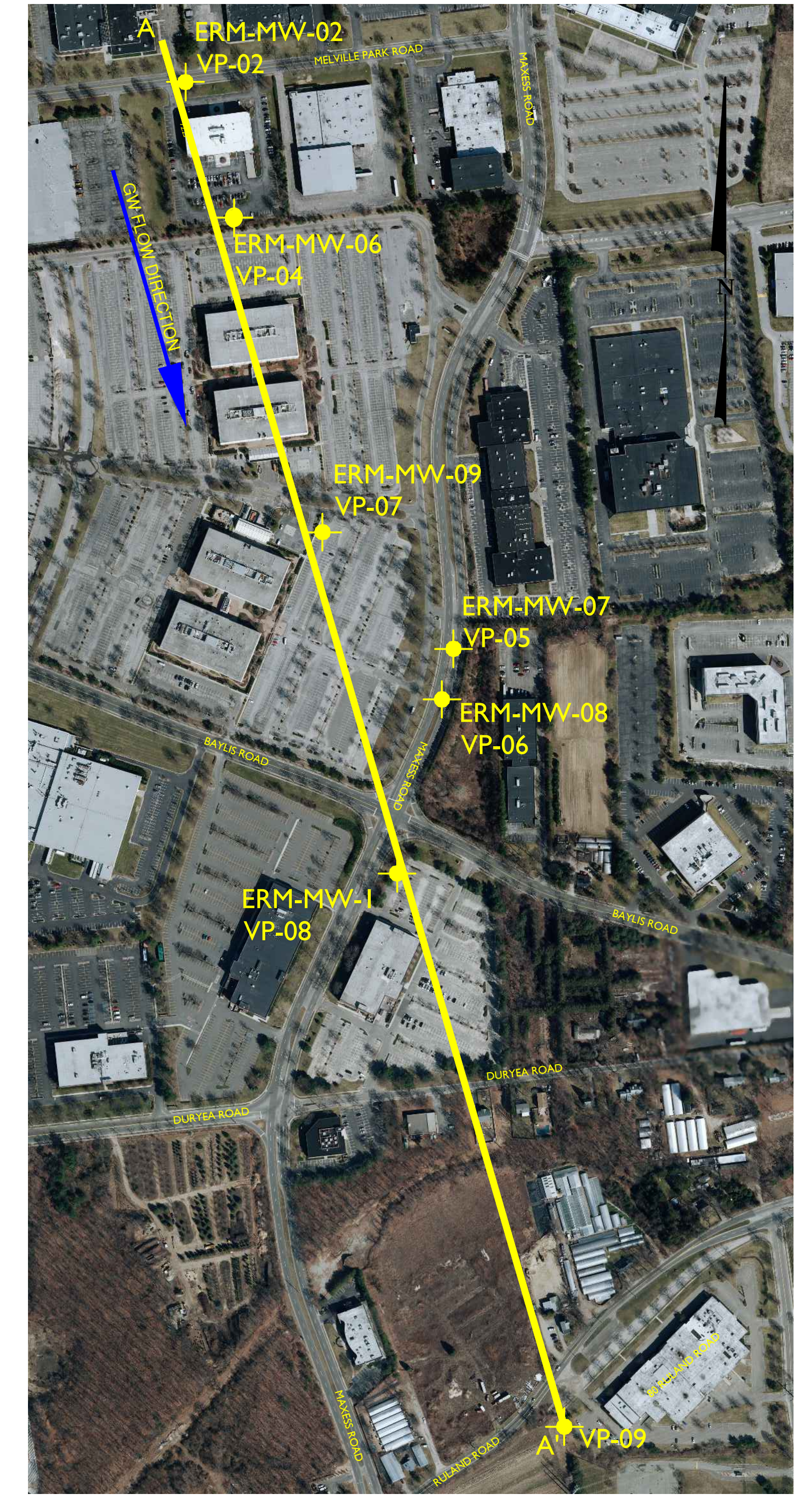
FIGURE

9

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	GRAPHIC	11/22/13	0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 RI Report\CAD\2013-05-03 - NY Twist Drill - Novem□er 2012 WTE.dwg (11/22/2013 - 2:32pm Melville)





NOTES:

1. ORTHO IMAGE SOURCE NEW YORK STATE GIS
2. CONDUCTIVITY DATA FROM STONE ENVIRONMENTAL INC GROUNDWATER QUALITY PROFILING DATA, VARIOUS REPORTS FROM 03-2006 TO 03-2008
3. GAMMA LOG DATA FROM DELTA WELL AND PUMP INC. GAMMA LOG STUDY 10-2012
4. GAMMA LOG DATA SHOWN HAS BEEN INVERTED ACROSS THE Y-AXIS.

LEGEND

- UPPER GLACIAL
- MAGOTHY
- WATER TABLE ELEVATION (11/21/2012)
- GROUND SURFACE
- UPPER GLACIAL/MAGOTHY INTERFACE
- INDEX OF HYDRAULIC CONDUCTIVITY
- GAMMA LOG

TITLE

□ERTICAL CROSS SECTION

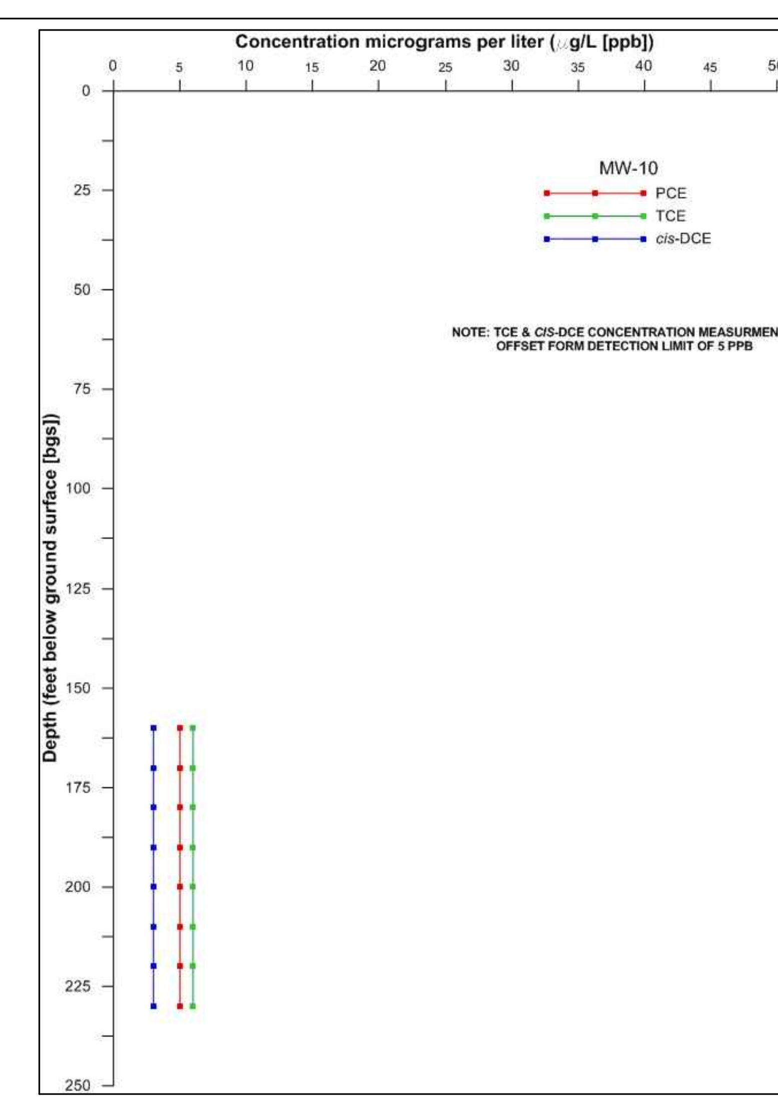
PREPARED FOR

RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

DRAWN BY	SCALE	DATE	JOB NO.	FIGURE
MC/MCW	GRAPHIC	11/22/13	0025381	10

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-03 - NY Twist Drill - RIR - Fig □ - Cross Sectio□ v08.dwg (11/22/2013 - 2:50pm Melville)



TITLE

VERTICAL DISTRIBUTION OF CVOCS AT VERTICAL PROFILES

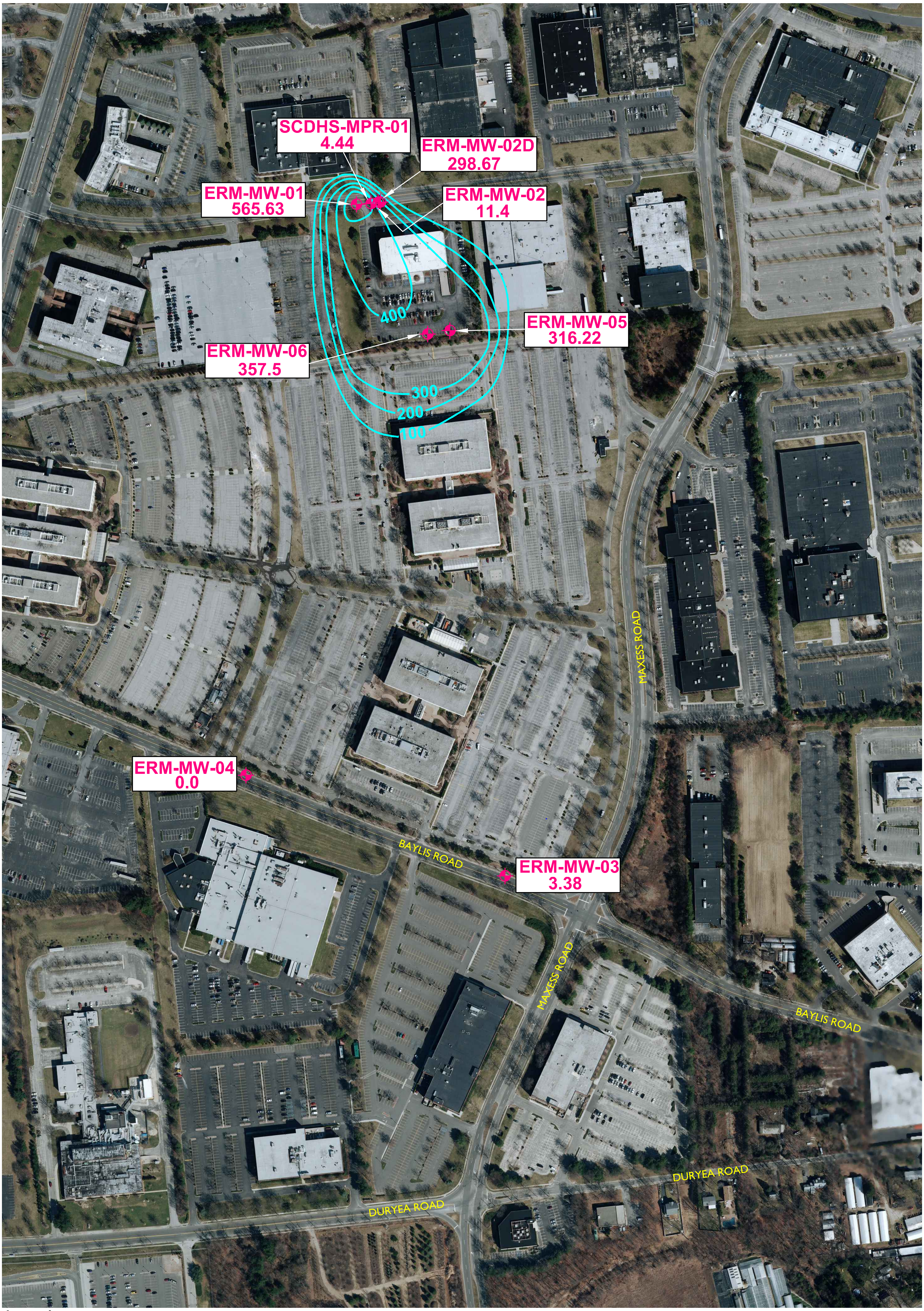
PREPARED FOR

RESPONDENTS NYTD ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

DRAWN BY	SCALE	DATE	JOB NO.	FIGURE
GKS/EMF	AS NOTED	11/22/13	025381	11

R:\Scout\Projects\NY Twist Drill\2013 RI Report\CAD\2013-02-12 - NY Twist Drill - Profile Chem Data.dwg (11/22/2013 - 2:53pm Melville)



Legend

Monitoring well location

475.7 Total VOC Concentration from Groundwater Sample Collected in 2007

Total VOC Concentraton Contour

All data reporting is in micrograms per liter (ug/l).

0 300' 600'

GRAPHIC SCALE IN FEET

N

TITLE
TOTAL □OC CONTOUR MAP
2007
NYTD
MONITORING WELL NETWORK

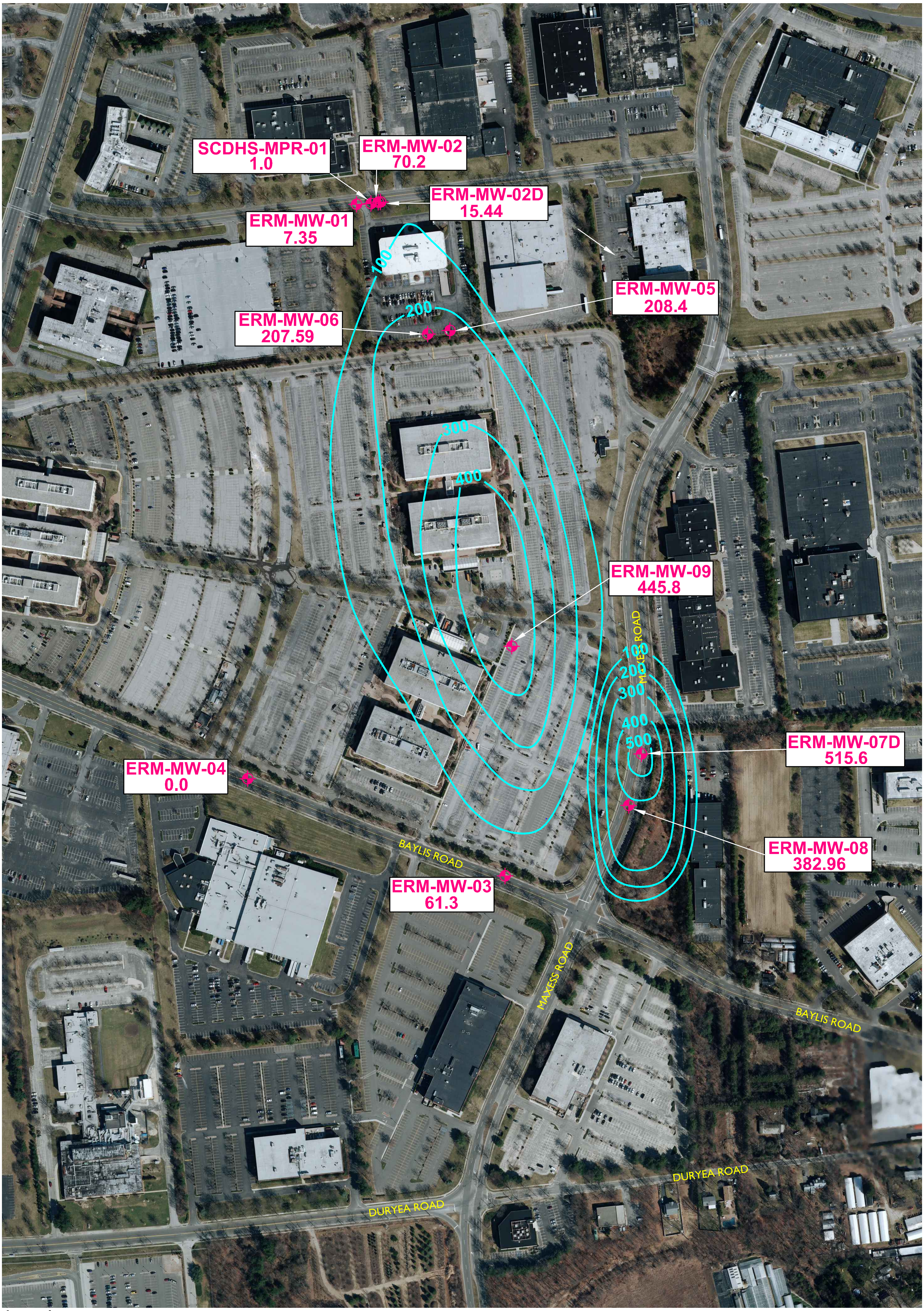
PREPARED FOR
RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

FIGURE
12-A

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	GRAPHIC	11/22/13	0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-02-12 - NY Twist Drill 2007 C emistr D - v02.dwg (11/22/2013 - 2:58pm Melville)



Legend

Monitoring well location

445.8 Total VOC Concentration from Groundwater Sample Collected in 2008

Total VOC Concentraton Contour

All data reporting is in micrograms per liter (ug/l).

0 300' 600'

GRAPHIC SCALE IN FEET

N

TITLE

TOTAL □OC CONTOUR MAP
2008
NYTD
MONITORING WELL NETWORK

PREPARED FOR

RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

FIGURE

12-□

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	GRAPHIC	11/22/13	0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-02-12 - NY Twist Drill 2008 C□emistr□ D□t□ - v03.dwg (11/22/2013 - 3:01pm Melville)

Legend

Monitoring well location

139.4 — Total VOC Concentration from Groundwater Sample Collected in 2010

Total VOC Concentraton Contour

All data reporting is in micrograms per liter (ug/l).

0 300' 600'

GRAPHIC SCALE IN FEET

N

TITLE

TOTAL □OC CONTOUR MAP
2010
NYTD
MONITORING WELL NETWORK

PREPARED FOR

RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

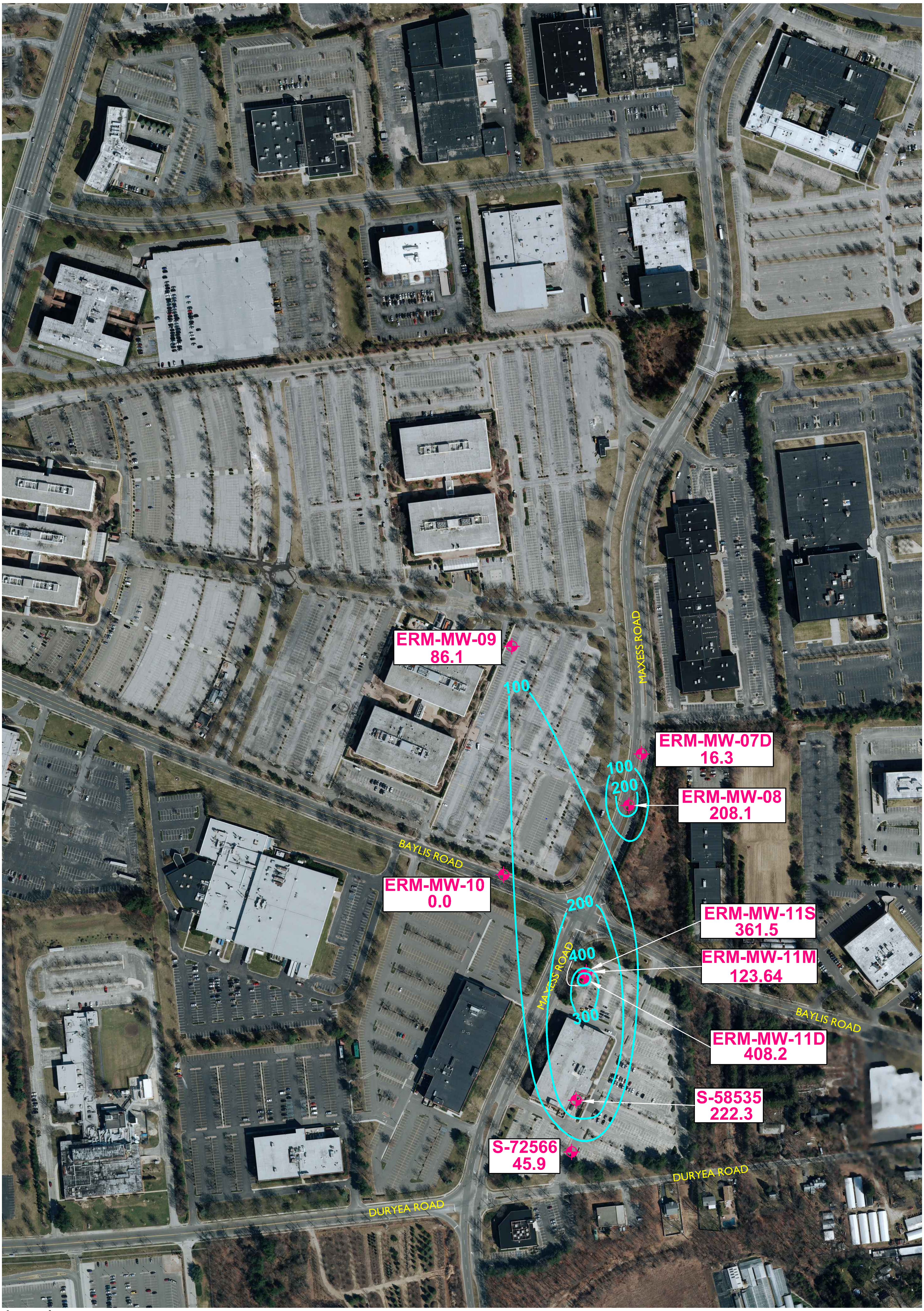
ERM Environmental Resources Management

FIGURE

12-C

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	GRAPHIC	11/22/13	0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-02-12 - NY Twist Drill 2010 C emistr D □ - v03.dwg (11/22/2013 - 3:08pm Melville)



Legend

Monitoring well location

208.1 Total VOC Concentration from Groundwater Sample Collected in 2011

Total VOC Concentraton Contour

All data reporting is in micrograms per liter (ug/l).

0 300' 600'

GRAPHIC SCALE IN FEET

N

TITLE

TOTAL □OC CONTOUR MAP
2011
NYTD
MONITORING WELL NETWORK

PREPARED FOR

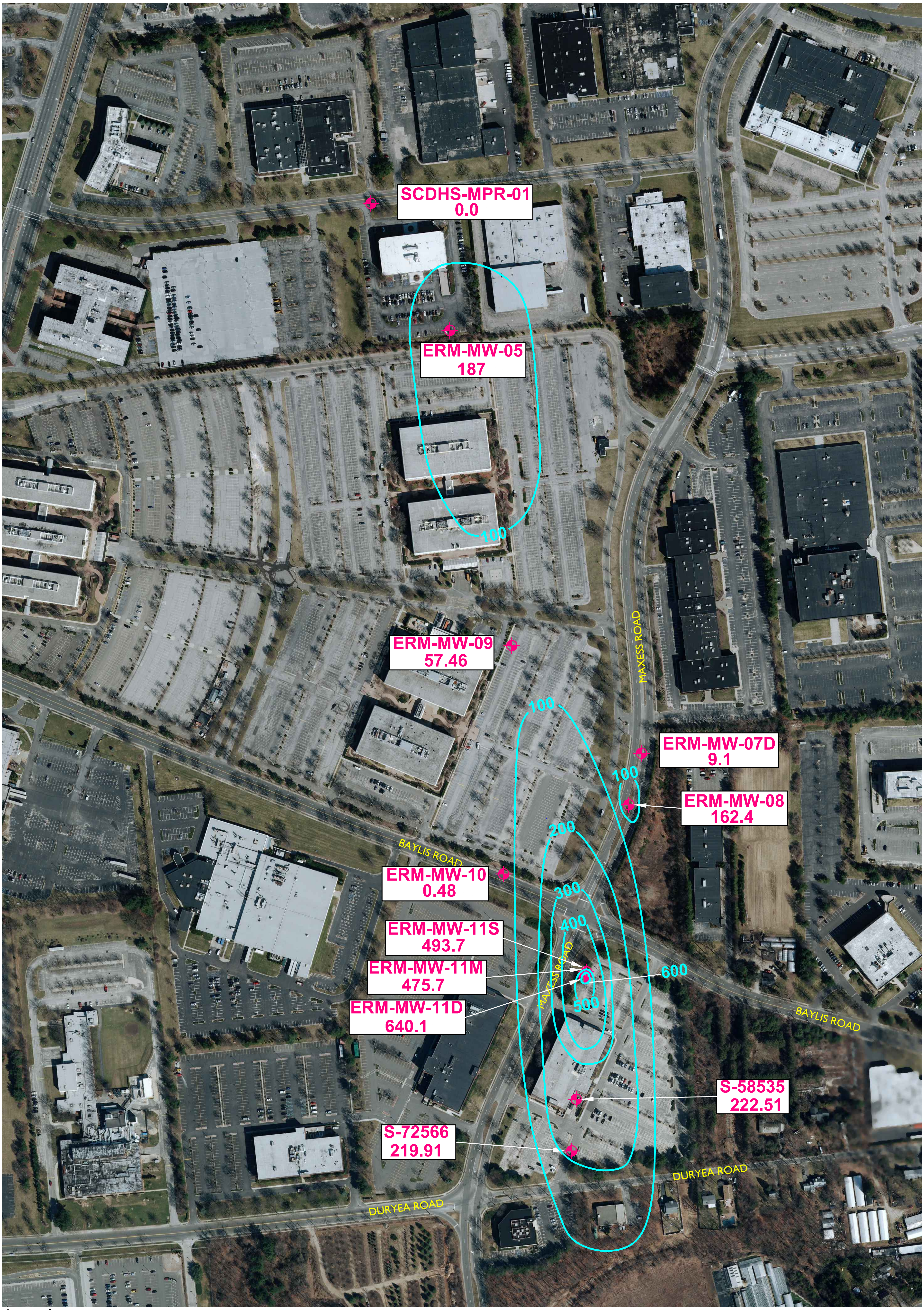
RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

FIGURE 12-D

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	GRAPHIC	11/22/13	0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-02-12 - NY Twist Drill 2011 C□emistr□ D□□ - v03.dwg (11/22/2013 - 3:11pm Melville)



Legend

Monitoring well location

162.4 Total VOC Concentration from Groundwater Sample Collected in 2012

Total VOC Concentraton Contour

All data reporting is in micrograms per liter (ug/l).

0 300' 600'

GRAPHIC SCALE IN FEET

N

TITLE

TOTAL □OC CONTOUR MAP
2012
NYTD
MONITORING WELL NETWORK

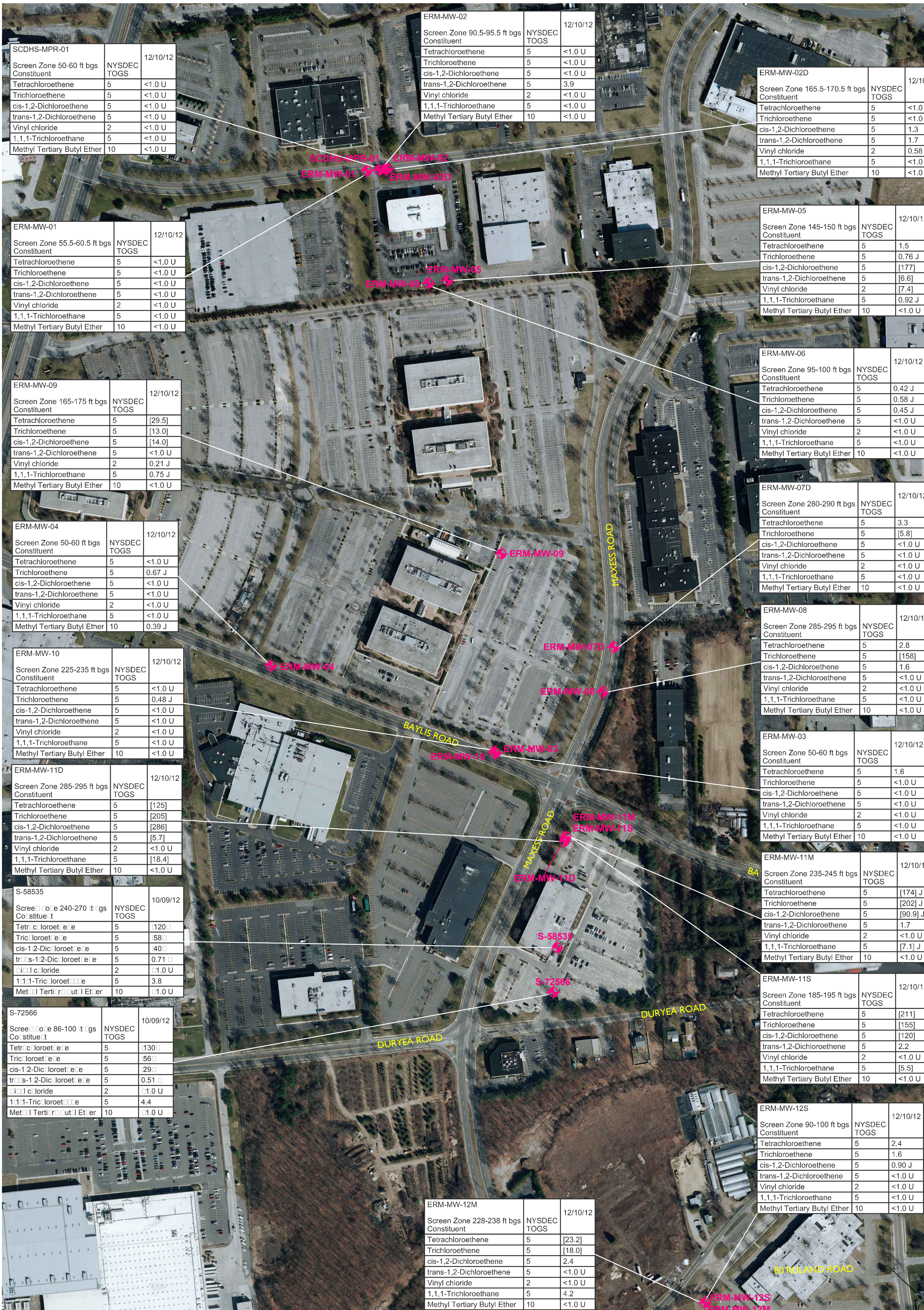
PREPARED FOR
RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

FIGURE
12-E

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	GRAPHIC	07/03/2014	0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 RI Report\CAD\2013-02-12 - NY Twist Drill 2012 C emistr□D □ - v04.dwg (07/18/2014 - 11:22 m Melville)



SCDHS-MPR-01		
Screen Zone 50-60 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	<1.0 U
Trichloroethene	5	<1.0 U
cis-1,2-Dichloroethene	5	<1.0 U
trans-1,2-Dichloroethene	5	<1.0 U
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	<1.0 U
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-02		
Screen Zone 90.5-95.5 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	<1.0 U
Trichloroethene	5	<1.0 U
cis-1,2-Dichloroethene	5	<1.0 U
trans-1,2-Dichloroethene	5	3.9
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	<1.0 U
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-02D		
Screen Zone 165.5-170.5 ft bgs Constituent	NYSDEC TOGS	12/10/1
Tetrachloroethene	5	<1.0 U
Trichloroethene	5	<1.0 U
cis-1,2-Dichloroethene	5	1.3
trans-1,2-Dichloroethene	5	1.7
Vinyl chloride	2	0.58 J
1,1,1-Trichloroethane	5	<1.0 U
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-01		
Screen Zone 55.5-60.5 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	<1.0 U
Trichloroethene	5	<1.0 U
cis-1,2-Dichloroethene	5	<1.0 U
trans-1,2-Dichloroethene	5	<1.0 U
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	<1.0 U
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-05		
Screen Zone 145-150 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	1.5
Trichloroethene	5	0.76 J
cis-1,2-Dichloroethene	5	[177]
trans-1,2-Dichloroethene	5	[6.6]
Vinyl chloride	2	[7.4]
1,1,1-Trichloroethane	5	0.92 J
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-06		
Screen Zone 95-100 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	0.42 J
Trichloroethene	5	0.58 J
cis-1,2-Dichloroethene	5	0.45 J
trans-1,2-Dichloroethene	5	<1.0 U
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	<1.0 U
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-09		
Screen Zone 165-175 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	[29.5]
Trichloroethene	5	[13.0]
cis-1,2-Dichloroethene	5	[14.0]
trans-1,2-Dichloroethene	5	<1.0 U
Vinyl chloride	2	0.21 J
1,1,1-Trichloroethane	5	0.75 J
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-07D		
Screen Zone 280-290 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	3.3
Trichloroethene	5	[5.8]
cis-1,2-Dichloroethene	5	<1.0 U
trans-1,2-Dichloroethene	5	<1.0 U
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	<1.0 U
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-04		
Screen Zone 50-60 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	<1.0 U
Trichloroethene	5	0.67 J
cis-1,2-Dichloroethene	5	<1.0 U
trans-1,2-Dichloroethene	5	<1.0 U
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	<1.0 U
Methyl Tertiary Butyl Ether	10	0.39 J

ERM-MW-08		
Screen Zone 285-295 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	2.8
Trichloroethene	5	[158]
cis-1,2-Dichloroethene	5	1.6
trans-1,2-Dichloroethene	5	<1.0 U
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	<1.0 U
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-10		
Screen Zone 225-235 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	<1.0 U
Trichloroethene	5	0.48 J
cis-1,2-Dichloroethene	5	<1.0 U
trans-1,2-Dichloroethene	5	<1.0 U
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	<1.0 U
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-03		
Screen Zone 50-60 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	1.6
Trichloroethene	5	<1.0 U
cis-1,2-Dichloroethene	5	<1.0 U
trans-1,2-Dichloroethene	5	<1.0 U
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	<1.0 U
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-11D		
Screen Zone 285-295 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	[125]
Trichloroethene	5	[205]
cis-1,2-Dichloroethene	5	[286]
trans-1,2-Dichloroethene	5	[5.7]
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	[18.4]
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-11M		
Screen Zone 235-245 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	[174] J
Trichloroethene	5	[202] J
cis-1,2-Dichloroethene	5	[90.9] J
trans-1,2-Dichloroethene	5	1.7
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	[7.1] J
Methyl Tertiary Butyl Ether	10	<1.0 U

S-58535		
Scree□ □o□e 240-270 □t □gs Co□stitue□t	NYSDEC TOGS	10/09/12
Tetr□c□loroet□e□e	5	□120□
Tric□loroet□e□e	5	□58□
cis-1□2-Dic□loroet□e□e	5	□40□
tr□□s-1□2-Dic□loroet□e□e	5	0.71 □
□i□□l c□loride	2	□1.0 U
1□1□1-Tric□loroet□□□e	5	3.8
Met□□l Terti□r□ □ut□l Et□er	10	□1.0 U

ERM-MW-11S		
Screen Zone 185-195 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	[211]
Trichloroethene	5	[155]
cis-1,2-Dichloroethene	5	[120]
trans-1,2-Dichloroethene	5	2.2
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	[5.5]
Methyl Tertiary Butyl Ether	10	<1.0 U

S-72566		
Scree□ □o□e 86-100 □t □gs Co□stitue□t	NYSDEC TOGS	10/09/12
Tetr□c□loroet□e□e	5	□130□
Tric□loroet□e□e	5	□56□
cis-1□2-Dic□loroet□e□e	5	□29□
tr□□s-1□2-Dic□loroet□e□e	5	0.51 □
□i□□l c□loride	2	□1.0 U
1□1□1-Tric□loroet□□□e	5	4.4
Met□□l Terti□r□ □ut□l Et□er	10	□1.0 U

ERM-MW-12S		
Screen Zone 90-100 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	2.4
Trichloroethene	5	1.6
cis-1,2-Dichloroethene	5	0.90 J
trans-1,2-Dichloroethene	5	<1.0 U
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	<1.0 U
Methyl Tertiary Butyl Ether	10	<1.0 U

ERM-MW-12M		
Screen Zone 228-238 ft bgs Constituent	NYSDEC TOGS	12/10/12
Tetrachloroethene	5	[23.2]
Trichloroethene	5	[18.0]
cis-1,2-Dichloroethene	5	2.4
trans-1,2-Dichloroethene	5	<1.0 U
Vinyl chloride	2	<1.0 U
1,1,1-Trichloroethane	5	4.2
Methyl Tertiary Butyl Ether	10	<1.0 U

Legend

- Monitoring well location
- **J** The constituent was positively identified the associated numerical value is the approximate concentration of the constituent for the sample.
- **[ ]** Indicates that a compound was detected above it's comparison criteria.
- **U** Non detect

All data reporting is in micrograms per liter (ug/l).

0 350' 700'
GRAPHIC SCALE IN FEET

N

TITLE
□OLATILE ORGANIC COMPOUNDS IN GROUNDWATER 2012

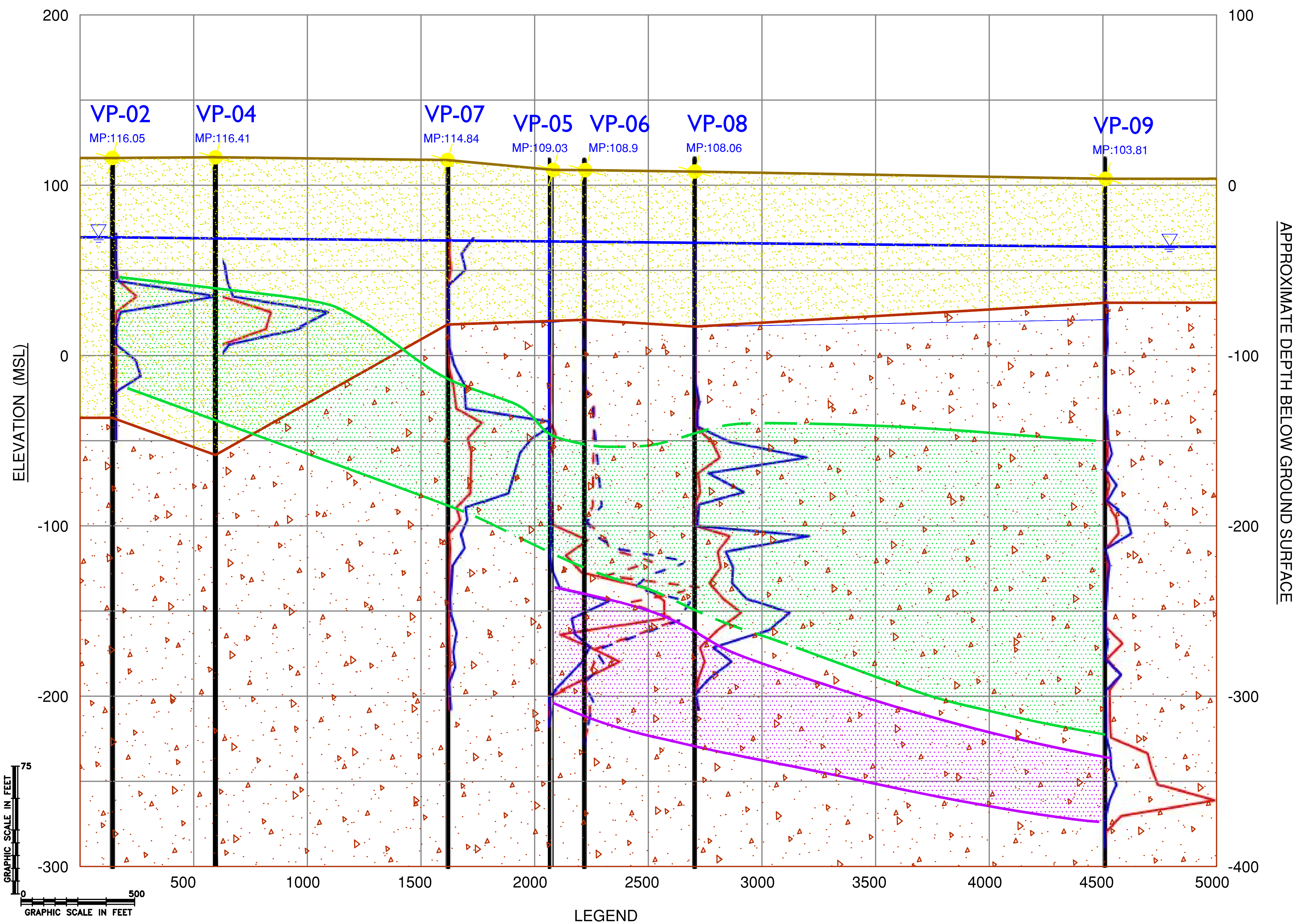
PREPARED FOR
RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

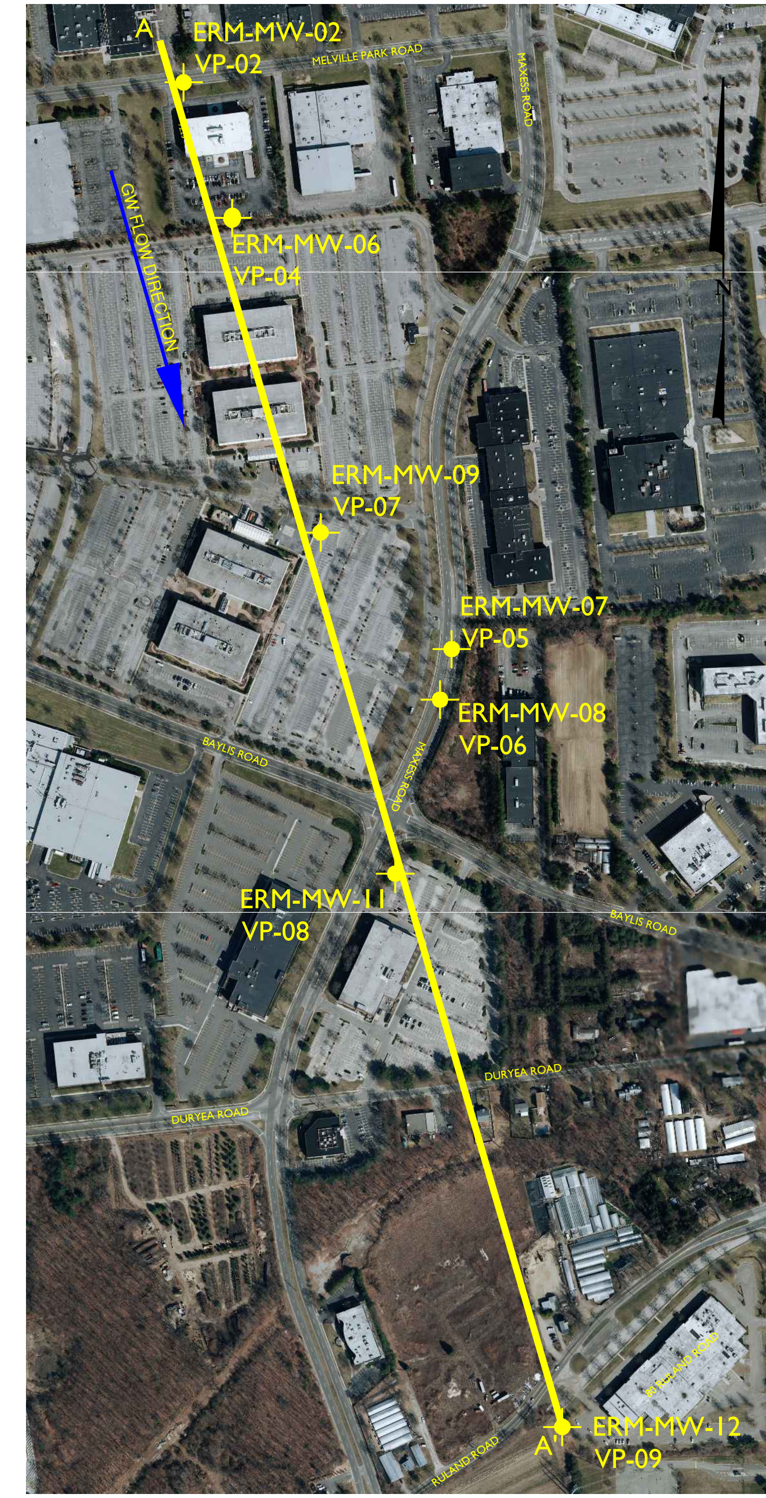
ERM Environmental Resources Management

FIGURE
13

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	AS SHOWN	11/22/13	0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-02-12 - NY Twist Drill 2012 C□emistr□ Spider M□p.dwg (11/22/2013 - 3:19pm Melville)





NOTES:

1. ORTHO IMAGE SOURCE NEW YORK STATE GIS
2. GROUNDWATER QUALITY DATA, VARIOUS REPORTS FROM 03-2006 TO 03-2008

LEGEND

- UPPER GLACIAL
- MAGATHY
- WATER TABLE ELEVATION (11/21/2012)
- GROUND SURFACE
- UPPER GLACIAL/MAGATHY INTERFACE
- PCE (RELATIVE CONCENTRATION)
- TCE (RELATIVE CONCENTRATION)
- NYTD PLUME
- UNKNOWN SOURCE PLUME

TITLE

□ERTICAL PLUME CROSS SECTION □ERTICAL PROFILE DATA

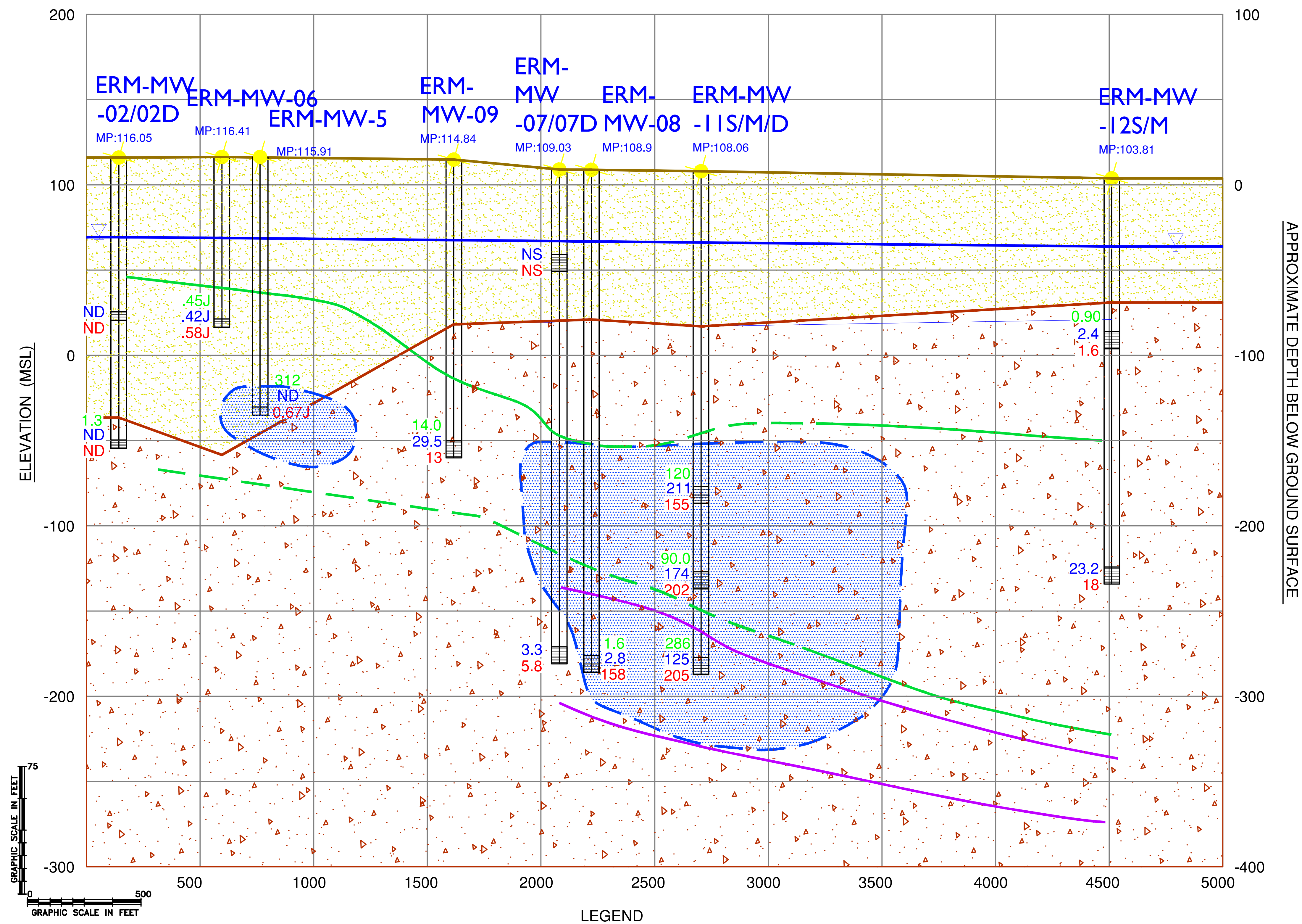
PREPARED FOR

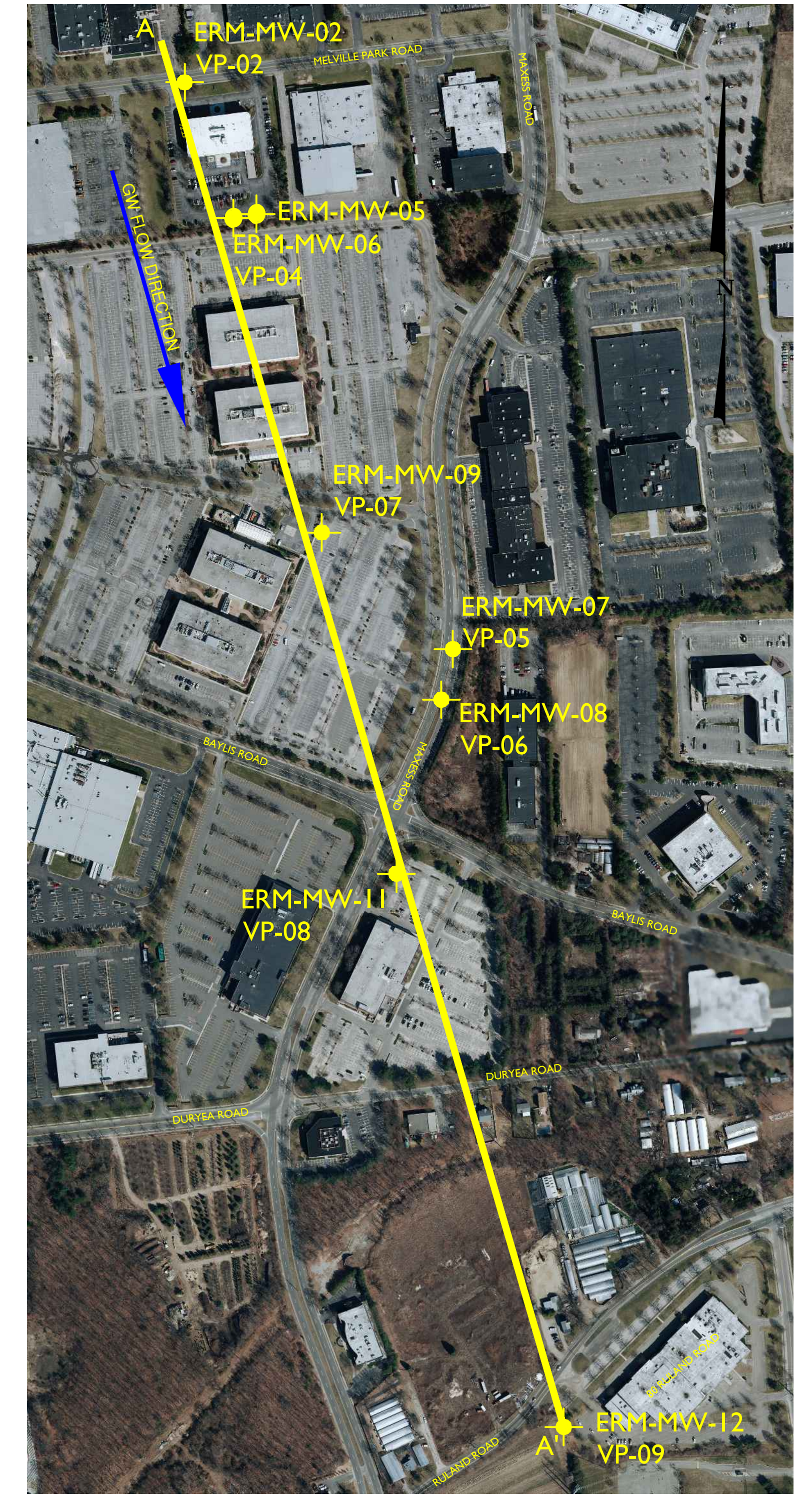
RESPONDANTS ORDER ON CONSENT NO. W1-0998-04-04

ERM Environmental Resources Management

DRAWN BY	SCALE	DATE	JOB NO.	FIGURE
MC/MCW/EMF	GRAPHIC	07/08/14	0025381	14□

R:\Scout\Projects\NY Twist Drill\CAD\2013 RI Report\CAD\2013-05-03 - NY Twist Drill □ertic□l Plume Cross Sectio□ v03.dwg (07/08/2014 - 4:26pm Melville)





LEGEND

UPPER GLACIAL		PCE CONCENTRATION	23.2	cis-DCE CONCENTRATION	312
MAGATHY		TCE CONCENTRATION	18	100 ppb	
WATER TABLE ELEVATION (11/21/2012)		NYTD PLUME BASED ON VERTICAL PROFILE DATA		100 ppb	
GROUND SURFACE		UNKNOWN SOURCE PLUME BASED ON VERTICAL PROFILE DATA			
UPPER GLACIAL/MAGATHY INTERFACE		TOTAL VOC PLUME BASED ON 2012 DATA (>100 ug/L)			

NOTES:

1. ORTHO IMAGE SOURCE NEW YORK STATE GIS
2. GROUNDWATER QUALITY DATA FROM DECEMBER 2012 SAMPLING EVENT.
3. ERM-MW-07 WAS NOT SAMPLED DUE TO AN OBSTRUCTION IN THE WELL.
4. ND = NON-DETECT
5. CONCENTRATIONS EXPRESSED IN ug/L

TITLE

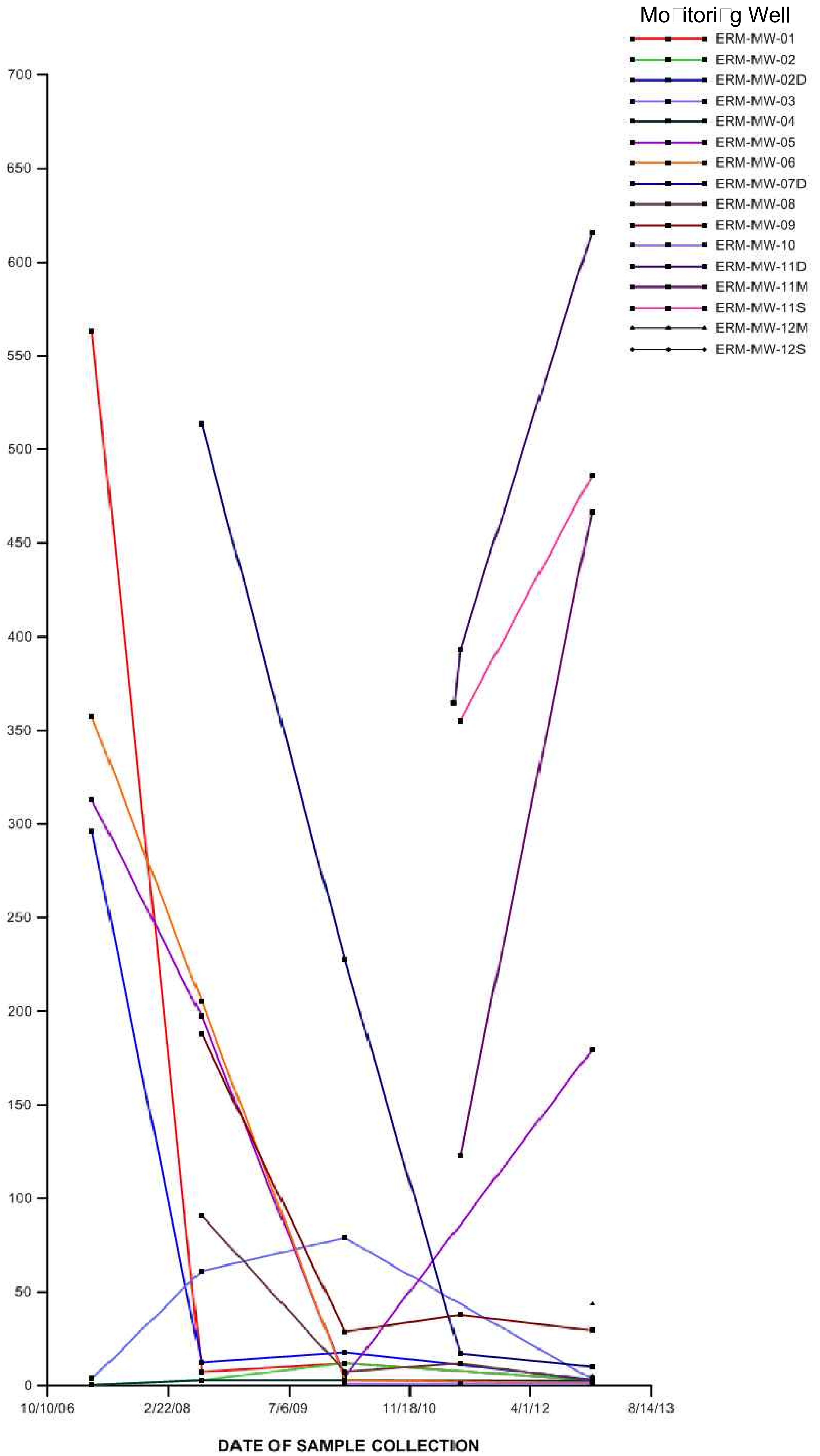
□ERTICAL PLUME CROSS SECTION MONITORING WELL DATA

PREPARED FOR
RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

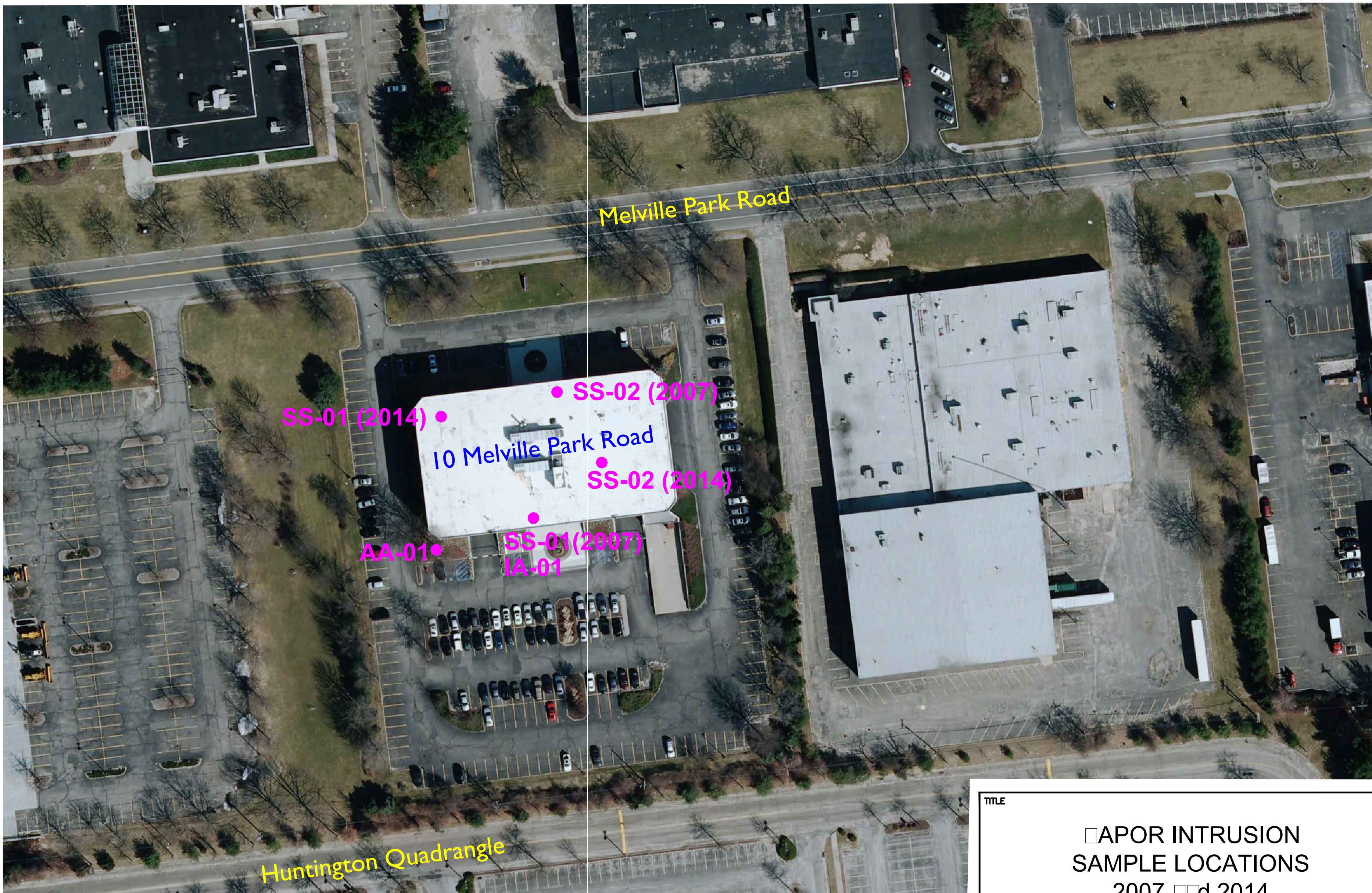
DRAWN BY	SCALE	DATE	JOB NO.	FIGURE
MC/MCW EMF	GRAPHIC	09/16/14	0025381	14□

R:\Scout\Projects\NY Twist Drill\CAD\2013 RI Report\CAD\2014-07-01 - NY Twist Drill - ertic l Plume Cross Sectio MW D v02.dwg (09/16/2014 - 11:18 - m Melville)



TITLE				
C□OC CONCENTRATION TRENDS				
PREPARED FOR: RESPONDANTS ORDER ON CONSENT NO. W1-0998-04-04				
ERM Environmental Resources Management				FIGURE 15
DRAWN BY: GKS/EMF	SCALE: GRAPHIC	DATE: 11/22/13	JOB NO.: 0025381	

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-05-03 - NY Twist Drill - Co ce tr tio Tre ds - v02.dwg (11/22/2013 - 3:28pm Melville)



0 120 240

GRAPHIC SCALE IN FEET

N

TITLE

VAPOR INTRUSION
SAMPLE LOCATIONS
2007 and 2014

PREPARED FOR

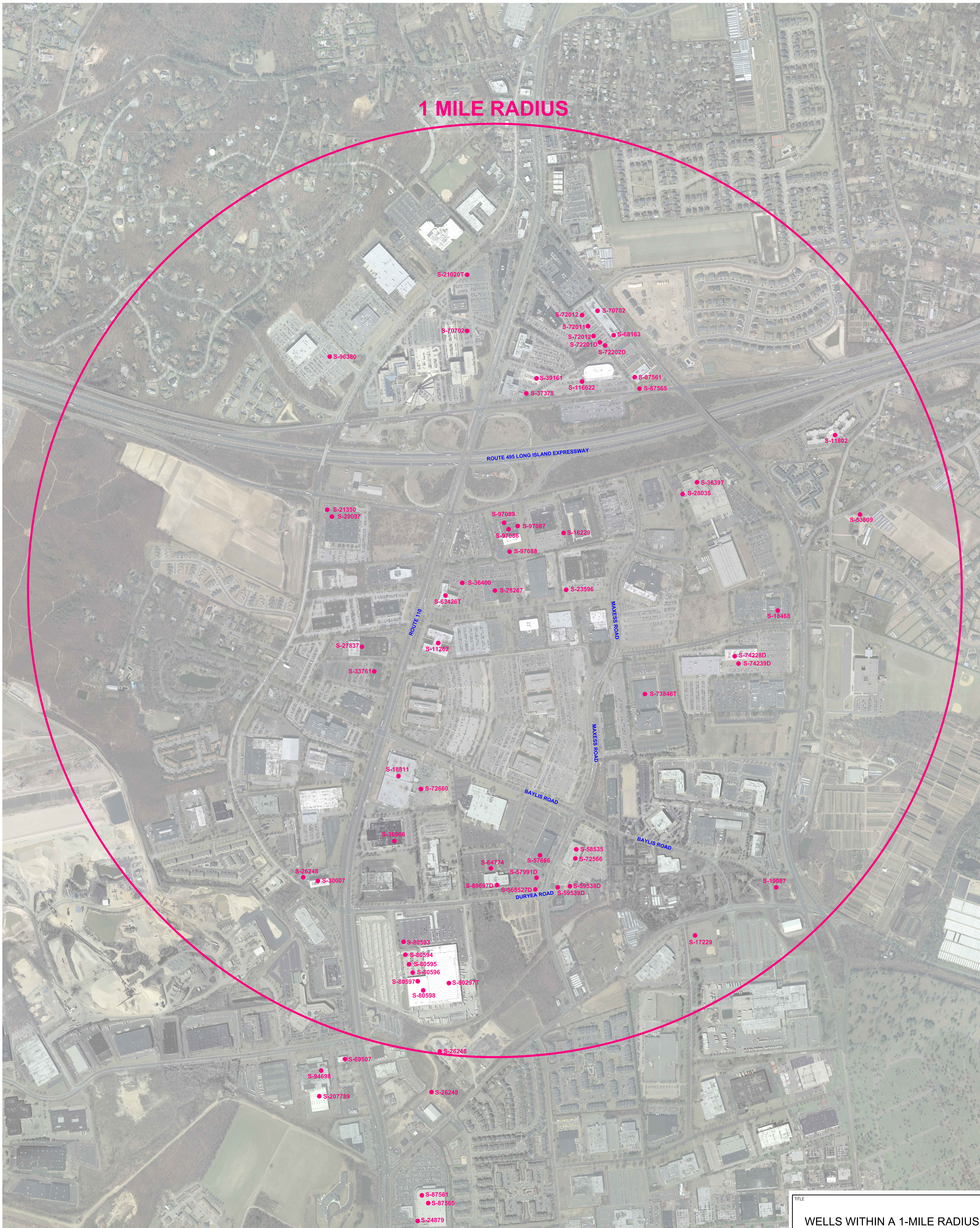
RESPONDENTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

FIGURE 16

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	GRAPHIC	07/09/14	025381

R:\Scout\Projects\NY Twist Drill\CAD\0025381 (NY Twist Drill)\CAD\2013-04-30 - NY Twist Drill - Soil Vapor Samples.dwg (07/18/2014 - 8:53am Melville)



0 4500' 9000'
GRAPHIC SCALE IN FEET

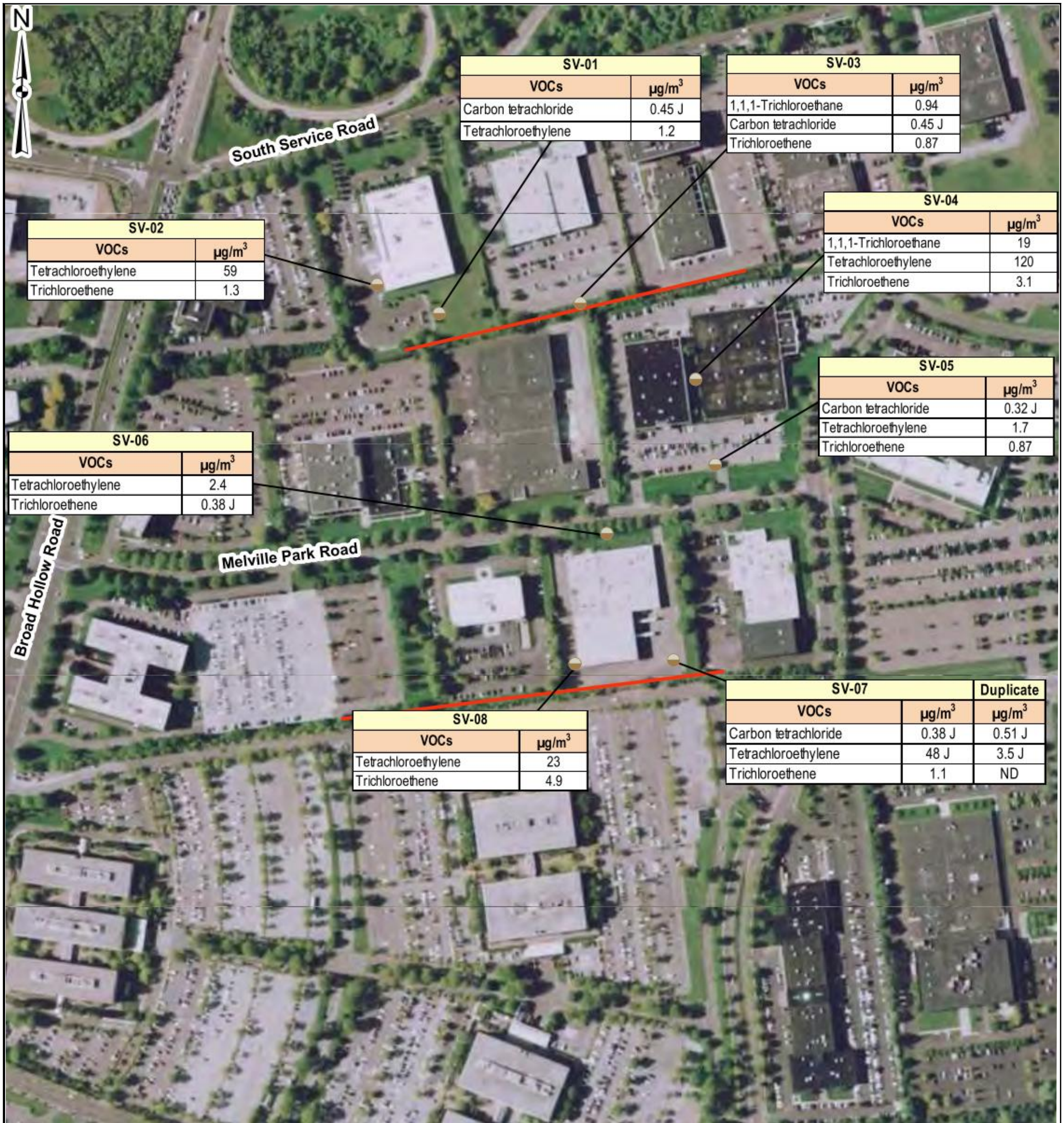
TITLE
WELLS WITHIN A 1-MILE RADIUS
OF NYTD

PREPARED FOR
RESPONDENTS ORDER ON CONCENT
NO. W1-0998-04-04

ERM Environmental Resources Management

DRAWN BY	SCALE	DATE	JOB NO.	FIGURE
GKS/EMF	GRAPHIC	11/22/13	0025381	17

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2010-04-14 - NY Twist Drill - 0025381-00-011 - 1 Mile Radius Well Search.dwg (11/22/2013 - 3:37pm Melville)



SV-01	
VOCs	µg/m³
Carbon tetrachloride	0.45 J
Tetrachloroethylene	1.2

SV-03	
VOCs	µg/m³
1,1,1-Trichloroethane	0.94
Carbon tetrachloride	0.45 J
Trichloroethene	0.87

SV-02	
VOCs	µg/m³
Tetrachloroethylene	59
Trichloroethene	1.3

SV-04	
VOCs	µg/m³
1,1,1-Trichloroethane	19
Tetrachloroethylene	120
Trichloroethene	3.1

SV-05	
VOCs	µg/m³
Carbon tetrachloride	0.32 J
Tetrachloroethylene	1.7
Trichloroethene	0.87

SV-06	
VOCs	µg/m³
Tetrachloroethylene	2.4
Trichloroethene	0.38 J

SV-07		Duplicate
VOCs	µg/m³	µg/m³
Carbon tetrachloride	0.38 J	0.51 J
Tetrachloroethylene	48 J	3.5 J
Trichloroethene	1.1	ND

SV-08	
VOCs	µg/m³
Tetrachloroethylene	23
Trichloroethene	4.9

Legend

- Soil Vapor Point
- Geophysical Survey Transect Completed by Aestus
- J Value is an estimate.
- ND Non-detect.
- µg/m³ Micrograms per cubic meter (parts per billion).

1 inch = 400 '

0 200 400 800 Feet

Source: EA, Project No. 14368.45, June 2012, File No. 1436845/GIS/ProjectsFigure6.MXD

TITLE

C□OC IN SOIL □APOR SAMPLES

PREPARED FOR

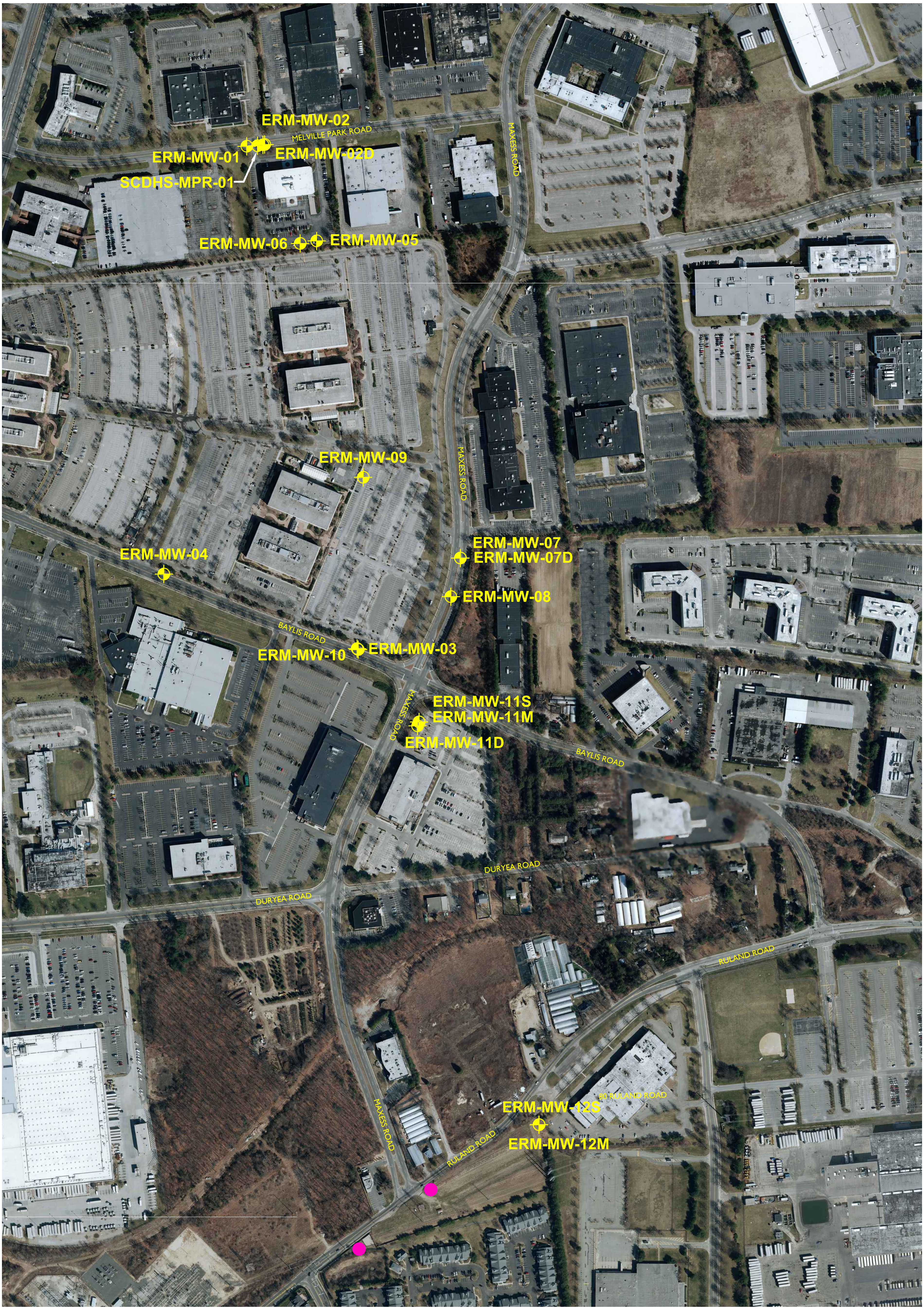
RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

FIGURE 18

DRAWN BY	SCALE	DATE	JOB NO.
EMF	AS SHOWN	/11/22/13	0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-04-15 - NY Twist Drill - C□lori□ted □OC i□S□ □ GW.dwg (11/22/2013 - 3:47pm Melville)



Legend

- Groundwater Monitoring Well Location
- Proposed New Groundwater Monitoring Well

N

0 400' 800'
GRAPHIC SCALE IN FEET

TITLE
PROPOSED NEW GROUNDWATER MONITORING WELL LOCATIONS

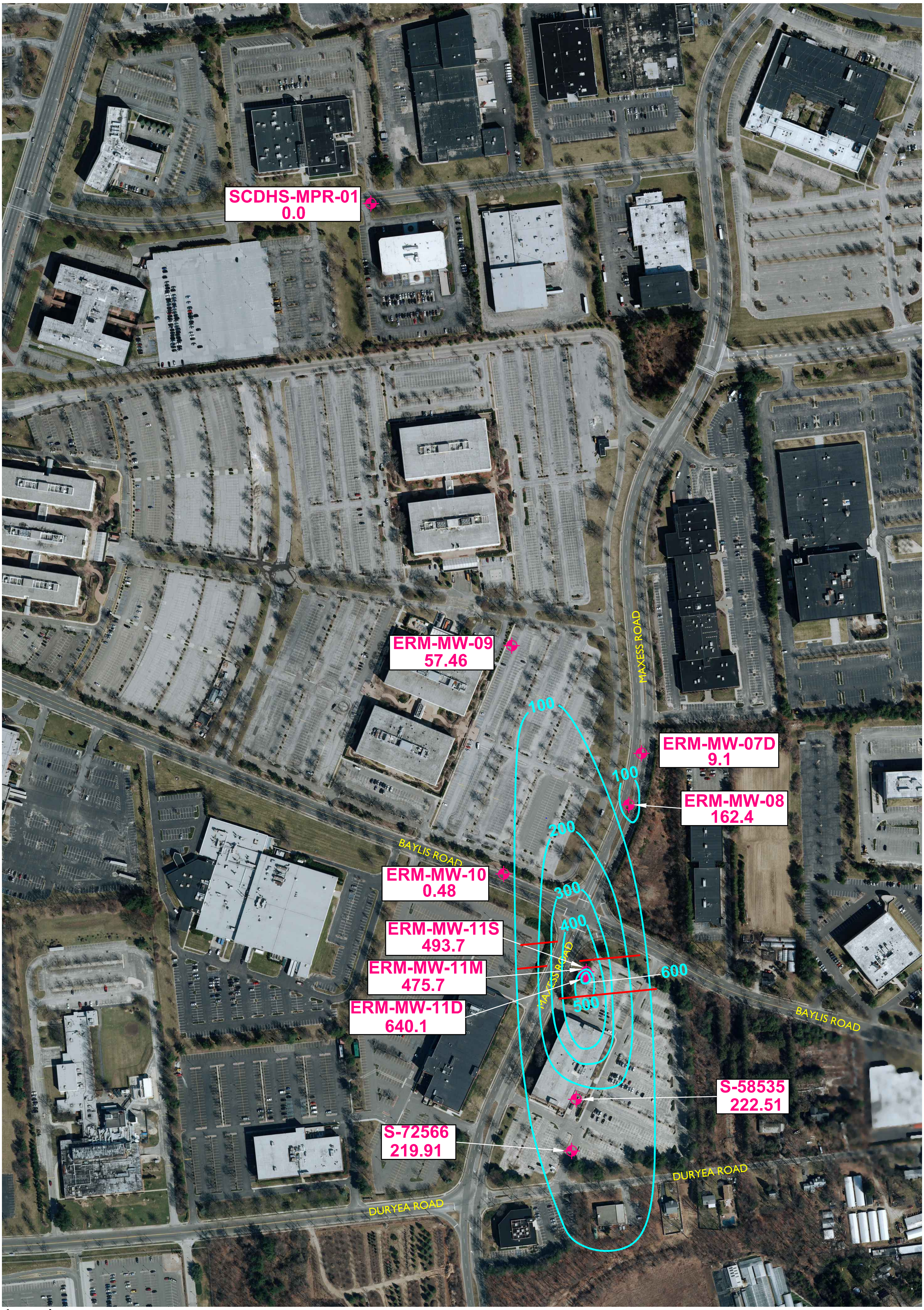
PREPARED FOR
RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

FIGURE
19

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	AS SHOWN	07/08/14	0025381

R:\Scout\Projects\NY Twist Drill\CAD\0025381 (NY Twist Drill)\CAD\2012-09-14 - NY Twist Drill - 0025381-00-006C.dwg (07/08/2014 - 4:13pm Melville)



Legend

Monitoring well location

162.4 Total VOC Concentration from Groundwater Sample Collected in 2012

Total VOC Concentraton Contour

ISCR Treatment Barrier

All data reporting is in micrograms per liter (ug/l).

0 300' 600'
GRAPHIC SCALE IN FEET

N

TITLE
ALTERNATI□E 3: FOCUSED ISCR vi□ ORGANIC SU□STRATE emulsio□ □MNA

PREPARED FOR
RESPONDANTS ORDER ON CONSENT
NO. W1-0998-04-04

ERM Environmental Resources Management

FIGURE
20

DRAWN BY	SCALE	DATE	JOB NO.
GKS/EMF	GRAPHIC	07/08/14	0025381

R:\ScoutProjects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-02-12 - NY Twist Drill 2012 C□emistr□D□t□ - v03.dwg (07/08/2014 - 4:19pm Melville)

Legend

Monitoring well location

162.4 Total VOC Concentration from Groundwater Sample Collected in 2012

Total VOC Concentraton Contour

ISCR Treatment Barrier

All data reporting is in micrograms per liter (ug/l).

0 300' 600'

GRAPHIC SCALE IN FEET

N

TITLE ALTERNATI□E 4: SITEWIDE ISCR vi□ ORGANIC SU□STRATE emulsio□ □ MNA			
PREPARED FOR RESPONDANTS ORDER ON CONSENT NO. W1-0998-04-04			
Environmental Resources Management			FIGURE 21
DRAWN BY GKS/EMF	SCALE GRAPHIC	DATE 07/08/14	JOB NO. 0025381

R:\Scout\Projects\NY Twist Drill\CAD\2013 - FS Report\CAD\2013-02-12 - NY Twist Drill 2012 C□emistr□ D□t□ - v03.dwg (07/08/2014 - 4:17pm Melville)

TABLES

TABLE 1
NEW TORK TWIST DRILL
OFF-SITE INVESTIGATION
Melville Park Road
Monitoring Well Elevation Data

Well	VP	MP	North	East	Lat	Long	Daimeter (inches)	Well Depth (feet-bgs)	Screen Interval (feet)	Screen Midpoint	DTW 11-21-2012	WT Elevation 11-21-2012
SCDHS-MPR-01		116.14	222588.4712	1145829.706	40.77615333	-73.41659983	2	60.6	50-60	55	46.7	69.44
ERM-MW-01	VP-01	116.21	222586.0558	1145783.468	40.77614755	-73.41676683	2	60.5	55.5-60.5	58	46.71	69.5
ERM-MW-02	VP-02	116.05	222593.8399	1145860.479	40.77616751	-73.41648859	2	95.5	90.5-95.5	93.2	46.64	69.41
ERM-MW-03		109.51	220430.397	1146260.783	40.77022223	-73.41509545	1	60	55-60	57.5	43.29	66.22
ERM-MW-04		111.21	220753.8975	1145428.618	40.77112534	-73.41809195	1	60	55-60	57.5	43.99	67.22
ERM-MW-02D	VP-02	115.96	222592.5035	1145852.984	40.77616397	-73.41651568	2	170.5	165.5-170.5	168	46.55	69.41
ERM-MW-05	VP-03	115.91	222180.746	1146083.202	40.77502962	-73.4156944	2	150	145-150	147.5	47.11	68.8
ERM-MW-06	VP-04	116.41	222169.9301	1146012.069	40.77500124	-73.41595148	2	100	95-100	97.5	47.6	68.81
ERM-MW-07	VP-05	109.15	220822.2631	1146698.196	40.77128974	-73.41350684	1	60	50-60	55	42.1	67.05
ERM-MW-07D	VP-05	109.03	220822.1554	1146698.503	40.77128944	-73.41350574	2	290	280-290	285	42.44	66.59
ERM-MW-08	VP-06	108.9	220656.916	1146657.895	40.77083666	-73.41365633	2	296	285-295	290	42.33	66.57
ERM-MW-09	VP-07	114.84	221168.045	1146282.009	40.77224644	-73.41500104	2	175	165-175	170	47.41	67.43
ERM-MW-10		109.94	220434.589	1146256.058	40.77023382	-73.41511241	2	235	225-235	230	43.52	66.42
ERM-MW-11S	VP-08	108.07	220120.474	1146521.346	40.76936681	-73.41416226	1	195	185-195	190	41.8	66.27
ERM-MW-11M	VP-08	108.06	220120.283	1146521.377	40.76936628	-73.41416215	2	245	235-245	240	41.98	66.08
ERM-MW-011D	VP-08	107.7	220103.525	1146515.079	40.7693204	-73.41418529	2	295	285-295	290	41.66	66.04
ERM-MW-012S	VP-09	103.84	218395.073	1147035.444	40.76462168	-73.41234809	1	100	90-100	95	39.9	63.94
ERM-MW-012M		103.81	218395.041	1147035.206	40.7646216	-73.41234895	2	238	228-238	233	40.1	63.71

NOTES

Horizontal Datum NAD83

Vertical Datum NAVD88

TABLE 2

NEW YORK TWIST DRILL

CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:

SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-01 02/28/2006 48.42	VP-01 03/01/2006 57.25	VP-01 03/01/2006 67.25	VP-01 03/01/2006 77.25	VP-01 03/01/2006 87.25
Tetrachloroethene	(ug/l)	5	[31.1]	[2704] E	[200.5] E	5 U	5 U
Trichloroethene	(ug/l)	5	5 U	[68]	5 U	5 U	5 U
cis-1,2-Dichloroethene	(ug/l)	5	5 U	[46]	5 U	5 U	5 U
trans-1,2-Dichloroethene	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
Vinyl chloride	(ug/l)	2	5 U	5 U	5 U	5 U	5 U
1,1,1-Trichloroethane	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
Methyl Tertiary Butyl Ether	(ug/l)	10	5 U	5 U	5 U	5 U	5 U
Freon 113	(ug/l)	5					

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-01 03/01/2006 97.25	VP-01 03/01/2006 107.25	VP-01 03/02/2006 117.25	VP-01 03/02/2006 127.25	VP-01 03/02/2006 137.25
Tetrachloroethene	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
Trichloroethene	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
cis-1,2-Dichloroethene	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
trans-1,2-Dichloroethene	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
Vinyl chloride	(ug/l)	2	5 U	5 U	5 U	5 U	5 U
1,1,1-Trichloroethane	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
Methyl Tertiary Butyl Ether	(ug/l)	10	5 U	5 U	9.1	[33]	[26]
Freon 113	(ug/l)	5					

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2

NEW YORK TWIST DRILL

CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:

SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-01 03/02/2006 147.25	VP-02 03/08/2006 47.45	VP-02 03/08/2006 57.45	VP-02 03/08/2006 67.45	VP-02 03/08/2006 77.45
Tetrachloroethene	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
Trichloroethene	(ug/l)	5	5 U	5 U	5 U	5 U	[8.1]
cis-1,2-Dichloroethene	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
trans-1,2-Dichloroethene	(ug/l)	5	5 U	5 U	[26.2]	[16.9]	5 U
Vinyl chloride	(ug/l)	2	5 U	5 U	5 U	5 U	5 U
1,1,1-Trichloroethane	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
Methyl Tertiary Butyl Ether	(ug/l)	10	[28.3]	5 U	5 U	5 U	5 U
Freon 113	(ug/l)	5					

U - Not Detected

J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-02 03/08/2006 87.45	VP-02 03/08/2006 97.45	VP-02 03/08/2006 107.45	VP-02 03/08/2006 117.45	VP-02 03/09/2006 127.45
Tetrachloroethene	(ug/l)	5	[139.4] E	[11.1]	5 U	[5.2]	[31.7]
Trichloroethene	(ug/l)	5	[32.7]	5 U	5 U	5 U	5 U
cis-1,2-Dichloroethene	(ug/l)	5	[24.4]	[27.6]	[58.6]	[72.8]	[106.4]
trans-1,2-Dichloroethene	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
Vinyl chloride	(ug/l)	2	[6.6]	5 U	5 U	5 U	5 U
1,1,1-Trichloroethane	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
Methyl Tertiary Butyl Ether	(ug/l)	10	5 U	5 U	5 U	5 U	5 U
Freon 113	(ug/l)	5					

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2

NEW YORK TWIST DRILL

CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:

SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-02 03/09/2006 137.45	VP-02 03/09/2006 147.45	VP-02 03/14/2006 157.50	VP-02 03/14/2006 167.50	VP-02 03/14/2006 178.90
Tetrachloroethene	(ug/l)	5	[38.1]	5 U	5 U	5 U	5 U
Trichloroethene	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
cis-1,2-Dichloroethene	(ug/l)	5	[76.4]	[148.4]	[28.1]	[353]	5 U
trans-1,2-Dichloroethene	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
Vinyl chloride	(ug/l)	2	5 U	5 U	5 U	5 U	5 U
1,1,1-Trichloroethane	(ug/l)	5	5 U	5 U	5 U	5 U	5 U
Methyl Tertiary Butyl Ether	(ug/l)	10	7.1	9.9	[12.6]	8.1	5 U
Freon 113	(ug/l)	5					

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-03 02/20/2007 47.40	VP-03 02/20/2007 57.40	VP-03 02/20/2007 67.40	VP-03 02/20/2007 77.40	VP-03 02/20/2007 87.40
Tetrachloroethene	(ug/l)	5	1.49	2.33	[5.39]	1.71	[22.3]
Trichloroethene	(ug/l)	5	0.09 U	0.09 U	1.14	0.09 U	2.83
cis-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	4.5	0.94	2.5
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2

NEW YORK TWIST DRILL

CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:

SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-03 02/21/2007 97.40	VP-03 02/21/2007 107.40	VP-03 02/21/2007 117.40	VP-03 02/21/2007 127.40	VP-03 02/21/2007 137.40
Tetrachloroethene	(ug/l)	5	[15.8]	[29.9]	[25.5]	[29.9]	[7.67]
Trichloroethene	(ug/l)	5	2.59	3.26	2.56	3.26	1.83
cis-1,2-Dichloroethene	(ug/l)	5	3.68	3.19	2.7	3.19	[20.7]
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected

J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-03 02/21/2007 147.40	VP-03 02/21/2007 157.40	VP-03 02/22/2007 165.05	VP-04 03/05/2007 47.45	VP-04 03/05/2007 57.45
Tetrachloroethene	(ug/l)	5	4.21	2.1	2.68	[5.9]	2.96
Trichloroethene	(ug/l)	5	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
cis-1,2-Dichloroethene	(ug/l)	5	[344]	[7.42]	0.96	1.57	1.94
trans-1,2-Dichloroethene	(ug/l)	5	3.73	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2

NEW YORK TWIST DRILL

CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:

SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-04 03/05/2007 67.45	VP-04 03/05/2007 77.45	VP-04 03/06/2007 87.45	VP-04 03/06/2007 97.45	VP-04 03/06/2007 107.45
Tetrachloroethene	(ug/l)	5	[71.2]	[92.4]	[143]	[945]	[687]
Trichloroethene	(ug/l)	5	[15.4]	[15.4]	[44.9]	[467]	[423]
cis-1,2-Dichloroethene	(ug/l)	5	[72.2]	[120]	[315]	[268]	[139]
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	1.28	3.01	3.52	2.62
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	1.07	0.92	2.36	[15]	[12.4]
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2

NEW YORK TWIST DRILL

CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:

SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-04 03/06/2007 117.45	VP-04 03/07/2007 127.45	VP-04 03/07/2007 137.45	VP-04 03/07/2007 147.45	VP-04 03/08/2007 162.00
Tetrachloroethene	(ug/l)	5	[105]	[12.3]	[27.3]	[28.4]	0.14 U
Trichloroethene	(ug/l)	5	[45]	1.33	1.92	1.66	0.09 U
cis-1,2-Dichloroethene	(ug/l)	5	[166]	[9.21]	[21.8]	[17]	1.8 U
trans-1,2-Dichloroethene	(ug/l)	5	1.53	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	1.16	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2

NEW YORK TWIST DRILL

CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:

SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-04 03/08/2007 172.00	VP-04 03/09/2007 185.94	VP-04 03/09/2007 194.65	VP-05 03/20/2007 42.60	VP-05 03/21/2007 52.60
Tetrachloroethene	(ug/l)	5	3.99	3.03	1.16	0.14 U	0.14 U
Trichloroethene	(ug/l)	5	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
cis-1,2-Dichloroethene	(ug/l)	5	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected

J - Estimated Value

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-05 03/21/2007 62.60	VP-05 03/21/2007 72.60	VP-05 03/21/2007 82.60	VP-05 03/21/2007 95.75	VP-05 03/22/2007 116.50
Tetrachloroethene	(ug/l)	5	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
Trichloroethene	(ug/l)	5	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
cis-1,2-Dichloroethene	(ug/l)	5	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-05 03/23/2007 127.60	VP-05 03/26/2007 152.25	VP-05 03/27/2007 166.05	VP-05 03/27/2007 174.15	VP-05 03/27/2007 192.00
Tetrachloroethene	(ug/l)	5	0.14 U	0.14 U	0.14 U	3.19	0.14 U
Trichloroethene	(ug/l)	5	[5.73]	[7.47]	1.69	[28.6]	0.09 U
cis-1,2-Dichloroethene	(ug/l)	5	1.8 U	1.8 U	1.8 U	2.82	0.95
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2

NEW YORK TWIST DRILL

CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:

SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-05 03/28/2007 201.40	VP-05 03/28/2007 212.00	VP-05 03/29/2007 221.30	VP-05 03/29/2007 232.00	VP-05 03/29/2007 242.00
Tetrachloroethene	(ug/l)	5	0.14 U	[6.19]	2.78	[8.88]	[11.8]
Trichloroethene	(ug/l)	5	0.09 U	3.65	[12.8]	[15.5]	[164]
cis-1,2-Dichloroethene	(ug/l)	5	1.8 U	3.17	1.19	3.05	3
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected

J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-05 03/30/2007 251.62	VP-05 04/02/2007 262.45	VP-05 04/02/2007 272.45	VP-05 04/03/2007 280.75	VP-05 04/03/2007 291.95
Tetrachloroethene	(ug/l)	5	[5.13]	[16.7]	[46.3]	[255]	[96]
Trichloroethene	(ug/l)	5	[71.4]	[138]	[409]	[485]	[485]
cis-1,2-Dichloroethene	(ug/l)	5	2.17	[6.12]	[8.58]	[81]	[28]
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.85	2.07	[6.57]	2.92
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	1.36	[5.66]	[7.33]	[10.1]

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-05 04/04/2007 302.15	VP-05 04/04/2007 309.95	VP-05 04/04/2007 319.45	VP-05 04/06/2007 341.50	VP-05 04/09/2007 351.63
Tetrachloroethene	(ug/l)	5	[111]	[174]	[141]	0.14 U	[8.82]
Trichloroethene	(ug/l)	5	[47.1]	[170]	[300]	1.57	2.24
cis-1,2-Dichloroethene	(ug/l)	5	[66.6]	[56.5]	[21.7]	1.34	4.13
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.8	1.18	1.74	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	[5.29]	[12.1]	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-05 04/09/2007 359.77	VP-06 04/26/2007 53.55	VP-06 04/26/2007 63.55	VP-06 04/26/2007 73.55	VP-06 04/26/2007 43.55
Tetrachloroethene	(ug/l)	5	0.98	0.14 U	0.14 U	0.14 U	0.14 U
Trichloroethene	(ug/l)	5	[5.83]	0.09 U	0.09 U	0.09 U	0.09 U
cis-1,2-Dichloroethene	(ug/l)	5	1.8 U	0.18 U	0.18 U	0.18 U	0.18 U
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-06 04/30/2007 101.85	VP-06 04/30/2007 110.15	VP-06 05/01/2007 134.50	VP-06 05/02/2007 145.10	VP-06 05/02/2007 153.50
Tetrachloroethene	(ug/l)	5	0.14 U	0.14 U	0.14 U	0.96	[12.9]
Trichloroethene	(ug/l)	5	2.41	0.87	0.09 U	1.22	[16.8]
cis-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-06 05/07/2007 220.25	VP-06 05/07/2007 230.15	VP-06 05/07/2007 239.75	VP-06 05/08/2007 247.45	VP-06 05/08/2007 255.65
Tetrachloroethene	(ug/l)	5	[29.6]	3.63	[21.9]	[54.4]	[175]
Trichloroethene	(ug/l)	5	[14.4]	3.26	[34.6]	[42.6]	[113]
cis-1,2-Dichloroethene	(ug/l)	5	[14]	4.78	[7.44]	[17.2]	[139]
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	1.91
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	2.72	0.72	1.09	1.58	[12.3]
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-06 05/08/2007 264.65	VP-06 05/09/2007 272.25	VP-06 05/09/2007 281.80	VP-06 05/10/2007 292.85	VP-06 05/14/2007 312.25
Tetrachloroethene	(ug/l)	5	[105]	[84.2]	[182]	[162]	[18.8]
Trichloroethene	(ug/l)	5	[37]	[197]	[73.4]	[156]	[12.7]
cis-1,2-Dichloroethene	(ug/l)	5	[34]	[19.1]	[92.7]	[40]	[25.8]
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	2.28	2.07	[9.29]	0.92	1.02
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-06 05/14/2007 320.30	VP-06 05/15/2007 333.05	VP-06 05/16/2007 345.00	VP-06 05/16/2007 355.20	VP-06 05/17/2007 364.60
Tetrachloroethene	(ug/l)	5	[33]	0.14 U	[16.4]	[8.26]	4.56
Trichloroethene	(ug/l)	5	[16.9]	0.09 U	[9.28]	[9.55]	3.32
cis-1,2-Dichloroethene	(ug/l)	5	[12.5]	0.18 U	[12.8]	[8.16]	4.69
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	2.57	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-06 05/17/2007 371.20	VP-07 05/16/2008 50.00	VP-07 05/16/2008 60.00	VP-07 05/16/2008 70.00	VP-07 05/19/2008 80.00
Tetrachloroethene	(ug/l)	5	0.14 U	[214]	[114]	[148]	[5.58]
Trichloroethene	(ug/l)	5	0.09 U	[16.6]	[11.9]	[24.5]	0.09 U
cis-1,2-Dichloroethene	(ug/l)	5	0.18 U	[73.4]	[50.6]	[57.9]	0.83
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	1.09	0.66	0.9	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-07 05/19/2008 90.00	VP-07 05/19/2008 100.00	VP-07 05/20/2008 110.00	VP-07 05/20/2008 119.00	VP-07 05/20/2008 130.00
Tetrachloroethene	(ug/l)	5	1.29	2.01	[8.25]	[12.4]	[49.4]
Trichloroethene	(ug/l)	5	0.09 U	0.09 U	1.73	3.99	3.47
cis-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	[5.71]	[6.99]	[5.71]
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-07 05/20/2008 143.00	VP-07 05/21/2008 158.00	VP-07 05/21/2008 167.00	VP-07 05/21/2008 177.00	VP-07 05/21/2008 186.00
Tetrachloroethene	(ug/l)	5	[140]	[150]	[905]	[701]	[602]
Trichloroethene	(ug/l)	5	[43.2]	[69.8]	[285]	[167]	[196]
cis-1,2-Dichloroethene	(ug/l)	5	[27.5]	[47.7]	[136]	[130]	[158]
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	1	2.58	1.61	2.17
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	2.08	2.35	0.07 U	1.82	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2

NEW YORK TWIST DRILL

CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:

SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-07 05/23/2008 212.00	VP-07 05/23/2008 221.00	VP-07 05/23/2008 229.00	VP-07 05/27/2008 238.00	VP-07 05/27/2008 247.00
Tetrachloroethene	(ug/l)	5	[502]	[148]	[163]	[109]	[140]
Trichloroethene	(ug/l)	5	[188]	[71]	[102]	[8]	[19.3]
cis-1,2-Dichloroethene	(ug/l)	5	[96.8]	[31]	[37]	[10.1]	[17]
trans-1,2-Dichloroethene	(ug/l)	5	1.62	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	3.86	4.28	[7.37]	0.07 U	1.09
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-07 05/27/2008 258.00	VP-07 05/27/2008 269.00	VP-07 05/28/2008 279.00	VP-07 05/28/2008 289.00	VP-07 05/29/2008 301.00
Tetrachloroethene	(ug/l)	5	[38.2]	[29.7]	[18.6]	[24.1]	[71.8]
Trichloroethene	(ug/l)	5	[11.6]	[15.7]	[8.42]	[7.04]	[7.52]
cis-1,2-Dichloroethene	(ug/l)	5	[9.06]	[8.79]	[7.22]	[9.33]	[35.1]
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.74	0.07 U	0.07 U	0.07 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-07 05/29/2008 313.00	VP-07 05/30/2008 323.00	VP-07 05/30/2008 333.00	VP-07 06/02/2008 349.00	VP-08 08/11/2010 49.45
Tetrachloroethene	(ug/l)	5	[42.4]	[59.6]	[10.1]	[24.1]	1.0 U
Trichloroethene	(ug/l)	5	[13.9]	[17.9]	4.82	[6.19]	1.0 U
cis-1,2-Dichloroethene	(ug/l)	5	[24.7]	[17.8]	2.88	[7.71]	1.0 U
trans-1,2-Dichloroethene	(ug/l)	5	0.18 U	0.18 U	0.18 U	0.18 U	1.0 U
Vinyl chloride	(ug/l)	2	0.39 U	0.39 U	0.39 U	0.39 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	0.07 U	0.07 U	0.07 U	0.07 U	1.0 U
Methyl Tertiary Butyl Ether	(ug/l)	10	0.45 U	0.45 U	0.45 U	0.45 U	1.0 U
Freon 113	(ug/l)	5	0.17 U	0.17 U	0.17 U	0.17 U	5.0 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2

NEW YORK TWIST DRILL

CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:

SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-08 08/11/2010 59.50	VP-08 08/11/2010 69.60	VP-08 08/11/2010 79.55	VP-08 08/12/2010 94.75	VP-08 08/12/2010 99.75
Tetrachloroethene	(ug/l)	5	1.0 U	1.0 U	0.63 J	0.48 J	0.41 J
Trichloroethene	(ug/l)	5	1.0 U	1.0 U	0.66 J	1.0 U	1.0 U
cis-1,2-Dichloroethene	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	(ug/l)	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

U - Not Detected
J - Estimated Value

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-08 08/12/2010 109.75	VP-08 08/12/2010 119.75	VP-08 08/12/2010 129.80	VP-08 08/12/2010 139.80	VP-08 08/13/2010 154.65
Tetrachloroethene	(ug/l)	5	0.41 J	1.6	1.3	0.98 J	[32.1]
Trichloroethene	(ug/l)	5	0.50 J	[6.1]	[5.1]	[5.7]	[22.3]
cis-1,2-Dichloroethene	(ug/l)	5	1.0 U	0.49 J	0.36 J	1.0 U	[5.7]
trans-1,2-Dichloroethene	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	2.4
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	0.43 J	0.40 J	1.0 U
Freon 113	(ug/l)	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-08 08/13/2010 159.70	VP-08 08/13/2010 169.80	VP-08 08/13/2010 179.70	VP-08 08/16/2010 189.60	VP-08 08/16/2010 199.60
Tetrachloroethene	(ug/l)	5	[19.1]	[18.2]	[240]	[754]	[93.4]
Trichloroethene	(ug/l)	5	[6.6]	[5.2]	[118]	[170]	[22.7]
cis-1,2-Dichloroethene	(ug/l)	5	[5.7]	4.1	[100]	[133]	[11.7]
trans-1,2-Dichloroethene	(ug/l)	5	1.0 U	1.0 U	2.0	2.4	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	0.55 J	1.0 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	0.69 J	0.35 J	[7.7]	[10.3]	1.1
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	(ug/l)	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-08 08/16/2010 211.60	VP-08 08/16/2010 219.60	VP-08 08/16/2010 233.20	VP-08 08/16/2010 239.60	VP-08 08/17/2010 249.60
Tetrachloroethene	(ug/l)	5	[335]	[28.7]	[17.2]	[771]	[211]
Trichloroethene	(ug/l)	5	[36.8]	3.7	2.9	[239]	[156]
cis-1,2-Dichloroethene	(ug/l)	5	[20.7]	1.1	1.2	[143]	[182]
trans-1,2-Dichloroethene	(ug/l)	5	1.0 U	1.0 U	1.0 U	2.0	2.7
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U	0.58 J
1,1,1-Trichloroethane	(ug/l)	5	3.6	1.0 U	1.0 U	[12.6]	[15.9]
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	(ug/l)	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-08 08/17/2010 259.55	VP-08 08/17/2010 269.55	VP-08 08/18/2010 279.60	VP-08 08/18/2010 288.45	VP-08 08/19/2010 299.55
Tetrachloroethene	(ug/l)	5	[262]	[255]	[353]	[639]	[498]
Trichloroethene	(ug/l)	5	[178]	[101]	[195]	[317]	[156]
cis-1,2-Dichloroethene	(ug/l)	5	[172]	[95.2]	[208]	[240]	[78.8]
trans-1,2-Dichloroethene	(ug/l)	5	3.0	1.6	4.5	5.0	2.5 U
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U
1,1,1-Trichloroethane	(ug/l)	5	[18.3]	[11.0]	[18.6]	[40.0]	2.5 U
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U
Freon 113	(ug/l)	5	5.0 U	5.0 U	5.0 U	5.0 U	2.4 J

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-08 08/19/2010 310.65	VP-08 08/19/2010 319.60	VP-08 08/20/2010 329.65	VP-08 08/20/2010 339.65	VP-08 08/20/2010 349.55
Tetrachloroethene	(ug/l)	5	[126]	[252]	[108]	[7.5]	[27.7]
Trichloroethene	(ug/l)	5	[35.5]	[68.8]	[27.6]	[5.8]	[18.6]
cis-1,2-Dichloroethene	(ug/l)	5	[38.6]	[30.3]	[17.3]	1.4	[9.4]
trans-1,2-Dichloroethene	(ug/l)	5	1.0 U	0.42 J	1.0 U	1.0 U	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	3.0	[8.9]	3.3	1.0 U	1.0 U
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	(ug/l)	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-09 10/08/2012 78.00	VP-09 10/08/2012 88.00	VP-09 10/09/2012 98.00	VP-09 10/09/2012 108.00	VP-09 10/09/2012 118.00
Tetrachloroethene	(ug/l)	5	4.0	[7.3]	[19]	[14]	[18]
Trichloroethene	(ug/l)	5	1.6	3.4	[7.7]	[5.6]	[6.6]
cis-1,2-Dichloroethene	(ug/l)	5	0.83 J	2.4	4.9	3.9	4.4
trans-1,2-Dichloroethene	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	1.0 U	0.29 J	0.89 J	0.54 J	0.72 J
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2

NEW YORK TWIST DRILL

CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:

SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-09 10/09/2012 128.00	VP-09 10/10/2012 138.00	VP-09 10/10/2012 148.00	VP-09 10/10/2012 158.00	VP-09 10/10/2012 168.00
Tetrachloroethene	(ug/l)	5	[8.0]	[8.8]	2.2	1.9	[18]
Trichloroethene	(ug/l)	5	3.5	4.6	1.4	1.1	[9.8]
cis-1,2-Dichloroethene	(ug/l)	5	0.89 J	0.98 J	1.0 U	0.36 J	4.2
trans-1,2-Dichloroethene	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	0.48 J	0.54 J	0.10 J	0.12 J	1.0
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	0.23 J	1.0 U	1.0 U
Freon 113	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-09 10/11/2012 178.00	VP-09 10/11/2012 188.00	VP-09 10/11/2012 198.00	VP-09 10/11/2012 208.00	VP-09 10/12/2012 218.00
Tetrachloroethene	(ug/l)	5	[21]	[48]	2.3	[80]	[16]
Trichloroethene	(ug/l)	5	[11]	[20]	1.2	[30]	[7.9]
cis-1,2-Dichloroethene	(ug/l)	5	1.4	4.9	0.44 J	[6.6]	1.4
trans-1,2-Dichloroethene	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	1.1	2.9	1.0 U	3.8	0.86 J
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	1.0 U	1.0 U	0.14 J
Freon 113	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	0.087 J

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	VP-09 10/12/2012 228.00	VP-09 10/12/2012 238.00	VP-09 10/12/2012 248.00	VP-09 10/15/2012 258.00	VP-09 10/15/2012 268.00
Tetrachloroethene	(ug/l)	5	[150]	[180]	[5.1]	[31]	[19]
Trichloroethene	(ug/l)	5	[77]	[94]	3.3	[15]	[14]
cis-1,2-Dichloroethene	(ug/l)	5	[10]	[12]	0.52 J	2.4	1.7
trans-1,2-Dichloroethene	(ug/l)	5	0.20 J	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	[19]	[27]	0.85 J	1.9	1.9
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	(ug/l)	5	1.0 U	0.27 J	1.0 U	1.0 U	1.0 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-09 10/15/2012 278.00	VP-09 10/15/2012 288.00	VP-09 10/16/2012 298.00	VP-09 10/16/2012 308.00	VP-09 10/16/2012 318.00
Tetrachloroethene	(ug/l)	5	[14]	[6.4]	3.6	[19]	1.0 U
Trichloroethene	(ug/l)	5	[6.7]	[8.1]	[9.5]	[120]	[15]
cis-1,2-Dichloroethene	(ug/l)	5	1.0	1.4	1.7	[11]	4.0
trans-1,2-Dichloroethene	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	0.81 J	0.24 J	0.12 J	0.91 J	3.9
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	(ug/l)	5	1.0 U	1.0 U	1.0 U	2.9	1.0 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-09 10/16/2012 328.00	VP-09 10/17/2012 338.00	VP-09 10/17/2012 358.00	VP-09 10/17/2012 368.00	VP-09 10/18/2012 378.00
Tetrachloroethene	(ug/l)	5	[110]	[7.5]	[11]	[11]	[37]
Trichloroethene	(ug/l)	5	[110]	[32]	[35]	[40]	[290]
cis-1,2-Dichloroethene	(ug/l)	5	[15]	4.8	5.0	[5.8]	[25]
trans-1,2-Dichloroethene	(ug/l)	5	0.26 J	1.0 U	1.0 U	1.0 U	0.26 J
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	[19]	0.79 J	0.55 J	0.68 J	1.8
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	0.18 J	1.0 U	1.0 U
Freon 113	(ug/l)	5	1.0 U	0.51 J	0.92 J	1.2	[7.5]

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-09 10/18/2012 388.00	VP-09 10/18/2012 398.00	VP-09 10/24/2012 408.00	VP-09 10/24/2012 418.00	VP-09 10/24/2012 428.00
Tetrachloroethene	(ug/l)	5	[43]	[79]	[31]	[6.6]	0.52 J
Trichloroethene	(ug/l)	5	[320]	[360]	[740]	[110]	[10]
cis-1,2-Dichloroethene	(ug/l)	5	[26]	[23]	[23]	3.8	0.34 J
trans-1,2-Dichloroethene	(ug/l)	5	0.26 J	0.21 J	0.48 J	1.0 U	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U	0.16 J	0.53 J	1.0 U	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	2.0	4.5	[5.9]	0.83 J	1.0 U
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U
Freon 113	(ug/l)	5	[8.4]	[8.6]	[6.4]	0.88 J	1.0 U

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 2
NEW YORK TWIST DRILL
CVOC DISTRIBUTION IN VERTICAL PROFILE BORINGS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	VP-09 / 10/24/2012 / 438.00
Tetrachloroethene	(ug/l)	5	1.0 U
Trichloroethene	(ug/l)	5	1.9
cis-1,2-Dichloroethene	(ug/l)	5	1.0 U
trans-1,2-Dichloroethene	(ug/l)	5	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U
1,1,1-Trichloroethane	(ug/l)	5	1.0 U
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U
Freon 113	(ug/l)	5	1.0 U

U - Not Detected
J - Estimated Value

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-01 4/13/2007 55.5-60.5-ft bgs	ERM-MW-01 7/8/2008 55.5-60.5-ft bgs	ERM-MW-01 12/10/2012 55.5-60.5-ft bgs	ERM-MW-02 4/13/2007 90.5-95.5-ft bgs	ERM-MW-02 7/8/2008 90.5-95.5-ft bgs
1,1,1,2-Tetrachloroethane	(ug/l)	5					
1,1,1-Trichloroethane	(ug/l)	5					2
1,1,2,2-Tetrachloroethane	(ug/l)	5					
1,1,2-Trichloroethane	(ug/l)	1					
1,1-Dichloroethane	(ug/l)	5	1.37				[39.3]
1,1-Dichloroethene	(ug/l)	5					
1,1-Dichloropropene	(ug/l)	5					
1,2,3-Trichlorobenzene	(ug/l)	5					
1,2,3-Trichloropropane	(ug/l)	5					
1,2,4-Trichlorobenzene	(ug/l)	5					
1,2,4-Trimethylbenzene	(ug/l)	5					
1,2-Dibromo-3-chloropropane	(ug/l)	0.04					
1,2-Dibromoethane	(ug/l)	0.0006					
1,2-Dichlorobenzene	(ug/l)	3					
1,2-Dichloroethane	(ug/l)	0.6					
1,2-Dichloropropane	(ug/l)	1					
1,3,5-Trimethylbenzene	(ug/l)	5					
1,3-Dichlorobenzene	(ug/l)	3					
1,3-Dichloropropane	(ug/l)	5					
1,4-Dichlorobenzene	(ug/l)	3					
1,4-Dioxane	(ug/l)						
2-Butanone	(ug/l)	50		8.3 J			28.3
2-Chlorotoluene	(ug/l)	5					
2-Hexanone	(ug/l)	50					
2-Nitropropane	(ug/l)						
3-Chloropropene	(ug/l)						
4-Chlorotoluene	(ug/l)	5					
4-Methyl-2-Pentanone	(ug/l)						
Acetone	(ug/l)	50		48	13.1		[52.2]
Acrylonitrile	(ug/l)	5					

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-01 4/13/2007 55.5-60.5-ft bgs	ERM-MW-01 7/8/2008 55.5-60.5-ft bgs	ERM-MW-01 12/10/2012 55.5-60.5-ft bgs	ERM-MW-02 4/13/2007 90.5-95.5-ft bgs	ERM-MW-02 7/8/2008 90.5-95.5-ft bgs
Benzene	(ug/l)	1			[4.1]		
Bromobenzene	(ug/l)	5					
Bromochloromethane	(ug/l)	5					
Bromodichloromethane	(ug/l)	50					
Bromoform	(ug/l)	50					
Bromomethane	(ug/l)	5					
Carbon Disulfide	(ug/l)	60					
Carbon Tetrachloride	(ug/l)	5					
Chlorobenzene	(ug/l)	5					
Chlorodifluoromethane	(ug/l)	5					
Chloroethane	(ug/l)	5					[6.7]
Chloroform	(ug/l)	7					
Chloromethane	(ug/l)	5					
Chloroprene	(ug/l)						
cis-1,2-Dichloroethene	(ug/l)	5	[499]	1.7			
cis-1,3-Dichloropropene	(ug/l)	0.4					
Cyclohexane	(ug/l)				0.53 J		
Dibromochloromethane	(ug/l)	50					
Dibromomethane	(ug/l)	5					
Dichlorodifluoromethane	(ug/l)	5					
Diethyl ether	(ug/l)						
Ethanol	(ug/l)						
Ethylbenzene	(ug/l)	5					0.64 J
Freon 113	(ug/l)	5					
Hexachlorobutadiene	(ug/l)	0.5					
Isopropyl Ether	(ug/l)						
Isopropylbenzene	(ug/l)	5					
m+p-Xylene	(ug/l)	5					1.9

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-01 4/13/2007 55.5-60.5-ft bgs	ERM-MW-01 7/8/2008 55.5-60.5-ft bgs	ERM-MW-01 12/10/2012 55.5-60.5-ft bgs	ERM-MW-02 4/13/2007 90.5-95.5-ft bgs	ERM-MW-02 7/8/2008 90.5-95.5-ft bgs
Methacrylonitrile	(ug/l)						
Methyl Acetate	(ug/l)						
Methyl acrylate	(ug/l)						
Methyl Cyclohexane	(ug/l)						
Methyl Tertiary Butyl Ether	(ug/l)	10					
Methylene Chloride	(ug/l)	5					
Naphthalene	(ug/l)	10					
n-Butylbenzene	(ug/l)	5					
n-Propylbenzene	(ug/l)	5					
o-Xylene	(ug/l)	5					3
p-Isopropyltoluene	(ug/l)	5					
sec-Butylbenzene	(ug/l)	5					
Styrene	(ug/l)	5					
tert-amyl alcohol	(ug/l)						
tert-Amyl methyl ether	(ug/l)						
tert-Buthyl ethyl ether	(ug/l)						
tert-Butylbenzene	(ug/l)	5					
Tertiary Butyl Alcohol	(ug/l)						
Tetrachloroethene	(ug/l)	5	[38.9]	5			
Toluene	(ug/l)	5		0.28 J			4
trans-1,2-Dichloroethene	(ug/l)	5	2.63			[11.4]	[68.2]
trans-1,3-Dichloropropene	(ug/l)	0.4					
Trichloroethene	(ug/l)	5	[25.1]	0.65 J			
Trichlorofluoromethane	(ug/l)	5					
Vinyl Acetate	(ug/l)						
Vinyl chloride	(ug/l)	2					

NOTES
U - Not Detected
J- Estimated Value

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-02 2/22/2010 90.5-95.5-ft bgs	ERM-MW-02 12/10/2012 90.5-95.5-ft bgs	ERM-MW-02D 4/13/2007 165-170.5-ft bgs	ERM-MW-02D 7/8/2008 165-170.5-ft bgs	ERM-MW-02D 2/22/2010 165-170.5-ft bgs
1,1,1,2-Tetrachloroethane	(ug/l)	5					
1,1,1-Trichloroethane	(ug/l)	5					
1,1,2,2-Tetrachloroethane	(ug/l)	5					
1,1,2-Trichloroethane	(ug/l)	1					
1,1-Dichloroethane	(ug/l)	5	1.2	0.20 J			[8.3]
1,1-Dichloroethene	(ug/l)	5					
1,1-Dichloropropene	(ug/l)	5					
1,2,3-Trichlorobenzene	(ug/l)	5					
1,2,3-Trichloropropane	(ug/l)	5					
1,2,4-Trichlorobenzene	(ug/l)	5					
1,2,4-Trimethylbenzene	(ug/l)	5					
1,2-Dibromo-3-chloropropane	(ug/l)	0.04					
1,2-Dibromoethane	(ug/l)	0.0006					
1,2-Dichlorobenzene	(ug/l)	3					
1,2-Dichloroethane	(ug/l)	0.6					
1,2-Dichloropropane	(ug/l)	1					
1,3,5-Trimethylbenzene	(ug/l)	5					
1,3-Dichlorobenzene	(ug/l)	3					
1,3-Dichloropropane	(ug/l)	5					
1,4-Dichlorobenzene	(ug/l)	3					
1,4-Dioxane	(ug/l)						
2-Butanone	(ug/l)	50				4.7 J	
2-Chlorotoluene	(ug/l)	5					
2-Hexanone	(ug/l)	50					
2-Nitropropane	(ug/l)						
3-Chloropropene	(ug/l)						
4-Chlorotoluene	(ug/l)	5					
4-Methyl-2-Pentanone	(ug/l)						
Acetone	(ug/l)	50		4.5 J		[69.2]	
Acrylonitrile	(ug/l)	5					

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-02 2/22/2010 90.5-95.5-ft bgs	ERM-MW-02 12/10/2012 90.5-95.5-ft bgs	ERM-MW-02D 4/13/2007 165-170.5-ft bgs	ERM-MW-02D 7/8/2008 165-170.5-ft bgs	ERM-MW-02D 2/22/2010 165-170.5-ft bgs
Benzene	(ug/l)	1					
Bromobenzene	(ug/l)	5					
Bromochloromethane	(ug/l)	5					
Bromodichloromethane	(ug/l)	50					
Bromoform	(ug/l)	50					
Bromomethane	(ug/l)	5					
Carbon Disulfide	(ug/l)	60					
Carbon Tetrachloride	(ug/l)	5					
Chlorobenzene	(ug/l)	5					
Chlorodifluoromethane	(ug/l)	5					
Chloroethane	(ug/l)	5		0.37 J			
Chloroform	(ug/l)	7					
Chloromethane	(ug/l)	5					
Chloroprene	(ug/l)						
cis-1,2-Dichloroethene	(ug/l)	5			[295]	[6.2]	[16]
cis-1,3-Dichloropropene	(ug/l)	0.4					
Cyclohexane	(ug/l)			0.53 J			
Dibromochloromethane	(ug/l)	50					
Dibromomethane	(ug/l)	5					
Dichlorodifluoromethane	(ug/l)	5					
Diethyl ether	(ug/l)						
Ethanol	(ug/l)						
Ethylbenzene	(ug/l)	5					
Freon 113	(ug/l)	5					
Hexachlorobutadiene	(ug/l)	0.5					
Isopropyl Ether	(ug/l)						
Isopropylbenzene	(ug/l)	5					
m+p-Xylene	(ug/l)	5		0.42 J			

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-02 2/22/2010 90.5-95.5-ft bgs	ERM-MW-02 12/10/2012 90.5-95.5-ft bgs	ERM-MW-02D 4/13/2007 165-170.5-ft bgs	ERM-MW-02D 7/8/2008 165-170.5-ft bgs	ERM-MW-02D 2/22/2010 165-170.5-ft bgs
Methacrylonitrile	(ug/l)						
Methyl Acetate	(ug/l)						
Methyl acrylate	(ug/l)						
Methyl Cyclohexane	(ug/l)						
Methyl Tertiary Butyl Ether	(ug/l)	10					
Methylene Chloride	(ug/l)	5					
Naphthalene	(ug/l)	10					
n-Butylbenzene	(ug/l)	5					
n-Propylbenzene	(ug/l)	5					
o-Xylene	(ug/l)	5		0.35 J			
p-Isopropyltoluene	(ug/l)	5					
sec-Butylbenzene	(ug/l)	5					
Styrene	(ug/l)	5					
tert-amyl alcohol	(ug/l)						
tert-Amyl methyl ether	(ug/l)						
tert-Buthyl ethyl ether	(ug/l)						
tert-Butylbenzene	(ug/l)	5					
Tertiary Butyl Alcohol	(ug/l)						
Tetrachloroethene	(ug/l)	5					
Toluene	(ug/l)	5		0.30 J		0.80 J	
trans-1,2-Dichloroethene	(ug/l)	5	[9.2]	3.9	2.7	0.74 J	[33.1]
trans-1,3-Dichloropropene	(ug/l)	0.4					
Trichloroethene	(ug/l)	5			0.97	[5.2]	
Trichlorofluoromethane	(ug/l)	5					
Vinyl Acetate	(ug/l)						
Vinyl chloride	(ug/l)	2				[3.3]	

NOTES
U - Not Detected
J- Estimated Value

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-02D 12/10/2012 165-170.5-ft bgs	ERM-MW-03 4/13/2007 55-60-ft bgs	ERM-MW-03 7/8/2008 55-60-ft bgs	ERM-MW-03 2/22/2010 55-60-ft bgs	ERM-MW-03 12/10/2012 55-60-ft bgs	ERM-MW-04 7/8/2008 55-60-ft bgs
1,1,1,2-Tetrachloroethane	(ug/l)	5						
1,1,1-Trichloroethane	(ug/l)	5						
1,1,2,2-Tetrachloroethane	(ug/l)	5						
1,1,2-Trichloroethane	(ug/l)	1						
1,1-Dichloroethane	(ug/l)	5	0.71 J					
1,1-Dichloroethene	(ug/l)	5						
1,1-Dichloropropene	(ug/l)	5						
1,2,3-Trichlorobenzene	(ug/l)	5						
1,2,3-Trichloropropane	(ug/l)	5						
1,2,4-Trichlorobenzene	(ug/l)	5						
1,2,4-Trimethylbenzene	(ug/l)	5						
1,2-Dibromo-3-chloropropane	(ug/l)	0.04						
1,2-Dibromoethane	(ug/l)	0.0006						
1,2-Dichlorobenzene	(ug/l)	3						
1,2-Dichloroethane	(ug/l)	0.6						
1,2-Dichloropropane	(ug/l)	1						
1,3,5-Trimethylbenzene	(ug/l)	5						
1,3-Dichlorobenzene	(ug/l)	3						
1,3-Dichloropropane	(ug/l)	5						
1,4-Dichlorobenzene	(ug/l)	3						
1,4-Dioxane	(ug/l)							
2-Butanone	(ug/l)	50						
2-Chlorotoluene	(ug/l)	5						
2-Hexanone	(ug/l)	50						
2-Nitropropane	(ug/l)							
3-Chloropropene	(ug/l)							
4-Chlorotoluene	(ug/l)	5						
4-Methyl-2-Pentanone	(ug/l)							
Acetone	(ug/l)	50	4.2 J		3.5 J		10.2	
Acrylonitrile	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-02D 12/10/2012 165-170.5-ft bgs	ERM-MW-03 4/13/2007 55-60-ft bgs	ERM-MW-03 7/8/2008 55-60-ft bgs	ERM-MW-03 2/22/2010 55-60-ft bgs	ERM-MW-03 12/10/2012 55-60-ft bgs	ERM-MW-04 7/8/2008 55-60-ft bgs
Benzene	(ug/l)	1						0.75 J
Bromobenzene	(ug/l)	5						
Bromochloromethane	(ug/l)	5						
Bromodichloromethane	(ug/l)	50						
Bromoform	(ug/l)	50						
Bromomethane	(ug/l)	5						
Carbon Disulfide	(ug/l)	60						
Carbon Tetrachloride	(ug/l)	5						
Chlorobenzene	(ug/l)	5						
Chlorodifluoromethane	(ug/l)	5						
Chloroethane	(ug/l)	5						
Chloroform	(ug/l)	7			0.69 J			
Chloromethane	(ug/l)	5						
Chloroprene	(ug/l)							
cis-1,2-Dichloroethene	(ug/l)	5	1.3		[14.9]	[31.9]		
cis-1,3-Dichloropropene	(ug/l)	0.4						
Cyclohexane	(ug/l)		0.63 J					
Dibromochloromethane	(ug/l)	50						
Dibromomethane	(ug/l)	5						
Dichlorodifluoromethane	(ug/l)	5						
Diethyl ether	(ug/l)							
Ethanol	(ug/l)							
Ethylbenzene	(ug/l)	5						
Freon 113	(ug/l)	5						
Hexachlorobutadiene	(ug/l)	0.5						
Isopropyl Ether	(ug/l)							
Isopropylbenzene	(ug/l)	5						
m+p-Xylene	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-02D 12/10/2012 165-170.5-ft bgs	ERM-MW-03 4/13/2007 55-60-ft bgs	ERM-MW-03 7/8/2008 55-60-ft bgs	ERM-MW-03 2/22/2010 55-60-ft bgs	ERM-MW-03 12/10/2012 55-60-ft bgs	ERM-MW-04 7/8/2008 55-60-ft bgs
Methacrylonitrile	(ug/l)							
Methyl Acetate	(ug/l)							
Methyl acrylate	(ug/l)							
Methyl Cyclohexane	(ug/l)							
Methyl Tertiary Butyl Ether	(ug/l)	10						
Methylene Chloride	(ug/l)	5						
Naphthalene	(ug/l)	10						
n-Butylbenzene	(ug/l)	5						
n-Propylbenzene	(ug/l)	5						
o-Xylene	(ug/l)	5	0.35 J					
p-Isopropyltoluene	(ug/l)	5						
sec-Butylbenzene	(ug/l)	5						
Styrene	(ug/l)	5						
tert-amyl alcohol	(ug/l)							
tert-Amyl methyl ether	(ug/l)							
tert-Buthyl ethyl ether	(ug/l)							
tert-Butylbenzene	(ug/l)	5						
Tertiary Butyl Alcohol	(ug/l)							
Tetrachloroethene	(ug/l)	5		3.38	[40.8]	[42.6]	1.6	
Toluene	(ug/l)	5	0.27 J		0.31 J			1.1
trans-1,2-Dichloroethene	(ug/l)	5	1.7					
trans-1,3-Dichloropropene	(ug/l)	0.4						
Trichloroethene	(ug/l)	5			[5.6]	4.4		
Trichlorofluoromethane	(ug/l)	5						
Vinyl Acetate	(ug/l)							
Vinyl chloride	(ug/l)	2	0.58 J					

NOTES
U - Not Detected
J- Estimated Value

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-04 12/10/2012 55-60-ft bgs	ERM-MW-05 4/13/2007 145-150-ft bgs	ERM-MW-05 7/8/2008 145-150-ft bgs	ERM-MW-05 2/22/2010 145-150-ft bgs	ERM-MW-05 11/15/2010 145-150-ft bgs	ERM-MW-05 7/9/2011 145-150-ft bgs
1,1,1,2-Tetrachloroethane	(ug/l)	5						
1,1,1-Trichloroethane	(ug/l)	5						[10.5] J
1,1,2,2-Tetrachloroethane	(ug/l)	5						
1,1,2-Trichloroethane	(ug/l)	1						
1,1-Dichloroethane	(ug/l)	5			0.94 J			[5.5] J
1,1-Dichloroethene	(ug/l)	5						
1,1-Dichloropropene	(ug/l)	5						
1,2,3-Trichlorobenzene	(ug/l)	5						
1,2,3-Trichloropropane	(ug/l)	5						
1,2,4-Trichlorobenzene	(ug/l)	5						
1,2,4-Trimethylbenzene	(ug/l)	5						
1,2-Dibromo-3-chloropropane	(ug/l)	0.04						
1,2-Dibromoethane	(ug/l)	0.0006						
1,2-Dichlorobenzene	(ug/l)	3						
1,2-Dichloroethane	(ug/l)	0.6						
1,2-Dichloropropane	(ug/l)	1						
1,3,5-Trimethylbenzene	(ug/l)	5						
1,3-Dichlorobenzene	(ug/l)	3						
1,3-Dichloropropane	(ug/l)	5						
1,4-Dichlorobenzene	(ug/l)	3						
1,4-Dioxane	(ug/l)							
2-Butanone	(ug/l)	50						
2-Chlorotoluene	(ug/l)	5						
2-Hexanone	(ug/l)	50						
2-Nitropropane	(ug/l)							
3-Chloropropene	(ug/l)							
4-Chlorotoluene	(ug/l)	5						
4-Methyl-2-Pentanone	(ug/l)							
Acetone	(ug/l)	50	13.9		47.1		2.88 J	[53.5] J
Acrylonitrile	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-04 12/10/2012 55-60-ft bgs	ERM-MW-05 4/13/2007 145-150-ft bgs	ERM-MW-05 7/8/2008 145-150-ft bgs	ERM-MW-05 2/22/2010 145-150-ft bgs	ERM-MW-05 11/15/2010 145-150-ft bgs	ERM-MW-05 7/9/2011 145-150-ft bgs
Benzene	(ug/l)	1						
Bromobenzene	(ug/l)	5						
Bromochloromethane	(ug/l)	5						
Bromodichloromethane	(ug/l)	50						
Bromoform	(ug/l)	50						
Bromomethane	(ug/l)	5						
Carbon Disulfide	(ug/l)	60					0.22 J	
Carbon Tetrachloride	(ug/l)	5						
Chlorobenzene	(ug/l)	5			0.44 J			
Chlorodifluoromethane	(ug/l)	5						
Chloroethane	(ug/l)	5			1.9			
Chloroform	(ug/l)	7						
Chloromethane	(ug/l)	5						
Chloroprene	(ug/l)							
cis-1,2-Dichloroethene	(ug/l)	5		[312]	[189]		[129]	[1170]
cis-1,3-Dichloropropene	(ug/l)	0.4						
Cyclohexane	(ug/l)							
Dibromochloromethane	(ug/l)	50						
Dibromomethane	(ug/l)	5						
Dichlorodifluoromethane	(ug/l)	5					0.28 J	
Diethyl ether	(ug/l)							
Ethanol	(ug/l)							
Ethylbenzene	(ug/l)	5						
Freon 113	(ug/l)	5						
Hexachlorobutadiene	(ug/l)	0.5						
Isopropyl Ether	(ug/l)							
Isopropylbenzene	(ug/l)	5						
m+p-Xylene	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-04 12/10/2012 55-60-ft bgs	ERM-MW-05 4/13/2007 145-150-ft bgs	ERM-MW-05 7/8/2008 145-150-ft bgs	ERM-MW-05 2/22/2010 145-150-ft bgs	ERM-MW-05 11/15/2010 145-150-ft bgs	ERM-MW-05 7/9/2011 145-150-ft bgs
Methacrylonitrile	(ug/l)							
Methyl Acetate	(ug/l)							
Methyl acrylate	(ug/l)							
Methyl Cyclohexane	(ug/l)							
Methyl Tertiary Butyl Ether	(ug/l)	10	0.39 J				0.88 J	
Methylene Chloride	(ug/l)	5					[5.04] J	[26.5] J
Naphthalene	(ug/l)	10						
n-Butylbenzene	(ug/l)	5						
n-Propylbenzene	(ug/l)	5						
o-Xylene	(ug/l)	5						
p-Isopropyltoluene	(ug/l)	5						
sec-Butylbenzene	(ug/l)	5						
Styrene	(ug/l)	5						
tert-amyl alcohol	(ug/l)							
tert-Amyl methyl ether	(ug/l)							
tert-Buthyl ethyl ether	(ug/l)							
tert-Butylbenzene	(ug/l)	5						
Tertiary Butyl Alcohol	(ug/l)							
Tetrachloroethene	(ug/l)	5		0.74	2.6	2.4	[56.4] J	[42]
Toluene	(ug/l)	5			0.76 J		0.42 J	
trans-1,2-Dichloroethene	(ug/l)	5		3.48	[7.2]		1.48	[10.5] J
trans-1,3-Dichloropropene	(ug/l)	0.4						
Trichloroethene	(ug/l)	5	0.67 J		[5.8]	1.1	[5.46]	[8] J
Trichlorofluoromethane	(ug/l)	5						
Vinyl Acetate	(ug/l)							
Vinyl chloride	(ug/l)	2			[3.8]			

NOTES
U - Not Detected
J- Estimated Value

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-05 12/10/2012 145-150-ft bgs	ERM-MW-06 4/13/2007 95-100-ft bgs	ERM-MW-06 7/8/2008 95-100-ft bgs	ERM-MW-06 11/15/2010 95-100-ft bgs	ERM-MW-06 7/9/2011 95-100-ft bgs	ERM-MW-06 12/10/2012 95-100-ft bgs
1,1,1,2-Tetrachloroethane	(ug/l)	5						
1,1,1-Trichloroethane	(ug/l)	5	0.92 J	3.76	0.89 J			
1,1,2,2-Tetrachloroethane	(ug/l)	5						
1,1,2-Trichloroethane	(ug/l)	1						
1,1-Dichloroethane	(ug/l)	5	4.7		1.1			
1,1-Dichloroethene	(ug/l)	5	0.61 J					
1,1-Dichloropropene	(ug/l)	5						
1,2,3-Trichlorobenzene	(ug/l)	5						
1,2,3-Trichloropropane	(ug/l)	5						
1,2,4-Trichlorobenzene	(ug/l)	5						
1,2,4-Trimethylbenzene	(ug/l)	5						
1,2-Dibromo-3-chloropropane	(ug/l)	0.04						
1,2-Dibromoethane	(ug/l)	0.0006						
1,2-Dichlorobenzene	(ug/l)	3						
1,2-Dichloroethane	(ug/l)	0.6						
1,2-Dichloropropane	(ug/l)	1						
1,3,5-Trimethylbenzene	(ug/l)	5						
1,3-Dichlorobenzene	(ug/l)	3						
1,3-Dichloropropane	(ug/l)	5						
1,4-Dichlorobenzene	(ug/l)	3						
1,4-Dioxane	(ug/l)							
2-Butanone	(ug/l)	50						
2-Chlorotoluene	(ug/l)	5						
2-Hexanone	(ug/l)	50						
2-Nitropropane	(ug/l)							
3-Chloropropene	(ug/l)							
4-Chlorotoluene	(ug/l)	5						
4-Methyl-2-Pentanone	(ug/l)							
Acetone	(ug/l)	50	13.8		47.9		2.89 J	19.4
Acrylonitrile	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-05 12/10/2012 145-150-ft bgs	ERM-MW-06 4/13/2007 95-100-ft bgs	ERM-MW-06 7/8/2008 95-100-ft bgs	ERM-MW-06 11/15/2010 95-100-ft bgs	ERM-MW-06 7/9/2011 95-100-ft bgs	ERM-MW-06 12/10/2012 95-100-ft bgs
Benzene	(ug/l)	1						
Bromobenzene	(ug/l)	5						
Bromochloromethane	(ug/l)	5						
Bromodichloromethane	(ug/l)	50						
Bromoform	(ug/l)	50						
Bromomethane	(ug/l)	5						
Carbon Disulfide	(ug/l)	60						
Carbon Tetrachloride	(ug/l)	5						
Chlorobenzene	(ug/l)	5						
Chlorodifluoromethane	(ug/l)	5						
Chloroethane	(ug/l)	5	0.75 J					
Chloroform	(ug/l)	7						
Chloromethane	(ug/l)	5						
Chloroprene	(ug/l)							
cis-1,2-Dichloroethene	(ug/l)	5	[177]	[107]	[146]	0.35 J	0.18 J	0.45 J
cis-1,3-Dichloropropene	(ug/l)	0.4						
Cyclohexane	(ug/l)		0.35 J					0.69 J
Dibromochloromethane	(ug/l)	50						
Dibromomethane	(ug/l)	5						
Dichlorodifluoromethane	(ug/l)	5						
Diethyl ether	(ug/l)							
Ethanol	(ug/l)							
Ethylbenzene	(ug/l)	5						
Freon 113	(ug/l)	5						
Hexachlorobutadiene	(ug/l)	0.5						
Isopropyl Ether	(ug/l)							
Isopropylbenzene	(ug/l)	5						
m+p-Xylene	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-05 12/10/2012 145-150-ft bgs	ERM-MW-06 4/13/2007 95-100-ft bgs	ERM-MW-06 7/8/2008 95-100-ft bgs	ERM-MW-06 11/15/2010 95-100-ft bgs	ERM-MW-06 7/9/2011 95-100-ft bgs	ERM-MW-06 12/10/2012 95-100-ft bgs
Methacrylonitrile	(ug/l)							
Methyl Acetate	(ug/l)							
Methyl acrylate	(ug/l)							
Methyl Cyclohexane	(ug/l)							
Methyl Tertiary Butyl Ether	(ug/l)	10						
Methylene Chloride	(ug/l)	5						
Naphthalene	(ug/l)	10						
n-Butylbenzene	(ug/l)	5						
n-Propylbenzene	(ug/l)	5						
o-Xylene	(ug/l)	5	0.67 J					
p-Isopropyltoluene	(ug/l)	5						
sec-Butylbenzene	(ug/l)	5						
Styrene	(ug/l)	5						
tert-amyl alcohol	(ug/l)							
tert-Amyl methyl ether	(ug/l)							
tert-Buthyl ethyl ether	(ug/l)							
tert-Butylbenzene	(ug/l)	5						
Tertiary Butyl Alcohol	(ug/l)							
Tetrachloroethene	(ug/l)	5	1.5	[86.3]	[19.4]	1.91 J	0.84	0.42 J
Toluene	(ug/l)	5			0.60 J	0.37 J		
trans-1,2-Dichloroethene	(ug/l)	5	[6.6]	1.15	1.2	0.51		
trans-1,3-Dichloropropene	(ug/l)	0.4						
Trichloroethene	(ug/l)	5	0.76 J	[164]	[40.1]	0.4 J	0.19 J	0.58 J
Trichlorofluoromethane	(ug/l)	5						
Vinyl Acetate	(ug/l)							
Vinyl chloride	(ug/l)	2	[7.4]					

NOTES
U - Not Detected
J- Estimated Value

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-07D 7/8/2008 280-290-ft bgs	ERM-MW-07D 2/22/2010 280-290-ft bgs	ERM-MW-07D 6/13/2011 280-290-ft bgs	ERM-MW-07D 12/10/2012 280-290-ft bgs	ERM-MW-08 7/8/2008 28-295-ft bgs	ERM-MW-08 2/22/2010 28-295-ft bgs
1,1,1,2-Tetrachloroethane	(ug/l)	5						
1,1,1-Trichloroethane	(ug/l)	5	2.6				0.76 J	
1,1,2,2-Tetrachloroethane	(ug/l)	5						
1,1,2-Trichloroethane	(ug/l)	1						
1,1-Dichloroethane	(ug/l)	5	1.7				0.50 J	
1,1-Dichloroethene	(ug/l)	5	3.1	2.4			0.97 J	
1,1-Dichloropropene	(ug/l)	5						
1,2,3-Trichlorobenzene	(ug/l)	5						
1,2,3-Trichloropropane	(ug/l)	5						
1,2,4-Trichlorobenzene	(ug/l)	5						
1,2,4-Trimethylbenzene	(ug/l)	5						
1,2-Dibromo-3-chloropropane	(ug/l)	0.04						
1,2-Dibromoethane	(ug/l)	0.0006						
1,2-Dichlorobenzene	(ug/l)	3						
1,2-Dichloroethane	(ug/l)	0.6						
1,2-Dichloropropane	(ug/l)	1						
1,3,5-Trimethylbenzene	(ug/l)	5						
1,3-Dichlorobenzene	(ug/l)	3						
1,3-Dichloropropane	(ug/l)	5						
1,4-Dichlorobenzene	(ug/l)	3						
1,4-Dioxane	(ug/l)							
2-Butanone	(ug/l)	50						
2-Chlorotoluene	(ug/l)	5						
2-Hexanone	(ug/l)	50						
2-Nitropropane	(ug/l)							
3-Chloropropene	(ug/l)							
4-Chlorotoluene	(ug/l)	5						
4-Methyl-2-Pentanone	(ug/l)							
Acetone	(ug/l)	50	45.9			10.6	45.3	
Acrylonitrile	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-07D 7/8/2008 280-290-ft bgs	ERM-MW-07D 2/22/2010 280-290-ft bgs	ERM-MW-07D 6/13/2011 280-290-ft bgs	ERM-MW-07D 12/10/2012 280-290-ft bgs	ERM-MW-08 7/8/2008 28-295-ft bgs	ERM-MW-08 2/22/2010 28-295-ft bgs
Benzene	(ug/l)	1						
Bromobenzene	(ug/l)	5						
Bromochloromethane	(ug/l)	5						
Bromodichloromethane	(ug/l)	50						
Bromoform	(ug/l)	50						
Bromomethane	(ug/l)	5						
Carbon Disulfide	(ug/l)	60						
Carbon Tetrachloride	(ug/l)	5						
Chlorobenzene	(ug/l)	5						
Chlorodifluoromethane	(ug/l)	5						
Chloroethane	(ug/l)	5						
Chloroform	(ug/l)	7					0.25 J	
Chloromethane	(ug/l)	5						
Chloroprene	(ug/l)							
cis-1,2-Dichloroethene	(ug/l)	5	[37.0]	[16.9]			[12.3]	[7.2]
cis-1,3-Dichloropropene	(ug/l)	0.4						
Cyclohexane	(ug/l)							
Dibromochloromethane	(ug/l)	50						
Dibromomethane	(ug/l)	5						
Dichlorodifluoromethane	(ug/l)	5						
Diethyl ether	(ug/l)							
Ethanol	(ug/l)							
Ethylbenzene	(ug/l)	5						
Freon 113	(ug/l)	5						
Hexachlorobutadiene	(ug/l)	0.5						
Isopropyl Ether	(ug/l)							
Isopropylbenzene	(ug/l)	5						
m+p-Xylene	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-07D 7/8/2008 280-290-ft bgs	ERM-MW-07D 2/22/2010 280-290-ft bgs	ERM-MW-07D 6/13/2011 280-290-ft bgs	ERM-MW-07D 12/10/2012 280-290-ft bgs	ERM-MW-08 7/8/2008 28-295-ft bgs	ERM-MW-08 2/22/2010 28-295-ft bgs
Methacrylonitrile	(ug/l)							
Methyl Acetate	(ug/l)							
Methyl acrylate	(ug/l)							
Methyl Cyclohexane	(ug/l)							
Methyl Tertiary Butyl Ether	(ug/l)	10						
Methylene Chloride	(ug/l)	5						
Naphthalene	(ug/l)	10						
n-Butylbenzene	(ug/l)	5						
n-Propylbenzene	(ug/l)	5						
o-Xylene	(ug/l)	5						
p-Isopropyltoluene	(ug/l)	5						
sec-Butylbenzene	(ug/l)	5						
Styrene	(ug/l)	5						
tert-amyl alcohol	(ug/l)							
tert-Amyl methyl ether	(ug/l)							
tert-Buthyl ethyl ether	(ug/l)							
tert-Butylbenzene	(ug/l)	5						
Tertiary Butyl Alcohol	(ug/l)							
Tetrachloroethene	(ug/l)	5	[129]	[66.6]	4.3	3.3	[90.9]	[7.5]
Toluene	(ug/l)	5						
trans-1,2-Dichloroethene	(ug/l)	5						
trans-1,3-Dichloropropene	(ug/l)	0.4						
Trichloroethene	(ug/l)	5	[348]	[144]	[12.0]	[5.8]	[279]	[116]
Trichlorofluoromethane	(ug/l)	5						
Vinyl Acetate	(ug/l)							
Vinyl chloride	(ug/l)	2						

NOTES
U - Not Detected
J- Estimated Value

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-08 6/13/2011 28-295-ft bgs	ERM-MW-08 12/10/2012 28-295-ft bgs	ERM-MW-09 7/8/2008 165-175-ft bgs	ERM-MW-09 2/22/2010 165-175-ft bgs	ERM-MW-09 6/13/2011 165-175-ft bgs	ERM-MW-09 12/10/2012 165-175-ft bgs
1,1,1,2-Tetrachloroethane	(ug/l)	5						
1,1,1-Trichloroethane	(ug/l)	5			2		0.57 J	0.75 J
1,1,2,2-Tetrachloroethane	(ug/l)	5						
1,1,2-Trichloroethane	(ug/l)	1						
1,1-Dichloroethane	(ug/l)	5		0.31 J	1.9		1.6	3
1,1-Dichloroethene	(ug/l)	5	0.85 J	0.87 J	0.75 J	1.1		0.40 J
1,1-Dichloropropene	(ug/l)	5						
1,2,3-Trichlorobenzene	(ug/l)	5						
1,2,3-Trichloropropane	(ug/l)	5						
1,2,4-Trichlorobenzene	(ug/l)	5						
1,2,4-Trimethylbenzene	(ug/l)	5						
1,2-Dibromo-3-chloropropane	(ug/l)	0.04						
1,2-Dibromoethane	(ug/l)	0.0006						
1,2-Dichlorobenzene	(ug/l)	3						
1,2-Dichloroethane	(ug/l)	0.6						
1,2-Dichloropropane	(ug/l)	1						
1,3,5-Trimethylbenzene	(ug/l)	5						
1,3-Dichlorobenzene	(ug/l)	3						
1,3-Dichloropropane	(ug/l)	5						
1,4-Dichlorobenzene	(ug/l)	3					0.55 J	0.84 J
1,4-Dioxane	(ug/l)							
2-Butanone	(ug/l)	50	13.1				19.3	
2-Chlorotoluene	(ug/l)	5						
2-Hexanone	(ug/l)	50						
2-Nitropropane	(ug/l)							
3-Chloropropene	(ug/l)							
4-Chlorotoluene	(ug/l)	5						
4-Methyl-2-Pentanone	(ug/l)							
Acetone	(ug/l)	50	12.2	4.9 J	46		15.3	4.0 J
Acrylonitrile	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-08 6/13/2011 28-295-ft bgs	ERM-MW-08 12/10/2012 28-295-ft bgs	ERM-MW-09 7/8/2008 165-175-ft bgs	ERM-MW-09 2/22/2010 165-175-ft bgs	ERM-MW-09 6/13/2011 165-175-ft bgs	ERM-MW-09 12/10/2012 165-175-ft bgs
Benzene	(ug/l)	1						
Bromobenzene	(ug/l)	5						
Bromochloromethane	(ug/l)	5						
Bromodichloromethane	(ug/l)	50						
Bromoform	(ug/l)	50						
Bromomethane	(ug/l)	5						
Carbon Disulfide	(ug/l)	60						
Carbon Tetrachloride	(ug/l)	5						
Chlorobenzene	(ug/l)	5					2.3	2.4
Chlorodifluoromethane	(ug/l)	5						
Chloroethane	(ug/l)	5						
Chloroform	(ug/l)	7		0.22 J				
Chloromethane	(ug/l)	5						0.24 J
Chloroprene	(ug/l)							
cis-1,2-Dichloroethene	(ug/l)	5	4.2	1.6	[99.3]	[39.5]	[27.9]	[14.0]
cis-1,3-Dichloropropene	(ug/l)	0.4						
Cyclohexane	(ug/l)							
Dibromochloromethane	(ug/l)	50						
Dibromomethane	(ug/l)	5						
Dichlorodifluoromethane	(ug/l)	5						
Diethyl ether	(ug/l)							
Ethanol	(ug/l)							
Ethylbenzene	(ug/l)	5						
Freon 113	(ug/l)	5	2.7 J	0.74 J				
Hexachlorobutadiene	(ug/l)	0.5						
Isopropyl Ether	(ug/l)							
Isopropylbenzene	(ug/l)	5						
m+p-Xylene	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-08 6/13/2011 28-295-ft bgs	ERM-MW-08 12/10/2012 28-295-ft bgs	ERM-MW-09 7/8/2008 165-175-ft bgs	ERM-MW-09 2/22/2010 165-175-ft bgs	ERM-MW-09 6/13/2011 165-175-ft bgs	ERM-MW-09 12/10/2012 165-175-ft bgs
Methacrylonitrile	(ug/l)							
Methyl Acetate	(ug/l)							
Methyl acrylate	(ug/l)							
Methyl Cyclohexane	(ug/l)							
Methyl Tertiary Butyl Ether	(ug/l)	10						
Methylene Chloride	(ug/l)	5						
Naphthalene	(ug/l)	10						
n-Butylbenzene	(ug/l)	5						
n-Propylbenzene	(ug/l)	5						
o-Xylene	(ug/l)	5						
p-Isopropyltoluene	(ug/l)	5						
sec-Butylbenzene	(ug/l)	5						
Styrene	(ug/l)	5						
tert-amyl alcohol	(ug/l)							
tert-Amyl methyl ether	(ug/l)							
tert-Buthyl ethyl ether	(ug/l)							
tert-Butylbenzene	(ug/l)	5						
Tertiary Butyl Alcohol	(ug/l)							
Tetrachloroethene	(ug/l)	5	[11.9]	2.8	[188]	[28.8]	[37.9]	[29.5]
Toluene	(ug/l)	5	0.15 J					
trans-1,2-Dichloroethene	(ug/l)	5			1.5		0.33 J	
trans-1,3-Dichloropropene	(ug/l)	0.4						
Trichloroethene	(ug/l)	5	[192]	[158]	[155]	[71.1]	[19.4]	[13.0]
Trichlorofluoromethane	(ug/l)	5						
Vinyl Acetate	(ug/l)							
Vinyl chloride	(ug/l)	2						0.21 J

NOTES
U - Not Detected
J- Estimated Value

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-10 6/13/2011 225-235-ft bgs	ERM-MW-10 12/10/2012 225-235-ft bgs	ERM-MW-11D 5/20/2011 285-295-ft bgs	ERM-MW-11D 6/13/2011 285-295-ft bgs	ERM-MW-11D 12/10/2012 285-295-ft bgs	ERM-MW-11M 6/13/2011 235-245-ft bgs
1,1,1,2-Tetrachloroethane	(ug/l)	5						
1,1,1-Trichloroethane	(ug/l)	5			[7.0]	[12.1]	[18.4]	0.94 J
1,1,2,2-Tetrachloroethane	(ug/l)	5						
1,1,2-Trichloroethane	(ug/l)	1						
1,1-Dichloroethane	(ug/l)	5			4.6	[7.2]	[14.1]	1.4
1,1-Dichloroethene	(ug/l)	5			[5.8]	[14.4]	[27.5]	1.4
1,1-Dichloropropene	(ug/l)	5						
1,2,3-Trichlorobenzene	(ug/l)	5						
1,2,3-Trichloropropane	(ug/l)	5						
1,2,4-Trichlorobenzene	(ug/l)	5						
1,2,4-Trimethylbenzene	(ug/l)	5						
1,2-Dibromo-3-chloropropane	(ug/l)	0.04						
1,2-Dibromoethane	(ug/l)	0.0006						
1,2-Dichlorobenzene	(ug/l)	3						
1,2-Dichloroethane	(ug/l)	0.6					0.48 J	
1,2-Dichloropropane	(ug/l)	1	0.96 J					
1,3,5-Trimethylbenzene	(ug/l)	5						
1,3-Dichlorobenzene	(ug/l)	3						
1,3-Dichloropropane	(ug/l)	5						
1,4-Dichlorobenzene	(ug/l)	3						
1,4-Dioxane	(ug/l)							
2-Butanone	(ug/l)	50				25.3		18.3
2-Chlorotoluene	(ug/l)	5						
2-Hexanone	(ug/l)	50						
2-Nitropropane	(ug/l)							
3-Chloropropene	(ug/l)							
4-Chlorotoluene	(ug/l)	5						
4-Methyl-2-Pentanone	(ug/l)							
Acetone	(ug/l)	50		5.0 J		15.3	4.4 J	15.1
Acrylonitrile	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-10 6/13/2011 225-235-ft bgs	ERM-MW-10 12/10/2012 225-235-ft bgs	ERM-MW-11D 5/20/2011 285-295-ft bgs	ERM-MW-11D 6/13/2011 285-295-ft bgs	ERM-MW-11D 12/10/2012 285-295-ft bgs	ERM-MW-11M 6/13/2011 235-245-ft bgs
Benzene	(ug/l)	1						
Bromobenzene	(ug/l)	5						
Bromochloromethane	(ug/l)	5						
Bromodichloromethane	(ug/l)	50	1.7					
Bromoform	(ug/l)	50	0.73 J					
Bromomethane	(ug/l)	5						
Carbon Disulfide	(ug/l)	60						
Carbon Tetrachloride	(ug/l)	5						
Chlorobenzene	(ug/l)	5						
Chlorodifluoromethane	(ug/l)	5						
Chloroethane	(ug/l)	5						
Chloroform	(ug/l)	7	3.9	[10.6]			0.22 J	1.1
Chloromethane	(ug/l)	5						
Chloroprene	(ug/l)							
cis-1,2-Dichloroethene	(ug/l)	5			[88.8]	[164]	[286]	[16.9]
cis-1,3-Dichloropropene	(ug/l)	0.4						
Cyclohexane	(ug/l)							
Dibromochloromethane	(ug/l)	50	2.2					
Dibromomethane	(ug/l)	5						
Dichlorodifluoromethane	(ug/l)	5						
Diethyl ether	(ug/l)							
Ethanol	(ug/l)							
Ethylbenzene	(ug/l)	5						
Freon 113	(ug/l)	5						
Hexachlorobutadiene	(ug/l)	0.5						
Isopropyl Ether	(ug/l)							
Isopropylbenzene	(ug/l)	5						
m+p-Xylene	(ug/l)	5						

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-10 6/13/2011 225-235-ft bgs	ERM-MW-10 12/10/2012 225-235-ft bgs	ERM-MW-11D 5/20/2011 285-295-ft bgs	ERM-MW-11D 6/13/2011 285-295-ft bgs	ERM-MW-11D 12/10/2012 285-295-ft bgs	ERM-MW-11M 6/13/2011 235-245-ft bgs
Methacrylonitrile	(ug/l)							
Methyl Acetate	(ug/l)							
Methyl acrylate	(ug/l)							
Methyl Cyclohexane	(ug/l)							
Methyl Tertiary Butyl Ether	(ug/l)	10						
Methylene Chloride	(ug/l)	5						
Naphthalene	(ug/l)	10						
n-Butylbenzene	(ug/l)	5						
n-Propylbenzene	(ug/l)	5						
o-Xylene	(ug/l)	5						
p-Isopropyltoluene	(ug/l)	5						
sec-Butylbenzene	(ug/l)	5						
Styrene	(ug/l)	5						
tert-amyl alcohol	(ug/l)							
tert-Amyl methyl ether	(ug/l)							
tert-Buthyl ethyl ether	(ug/l)							
tert-Butylbenzene	(ug/l)	5						
Tertiary Butyl Alcohol	(ug/l)							
Tetrachloroethene	(ug/l)	5			[200]	[107]	[125]	[78.9]
Toluene	(ug/l)	5			[6.5]	0.71 J		
trans-1,2-Dichloroethene	(ug/l)	5			3.1	3.1	[5.7]	
trans-1,3-Dichloropropene	(ug/l)	0.4						
Trichloroethene	(ug/l)	5		0.48 J	[75.8]	[122]	[205]	[26.9]
Trichlorofluoromethane	(ug/l)	5						
Vinyl Acetate	(ug/l)							
Vinyl chloride	(ug/l)	2						

NOTES
U - Not Detected
J- Estimated Value

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-11M 12/10/2012 235-245-ft bgs	ERM-MW-11S 6/13/2011 185-195-ft bgs	ERM-MW-11S 12/10/2012 185-195-ft bgs	ERM-MW-12M 12/10/2012 228-238-ft bgs	ERM-MW-12S 12/10/2012 90-100-ft bgs
1,1,1,2-Tetrachloroethane	(ug/l)	5					
1,1,1-Trichloroethane	(ug/l)	5	[7.1] J	4.5	[5.5]	4.2	
1,1,2,2-Tetrachloroethane	(ug/l)	5					
1,1,2-Trichloroethane	(ug/l)	1					
1,1-Dichloroethane	(ug/l)	5	[14.5]	[8.6]	[15.5]	1	
1,1-Dichloroethene	(ug/l)	5	[8.5] J	4.2	[6.7]	[6.3]	
1,1-Dichloropropene	(ug/l)	5					
1,2,3-Trichlorobenzene	(ug/l)	5					
1,2,3-Trichloropropane	(ug/l)	5					
1,2,4-Trichlorobenzene	(ug/l)	5					
1,2,4-Trimethylbenzene	(ug/l)	5					
1,2-Dibromo-3-chloropropane	(ug/l)	0.04					
1,2-Dibromoethane	(ug/l)	0.0006					
1,2-Dichlorobenzene	(ug/l)	3					
1,2-Dichloroethane	(ug/l)	0.6					
1,2-Dichloropropane	(ug/l)	1					
1,3,5-Trimethylbenzene	(ug/l)	5					
1,3-Dichlorobenzene	(ug/l)	3					
1,3-Dichloropropane	(ug/l)	5					
1,4-Dichlorobenzene	(ug/l)	3					
1,4-Dioxane	(ug/l)						
2-Butanone	(ug/l)	50					
2-Chlorotoluene	(ug/l)	5					
2-Hexanone	(ug/l)	50					
2-Nitropropane	(ug/l)						
3-Chloropropene	(ug/l)						
4-Chlorotoluene	(ug/l)	5					
4-Methyl-2-Pentanone	(ug/l)						
Acetone	(ug/l)	50	12.6	14	10.4	4.0 J	15.2
Acrylonitrile	(ug/l)	5					

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-11M 12/10/2012 235-245-ft bgs	ERM-MW-11S 6/13/2011 185-195-ft bgs	ERM-MW-11S 12/10/2012 185-195-ft bgs	ERM-MW-12M 12/10/2012 228-238-ft bgs	ERM-MW-12S 12/10/2012 90-100-ft bgs
Benzene	(ug/l)	1			0.30 J		
Bromobenzene	(ug/l)	5					
Bromochloromethane	(ug/l)	5					
Bromodichloromethane	(ug/l)	50					
Bromoform	(ug/l)	50					
Bromomethane	(ug/l)	5					
Carbon Disulfide	(ug/l)	60					
Carbon Tetrachloride	(ug/l)	5					
Chlorobenzene	(ug/l)	5	0.62 J	0.38 J	0.86 J		
Chlorodifluoromethane	(ug/l)	5					
Chloroethane	(ug/l)	5					
Chloroform	(ug/l)	7					0.29 J
Chloromethane	(ug/l)	5					
Chloroprene	(ug/l)						
cis-1,2-Dichloroethene	(ug/l)	5	[90.9] J	[97.8]	[120]	2.4	0.90 J
cis-1,3-Dichloropropene	(ug/l)	0.4					
Cyclohexane	(ug/l)						
Dibromochloromethane	(ug/l)	50					
Dibromomethane	(ug/l)	5					
Dichlorodifluoromethane	(ug/l)	5					
Diethyl ether	(ug/l)						
Ethanol	(ug/l)						
Ethylbenzene	(ug/l)	5					
Freon 113	(ug/l)	5					
Hexachlorobutadiene	(ug/l)	0.5					
Isopropyl Ether	(ug/l)						
Isopropylbenzene	(ug/l)	5					
m+p-Xylene	(ug/l)	5					

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	ERM-MW-11M 12/10/2012 235-245-ft bgs	ERM-MW-11S 6/13/2011 185-195-ft bgs	ERM-MW-11S 12/10/2012 185-195-ft bgs	ERM-MW-12M 12/10/2012 228-238-ft bgs	ERM-MW-12S 12/10/2012 90-100-ft bgs
Methacrylonitrile	(ug/l)						
Methyl Acetate	(ug/l)						
Methyl acrylate	(ug/l)						
Methyl Cyclohexane	(ug/l)						
Methyl Tertiary Butyl Ether	(ug/l)	10					
Methylene Chloride	(ug/l)	5					
Naphthalene	(ug/l)	10					
n-Butylbenzene	(ug/l)	5					
n-Propylbenzene	(ug/l)	5					
o-Xylene	(ug/l)	5					
p-Isopropyltoluene	(ug/l)	5					
sec-Butylbenzene	(ug/l)	5					
Styrene	(ug/l)	5					
tert-amyl alcohol	(ug/l)						
tert-Amyl methyl ether	(ug/l)						
tert-Buthyl ethyl ether	(ug/l)						
tert-Butylbenzene	(ug/l)	5					
Tertiary Butyl Alcohol	(ug/l)						
Tetrachloroethene	(ug/l)	5	[174] J	[166]	[211]	[23.2]	2.4
Toluene	(ug/l)	5		[9.1]	[14.5]		
trans-1,2-Dichloroethene	(ug/l)	5	1.7	1.8	2.2		
trans-1,3-Dichloropropene	(ug/l)	0.4					
Trichloroethene	(ug/l)	5	[202] J	[91.4]	[155]	[18.0]	1.6
Trichlorofluoromethane	(ug/l)	5					
Vinyl Acetate	(ug/l)						
Vinyl chloride	(ug/l)	2					

NOTES
U - Not Detected
J- Estimated Value

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	SCDHS-MPR-01 4/13/2007 50-60-ft bgs	SCDHS-MPR-01 7/8/2008 50-60-ft bgs	SCDHS-MPR-01 12/10/2012 50-60-ft bgs	S-58535 5/20/2011 240-270-ft-bgs	S-58535 10/9/2012 240-270-ft-bgs
1,1,1,2-Tetrachloroethane	(ug/l)	5					
1,1,1-Trichloroethane	(ug/l)	5				4.2	3.8
1,1,2,2-Tetrachloroethane	(ug/l)	5					
1,1,2-Trichloroethane	(ug/l)	1					
1,1-Dichloroethane	(ug/l)	5		0.98 J		3.6	4.2
1,1-Dichloroethene	(ug/l)	5				5.9	5.7
1,1-Dichloropropene	(ug/l)	5					
1,2,3-Trichlorobenzene	(ug/l)	5					
1,2,3-Trichloropropane	(ug/l)	5					
1,2,4-Trichlorobenzene	(ug/l)	5					
1,2,4-Trimethylbenzene	(ug/l)	5					
1,2-Dibromo-3-chloropropane	(ug/l)	0.04					
1,2-Dibromoethane	(ug/l)	0.0006					
1,2-Dichlorobenzene	(ug/l)	3					
1,2-Dichloroethane	(ug/l)	0.6					
1,2-Dichloropropane	(ug/l)	1					
1,3,5-Trimethylbenzene	(ug/l)	5					
1,3-Dichlorobenzene	(ug/l)	3					
1,3-Dichloropropane	(ug/l)	5					
1,4-Dichlorobenzene	(ug/l)	3					0.24 J
1,4-Dioxane	(ug/l)						
2-Butanone	(ug/l)	50		3.9 J			
2-Chlorotoluene	(ug/l)	5					
2-Hexanone	(ug/l)	50					
2-Nitropropane	(ug/l)						
3-Chloropropene	(ug/l)						
4-Chlorotoluene	(ug/l)	5					
4-Methyl-2-Pentanone	(ug/l)						
Acetone	(ug/l)	50		[54.6]	5.3 J		
Acrylonitrile	(ug/l)	5					

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	SCDHS-MPR-01 4/13/2007 50-60-ft bgs	SCDHS-MPR-01 7/8/2008 50-60-ft bgs	SCDHS-MPR-01 12/10/2012 50-60-ft bgs	S-58535 5/20/2011 240-270-ft-bgs	S-58535 10/9/2012 240-270-ft-bgs
Benzene	(ug/l)	1					
Bromobenzene	(ug/l)	5					
Bromochloromethane	(ug/l)	5					
Bromodichloromethane	(ug/l)	50					
Bromoform	(ug/l)	50					
Bromomethane	(ug/l)	5					
Carbon Disulfide	(ug/l)	60					
Carbon Tetrachloride	(ug/l)	5					
Chlorobenzene	(ug/l)	5				0.63 J	0.78 J
Chlorodifluoromethane	(ug/l)	5					
Chloroethane	(ug/l)	5					
Chloroform	(ug/l)	7				1.6	1.8
Chloromethane	(ug/l)	5					
Chloroprene	(ug/l)						
cis-1,2-Dichloroethene	(ug/l)	5				37.3	40
cis-1,3-Dichloropropene	(ug/l)	0.4					
Cyclohexane	(ug/l)						
Dibromochloromethane	(ug/l)	50					
Dibromomethane	(ug/l)	5					
Dichlorodifluoromethane	(ug/l)	5					
Diethyl ether	(ug/l)						
Ethanol	(ug/l)						
Ethylbenzene	(ug/l)	5					
Freon 113	(ug/l)	5					
Hexachlorobutadiene	(ug/l)	0.5					
Isopropyl Ether	(ug/l)						
Isopropylbenzene	(ug/l)	5					
m+p-Xylene	(ug/l)	5		0.53 J			

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	SCDHS-MPR-01 4/13/2007 50-60-ft bgs	SCDHS-MPR-01 7/8/2008 50-60-ft bgs	SCDHS-MPR-01 12/10/2012 50-60-ft bgs	S-58535 5/20/2011 240-270-ft-bgs	S-58535 10/9/2012 240-270-ft-bgs
Methacrylonitrile	(ug/l)						
Methyl Acetate	(ug/l)						
Methyl acrylate	(ug/l)						
Methyl Cyclohexane	(ug/l)			0.19 J			
Methyl Tertiary Butyl Ether	(ug/l)	10					
Methylene Chloride	(ug/l)	5					
Naphthalene	(ug/l)	10					
n-Butylbenzene	(ug/l)	5					
n-Propylbenzene	(ug/l)	5					
o-Xylene	(ug/l)	5	2.03				
p-Isopropyltoluene	(ug/l)	5					
sec-Butylbenzene	(ug/l)	5					
Styrene	(ug/l)	5					
tert-amyl alcohol	(ug/l)						
tert-Amyl methyl ether	(ug/l)						
tert-Buthyl ethyl ether	(ug/l)						
tert-Butylbenzene	(ug/l)	5					
Tertiary Butyl Alcohol	(ug/l)						
Tetrachloroethene	(ug/l)	5				123	120
Toluene	(ug/l)	5	[265]	0.74 J			
trans-1,2-Dichloroethene	(ug/l)	5	4.44	1		0.70 J	0.71 J
trans-1,3-Dichloropropene	(ug/l)	0.4					
Trichloroethene	(ug/l)	5				57.1	58
Trichlorofluoromethane	(ug/l)	5					
Vinyl Acetate	(ug/l)						
Vinyl chloride	(ug/l)	2					

NOTES
U - Not Detected
J- Estimated Value

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	S-72566 5/20/2011 86-100-ft-bgs	S-72566 10/9/2012 86-100-ft-bgs
1,1,1,2-Tetrachloroethane	(ug/l)	5		
1,1,1-Trichloroethane	(ug/l)	5	0.50 J	4.4
1,1,2,2-Tetrachloroethane	(ug/l)	5		
1,1,2-Trichloroethane	(ug/l)	1		
1,1-Dichloroethane	(ug/l)	5	0.68 J	3.3
1,1-Dichloroethene	(ug/l)	5		6.4
1,1-Dichloropropene	(ug/l)	5		
1,2,3-Trichlorobenzene	(ug/l)	5		
1,2,3-Trichloropropane	(ug/l)	5		
1,2,4-Trichlorobenzene	(ug/l)	5		
1,2,4-Trimethylbenzene	(ug/l)	5		
1,2-Dibromo-3-chloropropane	(ug/l)	0.04		
1,2-Dibromoethane	(ug/l)	0.0006		
1,2-Dichlorobenzene	(ug/l)	3		
1,2-Dichloroethane	(ug/l)	0.6		
1,2-Dichloropropane	(ug/l)	1		
1,3,5-Trimethylbenzene	(ug/l)	5		
1,3-Dichlorobenzene	(ug/l)	3		
1,3-Dichloropropane	(ug/l)	5		
1,4-Dichlorobenzene	(ug/l)	3		
1,4-Dioxane	(ug/l)			
2-Butanone	(ug/l)	50	20.2	
2-Chlorotoluene	(ug/l)	5		
2-Hexanone	(ug/l)	50		
2-Nitropropane	(ug/l)			
3-Chloropropene	(ug/l)			
4-Chlorotoluene	(ug/l)	5		
4-Methyl-2-Pentanone	(ug/l)			
Acetone	(ug/l)	50	9.9 J	
Acrylonitrile	(ug/l)	5		

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	S-72566 5/20/2011 86-100-ft-bgs	S-72566 10/9/2012 86-100-ft-bgs
Benzene	(ug/l)	1		
Bromobenzene	(ug/l)	5		
Bromochloromethane	(ug/l)	5		
Bromodichloromethane	(ug/l)	50		
Bromoform	(ug/l)	50		
Bromomethane	(ug/l)	5		
Carbon Disulfide	(ug/l)	60		
Carbon Tetrachloride	(ug/l)	5		
Chlorobenzene	(ug/l)	5		0.56 J
Chlorodifluoromethane	(ug/l)	5		
Chloroethane	(ug/l)	5		
Chloroform	(ug/l)	7		1.7
Chloromethane	(ug/l)	5		
Chloroprene	(ug/l)			
cis-1,2-Dichloroethene	(ug/l)	5	17.3	29
cis-1,3-Dichloropropene	(ug/l)	0.4		
Cyclohexane	(ug/l)			
Dibromochloromethane	(ug/l)	50		
Dibromomethane	(ug/l)	5		
Dichlorodifluoromethane	(ug/l)	5		
Diethyl ether	(ug/l)			
Ethanol	(ug/l)			
Ethylbenzene	(ug/l)	5		
Freon 113	(ug/l)	5		
Hexachlorobutadiene	(ug/l)	0.5		
Isopropyl Ether	(ug/l)			
Isopropylbenzene	(ug/l)	5		
m+p-Xylene	(ug/l)	5		

TABLE 3
GROUNDWATER SAMPLING RESULTS
NYTD OU-2 RI
ALL ROUNDS - HITS ONLY

CONSTITUENT	UNITS	NYSDEC TOGS	S-72566 5/20/2011 86-100-ft-bgs	S-72566 10/9/2012 86-100-ft-bgs
Methacrylonitrile	(ug/l)			
Methyl Acetate	(ug/l)			
Methyl acrylate	(ug/l)			
Methyl Cyclohexane	(ug/l)			
Methyl Tertiary Butyl Ether	(ug/l)	10		
Methylene Chloride	(ug/l)	5		
Naphthalene	(ug/l)	10		
n-Butylbenzene	(ug/l)	5		
n-Propylbenzene	(ug/l)	5		
o-Xylene	(ug/l)	5		
p-Isopropyltoluene	(ug/l)	5		
sec-Butylbenzene	(ug/l)	5		
Styrene	(ug/l)	5		
tert-amyl alcohol	(ug/l)			
tert-Amyl methyl ether	(ug/l)			
tert-Buthyl ethyl ether	(ug/l)			
tert-Butylbenzene	(ug/l)	5		
Tertiary Butyl Alcohol	(ug/l)			
Tetrachloroethene	(ug/l)	5	18.9	130
Toluene	(ug/l)	5		0.31 J
trans-1,2-Dichloroethene	(ug/l)	5	0.80 J	0.51 J
trans-1,3-Dichloropropene	(ug/l)	0.4		
Trichloroethene	(ug/l)	5	8.4	56
Trichlorofluoromethane	(ug/l)	5		
Vinyl Acetate	(ug/l)			
Vinyl chloride	(ug/l)	2		

NOTES
U - Not Detected
J- Estimated Value

TABLE 4
NEW YORK TWIST DRILL
ETHANE/ETHENE SAMPLING RESULTS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	ERM-MW-01 12/10/2012 0.00	ERM-MW-02 12/10/2012 0.00	ERM-MW-02D 12/10/2012 0.00	ERM-MW-03 12/10/2012 0.00	ERM-MW-04 12/10/2012 0.00
Ethane	(ug/l)		0.23 U	2.2	0.37	0.23 U	0.23 U
Ethene	(ug/l)		0.31 U	0.31 U	33.0	0.31 U	0.31 U

U - Not Detected
J - Estimated Value

TABLE 4
NEW YORK TWIST DRILL
ETHANE/ETHENE SAMPLING RESULTS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	ERM-MW-05 12/10/2012 0.00	ERM-MW-06 12/10/2012 0.00	ERM-MW-07D 12/10/2012 0.00	ERM-MW-08 12/10/2012 0.00	ERM-MW-09 12/10/2012 0.00
Ethane	(ug/l)		53.6	0.23 U	0.23 U	0.23 U	0.23 U
Ethene	(ug/l)		67.2	0.31 U	0.31 U	0.37	2.0

U - Not Detected
J - Estimated Value

TABLE 4
NEW YORK TWIST DRILL
ETHANE/ETHENE SAMPLING RESULTS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	ERM-MW-10 12/10/2012 0.00	ERM-MW-11D 12/10/2012 0.00	ERM-MW-11M 12/10/2012 0.00	ERM-MW-11S 12/10/2012 0.00	ERM-MW-12M 12/10/2012 0.00
Ethane	(ug/l)		0.23 U	0.23 U	0.23 U	0.23 U	0.31
Ethene	(ug/l)		0.31 U	0.31 U	0.31 U	1.7	0.31 U

U - Not Detected
J - Estimated Value

TABLE 4
NEW YORK TWIST DRILL
ETHANE/ETHENE SAMPLING RESULTS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE DATE DEPTH (ft)	NYSDEC TOGS	ERM-MW-12S 12/10/2012 0.00	SCDHS-MPR-01 12/10/2012 0.00
Ethane	(ug/l)		0.56	1.1
Ethene	(ug/l)		0.43	0.31 U

U - Not Detected
J - Estimated Value

TABLE 5

Subslab, Indoor and Outdoor Air Sampling Results

10 Melville Park Road

NYTD OU-2 Off-Site RI

PERIOD:

SAMPLE TYPE: Air

CONSTITUENT	SITE / SAMPLE ID / DATE	NYSDOH Guidance	10MPR-IA-01 / 10MPR-IA-01 / 01/18/2014	10MPR-OA-01 / 10MPR-OA-01 / 01/18/2014	10MPR-SS-01 / 10MPR-SS-01 / 01/18/2014	10MPR-SS-02 / 10MPR-SS-02 / 01/18/2014	AA-01 / AA-01 / 03/19/2007
1,1,2,2-Tetrachloroethane	(ug/m3)		1.4 U	1.4 U	5.5 U	5.5 U	
1,1,2-Trichloroethane	(ug/m3)		1.1 U	1.1 U	4.4 U	4.4 U	1.4 U
1,1-Dichloroethane	(ug/m3)		0.81 U	0.81 U	3.2 U	3.2 U	0.89 U
1,1-Dichloroethene	(ug/m3)		0.79 U	0.79 U	3.2 U	3.2 U	
1,2,4-Trichlorobenzene	(ug/m3)		1.5 U	1.5 U	5.9 U	5.9 U	6.2 U
1,2,4-Trimethylbenzene	(ug/m3)		0.98 U	0.98 U	3.9 U	3.9 U	3.1 U
1,2-Dibromoethane	(ug/m3)		1.5 U	1.5 U	6.1 U	6.1 U	1.8 U
1,2-Dichlorobenzene	(ug/m3)		1.2 U	1.2 U	4.8 U	4.8 U	4.6 U
1,2-Dichloroethane	(ug/m3)		0.81 U	0.81 U	3.2 U	3.2 U	6.96 U
1,2-Dichloropropane	(ug/m3)		0.92 U	0.92 U	3.7 U	3.7 U	2.0 U
1,3,5-Trimethylbenzene	(ug/m3)		0.98 U	0.98 U	3.9 U	3.9 U	2.2 U
1,3-Butadiene	(ug/m3)		0.44 U	0.44 U	1.8 U	1.8 U	1.1 U
1,3-Dichlorobenzene	(ug/m3)		1.2 U	1.2 U	4.8 U	4.8 U	1.9 U
1,3-Dichloropropane	(ug/m3)						1.3 U
1,4-Dichlorobenzene	(ug/m3)		1.2 U	1.2 U	4.8 U	4.8 U	4.4 U
1,4-Dioxane	(ug/m3)		0.72 U	0.72 U	2.9 U	2.9 U	2.1 U
2,2,4-Trimethylpentane	(ug/m3)		0.93 U	0.93 U	3.7 U	3.7 U	
2-Butanone	(ug/m3)		0.59 U	0.50 J	7.7	5.9	0.91 U
2-Chlorotoluene	(ug/m3)		1.0 U	1.0 U	4.1 U	4.1 U	
2-Hexanone	(ug/m3)		0.82 U	0.82 U	3.3 U	3.3 U	1.5 U
3-Chloropropene	(ug/m3)		0.63 U	0.63 U	2.5 U	2.5 U	
4-Ethyltoluene	(ug/m3)		0.98 U	0.98 U	3.9 U	3.9 U	
4-Methyl-2-Pentanone	(ug/m3)		0.82 U	0.82 U	3.3 U	3.3 U	4.1 U
Acetone	(ug/m3)		7.4	5.2	233	121	1.5 U
Benzene	(ug/m3)		0.18 J	0.83	2.6 U	2.6 U	1.0 U
Benzyl chloride	(ug/m3)		1.0 U	1.0 U	4.1 U	4.1 U	1.7 U
Bromodichloromethane	(ug/m3)		1.3 U	1.3 U	5.4 U	5.4 U	2 U
Bromoethene	(ug/m3)		0.87 U	0.87 U	3.5 U	3.5 U	
Bromoform	(ug/m3)		2.1 U	2.1 U	8.3 U	8.3 U	

[X] - Greater than NYSDOH Matrix 1 & 2 Values
J - Estimated Concentration, ND - Not Detected

TABLE 5

Subslab, Indoor and Outdoor Air Sampling Results

10 Melville Park Road

NYTD OU-2 Off-Site RI

PERIOD:

SAMPLE TYPE: Air

CONSTITUENT	SITE SAMPLE ID DATE	NYSDOH Guidance	10MPR-IA-01 10MPR-IA-01 01/18/2014	10MPR-OA-01 10MPR-OA-01 01/18/2014	10MPR-SS-01 10MPR-SS-01 01/18/2014	10MPR-SS-02 10MPR-SS-02 01/18/2014	AA-01 AA-01 03/19/2007
Bromomethane	(ug/m3)		0.78 U	0.78 U	3.1 U	3.1 U	2.3 U
Carbon Disulfide	(ug/m3)		0.62 U	0.62 U	2.5 U	2.5 U	0.50 U
Carbon Tetrachloride	(ug/m3)		1.3 U	1.3 U	5.0 U	5.0 U	1.8 U
Chlorobenzene	(ug/m3)		0.92 U	0.92 U	3.7 U	3.7 U	1.7 U
Chloroethane	(ug/m3)		0.53 U	0.53 U	2.1 U	2.1 U	0.61 U
Chloroform	(ug/m3)		0.98 U	0.98 U	3.9 U	12	1.2 U
Chloromethane	(ug/m3)		1.6	1.4	1.7 U	1.7 U	1.0 U
cis-1,2-Dichloroethene	(ug/m3)		0.79 U	0.79 U	3.2 U	3.2 U	1.3 U
cis-1,3-Dichloropropene	(ug/m3)		0.91 U	0.91 U	3.6 U	3.6 U	1.1 U
Cyclohexane	(ug/m3)		0.69 U	0.69 U	2.8 U	2.8 U	
Dibromochloromethane	(ug/m3)		1.7 U	1.7 U	6.8 U	6.8 U	2.7 U
Dichlorodifluoromethane	(ug/m3)		3.4	2.6	4.5	11	2 U
Ethanol	(ug/m3)		21.3	5.7	70.8	69.5	0.93 U
Ethyl acetate	(ug/m3)		0.72 U	2.3	2.9 U	2.9 U	1.5 U
Ethylbenzene	(ug/m3)		0.87 U	0.87 U	1.1 J	3.5 U	2 U
Freon 113	(ug/m3)		3.2	3.0	4.8 J	18	2.0 U
Freon 114	(ug/m3)		1.4 U	1.4 U	5.6 U	15	
Heptane	(ug/m3)		0.82 U	0.74 J	3.3 U	3.3 U	
Hexachlorobutadiene	(ug/m3)		2.1 U	2.1 U	8.5 U	8.5 U	
Hexane	(ug/m3)		0.46 J	1.1	2.0 J	9.2	5.85 U
Isopropyl Alcohol	(ug/m3)		1.5	0.98	15	4.2	1.1 U
m+p-Xylene	(ug/m3)		0.87 U	0.56 J	3.5 U	3.3 J	1.8 U
Methyl Tertiary Butyl Ether	(ug/m3)		0.72 U	0.72 U	2.9 U	2.9 U	2.1 U
Methylene Chloride	(ug/m3)		4.9	2.4	4.5	28	1 U
Methylmethacrylate	(ug/m3)		0.82 U	0.82 U	3.3 U	3.3 U	
Naphthalene	(ug/m3)						2.1 U
n-Heptane	(ug/m3)						1.4 U
o-Xylene	(ug/m3)		0.87 U	0.87 U	0.91 J	3.5 U	1.7 U
Propylene	(ug/m3)		0.86 U	0.86 U	3.4 U	3.4 U	

[X] - Greater than NYSDOH Matrix 1 & 2 Values
J - Estimated Concentration, ND - Not Detected

TABLE 5
Subslab, Indoor and Outdoor Air Sampling Results
10 Melville Park Road
NYTD OU-2 Off-Site RI

PERIOD:
SAMPLE TYPE: Air

CONSTITUENT	SITE / SAMPLE ID / DATE	NYSDOH Guidance	10MPR-IA-01 / 10MPR-IA-01 / 01/18/2014	10MPR-OA-01 / 10MPR-OA-01 / 01/18/2014	10MPR-SS-01 / 10MPR-SS-01 / 01/18/2014	10MPR-SS-02 / 10MPR-SS-02 / 01/18/2014	AA-01 / AA-01 / 03/19/2007
Styrene	(ug/m3)		0.85 U	0.85 U	2.7 J	2.9 J	1.7 U
Tertiary Butyl Alcohol	(ug/m3)		0.61 U	0.61 U	2.4 U	2.5	
Tetrachloroethene	(ug/m3)	100	0.27 U	0.27 U	32	73.9	1.8 U
Tetrahydrofuran	(ug/m3)		0.59 U	0.59 U	2.4 U	2.4 U	
Toluene	(ug/m3)		0.75 U	1.1	3.1	3.0	3.3 U
trans-1,2-Dichloroethene	(ug/m3)		0.79 U	0.79 U	3.2 U	3.2 U	
trans-1,3-Dichloropropene	(ug/m3)		0.91 U	0.91 U	3.6 U	3.6 U	
Trichloroethene	(ug/m3)	5.0	0.21 U	0.21 U	0.86 U	0.86 U	1.3 U
Trichlorofluoromethane	(ug/m3)		2.6	1.1	2.4 J	7.9	1.6 U
Vinyl Acetate	(ug/m3)		0.70 U	0.70 U	2.8 U	2.8 U	
Vinyl chloride	(ug/m3)		0.51 U	0.51 U	2.0 U	2.0 U	1.2 U
1,1,1,2-Tetrachloroethane	(ug/m3)						1.7 U
1,1,1-Trichloroethane	(ug/m3)	100	1.1 U	1.1 U	4.4 U	4.4 U	2 U

[X] - Greater than NYSDOH Matrix 1 & 2 Values
J - Estimated Concentration, ND - Not Detected

TABLE 5
Subslab, Indoor and Outdoor Air Sampling Results
10 Melville Park Road
NYTD OU-2 Off-Site RI

PERIOD:
SAMPLE TYPE: Air

CONSTITUENT	SITE / SAMPLE ID / DATE	NYSDOH Guidance	IA-01 / IA-01 / 03/19/2007	SS-01 / SS-01 / 03/19/2007	SS-02 / SS-02 / 03/19/2007
1,1,2,2-Tetrachloroethane	(ug/m3)				
1,1,2-Trichloroethane	(ug/m3)		1.4 U	1.4 U	1.4 U
1,1-Dichloroethane	(ug/m3)		0.89 U	0.89 U	0.89 U
1,1-Dichloroethene	(ug/m3)				
1,2,4-Trichlorobenzene	(ug/m3)		6.2 U	6.2 U	6.2 U
1,2,4-Trimethylbenzene	(ug/m3)		3.1 U	3.1 U	3.1 U
1,2-Dibromoethane	(ug/m3)		1.8 U	1.8 U	1.8 U
1,2-Dichlorobenzene	(ug/m3)		4.6 U	4.6 U	4.6 U
1,2-Dichloroethane	(ug/m3)		6.96 U	6.96 U	6.96 U
1,2-Dichloropropane	(ug/m3)		2.0 U	2.0 U	2.0 U
1,3,5-Trimethylbenzene	(ug/m3)		2.2 U	2.2 U	2.2 U
1,3-Butadiene	(ug/m3)		1.1 U	1.1 U	1.1 U
1,3-Dichlorobenzene	(ug/m3)		1.9 U	1.9 U	1.9 U
1,3-Dichloropropane	(ug/m3)		1.3 U	1.3 U	1.3 U
1,4-Dichlorobenzene	(ug/m3)		4.4 U	4.4 U	4.4 U
1,4-Dioxane	(ug/m3)		2.1 U	2.1 U	2.1 U
2,2,4-Trimethylpentane	(ug/m3)				
2-Butanone	(ug/m3)		0.91 U	0.91 U	0.91 U
2-Chlorotoluene	(ug/m3)				
2-Hexanone	(ug/m3)		1.5 U	1.5 U	1.5 U
3-Chloropropene	(ug/m3)				
4-Ethyltoluene	(ug/m3)				
4-Methyl-2-Pentanone	(ug/m3)		4.1 U	4.1 U	4.1 U
Acetone	(ug/m3)		1.5 U	1.5 U	1.5 U
Benzene	(ug/m3)		1.0 U	1.0 U	1.0 U
Benzyl chloride	(ug/m3)		1.7 U	1.7 U	1.7 U
Bromodichloromethane	(ug/m3)		2 U	2 U	2 U
Bromoethene	(ug/m3)				
Bromoform	(ug/m3)				

[X] - Greater than NYSDOH Matrix 1 & 2 Values
J - Estimated Concentration, ND - Not Detected

TABLE 5

Subslab, Indoor and Outdoor Air Sampling Results

10 Melville Park Road

NYTD OU-2 Off-Site RI

PERIOD:

SAMPLE TYPE: Air

CONSTITUENT	SITE SAMPLE ID DATE	NYSDOH Guidance	IA-01 IA-01 03/19/2007	SS-01 SS-01 03/19/2007	SS-02 SS-02 03/19/2007
Bromomethane	(ug/m3)		2.3 U	2.3 U	2.3 U
Carbon Disulfide	(ug/m3)		0.50 U	0.50 U	0.50 U
Carbon Tetrachloride	(ug/m3)		1.8 U	1.8 U	1.8 U
Chlorobenzene	(ug/m3)		1.7 U	1.7 U	1.7 U
Chloroethane	(ug/m3)		0.61 U	0.61 U	0.61 U
Chloroform	(ug/m3)		1.2 U	1.2 U	21.2
Chloromethane	(ug/m3)		1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	(ug/m3)		1.3 U	1.3 U	14.6
cis-1,3-Dichloropropene	(ug/m3)		1.1 U	1.1 U	1.1 U
Cyclohexane	(ug/m3)				
Dibromochloromethane	(ug/m3)		2.7 U	2.7 U	2.7 U
Dichlorodifluoromethane	(ug/m3)		2 U	2 U	2 U
Ethanol	(ug/m3)		0.93 U	0.93 U	0.93 U
Ethyl acetate	(ug/m3)		1.5 U	1.5 U	1.5 U
Ethylbenzene	(ug/m3)		2 U	2 U	2 U
Freon 113	(ug/m3)		2.0 U	2.0 U	2.0 U
Freon 114	(ug/m3)				
Heptane	(ug/m3)				
Hexachlorobutadiene	(ug/m3)				
Hexane	(ug/m3)		5.85 U	5.85 U	5.85 U
Isopropyl Alcohol	(ug/m3)		1.1 U	1.1 U	1.1 U
m+p-Xylene	(ug/m3)		1.8 U	1.8 U	1.8 U
Methyl Tertiary Butyl Ether	(ug/m3)		2.1 U	2.1 U	2.1 U
Methylene Chloride	(ug/m3)		1 U	1 U	1 U
Methylmethacrylate	(ug/m3)				
Naphthalene	(ug/m3)		2.1 U	2.1 U	2.1 U
n-Heptane	(ug/m3)		1.4 U	1.4 U	1.4 U
o-Xylene	(ug/m3)		1.7 U	1.7 U	1.7 U
Propylene	(ug/m3)				

[X] - Greater than NYSDOH Matrix 1 & 2 Values
J - Estimated Concentration, ND - Not Detected

TABLE 5

Subslab, Indoor and Outdoor Air Sampling Results

10 Melville Park Road

NYTD OU-2 Off-Site RI

PERIOD:

SAMPLE TYPE: Air

CONSTITUENT	SITE SAMPLE ID DATE	NYSDOH Guidance	IA-01 IA-01 03/19/2007	SS-01 SS-01 03/19/2007	SS-02 SS-02 03/19/2007
Styrene	(ug/m3)		1.7 U	1.7 U	1.7 U
Tertiary Butyl Alcohol	(ug/m3)				
Tetrachloroethene	(ug/m3)	100	1.8 U	[111]	[1010]
Tetrahydrofuran	(ug/m3)				
Toluene	(ug/m3)		3.3 U	3.3 U	3.3 U
trans-1,2-Dichloroethene	(ug/m3)				
trans-1,3-Dichloropropene	(ug/m3)				
Trichloroethene	(ug/m3)	5.0	1.3 U	1.3 U	[66.6]
Trichlorofluoromethane	(ug/m3)		1.6 U	1.6 U	1.6 U
Vinyl Acetate	(ug/m3)				
Vinyl chloride	(ug/m3)		1.2 U	1.2 U	1.2 U
1,1,1,2-Tetrachloroethane	(ug/m3)		1.7 U	1.7 U	1.7 U
1,1,1-Trichloroethane	(ug/m3)	100	2 U	2 U	2 U

[X] - Greater than NYSDOH Matrix 1 & 2 Values

J - Estimated Concentration, ND - Not Detected

[x]=Greater than Action Level

TABLE 6
NEW YORK TWIST DRILL
AIR CONDITIONING WELL SAMPLING RESULTS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	S-58535 05/20/2011 0.00	S-58535 10/09/2012 0.00	S-72566 05/20/2011 0.00	S-72566 10/09/2012 0.00
1,1,1-Trichloroethane	(ug/l)	5	4.2	3.8	0.50 J	4.4
1,1,2,2-Tetrachloroethane	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	(ug/l)	1	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	(ug/l)	5	3.6	4.2	0.68 J	3.3
1,1-Dichloroethene	(ug/l)	5	[5.9]	[5.7]	1.0 U	[6.4]
1,2,3-Trichlorobenzene	(ug/l)	5		1.0 U		1.0 U
1,2,4-Trichlorobenzene	(ug/l)	5	5.0 U	1.0 U	5.0 U	1.0 U
1,2-Dibromo-3-chloropropane	(ug/l)	0.04	10 U	1.0 U	10 U	1.0 U
1,2-Dibromoethane	(ug/l)	0.0006	2.0 U	1.0 U	2.0 U	1.0 U
1,2-Dichlorobenzene	(ug/l)	3	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	(ug/l)	0.6	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	(ug/l)	1	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	(ug/l)	3	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	(ug/l)	3	1.0 U	0.24 J	1.0 U	1.0 U
1,4-Dioxane	(ug/l)			50 U		50 U
2-Butanone	(ug/l)	50	10 U	5.0 U	20.2	5.0 U
2-Hexanone	(ug/l)	50	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	(ug/l)		5.0 U	5.0 U	5.0 U	5.0 U
Acetone	(ug/l)	50	10 U	5.0 U	9.9 J	5.0 U
Benzene	(ug/l)	1	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	(ug/l)	5		1.0 U		1.0 U
Bromodichloromethane	(ug/l)	50	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	(ug/l)	50	4.0 U	1.0 U	4.0 U	1.0 U
Bromomethane	(ug/l)	5	2.0 U	1.0 U	2.0 U	1.0 U
Carbon Disulfide	(ug/l)	60	2.0 U	1.0 U	2.0 U	1.0 U
Carbon Tetrachloride	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	(ug/l)	5	0.63 J	0.78 J	1.0 U	0.56 J
Chloroethane	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	(ug/l)	7	1.6	1.8	1.0 U	1.7

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 6
NEW YORK TWIST DRILL
AIR CONDITIONING WELL SAMPLING RESULTS

PERIOD:
SAMPLE TYPE: Water

CONSTITUENT	SITE / DATE / DEPTH (ft)	NYSDEC TOGS	S-58535 05/20/2011 0.00	S-58535 10/09/2012 0.00	S-72566 05/20/2011 0.00	S-72566 10/09/2012 0.00
Chloromethane	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	(ug/l)	5	[37.3]	[40]	[17.3]	[29]
cis-1,3-Dichloropropene	(ug/l)	0.4	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	(ug/l)		5.0 U	1.0 U	5.0 U	1.0 U
Dibromochloromethane	(ug/l)	50	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane	(ug/l)	5	5.0 U	1.0 U	5.0 U	1.0 U
Ethylbenzene	(ug/l)	5	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	(ug/l)	5	5.0 U	1.0 U	5.0 U	1.0 U
Isopropylbenzene	(ug/l)	5	2.0 U	1.0 U	2.0 U	1.0 U
m+p-Xylene	(ug/l)	5		2.0 U		2.0 U
Methyl Acetate	(ug/l)		5.0 U	2.0 U	5.0 U	2.0 U
Methyl Cyclohexane	(ug/l)		5.0 U	1.0 U	5.0 U	1.0 U
Methyl Tertiary Butyl Ether	(ug/l)	10	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	(ug/l)	5	2.0 U	1.0 U	2.0 U	1.0 U
o-Xylene	(ug/l)	5		1.0 U		1.0 U
Styrene	(ug/l)	5	5.0 U	1.0 U	5.0 U	1.0 U
Tetrachloroethene	(ug/l)	5	[123]	[120]	[18.9]	[130]
Toluene	(ug/l)	5	1.0 U	1.0 U	1.0 U	0.31 J
trans-1,2-Dichloroethene	(ug/l)	5	0.70 J	0.71 J	0.80 J	0.51 J
trans-1,3-Dichloropropene	(ug/l)	0.4	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	(ug/l)	5	[57.1]	[58]	[8.4]	[56]
Trichlorofluoromethane	(ug/l)	5	5.0 U	1.0 U	5.0 U	1.0 U
Vinyl chloride	(ug/l)	2	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	(ug/l)	5	1.0 U		1.0 U	

U - Not Detected
J - Estimated Value

[x]=Greater than Action Level

TABLE 7
SCGs (STANDARDS, CRITERIA AND GUIDELINES)
NEW YORK TWIST DRILL

CITATION	DESCRIPTION	Applicability to RAOs	COMMENTS
Standards and Criteria (1)			
6 NYCRR Part 364	Waste Transporter Permits	Applicable	This standard would relate to alternatives that involve waste removal.
6 NYCRR 375-1	General Remedial Program Requirements	Applicable	Applicable
6 NYCRR 375-2	Inactive Hazardous Waste Disposal Site Remedial Program	Applicable	Applicable
6 NYCRR Part 608	Use and Protection of Waters	Not applicable	No navigable Waters in study area.
6 NYCRR Part 661	Tidal Wetlands - Land Use Regulations	Not applicable	No wetlands in study area
6 NYCRR Part 663	Freshwater Wetlands - Permit Requirements	Not applicable	No wetlands in study area
6 NYCRR 703-5	Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations	Applicable	Standards would be applicable for remedial action alternatives that involve work associated with Site ground water.
6 NYCRR Part 376	Land Disposal Restrictions	Not applicable	No hazardous wastes in study area
19 NYCRR Part 600	Waterfront Revitalization and Coastal Resources	Not applicable	No waterfront in study area
OSHA; 29 CFR 1910	Guidelines/Requirements for Workers at Hazardous Waste Sites (Subpart 120) and Standards for Air Contaminants (Subpart 1).	Applicable	May relate to certain remedial action activities
OSHA; 29 CFR 1926	Safety and Health Regulations for Construction	Applicable	May relate to certain remedial action activities.
Guidance (1)			
NYSDEC DER-10	Technical Guidance for Site Investigation and Remediation	Applicable	Relates to all Site remedial action activities.
DER-15	Presumptive/Proven Remedial Technologies (February 2007)	Applicable	Guidance is applicable for remedy selection and evaluation
NYSDOH Community Air Monitoring Plan for Intrusive Activities	Requirements real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust)	Applicable	Would relate to any intrusive remedial activities (soil excavation and disposal).
NYSDOH Guidance for Evaluating Soil Vapor Intrusion	Guidance in identifying and addressing existing and potential human exposures to contaminated subsurface vapors associated with known or suspected VOCs contamination.	Applicable	Guidance would be applicable for remedial action alternatives for buildings above impacted areas.
NYSDEC TOGS 1.1.1	Ambient Water Quality Standards and Guidance Values	Applicable	Guidance would be applicable for remedial action alternatives that involve work associated with Site ground water.
CP-43	Groundwater Monitoring Well Decommissioning Policy (November 2009)	Applicable	This guidance will apply to remedial alternatives that require the use of monitoring wells.
TAGM -4030	Selection of Remedial Actions at Inactive Hazardous Waste Sites	Not applicable	TAGMs no longer applicable
TAGM 4051	Early Design Strategy (August 1993)	Not applicable	TAGMs no longer applicable
TAGM 3028	Contained In Criteria for Environmental Media: Soil Action Levels (August 1997)	Not applicable	No soil contamination, TAGM no longer applicable
Freshwater Wetlands Regulations	Guidelines on Compensatory Mitigation (October 1993)	Not applicable	No wetlands in study area
DAR-1 (Air Guide 1)	Guidelines for the Control of Toxic Ambient Air Contaminants	Applicable	May be applicable in remedial alternatives that involve installation of an SSD system
	Technical Guidance for Screening Contaminated Sediments (January 1999)	Not applicable	No sediment contamination in study area
	USEPA Office of Solid Waste and Emergency Response Directive 9355.047FS Presumptive Remedies: Policy and Procedures	Applicable	Relates to all Site remedial action activities.
	USEPA Office of Solid Waste and Emergency Response Directive 9355.048FS Presumptive Remedies: Site Characterization and Technology Selection for CERCLA sites with Volatile Organic Compounds in Soils	Not applicable	No soil contamination in study area
	USEPA Office of Solid Waste and Emergency Response Directive 9355.049FS Presumptive Remedy for CERCLA Municipal Landfills	Not applicable	No municipal landfill in study area

(1) Standards and Criteria and Guidelines were obtained from NYSDEC DER-10 and additional SCGs used in similar projects

GLOSSARY OF ACRONYMS

NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Code of Rules and Regulations
OSHA	Occupational Safety and Health
SCG	Standards, Criteria and Guidance
USEPA	U. S. Environmental Protection Agency
DER	Division of Environmental Remediation

TABLE 8
RAO EVALUATION
NEW YORK TWIST DRILL

GROUND WATER RAOS	Applicable	Comments
Protection of Public Health		
GWRAO1 - Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards	YES	Although the pathway is incomplete, groundwater depth (100+ feet), and direct contact is highly unlikely, remedial action must prevent installation of drinking wells within the off-Site plume.
GWRAO2 - Prevent contact with, or inhalation of volatiles, from contaminated groundwater.	YES	Pathway complete. Remedial action to conduct SV sampling in 10 Melville Park Road building and the building above exisiting off-Site plume,100 Baylis Road, and remedial action to address potential SV issues based on the SV results.
Environmental Protection		
GWRAO3 - Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.	YES	
GWRAO4 - Prevent the discharge of contaminants to surface water	NO	Not applicable, incomplete pathway as there are no surface water bodies within approx. 3 miles.
GWRAO5 - Remove the source of ground or surface water contamination.	NO	Not applicable, soil source has been addressed.
SOIL RAOs		
Protection of Public Health		
SRAO1 - Prevent ingestion/direct contact with contaminated soil.	NO	No soil contamination in OU-2
SRAO2 - Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil	NO	No soil contamination in OU-2
Environmental Protection		
SRAO3 - Prevent migration of contaminants that would result in groundwater or surface water contamination.	NO	No soil contamination in OU-2
SRAO4 - Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.	NO	No soil contamination in OU-2
SURFACE WATER RAOs		
Protection of Public Health		
SWRAO1 - Prevent ingestion of water impacted by contaminants.	NO	No surface water contamination in OU-2
SWRAO2 - Prevent contact or inhalation of contaminants from impacted water bodies.	NO	No surface water contamination in OU-2
SWRAO3 - Prevent surface water contamination which may result in fish advisories.	NO	No surface water contamination in OU-2
Environmental Protection		
SWRAO4 - Restore surface water to ambient water quality criteria for the contaminant of concern.	NO	No surface water contamination in OU-2
SWRAO5 - Prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the marine or aquatic food chain.	NO	No surface water contamination in OU-2
SEDIMENT RAOs		
Protection of Public Health		
SDRAO1 - Prevent direct contact with contaminated sediments	NO	No sediment contamination in OU-2
SDRAO2 - Prevent surface water contamination which may result in fish advisories.	NO	No sediment contamination in OU-2
Environmental Protection		
SDRAO3 - Prevent releases of contaminant(s) from sediments that would result in surface water levels in excess of (ambient water quality criteria).	NO	No sediment contamination in OU-2
SDRAO4 - Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain.	NO	No sediment contamination in OU-2
SDRAO5 - Restore sediments to pre-release/background conditions to the extent feasible.	NO	No sediment contamination in OU-2
SOIL VAPOR RAOs		
Protection of Public Health		
SVRAO1 - Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.	YES	Pathway complete. Remedial action to conduct SV sampling in 10 Melville Park Road building and the building above exisiting off-Site plume, 100 baylis Road, and remedial action to address potential SV issues based on the SV results.

TABLE 9
TECHNOLOGY SCREENING
NEW YORK TWIST DRILL

GRA	TECHNOLOGY	DESCRIPTION	ABILITY TO MEET RAOs*	EFFECTIVENESS	IMPLEMENTABILITY	Cost	Technology Carried Forward?
Limited Action	Institutional Controls - 10 NYCRR Part 5-1.31 Drinking Water Supplies.	10 NYCRR Part 5-1.31 of the State Sanitary Code prevents installation of a private potable water supply well in areas that are served by a public water supply system.	This technology meets the following RAOs: GWRAO1	This technology would need to be used in conjunction with other technologies to be effective	All the properties within the VOC affected plume are supplied by a public water system, therefore, this part of the code is readily implementable and would continue to be enforced by NYSDOH. preventing contact with the VOC-affected groundwater.	Low	**Yes**
Limited Action	Environmental Easement	This technology involves filing an environmental easement prohibiting groundwater use at the NYTD Site without treatment to render it safe for the intended use and notification of off-Site property owners to guide future intrusive groundwater work or A/C pump maintenance activities within the study area. This technology would also rely on existing State Sanitary code restrictions for the installation of water supply wells in areas served by public water supply.	This technology meets the following RAOs: GWRAO1 and GWRAO2	This technology would need to be used in conjunction with other technologies to be effective	This technology is readily implementable	Low	**Yes**
Limited Action	Ground Water Monitoring	Relies on natural processes to breakdown ground water contaminants. Natural attenuation processes include physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce mass, toxicity, mobility, volume.	This technology meets the following RAOs: GWRAO3	Evaluation of contaminant trends and geochemical parameters indicates that natural attenuation through aerobic and anaerobic biodegradation is occurring within the plume. Off-Site groundwater concentrations are showing decreasing trends and groundwater monitoring will be an effective technology for meeting RAOs within an acceptable timeframe.	Groundwater Monitoring is readily implementable and requires a certain sampling frequency for the appropriate parameters, which is currently underway at the site.	Low	**Yes**
Limited Action	Soil Vapor Monitoring	Soil Vapor Monitoring is used to evaluate potential soil vapor impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.	This technology meets the following RAOs: GWRAO2 and SVRAO1	This technology would need to be used in conjunction with other technologies to be effective.	Soil Vapor Sampling is readily implementable and has been conducted at the Site previously and will be conducted in areas where soil vapor pathways are complete.	Low	**Yes**
Extraction and Disposal	Sub-Slab Depressurization (SSD)	This technology involves the installation of subsurface piping to collect soil gas. The collected vapors are then transferred to the atmosphere through emission controls, if needed. The sub-slab depressurization system utilizes a blower and controls to create vacuum	This technology meets the following RAOs: GWRAO2 and SVRAO1	Sub-slab depressurization is effective in collecting soil gas from beneath slabs. Systems of this type have been used for years to mitigate intrusion of radon gas into enclosed structures.	SSD installation is a contingency measure should potential Soil Vapor Monitoring in future locations mandate the need for treatment.	Low to Moderate	**Yes**
Extraction and Disposal	Ground Water Pump and Treat	Groundwater extraction, also called pump-and-treat, is a source removal technology using extraction wells and pumps. As water impacted by contaminants is drawn from the aquifer, uncontaminated water is pulled into the source area limiting the migration of contaminants from the source area. Contaminants adsorbed to soil below the water table are released into groundwater by chemical gradients and then can be extracted and treated. In order to implement this technology, a network of recovery wells would be installed throughout the Site. The number, location, well screen size/length, and pumping rates would be determined by pilot testing during the remedial design phase. The collected water would be transported by underground piping to an on-site treatment facility and discharged to a sanitary or stormwater sewer, or potential discharged directly into the sanitary sewer.they can be treated above ground by one of the many treatment methods available. Several ex-situ treatment technologies are available including air stripping and Granular Activated Carbon (GAC) adsorption.	This technology meets the following RAOs: GWRAO3	Pump and Treat technology is a mature technology that has been used in multiple Sites. Pump-and-treat systems remove groundwater contaminated with a variety of dissolved materials, including VOCs, SVOCs, fuels, explosive compounds, and dissolved metals. Pump-and-treat systems often take a very long time to meet cleanup goals. Pumping depresses the groundwater level, leaving residuals sorbed to the soil. After the groundwater level returns to its normal level, contaminants sorbed onto soil become dissolved. This phenomenon is called "rebound." Rebound tests should be performed frequently in the first few years after a system is turned off, and after major rain or flooding events.	Capital and O&M expenses for pump and treat technologies are generally much larger than technologies involving direct push injections. In this case, given the depth of the affected media, those capital expenses would be even bigger. Also, from an implementation point of view, installation and operation may be disruptive of current Site activities. Another implementability issue would be installation of piping and extraction wells throughout the large plume and finding a suitable discharge location for the treated water. Typical discharge points are the publically-owned treatment works (POTW), surface water, and groundwater. The local POTW is often reluctant to receive large volumes of groundwater that could interfere with their treatment process. Groundwater discharge could be through a stormwater recharge basin. The nearest surface water for discharge is several miles from the Site. Significant permitting would be required for all three options.	High	No
Treatment	In Situ Chemical Oxidation (ISCO) with permanganate	ISCO involves the introduction of a chemical oxidant into the subsurface for the purpose of transforming groundwater or soil contaminants into less harmful chemical species.This technology includes in situ chemical oxidation of VOCs using potassium permanganate, with follow-up groundwater monitoring as necessary.	This technology meets the following RAOs: GWRAO3	In situ chemical oxidation has been used successfully to remove significant contaminant mass from soils and groundwater at thousands of sites. Permanganate is very effective short term technology is the goechemical conditions are ideal for the treatment of VOCs such as TCE, and PCE. Current chemical Site conditions favor the application of Chemical Oxidation, however, the geological conditions make this application unfeasible. ISCO relies heavily on contact, but being the geology of the site mostly sand with some layers of clay, it would require large amounts of injected material to reach the desired contact time.	The equipment and construction methods required for the direct-push injection of potassium permanganate are readily available, material injection given the depth of the plume might prove costly. Also, given the large portions of fluid that will need to be injected for effectiveness, it may prove to be troublesome for the activities in the areas of injection. Preferential flow paths and areas of low conductivity will dictate where injected potassium permanganate will flow, which could result in portions of the treatment area not receiving injected material. This can be overcome by conducting a pilot test to evaluate effectiveness parameters and/or by reducing the grid spacing for the direct-push injections.	High	No
Treatment	In Situ Chemical Reduction (ISCR) and Enhanced Bioremediation via Zero-Valent Iron (ZVI) and Organic Substrate	The synergistic mix of ZVI and a carbon source used together for the remediation of soil, groundwater and sediment. Stimulation of both abiotic and biotic dechlorination mechanisms are achieved in this process.	This technology meets the following RAOs: GWRAO3	Proven to be very effective in the short-medium term at many Sites. Previous Site source was succesfully treated with this technology, off-Site GW can be easily converted to anaerobic conditions.	ZVI is not soluble in water and hydraulic fracturing or pneumatic fracturing would need to be used to deliver the ZVI into the plume. The equipment and construction methods required for the injection of ZVI given the depth of the plume might prove costly and ineffective in comparison with other in-situ treatment alternatives.	High	No
Treatment	In Situ Chemical Reduction and Enhanced Bioremediation via Organic Substrate emulsion	The practice of adding a controlled-release organic carbon substrate to the affected groundwater. Stimulation of both abiotic and biotic dechlorination mechanisms are achieved in this process. The anaerobic bioremediation processes and abiotic dechlorination reactions promoted by the carbon substrate emulsion are effective at remediating chlorinated solvents.The most commonly targeted chlorinated groundwater contaminants are primarily used in industry as degreasing agents and include: ■Perchloroethylene (PCE) ■Trichloroethylene (TCE) ■Dichloroethylene (DCE) ■Vinyl Chloride (VC)	This technology meets the following RAOs: GWRAO3	Technology not as proven as ISCR via ZVI, but effective in the short-medium term at many Sites. Previous Site source was succesfully treated with reductive technologies , off-Site GW can be easily converted to anaerobic conditions.	The Carbon substrate emulsion is food-grade and soluble in water, therefore, the equipment and construction methods required for the injection of the substrate emulsion are readily available. Direct push technologies cannot be used at the Site given the depth of the plume,. therefore, material injection given the depth of the plume might prove costly, but less costly than ZVI as material can be delivered through gravity fed temporary wells. Injection effectiveness, implementability and cost can be largely improved by conducting a pilot test.	Moderate to High	**Yes**

(*) **<u>Ground Water Remedial Action Objectives (RAOs)</u>**
GWRAO1 - Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards
GWRAO2 - Prevent contact with, or inhalation of volatiles, from contaminated groundwater.
GWRAO3 - Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.

(*) **<u>Soil Vapor RAOs</u>**
SVRAO1 - Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

TABLE 10
EVALUATION OF COMPLIANCE WITH STANDARDS, CRITERIA, AND GUIDELINES
NEW YORK TWIST DRILL SITE, MELVILLE, NY

CITATION	DESCRIPTION	TYPE	ALTERNATIVES				MANNER OF COMPLIANCE
			1	2	3	4	
STANDARDS AND CRITERIA (1)							
6 NYCRR Part 364	Waste Transporter Permits	Action	--	✓	✓	✓	Alternatives 2, 3 and 4 will generate some waste material in the develoment and installation of wells. Additionally, it is anticipated some waste material from direct-push or other drilling techniques used for the injection of the remediation materials. All materials will be shipped accordance with the referenced Standard.
6 NYCRR 375-1	General Remedial Program Requirements	Action	NC	✓	✓	✓	Alternatives 2, 3 and 4 comply with this standard as those alternatives include remedial technologies that will be protective of the human health and enviroment. In all these alternatives the selection of a remedy has been completed in accordance with the referenced regulation.
6 NYCRR 375-2	Inactive Hazardous Waste Disposal Site Remedial Program	Action	NC	✓	✓	✓	Alternatives 2, 3 and 4 comply with this standard as those alternatives include remedial technologies that will be protective of the human health and enviroment. In all these alternatives the selection of a remedy has been completed in accordance with the referenced regulation.
6 NYCRR 703-5	Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations	Chemical	NC	✓	✓	✓	Alternatives 2, 3 and 4 will use Class GA standards to assess remedial needs for the Off-Site ground water and these values will be used in these alternatives to evaluate the effectiveness of the Remedial Action.
OSHA; 29 CFR 1910	Guidelines/Requirements for Workers at Hazardous Waste Sites (Subpart 120) and Standards for Air Contaminants (Subpart 1).	Action	--	✓	✓	✓	All alternatives will include preparation and implementation of a HASP that will address the requirement of this regulation.
OSHA; 29 CFR 1926	Safety and Health Regulations for Construction	Action	--	✓	✓	✓	The HASP prepared for the alternatives will include provisions for construction safety.
GUIDELINES (1)							
NYSDEC DER-10	Technical Guidance for Site Investigation and Remediation	Action	NC	✓	✓	✓	Development of remedial goals, objectives and alternatives conducted in accordance with this document, remedial design and O&M would address the requirements of this document once finalized.
NYSDEC DER-15	Presumptive/Proven Remedial Technologies (February 2007)	Action	--	✓	✓	✓	Selection of remedial technologies conducted in accordance with this document.
NYSDOH Community Air Monitoring Plan for Intrusive Activities	Requirements real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust)	Action, Chemical	--	✓	✓	✓	Air monitoring conducted during intrusive activities will address the requirements of this document. Fugitive dust and particulate suppression controls will be employed if necessary.
NYSDOH Guidance for Evaluating Soil Vapor Intrusion	Guidance in identifying and addressing existing and potential human exposures to contaminated subsurface vapors associated with known or suspected VOCs contamination	Action, Chemical	--	✓	✓	✓	Alternatives 2, 3 and 4 include an air monitoring program to assess and monitor potential for vapor intrusion and incorporate operation of a sub-slab. depressurization system to address potential harmful vapors emanating from site groundwater underneath office buildings. Contaminant values in Matrices 1 and 2 in this guidance document will be used to evaluate the need for further action.
NYSDEC TOGS 1.1.1	Ambient Water Quality Standards and Guidance Values	Action, Chemical	NC	✓	✓	✓	This guidance document will be used to evaluate the effectiveness of remedial actions. Alternatives 2, 3 and 4 comply with this guideline as these alternatives include technologies that address all groundwater RAOs by treatment (active or natural) and monitoring of natural attenuation processes.
USEPA Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites	EPA's policy regarding the applicability and use of MNA for remediation of contaminated groundwater and soil.	Action	NC	✓	✓	✓	Alternatives 2, 3, and 4 include a component of MNA as part of the remedy. This guidance is used to confirm the applicability of MNA as a remedial option. Further, this document is referenced in DER-10 for use in developing the effectiveness monitoring requirements of the final MNA remedy.
CP-43	Groundwater Monitoring Well Decommissioning Policy (November 2009)	Action	--	✓	✓	✓	Remedial design and O&M would address the requirements of this document once finalized.
DAR-1 (formerly Air Guide 1)	Guidelines for the Control of Toxic Ambient Air Contaminants	Action, Chemical	--	✓	✓	✓	SSD remedial design and O&M would address the requirements of this document once finalized.
	USEPA Office of Solid Waste and Emergency Response Directive 9355.047FS Presumptive Remedies: Policy and Procedures	Action	NC	✓	✓	✓	Development of remedial goals, objectives and alternatives conducted in accordance with this document, remedial design and O&M would address the requirements of this document once finalized.

Notes:

(1) Standards, Criteria and Guidelines were obtained from NYSDEC DER-10 and additional SCGs used in similar NY State projects

Alternatives
1: No Action
2: Institutional Control, Soil Vapor Monitoring , SSD Installation (Contingent) + MNA
3: Alternative 2 + Focused ICRS via Organic Substrate Emulsion Injections
4: Alternative2 + Sitewide ICRS via Organic Substrate Emulsion Injections

✓ Alternative complies with this SCG.
NC Alternative does not comply with this SCG.
PC Alternative partially complies with this SCG. See manner of compliance column and FS text for additional detail.
-- SCG is not applicable to this alternative.

GLOSSARY OF ACRONYMS

NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Code of Rules and Regulations
OSHA	Occupational Safety and Health
SCG	Standards, Criteria and Guidance
USEPA	U. S. Environmental Protection Agency
DER	Division of Environmental Remediation

TABLE 11

Remedial Alternative 2 Cost Estimate

Existing Institutional Controls + Contingent Soil Vapor Investigation + Contingent SSD Installation And Groundwater Monitoring

New York Twist Drill Off-Site Ground Water Site

Melville, NY

Item Description	Units	Unit Cost	Quantity	Total Cost	Ref
CAPITAL COSTS					
Common Action No. 1 - Institutional Controls					
Mandatory Enforcement of Part 5 NYSDOH Sanitary Code	ls	$ -	1	$ -	1
Groundwater Monitoring					
Monitoring Well Installation	wells	$ 41,000	2	$ 82,000	3
			Grand Total	$ 82,000	
			Mobilization/Demobilization (5%)	$ 4,100	4
			Project Management (8%)	$ 6,560	4
			Remedial Design (15%)	$ 12,300	4
			Construction Management (10%)	$ 8,200	4
			Reporting (8%)	$ 6,560	4
Total Remedial Action Capital Costs To Be Incurred (A)				***$ 119,720***	

Item Description	Units	Unit Cost	Quantity	Total Cost	Ref
LONG TERM O&M COSTS					
Monitoring Well Installation (2 additional contingency wells)					
Monitoring Well Installation Year 3 ($41,000, 2% inflation, 4.25% discount rate)	wells	$ 38,353	1	$ 38,353	5, 6
Monitoring Well Installation Year 6 ($41,000 , 2% inflation, 4.25% discount rate)	wells	$ 35,876	1	$ 35,876	5, 6
Ground Water Sampling and Reporting					
Annual monitoring and reporting for 10 years.Analysis of Site COPC parameters, and natural attenuation parameters annually ($18,000 per year, 2% inflation, 4.25% discount rate)	ls	$ 159,592	1	$ 159,592	7
Common Action No. 2 - Contingent Indoor Air Investigation (at year 5)					
Indoor Air Sampling Program Work Plan Preparation	ls	$ 13,421	1	$ 13,421	2, 9
Indoor Air Sampling	sampling events	$ 10,737	1	$ 10,737	2, 8, 9
Total Present Value of Long Term Operation and Maintenance Costs (B)				***$ 257,978***	
TOTAL PRESENT WORTH OF COSTS (A+B)				**$ 377,698**	
CONTINGENCY (10%)				**$ 37,770**	4
TOTAL PRESENT WORTH OF COSTS (A+B)				**$ 415,467**	

Notes:

1 Mandatory Enforcement by NYSDOH, no cost incurred towards Remedial Action
2 ERM estimate based on prior experience with comparable tasks
3 ERM estimate based on Delta Well quote
4 Recommended Percentages for Technical Services (USEPA, 2000)
5 These wells are contingent and have been added for budgeting purposes but it is anticipated that the existing and future wells in Transect 5 will be sufficient to serve as Sentinel wells.
6 Transactional and legal costs for access are not included.
7 One round of sampling includes sampling of 8-12 monitoring wells + 2 QA/QC samples, average $250 lab costs per sample $11,000 in equipment rental and labor and $4500 in MNA evaluation and reporting, sampling event; resulting in approximately $18,000 every sampling event. Passive diffusion sampling will be used for the length of the study.
8 One Sub-slab vapor sample, indoor air samples, outdoor background samples per event. Assumes one event needed at future locations.
9 Soil Vapor monitoring is a contingent measure at potential future locations and has been added for budgeting purposes.

TABLE 12

Remedial Alternative 3 Cost Estimate

Common Actions No. 1-3 + Focused ISCR vis Organic Substrate Emulsion Injections + Ground Water Monitoring

New York Twist Drill Off-Site Ground Water Site

Melville, NY

Item Description	Units	Unit Cost	Quantity	Total Cost	Ref
CAPITAL COSTS					
Common Action No. 1 - Institutional Controls					
(Mandatory Enforcement of Part 5 NYSDOH Sanitary Code)	ls	$ -	-	$ -	1
Groundwater Sampling					
Monitoring Well Installation (Year 1)	wells	$ 41,000	2	$ 82,000	2
Focused Enhanced Anaerobic Bioremediation via Oil/Water Emulsion					
Field Subcontractor Work	injection point	$ 34,400	40	$ 1,376,000	2
Bio-chemical product	lbs	$ 1.45	206,400	$ 299,280	3
Freight Costs	ls	$ 4,000.00	7	$ 27,520	3
Surveying	ls	$ 6,000	1	$ 6,000	4
Injection Well Installation IDW Transportation and Disposal	drums	$ 195	234	$ 45,614	4
Expenses, H&S, Equipment Rental (frac tank)	ls	$ 43,000	1	$ 43,000	4
			Grand Total	$ 1,879,414	
			Mobilization/Demobilization (5%)	$ 93,971	5
			Project Management (8%)	$ 150,353	5
			Remedial Design (15%)	$ 281,912	5
			Construction Management (10%)	$ 187,941	5
			Reporting (8%)	$ 150,353	5
			Total Remedial Action Capital Costs To Be Incurred (B)	***$ 2,743,945***	

TABLE 12

Remedial Alternative 3 Cost Estimate
Common Actions No. 1-3 + Focused ISCR vis Organic Substrate Emulsion Injections + MNA
New York Twist Drill Off-Site Ground Water Site
Melville, NY

Item Description	Units	Unit Cost	Quantity	Total Cost	Ref
LONG TERM O&M COSTS					
Monitoring Well Installation (2 additional wells)					
Monitoring Well Installation Year 3 ($41,000, 2% inflation, 4.25% discount rate)	wells	$ 38,353	1	$ 38,353	2, 6, 7
Monitoring Well Installation Year 6 ($41,000 , 2% inflation, 4.25% discount rate)	wells	$ 35,876	1	$ 35,876	2, 6, 7
Focused Enhanced Anaerobic Bioremediation via Oil/Water Emulsion (Re-injection 50% of treated area after 5 years)					
Field Subcontractor Work	injection point	$ 34,400	20	$ 688,000	2
Bio-chemical product	lbs	$ 1.45	103,200	$ 149,640	3
Freight Costs	ls	$ 4,000.00	3	$ 13,760	3
Surveying	ls	$ 3,000	1	$ 3,000	4
Expenses, H&S, Equipment Rental (frac tank)	ls	$ 21,500	1	$ 21,500	4
Injection Well Installation IDW Transportation and Disposal	drums	$ 195	117	$ 22,807	4
Mob/Demob (5%), Project Management (8%), Remedial Design (15%), Construction Management (10%), Reporting (8%)	ls			$ 402,914	
			Subtotal	$ 1,301,621	
Subtotal Present Value of 50% re-injection in 5 years. ($450,000 lump sum value, 2% inflation, 4.25% discount rate)				$ 1,164,577	7
Ground Water Sampling and Reporting (Monitoring Natural Attenuation, MNA)					
Semiannual monitoring and reporting for 2 years.Analysis of Site COPC parameters, and natural attenuation parameters annually ($36,000 per year, 2% inflation, 4.25% discount rate)	ls	$ 69,641	1	$ 69,641	8
Yearly monitoring subsequently every year for 8 years for Site COPC parameters, and natural attenuation parameters ($18,000 per year, 2% inflation, 4.25% discount rate)	ls	$ 124,771	1	$ 124,771	8
			Subtotal MNA Present Value	**$ 194,412**	
Common Action No. 2 - Contingent Indoor Air Investigation (at Year 5 - assumption)					
Indoor Air Sampling Program Work Plan Preparation	ls	$ 13,421	1	$ 13,421	4, 10
Indoor Air Sampling	sampling events	$ 10,737	1	$ 10,737	4, 9, 10
Total Present Value of Long Term Operation and Maintenance Costs (C)				***$ 1,457,375***	
TOTAL PRESENT WORTH OF COSTS (B+C)				**$ 4,201,320**	
CONTINGENCY (10%)				**$ 420,132**	5
TOTAL PRESENT WORTH OF COSTS (A+B)				**$ 4,621,452**	

Notes:
1 Mandatory Enforcement by NYSDOH, no cost incurred towards Remedial Action
2 Drilling costs (monitoring well installation and temporary injection well) provided by Delta well. Assumed 25 injection wells will be needed for this alternative.
3 Cost obtained from EOS Environmental quote for the Project
4 ERM estimate based on prior experience with comparable tasks
5 Recommended Percentages for Technical Services (USEPA, 2000)
6 These wells are contingent and have been added for budgeting purposes but it is anticipated that the existing and future wells in Transect 5 will be sufficient to serve as Sentinel wells.
7 Transactional and legal costs for access are not included.
8 One round of sampling includes sampling of 8-12 monitoring wells + 2 QA/QC samples, average $250 lab costs per sample $11,000 in equipment rental and labor and $4500 in MNA evaluation and reporting, sampling event; resulting in approximately $18,000 every samping event. Passive diffusion sampling will be used for the length of the study.
9 One Sub-slab vapor sample, indoor air samples, outdoor background samples per event. Assumes one event.
10 Soil Vapor monitoring is a contingent measure at potential future locations and has been added for budgeting purposes.

TABLE 13

Remedial Alternative 4 Cost Estimate
Common Actions No. 1-3 + Sitewide ISCR vis Organic Substrate Emulsion Injection + MNA
New York Twist Drill Off-Site Ground Water Site
Melville, NY

Item Description	Units	Unit Cost	Quantity	Total Cost	Ref
CAPITAL COSTS					
Common Action No. 1 - Institutional Controls					
(Mandatory Enforcement of Part 5 NYSDOH Sanitary Code)	ls	$ -	-	$ -	1
Monitored Natural Attenuation					
Monitoring Well Installation (Year 1)	wells	$ 41,000	2	$ 82,000	2
Focused Enhanced Anaerobic Bioremediation via Oil/Water Emulsion					
Field Subcontractor Work	injection point	$ 34,400	110	$ 3,784,000	2
Bio-chemical product	lbs	$ 1.45	516,000	$ 748,200	3
Freight Costs	ls	$ 4,000.00	17	$ 68,800	3
Surveying	ls	$ 15,000	1	$ 15,000	4
Injection Well Installation IDW Transportation and Disposal	drums	$ 195	643	$ 125,440	4
Expenses, H&S, Equipment Rental (frac tank)	ls	$ 120,400	1	$ 120,400	4
			Grand Total	$ 4,943,840	
			Mobilization/Demobilization (5%)	$ 247,192	5
			Project Management (8%)	$ 395,507	5
			Remedial Design (15%)	$ 741,576	5
			Construction Management (10%)	$ 494,384	5
			Reporting (8%)	$ 395,507	5
			Total Remedial Action Capital Costs To Be Incurred (B)	***$ 7,218,006***	

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TABLE 13

Remedial Alternative 4 Cost Estimate
Common Actions No. 1-3 + Sitewide ISCR vis Organic Substrate Emulsion Injection + MNA
New York Twist Drill Off-Site Ground Water Site
Melville, NY

Item Description	Units	Unit Cost	Quantity	Total Cost	Ref
LONG TERM O&M COSTS					
Monitoring Well Installation (2 additional wells)					
Monitoring Well Installation Year 2 ($41,000, 2% inflation, 4.25% discount rate)	wells	$ 39,215	1	$ 39,215	2, 6, 7
Monitoring Well Installation Year 5 ($41,000 , 2% inflation, 4.25% discount rate)	wells	$ 36,683	1	$ 36,683	2, 6, 7
Focused Enhanced Anaerobic Bioremediation via Oil/Water Emulsion (Re-injection 50% of treated area after 3 years)					
Field Subcontractor Work	injection point	$ 34,400	50	$ 1,720,000	2
Bio-chemical product	lbs	$ 1.45	258,000	$ 374,100	3
Freight Costs	ls	$ 4,000.00	9	$ 34,400	3
Surveying	ls	$ 7,500	1	$ 7,500	4
Expenses, H&S, Equipment Rental (frac tank)	ls	$ 60,200	1	$ 60,200	4
Injection Well Installation IDW Transportation and Disposal	drums	$ 195	322	$ 62,720	4
Mob/Demob (5%), Project Management (8%), Remedial Design (15%), Construction Management (10%), Reporting (8%)	ls			$ 1,010,252	
				$ 3,269,172	
Subtotal Present Value of 50% re-injection in 3 years. ($450,000 lump sum value, 2% inflation, 4.25% discount rate)				$ 3,058,073	7
Ground Water Sampling and Reporting (Monitoring Natural Attenuation, MNA)					
Semiannual monitoring and reporting for 2 years.Analysis of Site COPC parameters, and natural attenuation parameters annually ($36,000 per year, 2% inflation, 4.25% discount rate)	ls	$ 69,641	1	$ 69,641	8
Yearly monitoring subsequently every year for 6 years for Site COPC parameters, and natural attenuation parameters ($20,000 per year, 2% inflation, 4.25% discount rate)	ls	$ 95,629	1	$ 95,629	8
Subtotal MNA Present Value				**$ 165,270**	
Common Action No. 2 - Contingent Indoor Air Investigation (at Year 5 - assumption)					
Indoor Air Sampling Program Work Plan Preparation	ls	$ 13,421	1	$ 13,421	4, 10
Indoor Air Sampling	sampling events	$ 10,737	1	$ 10,737	4, 9, 10
Total Present Value of Long Term Operation and Maintenance Costs (C)				***$ 3,323,398***	
TOTAL PRESENT WORTH OF COSTS (B+C)				**$ 10,541,404**	
CONTINGENCY (10%)				**$ 1,054,140**	7
TOTAL PRESENT WORTH OF COSTS (A+B)				**$ 11,595,545**	

Notes:
1 Mandatory Enforcement by NYSDOH, no cost incurred towards Remedial Action
2 Drilling costs (monitoring well installation and temporary injection well) provided by Delta well. Assumed 25 injection wells will be needed for this alternative.
3 Cost obtained from EOS Environmental quote for the Project
4 ERM estimate based on prior experience with comparable tasks
5 Recommended Percentages for Technical Services (USEPA, 2000)
6 These wells are contingent and have been added for budgeting purposes but it is anticipated that the existing and future wells in Transect 5 will be sufficient to serve as Sentinel wells.
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9 One Sub-slab vapor sample, indoor air samples, outdoor background samples per event. Assumes one event.
10 Soil Vapor monitoring is a contingent measure at potential future locations and has been added for budgeting purposes.

APPENDIX A

LINEAR REGRESSION ANALYSIS TO ASSESS TIME TO ACHIEVE GROUNDWATER QUALITY STANDARDS

APPENDIX A

Linear Regression Analysis to Asses time to reach Groundwater Standards
New York Twist Drill Off-Site Ground Water Site
Melville, NY

A First Order rate of Decay was used to calculate the Estimated Date of MNA Termination (1):

End C = Start Co*e^(-k*t)

Where: End C = Final Concentration
Start Co = Initial Concentration
k = degradation rate (days-1)
t = time (days)

Area & Well	Parameter	Concentration Start (C_o) (ppb)	Concentration End (C) (ppb)	k	Time to meet GWQS (day)	Time to meet GWQS (yr)	Contingency %	Date of last sample	Estimated Date of MNA Termination
MW-11D (based on MW-09 kinetics)	PCE	125	5	0.001	3218.9	8.8	13.2	12/10/12	2/28/26
MW-11D (based on MW-09 kinetics)	TCE	205	5	0.0016	2321.0	6.4	9.5	4/7/09	6/26/22

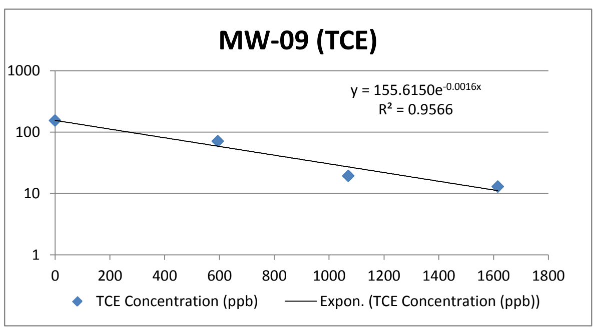
K Calculations: Best-Fit Method

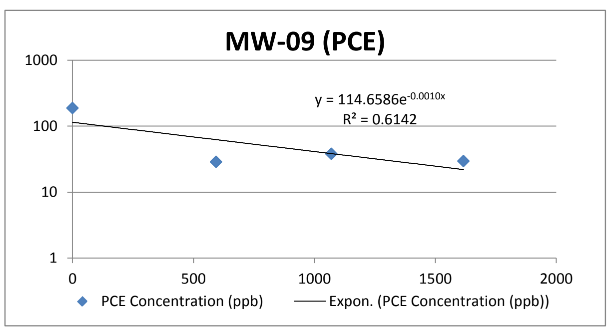
MW-09 (Representative Well of NYTD plume with sufficient data points)

Date	*Days*	*PCE Concentration (ppb)*	*TCE Concentration (ppb)*
7/8/08	0	188	155
2/22/10	594	28.8	71.1
6/13/11	1070	37.9	19.4
12/10/12	1616	29.5	13

k (PCE) = 0.001 days $^{-1}$

k (TCE) = 0.0016 days $^{-1}$





(1) NJDEP, Guidance on Designation Of Classification Exception Areas