Long Island Jewish Medical Center

Preliminary Site Assessment Work Plan

400 Lakeville Road
New Hyde Park, NY

July, 2007

Environmental Resources Management
520 Broad Hollow Road
Melville, New York 11747

PRELIMINARY SITE ASSESSMENT WORK PLAN

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1.0 INTRODUCTION

On behalf of Long Island Jewish Medical Center (LIJMC), Environmental Resources Management (ERM) is submitting this Preliminary Site Assessment (PSA) Work Plan (WP) for the site located at 400 Lakeville Road in New Hyde Park, Nassau County, New York (the Site). This PSA WP has been prepared as per the Order on Consent dated 23 January 2007, Index No. D1-0501-06-12.

This WP, Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP), defines all necessary operating parameters, procedures and protocols for performance of the PSA in one, comprehensive document. It is intended to:

- Identify the overall objectives of the PSA;
- Identify and describe both the technical approach and Scope of Work of the PSA;
- Define procedures and protocols for sampling and analysis, quality assurance (QA)/quality control (QC), and health and safety that will be used to implement field operations associated with the PSA;
- Establish data management and presentation guidelines;
- Establish final reporting guidelines;
- Present the overall anticipated project schedule; and
- Identify key project team members and their corresponding responsibilities and management/QA/QC roles on the project.

This document is intended to be followed by all personnel working on the PSA to ensure the generation of reliable data and measurement activities such that the resultant data and evaluations are scientifically valid, defensible, comparable, and of known precision and accuracy.

1.1 PURPOSE AND OBJECTIVES

Chlorodifluoromethane (Freon 22) has been detected in groundwater samples collected in northwestern Nassau County in a study being conducted by Lockheed Martin Corporation (LMC). The goals of the PSA are:

- investigate potential source areas at or in the vicinity of the Site;

- evaluate whether chemical constituents of concern (i.e., Freon 22 and VOCs) are present in environmental media (i.e., soil, groundwater and soil gas);
- confirm the general groundwater flow direction at the Site; and,
- evaluate data collected to determine if any impacts from past operations and/or disposal practices contributed to the existing groundwater plume in the Site area.

1.1.1 Site Setting

The Site presented on Figure 1-1, is located in New Hyde Park, Town of North Hempstead, Incorporated Village of Lake Success, Nassau County, New York. The Site encompasses approximately 46 acres and is designated Section 8, Block J, Lots 411 & 424. The Site is developed with a multi-story building structure, landscaping and asphalt parking areas. The property is owned by LIJMC which is located at 270-05 76th Avenue, New Hyde Park, New York 11040.

The approximate boundaries of the Site include; to the east, Lakeville Road; to the south, 410 Lakeville Road which is a two Story office building on a 5.5 acre parcel (Section 8, Block J, Lots 412 & 413) located to the southeast and 420 Lakeville Road which is a one story office building on a 3.85 acre parcel located directly south of the subject property (Section 8, Block J, Lot 423); bordering to the west is 1 Marcus Avenue (Astoria Federal Savings), a two story office building on 15.3 acre parcel (Section 8, Block J, Lots 10 & 416); and to the north, the Site is bordered by Marcus Avenue. A Site layout is presented on Figure 1-2.

1.1.2 Site History

Freon 22 has been used at the Site as a refrigerant in air conditioning systems using groundwater as a heat exchange medium. Groundwater was pumped from a supply well, through a chiller(s) containing the Freon 22 and then discharged back to the subsurface generally through a diffusion well(s). The system at 400 Lakeville was operated until 2004.

Freon 22 has been detected in groundwater samples collected in northwestern Nassau County in a study being conducted by LMC; and specifically in groundwater samples collected from well N-7560, located at 400 Lakeville, which was formerly used to provide groundwater to the building air conditioning system. The New York State Department of Environmental Conservation (NYSDEC) requested that LIJMC collect additional groundwater samples to evaluate whether the system at 400 Lakeville is a potential source of the Freon that has been detected in the area.

In addition, the NYSDEC directed that an engineering study of the air conditioning system at 400 Lakeville be conducted to determine if the system was leaking.

Records obtained from the NYSDEC and the United States Geological Survey (USGS) indicated that the system at 400 Lakeville consisted of the following wells:

400 Lakeville Road

Well Number	Use	Depth (below ground surface [bgs] in feet)	Aquifer
N-7560	Supply	242	Magothy
N-7762D	Diffusion	98	Unsaturated Zone
N-9714D[1]	Diffusion	98	Unsaturated Zone

1.1.2.1 July 6, 2004 Anson Environmental LTD. (AEL) letter referenced "Lockheed-Martin Corporation Groundwater Sampling Event"

As presented in the letter by Anson Environmental LTD (AEL) of Huntington New York, dated July 6, 2004 to LIJMC, AEL collected several grab samples (April 15, 2002, Sept. 26, 2002, June 13, 2003, Nov. 25, 2003 and May 26, 2004) of groundwater that was supplied to the air conditioning chiller(s) located in the basement of 400 Lakeville. The chiller influent water was supplied from the on-Site well designated N-7560 located adjacent to the northwest corner of 400 Lakeville. The groundwater samples were collected from a valve located at the influent line to the chiller unit. The grab sample collected on May 26, 2004, was split-sampled with ARCADIS Geraghty & Miller, Melville, New York (a consultant representing LIJ) and analyzed for volatile organic compounds (VOCs), Freon 113 and Freon 22, using New York State Analytical Services Protocol (NYSASP) Method 95-1. In addition, a groundwater sample was collected from N-7560 in February 2002, with a submersible pump from a depth of 110-feet bgs and analyzed for VOCs.

The results of the groundwater samples collected from the chiller influent line valve and submersible pump indicated that four (4) VOC compounds were detected above the New York State Department of Environmental Conservation (NYSDEC) Class GA Groundwater Criteria. These compounds included; *cis* -1,2-dichloroethene (c-1,2-DCE), trichloroethene (TCE), tetrachloroethene (PCE) and chlorodifluoromethane (Freon 22). Concentrations of *cis* -1,2-DCE ranged in concentration from 49 to 100 (ug/L [ppb]), TCE ranged from 8 to 23 ppb, PCE ranged from 8 to 23 ppb and Freon 22 ranged from 11 to 5,800 ppb.

[1] Replacement well

1.1.2.2 ERM Freon Investigation Report Dated July 2005

In March 2005, North Shore – Long Island Jewish Health System NS-LIJ contracted with ERM to perform additional investigative activities of the air conditioning system operations at 400 Lakeville.

Well Access

ERM subcontracted Delta Well & Pump of Lake Ronkonkoma (Delta) to assist in gaining access to the supply and diffusion wells and to assist in well purging prior to groundwater sampling. The supply well at 400 Lakeville (N-7560), located to the north of the building in a small island in the parking area, was still connected to the building piping and contained a dedicated submersible pump. Initially, Delta disconnected the electrical connections to the pump and the piping connection from the wellhead to the building (April 2005). The first sample collected from this well was collected with the non-dedicated submersible pump in the well (i.e., the sample was collected from above the pump). After the results of the first sampling round were reviewed, ERM decided to remove the submersible pump and interior well casing prior to sample collection to permit more complete purging of the well. On June 12, 2005, Delta returned to 400 Lakeville (N-7560) and removed the pump.

The diffusion wells at 400 Lakeville (N-7762D and N-9714D) are located to the east of the building in a landscaped area and shown on Figure 1-2. After gaining access, ERM and Delta determined that the well screens of both the wells were filled with gravel and/or sediment. Construction records for these wells indicate that they both were completed to a depth of 98 feet below ground surface (bgs), above the current water table. Samples of the gravel/sediment were then collected to assess the presence of contaminants.

The contaminants detected above the method detection limit (MDL) in the soil/sediment samples collected from the diffusion wells at 400 Lakeville (N-7762D and N9715D) were acetone, trichloroethene, tetrachloroethene, *cis*-1,2-dichloroethene, toluene and xylenes. Acetone is a common laboratory artifact and its presence in these samples is likely attributable to laboratory sources. Methylene chloride was also detected in these samples and in the associated blank.

Groundwater Sampling

Three rounds of groundwater sampling were carried out. During the second round samples were split with the NYSDEC and ARCADIS - Geraghty & Miller, Inc., LMC's environmental consultant. In the third round, samples were split with LMC's environmental consultant only.

First Round – April 2005

On April 14, 2005, the supply well at 400 Lakeville was sampled using a standard three-volume purge to insure fresh groundwater was present in the well. The well was purged using a 20 gallon per minute (gpm) Grundfos pump until measurements of temperature, pH, specific conductance (SC), dissolved oxygen (DO) in the purge water stabilized, and turbidity was below 50 nephelometric turbidity units (NTUs).

Second Round – June 2005

On June 10, 2005, ERM collected another round of groundwater samples from 400 Lakeville. The purging and sample collection method was modified to permit collection of "low-flow" samples after the completion of a three-volume purge. A 5-gpm Grundfos Readi-Flow pump was "piggybacked" onto the larger 20-gpm pump wire and dedicated discharge tubing and the two pump assembly lowered into the well[2]. The 20-gpm pump was primarily used to purge the well of the standard three volumes of water.

The samples collected from the supply well at 400 Lakeville (N-7560) contained Freon 22 at concentrations of 4 micrograms per liter (ug/L [ppb]) in April and 5 ppb and 4 ppb in the samples collected in June. The Principal Organic Contaminant[3] (POC) groundwater standard for Class GA groundwater is 5 ppb (6 NYCRR Part 703.5). Freon 22 in this well is therefore just at or slightly below the standard. *cis*-1,2-DCE was detected at concentration of 21 ppb (April), and 20 ppb and 20 ppb (June), PCE was detected at concentrations of 4 ppb (April), and 4 ppb and 3 ppb (June) and TCE was detected at 4 ppb in both the April and June samples. PCE, TCE and *cis*-1,2-DCE are not site related and their presence in N7560 apparently results from an offsite source which has impacted groundwater in northwestern Nassau County.

Third Round – May 2007

On May 17, 2007, as part of LMC's annual groundwater monitoring program, ARCADIS - Geraghty & Miller, Inc., LMC's environmental consultant collected a groundwater sample from N-7560. The purging and sampling method was the modified "low-flow" method described above. ERM split samples with Arcadis. The sample contained Freon 22 at a concentration of 2.89 ppb, which is below the 5 ppb Class GA POC

[2] The 5-gpm Rediflow pump had its own dedicated discharge tubing

[3] Principal Organic Contaminants are six chemical classes of compounds to which a standard of 5 ug/L (ppb) is applied. POC Classes 1 and 2 include halogenated alkanes containing fluorine, chlorine, bromine and iodine atoms. Freon 22 (chlorodifluoromethane), a halogenated methane therefore is a member of these classes

standard of 5 ppb. The sample also contained *cis*-1,2-DCE, PCE, TCE, methyl acetate, methyl cyclohexane and toluene. The observed concentration of *cis*-1,2-DCE exceeded Class GA standards.

The results of all three rounds of groundwater sampling are provided in Table 1. A copy of the laboratory data is provided on CDROM in Attachment 1.

Leak Testing

Helium leak testing of the groundwater cooled chiller units at 400 Lakeville site was carried out by Hoffmann & Feige (H&F) in February 2005. The chiller units, which discharged once through cooling water, had previously been tested (September 2004) and were thought to have leaked.

The chiller (two) units each had 60- and 30- ton shell and tube heat exchangers and were in operation until September 2004. Refrigerant (Freon 22) was used on the shell side and once-through groundwater ran through the tubes of each unit. The shell side refrigerant was at a pressure higher than the groundwater and therefore if leakage occurred, refrigerant would have leaked from the shell side into the groundwater.

The four refrigerant units were isolated from the chiller units prior to testing to ensure that only Freon leakage from the shell would be measured. All equipment was calibrated prior to testing using a traceable calibrated helium leak. All four units were checked while under pressure for any stray leaks so that all units were mechanically and under helium at test pressure when testing was completed. The shell side of each unit was tested at a helium pressure similar to the refrigerant operating pressure and leakage was measured using a Varian Instruments Portatest Helium Mass Spectrometer Leak Detector.

The results of the helium leak testing carried out on the four heat exchangers in the chillers located at 400 Lakeville showed that three of the four heat exchange units (Unit 1- 60 Ton and Unit 2- 30 and 60 Ton) had minimal measured leakage rates, ranging from 0.20 to 0.61 ounces per year (oz/yr). The measured leakage rate from the Unit 1 – 30 Ton heat exchanger ranged from 6.6 to 23.5 pounds per year (lbs/yr) based on an idle pressure differential (between refrigerant and groundwater) of 110 pounds per square inch (psi) and an operating pressure differential of 200 psi.

1.2 SITE HYDROGEOLOGY

The Site is situated at an elevation of approximately 135 feet mean sea level (msl). The Site is located in western Nassau County, Long Island. Long Island is situated within the Atlantic Coastal Plain physiographic province, which is underlain by a wedge of unconsolidated sediments that thickens and dips to the southeast toward the Atlantic Ocean.
The groundwater aquifer system in the western part of Nassau County consists of unconsolidated glacial deposits of the Pleistocene age (an epoch of glaciations from 1.8 million to 11,000 years ago) and coastal-plain deposits of continental and marine origin of the Late Cretaceous age (65 million years ago). These unconsolidated deposits consist of gravel, sand and clay and are underlain by bedrock. The bedrock, which is relatively impermeable, forms the base of the groundwater reservoir.

The relationships between hydrogeologic and geologic units underlying the Site are depicted on Figure 1-3 to facilitate discussion and depicts a generalized north-south trending cross-sectional view of the sediments, which comprise Long Island. As shown on the figure, the unconsolidated deposits underlying the Site consist of: (descending from land surface) the Upper Glacial Aquifer, the Magothy Aquifer, the Raritan Clay Confining Unit, and the Lloyd Aquifer.

2.0 PRELIMINARY SITE ASSESSMENT SCOPE OF WORK

The PSA Scope of Work, presented herein, is based on the tasks set forth in the Order on Consent dated 23 January 2007, Index No. D1-0501-06-12. These tasks are identified and described in detail below.

2.1 PRELIMINARY SITE ASSESSMENT TASKS

The Scope of Work involves an investigation that includes:

Data and Records Search: Available historic information (documents, maps, aerial photos, building permits, reports, etc.) shall be located and reviewed. Freedom of Information Law (FOIL) requests and well records search will be performed at the NYSDEC, Nassau County Department of Health (NCDOH), Nassau County Department of Public Works (NCDPW) and USGS.

Vertical Profile Borings: Groundwater profile borings will be installed at four locations. Groundwater samples will be obtained at 10 foot intervals beginning at the water table, anticipated to be approximately 105 feet bgs to a depth of approximately 250 feet bgs. The groundwater profile sampling will be initiated to determine the nature and extent of the groundwater impacts.

Soil samples will be collected using a split-barrel core sampler ("split-spoon") to characterize local geology and screened for the presence of volatile organic constituents (VOCs) using photo-ionization detection (PID) at the proposed vertical profile boring located adjacent to diffusion wells (N-9741D and N-7762D). Soil samples will be logged and screened at 10-foot intervals beginning at ground surface to the water table. Soil samples will be analyzed for Freons by a commercial laboratory with normal turn around time (TAT). Using USEPA SW-846 Method 8260 plus Freons.

Groundwater samples will be collected utilizing the Waterloo profiling method at ten-foot intervals from the water table to approximately 250 feet bgs. Groundwater samples will be analyzed for VOCs by a commercial laboratory with an expedited turn around time (TAT). Collected soil samples will be analyzed by USEPA SW-846 Method 8260 plus Freons with an expedited TAT.

Groundwater Monitoring Wells: Groundwater monitoring wells will be installed at up to seven (7) locations. Monitoring wells will be installed at the four (4) completed groundwater profile locations and screen zone settings will be selected based upon groundwater profile sampling results.

The NYSDEC will be consulted during selection of the screen zones. A monitoring well may be installed at a downgradient location, adjacent to Nassau County Department of Public Works monitoring well N-10290, if the groundwater profiling investigation reveals Freons at depth. Shallow (Upper Glacial Aquifer) monitoring wells may also be installed, to supplement monitoring well clusters previously installed by LMC at the Lakeville Jewish Center (Cluster 37) and the Great Neck Public School (Cluster 38). Currently, these two clusters contain well screened in the Magothy Aquifer. If Freon contamination is detected in the Upper Glacial aquifer during the installation of the on-Site Vertical Profile Borings, ERM will consult with LIJ and the NYSDEC to determine if installation of Upper Glacial Aquifer well(s) at one or both of these locations is justified. If it is determine that shallow monitoring wells are required, ERM will arrange for site access and monitoring well(s) will be installed.

Groundwater Sampling: Groundwater samples will be collected from each of the newly installed wells, the existing on-site supply well N-7560 and N10290. Groundwater samples will be analyzed for VOCs using USEPA SW-846 Method 8260 plus Freons. The laboratory will achieve a detection limit of 0.5 ppb and report the ten highest concentrations tentatively identified compounds (TICs) present in the samples.

Survey: At the completion of field sampling activities a New York State licensed surveyor will establish the location of each Waterloo profile boring and the elevation and location of all monitoring wells. Elevations of all riser pipes, protective well casings and ground surface and their corresponding latitude and longitude coordinates will be determined to within 0.01 feet, based on USGS datum.

Sub-slab Soil Gas and Indoor Air Sampling: To assess intrusion of Freon 22 contaminated vapors into 400 Lakeville Road, sub-slab soil gas samples and indoor air samples will be collected. Sampling methodologies will be in accordance with the New York State Department of Health (NYSDOH) Guidance Document entitled "Guidance for Evaluating Vapor Intrusion in the State of New York, dated October 2006. Four sub-slab soil gas and four indoor samples will be collected.

Data Usability Validation: All soil and groundwater analytical data will be validated to determine whether the data meets the site/project specific data quality objectives and data use as specified in the Draft DER10 Technical Guidance by an ERM Quality Assurance/Quality Control (QA/QC) officer.

The core field investigative activities of the PSA are discussed below, which comprise the Detailed Field Activities Plan (FAP). To streamline the FAP, and ensure that the field activities are executed in a consistent and safe manner, the FAP is supported by the following documents:

- Appendix A: Standard Operating Procedures (SOP);
- Appendix B: Quality Assurance Project Plan (QAPP); and
- Appendix C: Site Specific Health and Safety Plan (HASP).

Strict adherence to the SOPs, the QAPP and HASP will ensure the generation of reliable data and measurement activities such that resultant data and evaluations of the same are scientifically valid, defensible, comparable and of known precision and accuracy.

2.1.1 Historic Records Search

Available historic and contemporary information (documents, topographic and tax maps, aerial photos, building permits, reports, etc.) shall be located and reviewed. Information sources may include NYSDEC's Region 1 and Central Office (Albany) files, the Town of North Hempstead files, Nassau County Health Department (NCHD) files, Department of Public Works (NCDPW) and USGS files.

2.1.2 Underground Utility Markouts

ERM's Health and Safety policy requires that underground utility markouts be performed at the areas to be investigated prior to finalization of sampling locations, and/or any intrusive field investigation is undertaken. As part of this survey, the Underground Utilities Protection Organization (UFPO) will be contacted as required by law. Any information identified by utility mark outs that suggests the location of underground utility lines will be considered in design of the field-sampling program. Drilling will only be performed at a safe distance from all utilities.

2.1.3 Site Access

ERM anticipates performing on and off-Site investigative activities. ERM's drilling subcontractor will be tasked with obtaining the necessary (if needed) road opening permits and/or other authorizations as required by the Town of North Hempstead, Nassau County, State of New York State or Federal authority to lawfully perform the work described herein, including the payment of any required fees, posting of any bonds, or acquisition of any required additional insurance coverage and providing certificates/proof of the same.

ERM will require access to the LIJMC property to temporarily stage:

- Well construction materials;
- Subcontractor vehicles (i.e. overnight parking of the drill rig);
- A self-contained decontamination area;

- Drums of investigative derived waste (IDW) such as drill cuttings, decontamination water, and groundwater monitoring well development/purge water; and
- To install the Vertical Profile Borings and monitoring wells.

Property access may be required to the north of the site; specifically at the Lakeville Jewish Center and Great Neck Public School properties for the purpose of installing Upper Glacial monitoring well(s). ERM will contact the property owners to arrange access and provide the necessary insurance documents. In addition, ERM will consult LIJ to determine the ownership of the property to the south of 400 Lakeville Road to ascertain if an access agreement is necessary to install the upgradient Vertical Profile Boring and monitoring well.

Finally, a monitoring well may be installed at the existing N-10290 monitoring well located north of the Site. If the installation of this well is required the necessary access agreements and road opening permits and/or other authorizations as required by the Town of North Hempstead, Nassau County, State of New York or Federal authority to lawfully perform the work described herein, including the payment of any required fees, posting of any bonds, or acquisition of any required additional insurance coverage and providing certificates/proof of the same.

2.1.4 Vertical Profile Groundwater Borings

Vertical profile borings will be installed at four (4) on-site locations. Groundwater samples will be collected at each location to vertically characterize groundwater and to determine if Site-related contaminants have migrated off-Site in the direction of groundwater flow. The vertical profile borings will be advanced to depths equivalent of the bottom of the screen zone of N-7560 (approximately 250 feet bgs).

The approximate locations of the Vertical Profile Borings are shown in Figure 2-1. The on-Site groundwater profile borings will be installed at Site in four locations, specifically to the northeast near the intersection of Lakeville Road and Marcus Avenue, to the east at the location of the diffusion wells (N-9714D and N-7762D), to the south of the 400 Lakeville Road building adjacent to the square esplanade and to the northeast along the boundary with Astoria Federal Savings.

The Vertical Profile Borings will be installed using a Waterloo Profiler. The profiling tool will be installed with a hybrid drive platform. The Waterloo Profiler is a direct push tool, however the depth requirements and drilling conditions are at, or beyond the limits of direct push technologies. To extend these limits, the hybrid approach couples conventional drilling techniques with direct push technology.

Specifically, a Geoprobe GH60 hammer is mounted on a CME 1050 or a Mobile B80 rotary drilling rig. The drill rig will use a mud rotary technique with a casing advancer. Casing will be 4-inch in diameter and advanced to just above the water table, which is approximately 105-feet bgs on-Site, using the mud rotary technique. The profiler, equipped with a protective sheath to prevent mud intrusion, will be lowered down the casing to the bottom. The Profiler will then be driven to a depth of approximately 3 feet below the water table where the first sample will be collected. In the on-Site Vertical Profiles, groundwater samples will be collected every five feet from the initial water table sample to a depth of 130 feet bgs. Subsequent on-Site groundwater samples will be collected at ten-foot intervals. At each profile location, groundwater samples will be collected at 10 foot intervals from the water table to the final depth of the Vertical Profile boring (estimated at 250 feet bgs).

Once the Profiler encounters refusal or when it is 100 feet outside the casing, the Profiler will be tripped out, the casing will be advanced to a depth that is at least 5 feet less than the next target sample interval, and the profiler will be redeployed. The profiler assembly will be removed and replaced in the borehole in 10 to 20 foot sections to shorten tripping time. Assuming that the water table is approximately 105 feet bgs, 15 groundwater samples will be collected from each vertical profile boring excluding quality assurance/quality control samples.

As indicated above, the Vertical Profile Borings will be installed using the Waterloo Profiler and groundwater will be sampled at 10 foot intervals to the desired depth. Multiple data sets will be acquired at each vertical profile location during installation. Parameters to be measured include:

- the analytical chemistry of the contaminants,
- continuous index of hydraulic conductivity so that zones of high conductivity are identified for future monitoring,
- hydraulic head at each sample depth,
- dissolved oxygen,
- reduction/oxidation potential,
- pH,
- specific conductance; and
- rate of penetration, which reveals stratigraphic changes that may affect contaminant transport, IRM or remedial design.

Groundwater samples obtained from the Vertical Profile Borings installed will be analyzed by an ELAP-certified laboratory for TCL VOCs and Freons using USEPA SW-846 Method 8260 with the addition of Freons.

The applicable standard operating procedures that will be employed during this activity are summarized below and presented in Appendix A.

Section	Standard Operating Procedure
A.1	SOP 1 Waterloo Vertical Profile Borings with Groundwater Sampling
A.2	SOP 2 Water Level Measurement Procedure
A.3	SOP 3 Groundwater pH And Temperature
A.4	SOP 4 Measurement Of Groundwater Specific Conductance
A.5	SOP 5 Measurement Of Groundwater Turbidity
A.6	SOP 6 Measurement Of Groundwater Dissolved Oxygen
A.7	SOP 7 Measurement of Oxidation Reduction Potential
A.8	SOP 8 Groundwater pH and Temperature
A.9	SOP 9 Measurement of Groundwater Specific Conductance
A.10	SOP 10 Measurement of Groundwater Turbidity
A. 11	SOP 11 Measurement of Groundwater Dissolved Oxygen

2.1.4.1 Vertical Profile Installation Contingency Plan

It should be noted that in the event that the Waterloo Profile subcontractor can not meet the project schedule needs, then conventional groundwater profiling techniques will be employed. The conventional temporary vertical profile wells will be installed utilizing the hollow-stem auger drilling method.

Each well will be constructed of two-inch black steel casing fitted with a five-foot long well point screen. When the borehole has been drilled to the prescribed completion depth (250-feet), the well casing and drive-point will be assembled within the augers. The temporary well will then be driven slightly ahead of the lead auger and the augers will then be retracted from the borehole leaving the temporary well behind. The formation will be allowed to collapse back against the well screen and casing.

The well will then be purged and sampled at the prescribed completion depth using a Grundfos 2-inch submersible pump. Following collection of the first sample, the temporary well will be pulled back 10 feet and another purge and sample sequence will be performed. The aforementioned sampling sequence will continue at 10-foot intervals back to the water table.

2.1.5 Vertical Profile Soil Sampling

Split spoon soil samples will be collected from the ground surface to the top of the water table at the vertical profile boring located adjacent to diffusion wells N-9714D and N-7762D. Split spoon sample collection will

be collected at 10-foot intervals from ground surface. At approximately 95 feet bgs continuous split spoon soil sampling will be carried out to identify the water table elevation.

The drill stem shall be advanced to the sample collection depth and a split-spoon sampler shall be deployed ahead of the lead drill stem according to ASTM Method 1586 – Standards for Penetration Testing and Split-Barrel Sampling of Soils. Split-spoons shall be advanced by either the wire-line method (downhole cable hammer) or with a cathead and standard 140 pound hammer simulating a free-fall of 30 inches. The soil samples shall be collected using a 2-foot by 2-inch carbon steel split-spoon sampler driven by a 140 lb. hammer dropped 30 inches repeatedly. An ERM Hydrogeologist shall examine and identify the sample immediately upon collection. The sample shall also be screened for volatile organic compound contamination using a hand-held PID total organic vapor analyzer and the PID reading will be noted on the geologic boring log.

A standard "Geologic Log" shall be maintained for each boring that shall include all of the geological information gathered in the field, including the following:

- The structure of the soils sampled, including layering stratification features, and the dominant soil types.
- The color of soils, using Munsell Soil Color Charts.
- The moisture content of soils.
- Soil grain features, including grain sizes, degree of sorting or grading, angularity, and mineralogy. The soils shall be classified using the American Society for Testing and Materials (ASTM) Method D2488-84, a visual manual procedure.
- Identification of any rock fragments, organic material or other components.
- The consistency of clay-dominated soils.

All of the soils information collected shall be recorded as a designation under the Unified Soil Classification System (USCS) along with additional observations for each distinctive soil type within each sample. Geologic logging of each core sample will be by direct observation and classification of soils, using the Munsell Soil Color Chart and Unified Soil Classification System (USCS), as the boreholes are advanced. Each split spoon will be screened using a photoionization detector (PID) instrument for the presence of VOCs and the PID reading will be noted on the geologic boring log.

Soil samples will be submitted for laboratory analysis based on the following criteria:

- the soil sample exhibiting the highest PID reading in the borehole will submitted for VOC analysis using USEPA SW-846 Method 8260 plus Freons; and
- the soil sample from immediately above the water table (estimated at 105-feet bgs) will also be submitted for VOC analysis using Method 8260 plus Freons.

In the event that no PID detections are observed in the borehole, then only the soil sample from immediately above the water table will be submitted for laboratory analysis.

Section	Standard Operating Procedure
A.8	SOP 8 Organic Vapor Screening – Soil Sample Headspace

2.1.6 Monitoring Well Installation

Four (4) groundwater monitoring wells will be installed after completion of the Vertical Profile Borings. Each of the four (4) monitoring wells will be installed at the locations of the complete groundwater vertical profiles borings. The monitoring well locations are presented on Figure 2-2. The screen zone settings for each of the four (4) monitoring wells will be determined after review of the geologic and chemistry data is obtained from the Waterloo Groundwater Profiler and the contaminant concentration analysis is performed. The contaminant concentration analysis will consist of a plot of VOC data versus depth obtained from the groundwater samples collected during the Vertical Profile Boring installations. It is anticipated, however, that the four (4) monitoring wells will be screened at the interval equivalent to the zone of greatest groundwater impacts. If multiple depths exhibit elevated groundwater impacts at the groundwater profile location, the installation of a second well will be evaluated.

Monitoring wells will be constructed of 2-inch ID Schedule 40, 0.010-inch slot polyvinyl chloride (PVC) well screen and threaded, flush joint PVC casing. The on-Site well screens will be 10 feet in length with a screen elevation corresponding to the zone of greatest COC concentrations. Monitoring wells will be constructed with a sand pack, consisting of Morie #2 grade sand, to fill the annular space between the well screen and the borehole wall. Following placement of the sand pack, a Morie #00 sand pack will be used to create a fine sand layer between the Morie #2 sand pack and the bentonite pellet seal. Bentonite seals will consist of hydrated bentonite pellets. The remainder of the borehole annulus will be filled with a high solids bentonite grout. Construction of the wells will be similar for both on and off Site wells.

For each of the wells, a 2-inch diameter PVC riser will extend from the top of the screen to approximately 4-inches below ground surface and be fitted with a 6-inch diameter flush-mounted steel well vault and locking cover. The well vault will be cemented in place.

2.1.6.1 Optional Off-Site Groundwater Monitoring Well Installation

In the event that groundwater impacts are observed in the deep Magothy aquifer, the NYSDEC has requested that an optional monitoring well be installed off-Site. The monitoring well would be installed at the location of existing off-Site monitoring well N-10290 (170-feet bgs) and would be presumably screened at the zone equivalent of N-7560 screen elevation (242-feet bgs).

Upon receipt of final groundwater profile sampling results, a determination with agreement from the NYSDEC will be made as to whether installation of this monitoring well is merited. If the monitoring well is deemed necessary, an off-Site access agreement will need to be obtained and required Right-of-Way permitting (if necessary) and underground utility markouts will be completed. In addition, this newly installed monitoring well will be included in the proposed groundwater sampling event, discussed further in Section 2.1.7.

The NYSDEC has also requested that if Freon 22 contamination is detected in the Upper Glacial Aquifer, installation of Upper Glacial monitoring wells at LMC Cluster 37 (Lakeville Jewish Center) and Cluster 38 (Great Neck Public School) be considered and evaluated. Upon receipt of final groundwater profile sampling results, a determination with agreement from the NYSDEC will be made as to whether installation of one or both of these monitoring wells is merited. If the monitoring well(s) is deemed necessary, an off-Site access agreement will be obtained. If installed, this newly installed monitoring well(s) will also be included in the proposed groundwater sampling event, discussed in Section 2.1.7.

2.1.6.2 Well Development

Following the completion of the permanent monitoring well installation program, each monitoring well will be developed prior to groundwater sampling. The purpose of development is to:

- remove fine-grained materials from the sand pack and formation;
- reduce the turbidity of groundwater samples; and
- increase the yield of the well to reduce the potential of the well yielding an insufficient volume of water during groundwater sampling.

Monitoring wells will be developed as soon as possible, but not less than 24 hours after installation. The wells will be developed using procedures presented in SOP 14.

Monitoring Well Development

All data collected during monitoring well development will be recorded on a Well Development Data Sheet.

The applicable standard operating procedures that will be employed during this activity are summarized below and presented in Appendix A.

Section	Standard Operating Procedure
A.2	SOP 2 Water Level Measurement Procedure
A.3	SOP 3 Groundwater pH And Temperature
A.4	SOP 4 Measurement Of Groundwater Specific Conductance
A.5	SOP 5 Measurement Of Groundwater Turbidity
A.6	SOP 6 Measurement Of Groundwater Dissolved Oxygen
A.7	SOP 7 Measurement of Oxidation Reduction Potential
A.09	SOP 09 Groundwater Well Construction
A.10	SOP 10 Groundwater Well Development

2.1.7 Groundwater Sampling

Approximately two weeks following well development activities, groundwater samples will be collected from all newly installed monitoring wells and the existing supply well N-7560 and analyzed by a NYSDOH ELAP-certified laboratory for TCL VOCs and Freons using USEPA SW-846 Method 8260. The Laboratory will achieve a method detection limit (MDC) of 0.5 ppb and also report the ten highest concentration TICs present in the sample.

It is anticipated that USEPA traditional well sampling techniques will be utilized. Well purging will continue until the turbidity of the recovered well water is, if possible, less than 50 Nephelometric Turbidity Units (NTUs) and the pH, conductivity and temperature measurements of the purge water have stabilized within 10% for a minimum of three consecutive measurements. ERM's representative shall be responsible for collection of turbidity, pH, conductivity and temperature measurements.

The applicable standard operating procedures that will be employed during this activity are summarized below and presented in Appendix A.

Section	Standard Operating Procedure
A.1	SOP 1 Groundwater Sampling (Conventional & Low Flow)
A.2	SOP 2 Water Level Measurement Procedures
A.3	SOP 3 Groundwater pH and Temperature

A.4	SOP 4 Measurement of Groundwater Specific Conductance
A.5	SOP 5 Measurement of Groundwater Turbidity
A.6	SOP 6 Measurement of Groundwater Dissolved Oxygen
A.7	SOP 7 Measurement of Oxidation Reduction Potential

2.1.8 Soil Gas and Indoor Air Sampling

Four subslab soil gas and four indoor air samples will be collected at 400 Lakeville Road. The sampling will be carried out using the methodologies presented in the NYSDOH document entitled" Guidance for Evaluation Soil Vapor Intrusion in the State of New York, dated October 2006. Samples will be collected over a 24-hour period from four locations beneath the basement of 400 Lakeville Road and from adjacent basement areas. Sampling locations will be biased towards the east side of the building, nearest the former diffusion wells. Samples will be analyzed by an ELAP certified laboratory for VOCs and Freons using USEPA Method TO-15.

Section	**Standard Operating Procedure**
A.12	SOP 12 Sub Slabs Soil Gas Sampling
A.13	SOP 13 Indoor Air Sampling Using Summa® Canisters

2.1.9 Management of Investigative Derived Wastes

The following section describes the general protocols for handling and disposal of solid and liquid investigative derived waste (IDW) generated during the implementation of the PSA. Waste generated during the investigation is expected to consist of trash (boxes, paper, etc.), soil cuttings, decontamination wash water, groundwater monitoring well purge water, and used protective clothing.

The following guidance documents and regulations may be relied upon to guide the management, staging, storage and disposal of RI-generated IDW:

- NYSDEC's TAGM #4032 on " Disposal of Drill Cuttings" {November 21, 1989};
- NYSDEC's RCRA TAGM #3028 on " Contained-In Criteria for Environmental Media" {November 30, 1992};
- 40 C. F. R. Part 262 (Standards Applicable to Generators of Hazardous Waste);
- 40 C. F. R. Part 263 (Standards Applicable to Transporters of Hazardous Waste;

- 40 C. F. R. Part 264 (Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities); and
- 40 C. F. R. Part 268 (Land Disposal Restrictions).

Accordingly, handling and disposal will be as follows:

- Cuttings from soil borings and the tailings from the unused portion of the samples collected from on-Site and/or source areas will be collected on plastic sheeting and stored in reconditioned 55-gallon, New York State Department of Transportation (DOT) open-top drums to be provided by the ERM's drilling subcontractor. The borehole will be grouted by hand or with a tremie pipe. If necessary, the borehole will also be sealed at or near the ground surface with a non-shrinking impermeable material to prevent the hole from acting as a conduit for surface runoff.
- Cuttings from monitoring well installations will be collected on plastic sheeting and stored in reconditioned 55-gallon, New York State Department of Transportation (DOT) open-top drums to be provided by the ERM's drilling subcontractor. The annuli of the monitoring wells will be backfilled using tremie pipes to avoid bridging. As specified in Standard Operating Procedure 13 (SOP-13, Appendix A), annuli will be backfill with a cement/bentonite grout.
- With the exception of confining layers, cuttings and tailings generated from soil borings and monitoring well installations in off-Site and non-source area locations will be placed back down the borehole. Confining layers will be pressure grouted with cement/bentonite.
- Liquids generated from equipment decontamination, temporary and permanent groundwater monitoring well development/purging will be collected in drums at the point of generation. The collected water will be transported and temporarily stored in a frac tank that will be staged on the Site. The water will be sampled for VOCs and then disposed of appropriately.
- Used protective clothing and equipment that is suspected to be contaminated with hazardous waste will be placed in plastic bags, packed in 55-gallon ring-top drums.
- All drums will be labeled according to the borehole/well number. The drilling subcontractor shall move the drums on a daily basis at the direction of ERM's representative to the staging area.
- ERM will procure waste transport and disposal subcontractor services to properly dispose of all IDW in accordance with all local, State and Federal regulations.
- Non-contaminated trash, debris and protective clothing will be placed in a trash dumpster and disposed of by a local garbage hauler.

2.1.10 Analytical Data Quality Evaluation

Data quality objectives and analytical requirements are detailed in the QAPP (Appendix B). All laboratory data will be reviewed and qualified as necessary by an ERM QA/QC officer. Data usability will be assessed by direct comparison to the specified data quality objectives and/or procedures set forth in the QAPP. ERM's (QA/QC) Officer will validate the data from the sampling of the permanent monitoring wells and prepare a validation report to be submitted to the NYSDEC along with "Category B Deliverables".

2.1.11 Site Survey

At the completion of field sampling activities a New York State licensed surveyor will establish the location and elevation of each newly installed waterloo profile boring and monitoring wells. Elevations of all riser pipes, protective well casings and ground surfaces and their corresponding latitude and longitude coordinates will be determined to within 0.01 feet, +/- 0.01 feet based on the NGVD 86 datum. A notch will be placed in all interior casings to provide the reference point from which to collect future groundwater elevation measurements.

All surveyor collected latitude, longitude and elevation data will be provided to ERM in an ASCII file and imported in to GISKEY database format.

An aerial survey map will be used as a base map and all existing and newly installed wells will be accurately located and plotted on the aerial. Vertical elevation data together with depth to water measurements will be used to prepare a water table contour map.

2.2 PRELIMINARY SITE ASSESMENT REPORT PREPARATION

The PSA Report will be prepared following completion of all PSA field activities, and the reduction, validation and interpretation of the data. The PSA Report will provide a summary of the Scope of Work, methods, results, conclusions and recommendations from the PSA. It will present a any available waste disposal history, the environmental setting, contamination assessment, and hydrogeology. The PSA Report will also identify any data gaps that require further investigation and recommend any IRMs, if required. Further details concerning essential components to the PSA Report are discussed below.

- Reporting: The historic records will be appended to the Draft PSA Report.

- Summary of Site History and Conditions: The report will include all of the information collected during the historic records and file search and a section detailing the geologic and hydrogeologic conditions.
- Summary of Field Work: The report will include a detailed summary of investigative and analytical methods related to the fieldwork performed during the PSA. This account will include figures and tables to show sample locations, parameters analyzed for, etc.
- Summary of Analytical Data: Using tables and maps, the report will summarize to the extent possible, all of the analytical data collected during the PSA and historical records search.
- Comparison to State Standards, Criteria and Guidelines (SCGs): The PSA Report will identify SCGs. The concentrations of each contaminant detected will be compared to the SCGs.
- Evaluation of Data Collected: The completeness of the data collected during the PSA will be evaluated. ERM will make recommendations on ways to fill these data gaps, if required.

All reports and correspondence will be provided in Adobe Acrobat format in addition to providing paper copies.

3.0 MONTHLY PROGRESS REPORTING

ERM will submit Monthly Progress Reports (MPRs) to NYSDEC on or before the 20th of each month following Notice-To-Proceed. Each MPR will address the following topics:

- Accomplishments during the reporting period.
- Problems encountered during the reporting period.
- Compliance with project schedule and budget.
- Projected changes in Scope of Work.

All raw and validated data will be forwarded to the NYSDEC as soon as it becomes available. All reports and correspondence will be provided in Adobe Acrobat format in addition to providing paper copies.

4.0 DETAILED WORK ASSIGNMENT SCHEDULE

The NS-LIJ 400 Lakeville Road PSA Implementation Schedule, including milestones and deliverables for the PSA is presented in Figure 4-1.

The schedule contemplates a DATE start for field activities. ERM will endeavor to adhere to the schedule at all times, but there are several critical path items related to execution of the PSA fieldwork (i.e. drilling site access and logistical issues) and several cycles of draft/final document review by NS-LIJ and NYSDEC. As such, it may be necessary to modify and revise the schedule as the PSA progresses because of:

- Potential new requirements or activities that may be requested by the NYSDEC and/or the Town of North Hempstead;
- Force majeure;
- Severe weather conditions preventing timely completion of scheduled field activities; or
- Other matters beyond ERM's or LIJMC's reasonable anticipation and control.

5.0 PROJECT STAFFING PLAN

Staffing for the NS-LIJ 400 Lakeville PSA will be from ERM's Melville New York, and New York City Offices.

While all personnel involved in an investigation and in the generation of data are implicitly a part of the overall project management and QA program, certain members of the Project Team have specifically designated responsibilities. Project Team members with specific management and QA roles in the PSA are the ERM Principal in Charge (PIC), the ERM Project Manager (PM), the ERM Field Team Leader (FTL) and the ERM QA/QC Officer. In the following sections, the roles and responsibilities of key personnel are identified.

5.1 ERM PRINCIPAL IN CHARGE

The ERM PIC, Mr. Earnest Rossano. Mr. Rossano will oversee the ERM PM, and be responsible for all technical aspects of the project including the overall quality of the project and project deliverables for ERM. Mr. Rossano has extensive experience with the management and coordination of multi-disciplinary investigation and remedial projects in New York State.

5.2 ERM PROJECT MANAGER

The ERM PM, Dr. Gregory Shkuda, Ph. D, will report to the ERM PIC. Dr. Shkuda, will oversee the ERM QA/QC Officer and the ERM FTL, field investigation staff, and any subcontractors. Dr. Shkuda, will also be responsible for all technical aspects of the project for ERM. This includes scheduling, communicating to the ERM PD, technical development and review of all field activities, subcontracting, and the overall quality of the project and project deliverables for ERM. Dr. Shkuda will be the primary contact between ERM and NS-LIJ and NYSDEC. Dr. Shkuda, has extensive experience in the management and coordination of multi-disciplinary investigation and remedial projects in New York State.

5.3 ERM QA/QC OFFICER

The QA/QC Officer, Mr. Andrew Coenen, will report to the ERM PM and the ERM PD. Mr. Coenen will be responsible for interface with the analytical laboratory, third party data validator, and will prepare the Data Usability Report that ERM will prepare as part of this WA. Mr. Coenen

will have overall responsibility for QA/QC review of all analytical data generated during the field investigation, data validation and qualification of analytical results in terms of data usability. Mr. Coenen has extensive analytical laboratory experience and experience in the validation of analytical data and the protocols and QC specifications of the analytical methods listed in the NYSDEC ASP and the data validation guidance, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data review (February 1994) and USEPA Region II CLP Data Review SOP.

5.4 ERM FIELD TEAM LEADER

The FTL, Mr. Michael Mattern, will report to the ERM PM and the ERM PIC. Mr. Mattern will be responsible for the day-to-day management and coordination of ERM field staff and subcontractors. Mr. Mattern will be responsible for the implementation and quality of the field activities. Mr. Mattern has extensive environmental field investigation/subcontractor oversight experience in New York State.

5.5 PROJECT HEALTH AND SAFETY COORDINATOR

Ms. Paulina Gravier will be the Project Health and Safety Coordinator. Ms. Gravier will report to the ERM PM and the ERM PIC. Ms. Gravier has extensive experience as a Project Health and Safety Coordinator for multi-disciplinary investigation and remedial projects in New York State. Ms. Gravier's experience includes the preparation and implementation of site-specific health and safety plans, field oversight, and field health and safety audits.

6.0 CITIZEN PARTICIPATION

Public Information Repositories will be established at two local libraries. Initially, copies of the PSA Work Plan will be placed in the repositories. As additional documents and/or reports become available, copies will also be placed in the repositories. The two libraries that will be used as repositories, there are:

Hillside Public Library
155 Lakeville Road
New Hyde Park, New York 11040
516.355.7850

Great Neck Library
Parkville Branch
10 Campbell Street
New Hyde Park, New York, New York 11040

7.0 REFERENCES

NYSDEC, 1989. Division Technical and Administrative Guidance Memorandum (TAGM): Disposal of Drill Cuttings. Division of Hazardous Waste Remediation. HWR-94-4032. 21 November 1989.

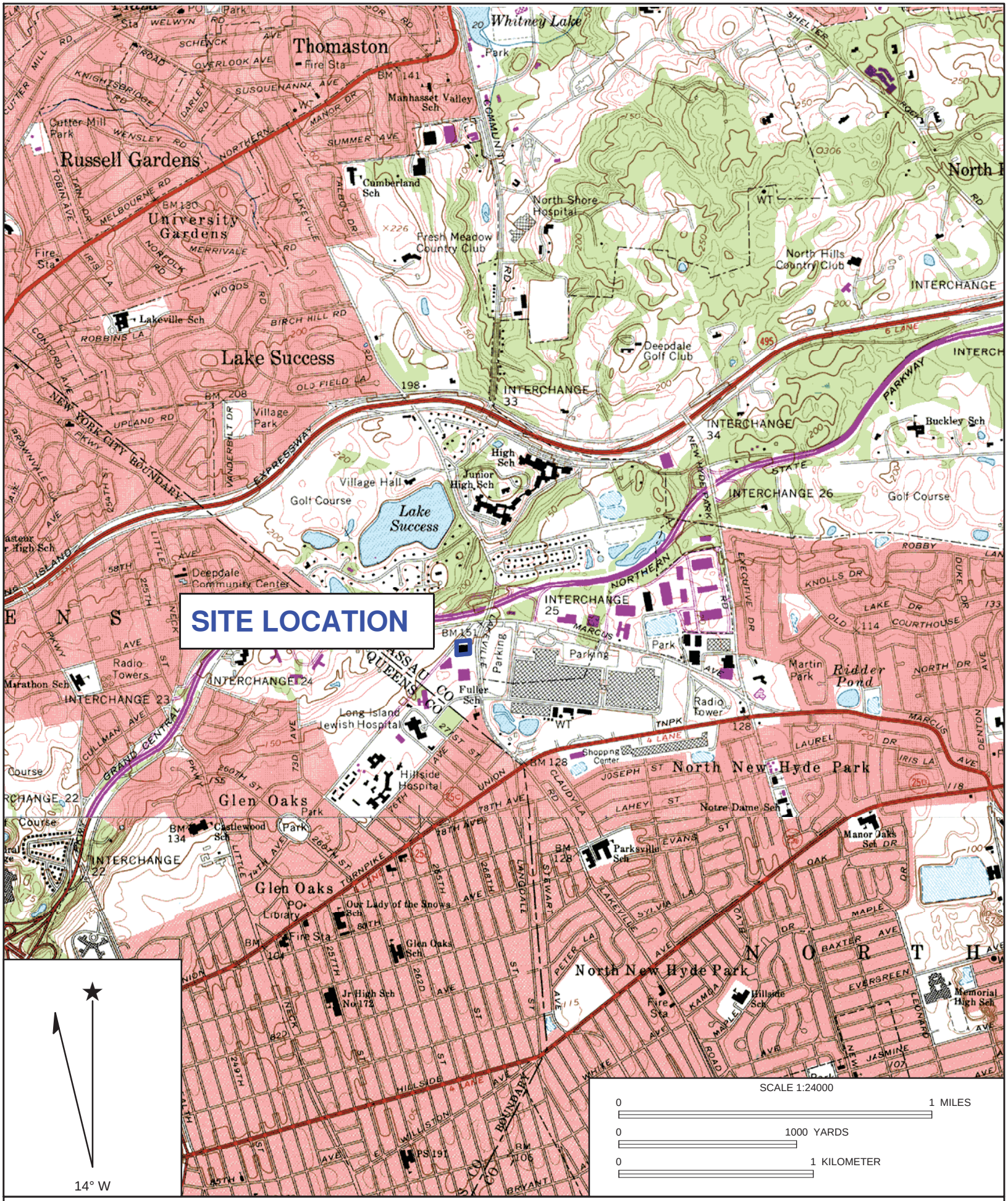
NYSDEC, 1991. New York State Water Classifications – 6 NYCRR 701. 2 August, 1991

NYSDEC, 1992. Division Technical and Administrative Guidance Memorandum (TAGM): "Contained-In" Criteria For Environmental Media. Division of Hazardous Substance Regulation. HWR-92-3028. 30 November 1992.

NYSDEC, 1994. Division Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels. Division of Hazardous Waste Remediation. HWR-94-4046. 24 January 1994.

NYSDEC, 1998. New York State Groundwater Quality Standards – 6 NYCRR 703 (12 March 1998) and Division of Water Technical and Operational Guidance Series (1.1.1) – Ambient Water Quality Standards and Guidance Values, (June 1998), Errata Sheet (January 1999), and Addenda (April 2000).

FIGURES



Name: SEA CLIFF
Date: 3/2/2007
Scale: 1 inch equals 2000 feet

Location: 040° 45' 36.35" N 073° 42' 11.60" W
Caption: Fig 1-1 Site Area Location
400 Lakeville Rd, Lake Success
NS-LIJ Health System

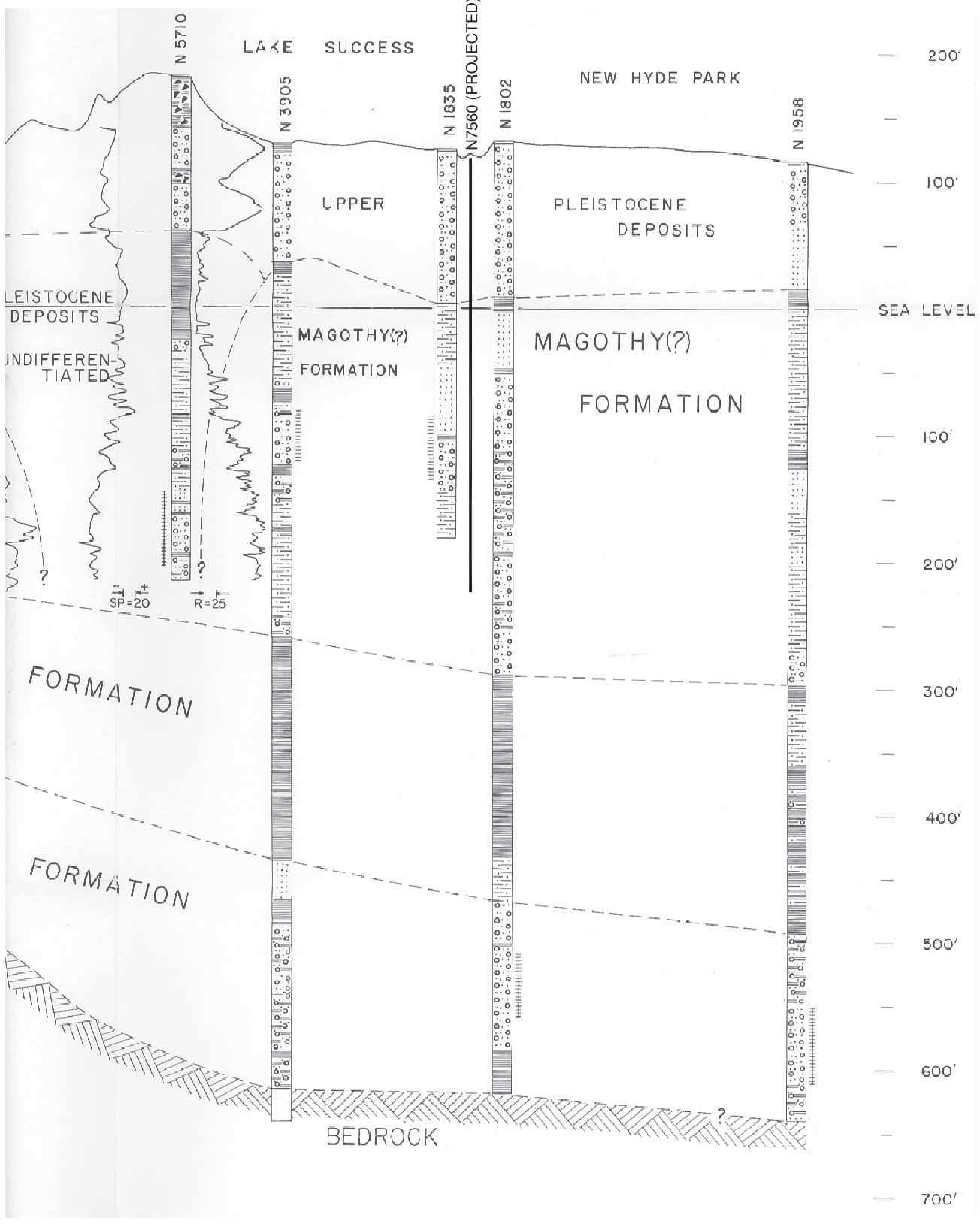
NO.	DATE	APPR.	REVISION	NO.	DATE	APPR.	REVISION

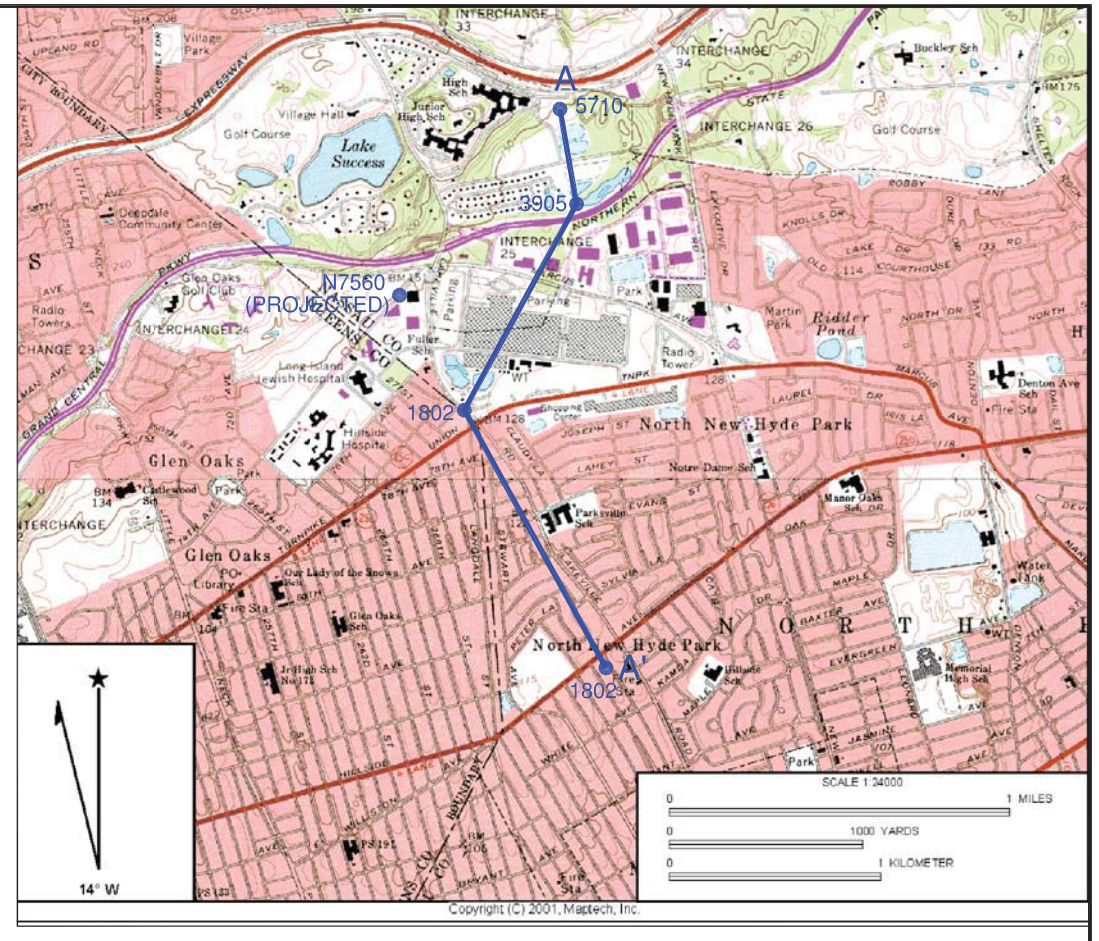
NS–LIJ

HEALTH SYSTEM

ERM Environmental Resources Management

CHECKED	DATE	SITE LAYOUT 400 LAKEVILLE ROAD	DRAWING NO. 1–2
DESIGN ENGINEER			REV. NO.
PROJECT ENGINEER			
PROJECT MANAGER			
APPROVED		DRAWN: EMF / DATE: 3/2/07 / REVISION DATE:	
APPROVED		SCALE: GRAPHIC / JOB NO.: 0030777 / FILE NAME: 0030777–01–008	SHEET OF





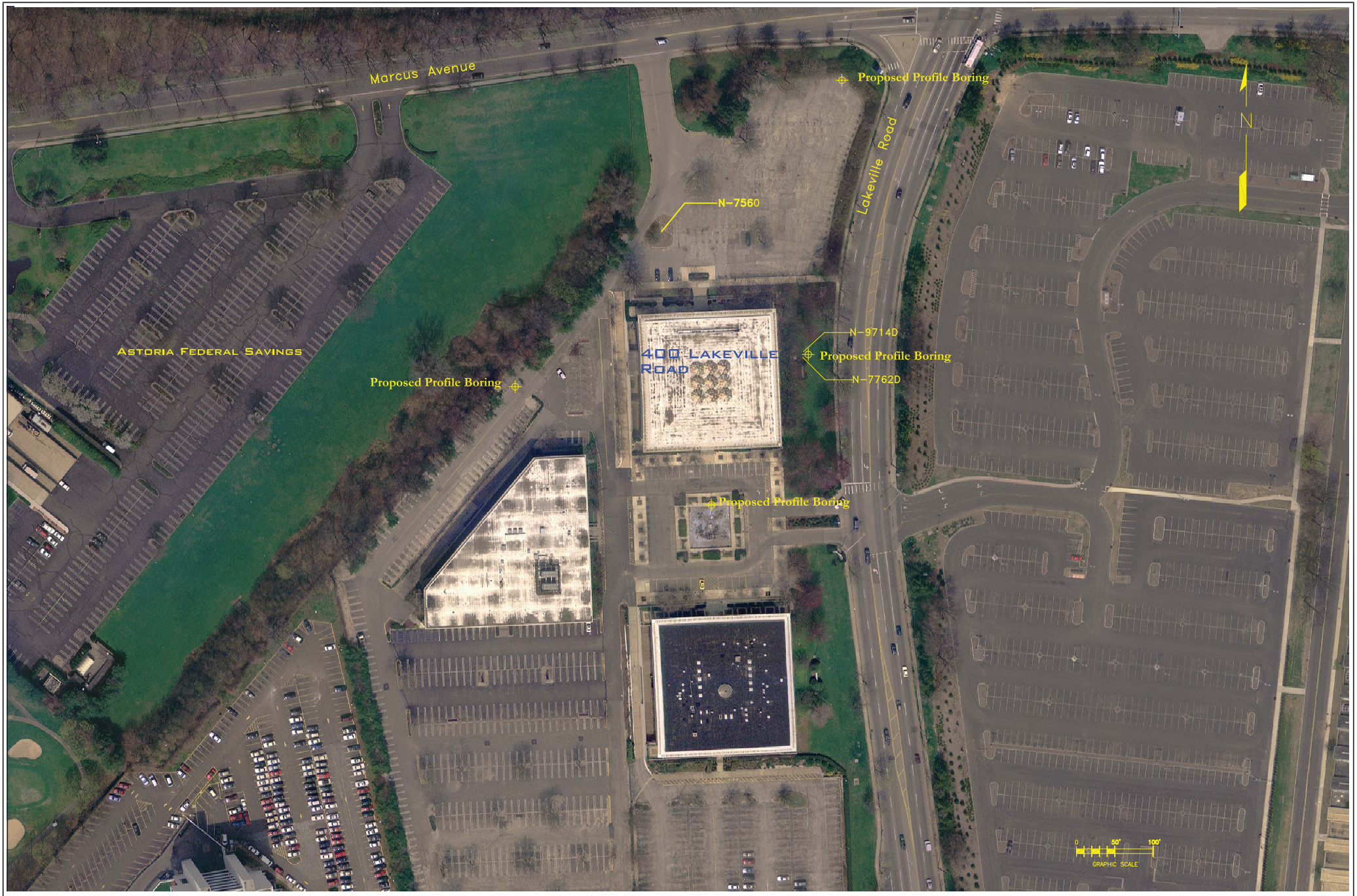
TITLE

GEOLOGICAL CROSS SECTION A–A'

PREPARED FOR

NS–LIJ HEALTH SYSTEM

ERM Environmental Resources Management			SCALE: GRAPHIC	FIGURE: 1–3
DRAWN: EG/EMF	JOB NO.: 0030777	FILE NAME: 0030777–01–003	DATE: 3/2/07	



NO.	DATE	APPR.	REVISION	NO.	DATE	APPR.	REVISION

NS–LIJ

HEALTH SYSTEM

Environmental Resources Management

ERM

CHECKED		DATE
DESIGN ENGINEER		
PROJECT ENGINEER		
PROJECT MANAGER		
APPROVED		
APPROVED		

PROPOSED MONITORING WELL VERTICAL PROFILE BORING LOCATIONS 400 LAKEVILLE ROAD

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DRAWING NO. 2–1

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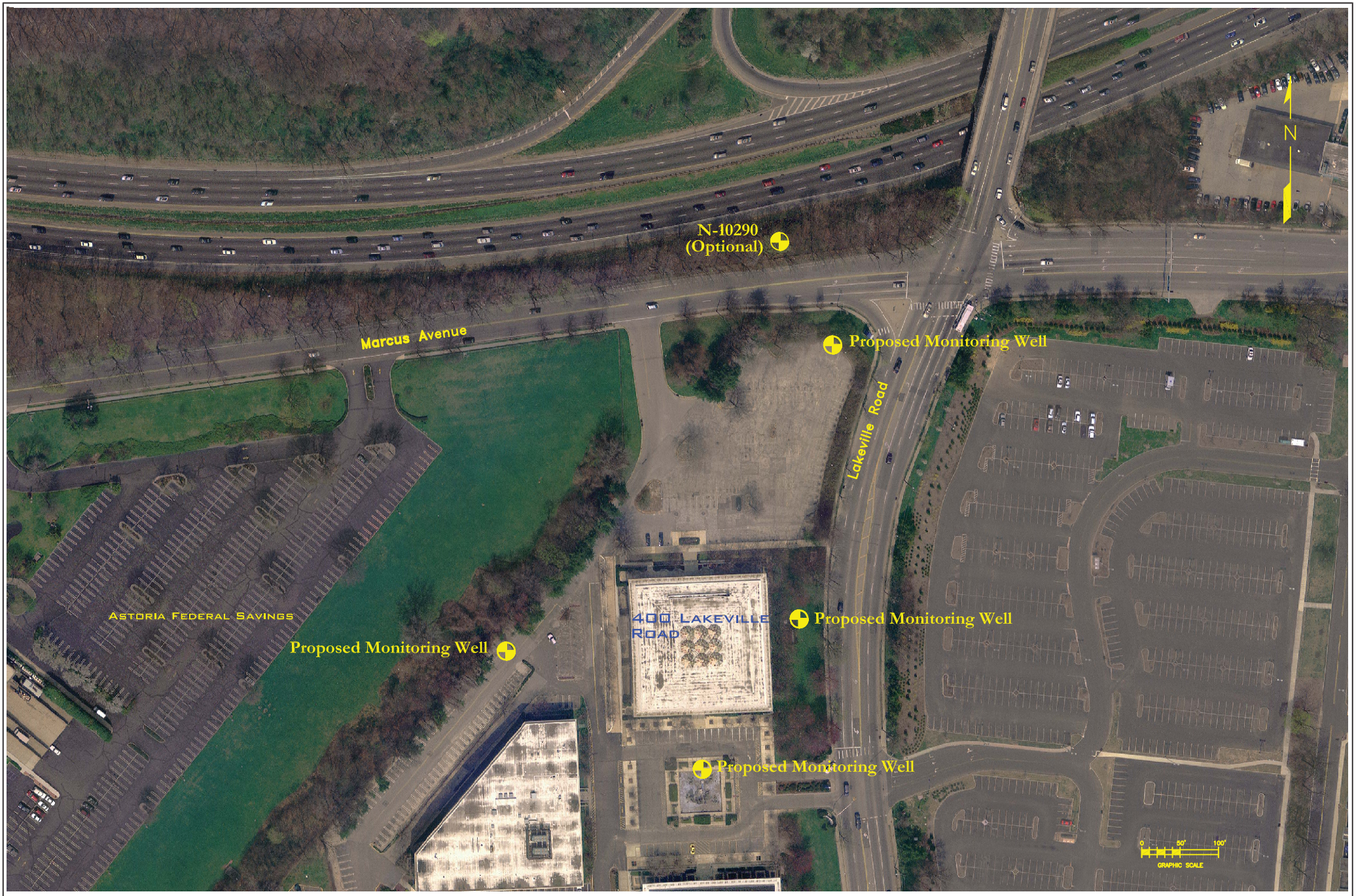

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Environmental Resources Management
ERM

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PROJECT MANAGER		
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PROPOSED MONITORING WELL LOCATIONS
400 LAKEVILLE ROAD

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SCALE: GRAPHIC	JOB NO.: 0030777	FILE NAME: 0030777–01–009	

DRAWING NO. 2–2
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SHEET OF

TABLE 4-1
PROJECT SCHEDULE PRELIMINARY SITE ASSESSMENT
400 LAKEVILLE ROAD, NEW HYDE PARK, NY

ID	Task Name
1	**Historic records Search**
2	**Site Access**
3	**Utility Markouts**
4	**Mobilization**
5	**Vertical Profile Soil Sampling**
6	**Vertical Profile Sampling**
7	**Monitoring Well Installation**
8	**Monitoring Well Installation**
9	**Monitoring Well Installation**
10	**Monitoring Well Installation**
11	**Off-Site Access**
12	**Off-Site Monitoring Well Installation**
13	**Groundwater Sampling**
14	**Laboratory Analysis**
15	**Data Validation**
16	**Soil Gas and Indoor Air Sampling**
17	**Laboratory Analysis**
18	**Data Validation**
19	**Draft Preliminary Site Assessment Report**
20	**NYSDEC Review**
21	**Final Preliminary Site Assessment Report**
22	**Monthly Reporting**