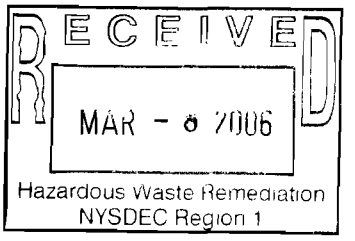
Performance Analysis and Design Modification Plan



Off-Site Interim Remedial Measure
Former Unisys Facility
Great Neck, New York

NYSDEC Site ID# 130045

March 2006

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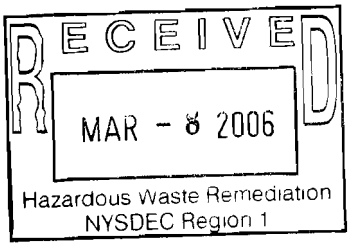
Performance Analysis and Design Modification Plan



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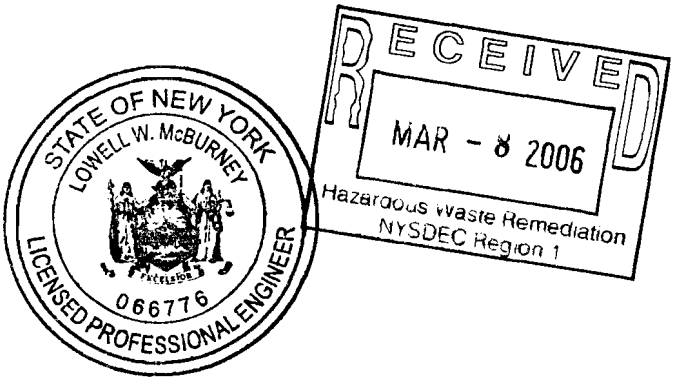
BBL
ENVIRONMENTAL SERVICES, INC.
Remedial Management & Construction

Statement of Certification

On behalf of Lockheed Martin Corporation, I hereby certify and attest that the enclosed Performance Analysis and Design Modification Plan for the Off-Site Interim Remedial Measure was prepared in accordance with the New York State Department of Environmental Conservation Administrative Order on Consent No. W-1-0527-91-02, referencing the Former Unisys Corporation Site (Code No. 1-30-045) and dated December 13, 1991.

SIGNED: _____

Lowell W. McBurney, P.E.
License Number 066776, New York
Blasland, Bouck & Lee, Inc.



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Acronyms and Abbreviations

AEANY	ARCADIS Engineers & Architects of New York, P.C.
AOC	Administrative Order on Consent
ARCADIS	ARCADIS G&M, Inc.
ARARs	Applicable or Relevant and Appropriate Requirements
ASP	Analytical Services Protocol
BBLES	BBL Environmental Services, Inc.
bls	Below land surface
COC	Constituent of Concern
DAR	Division of Air Resources
ECU	Emission Control Unit
FS	Feasibility Study
ft	Feet
Great Neck UFSD	Great Neck Union Free School District
gpm	Gallons per minute
HDPE	High Density Polyethylene
i.park	i.park, Lake Success, LLP
IRM	Interim Remedial Measure
Lockheed Martin	Lockheed Martin Corporation
MLWD	Manhasset-Lakeville Water District
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
OM&M	Operation, Maintenance, and Monitoring
OU-1	Operable Unit 1 (pertaining to areas on the former Unisys site)

OU-2	Operable Unit 2 (pertaining to areas off the former Unisys site)
PADM	Performance Analysis and Design Modification Plan
PPZ	Potassium Permanganate-Impregnated Zeolite
PVC	Polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Program Plan
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SCADA	Supervisory Control and Data Acquisition
SDR	Side-Wall Dimension Ratio
SGPA	Special Groundwater Protection Area
SVE	Soil Vapor Extraction
TCL	Target Compound List
TVOC	Total Volatile Organic Compounds
Unisys	Unisys Corporation
USEPA	United States Environmental Protection Agency
VPGAC	Vapor-Phase Granular Activated Carbon
VOCs	Volatile Organic Compounds

1. Introduction

1.1 General

ARCADIS G&M, Inc. (ARCADIS) and ARCADIS Engineers & Architects of New York, P.C. (AEANY) originally prepared this Performance Analysis and Design Modification (PADM) Plan on behalf of Lockheed Martin Corporation (Lockheed Martin) for the Off-Site Interim Remedial Measure (IRM) for Operable Unit 2 (OU-2) associated with the Former Unisys Corporation (Unisys) facility located in Great Neck, New York (see Figure 1). This PADM Plan was subsequently revised by BBL Environmental Services, Inc. (BBLES), in conjunction with Blasland, Bouck & Lee, Inc. The former Unisys site, located at 365 Lakeville Road, is classified by the New York State Department of Environmental Conservation (NYSDEC) as a Class 2 Site in the Registry of Inactive Hazardous Waste Disposal Sites in New York State (Site No. 130045) due to the presence of volatile organic compounds (VOCs) in soil and groundwater. The former Unisys site, which is currently owned by i.park, Lake Success, LLP (i.park), is designated as Operable Unit 1 (OU-1), whereas OU-2 addresses off-site areas.

An OU-2 Remedial Investigation (RI) is in progress and being conducted under NYSDEC Administrative Order on Consent (AOC) No. W-1-0527-91-02, dated December 13, 1991. Based on the results of the OU-2 RI obtained to date, an IRM is being implemented for the OU-2 area. The NYSDEC-approved Off-Site IRM was installed between the Northern State Parkway and the Long Island Expressway (see Figure 2). The goals of the Off-Site IRM are to help protect public drinking water wells and retard further constituent migration into the North Hills Special Groundwater Protection Area (SGPA).

The conceptual Off-Site IRM is documented in the NYSDEC-approved OU-2 IRM South System Groundwater Remediation Work Plan (hereinafter called the OU-2 South IRM Work Plan), dated May 29, 2003. The PADM Plan describes the parameters, conditions, and procedures that will be used to evaluate the effectiveness of the Off-Site IRM. In general, a PADM Plan identifies the criteria for which the operation of remediation systems may be terminated. However, in this case, because the Off-Site IRM will eventually be combined with the OU-1 groundwater system in an integrated remedy for groundwater, it is premature to determine the shutdown criteria for the Off-Site IRM. After the final remedy for the off-site areas has been finalized and implemented as part of an OU-2 Record of Decision (ROD), shutdown criteria will be developed for the integrated OU-1/OU-2 remedy and these criteria will be presented in the PADM Plan for the final remedy for the site.

1.2 PADM Plan Organization

In addition to this introduction (Section 1), this PADM Plan is organized as outlined below.

- Section 2 (Project Background) provides a brief summary of project information.
- Section 3 (Project Objective and Remedial Goals) includes the objective and remedial goals of the Off-Site IRM, and summarizes how the Off-Site IRM will be operated to meet the remedial goals.
- Section 4 (Description of Off-Site IRM) provides a general description of the Off-Site IRM.
- Section 5 (Performance Analysis and Effectiveness Evaluation) describes the elements of monitoring the short- and long-term performance and effectiveness of the Off-Site IRM. It is divided into two subsections. The first presents the performance analysis and effectiveness evaluation of the Groundwater Recovery System. This subsection also describes the components of the groundwater recovery system along with the

monitoring and reporting schedule. The second presents the performance analysis and effectiveness evaluation of the groundwater treatment system, including the required emission control system.

- Section 6 (Record Keeping and Reporting) describes the means of recording and reporting routine maintenance, monitoring and sampling activities.

- Section 7 (Shutdown Evaluation) describes how the Off-Site IRM will be integrated with the OU-1 System and indicates that shutdown criteria will be developed for the integrated system when the OU-2 final remedy system PADM is prepared.

2. Project Background

This section provides a brief summary of project background information. A more detailed discussion of site description, site history, and project history is provided in Section 2 of the Off-Site IRM Operation, Maintenance & Monitoring (OM&M) Manual.

In 1991, Unisys Corporation (a previous facility owner) entered into AOC No. W-1-0527-91-02 with the NYSDEC for the Great Neck site. This AOC required completion of a Remedial Investigation/Feasibility Study (RI/FS) and implementation of IRMs for soil and groundwater. The initial on-site groundwater IRM was initiated in April 1993. In 1995, the NYSDEC divided the site into two operable units. OU-1 includes the 94-acre subject facility, while OU-2 consists of the off-site areas. The ROD detailing the selected remedies for OU-1 was signed by the NYSDEC on March 31, 1997. Lockheed Martin and the NYSDEC entered into an AOC (No. W1-0787-96-12) in 1997 for OU-1.

Lockheed Martin completed and submitted a detailed design for the OU-1 treatment system in June 1998. Subsequent to this submittal, additional ground water modeling was conducted in response to comments raised by the NYSDEC. This modeling demonstrated that the proposed system, while successfully capturing a portion of the downgradient VOC plume, would require pumping a large quantity of water and spread the plume in the upgradient direction. Based on this analysis, additional options were analyzed in an effort to develop a more efficient approach to remediate on-site groundwater. The modeling indicated that the requirements of the ROD could be achieved by pumping a smaller quantity of water if the diffusion wells, that are designed to re-inject water into the aquifer, were situated off-site, away from the pumping wells. The on-site pumping/off-site re-injection arrangement would also result in a smaller treatment system that could be constructed more quickly and occupy less space on the i.park property than the larger one originally envisioned in the ROD.

The OU-1 Final Remedy groundwater remediation system went into operation in August 2002 and consists of three groundwater recovery wells, two air strippers, and four emission control units (ECUs). Treated water is discharged to off-site groundwater via four diffusion wells located off-site, south of the Northern State Parkway.

Since 2000, the OU-1 soil vapor extraction (SVE) system has been upgraded three times. In 2000, the SVE system was expanded to remove perched water and to remediate shallow soil above the confining later. In 2001, the SVE system was: expanded (by the addition of another SVE well), relocated (above ground SVE system equipment was moved to the OU-1 groundwater treatment plant property), and upgraded (the catalytic oxidizer vapor treatment system was replaced by three ECUs, specifically two vapor-phase granular activated carbon [VPGAC] ECUs and one potassium permanganate-impregnated zeolite [PPZ] ECU). In 2005, the SVE system was upgraded with two additional VPGAC ECUs and one additional PPZ ECU.

Construction of the Off-Site IRM consisting of one groundwater recovery well, two air strippers and four ECUs was completed in June 2004. Initial testing of the Off-Site IRM was conducted from July to October 2004. Following initial testing, a 90-Day Test was conducted from December 2004 through March 2005. Trace levels of vinyl chloride were detected in the air discharge at levels slightly above the Non-Detect Performance Standards required by the Remediation Access and Licensing Agreement between Lockheed Martin and the Great Neck Union Free School District (Great Neck UFSD), dated April 14, 2003 (Access Agreement). As a result of the detection of vinyl chloride, the fourth, and smallest, VPGAC unit was taken out of service and two PPZ units were installed downstream of the three VPGAC units. The PPZ units, which are arranged in a series configuration, were installed to reduce the concentration of trace vinyl chloride within the vapor stream to non-detect concentrations via chemical oxidation. Following installation of the PPZ units, a change out of the carbon in the lead VPGAC unit and some additional improvements to system controls, a 30-Day Test was

conducted in August 2005. Data obtained from the 30-Day Test indicated that all of the VOCs previously detected were efficiently removed from the water by the air strippers and the water being reinjected into the ground via the diffusion wells contained no detectable concentration of VOCs, thus meeting the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD.

Trace VOCs (e.g., chloromethane, methylene chloride, Freon 12, and Freon 22) were intermittently detected in the air discharge during the testing phase and may continue to be detected during normal system operations; however, calculations demonstrated these concentrations were below NYSDEC Division of Air Resources Air Guide 1 (DAR-1) requirements, dated December 22, 2003. Vinyl chloride was not detected in the vapor discharge during the 30-Day Test.

The Off-Site IRM will be operated in accordance with the OM&M Manual and this PADM Plan. Once the OU-2 RI/FS is completed, the final remedy for OU-2 will be implemented.

3. Project Objective and Remedial Goals

To accomplish the objective and goals outlined in the following subsections, the Off-Site IRM includes pumping of groundwater from an off-site recovery well located on property belonging to the Great Neck UFSD. The recovered groundwater is treated and discharged to diffusion wells screened in the Magothy aquifer on property owned by the New York State Department of Transportation (NYSDOT), northeast of the site. The Off-Site IRM removes and treats groundwater in the Magothy aquifer off-site where high concentrations of VOCs were found, thereby retarding further migration of the Total VOC (TVOC) plume and reducing off-site groundwater concentrations over time.

3.1 Project Objective

The objective of the Off-Site IRM is to effectively capture the off-site area of highest constituent concentrations, in order to:

1. Help protect public drinking water wells.

2. Retard further constituent intrusion into the North Hills SGPA.

3.2 Remedial Goals and Elements of the Groundwater Remedy

To accomplish the Project Objective specified in Section 3.1, VOC-impacted groundwater is pumped from one recovery well (RW-100), treated (using air strippers to remove VOCs in the water), and returned to the off-site groundwater system via one or more of the three diffusion wells (DW-100, DW-101, and DW-102) located on the NYSDOT Property (see Figure 3). Furthermore, as described below, the Off-Site IRM was specifically designed to complement the performance of the existing OU-1 Groundwater Final Remedy.

Figures FS1-UG, FS1-UM, FS1-MM, and FS1-BM (Attachment A) show simulated captures zones on April 19, 2001 expected under OU-1 System operation in the upper Glacial, upper, middle, and basal Magothy aquifer horizons, respectively. The shaded capture zones clearly extend to or beyond the site boundaries in all horizons. Figures A-1, A-2, A-3, and A-4 (Attachment A) show the potentiometric surface configurations for the upper Glacial, upper, middle, and basal Magothy aquifer horizons, respectively, during operation of the OU-1 System on September 22, 2003. Figures FS2-UG, FS2-UM, FS2-MM, and FS2-BM (Attachment A) show simulated captures zones on April 19, 2001 expected under the combined OU-1 System and the Off-Site IRM operation, in the upper Glacial, upper, middle, and basal Magothy aquifer horizons, respectively. When the FS1 series of figures are compared to the FS2 series of figures, it is clear that additional capture has been achieved north (downgradient) of the site in the area where elevated concentrations of VOCs have been observed. Just as important is the fact that operation of the Off-Site IRM has had no detrimental impacts on the hydraulic effectiveness of the OU-1 System. It can be seen that capture zones under the combined pumping scenario still cover the entire on-site area, and therefore, the OU-1 System effectiveness should not be compromised by simultaneous operation of the Off-Site IRM. Potentiometric surface configurations and capture zone analysis will be updated and revised as part of the OU-2 RI/FS under combined OU-1 System and Off-Site IRM System operation.

Under normal operating conditions, a total of 500 gallons per minute (gpm) will be pumped by the Off-Site IRM. The dissolved VOC concentrations used in the design of the system are presented in Table 1. The design VOC concentrations were based on recent groundwater analytical data from nearby groundwater monitoring wells and from recovery well RW-100. Additional design goals/parameters are described below.

- Treatment and conveyance systems are designed to handle a maximum of 600 gpm as a safety factor to the design.

- Water treatment will meet the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD.

- Operation of the groundwater recovery and treatment system will allow for ease of visual monitoring, testing, and maintenance, with automatic control of the principal equipment units and interlocks so that only treated water will be discharged from the system.

- Piping connections and valving will provide flexibility in operation of the treatment and discharge system. However, the entire system is designed to operate at a steady-state condition where the flow throughout the system is constant (i.e., pumps are not cycling on and off).

- Off-gas treatment will achieve the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD. In doing so, the Off-Site IRM will be below the NYSDEC DAR-1 requirements.

4. Description of Off-Site Interim Remedial Measure

The Off-Site IRM consists of one groundwater recovery well, a dual-wall influent pipeline, two air strippers with an off-gas treatment system, and an effluent pipeline with three off-site diffusion wells (see Figures 3 and 4).

Recovery well (RW-100) is installed on the Great Neck UFSD property at a location selected to capture groundwater in the off-site area where VOC concentrations are highest. The well is installed to total depth of 335 feet below land surface (bls), and has three screened intervals in the middle horizon of the Magothy Aquifer.

Groundwater recovered from recovery well RW-100 is conveyed to the Off-Site Remediation Treatment Plant using a submersible pump via a dual-containment pipeline. The primary or carrier pipe from the recovery well (or influent) pipeline is 8-inch-diameter high density polyethylene (HDPE), with a side-wall dimension ratio (SDR) of 11 (SDR-11). The carrier pipe is installed inside of the containment pipe, which is 12-inch-diameter HDPE SDR-17. The carrier and containment pipes are equipped with leak detection devices (pressure transmitters) to shut the system down in case of a pipeline failure.

The concentration of project VOCs in the influent groundwater is reduced to meet the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD via the two Layne Christiansen (Formerly Hydro Group, Inc.) Model No. PCS-108-24 air strippers arranged in a series configuration. Air stripping is a mass transfer process. In a packed-column aeration system like the Off-Site IRM, air and water are run counter-current through a randomly packed media in a tower structure. The media enhances air/liquid contact by breaking the water into a thin film and exposing a large amount of the liquid surface area to the counter-flowing air. When more surface area is exposed, there is greater opportunity for transfer of the VOCs out of the water into the passing air. The media also serves to continually mix the water so that the stripping process in not limited by diffusion of the VOCs through the water.

Treated water is discharged from the treatment plant and recharged into the Magothy Aquifer via three diffusion wells (DW-100 thru DW-102). The treated water is conveyed to the diffusion wells via a single-walled pipe. A portion of the effluent pipeline consists of a 12-inch-diameter ductile iron, cement-lined pipeline, which was originally installed and used by the Manhasset-Lakeville Water District (MLWD) as a conveyance line between MLWD Well N5710 and the MLWD Plant. The remainder of the discharge pipeline is 8-inch-diameter Blue Brute polyvinyl chloride (PVC). The discharge pipeline is equipped with leak detection devices (pressure transmitters) to shut the system down in case of a pipeline failure.

VOCs in the air stripper off-gas are removed to the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD using VPGAC and PPZ prior to atmospheric discharge. There are three ECUs filled with VPGAC and two ECUs filled with PPZ. The system is constructed in a series configuration, such that VPGAC units remove the majority of the VOCs from the air stream (with the lead unit removing most of the contaminant mass), while the remaining two PPZ-filled ECUs are designed to remove vinyl chloride that is not well adsorbed by VPGAC.

VPGAC adsorbs the VOC molecules forming a physical bond via Van der Waal forces with the VOC molecule. VPGAC is manufactured to promote an extensive natural surface area that is available for the adsorption process. The surface area of granular carbons can range up to 1,400 square meters per gram of material. The physical adsorption of VOCs on and into VPGAC is concentration gradient driven. Thus, the adsorption

capacity of the VPGAC is dependent on the concentration of VOCs in the off-gas. For example, as VOC concentration increases, additional pounds of VOCs per pound of VPGAC can be adsorbed.

In addition, due to the need for direct contact between the VOC molecule and the VPGAC surface, the presence of moisture in the air stream will impact the rate of adsorption. The capacity of the activated carbon declines rapidly as the relative humidity of the air increases above 60%. In order to optimize the carbon usage rate, the air stream is heated to lower the relative humidity of the air to the 40% to 60% range.

5. Performance Analysis and Effectiveness Evaluation

This section describes the methods that will be used to evaluate the short- and long-term performance and effectiveness of the Off-Site IRM. For purposes of this PADM Plan, this section is subdivided to address performance analysis and effectiveness evaluation of the two primary components of the Off-Site IRM: 1) groundwater recovery system, and 2) groundwater treatment system, including the emission control system. The following subsections in this PADM Plan include detailed descriptions of the components which the performance analysis and effectiveness evaluation will focus on, describes the monitoring requirements necessary to perform the analysis and evaluation associated with these two primary Off-Site IRM components, and presents the procedure that will be followed in the event of a non-compliant water or vapor analytical result. The Great Neck UFSD will be notified at least 5 business days prior to collection of any samples associated with the Off-Site IRM.

5.1 Performance Analysis and Effectiveness Evaluation of the Groundwater Recovery System

The performance analysis and effectiveness evaluation of the Off-Site IRM includes operational hydraulic monitoring and operational groundwater quality monitoring (see Appendix B of OM&M Manual – Groundwater Monitoring Plan). The methodologies and quality assurance/quality control (QA/QC) procedures to be utilized associated with these operational and performance/compliance monitoring elements (as defined in the OM&M Manual) are described in the Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) included as Appendix A and Attachment A-1 of the OM&M Manual, respectively.

The following sections of the PADM Plan describe the recovery well system components, monitoring plan objectives, monitoring network, water level and groundwater sampling methodologies, analytical parameters, and hydraulic and groundwater sampling and reporting schedules. Ultimately this monitoring plan will be incorporated into an overall monitoring plan which covers both the on-site area, designated OU-1, and the off-site area that is designated as OU-2. A remedy for the off-site area will be developed as part of the OU-2 FS.

The objectives of this monitoring plan are as follows:

- To monitor groundwater flow patterns and determine the area of influence created by the operation of the Off-Site IRM recovery well; and
- To determine and monitor groundwater quality concentration trends at strategic locations.

5.1.1 Groundwater Recovery System Components

The recovery well was installed in a below grade well vault and is equipped with a dedicated submersible pump, piping, valves and instrumentation. The location of the recovery well is shown on Figure 3. The recovery well is described briefly below.

The recovery well (RW-100) was installed on the Great Neck UFSD property at a location selected to capture groundwater in the off-site area where VOC concentrations are highest. Well RW-100 is installed to total depth of 335 feet bls, and has three screened intervals in the middle horizon of the Magothy Aquifer. Specifically, the screens are located between 190 and 210 feet bls, 238 and 260 feet bls, and 276 to 324 feet bls. The exact

intervals screened were selected after a vertical profile boring was drilled to better define the local hydrogeologic and groundwater conditions, and constituent concentrations.

Groundwater is recovered from recovery well RW-100 using a 40 horsepower submersible pump. The RW-100 wellhead is enclosed in a below-grade vault along with associated piping, valves and instrumentation that include an air release valve, Cla-Val™/check valve combination, pressure indicator, sample tap, strainer (single basket) and a flow meter readout panel. The recovery well vault is watertight with a level switch to shut the entire system down on a high alarm to mitigate release of untreated groundwater to the surrounding soil should a leak occur in the piping in the well vault.

5.1.2 Monitoring Network

Groundwater monitoring in the area of the Off-Site IRM includes both hydraulic (water-level) measurements and groundwater quality monitoring. The monitoring network has been established to satisfy the objectives described in subsection 5.1, above. A total of 28 wells are included in the hydraulic monitoring network (27 monitoring wells and one recovery well). A total of 16 wells are included in the groundwater quality monitoring network. Table 3 summarizes the wells included in the monitoring plan for hydraulic monitoring and groundwater quality. Figure 5 shows the locations of wells in the monitoring network. The wells included in the monitoring network may be modified based on a review of the monitoring reports and with NYSDEC's prior approval.

5.1.3 Water Level Measurement Methodology

Water level measurements will be collected to the nearest hundredth of a foot (0.01 ft) from the wells in the hydraulic monitoring network using a decontaminated electric water level indicator. A synoptic round of water level measurements will be completed on the same day from the wells listed on Table 3. Additional water-level measurement protocols/requirements are described in the SAP.

5.1.4 Groundwater Quality Sampling Methodology

Groundwater samples to be collected as part of the groundwater monitoring program will be analyzed for Target Compound List (TCL) VOCs plus freons using NYSDEC Analytical Services Protocol (ASP) Method 2000-1, as specified in the SAP. Evacuation and collection of groundwater samples from monitoring wells will be conducted in accordance with the 1995 United States Environmental Protection Agency (USEPA) Region II Draft Groundwater Sampling Procedure for Low-Flow Pump Purging and Sampling, as discussed in the SAP. Groundwater samples collected from the recovery wells will be collected in accordance with the sampling protocols established in the SAP.

QA/QC samples to be collected as part of the groundwater monitoring program will include blind duplicates, matrix spike/matrix spike duplicate (MS/MSD), field blanks, and trip blanks. QA/QC samples will be collected in accordance with the QAPP, which is Attachment A-1 to the SAP.

Decontamination procedures and waste disposal guidelines are also discussed in the SAP. Data validation guidelines are established in the QAPP.

5.1.5 Hydraulic Monitoring Schedule and Reporting

Baseline operational hydraulic monitoring will commence prior to the initial startup of the Off-Site IRM and continue following start-up of the Off-Site IRM once a month for six months, then quarterly for the remainder of the first year (two additional water level events). Groundwater elevations will be measured in the 27 monitoring wells and the recovery well (a total of 28 wells). Thereafter, water levels will be measured annually. The number of wells in the baseline operational hydraulic monitoring network may be modified after the first six months of monitoring is complete based on the review of the monitoring reports and with NYSDEC's prior approval.

Water level elevation results will be tabulated and added to the existing database. These data will be plotted on maps for all four aquifer zones (upper Glacial, and the upper, middle, and lower portions of the Magothy aquifer) and will be contoured, if possible. The figures will be reviewed to assess the area of influence created by the pumping at recovery well RW-100. Vertical hydraulic gradients will also be analyzed to determine vertical flow gradients.

Upon completion of water-level measurement rounds and the reduction of the field records, the data will be included in the Off-Site IRM OM&M Reports. The reports will include a description of the field work, tabulated water level results, tabulated vertical gradients, and groundwater maps. These reports are discussed in more detail in Section 6.

These operational water level data will be used, along with the groundwater quality data, to assess the overall performance of the Off-Site IRM. Conclusions will be included based on the data generated in the reporting period and over the period of record. In addition, recommendations, if appropriate, will be provided for changes to the monitoring program, as needed. Changes to the monitoring program will only be made with prior NYSDEC approval.

5.1.6 Groundwater Quality Sampling Schedule and Reporting

Baseline operational groundwater quality sampling will commence following start-up of the Off-Site IRM. Groundwater samples will be collected and analyzed from the 15 monitoring wells and the recovery well (a total of 16 wells) twice a year for the first year of operation (after the start-up period). Thereafter, groundwater samples will be collected annually. The number of wells in the groundwater quality network may be additionally modified after the first year of sampling (i.e., two rounds) is complete based on the review of the analytical reports and with NYSDEC's prior approval.

Groundwater quality results will be tabulated and added to the existing database. Groundwater Applicable or Relevant and Appropriate Requirements (ARARs) will be included with the tabulated groundwater quality results. The primary VOCs of concern (cis-1,2-dichloroethene, trichloroethene, tetrachloroethene, vinyl chloride, and 1,1,2-trichlorotrifluoroethane [Freon 113]) will be monitored and compared to the ARARs. Table 3 in Appendix B of the OM&M Manual summarizes the ARARS. In addition, TVOC groundwater quality results will be plotted over time for the 16 wells in the groundwater monitoring network. The plots will include historical data, if available. The plots will be reviewed to determine the effectiveness of the Off-Site IRM.

Upon completion of the groundwater quality sampling rounds, receipt of the data from the analytical laboratory and validation of the analytical data, Off-Site IRM OM&M Reports will be prepared. Each report will include a description of the field work, tabulated groundwater quality results, and graphs showing groundwater quality over time for select wells sampled. These reports are discussed in more detail in Section 6.

The operational groundwater quality data, along with the water-level data, will be used to assess the overall performance of the Off-Site IRM. Conclusions based on the data generated in the reporting period and over the period of record will be included. In addition, recommendations, as appropriate, will be provided for changes to the monitoring program, as needed. Changes to the sampling program will only be made with prior NYSDEC approval.

5.2 Performance Analysis and Effectiveness Evaluation of the Groundwater Treatment System

This section includes the performance analysis and effectiveness evaluation for the groundwater treatment system. The groundwater treatment system requires an emission control system. This subsection discusses the following for both the groundwater treatment and the emission control systems:

- System objectives;
- Brief process descriptions, along with influencing factors;
- Brief description of system operation and monitoring; and
- Non-compliance events and corrective actions.

The methodologies and QA/QC procedures to be utilized for the collection and analysis of the influent and effluent water and air samples are described in the SAP and QAPP included as Appendix A and Attachment A-1 of the OM&M Manual, respectively.

5.2.1 Groundwater Treatment System

The following sections describe operation of the groundwater treatment system.

5.2.1.1 Groundwater Treatment System Objective

The objective is to operate, monitor, and maintain the groundwater treatment system to consistently achieve the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD on the treated water effluent.

5.2.1.2 Groundwater Treatment Process and System Description

The VOCs will be removed from the extracted groundwater using a mass transfer process referred to as air stripping. Air stripping is a proven technology for the removal of the site-related constituents of concern (COCs) from groundwater. Specifically, the entire extracted groundwater stream passes through two air strippers arranged in series to treat the site-related COCs in groundwater prior to re-injection through the diffusion wells.

5.2.1.3 Groundwater Treatment System Factors

Major factors that influence the treatment efficiency of the Off-Site IRM air stripping system are provided below.

1. Water flow rate – The rate of water flow through an air stripper is directly related to the treatment efficiency. The higher the water flow rate, the higher the required air flow rate to achieve the same removal efficiency, assuming the same influent VOC concentration. For this system, the design water flow rate is

500 gpm. This flow rate, originally determined by the groundwater model, is set and controlled by Lockheed Martin or their authorized agent.

2. Influent groundwater quality – Typically, initial influent concentrations for pump-and-treat systems begin relatively high, then decreases exponentially to a point at which the influent concentration is virtually constant after several years. Influent concentrations will be monitored in accordance with the sampling program (refer to OM&M Manual for monitoring schedule). If the influent concentrations fluctuate, modifications can be made to maintain the desired treatment efficiency. System parameters that can be modified include adjusting the air flow rate or the rate of groundwater extraction.

3. Air flow rate – The initial air flow rate has been calculated to provide the desired air-to-water ratio to achieve the treatment efficiency resulting in a non-detect condition in the water discharge. The air flow rate may be adjusted, based on results of the water monitoring performed (refer to OM&M Manual for monitoring schedule). The air flow rate is set and controlled by Lockheed Martin or their authorized agent. In case of a blower failure or some other sort of low air flow condition, which could result in an inadequate air-to-water ratio, the system is designed to automatically and immediately proceed through a controlled shutdown procedure.

5.2.1.4 Groundwater Treatment System Operation and Monitoring

The groundwater treatment system was constructed and will be operated based on the final design and start-up procedure presented in the OM&M Manual. Specifically, the groundwater flow rate will be set at 500 gpm and the air flow rate will be set to achieve the worst case design air-to-water ratio of 60:1. Since the air-to-water ratio is dependent on the concentration of the VOCs in the groundwater, the air-to-water ratio will be adjusted during the start-up process in accordance with actual VOC concentrations in the influent groundwater. Effluent samples will be collected weekly during the short-term monitoring period to determine proper treatment by the groundwater treatment system (refer to OM&M Manual for monitoring schedule). The air-to-water ratio will not be decreased to below the worst case design condition of 60:1 without prior NYSDEC approval.

The groundwater treatment system will be operated, maintained, and monitored according to the OM&M Manual. The sampling results will provide actual site-specific data regarding the air-to-water ratio to achieve the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD in the water discharge. Periodically evaluated, this air-to-water ratio will be used to maintain appropriate levels of treatment throughout the duration of the project. However, as project conditions change, so may the required air-to-water ratio. As discussed in the OM&M Manual, VOC concentrations at the following locations will be periodically monitored:

1. System influent – An analysis of these data will be used to assess whether the influent VOC concentrations are changing and whether system parameters, such as the air flow rate, should be adjusted accordingly.

2. Mid-train (in between the first air stripper tower and the second air stripper tower) – An analysis of these data will be used to track the first air stripper's treatment efficiency and also to help assess whether fouling of the air stripper packing may be occurring.

3. Effluent – An analysis of these data will be used to track compliance with the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD and to provide information associated with the continued performance of the second air stripper tower.

This monitoring data will also be used to evaluate and schedule maintenance activities (e.g., cleaning tower air stripper packing material). The frequency and location of monitoring may be modified in the future after sufficient influent, mid-train and treated effluent water sample data has been collected and evaluated. This modification will only be made with prior NYSDEC approval.

5.2.1.5 Groundwater Treatment System Non-Compliance Events and Corrective Actions

If a VOC is detected in the plant water effluent at a concentration above the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD, the following steps will be taken:

1. A non-compliance event occurs, Lockheed Martin or their authorized agent will resample the water effluent within two working days from date of determination of non-compliance. Confirmation samples will be submitted to the laboratory for analysis on a 24-hour turnaround basis. If initial confirmation sampling confirms non-compliance, then a decision will be made whether to modify selected system operating parameter(s), which would likely remedy the non-compliance event, and to collect another confirmation sample and submit for analysis on a 24-hour turnaround basis. If the subsequent laboratory result indicates that the system is non-compliant, then the following will occur:

    a. The system will be shut down.
    b. NYSDEC and Great Neck UFSD representatives will be contacted.

2. Lockheed Martin or their authorized agent will attempt to determine the cause of non compliance based on a review of salient data associated with system.

3. Upon approval by the NYSDEC, Lockheed Martin or their authorized agent will implement a corrective action plan, if needed. This may require that the system be operated to troubleshoot, test, and perform other corrective or curative work necessary to meet the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD. Typical corrective actions include, but are not limited to, the following:

    a. Increase the air flow rate to increase the air-to-water ratio.
    b. Decrease the water flow rate to increase the air-to-water ratio or to reduce the constituent loading to the air strippers. However, the flow rate will not be reduced below 500 gpm.
    c. A combination of a. and b. above.
    d. Cleaning of air stripper and ancillary equipment.
    e. Repair or upgrade of existing equipment.

4. Once Lockheed Martin or their authorized agent and NYSDEC are satisfied that the system can be operated to meet the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD, the system will be restarted.

5. Upon restart of the system, Lockheed Martin or their authorized agent will notify both the NYSDEC and Great Neck UFSD representatives that the system is operational.

6. Lockheed Martin or their authorized agent will prepare a non-compliance report and resume system operation and monitoring in accordance with the OM&M Manual.

7. If the system is not in compliance after Step 6 is implemented, Steps 2 through 6 will be repeated. However, the non-compliance will be corrected within 20 business days of the initial non-compliant event (Step 1), or such other period of time as NYSDEC may specifically allow to rectify the particular non-compliant event.

In the event of leakage or spillage of water on Great Neck UFSD property, Lockheed Martin or their authorized agent will take actions necessary to correct and cure the condition within 10 days in accordance with a corrective action plan approved by the NYSDEC. However, based on the nature of the leak or spill and the details of the corrective action plan, a longer time frame may be specified in the corrective action plan.

5.2.2 Emission Control System

The following sections describe operation of the emission control system.

5.2.2.1 Emission Control System Objective

The objective is to operate, monitor, and maintain the air stripper emission control system to consistently achieve the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD on the treatment plant air discharge.

5.2.2.2 Emission Control Process and System Description

During the air stripping process, VOCs are transferred from the water entering the top of the air strippers to the countercurrent air stream which enters from the bottom of the air strippers. Initially, the air stripper off-gas vapor was treated by four ECUs, which were VPGACs arranged in a series configuration for the removal of VOCs prior to discharge to the atmosphere. However, during initial testing, vinyl chloride was detected at concentrations slightly above the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD. As a result, the fourth, and smallest, VPGAC unit was taken out of service and two PPZ units were installed downstream of the three VPGAC units. The PPZ units, which are arranged in a series configuration, were installed to reduce the concentration of vinyl chloride within the vapor stream to non-detect concentrations via chemical oxidation.

In addition, due to the need for direct contact between the VOC molecule and the VPGAC surface, the presence of moisture in the air stream will impact the rate of adsorption. The capacity of the activated carbon declines rapidly as the relative humidity of the air increases above 60%. In order to optimize the carbon usage rate, the air stream is heated to lower the relative humidity of the air to the 40% to 60% range

5.2.2.3 Emission Control System Factors

Major factors that will influence the treatment efficiency of the Off-Site IRM emission control system are provided below.

1. Air flow rate – The air flow rate will be determined by the required air-to-water ratio for the air stripper units. Typically, as noted earlier, the influent groundwater concentrations of a pump-and-treat system decrease with time, and as the influent concentrations decrease, the air flow rate can also be decreased.

2. VOC concentration – The VOC concentration in the air stream is controlled by the mass of VOCs in the influent groundwater and the air stripper air flow rate. Typically, the adsorption capacity of VPGAC increases with higher VOC concentrations.

3. Air temperature – The adsorption capacity of VPGAC is affected by the temperature of the air stream. Typically, the higher the temperature of the air stream, the better the adsorption capacity, as long as the temperature is not too hot (above 100 degrees Fahrenheit). A duct heater is used to heat the air stripper off-gas. A temperature sensor will be used to continually monitor the air temperature of the VPGAC influent air stream. If a low temperature condition occurs, the system will automatically and immediately proceed through a controlled shutdown procedure.

5.2.2.4 Emission Control System Operation and Monitoring

The emission control system was constructed and started-up as detailed in the OM&M Manual. Specifically, the air flow rate will be set at a calculated rate to achieve the design air-to-water ratio for the water treatment system, based on the influent groundwater concentration as discussed in Section 5.2.1.4. From startup, the system will be operated, maintained, and monitored according to the OM&M Manual.

Lockheed Martin or their authorized agent will monitor the system's performance, including compliance with the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD by implementing the monitoring program (refer to OM&M Manual). The results of the initial six months of sampling events will provide actual, site-specific data regarding the adsorption capacity of the VPGAC to remove the site-specific VOC mixture. Once determined, this adsorption capacity will be used to estimate expected practical usage duration of a VPGAC bed for the duration of the project. A similar approach will be used for the PPZ beds. However, as project conditions change, so will the practical usage duration of VPGAC and PPZ beds. Typically, as the mass of VOCs decrease, the longer the VPGAC and PPZ beds are effective.

Specifically, the following key samples will be collected as part of the monitoring program:

1. System influent – An analysis of these data will be used to assess whether the influent VOC concentrations are changing and whether system parameters, like VPGAC and PPZ usage rates, may be impacted.

2. VPGAC mid-train (in between the first VPGAC unit and the second VPGAC unit) – Any detection of VOCs at the VPGAC mid-train will initiate replacement of the VPGAC in the first bed and reconfiguration of the air treatment units.

3. PPZ mid-train (in between PPZ units) – Any detection of vinyl chloride at the PPZ mid-train will initiate replacement of the PPZ in the first bed.

4. Effluent – An analysis of these data will be used to track compliance with the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD.

This monitoring data will also be used to evaluate and schedule maintenance activities (e.g., VPGAC or PPZ replacement). The frequency and location of monitoring may be modified in the future after sufficient influent, mid-train and treated air effluent sample data has been collected and evaluated. This modification will only be made with prior NYSDEC approval.

5.2.2.5 Emission Control System Non-Compliance Events and Corrective Actions

If a VOC is detected in the plant vapor emissions at a concentration above the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD, the following steps will be taken:

1. If a non-compliance event occurs, Lockheed Martin or their authorized agent will resample the vapor effluent within two working days from date of determination of non-compliance. Confirmation samples will be submitted to the laboratory for analysis on a 24-hour turnaround basis. If initial confirmation sampling confirms non-compliance, then a decision will be made whether to modify selected system operating parameter(s), which would likely remedy the non-compliance event, and to collect another confirmation sample and submit for analysis on a 24-hour turnaround basis. If the subsequent laboratory result indicates that the system is non-compliant, then the following will occur:

    a. The system will be shut down.
    b. NYSDEC and Great Neck UFSD representatives will be contacted.

2. Lockheed Martin or their authorized agent will attempt to determine the cause of non-compliance based on a review of salient data associated with system.

3. Upon approval by the NYSDEC, Lockheed Martin or their authorized agent will implement the corrective action plan, if needed. This may require that the system be operated to troubleshoot, test, and perform other corrective or curative work necessary to meet the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD. Typical corrective actions include, but are not limited to, the following:

    a. Decrease the air flow rate. However, the air flow rate will not be decreased to below a 60:1 air-to-water ratio without NYSDEC prior approval.
    b. Decrease the water flow rate to increase the air-to-water ratio or to reduce the constituent loading to the air strippers. However, the flow rate will not be reduced below 500 gpm.
    c. A combination of a. and b. above.
    d. Cleaning of air stripper and ancillary equipment.
    e. Replace VPGAC or PPZ.
    f. Repair or upgrade of existing equipment.

4. Once Lockheed Martin or their authorized agent and NYSDEC are satisfied that the system can be operated to meet the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD, the system will be restarted.

5. Upon restart of the system, Lockheed Martin or their authorized agent will notify both the NYSDEC and Great Neck USFD representatives that the system is operational.

6. Lockheed Martin or their authorized agent will prepare a non-compliance report and resume system operation and monitoring in accordance with OM&M Manual.

7. If the system is not in compliance after Step 6 is implemented, Steps 2 through 6 will be repeated. However, the non-compliance will be corrected within 20 business days of the initial non-compliant event

(Step 1), or such other period of time as NYSDEC may specifically allow to rectify the particular non-compliant event.

6. Record Keeping and Reporting

This section describes the preparation of OM&M reports that will aid in tracking system performance and effectiveness. Records documenting the operation and maintenance of the Off-Site IRM will be maintained electronically by the Supervisory Control and Data Acquisition (SCADA) system, and via manual means (visual site inspection logs). Site inspection and maintenance logs (Appendix F of the OM&M Manual) will be completed during site inspections to document system operation and maintenance activities. Electronic and system inspection and maintenance logs will be retained a minimum of 10 years after data is collected.

Off-Site IRM OM&M Reports summarizing the remediation system operation, performance, and discharge monitoring sampling will be prepared monthly for the first six months of operation and then quarterly until a determination can be made, based on these reports, that system operation has reached a steady state (i.e., system operating parameters have stabilized). At that time, Lockheed Martin will petition the NYSDEC to change the Off-Site IRM OM&M reporting frequency from quarterly to semi-annually. Contingent upon the NYSDEC's approval, semi-annual reports will be prepared thereafter. The reports will be published in paper and electronic format for submittal to the NYSDEC. The content of these Off-Site IRM OM&M Reports may be modified with prior NYSDEC approval.

The Off-Site IRM OM&M Reports will contain the analytical and operational data collected during the reporting period associated with the groundwater recovery system, the air stripping treatment system and the ECU system. The following information will be included in these Off-Site IRM OM&M Reports:

- Total volume of groundwater recovered and treated;
- Total mass of VOCs recovered and treated;
- Graphs showing constituent mass removals (cumulative) on a quarterly basis;
- Graphs showing constituent concentration trends (cumulative) in system influent on a quarterly basis;
- Operational data which includes the number of days on-line, and average air flow rate;
- Results of treated water discharge sampling and evaluation of compliance with Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD;
- Results of air discharge sampling and evaluation of compliance with the Non-Detect Performance Standards in accordance with the Access Agreement between Lockheed Martin and the Great Neck UFSD, including a comparison to the NYSDEC DAR-1 requirements;
- Summary of Operation & Maintenance activities during the reporting period (i.e., ECU media changeout, tower air stripping system packing material cleaning, etc.);
- Summary of any technical difficulties associated with the treatment system and corrective actions planned or taken; and
- Summary of any causes of any shutdown associated with the treatment system, notifications made, and corrective actions planned or taken.

The Groundwater Monitoring Plan, which is provided as Appendix B of the OM&M Manual, specifies groundwater sampling and hydraulic monitoring. The following information collected under the Groundwater Monitoring Plan will be included in the Off-Site IRM OM&M Reports:

- Water-level measurements and calculated groundwater elevations for wells associated with the operational hydraulic monitoring program;
- Field measurements of pH, conductivity and temperature;

- Tabulated analytical results for monitoring wells associated with the operational groundwater quality monitoring program;
- Graphs showing TVOC concentrations over time (cumulative) for monitoring wells associated with the performance of the operational groundwater quality monitoring program;
- The results of data validation;
- Maps showing the water level data that will be contoured, if possible; and
- Mapped concentrations of TVOCs in the four aquifer zones.

7. Shutdown Evaluation

Because the Off-Site IRM will eventually be combined with the OU-1 groundwater system in an integrated remedy for groundwater, it is premature to determine the shutdown criteria for the Off-Site IRM. After the OU-2 Final Remedy System has been determined and implemented as part of an OU-2 ROD, shutdown criteria will be developed for the integrated OU-1/OU-2 groundwater system and these criteria will be presented in the PADM for the integrated remedial system.

Tables

TABLE 1

FORMER UNISYS FACILITY
GREAT NECK, NEW YORK
OFF-SITE INTERIM REMEDIAL MEASURE

DESIGN INFLUENT AND EFFLUENT LIMITS FOR TREATED WATER

Parameter	Air Stripper Design Influent Concentration [1] (µg/L)	DEC Regulatory Effluent Concentration (µg/L)	Effluent Water Performance Standard [2] (µg/L)
Tetrachloroethene	300	5	ND
Trichloroethene	858	5	ND
cis-1,2-Dichloroethene	3,400	5	ND
Vinyl Chloride	10	2	ND
Freon 113	42	5	ND

Notes:
µg/L - micrograms per liter

(1) Design influent concentrations based on results of analytical results of groundwater samples collected after installation of Recovery Well RW-100.
(2) "ND" denotes analyte not detected in the sample at or above its minimum detection limit of 1 µg/L per USEPA SOW OLM04.2 per NYSDEC ASP 2000-1. The Non-Detect Performance Standards are specified in the Remediation Access and Licensing Agreement between Lockheed Martin Corporation and the Great Neck Union Free School District, dated April 14, 2003.

TABLE 2

FORMER UNISYS FACILITY
GREAT NECK, NEW YORK
OFF-SITE INTERIM REMEDIAL MEASURE

EFFLUENT LIMITS FOR TREATED AIR

Parameter	AGC [1,2] ($\mu g/m^3$)	SGC [1,2] ($\mu g/m^3$)	Effluent Air Performance Standard [3] ($\mu g/m^3$)
Tetrachloroethene	1	1,000	ND
Trichloroethene	0.5	54,000	ND
cis-1,2-Dichloroethene	1,900	190,000 [4]	ND
Vinyl Chloride	0.11	180,000	ND
Freon 113	180,000	960,000	ND

Notes:
$\mu g/m^3$ - micrograms per cubic meter

(1) Ambient air concentrations limits based on NYSDEC December 22, 2003 Air Guide No. 1 (DAR-1) AGCs and SGC, and NYSDEC recommendations.
(2) AGC refers to Annual Guidance Concentrations and SGC refers to Short-Term Guidance Concentrations.
(3) "ND" denotes analyte not detected in the sample at or above its minimum detection limit of 0.5 ppbV per USEPA Method TO-15. The Non-Detect Performance Standards are specified in the Remediation Access and Licensing Agreement between Lockheed Martin Corporation and the Great Neck Union Free School District, dated April 14, 2003.
(4) Since no SGC was provided in the DAR-1 AGC/AGC Tables, dated December 22, 2003, an interim SGC was developed based on guidance provided in Section IV.A.2.b.1 of the New York State DAR-1 Guidelines for the Control of Toxic Ambient Air Contaminants, 1991 edition. Specifically, for cis-1,2-Dichloroethene, which is not defined as a HIGH toxicity contaminant, the interim SGC = (smaller of TWA-TLV or TWA-REL)/4.2 or 793,000 $\mu g/m^3$/4.2 = 190,000 $\mu g/m^3$.

TABLE 3

FORMER UNISYS FACILITY
GREAT NECK, NEW YORK
OFF-SITE INTERIM REMEDIAL MEASURE

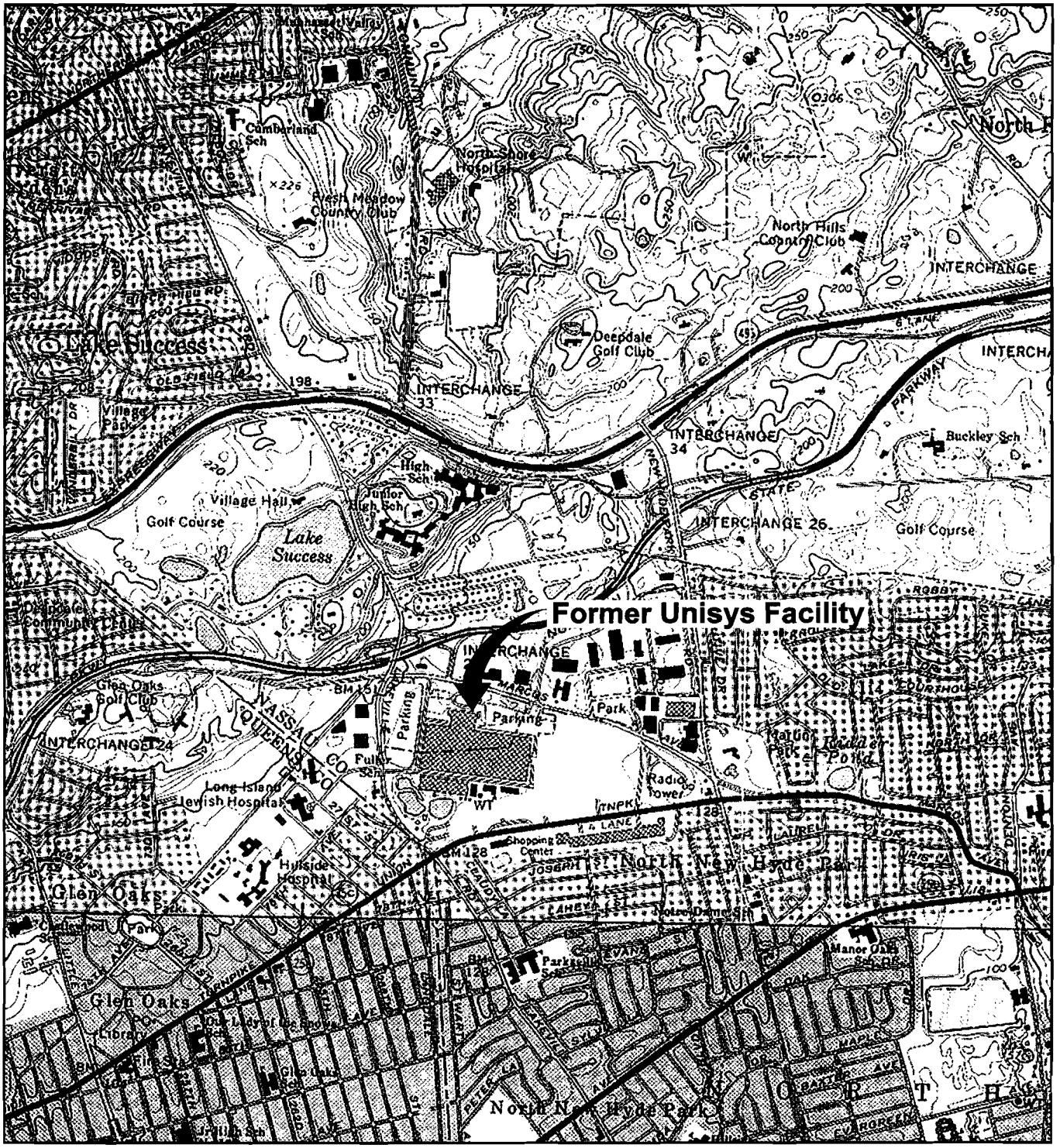
GROUNDWATER MONITORING NETWORK

Wells [1]	Screened Zone	Water Quality Sample	Water-Level Measurement
Recovery Well			
RW-100	UM/MM	X	X
Diffusion Wells			
DW-100	MM/BM		X
DW-101	BM		X
DW-102	BM		X
Monitoring Wells			
13ML	MM	X	X
14MI	UM	X	
16GL	UG	X	X
16ML	UM	X	X
17GL	UM	X	X
17ML	BM	X	X
18GL	UG		X
18ML	MM		X
22GL	UM		X
22ML	MM		X
30GL	UG		X
30MI	MM		X
30ML	BM		X
37MU	UM		X
37MI	MM		X
37ML	BM		X
38MU	UM	X	X
38MI	MM	X	X
38ML	BM	X	X
39MU	UM	X	X
39MI	MM	X	X
39ML	BM	X	X
N3905	UM	X	X
N4243	UM	X	X
N5710	MM/BM	X	X
TOTALS		16	28

Note:
UG - Upper Glacial Aquifer
UM - Upper Magothy Zone
MM - Middle Magothy Zone
BM - Basal Magothy Zone

(1) The wells included in the monitoring network may be modified based on a review of the monitoring and analytical reports, and with NYSDEC prior approval.

Figures



REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., LYNBROOK & SEA CLIFF, NY, 1968, PHOTOREVISED 1979.

2000' 0 2000'

Approximate Scale: 1" = 2000'

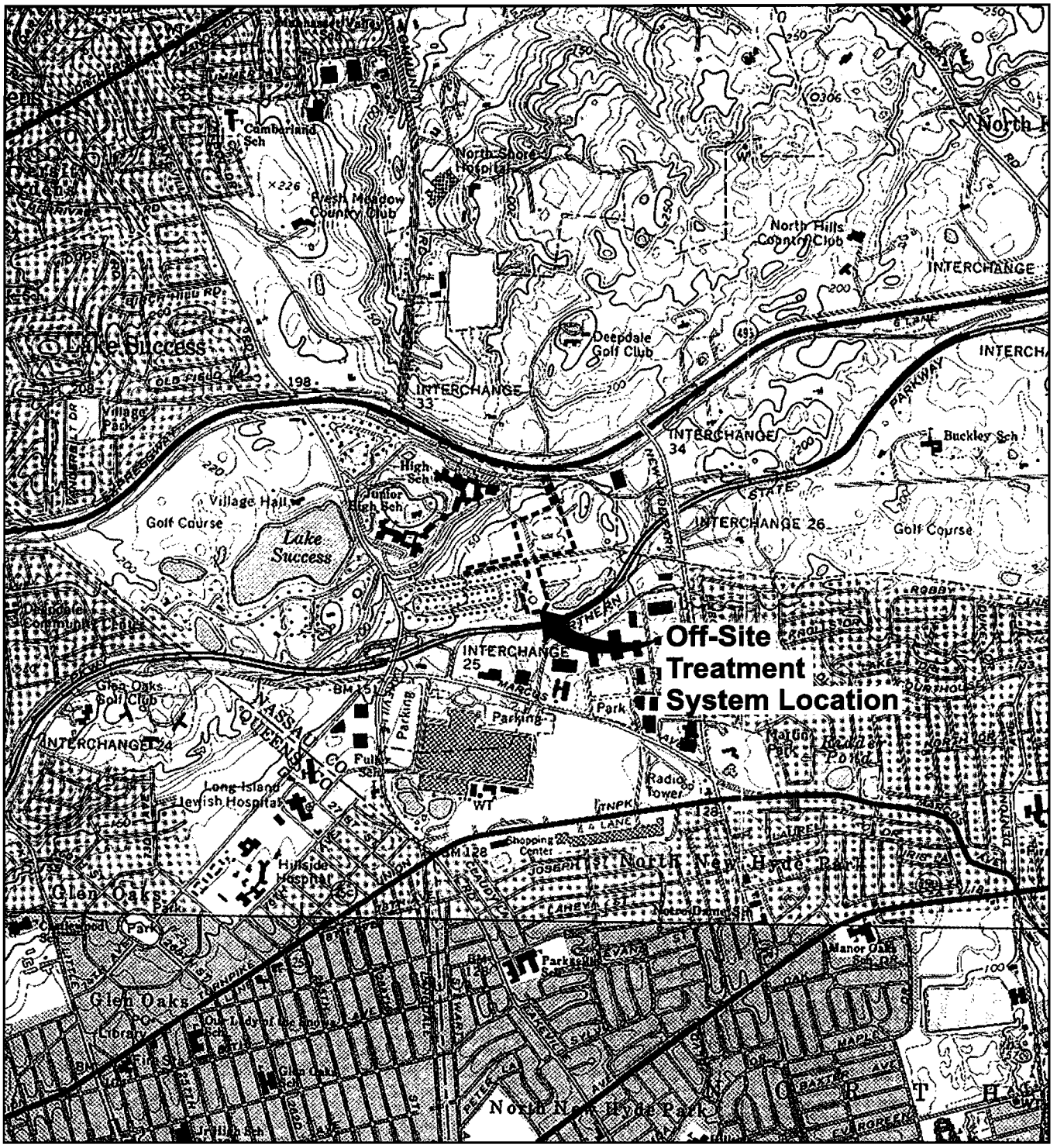
FORMER UNISYS FACILITY
OFF-SITE IRM
GREAT NECK, NEW YORK

SITE LOCATION MAP

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE 1

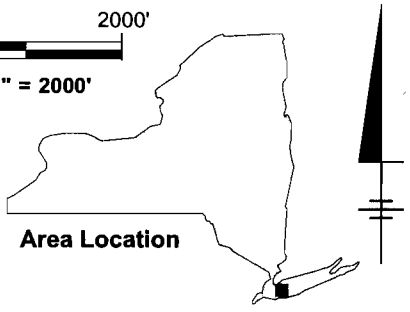
02/24/06 SYR-D85- DJH, KLS
38031004/38031n02.cdr



REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., LYNBROOK & SEA CLIFF, NY, 1968, PHOTOREVISED 1979.

2000' 0 2000'

Approximate Scale: 1" = 2000'



Area Location

02/24/06 SYR-D85- DJH, KLS
38031004/38031n03.cdr

FORMER UNISYS FACILITY
OFF-SITE IRM
GREAT NECK, NEW YORK

OFF-SITE TREATMENT SYSTEM LOCATION MAP

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FIGURE 2

HORACE HARDING EXPRESSWAY EXT.

LEGEND:

- REFERENCE AREA BOUNDARY
- INFLUENT PIPELINE AND ELECTRICAL CONDUITS AND CONDUCTORS
- PRE-EXISTING DISCHARGE PIPELINE
- NEW DISCHARGE PIPELINE
- PRIMARY ELECTRICAL FEED
- ELECTRICAL FEED
- NATURAL GAS LINE
- MLWD WATER MAIN
- STORMWATER LINE
- SANITARY LINE
- FENCE
- DIFFUSION WELL
- GROUNDWATER RECOVERY WELL

DIFFUSION WELL DW-100

DIFFUSION WELL DW-101

DIFFUSION WELL DW-102

RECHARGE BASIN

RECHARGE BASIN

RECOVERY WELL RW-100

INFLUENT PIPELINE AND ELECTRICAL CONDUITS

TANNERS ROAD

OLIVE STREET

DISCHARGE PIPELINE (FORMER MLWD N-5710)

MODIFIED WATER TREATMENT PLANT AND AIR STRIPPERS

POTASSIUM PERMANGANATE IMPREGNATED ZEOLITE EMISSION CONTROL UNITS

GRANULAR ACTIVATED CARBON EMISSION CONTROL UNITS

NORTHERN STATE PARKWAY

0 100' 200'
APPROXIMATE GRAPHIC SCALE

NOTES:

1. ALL INFORMATION WAS SUPPLIED BY ARCADIS G&M, INC. IN THE FORM OF ELECTRONIC FILE, ENTITLED "SITE PLAN" DATED 3/14/05.
2. ELEVATIONS, PROPERTY BOUNDARIES AND TREE INFORMATION BASED ON SURVEY PERFORMED BY SEAR BROWN INC., DECEMBER 2002 AND SIGNED AND SEALED BY JOHN MACDONALD, LICENSE NO. 049774.
3. LOCATIONS OF TANNERS ROAD, OLIVE STREET, SCHOOL BUILDING AND TENNIS COURTS ARE APPROXIMATE.

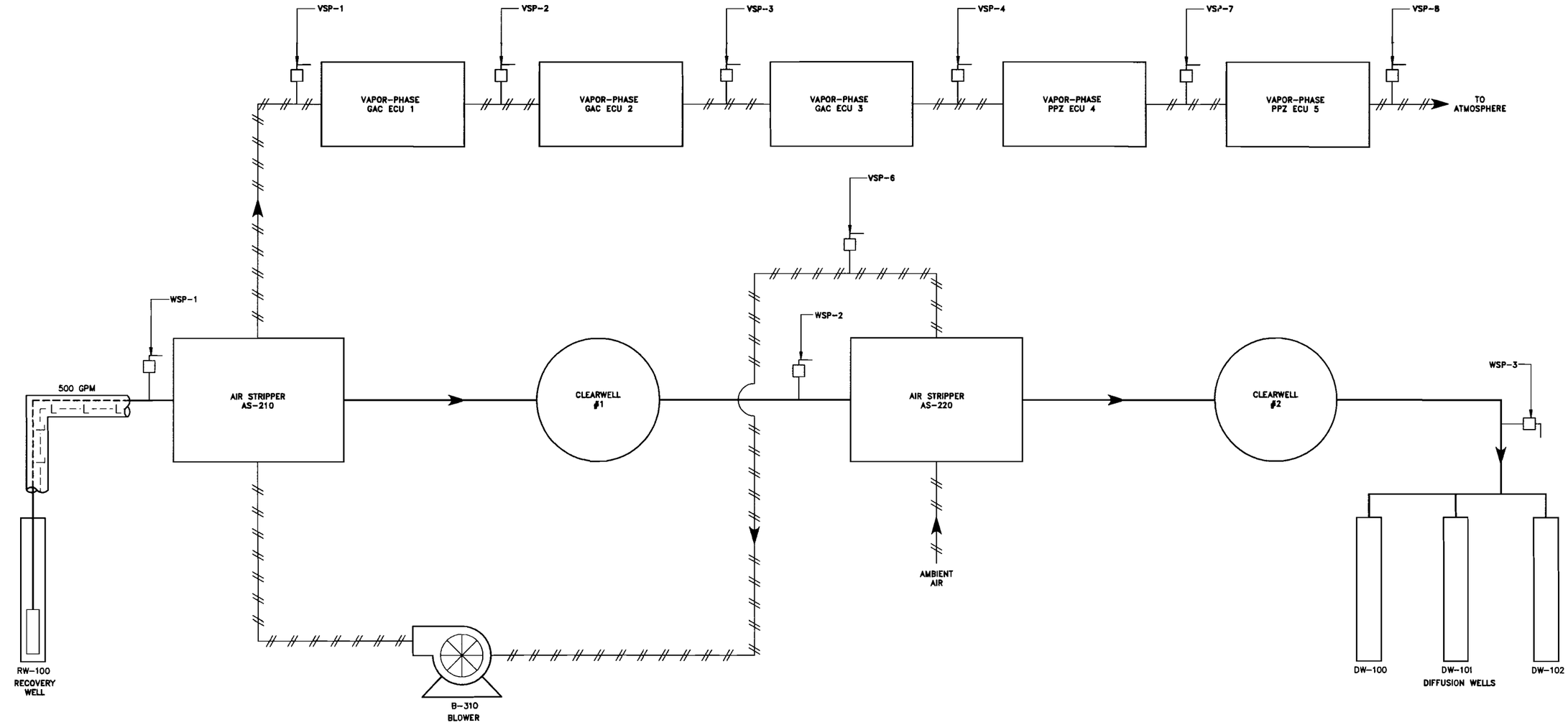
FORMER UNISYS FACILITY
OFF-SITE IRM
GREAT NECK, NEW YORK

OFF-SITE TREATMENT SYSTEM SITE PLAN

BBL BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE 3

L: ON=*, OFF=*REF*
P: PAGESET/SYR-DL
3/3/06 SYR-85-BGP KLS GMS
38031004/38031B02.0WG



NOTE:

VSP-5 WAS FORMERLY THE DISCHARGE FROM THE FOURTH VAPOR-PHASE GAC UNIT.

LEGEND:

VSP-1 — VAPOR SAMPLE PORT

WSP-1 — WATER SAMPLE PORT

AIR PROCESS LINE

WATER PROCESS LINE

PROCESS LINE (DUAL WALL WITH LEAK DETECTION)

SAMPLE PORT

FORMER UNISYS FACILITY
OFF-SITE IRM
GREAT NECK, NEW YORK

OFF-SITE TREATMENT SYSTEM SCHEMATIC

BBL
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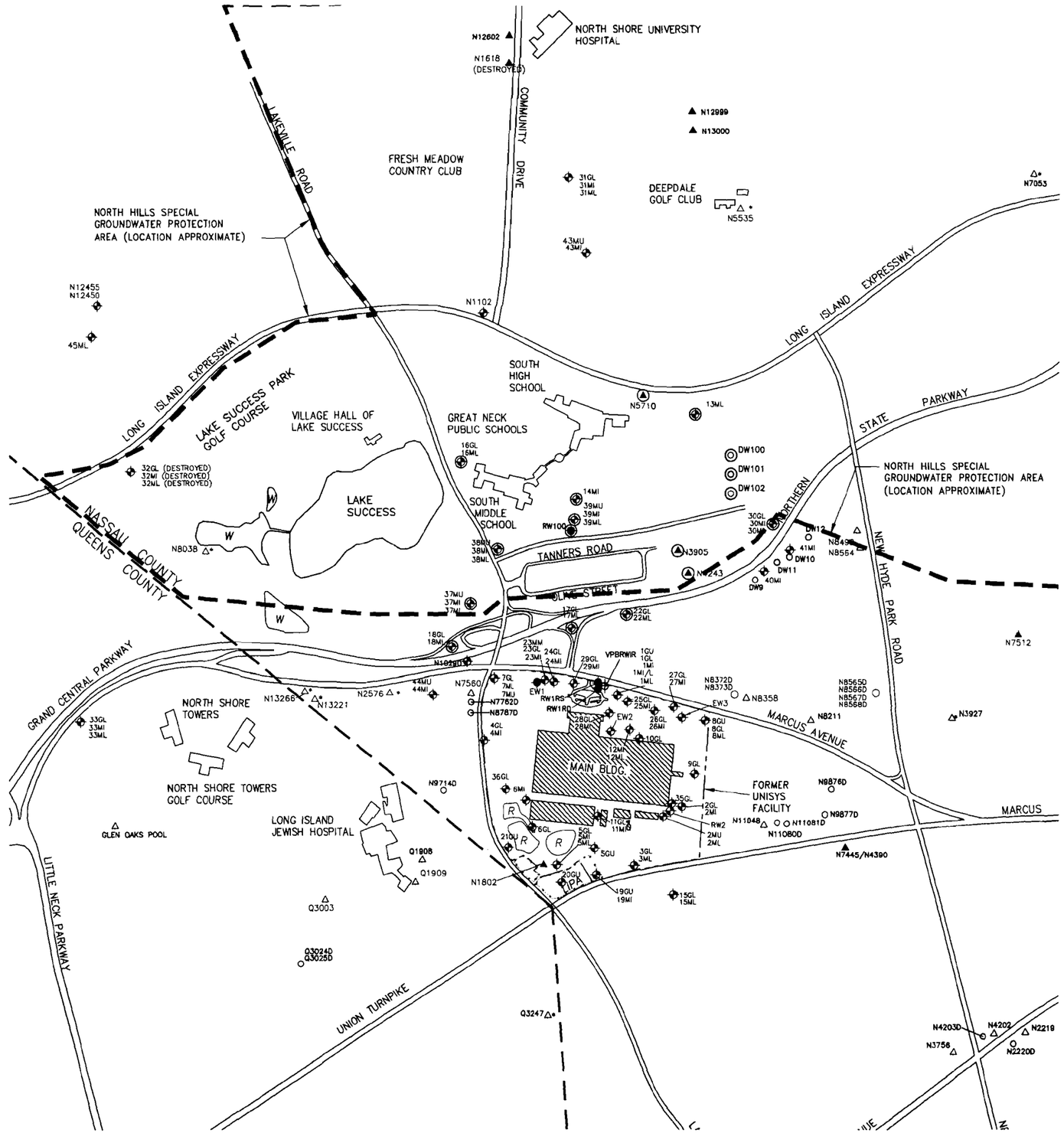
FIGURE 4

X: (XREF)
L: (LAYER)
P: PAGESET/PLT-DL
02/24/06 SYR-85-SDL BGP KLS
38031004/38031F01.DWG



LEGEND:

- W — BODY OF WATER
- R — RETENTION BASIN
- 8GU — LOCATION AND DESIGNATION OF MONITORING WELL/CLUSTER
- EW1 — LOCATION AND DESIGNATION OF SITE EXTRACTION OR RECOVERY WELL
- N7512 ▲ — LOCATION AND DESIGNATION OF MUNICIPAL SUPPLY WELL
- N6073 △ — LOCATION AND DESIGNATION OF NON-MUNICIPAL SUPPLY WELL
- N2576 △* — LOCATION AND DESIGNATION OF NON-MUNICIPAL IRRIGATION WELL
- N83720 ○ — LOCATION AND DESIGNATION OF NON-MUNICIPAL DIFFUSION WELL
- FORMER UNISYS FACILITY PROPERTY BOUNDARY
- WELL IN OFF-SITE IRM MONITORING PROGRAM

NOTES:

BASE MAP SUPPLIED BY ARCADIS IN THE FORM OF ELECTRONIC FILE, ENTITLED "GROUND WATER MONITORING NETWORK FOR THE OFF-SITE INTERIM REMEDIAL MEASURE (IRM)" DATED 11/8/05, AT A SCALE OF 1"=800".

0 600' 1200'
GRAPHIC SCALE

FORMER UNISYS FACILITY
OFF-SITE IRM
GREAT NECK, NEW YORK

GROUNDWATER MONITORING NETWORK

BBL BLASLAND, BOUCK & LEE, INC. engineers, scientists, economists

FIGURE 5

X: 38031X01.DWG
L: ON=*, OFF=REF
P: PAGESET/SYR-DL
3/3/06 SYR-BS-LJP GMS
38031004/MANUAL/38031W01.DWG

Attachments

Attachment A

Groundwater Treatment Systems (OU-1 and Off-Site IRM) Simulated Capture Zones

ATTACHMENT A
GROUNDWATER TREATMENT SYSTEMS
(OU-1 AND OFF-SITE INTERIM REMEDIAL MEASURE)
SIMULATED CAPTURE ZONES
FORMER UNISYS FACILITY
GREAT NECK, NEW YORK

Attachment A provides a clarification of the expected hydraulic effectiveness associated with operation of the OU-1 groundwater treatment system and a comparison to the OU-1 system operating simultaneously with the Off-Site Interim Remedial Measure (IRM) System.

Hydraulic containment as specified in the OU-1 Record of Decision (ROD) calls for capture of on-site groundwater to a depth of 270 feet below land surface (bls). Figures FS1-UG, FS1-UM, FS1-MM, and FS1-BM show simulated captures zones on April 19, 2001 expected under OU-1 System operation in the upper Glacial, upper, middle, and basal Magothy aquifer horizons, respectively. The shaded capture zones clearly extend to or beyond the site boundaries in all horizons. As the 270 ft depth corresponds to the uppermost portions of the middle Magothy horizon, capture in the remainder of the middle Magothy and in the basal Magothy horizons clearly exceeds the requirements of the ROD. Figures A-1, A-2, A-3, and A-4 show the potentiometric surface configurations for the upper Glacial, upper, middle, and basal Magothy aquifer horizons, respectively, during operation of the OU-1 System on September 22, 2003.

The primary objectives for the Off-Site IRM are to help protect public supply wells and minimize plume intrusion into the Special Groundwater Protection Area (SGPA), while removing contaminant mass from the aquifer. The Off-Site IRM was specifically designed to complement and perform in concert with the existing OU-1 System.

Figures FS2-UG, FS2-UM, FS2-MM, and FS2-BM show simulated captures zones on April 19, 2001 expected under the combined OU-1 System and Off-Site IRM System operation in the upper Glacial, upper, middle, and basal Magothy aquifer horizons, respectively. When compared to the FS1 series of figures, it is clear that additional capture has been achieved north (downgradient) of the site in the key area where elevated concentrations of volatile organic compounds (VOCs) have been observed. Just as important is the fact that operation of the Off-Site IRM system has had no detrimental impacts on the hydraulic effectiveness of the on-site OU-1 System. It can be seen that capture zones under the combined pumping scenario still cover the entire on-site area, and therefore, the OU-1 System effectiveness has not been compromised by simultaneous operation of the Off-Site IRM System.

Potentiometric surface configurations and capture zone analysis will be updated and revised as part of the OU-2 Remedial Investigation/Feasability Study (RI/FS) under combined OU-1 System and Off-Site IRM System operation.

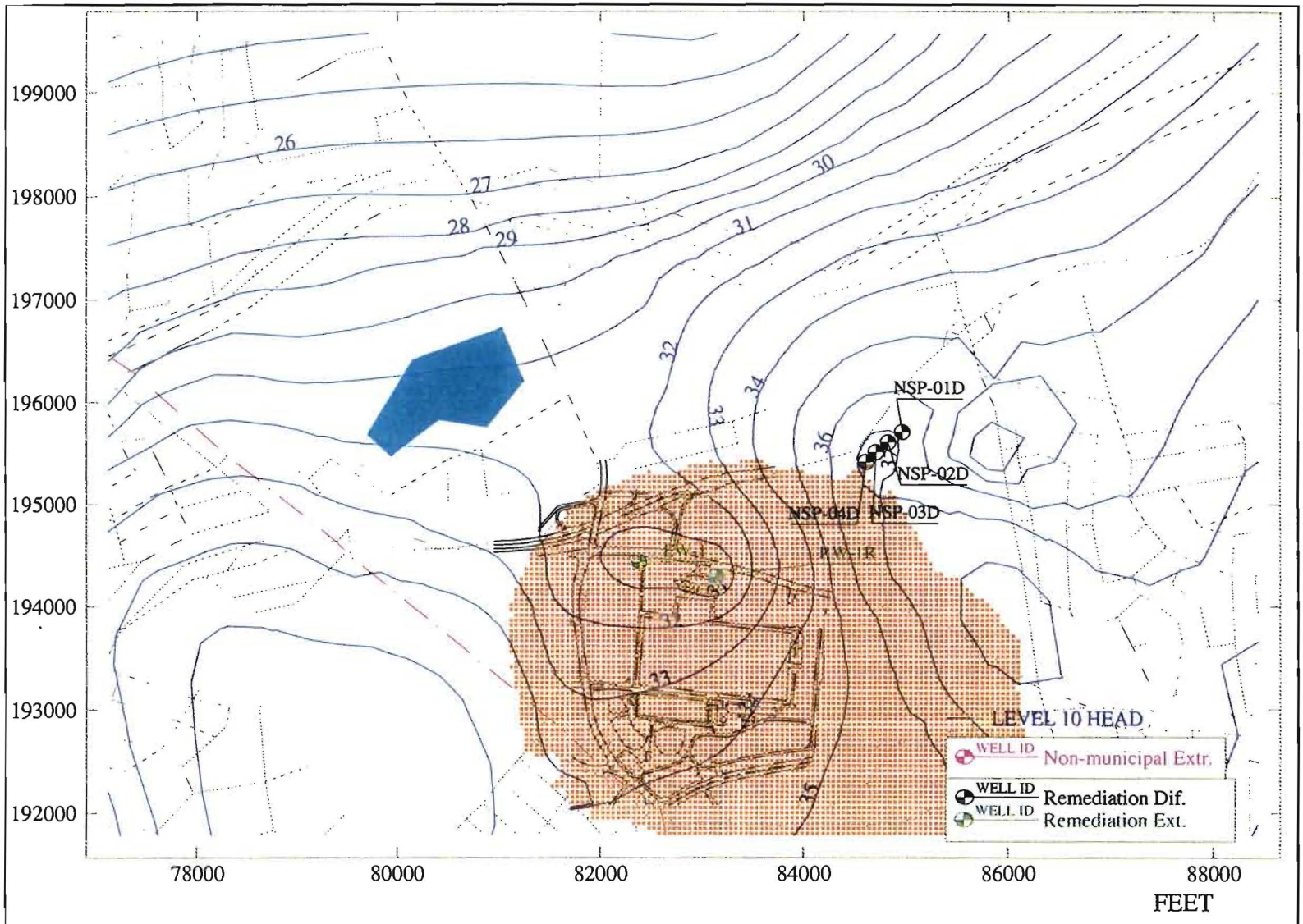


FIGURE FS1-UG	Simulated Upper Glacial Capture Zone Scenario FS1 Lockheed Martin - Great Neck, New York April 19, 2001	consulting engineering construction operations CDM

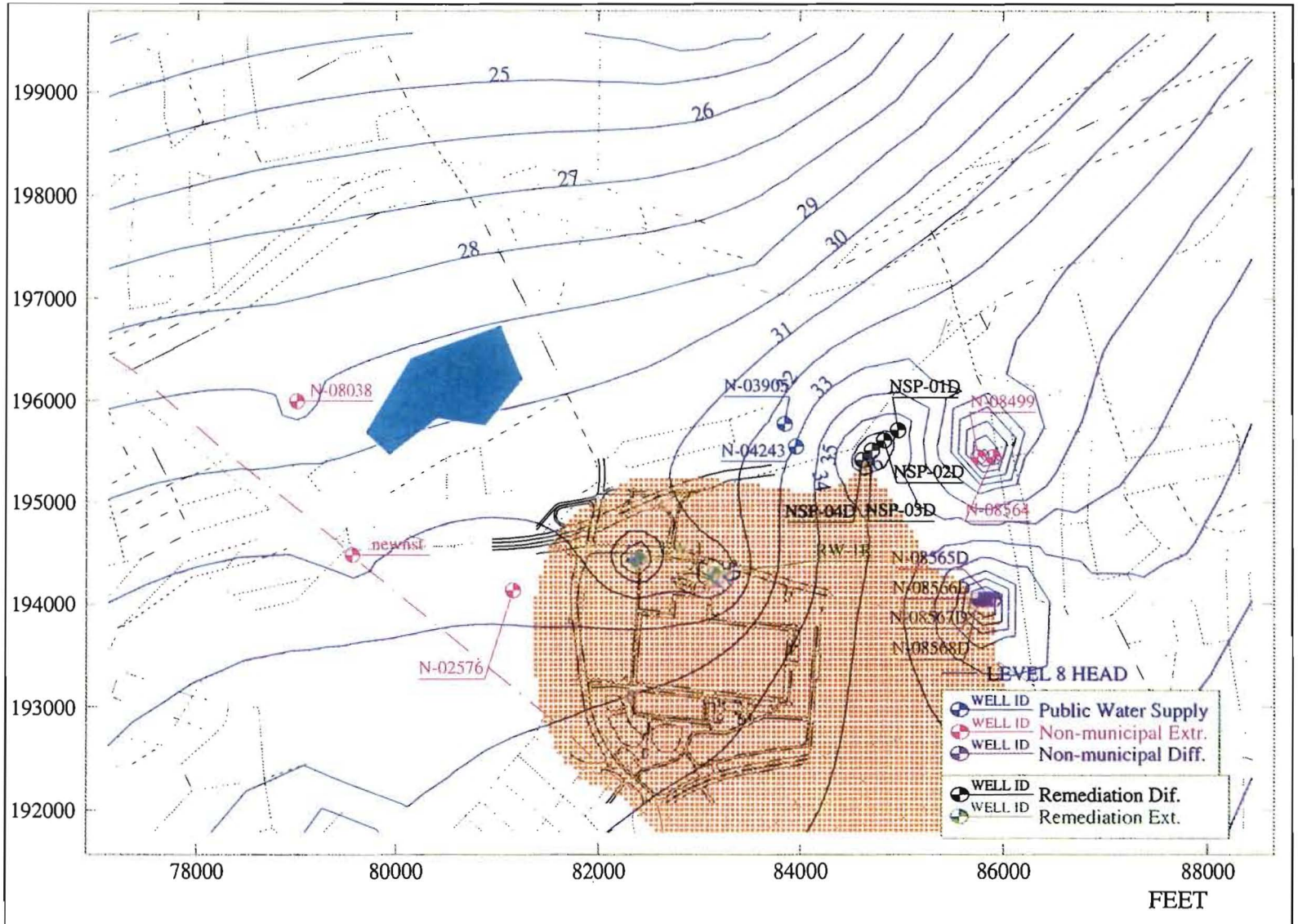


FIGURE FS1-UM	Simulated Upper Magothy Capture Zone Scenario FS1 Lockheed Martin - Great Neck, New York April 19, 2001	consulting engineering construction operations CDM

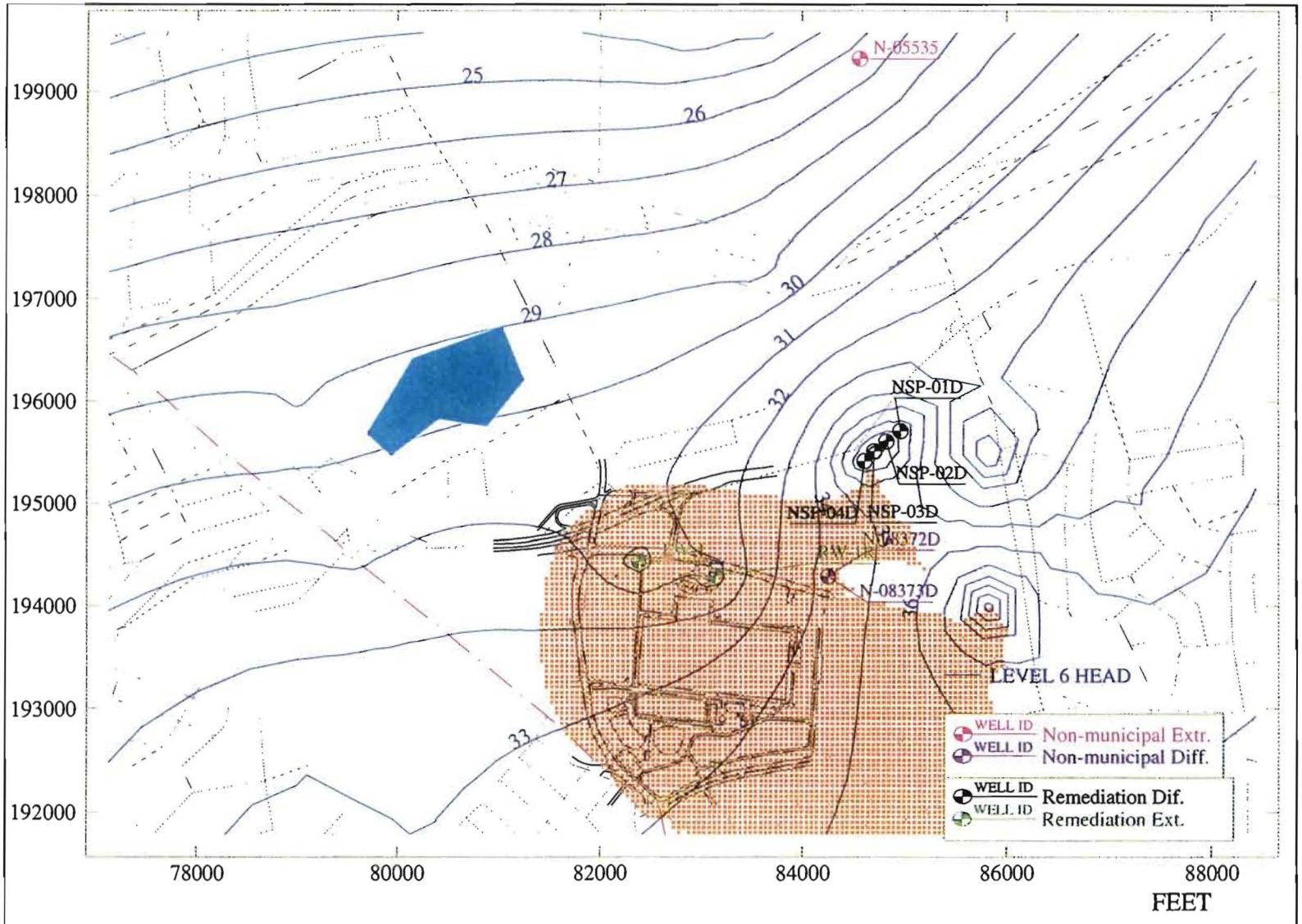


FIGURE FS1-MM	Simulated Middle Magothy Capture Zone Scenario FS1 Lockheed Martin - Great Neck, New York April 19, 2001	consulting engineering construction operations CDM

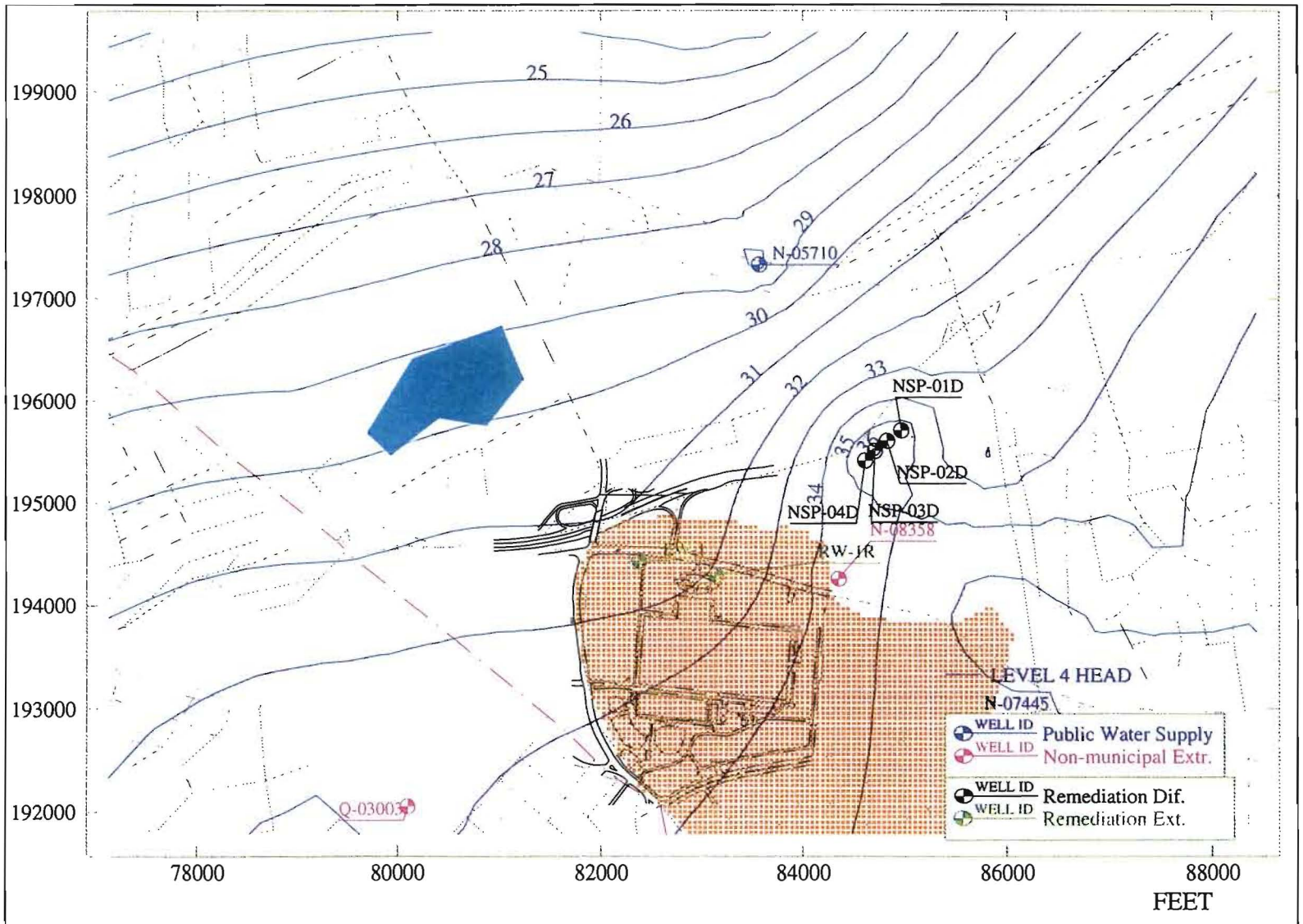


FIGURE FS1-BM	Simulated Basal Magothy Capture Zone Scenario FS1 Lockheed Martin - Great Neck, New York April 19, 2001	consulting engineering construction operations CDM

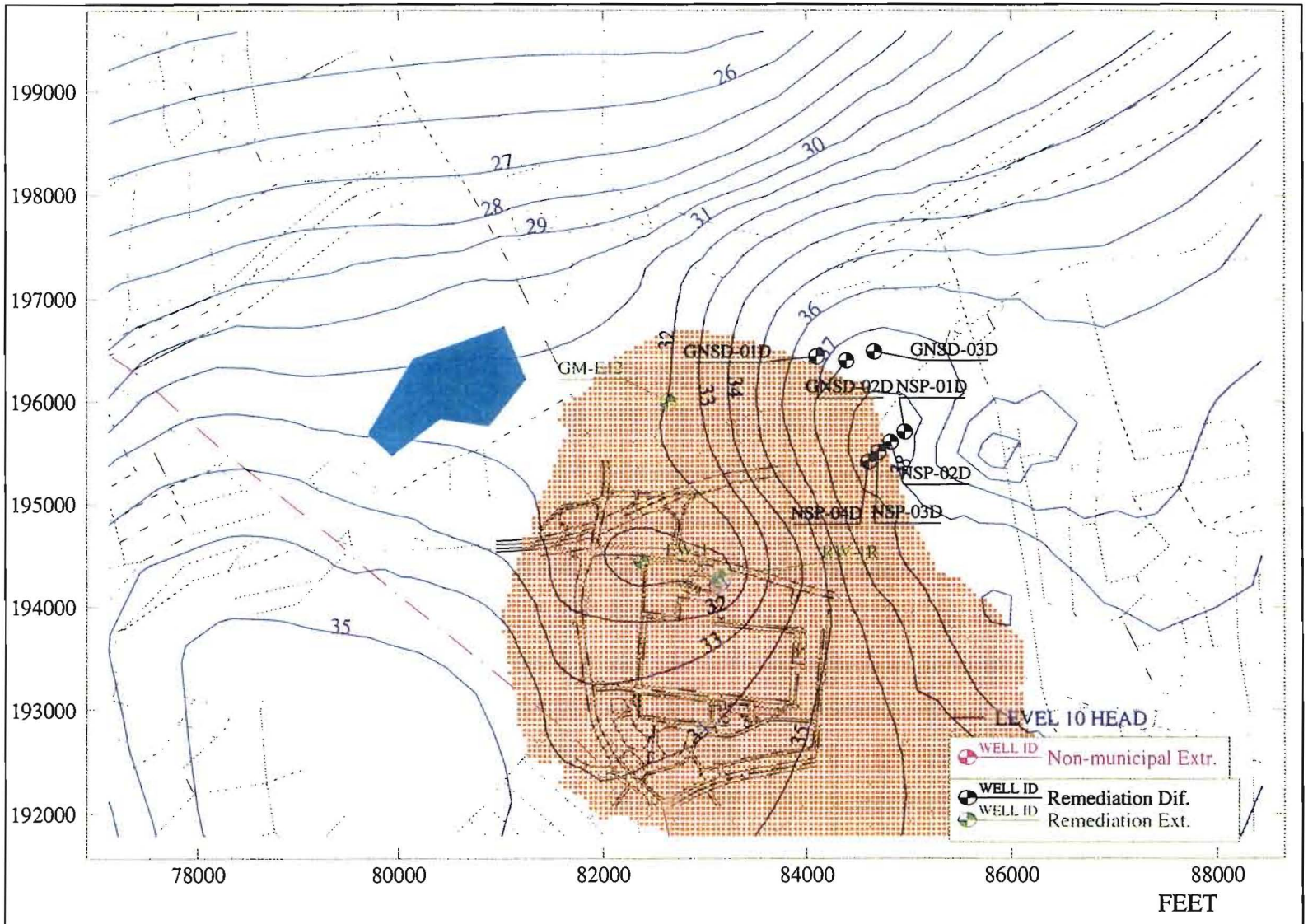


FIGURE FS2-UG	Simulated Upper Glacial Capture Zone Scenario FS2 Lockheed Martin - Great Neck, New York April 19, 2001	consulting engineering construction operations CDM

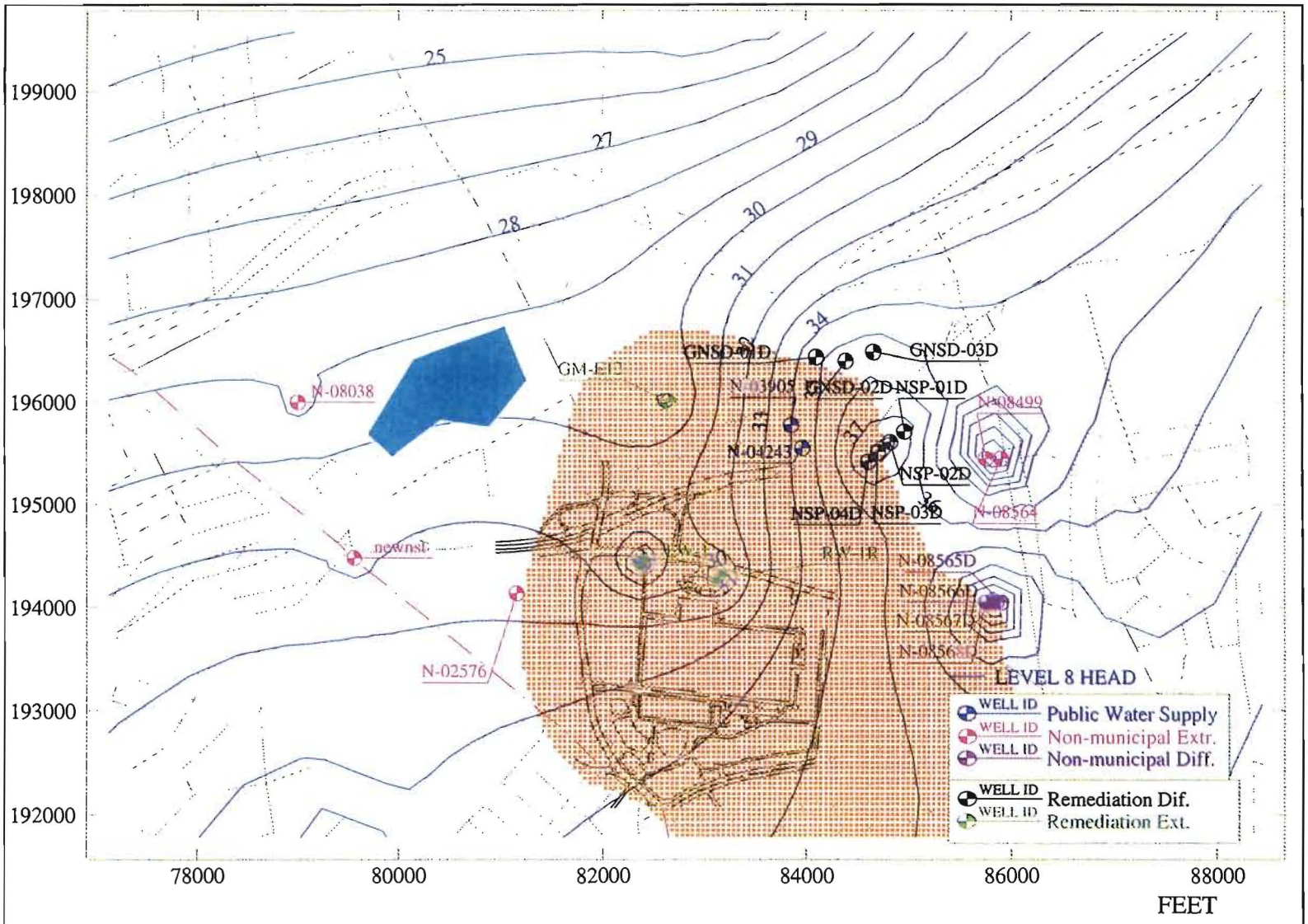


FIGURE FS2-UM	Simulated Upper Magothy Capture Zone Scenario FS2 Lockheed Martin - Great Neck, New York April 19, 2001	consulting engineering construction operations CDM

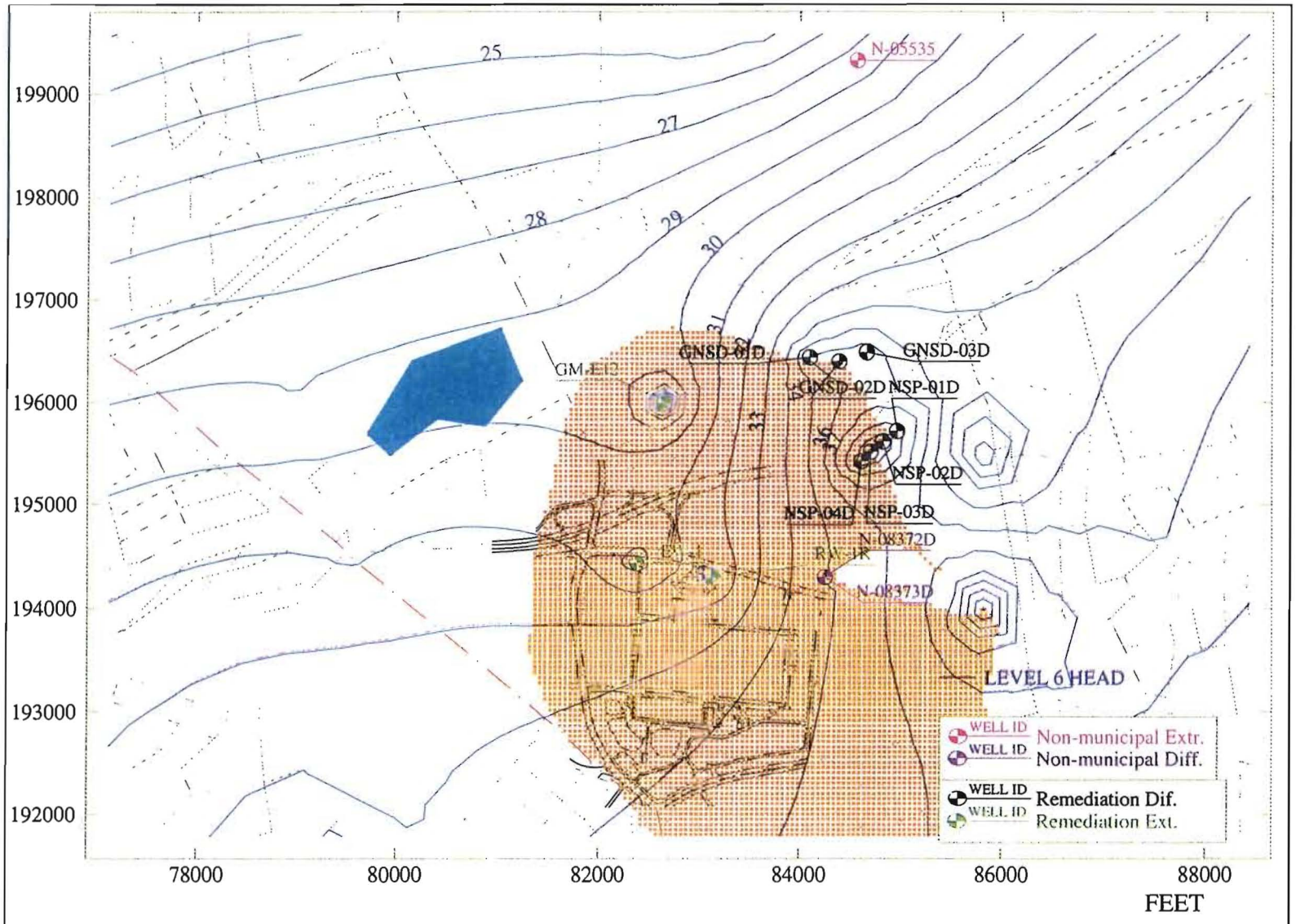


FIGURE FS2-MM	Simulated Middle Magothy Capture Zone Scenario FS2 Lockheed Martin - Great Neck, New York April 19, 2001	consulting engineering construction operations CDM

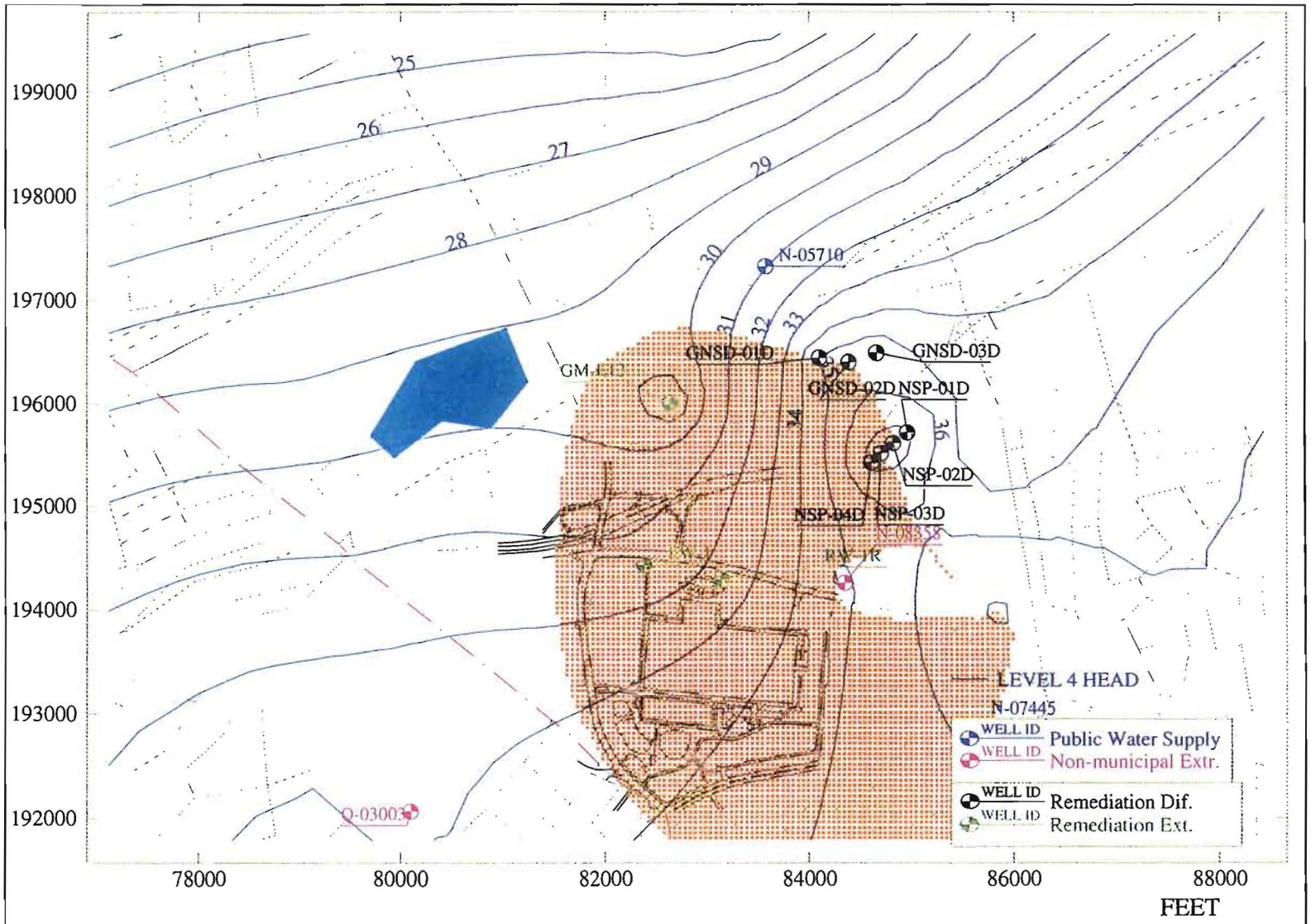
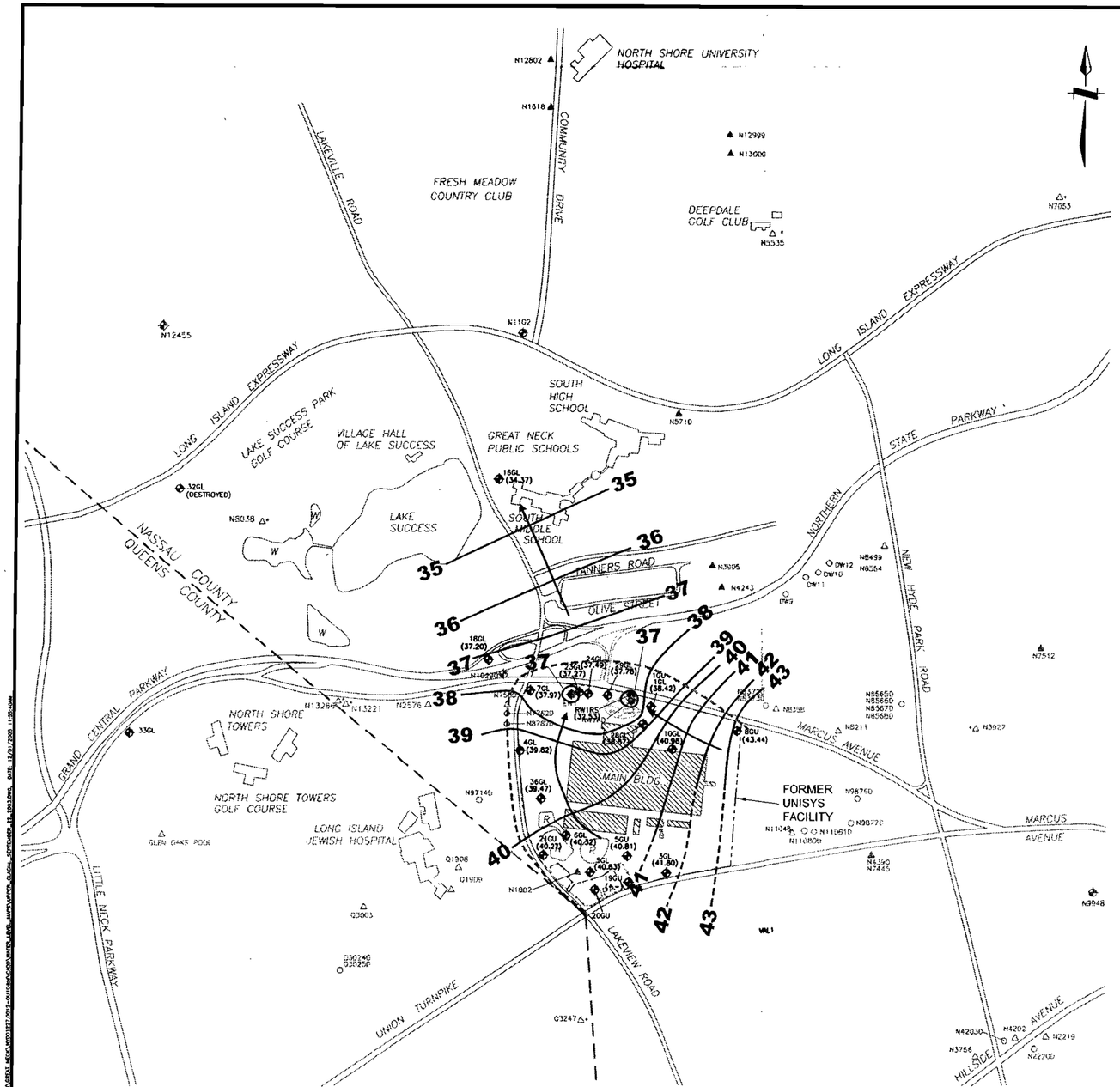


FIGURE FS2-BM	Simulated Basal Magothy Capture Zone Scenario FS2 Lockheed Martin - Great Neck, New York April 19, 2001	consulting engineering construction operations CDM



EXPLANATION:

- W — BODY OF WATER
- R — RETENTION BASIN
- 8GU — LOCATION AND DESIGNATION OF MONITORING WELL SCREENED IN THE UPPER GLACIAL AQUIFER
- EW1 — LOCATION AND DESIGNATION OF SITE EXTRACTION OR RECOVERY WELL
- N7512 — LOCATION AND DESIGNATION OF MUNICIPAL SUPPLY WELL
- N6073 — LOCATION AND DESIGNATION OF NON-MUNICIPAL SUPPLY WELL
- N2576 — LOCATION AND DESIGNATION OF NON-MUNICIPAL IRRIGATION WELL
- N8372D — LOCATION AND DESIGNATION OF NON-MUNICIPAL DIFFUSION WELL
- FORMER UNISYS FACILITY PROPERTY BOUNDARY
- (43.44) — WATER LEVEL ELEVATION IN FEET ABOVE SEA LEVEL (NAVD 88)
- 41 — LINE OF EQUAL WATER-LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL (DASHED WHERE INFERRED)
- DIRECTION OF HORIZONTAL COMPONENT OF GROUNDWATER FLOW
- HORIZONTAL EXTENT OF GROUNDWATER TREATMENT SYSTEM CAPTURE ZONE – REPRESENTED BY LIMITING FLOW LINE

NOTES:

1. THE UPPER GLACIAL AQUIFER EXTENDS FROM APPROXIMATELY LAND SURFACE TO-24 FEET RELATIVE TO MEAN SEA LEVEL.
2. THE FOLLOWING ON-SITE EXTRACTION AND RECOVERY WELLS WERE PUMPING FROM THE INDICATED AQUIFERS:
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – RW1RS PUMPING AT 270 GALLONS PER MINUTE (GPM)
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – RW1RD PUMPING AT 108 GPM
   - UPPER PORTION OF THE MAGOTHY – EW1 PUMPING AT 359 GPM
3. THE FOLLOWING OFF-SITE MUNICIPAL SUPPLY WELLS WHEN PUMPING WITHDRAW FROM THE INDICATED AQUIFERS.
   - UPPER PORTION OF THE MAGOTHY – N3905, N4243, AND N12999
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N13000
   - MIDDLE PORTION OF THE MAGOTHY – N4390
   - MIDDLE AND BASAL PORTION OF THE MAGOTHY – N5710
   - BASAL PORTION OF THE MAGOTHY – N7445 AND N7512
4. THE FOLLOWING OFF-SITE NON-MUNICIPAL SUPPLY WELLS WITHDRAW FROM THE INDICATED AQUIFERS WHEN PUMPING:
   - UPPER GLACIAL – GLEN OAKS POOL, N2219, N3756, N3927, N4202, N13266 AND Q3247
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – N13221 AND Q1908
   - UPPER GLACIAL AND UPPER AND MIDDLE PORTION OF THE MAGOTHY – N8499 AND N8564
   - UPPER PORTION OF THE MAGOTHY – N2576, N7053, N7560, N8038, N8211, AND Q1909
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N5535 AND N6073
   - MIDDLE PORTION OF THE MAGOTHY – N11048 AND Q3003
   - BASAL PORTION OF THE MAGOTHY – N8358
5. THE FOLLOWING OFF-SITE NON-MUNICIPAL DIFFUSION WELLS RECHARGE TO THE INDICATED AQUIFER WHEN OPERATING:
   - UPPER GLACIAL – N2220D, N4203D, N6109D, N7762D, N8787D AND N9714D
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – Q3024D
   - UPPER PORTION OF THE MAGOTHY – Q3025D
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N8565D, N8566D, N8567D AND N8568D
   - MIDDLE PORTION OF THE MAGOTHY – DW9, DW10, N9876D, N9877D, N11080D AND N11081D
   - MIDDLE AND BASAL PORTION OF THE MAGOTHY – DW11, DW12, N8372D AND N8373D
5. MONITORING WELL 19GU WAS DRY.

0 800
SCALE IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ARCADIS GERAGHTY & MILLER

POTENTIOMETRIC SURFACE CONFIGURATION OF THE UPPER GLACIAL AQUIFER ON SEPTEMBER 22, 2003

FORMER UNISYS FACILITY
GREAT NECK, NEW YORK

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
LMC	2/03	C. SAN GIOVANNI	
		LEAD DESIGN PROF.	CHECKED
		PROJECT NUMBER	DRAWING NUMBER
CLIENT: LOCKHEED MARTIN CORPORATION		NY12270012	A-1

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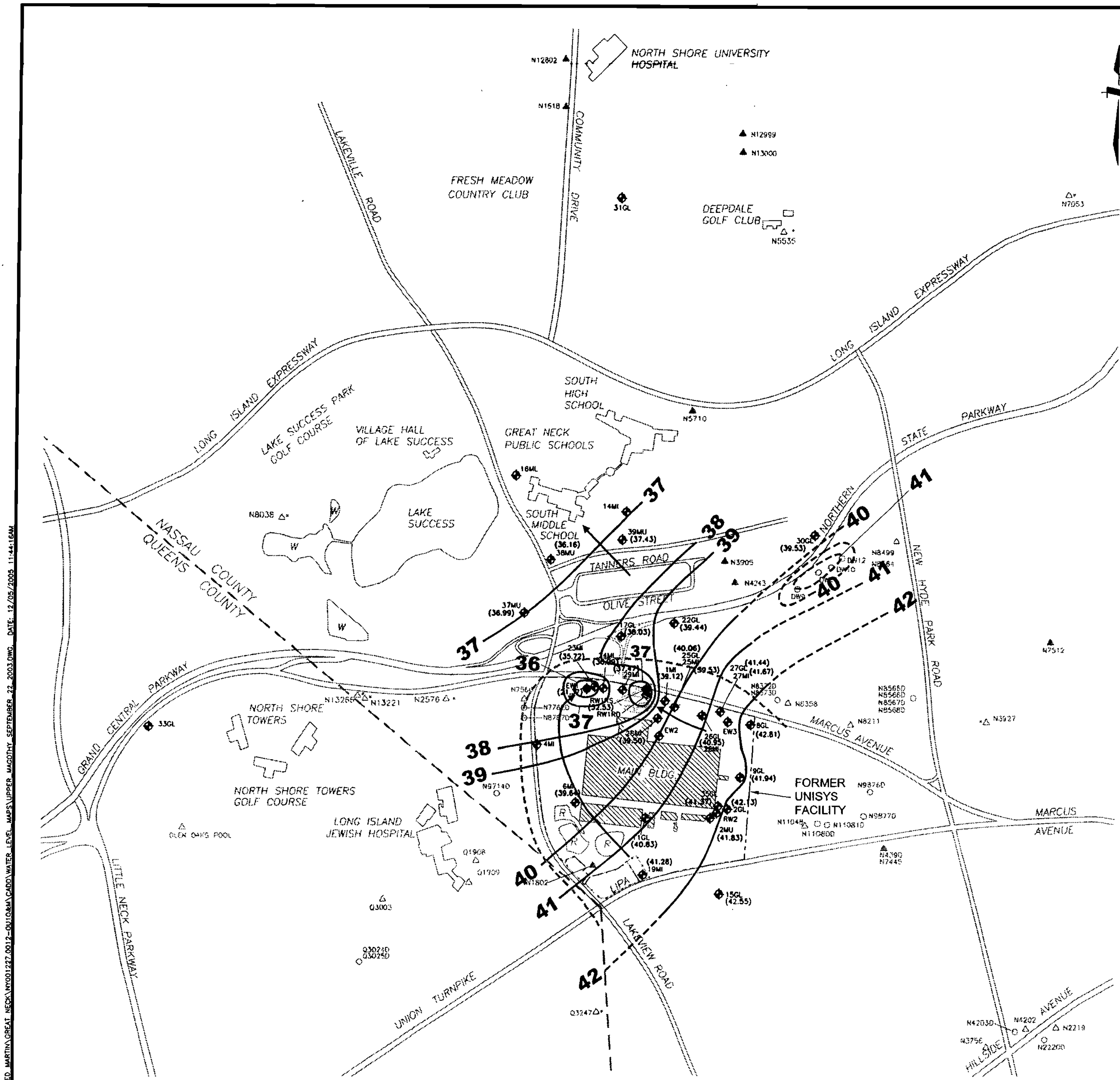


EXPLANATION:

- W — BODY OF WATER
- R — RETENTION BASIN
- 9GL — LOCATION AND DESIGNATION OF MONITORING WELL SCREENED IN THE UPPER PORTION OF THE MAGOTHY AQUIFER
- EW1 — LOCATION AND DESIGNATION OF SITE EXTRACTION OR RECOVERY WELL
- N7512 — LOCATION AND DESIGNATION OF MUNICIPAL SUPPLY WELL
- N6073 — LOCATION AND DESIGNATION OF NON-MUNICIPAL SUPPLY WELL
- N2576 — LOCATION AND DESIGNATION OF NON-MUNICIPAL IRRIGATION WELL
- N8372D — LOCATION AND DESIGNATION OF NON-MUNICIPAL DIFFUSION WELL
- FORMER UNISYS FACILITY PROPERTY BOUNDARY
- (42.81) — WATER LEVEL ELEVATION IN FEET ABOVE SEA LEVEL (NAVD 88)
- 40 — LINE OF EQUAL WATER-LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL (DASHED WHERE INFERRED)
- DIRECTION OF HORIZONTAL COMPONENT OF GROUNDWATER FLOW
- HORIZONTAL EXTENT OF GROUNDWATER TREATMENT SYSTEM CAPTURE ZONE – REPRESENTED BY LIMITING FLOW LINE

NOTES:

1. THE UPPER MAGOTHY AQUIFER EXTENDS FROM APPROXIMATELY −24 TO −113 FEET RELATIVE TO MEAN SEA LEVEL.
2. THE FOLLOWING ON-SITE EXTRACTION AND RECOVERY WELLS WERE PUMPING FROM THE INDICATED AQUIFERS:
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – RW1RS PUMPING AT 270 GALLONS PER MINUTE (GPM)
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – RW1RD PUMPING AT 108 GPM
   - UPPER PORTION OF THE MAGOTHY – EW1 PUMPING AT 359 GPM
3. THE FOLLOWING OFF-SITE MUNICIPAL SUPPLY WELLS WHEN PUMPING WITHDRAW FROM THE INDICATED AQUIFERS:
   - UPPER PORTION OF THE MAGOTHY – N3905, N4243, AND N12999
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N13000
   - MIDDLE PORTION OF THE MAGOTHY – N4390
   - MIDDLE AND BASAL PORTION OF THE MAGOTHY – N5710
   - BASAL PORTION OF THE MAGOTHY – N7445 AND N7512
4. THE FOLLOWING OFF-SITE NON-MUNICIPAL SUPPLY WELLS WITHDRAW FROM THE INDICATED AQUIFERS WHEN PUMPING:
   - UPPER GLACIAL – GLEN OAKS POOL, N2219, N3756, N3927, N4202, N13266 AND Q3247
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – N13221 AND Q1908
   - UPPER GLACIAL AND UPPER AND MIDDLE PORTION OF THE MAGOTHY – N8499 AND N8564
   - UPPER PORTION OF THE MAGOTHY – N2576, N7053, N7560, N8038, N8211, AND Q1909
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N5535 AND N6073
   - MIDDLE PORTION OF THE MAGOTHY – N11048 AND Q3003
   - BASAL PORTION OF THE MAGOTHY – N8358
5. THE FOLLOWING OFF-SITE NON-MUNICIPAL DIFFUSION WELLS RECHARGE TO THE INDICATED AQUIFER WHEN OPERATING:
   - UPPER GLACIAL – N22200, N42030, N61090, N77620, N87870 AND N97140
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – Q3024D
   - UPPER PORTION OF THE MAGOTHY – Q3025D
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N8565D, N8566D, N8567D AND N8568D
   - MIDDLE PORTION OF THE MAGOTHY – DW9, DW10, N9876D, N9877D, N11080D AND N11081D
   - MIDDLE AND BASAL PORTION OF THE MAGOTHY – DW11, DW12, N8372D AND N8373D
6. THE WATER-LEVEL ELEVATION FOR MONITORING WELL 4MI APPEARS TO BE ANAMOLOUS AND WAS NOT USED

0 800
SCALE IN FEET

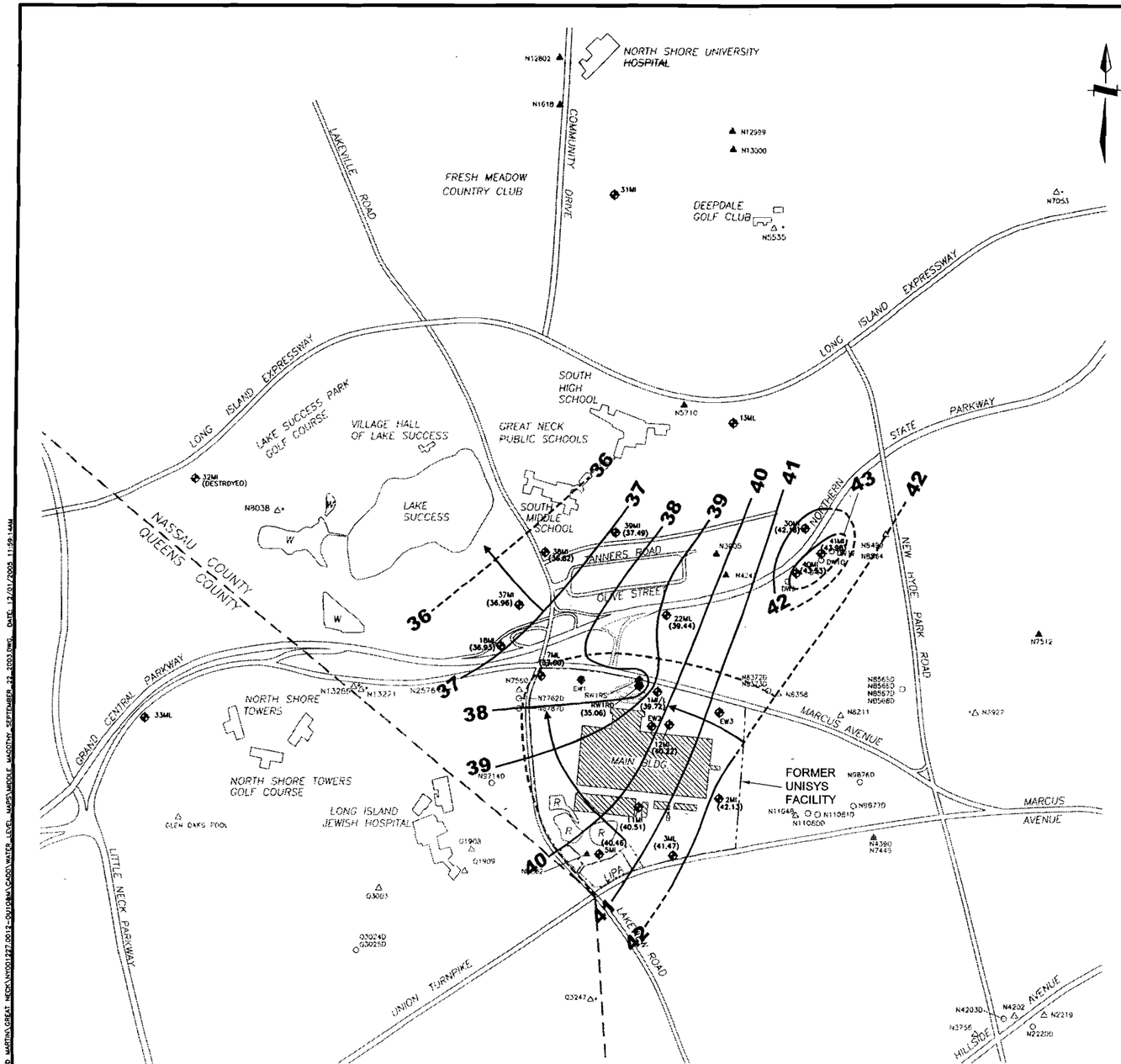
NO.	DATE	REVISION DESCRIPTION	BY	CKD

ARCADIS GERAGHTY&MILLER

PONTENTIOMETRIC SURFACE CONFIGURATION OF THE UPPER PORTION OF THE MAGOTHY AQUIFER ON SEPTEMBER 22, 2003

FORMER UNISYS FACILITY
GREAT NECK, NEW YORK

DRAWN LMC 11/02	DATE 2/03
CLIENT: LOCKHEED MARTIN COPRPORATION	
PROJECT MANAGER C. SAN GIOVANNI 11/02	DEPARTMENT MANAGER
LEAD DESIGN PROF.	CHECKED
PROJECT NUMBER NY12270012	DRAWING NUMBER A-2



EXPLANATION:

- BODY OF WATER
- RETENTION BASIN
- LOCATION AND DESIGNATION OF MONITORING WELL SCREENED IN THE MIDDLE PORTION OF THE MAGOTHY AQUIFER
- LOCATION AND DESIGNATION OF SITE EXTRACTION OR RECOVERY WELL
- LOCATION AND DESIGNATION OF MUNICIPAL SUPPLY WELL
- LOCATION AND DESIGNATION OF NON-MUNICIPAL SUPPLY WELL
- LOCATION AND DESIGNATION OF NON-MUNICIPAL IRRIGATION WELL
- LOCATION AND DESIGNATION OF NON-MUNICIPAL DIFFUSION WELL
- FORMER UNISYS FACILITY PROPERTY BOUNDARY
- WATER LEVEL ELEVATION IN FEET ABOVE SEA LEVEL (NAVD 88)
- LINE OF EQUAL WATER-LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL (DASHED WHERE INFERRED)
- DIRECTION OF HORIZONTAL COMPONENT OF GROUNDWATER FLOW
- DIRECTION OF HORIZONTAL COMPONENT OF GROUNDWATER FLOW
- HORIZONTAL EXTENT OF GROUNDWATER TREATMENT SYSTEM CAPTURE ZONE – REPRESENTED BY LIMITING FLOW LINE

NOTES:

1. THE MIDDLE MAGOTHY AQUIFER EXTENDS FROM APPROXIMATELY -113 TO -204 FEET RELATIVE TO MEAN SEA LEVEL.
2. THE FOLLOWING ON-SITE EXTRACTION AND RECOVERY WELLS WERE PUMPING FROM THE INDICATED AQUIFERS:
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – RW1RS PUMPING AT 270 GALLONS PER MINUTE (GPM)
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – RW1RD PUMPING AT 108 GPM
   - UPPER PORTION OF THE MAGOTHY – EW1 PUMPING AT 359 GPM.
3. THE FOLLOWING OFF-SITE MUNICIPAL SUPPLY WELLS WHEN PUMPING WITHDRAW FROM THE INDICATED AQUIFERS:
   - UPPER PORTION OF THE MAGOTHY – N3905, N4243, AND N12999
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N13000
   - MIDDLE PORTION OF THE MAGOTHY – N4390
   - MIDDLE AND BASAL PORTION OF THE MAGOTHY – N5710
   - BASAL PORTION OF THE MAGOTHY – N7445 AND N7512
4. THE FOLLOWING OFF-SITE NON-MUNICIPAL SUPPLY WELLS WITHDRAW FROM THE INDICATED AQUIFERS WHEN PUMPING:
   - UPPER GLACIAL – GLEN OAKS POOL, N2219, N3756, N3927, N4202, N13266 AND Q3247
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – N13221 AND Q1908
   - UPPER GLACIAL AND UPPER AND MIDDLE PORTION OF THE MAGOTHY – N8499 AND N8564
   - UPPER PORTION OF THE MAGOTHY – N2576, N7053, N7560, N8038, N8211, AND Q1909
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N5535 AND N6073
   - MIDDLE PORTION OF THE MAGOTHY – N11048 AND Q3003
   - BASAL PORTION OF THE MAGOTHY – N8358
5. THE FOLLOWING OFF-SITE NON-MUNICIPAL DIFFUSION WELLS RECHARGE TO THE INDICATED AQUIFER WHEN OPERATING:
   - UPPER GLACIAL – N22200, N42030, N6109D, N77620, N8787D AND N9714D
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – Q3024D
   - UPPER PORTION OF THE MAGOTHY – Q3025D
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N8565D, N8566D, N8567D AND N8568D
   - MIDDLE PORTION OF THE MAGOTHY – DW9, DW10, N9876D, N9877D, N11080D AND N11081D
   - MIDDLE AND BASAL PORTION OF THE MAGOTHY – DW11, DW12, N8372D AND N8373D

0 800
SCALE IN FEET

NO.	DATE	REVISION DESCRIPTION	BY

ARCADIS GERAGHTY & MILLER

POTENTIOMETRIC SURFACE CONFIGURATION OF THE MIDDLE MAGOTHY AQUIFER ON SEPTEMBER 22, 2003

FORMER UNISYS FACILITY
GREAT NECK, NEW YORK

DRAWN	DATE
LMC	2/02

CLIENT:
LOCKHEED MARTIN CORPORATION

PROJECT MANAGER	DEPARTMENT MANAGER
C. SAN GIOVANNI	
LEAD DESIGN PROF.	CHECKED
PROJECT NUMBER	DRAWING NUMBER
NY12270012	A-3

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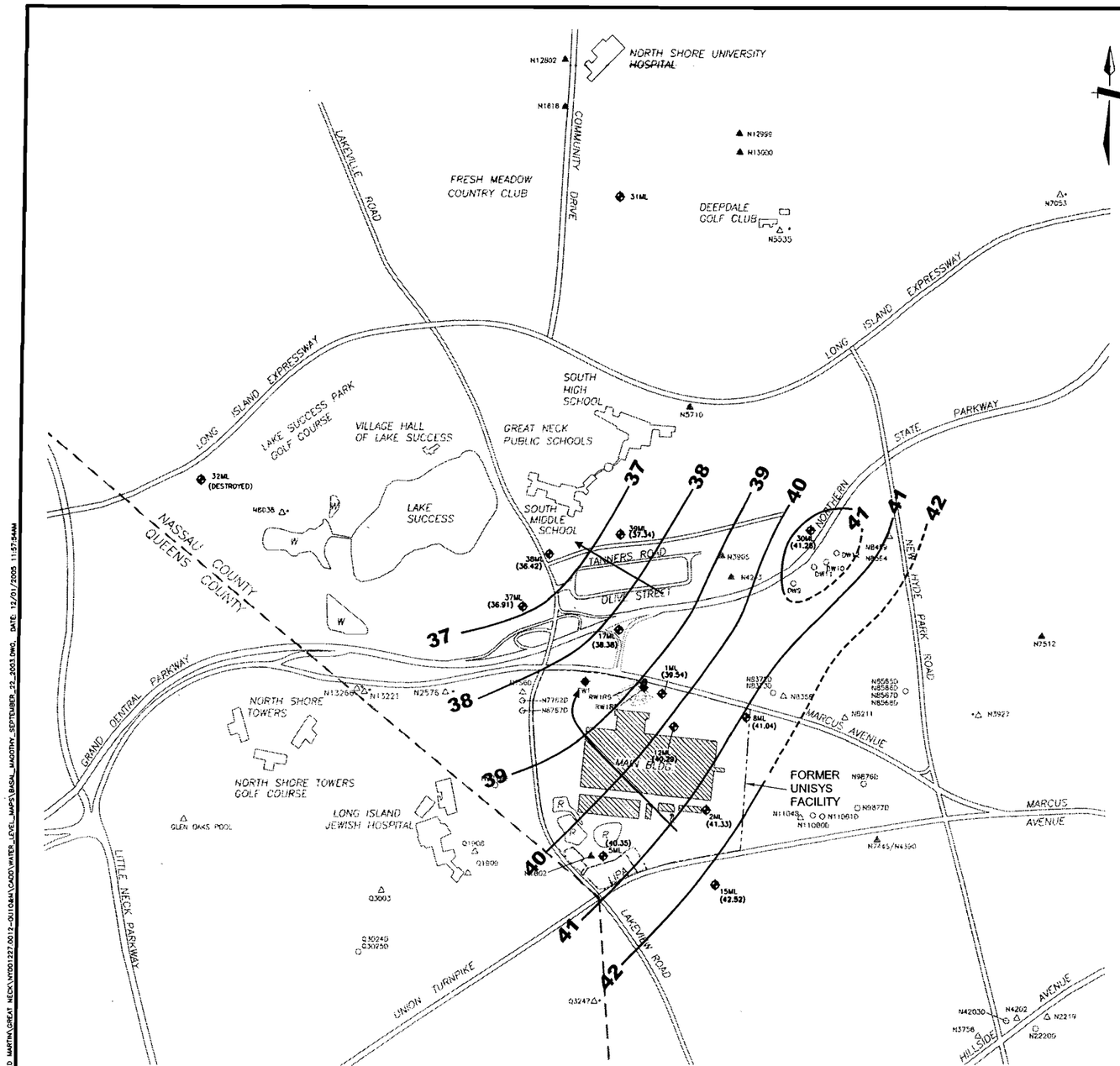
FILE: G:\APROJECT\LOCKHEED MARTIN\GREAT NECK\NY012270012-OU1\GW\GW03\WATER_LEVEL_MAPS\MIDDLE_MAGOTHY_SEPTEMBER_22_2003.DWG, DATE: 12/01/2005 11:59:14AM



EXPLANATION:

- W — BODY OF WATER
- R — RETENTION BASIN
- 30ML — LOCATION AND DESIGNATION OF MONITORING WELL SCREENED IN THE BASAL PORTION OF THE MAGOTHY AQUIFER
- EW1 — LOCATION AND DESIGNATION OF SITE EXTRACTION OR RECOVERY WELL
- N7512 — LOCATION AND DESIGNATION OF MUNICIPAL SUPPLY WELL
- N6073 — LOCATION AND DESIGNATION OF NON-MUNICIPAL SUPPLY WELL
- N2576 — LOCATION AND DESIGNATION OF NON-MUNICIPAL IRRIGATION WELL
- N83720 — LOCATION AND DESIGNATION OF NON-MUNICIPAL DIFFUSION WELL
- FORMER UNISYS FACILITY PROPERTY BOUNDARY
- (42.28) — WATER LEVEL ELEVATION IN FEET ABOVE SEA LEVEL (NAVD 88)
- 41 — LINE OF EQUALL WATER-LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL (DASHED WHERE INFERRED)
- DIRECTION OF HORIZONTAL COMPONENT OF GROUNDWATER FLOW

NOTES:

1. THE BASAL MAGOTHY AQUIFER EXTENDS FROM APPROXIMATELY -204 TO -270 FEET RELATIVE TO MEAN SEA LEVEL.
2. THE FOLLOWING ON-SITE EXTRACTION AND RECOVERY WELLS WERE PUMPING FROM THE INDICATED AQUIFERS:
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – RW1RS PUMPING AT 270 GALLONS PER MINUTE (GPM)
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – RW1RD PUMPING AT 108 GPM
   - UPPER PORTION OF THE MAGOTHY – EW1 PUMPING AT 359 GPM.
3. THE FOLLOWING OFF-SITE MUNICIPAL SUPPLY WELLS WHEN PUMPING WITHDRAW FROM THE INDICATED AQUIFERS:
   - UPPER PORTION OF THE MAGOTHY – N3905, N4243, AND N12999
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N13000
   - MIDDLE PORTION OF THE MAGOTHY – N4390
   - MIDDLE AND BASAL PORTION OF THE MAGOTHY – N5710
   - BASAL PORTION OF THE MAGOTHY – N7445 AND N7512
4. THE FOLLOWING OFF-SITE NON-MUNICIPAL SUPPLY WELLS WITHDRAW FROM THE INDICATED AQUIFERS WHEN PUMPING:
   - UPPER GLACIAL – GLEN OAKS POOL, N2219, N3756, N3927, N4202, N13266 AND Q3247
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – N13221 AND Q1908
   - UPPER GLACIAL AND UPPER AND MIDDLE PORTION OF THE MAGOTHY – N8499 AND N8564
   - UPPER PORTION OF THE MAGOTHY – N2576, N7053, N7560, N8038, N8211, AND Q1909
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N5535 AND N6073
   - MIDDLE PORTION OF THE MAGOTHY – N11048 AND Q3003
   - BASAL PORTION OF THE MAGOTHY – N8358
5. THE FOLLOWING OFF-SITE NON-MUNICIPAL DIFFUSION WELLS RECHARGE TO THE INDICATED AQUIFER WHEN OPERATING:
   - UPPER GLACIAL – N2220D, N4203D, N6109D, N7762D, N8787D AND N9714D
   - UPPER GLACIAL AND UPPER PORTION OF THE MAGOTHY – Q3024D
   - UPPER PORTION OF THE MAGOTHY – Q3025D
   - UPPER AND MIDDLE PORTION OF THE MAGOTHY – N8565D, N8568D, N8567D AND N8568D
   - MIDDLE PORTION OF THE MAGOTHY – DW9, DW10, N9876D, N9877D, N11060D AND N11081D
   - MIDDLE AND BASAL PORTION OF THE MAGOTHY – DW11, DW12, N8372D AND N8373D

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0 800
SCALE IN FEET

NO.	DATE	REVISION DESCRIPTION	BY	CKD

ARCADIS GERAGHTY & MILLER

POTENTIOMETRIC SURFACE CONFIGURATION OF THE BASAL MAGOTHY PORTION OF THE MAGOTHY AQUIFER ON SEPTEMBER 22, 2003
FORMER UNISYS FACILITY
GREAT NECK, NEW YORK

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
LMC	2/03	C. SAN GIOVANNI	
		LEAD DESIGN PROF.	CHECKED
		PROJECT NUMBER	DRAWING NUMBER
		NY12270012	A-4

CLIENT:
LOCKHEED MARTIN CORPORATION