TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
INTERIM REMEDIAL MEASURE - CONSTRUCTION AREA

INVESTIGATION REPORT
& REMEDIAL ACTION PLAN

NOVEMBER 2005

Prepared For:

Town of Oyster Bay
Department of Public Works

H2M GROUP

Engineers • Architects • Scientists • Planners • Surveyors

HOLZMACHER, McLENDON & MURRELL, P.C.
575 Broad Hollow Road
Melville, New York 11747-5076

H2M GROUP

TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
INTERIM REMEDIAL MEASURE - CONSTRUCTION AREA
INVESTIGATION REPORT & REMEDIAL ACTION PLAN

NOVEMBER 2005

TABLE OF CONTENTS

TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
INTERIM REMEDIAL MEASURE - CONSTRUCTION AREA
INVESTIGATION REPORT & REMEDIAL ACTION PLAN

NOVEMBER 2005

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (continued)

APPENDICES

TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
INTERIM REMEDIAL MEASURE - CONSTRUCTION AREA
INVESTIGATION REPORT & REMEDIAL ACTION PLAN

NOVEMBER 2005

1.0 INTRODUCTION

This Interim Remedial Measure (IRM) Investigation Report and Remedial Action Plan summarizes the results of an environmental investigation conducted within a designated construction area (Construction Area) at the Bethpage Community Park in Bethpage, New York (site), and presents a remedial strategy to address areas identified with contamination. This program was conducted in accordance with a New York State Department of Environmental Conservation (NYSDEC) approved IRM Work Plan, prepared by Holzmacher, McLendon & Murrell, P.C. (H2M) dated May 2005, as well as the terms of an Order on Consent between the Town of Oyster Bay and the NYSDEC.

The remedial investigation was completed in support of an Interim Remedial Measure (IRM) at the Bethpage Community Park. The site is currently owned by the Town of Oyster Bay, but was formerly owned and operated by Grumman Aircraft Engineering Corporation, a predecessor to Northrop Grumman Systems Corporation (Northrop Grumman). Prior site investigation reports, prepared on behalf of Northrop Grumman, have indicated that the site had been utilized by Northrop Grumman for waste disposal activities including industrial wastewater treatment sludge disposal, spent paint booth rag disposal, possible used oil disposal, and fire training activity that included ignition of waste oil and jet fuel. Previous site investigations documented significant impacts to site soils from these activities including the presence of elevated concentrations of metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and polychlorinated biphenyls (PCBs). In addition, prior investigation reports documented volatile organic compound impacts to groundwater at the site.

The Bethpage Community Park totals approximately 18-acres. In an effort to expedite remediation of an approximately 7-acre portion of the Park for redevelopment, designated as the

Construction Area, the Town of Oyster Bay entered into an Order on Consent with the NYSDEC. As of the date of this report, it is H2M's understanding that the NYSDEC has negotiated an Order on Consent with Northrop Grumman relating to further investigation and remediation of the subject property and off-site impacts.

2.0 SITE HISTORY AND DESCRIPTION

The Bethpage Community Park is located in Bethpage, New York, on the west side of the intersection of Stewart Avenue and Cherry Avenue. The site is located within the Town of Oyster Bay in Nassau County. A site location map is presented in Figure 1. The park includes a pool, skating rink, baseball field, tennis courts, children's play areas and parking. The entire site is approximately 18 acres in size and is currently owned by the Town of Oyster Bay.

Prior to being donated to the Town of Oyster Bay, the subject site was owned by Grumman Aircraft Engineering Corporation, a predecessor to Northrop Grumman Systems Corporation. According to reports prepared on behalf of Northrop Grumman Systems Corporation[1], Northrop Grumman utilized the property for waste disposal purposes including industrial wastewater treatment sludge, spent paint booth rag disposal, and possible used oil disposal. In addition, it has been reported that Northrop Grumman utilized the site for fire training, which included ignition of waste oil and jet fuel.

Ownership of the site was transferred to the Town of Oyster Bay in 1962, after which, the Town constructed the present-day Park. The community actively utilized the site until 2002, when the Park was partially closed due to the identification of PCB and metals impacts above state guideline concentrations in surface soils. Portions of the site remain closed to this day, pending remediation.

A number of environmental investigations have been conducted relative to the Park. Recent site investigations have been conducted by Dvirka and Bartilucci Consulting Engineers, on behalf of

[1] Dvirka and Bartilucci, December 2003, Town of Oyster Bay Bethpage Community Park Investigation Sampling Program – Field Report.

Northrop Grumman. Two significant soil sampling programs were implemented by Northrop Grumman in recent years, a March/May 2002 soil sampling event and a May/June 2003 sampling event. Northrop Grumman also conducted groundwater sampling in June, September and November 2003. These events were documented in two reports dated June 2002 and December 2003.

The Town of Oyster Bay intends to improve the Park grounds through construction of new facilities including an indoor ice-skating rink. The anticipated redevelopment activities will impact approximately 7 acres of the site. The Construction Area, as it is referred to, extends from the north border of the property in a southerly direction approximately central to the site. The construction area is shown on Figure 2. Although redevelopment activities have not been finalized, the construction of a new building measuring approximately 30,000-50,000 square feet is anticipated as well as upgrading of surrounding parking areas. The proposed redevelopment will require site excavation.

3.0 DESCRIPTION OF WORK COMPLETED

The purpose of the IRM field investigation was to characterize the nature and extent of contamination in both soil and shallow groundwater within the boundaries of the Construction Area. Potential contaminants for investigation included PCBs, VOCs, SVOCs, and metals (including hexavalent chromium and cyanide). Field investigation activities were based on the NYSDEC approved IRM Work Plan dated May 2005. A NYSDEC approved Quality Assurance Project Plan (QAPP) was included as part of the IRM Work Plan.

3.1 Geophysical Survey

A geophysical survey was conducted by NAEVA Geophysics Inc. throughout the Construction Area under the direction of H2M during the period of May 17 through May 20, 2005 and May 24 through May 26, 2005. The purpose of the geophysical survey was to delineate detectable buried utilities and significant subsurface anomalies in accessible areas located within the Construction Area planned for subsurface investigation. The results of the survey are depicted on a map with identified utilities and subsurface anomalies, included herein as Figure 3.

3.2 Soil Sampling Program

The field investigation identified within the Work Plan included a comprehensive soil quality investigation. Soil borings were advanced across the entire Construction Area on a grid with approximately 50-foot on-center node spacing. Each grid node was identified with an alpha-numeric code representing a letter for each row transect and a number for each column transect. Numeric columns were in an approximate north-south orientation. Results of previous site investigations were taken into account in establishing the sampling grid, selecting soil boring locations, and determining the soil boring depth and sampling intervals. Some deviations to the grid layout were made based on encountered field conditions and are summarized in Section 3.2.1. The revised grid layout and numbering system showing the actual boring locations employed during the IRM field investigation is shown in Figure 4.

The soil investigation was conducted under the direction of H2M during the period of May 26, 2005 through June 24, 2005, excluding weekends. The soil boring and sampling program included the advancement of shallow soil borings, i.e., grade surface to 10 feet below grade, and deep soil borings, i.e., grade surface to 60 feet below grade. A few select shallow soil borings were advanced to 20 feet below grade. As specified in the Work Plan, sampling was typically performed continuously in two-foot intervals from grade to 10 feet below grade. From 10 feet below grade to 60 feet below grade, sampling was performed in two-foot cores at 10 foot intervals, i.e. 18-20, 28-30, 38-40, etc.

A total of 141 soil borings were completed within the Construction Area including 107 shallow borings and 38 deep borings. Three of the shallow borings were advanced to 20 feet. The soil boring work was conducted utilizing Geoprobe® direct-push drilling methods for shallow borings and hollow stem auger (HSA) drilling techniques for deep borings provided by Universal Testing & Inspection Services of West Babylon, New York.

Shallow soil probes were advanced as 2-inch diameter by 4-feet long "macro-core" barrels fitted with a cutting shoe and disposable acetate liner. Soil samples from deep borings were retained using 2-foot split spoon samplers. Between sampling intervals, all non-disposable sampling equipment was decontaminated in accordance with the Quality Assurance Project Plan. Non-disposable drilling equipment was decontaminated between boring locations. All collected soil samples were visually inspected, characterized and screened with a portable photoionization detector (PID) for evidence of contamination. Copies of soil boring logs are provided in Appendix A. All retained soil samples were analyzed for PCBs and RCRA metals, which were anticipated to be the primary contaminants of concern based on previous environmental investigations. At least one sample from each boring location was also analyzed for an expanded list of parameters including Target Analyte List (TAL) metals (including hexavalent chromium and cyanide), Target Compound List (TCL) VOCs and TCL SVOCs. In addition, blind duplicate, matrix/matrix spike duplicates, field blank and trip blank samples were collected and analyzed in accordance with standard QA/QC procedures. Analytical services were provided by H2M Labs following Contract Laboratory Protocols (CLP) for NYSDEC ASP Category B deliverables.

3.2.1 Deviations to Proposed Soil Sampling Program

The soil investigation program proposed in the May 2005 Work Plan identified 145 soil boring locations. As identified as a possibility within the Work Plan, the sampling grid was altered in some locations due to encountered field conditions including existing structures, trees and below grade utilities or suspect anomalies that could have impeded sampling. A summary of the sampling location deviations is provided in Table 3.2.1.

As noted in Table 3.2.1, due to the elimination of some soil borings, the total number of boring locations was reduced from 145 to 141. Soil borings within the skating rink area were eliminated from the IRM investigation. Based on information provided by the Town of Oyster Bay, it was determined that the refrigerant coils beneath the skating surface were spaced on 2-inch intervals. Considering that the short-term fate of the existing rink had not been determined at the time of the field investigation, drilling was not performed in this area due to the possibility of damage to the refrigerant coils from invasive drilling. Further evaluation of the ice rink design later revealed that drilling through the rink area could be performed in a manner that was protective of the refrigerant coils. This prompted a supplemental investigation to the IRM. Results of the supplemental IRM investigation will be reported under separate cover following completion.

3.3 Soil Vapor Sampling

A soil vapor sampling program was implemented to determine whether soil and/or groundwater contamination is producing significant levels of VOCs in the vadose zone, and evaluate the potential for current and future human exposure. The soil vapor sampling was performed under the direction of H2M on June 10, 17 and 23, 2005. Soil vapor samples were collected from 14 boring locations including D1, E3, E5, E13, G4, J1, N4, N7, E11, G11, H13, I3, I5 and J9. In all locations, soil vapor samples were collected at a depth of 10 feet below grade. Additionally, at boring locations G4, J1, N4, N7, H13 and J9, soil vapor samples were also collected at a depth of 52 feet below grade. A deeper sample was also collected at location D1. However, this sample was advanced to 58-60 feet rather than 52 feet. Location D1 was the first deeper soil vapor sampling location and was collected at 58-60 feet based on the Work Plan, which had assumed a groundwater elevation of approximately 60 feet below grade. It was subsequently determined and confirmed throughout the field investigation that the groundwater interface was typically encountered at approximately 54-55 feet below grade. The soil vapor sampling program also included the collection and analysis of an ambient sample for each field day that soil vapor samples were collected.

Soil vapor borings were advanced utilizing direct-push drilling methods. Samples were collected with a post run tubing system using Summa canisters fitted with flow restrictors to provide a sampling flow of not greater than 0.2 liters per minute. The tubing systems were discarded after each use. Each collected sample was submitted to Severn Trent Laboratories, Inc. (STL Burlington) in Colchester, VT and analyzed for Target Compound List VOCs via EPA Method TO-15.

3.4 Monitoring Well Installation and Sampling

A total of four groundwater monitoring wells were installed within the Construction Area under the direction of H2M during the period of June 22 through June 24, 2005 and June 27, 2005. The monitoring well locations are presented on Figure 4 and are identified as CAMW-1, CAMW-2, CAMW-3 and CAMW-4.

The monitoring well installation work was conducted utilizing a hollow stem auger drill rig provided by Fenley & Nicol Environmental Inc. of Deer Park, New York. Each well was constructed of 4" diameter Schedule 40 PVC piping with 20-feet of 0.01-inch slot screen in accordance with the Work Plan and utilizing generally accepted NYSDEC protocols for monitoring well installations. Each well was finished with a locking cap and flush mounted road box. Upon completion of the monitoring well installation work, each well was properly developed using Grundfos® submersible pumps in accordance with the Work Plan and generally accepted NYSDEC protocols. Copies of well construction diagrams are provided in Appendix B.

Groundwater samples were collected from each well on June 13, 2005 by H2M. The groundwater sampling was performed in accordance with US EPA 540/S-95/504 Low-Flow (Minimal Drawdown) Groundwater Sampling Procedure. Each groundwater sample collected was analyzed for PCBs, metals including hexavalent chromium, VOCs, SVOCs and cyanide. In addition, a blind duplicate, matrix/matrix spike duplicate, field blank and trip blank were collected and analyzed in accordance with standard QA/QC procedures.

3.5 Community Air Monitoring

In accordance with the Work Plan, a community air monitoring program (CAMP) was implemented for the duration of the IRM field investigation during all ground intrusive activities. The CAMP was based on the New York State Department of Health Generic Community Air Monitoring Plan as referenced in the approved project Work Plan and included regular monitoring of VOCs and particulates. Equipment utilized as part of the CAMP included portable photoionization detectors (Photovac Pro 2020) for VOCs and TSI Dust Traks for particulates. The TSI Dust Traks were fitted with environmental enclosures and visual alarm indicators.

Monitoring was performed at upwind and downwind locations from each drilling or sampling area, which were typically 30-50 feet away. The upwind or background measurements were recorded prior to the initiation of intrusive activity. All measurements were logged on pre-printed forms. Downwind measurements were recorded hourly. As recommended by the

NYSDOH, a threshold of 5 parts per million (ppm) over background was utilized for VOC measurements. At no point during the duration of the IRM field investigation activities did the VOC monitoring detect an airborne concentration exceedence of 5 ppm over background. In fact, no VOCs were detected while air monitoring for the duration of the IRM field investigation.

Particulates were monitored continuously during the field investigation although documented hourly on the pre-printed log forms. The NYSDOH recommends an initial airborne dust threshold of 100 micrograms per cubic meter ($\mu g/m^3$) for comparison of downwind to upwind airborne dust levels. The visual alarm indicators on the particulate monitors were programmed to alarm at 100 $\mu g/m^3$ to provide an early indication of possible dust migration. At no point during the IRM field investigation did the downwind airborne dust concentration exceed the upwind level by 100 $\mu g/m^3$. For the duration of the IRM field investigation, dust measurements in both upwind and downwind locations were typically between 10 and 60 $\mu g/m^3$.

In consideration of the community air monitoring results, it is H2M's opinion that no off-site receptors were adversely impacted by elevated airborne VOC or dust contaminants related to the IRM field work activities.

4.0 NATURE AND EXTENT OF CONTAMINATION

The IRM field investigation for the approximately 7-acre Construction Area included soil, soil vapor and groundwater sampling. The findings of the sampling program are provided within this section.

4.1 Standards, Criteria and Guidelines (SCG)

To assess the soil sampling analytical data, the laboratory results were compared to the Recommended Soil Cleanup Objectives (RSCOs), as presented in New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum (TAGM) #4046 entitled "Determination of Soil Cleanup Objectives and Cleanup Levels," April 1995. With regards to metals in soils, the TAGM RSCOs identify a specific cleanup objective concentration for mercury, cadmium and chromium. All other metal contaminants are identified with "site background" or given "site background" as an option for the RSCO. In these cases, the upper range of the TAGM-identified Eastern USA Regional Background Concentration was used as the cleanup objective. For PCBs in soil, the RSCO is 1 mg/kg for surface soils and 10 mg/kg for subsurface soils. Considering the near and long-term potential use of the property, the more stringent guideline of 1 mg/kg was used as the cleanup objective for all soils to a depth of 10 feet below grade.

For assessment of groundwater sampling analytical data, the laboratory results were compared to the applicable NYSDEC Class GA groundwater and effluent standards as presented in 6 NYCRR Part 703; Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations, amended August 1999.

With regards to soil vapor sampling and subsurface vapors, the State of New York has not promulgated specific standards, criteria or guidance values for concentrations of compounds in subsurface vapors, as reported in the New York State Department of Health (NYSDOH) *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, February 2005 Public Comment Draft. However, the NYSDOH guidance document offers decision making matrices to serve as risk management tools for evaluating soil vapor entering buildings. Although the matrices were developed for trichloroethylene (TCE) and tetrachloroethylene (PCE), these matrices were considered when evaluating the soil vapor data collected as part of this investigation. As recommended within the NYSDOH guidance document, soil vapor sampling results were also evaluated individually, compared with background outdoor air levels and reviewed "as a whole" to identify trends and special variations in the data.

4.2 Soil Investigation Findings

The IRM soil investigation in the Bethpage Community Park Construction Area included 104 shallow soil borings advanced to 10 feet below grade, three soil borings advanced to 20 feet below grade and 38 deep soil borings advanced to 60 feet below grade. Three of the shallow borings, i.e., L6, M9 and N4, were advanced to 12 feet below grade, and one shallow boring, i.e., G4, was advanced to 14 feet below grade based on field screening results. A total of 773 soil samples were collected and analyzed. All collected samples were analyzed for PCBs and RCRA metals. Additionally, 153 samples were analyzed for an expanded list of parameters comprising TAL metals (including cyanide and hexavalent chromium), TCL VOCs, and TCL SVOCs. At least one sample per boring location was analyzed for the expanded list of parameters.

Analytical services were provided by H2M Labs, Inc., a New York ELAP approved and ASP certified laboratory. Analytical results were presented as a NYSDEC ASP Category B data package that documented the quality of the analytical work. As part of the soil sampling program, Quality Assurance/Quality Control (QA/QC) samples were collected including trip blanks, field blanks, blind duplicates, and matrix spike/matrix spike duplicates (MS/MSDs). A total of 19 trip blanks were analyzed equating to one sample for each field sampling day. A total of 45 field blanks, blind duplicates and MS/MSDs were collected.

Soil sampling results for PCBs, metals (including cyanide and hexavalent chromium), VOCs and SVOCs are presented in Tables 4.2.1, 4.2.2, 4.2.3 and 4.2.4, respectively. For identification purposes in Table 4.2.1, all sampling results with a PCB concentration greater than 1 mg/kg are identified in bold. The NYSDEC TAGM 4046 Recommended Soil Cleanup Objective (RSCO) is 1 mg/kg for surface soils and 10 mg/kg for subsurface soil samples. PCB concentrations measured across the Construction Area ranged from non-detectable to a high of 550 mg/kg at boring G7. Regardless of sampling depth, PCBs exceeded 1 mg/kg in 48 of the 141 boring locations, and exceeded 10 mg/kg in 10 of the 141 boring locations. A site plan showing all PCBs detected at concentrations above 1 mg/kg is provided as Figure 7.

Soil sampling results for metals are summarized in Table 4.2.2. Metal concentrations exceeding the NYSDEC RSCOs are identified in bold and included arsenic, barium, beryllium, cadmium, chromium, copper, iron, magnesium, mercury, nickel, selenium, and zinc although the predominant metals detected above RSCOs were arsenic, chromium, iron, mercury and zinc. A site plan depicting boring locations with metals detected at concentrations above their respective RSCOs is provided as Figure 6. As shown, metals were detected at concentrations above the RSCOs is nearly all boring locations.

Cyanide soil sampling results are also provided in Table 4.2.2. The NYSDEC TAGM 4046 does not identify a RSCO for cyanide considering the stability of cyanide is dependent on the chemical form. Cyanide was detected in approximately 18 boring locations. The highest concentrations of cyanide were 84.0 mg/kg at G3 (8-10), 23.4 mg/kg at I10 (6-8) and 14.4 mg/kg at G3 (8-10).

Soil sampling results for VOCs are summarized in Table 4.2.3. In general, VOCs were non-detectable in site soils with the exception of two boring locations near the southwestern boundary of the Construction Area. The volatile organics detected above their respcctive RSCOs are identified in bold in Table 4.2.3. At boring location I1, total xylenes were detected at a concentration of 3.3 mg/kg, exceeding the RSCO of 1.2 mg/kg. At boring location J1, 1,2-dichloroethene was detected at a concentration of 0.76 mg/kg, exceeding the RSCO of 0.3 mg/kg, and trichloroethene was detected at a concentration of 17.0 mg/kg, exceeding the RSCO of 0.7 mg/kg. Volatile organic compounds that exceedcd their respective RSCOs are shown on a site plan in Figure 7.

Semi-volatile organic compound soil sampling results are summarized in Table 4.2.4. Within the table, compounds detected above the RSCOs are identified in bold. Semi-volatile organics were detected in 44 of the 141 boring locations above the RSCOs. The semi-volatile contaminants that exceeded their individual RSCOs were polycyclic aromatic hydrocarbons and included benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and dibenzo(a,h)anthracene. However, not all of these contaminants were detected at each location. The NYSDEC TAGM 4046 recommends a comparison of individual compounds with their respective RSCOs. A cumulative total SVOC concentration maximum of 500 mg/kg is also recommended, when individual contaminant concentrations are not known. Total SVOCs exceeded 500 mg/kg in one boring location, i.e., G6. A summary of the SVOC impacts detected above thc RSCOs is shown on the site plan provided in Figure 7.

4.3 Soil Vapor Sampling Results

The IRM field investigation included soil vapor sampling in a total of 14 boring locations. The sampling locations were identified within the Work Plan and were selected based on historical information about the site and past environmental investigations. Soil vapor sampling locations included D1, E3, E5, E11, G4, G11, H13, I3, I5, J1, J9, N4 and N7. The soil vapor samples were all analyzed for TCL VOCs. The sampling results are summarized in Table 4.3.1.

As discussed in Section 4.1, the State of New York has not promulgated any standards, criteria or guidance values with regards to soil vapor concentrations. The soil vapor sampling results shown in Table 4.3.1 are compared with ambient/background outdoor air levels, which were collected on each day of soil gas sampling. As shown, soil vapor concentrations exceeded ambient volatile organic compound conditions in all locations. Detected organics were predominantly 1,2-dichloroethene, trichloroethene and tetrachloroethene. The highest concentrations of these organics in soil vapor were detected in decreasing order at locations J9, G4 and J1. Dichlorodifluoromethane (freon-12) was also detected in the soil vapor sampling locations in the vicinity of the existing ice rink. The volatile compounds detected in the soil vapor were generally not identified at significant concentrations in local soils. As previously reported in Section 4.2, volatile organic compounds, specifically comprising xylenes, trichloroethene and 1,2 dichloroethene, were only detected at concentrations above NYSDEC RSCOs at boring locations I1 and J1. Dichlorodifluoromethane (freon-12) was not detected during soil sampling. It should be noted that dichlorodifluoromethane was not an analyte in the Target Compound List of parameters (NYSDEC ASPB 10/95 8260B) for VOCs. However, if present, this compound would have been identified as a tentatively identified compound (TIC).

The soil vapor sampling investigation determined that soil vapor concentrations were typically higher at the deeper sampling depth in locations where samples were collected at a shallow and deep depth, i.e., 10 feet and 52 feet below grade. For chlorinated compounds identified in the soil vapor, it is assumed that groundwater, or historical groundwater impacts, are the source of contamination considering that the soil vapor concentrations were higher at the deeper sampling depths and that the field investigation did not identify significant VOC contamination in the soil.

4.4 Groundwater Sampling Results

The IRM field investigation for the Construction Area at the Bethpage Community Park included the installation and sampling of four monitoring wells. The wells are identified as CAMW-1, CAMW-2, CAMW-3 and CAMW-4. Well installation and sampling details were provided in Section 3.4. Each well was sampled for PCBs, TAL metals (including cyanide and hexavalent chromium), VOCs and SVOCs. Summaries of the analytical results for these analyses are provided in Tables 4.4.1 through 4.4.4.

As shown in Table 4.4.1, no PCBs were detected in any groundwater samples. Metal sampling results indicated only sodium was detected in each monitoring well location at concentrations above the NYSDEC Class GA Groundwater Quality Standards. Detected sodium concentrations ranged from 30,500 µg/L to 105,000 µg/L compared with the Class GA Standards of 20,000 µg/L. No other metals were detected above listed Class GA Standards. Due to its relatively benign nature, sodium impacts are not considered significant to this IRM program.

Volatile organic compound sampling identified the presence of 1,2-dichloroethene and trans-1,3 dichloropropene in each monitoring well. The organic compound 1,2-dichloroethene was detected at concentrations ranging from 20 to 1400 µg/L compared with the Class GA Standard of 5.0 µg/L. The highest concentration of 1400 µg/L was detected in monitoring well CAMW-3, which is located in close proximity to boring location J9. As discussed in the preceding section, soil vapor sampling identified the highest concentration of 1,2-dichloroethene at boring location J9. In addition, the soil vapor concentration of 1,2-dichloroethene detected at 52 feet below grade was approximately ten times higher than the concentration detected at 10 feet below grade. It should be noted that 1,2-dichloroethene was not identified in the soil sample collected at boring location J9 at a depth of 6-8 feet below grade.

The compound trans-1,3 dichloropropene was detected in the monitoring wells at concentrations ranging from 5 to 170 µg/L compared with a Class GA Standard of 0.4 µg/L. The highest concentration of trans-1,3 dichloropropene was detected at monitoring well CAMW-2, located at the southern boundary of the Construction Area.

Based on the identification of dichlorodifluoromethane (freon-12) in select soil vapor sampling locations, TICs were reviewed for the VOC groundwater sampling results. Dichlorodifluoromethane was not detected in any of the monitoring well locations. Chlorodifluoromethane (freon-22) was detected at a concentration of 200 µg/L at monitoring well CAMW-4, located on the south side of the existing skating rink. Chlorodifluoromethane was not detected in monitoring wells CAMW-1, CAMW-2 or CAMW-3.

As summarized in Table 4.4.4, analytical results for SVOCs indicate that all compounds were present at concentrations below their respective method detection limits at each of the four monitoring wells.

Upon completion of the monitoring well installation activity, a monitoring well survey was conducted in late June 2005. The well survey included each of the four new wells installed as part of the IRM field investigation in order to more accurately define the site specific groundwater flow direction within the Construction Area. Results of the well survey and associated groundwater contours are depicted on Figure 8 (Construction Area IRM Investigation Potentiometric Groundwater Surface Map).

Based upon the groundwater contours depicted on Figure 8, the shallow groundwater flows in a south-southeasterly direction beneath the designated Construction Area at the Bethpage Community Park. To assess any potential impacts to the shallow groundwater underlying the Construction Area from possible contaminant source areas located on the subject parcel, the groundwater monitoring well analytical data was compared. Based on the groundwater contours in Figure 8, CAMW-1 may be considered as an upgradient well with respect to CAMW-2. Monitoring wells CAMW-3 and CAMW-4 are not as suitably located for comparison with upgradient well CAMW-1.

The volatile organic compounds 1,2-dichloroethene and trans-1,3 dichloropropene were detected in both monitoring well CAMW-1 and monitoring well CAMW-2. Concentrations of both organic compounds were approximately 10 times higher at the downgradient monitoring well location. This may indicate a possible source, or historical source, of contamination within the confines of the Park, although no significant source areas were identified in the Construction Area. Trans-1,3-dichloropropene was detected in one sample, i.e., boring G-4 (12-14 feet below grade) at a concentration of 12 µg/kg. The compound 1,2-dichloroethene was detected in four boring locations; Detected concentrations were 100 µg/kg at G4 (2-4 feet), 12 µg/kg at I1 (18-20 feet), 160 µg/kg at I2 (2-4 feet), and 760 µg/kg at J1 (48-50 feet). The NYSDEC RSCO for 1,2-dichloroethene is 300 µg/kg. Therefore, the concentration of 1,2-dichloroethene exceeded the RSCO at boring J1. Both organic contaminants detected in thc groundwater at the upgradient and downgradient wells were also detected at low concentrations at boring location G4, which is situated upgradient of well CAMW-2. The concentration of 1,2-dichloroethene at G4 (2-4 feet) was 100 µg/kg. This concentration is less than the RSCO of 300 µg/kg.

In assessing analytical data for metals, only sodium was detected in any well at concentrations above the NYSDEC Class GA Groundwater Standards. The concentration of sodium was detected at 59,800 µg/l in well CAMW-2, which exceeds the NYSDEC Class GA Groundwater Standard of 20,000 µg/l and the concentration detected at upgradient well CAMW-1 of 30,500 µg/l. Sodium, however, is not typically considered a significant environmental concern.

5.0 QA/QC SAMPLING & DATA VALIDATION

This section summarizes the quality assurance/quality control (QA/QC) procedures used during the field investigation, data validation results and data usability.

5.1 Field Investigation QA/QC

QA/QC procedures for the field investigation activities as well as all laboratory work were presented in the NYSDEC approved Work Plan. The purpose of establishing and following strict field and laboratory specific procedures was to ensure that the data collected was precise, accurate, representative, complete and comparable.

The field QA/QC procedures included the use of specially developed forms and logs for the collection of repetitive data such as soil and groundwater sampling, and community air monitoring. In addition, QA/QC procedures stipulated in the Work Plan such as Chain-of-Custody procedures, field measurement requirements, QA/QC sample collection, etc., were followed.

In order to meet project-specific Data Quality Objectives (DQOs), various types of QA/QC blank and duplicated samples were collected and analyzed. These QA/QC samples included trip blanks, field blanks and blind duplicate samples.

Trip Blanks

Trip blanks containing distilled and de-ionized water from the analytical laboratory were transported to the site and returned without opening. Trip blanks serve as a check for potential contamination from volatile organic compounds that may originate from sample transport, shipping and/or from site conditions. Trip blanks were collected during the field investigation at the Construction Area at the rate of one per day. All trip blanks were analyzed for VOCs. The analytical results are summarized in Table 5.1.1. As shown, no VOCs were dctected in any trip blank. Therefore, it is unlikely that any of the samples collected during the field investigation were impacted by sample transport and shipping.

Field Blanks

Field blanks, also identified as equipment blanks, were used to determine if field sampling or sampling equipment decontamination procedures resulted in cross-contamination of site samples. Field blanks were collected at a rate of one per sample delivery group (SDG, i.e., up to 20 samples) by pouring distilled and deionized water through or over the sampling equipment following cleaning. Field blank samples were analyzed for PCBs, TAL metals including hexavalent chromium and cyanide, TCL VOCs and TCL SVOCs. The field blanks were collected during soil sampling, which was performed by split-spoon sampling or direct-push drilling core barrel sampling, and during groundwater sampling.

The analytical results for field blanks were reviewed by the independent data validators and are reported in the Data Usability Summary Reports. As reported in the data validation reports, in some cases, select analytes were found in the field blanks at concentrations between the Contract Required Detection Limit (CRDL) and the Instrument Detection Limit (IDL). These very low concentrations are not required to be noted in the data validation summary tables and do not affect the end use of the data. Therefore, it can be concluded that field decontamination procedures were effective and there are no concerns with regards to cross contamination impacting the analytical results of the samples.

Blind Duplicates

Blind duplicate samples were utilized as an additional QA/QC measure to assess the accuracy and repeatability of field procedures and laboratory analytical procedures. Duplicate samples were collected and labeled with a fictitious identifier known only to the samplers and those responsible for data interpretation. The analytical laboratory was not aware of the precise sampling location. Field blanks were submitted to the analytical laboratory in an identical manner as all other samples, and were documented on the chains of custody. Sample collection times were not provided on the chains of custody for the blind duplicate samples.

Blind duplicate samples were analyzed for PCBs and RCRA metals. Analysis of the blind duplicate samples did not include the expanded list of metals (i.e., TAL metals), cyanide, hexavalent chromium, VOCs or SVOCs, as specified in the NYSDEC approved Work Plan. All soil samples collected during the field investigation were analyzed for PCBs and RCRA metals. The expanded list of analytical parameters was reserved to a minimum of one sample per boring location based on field screening results. Analysis of the blind duplicates for the expanded list of parameters would have reduced the effective "blind" nature of these duplicate samples.

Blind duplicate sampling results for PCBs and RCRA metals are summarized in Tables 5.1.2 and 5.1.3, respectively. The analytical results for the blind duplicates are provided along with the comparable duplicate sample. As shown, the blind duplicates are in general agreement with the comparable sample with an acceptable correlation, thereby, indicating the analytical results are precise, accurate, representative and comparable.

5.2 Data Validation

In accordance with the Work Plan, all of the CLP analytical data packages and results generated as part of this investigation underwent independent data validation. A total of 45 analytical data packages or sample delivery groups (SDGs) were generated as part of the soil investigation, and one sample delivery group (SDG #46) was generated during groundwater sampling. Analytical services for soil and groundwater samples were provided by H2M Labs, Inc., a New York ELAP approved and ASP certified laboratory. Soil vapor sampling results were provided as two data packages by Severn Trent Laboratories (STL Burlington).

Independent data validation services were provided by Data Validation Services (North Creek, NY) and Ms. Nancy Potak (Greensboro, VT). Methodologies utilized were those of the 1995 NYSDEC ASP. The data usability summary reports for the SDGs are included in Appendix C.

As per NYSDEC CLP procedures, the concentrations and data qualifiers shown on the summary analytical tables referenced in Section 4.0 have been edited to reflect minor recommendations made during the validation process. The analytical results presented in the data summary tables report validated data, which are applicable for use in health-based risk assessments. The data validation was performed following NYSDEC Analytical Services Protocol (ASP) guidelines.

6.0 HUMAN EXPOSURE ASSESSMENT

The purpose of this exposure assessment is to qualitatively evaluate the contaminants of concern and the affected media with respect to potential exposure pathways and receptors for human health. It should be noted that this assessment is performed to evaluate the potential for exposure routes to be present in order to facilitate the development of a remedial action plan that adequately addresses the identified potential exposure routes. This assessment is not meant to infer the past or present human exposure to the contaminants of concern or affected media.

For the Construction Area within the Bethpage Community Park, the following exposure pathways were evaluated:

- Ingestion of contaminated soil.
- Inhalation of vapors and/or dust.
- Direct contact with potentially contaminated surface runoff.
- Ingestion of contaminated groundwater.
- Dermal contact with contaminated soils.
- Dermal contact with contaminated groundwater.

Potential human receptors in the vicinity of the site include:

- Visitors to/workers at the site.
- Residents that live in the area.
- Construction workers involved with remedial activities or site redevelopment activities.

The following conservative scenario assumptions were made in the qualitative exposure pathway analyses. It should be noted that these assumptions are for the purposes of the exposure assessment and do not infer that the identified circumstances are occurring or have occurred in the past.

- Contaminated soil in contact with groundwater and contaminants in soils released to groundwater.
- Contaminated unsaturated soils releasing fugitive dust into the atmosphere during excavation activities.
- Individuals who visit or work at the property coming into contact with potentially contaminated on-site surface and unsaturated-zone soils.
- Remedial efforts exposing potentially contaminated soils and groundwater on and off of the property.

6.1 Exposure and Pathway Overview for the Site

To evaluate potential exposures to the site in a qualitative fashion, various exposure scenarios were classified in terms of the general release mechanisms including:

1. Transport of soil impacts to groundwater.

2. Volatilization.
3. Erosion producing dust during remedial measures.
4. Direct contact to soil and potentially contaminated groundwater.
5. Water runoff.

Direct exposures to the chemicals of concern from the above-referenced mechanisms could potentially occur in the following ways:

1. Ingestion of contaminated soil.
2. Inhalation of vapors from volatilization of soil contaminants or from soil vapor.
3. Inhalation of potentially contaminated dust during remedial measures or construction.
4. Direct contact with potentially contaminated runoff water.
5. Ingestion of contaminated groundwater.
6. Dermal adsorption of contaminants via direct contact with contaminated soils and groundwater.

Potential exposure pathways are examined for functionality and completeness as follows:

Functional Exposure Pathways – A functional pathway requires that a contaminant source, release mechanism and transport mechanism be present. If any of these three components is absent, the pathway is considered nonfunctional.

Complete Pathway – A complete pathway requires a functional exposure pathway, potential receptors to the exposure and an exposure/uptake route. An exposure is considered incomplete and the risks qualitatively low if one or more of these components are missing.

6.1.1 Exposure Pathways

This section provides an evaluation of the five exposure pathway components and their status with respect to the subject site. The evaluation is performed to determine whether the exposure pathways are considered functional, i.e., present or potentially present at the subject site. It should be noted that a functional exposure pathway does not indicate the presence of an actual exposure hazard. A functional exposure pathway requires additional conditions to be present in order to be considered 'complete,' i.e., potential receptors and an uptake route.

1. Ingestion of Contaminated Soil

Based upon the review of the soil analytical data presented in Section 4.0, PCBs, metals (predominantly arsenic, cadmium, chromium, copper, mercury and zinc), and select polynuclear aromatic hydrocarbons (PAHs) were detected above NYSDEC cleanup guidelines (i.e., RSCOs) in the on-site unsaturated-zone soils resulting in a contaminant source. These contaminants were also detected in on-site surface soils. Subsurface impacted soils could also be brought to the surface of the site during excavation activities where they could be potentially ingested. Therefore, this exposure pathway is considered functional.

2. Inhalation of Vapors

As presented in Section 4.0, contamination within the Construction Area is predominantly due to PCBs, metals and select polynuclear aromatic hydrocarbons. These contaminants are not volatile at standard temperatures and pressures. Some VOC contamination was identified in site soils and was predominantly located along the western portion of the Construction Area. The potential exists for a release of the VOC-type contaminants in the form of vapors. Soil vapor sampling confirmed the presence of elevated concentrations of contaminants in the soil vapor. Therefore, there is a contaminant source, release mechanism (i.e., volatilization of VOCs from impacted soils) and a potential transport mechanism (i.e., airborne VOC vapors present on the site). The potential for human inhalation of vapors from on-site contaminated soils is considered functional.

3. Inhalation of Dust during Remedial Measures

As presented in Section 4.0, PCBs, metals and select polynuclear aromatic hydrocarbons were detected in on-site soil samples above NYSDEC concentrations of concern. Therefore, this exposure pathway is considered functional due to a contaminant source; a release mechanism (contaminants present in the near-surface soil samples) and a transport mechanism (identified contaminants released during potential near-surface excavation activities).

4. Direct Contact with Potentially Contaminated Runoff Water

The majority of the Construction Area is developed with buildings and parking areas. Stormwater in these areas is conveyed through drainage systems. Remaining areas of the Construction Area are unpaved but covered with grass that permits stormwater infiltration into the subsurface. There is typically no ponding of stormwater on the unpaved areas. Therefore, the potential for human exposure to potentially contaminated site runoff is considered low and this exposure pathway is considered nonfunctional due to a lack of a contaminant source.

5. Ingestion of Contaminated Groundwater

There are several public water supply wells owned and operated by the Bethpage Water District in the vicinity of the site. Due to documented VOC contamination in area groundwater by others, all public water supply wells in the vicinity of the site are tested for contaminants and treated for organic compounds. Groundwater sampling during this investigation confirmed VOC contamination in on-site groundwater.

Although this exposure pathway contains a documented contaminant source (VOC contaminated groundwater) and a transport mechanism (hydrogeologic flow of contaminated groundwater), the ingestion of contaminated groundwater exposure pathway will not be considered functional for the purpose of this effort due to engineering controls already in place in the local water supply infrastructure, the off-site nature of the pathway, and the fact that remediation of the impacted groundwater is being addressed by others under a separate Order on Consent with the NYSDEC.

6. Dermal Adsorption of Contaminants via Direct Contact with Contaminated Soil

As discussed in previous subsections, PCBs, metals and select polynuclear aromatic hydrocarbons were detected in on-site soil samples above NYSDEC concentrations of concern. Therefore, this exposure pathway is considered functional due to the presence of a contaminant source, a release mechanism (contaminants present in the near-surface soil samples) and a transport mechanism (contaminants released during potential near-surface excavation activities).

7. Dermal Adsorption of Contaminants via Direct Contact with Contaminated Groundwater

Volatile organic compounds were detected in groundwater samples above NYSDEC concentrations of concern. However, as reported above, an infrastructure is already in place for treatment of the local water supply. Therefore, this exposure pathway is not considered functional for the purpose of this effort.

6.1.2 Complete Pathway

A complete pathway requires a functional exposure pathway, potential receptors to the exposure and an exposure/uptake route. As indicated in Section 6.1.1, there are four functional exposure pathways with respect to human health that will be evaluated in this section including:

1. Ingestion of contaminated soil.
2. Inhalation of vapors from volatilization of soil contaminants.
3. Inhalation of potentially contaminated dust during remedial measures or construction.
4. Dermal adsorption of contaminants via direct contact with contaminated soils.

This section of the human exposure assessment details potential receptors and exposure/uptake routes.

Visitors to/Workers at the Site

The potential for visitors and/or workers on the site to be exposed to site-related contaminants includes:

- Ingestion of on-site contaminated soils - This pathway is potentially completable for on-site visitors and/or workers due to the presence of impacted unsaturated-zone soils at the site.
- Inhalation of vapors – Potential exists for on-site visitors/workers to be exposed to VOC vapors emanating from impacted soil piles during future remediation or construction

excavation activities. Potential exists for future site workers or visitors to be exposed to adverse indoor air quality from permeation of contaminated soil vapor.

- Inhalation of dust - Potential exists for on-site visitors/workers to be exposed to airborne dust impacted by PCBs, metals and select organic aromatics from future remediation or construction excavation activities. Potential exists for visitors to be exposed to dust if recreation activities involve disturbing the surface soils.
- Dermal adsorption of contaminants via direct contact with contaminated soil - Potential exists for workers to be exposed to contaminated unsaturated soils during on-site excavation activities. As with inhalation of dust, potential exists for visitors to be exposed to dust if recreation activities involve disturbing the surface soils.

Residents Who Live in the Area

The potential for residents who live in the area of the site to be exposed to site-related contaminants by potentially completable functional pathways includes:

- Ingestion of contaminated onsite soil by residents – No residents live within the Park limits.
- Inhalation of vapors for residents – The potential exists for an inhalation exposure for residents to vapors that may be present during remediation or construction activities that involve subsurface excavation activities. However, such activities would involve a community air monitoring program that would greatly reduce any potential vapor exposure hazard to residents.
- Inhalation of potentially contaminated dust during remedial activities for residents – Fugitive airborne dust from surface and subsurface soils from the site would likely be encountered during remediation or construction activities that involve subsurface excavation activities. Such activities incorporate mitigation measures that reduce or eliminate fugitive dust. In addition, during any such activity a community monitoring program would be initiated that would greatly reduce the likelihood of dust exposure to residents.

- <u>Dermal adsorption of contaminants via direct contact with contaminated soil</u> – Residents are not likely to be in direct contact with impacted soil from the site, unless visiting the Park (See visitors/workers at the Site above).

Construction Workers

Construction workers could potentially be exposed for short periods of time to contaminants of concern during site remediation or construction activities. However, all work should be performed in accordance with a NYSDEC-approved Health and Safety Plan (HASP), with knowledge of site conditions, and while utilizing appropriate personal protective equipment, as specified in the HASP. Therefore, the qualitative risk is considered low for construction workers.

6.2 Toxicity Assessment

Of the contaminants identified at the subject site, the constituents identified at the most significant concentrations include PCBs, metals (arsenic, cadmium, chromium, copper, mercury and zinc) and select PAHs (benzo(a)anthracene, benzo(a)pyrene, and chrysene).

PCBs are a group of highly toxic chlorinated industrial chemicals that have multiple applications including use as dielectrics, coolants and lubricants in electrical transformers and other electrical equipment. PCBs refer to a family of chemical compounds formed by the addition of chlorine or multiple chlorine atoms to the biphenyl ($C_{12}H_{10}$) molecule. Toxic effects of PCB exposure in humans include liver disease, immune function impacts and increased cancer risk.

Metals detected in site soils above NYSDEC guidance values predominantly included arsenic, cadmium, chromium, copper, mercury and zinc. Arsenic (As) is a common metal that may be sourced from coal combustion, pesticides, fungicides or paints. Human health exposure to low levels of arsenic may result in stomach ache, nausea, vomiting and diarrhea. Long term exposure can result in skin changes, neurological effects (headaches, vision problems) and behavioral changes. Arsenic is also listed as a suspect human carcinogen.

Cadmium (Cd) is considered a heavy metal that can cause damage to all types of human body cells. Prolonged accumulation of cadmium can cause nervous system and immune system effects, emphysema and cancer. Chromium (Cr) is a metal that may be present in trivalent (Cr^{3+}) or hexavalent (Cr^{6+}) forms. The trivalent chromium is not as readily absorbed by the human body and, therefore, not generally considered as toxic. Human health effects for respiratory and dermal exposure to chromium include nasal irritation, nasal ulcers, and perforation of the nasal septum at higher doses. Chromium is also suspected to increase cancer risk during inhalation exposure.

Copper (Cu) is an essential element required by the body for normal physiological processes; however, increased copper exposure can have adverse toxicity effects. Copper absorption occurs predominantly through the lungs, gastrointestinal tract and skin. Acute toxicity of ingested copper is characterized by abdominal pain, diarrhea, vomiting and a metallic taste in the mouth. Continued ingestion of copper compounds can cause cirrhosis and other debilitating liver conditions. Inhaled copper dust or fumes can produce eye and respiratory tract irritation, headaches, vertigo, drowsiness, chills, fever, aching muscles and discoloration of the skin and hair.

Mercury (Hg) is a heavy metal with known toxicity effects in humans. Mercury absorbed through the gastrointestinal tract is distributed throughout the body but tends to concentrate in the brain and kidneys. Inhaled mercury vapor is distributed primarily to the central nervous system and the kidneys. Ingestion of mercury inorganic salts may cause severe gastrointestinal irritation, renal failure, and death with acute lethal doses. Inhalation of mercury vapor may cause irritation of the respiratory tract, renal disorders, central nervous system effects characterized by behavioral changes, peripheral nervous system toxicity, renal toxicity and death.

Zinc, along with copper, is an essential element required by the body. Zinc is essential for adequate membrane function and protein synthesis. Adverse human health effects from large intakes of zinc include anemia, damage to the pancreas, and a lowering of the level of lipoprotein cholesterol.

Benzo(a)anthracene, benzo(a)pyrene, and chrysene are part of a class of chemicals known as polycyclic hydrocarbons or polynuclear aromatic hydrocarbons (PAHs). PAHs are suspect carcinogens. Epidemiological studies have reported an increase in lung cancer in humans exposed to coke oven emission, roofing tar emissions, and cigarette smoke. Each of these mixtures contains a number of PAHs

Based upon the toxicity assessment provided above, chronic exposure to the contaminants reported on-site may cause carcinogenic effects. Additionally, several negative health effects may occur due to acute exposures to high concentrations of these compounds. However, the concentration levels reported at the site are not likely to cause acute overexposure effects.

6.3 Risk Characterization

Based upon potentially complete functional pathways and exposure/uptake routes, a qualitative risk characterization per functional exposure pathway and potentially exposed receptors was prepared. As indicated in Table 6.3.1, the potential receptor populations comprising Visitors/Workers at the Site were identified to have potential risk from ingestion of contaminated soil, inhalation or vapors, inhalation of contaminated dust during remediation activities and dermal absorption of contaminated soil. All other potential risks for identified receptors are considered minor.

The risk characterization is based on the Exposure Assessment results and conservatively identifies the potential exposure risks at the Site. Past and/or present exposures to site contaminants through the identified exposure pathways are not assumed or insinuated.

7.0 REMEDIAL ACTION PLAN

7.1 Site Investigation Summary

The site investigation, which consisted of soil, groundwater and soil vapor sampling, identified the nature and extent of contamination within the Construction Area at the Bethpage Community Park. Results of the site investigation were presented in Section 4.0. Contaminants including

PCBs, metals, VOCs and select SVOCs were identified at levels exceeding NYSDEC guidance concentrations, i.e., Technical and Administrative Guidance Memorandum #4046 Recommended Soil Cleanup Objectives. The predominant metals identified included arsenic, cadmium, chromium, copper, iron, mercury and zinc. Barium and nickel were also identified in a few locations above NYSDEC RSCOs. VOCs identified above NYSDEC guidance values included xylenes, 1,2-dichloroethene, and trichloroethene. SVOCs identified above NYSDEC guidance values were benzo(a)anthracene, benzo(a)pyrene and chrysene.

PCB contamination, as summarized in Table 4.2.1 and shown on Figure 6, appears to be predominantly located in the northern and western central areas of the Construction Area. The northern area is currently a picnic area within the Community Park. The western central area, which had the highest amount of PCB impacts, comprises parking areas, basketball courts, shuffleboard courts and bocce ball courts. Other PCB contamination was interspersed in the southern and northeastern portion of the Construction Area. PCBs shown on Figure 6 include all concentrations above 1 mg/kg. The NYSDEC RSCO for PCBs is 1 for surface soils and 10 for subsurface soils. PCBs exceeded the RSCO of 1 for surface soils in 30 locations. Subsurface PCB concentrations were above 10 mg/kg in approximately 8 locations. As previously reported, the soil investigation included soil borings to 10 feet below grade (20 feet in three locations) and a fewer number of borings to 60 feet below grade. In the samples collected, PCB impacts were not detected below 18-20 feet below grade. As reported in Section 4.4, PCBs were not detected in site groundwater. The highest concentration of PCBs was detected at boring location G7 at a concentration of 550 mg/kg.

Soil investigation results for metals are summarized in Table 4.2.2 and shown on Figure 5. Metal contamination, i.e., metals detected at concentrations above the NYSDEC RSCOs, was fairly evenly spread across the Construction Area. As reported, the predominant metals identified included arsenic, cadmium, chromium, copper, iron, mercury and zinc. At depths below approximately 10 feet, the metals detected above the NYSDEC RSCOs were typically arsenic, iron, and, in fewer locations, chromium. The metal contaminants detected in the site soils were not identified in the groundwater samples collected as part of the site investigation.

Cyanide sampling results were also summarized in Table 4.2.2. Cyanide was detected in approximately 18 boring locations. The highest concentrations, ranging between 4 and 84 mg/kg, were detected at D6 (2-4), G3 (8-10), G4 (8-10), I1 (18-20), I10 (6-8) and K9 (6-8).

The site investigation identified VOC contamination at concentrations above the NYSDEC RSCOs in only two locations, i.e., I1 and J1, which are located on the western central portion of the Construction Area near the baseball field. The VOC sampling results are summarized in Table 4.2.3 and shown on Figure 7. The VOCs identified above the NYSDEC guidance values included xylenes, 1,2-dichloroethene, and trichloroethene. Of these, only 1,2-dichloroethene was identified in the groundwater samples collected as part of the site investigation. As previously discussed, chlorinated organics are known groundwater contaminants in the general vicinity of the subject site.

Semi-volatile organics were identified above NYSDEC RSCOs within the Construction Area in the northern area, currently occupied by the picnic area, the western central area, currently occupied by basketball, shuffleboard and bocce ball courts, the south central area, currently a parking area, and the southern portion, also a parking area. Contaminants were PAH compounds (benzo(a)anthracene, benzo(a)pyrene and chrysene) and were predominantly detected in the soils from zero to 4 feet below grade. SVOCs were not identified in the groundwater samples collected as part of this site investigation.

The site investigation included soil vapor sampling in select locations across the Construction Area. Soil vapor samples were typically collected from 10 feet below grade and 52 feet below grade. During the site investigation, groundwater was typically encountered at approximately 54 feet below grade. The soil gas sampling results were discussed in Section 4.3 and summarized in Table 4.3.1. Volatile compounds detected during the soil vapor sampling predominantly included 1-2-dichloroethene, trichloroethene, tetrachloroethene and dichlorodifluoromethane (Freon-12). The dichlorodifluoromethane was only identified in soil vapor samples collected in the vicinity of the ice rink. Soil vapor concentrations were generally higher in the samples collected at the deeper depths. With regards to the chlorinated compounds, it is assumed that the groundwater, or historical groundwater impacts, serves as the source of contamination for the soil vapor in the areas sampled considering that the concentrations were higher near the groundwater table and that the soil investigation did not identify these volatile compounds in a significant concentration in the soil.

As indicated in Section 3.2.1 of this report, a supplemental investigation has been implemented which will include additional data collection in the vicinity of the ice rink. The results of this investigation will be utilized to further characterize the soil in this area and may result in revisions to the Remedial Action Plan.

7.2 Remedial Action Objective

The site specific remedial action objective is to identify a remedial strategy that is protective of human health and the environment, and meets the intended objectives of the IRM. Protection of human health may be achieved by eliminating the contaminants of concern, reducing the contaminant levels or by minimizing the potential exposure taking into consideration the proposed future use and potential future use of the site. Remedial action objectives that are protective of the environment typically seek to preserve or restore site soils and groundwater to target cleanup levels.

The remedial action goal for this site will be to establish a general response action that is protective of human health considering the intended future use and potential future use of the property, as well as protective of the environment. Although secondary to human health and the environment, a remedial action objective should be fiscally prudent and logistically attainable.

7.3 Proposed Remedial Strategy

The Interim Remedial Measure site investigation was conducted to characterize the subject area conditions and to provide suitable data to support the development of a remedial action plan. The remedial action plan proposed herein was developed to be protective of human health, protective of the environment, and to facilitate redevelopment of a portion of the Bethpage Community Park by the Town of Oyster Bay. Past environmental investigations conducted at the Bethpage Community Park, on behalf of Northrop Grumman, documented contamination within the designated 'Construction Area.' Investigative results documented herein provide significantly greater detail relative to the impacts to the subject area. Near-term plans for redevelopment at the site include the construction of a new indoor ice skating rink in the vicinity of the existing outdoor rink. Associated with the redevelopment will be reconfiguration of the site access and parking areas. In developing a remedial strategy, the near-term future use and potential future use of the subject area were considered. In order to meet these needs, and the objectives of the IRM, the following criteria have been applied in order to develop a remediation strategy:

Remedial Strategy Criteria

1. Entire subject site area, the limits of which are defined by the Consent Order, should be rendered clean to a suitable depth below grade so as to allow for unrestricted future use of the site. This will allow the town to upgrade, redevelop, or augment the site as they deem appropriate, while not having to encounter contaminated materials.
2. Areas contaminated by historical fill material should be remediated.
3. Identified contaminants below the depth determined to support Item 1 above should also be remediated if determined to have the potential to negatively impact groundwater quality, soil vapor or public health.

In developing a remedial strategy, we have considered the nature and extent of contamination documented herein, exposure assessment results, proposed site redevelopment plan and continued future site use for recreational purposes, the objectives of the IRM and the above listed criteria. The above criteria and the resulting strategy do not address groundwater impacts directly as these impacts are being investigated more fully and will be remediated by Northrop Grumman under a separate Order on Consent with NYSDEC. Accordingly, we propose the following remedial strategy:

Proposed Remedial Strategy

1. Remediate all impacted soils within the confines of the Consent Order defined site to NYSDEC recommended soil cleanup objective concentrations to a depth of ten feet below grade. NYSDEC cleanup objectives for the purposes of this strategy initiative are equivalent to the Recommended Soil Cleanup Objectives for surface soils identified in

the latest version of NYSDEC Technical and Administrative Guidance Memorandum 4046. A depth of ten feet below grade was chosen because most typical construction/development activity would not require deeper excavation.

2. Remediate historical fill areas to NYSDEC recommended soil cleanup objective concentrations for subsurface soils. For the purpose of this initiative, historical fill areas are defined as areas identified by area photography as being potential release areas and confirmed as fill areas (debris and non-native soils) through boring log information. In addition, areas identified through boring logs to include fill material even if not suspected though aerial photography will be subject to this initiative.
3. Remediate all source areas affecting groundwater quality or soil vapor to NYSDEC recommended soil cleanup objective concentrations for subsurface soils. For the purpose of this initiative, source areas are defined as impacted soils that are currently affecting groundwater or soil vapor quality, or that have the potential to negatively affect groundwater or soil vapor quality. This potential is a function of the nature of the contaminant, the contaminant concentration, the location of the impact, and any mitigating factors.
4. Any identified impacts that are subject to more than one of these strategic initiatives will be remediated to meet the more conservative (i.e., more comprehensive cleanup) initiative.

The first criteria of the proposed remedial strategy provides for remediation of all contaminated surface and near surface soils to a depth of ten feet. The extent of remediation is to be based on the NYSDEC RSCOs although for PCBs, the RSCO cleanup objective of 1 mg/kg for surface soils is recommended as the cleanup guideline to a depth of 10 feet. Remediation based on these cleanup guidelines will enable future site use and redevelopment to conventional excavation depths with minimal exposure concerns, including revised surface grade elevations. For metals, the NYSDEC RSCOs identify a precise value or, in some cases, the Site Background concentration. For metals identified with Site Background as the RSCO, the upper range of the Eastern USA Regional concentration will be used as the cleanup objective.

The second criteria of the remedial strategy provides for remediation of contaminated fill areas identified from historical records, such as aerial photographs or site records, and identified from soil classification information obtained during the IRM field investigation. These areas will be remediated to meet NYSDEC recommended soil cleanup objective concentrations for subsurface soils. For metals identified with Site Background as the RSCO, the upper range of the Eastern USA Regional concentration will be used as the cleanup objective.

The third criteria of the remedial strategy provides for remediation of all source areas (impacted soils) affecting or having the potential to affect groundwater or soil vapor quality to NYSDEC recommended soil cleanup objective concentrations for subsurface soils.

Implementation of the remedial strategy will be conducted through excavation and off-site disposal of all soil impacts identified as requiring remediation.

The extent of remediation for the proposed remedial strategy is shown in Figure 9. The depths identified for excavation are based on the results of the field investigation and utilization of the proposed remedial strategy criteria. At any given point within the Construction Area, the specified depth of excavation is based on the deepest contamination identified at the nearest node. The excavation plan also identifies the historical fill areas that are designated for deeper excavation, which include G4, G6-G8, I1, I8, J1, J6 and N9. The fill areas identified during the field investigation were characterized with wood and miscellaneous debris including man-made fibrous material.

In summary, the proposed remedial strategy will remediate all contaminated soils to a depth of ten feet and fill areas to depths of up to 20 feet below grade. The proposed remedial strategy will result in the removal of the majority of site contamination. A buffer of 10 feet will be provided between grade and any residual contamination left in place. In addition, the more significantly contaminated fill areas will be addressed through deeper excavation.

All impacted soils that are excavated as part of the remediation effort will be transported off-site and disposed at a permitted facility considering the contaminant concentrations identified during the IRM investigation. All excavated soils will be replaced with clean fill and top soil, as necessary. Remedial excavation and backfilling will be coordinated with the site redevelopment and construction plan to minimize duplication of effort.

In addition to the proposed remedial strategy and considering the soil vapor concentrations identified in site soils, it is recommended that any enclosed spaces contemplated as part of the proposed development activity include provision for soil vapor mitigation (i.e., prevention of soil vapor intrusion) as a design consideration. Given that VOC concentrations identified in soils were limited and no specific source for the soil vapor was identified, no soil remediation is recommended relative to VOCs as part of this IRM.

As noted previously, groundwater impacts are being addressed under remedial investigation being conducted by Northrop Grumman.

In consideration of the potential contaminant exposure pathways and potential receptors, the proposed remedial strategy seeks to eliminate contaminant exposure routes and contaminant migration through the addition of a clean surface soil buffer. Excavation to remove all contamination above NYSDEC cleanup objectives to a depth of ten feet permits relatively unrestricted future site use. For example, site maintenance operations such as installation of footings, fencing, lamp posts, curbs, new pavement, revised drain piping, new foundations, and revised surface gradients, to depths less than ten feet may proceed without cxposure concerns. The near-term proposed site redevelopment will further reduce exposure pathways in the majority of the Construction Area through installation of impervious surfaces, i.e., the new ice rink building, concrete sidewalks or pavement in the parking areas.

The Human Exposure Assessment discussed in Section 6 evaluated the nature and extent of contamination with functional exposure pathways. The greatest qualitative potential risks were identified with ingestion of contaminated soil by visitors/workers at the site, inhalation of vapors (volatilization of contaminants or adverse indoor air quality from permeation of soil vapor) by visitors/workers to the site, inhalation of contaminated dust during remediation activities by workers at the site, and dermal absorption of contaminants in soil by visitors/workers at the site.

An evaluation of the proposed remedial strategy to the identified greatest qualitative potential risks is provided below:

Ingestion of Contaminated Soil by Visitors/Workers at the Site

This qualitative potential risk generally refers to an inadvertent ingestion of the contaminated soil through contact of food or hands with contaminated media. The proposed remedial alternative would remove all contaminated soils to a depth of ten feet throughout the Construction Area. This would reduce the qualitative potential risk to 'minor.'

Inhalation of Vapors by Visitors/Workers at the Site

Following implementation of the recommended remedial alternative, the qualitative potential risk associated with inhalation of vapors associated with the volatilization of VOCs from contaminated soils will be low. The proposed removal of impacted soils will not, in and of itself, eliminate the qualitative potential risk from permeation of contaminated soil vapor into site buildings, which may result in adverse indoor air quality. The proposed remedial alternative therefore recommends soil vapor intrusion mitigation measures. It is recommended that any new site building be designed to incorporate soil vapor intrusion mitigation measures such as a sub-slab depressurization system. The primary source of the soil vapor is perceived to be the groundwater, which will be remediated through an area-wide groundwater remediation program to be implemented by Northrop Grumman, as part of a Consent Order with NYSDEC.

Inhalation of Contaminated Dust during Remediation Activities by Workers at the Site

This qualitative potential risk is associated with the identified remedial alternative. The proposed remedial strategy will reduce the qualitative potential risk of inhalation of contaminated dust through compliance with a site specific Health and Safety Plan involving the implementation of dust suppression measures, appropriate personal protective equipment and continuous air monitoring.

Dermal Absorption of Contaminants in Soil by Visitors/Workers at the Site

The proposed remedial alternative would remove all contaminated soils to a depth of ten feet throughout the Construction Area. This strategy should reduce the qualitative potential risk to park visitors and workers to 'minor.'

7.4 Logistical Implementation

The proposed remedial excavation plan, based on application of the remedial strategy criteria to the contaminant concentrations identified during the field investigation results, is shown as Figure 9. The proposed volume of soil to be excavated totals approximately 100,000 cubic yards. Considering the sizeable volume of soil to be removed, remediation activity is planned to be coordinated with redevelopment activity to enable a more expedient schedule and cost avoidance associated with interim backfill and temporary surface stabilization.

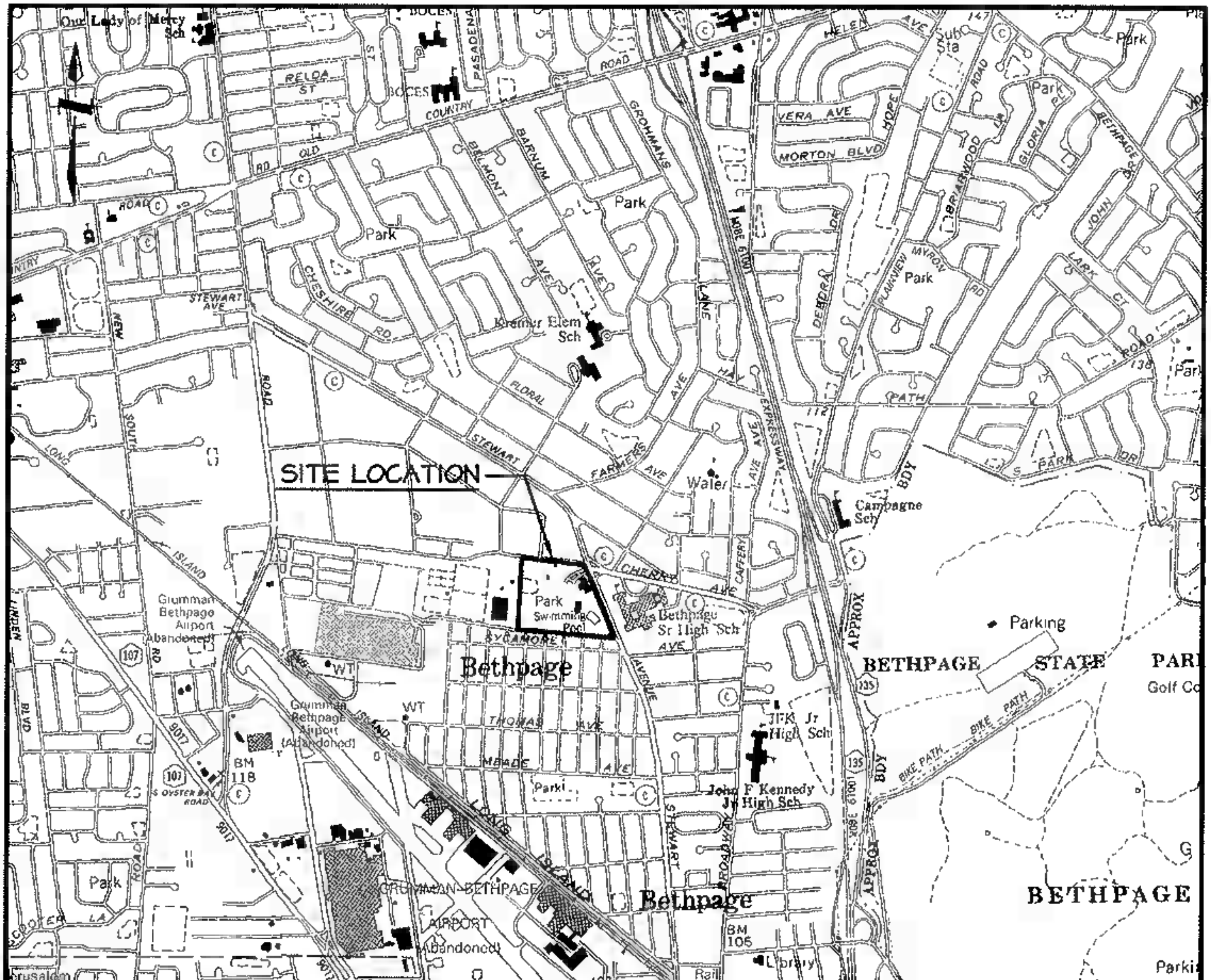
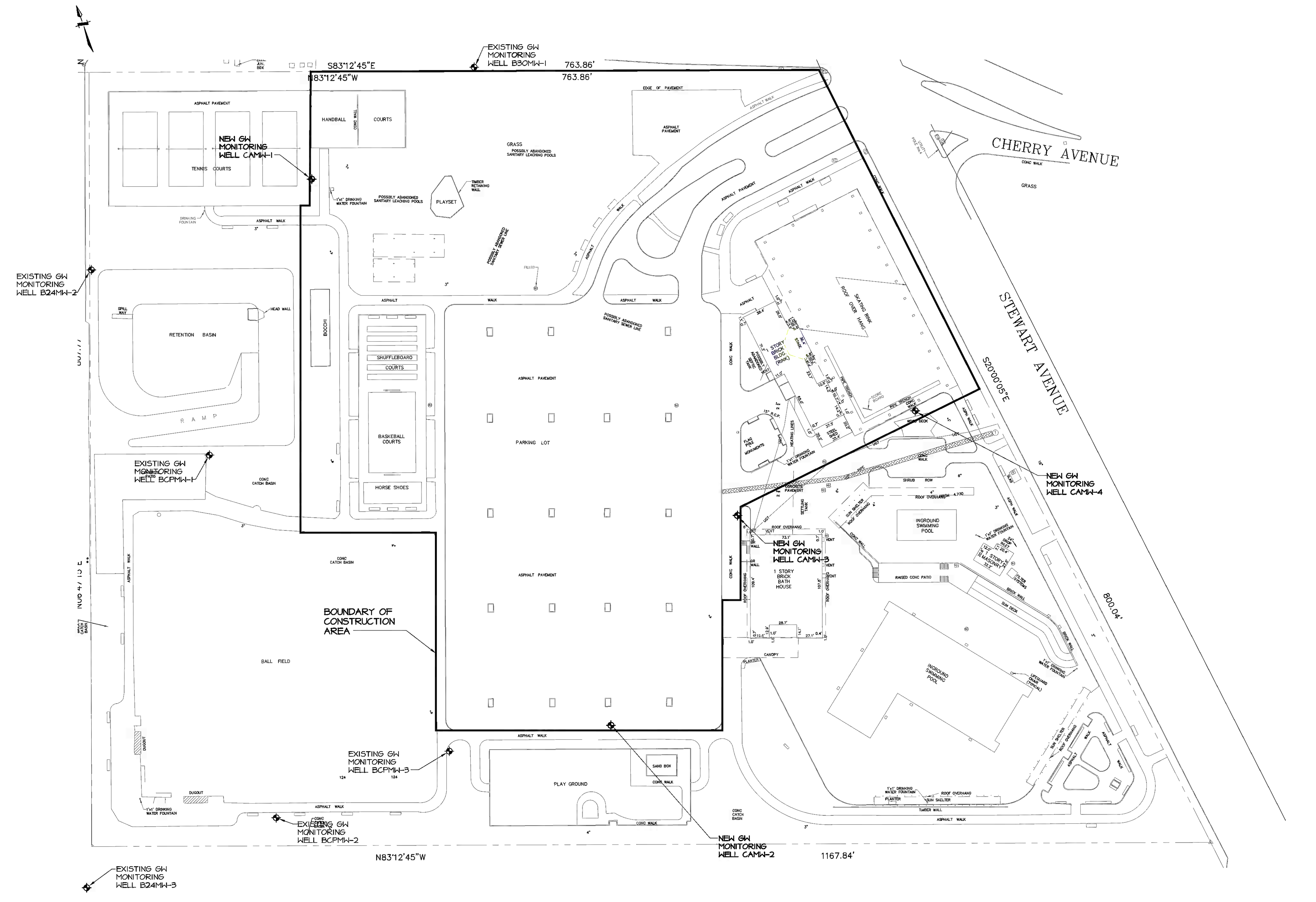


FIGURE 1. SITE LOCATION

SCALE: 1" = 2000'

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS

MELVILLE, N.Y. TOTOWA, N.J.



LEGEND

- SOIL SAMPLING POINT
- GROUND WATER MONITORING WELL

NOTES:

1. BASEMAP SOURCE: SIDNEY B. BOWNE & SON, LLP, PROJ. NO. 10408802, SEPT. 2004

H2MGROUP
HOLZMACHER, McLENDON & MURRELL, P.C.
575 Broad Hollow Road, Melville, New York 11747
ENGINEERS • ARCHITECTS • PLANNERS • SCIENTISTS • SURVEYORS
E-mail: h2m@h2m.com
www.h2m.com
MELVILLE, N.Y. (631)-756-8000
TOTOWA, N.J. (973)-942-0700

"ALTERATION OF THIS DOCUMENT, EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL"

MARK	DATE	DESCRIPTION
	-	-

ISSUE:	
PROJECT NO:	TOBY 0402
DATE:	NOVEMBER 2004
CAD DWG FILE:	fig2-site.dwg
XREF DWG FILE:	xr_EXCAVATION.dwg
SCALE:	1"= 50'
FILE LOCATION:	
DESIGNED BY:	PJS
DRAWN BY:	DP
CHECKED BY:	
REVIEWED BY:	

TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
BETHPAGE, NEW YORK

CONSTRUCTION AREA
IRM INVESTIGATION

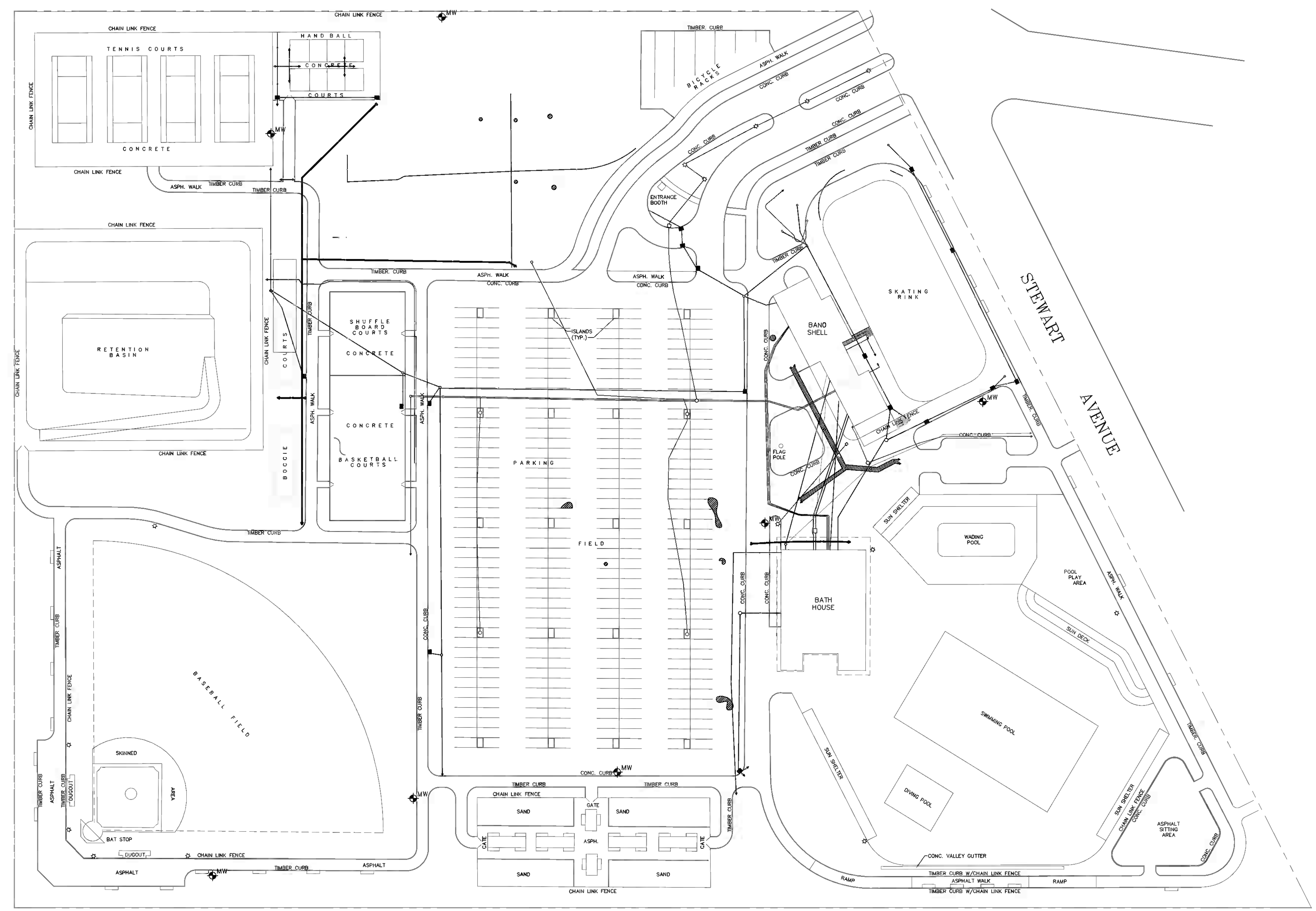
CONTRACT

SHEET TITLE

GENERAL SITE PLAN

SHEET NUMBER

FIGURE 2



NAEVA GEOPHYSICS, INC. — THE LEADER IN SUBSURFACE DETECTION — Subsurface Geophysical Surveys

50 N. Harrison Avenue, Suite 11
Congers, NY. 10920
(845)268-1800
(845)268-1802 FAX

Plate 1. Site Map Indicating Subsurface Features Detected during a Geophysical Investigation at the Bethpage Community Park, Located in Bethpage, New York

Client	H2M Group	Base Map Provided By H2M Group	
		Date of Work	May 17-23, 2005
Project No.	C0505171J	Map By	Jeremy Haney

ALL UNDERGROUND FACILITIES MAY NOT BE DEPICTED ON THIS MAP

LEGEND

- e — electric line
- t — telephone
- w — water
- st — storm sewer
- s — sanitary sewer
- c — conduit of unknown use
- metal-detector anomaly
- catch basin
- man hole
- fire hydrant

0 10 20 ft

H2MGROUP

HOLZMACHER, McLENDON & MURRELL, P.C.
575 Broad Hollow Road, Melville, New York 11747

ENGINEERS • ARCHITECTS • PLANNERS • SCIENTISTS • SURVEYORS

E-mail: h2m@h2m.com
www.h2m.com

MELVILLE, N.Y. (631)-756-8000 ■
TOTOWA, N.J. (973)-942-0700 □

"ALTERATION OF THIS DOCUMENT, EXCEPT BY A LICENSED PROFESSIONAL, IS ILLEGAL"

MARK	DATE	DESCRIPTION
	–	–

ISSUE:
PROJECT NO: TOBY 0402
DATE: NOVEMBER 2004
CAD DWG FILE: fig3–site.dwg
XREF DWG FILE: –
SCALE: 1"= 50'
FILE LOCATION:
DESIGNED BY: PJS
DRAWN BY: DM
CHECKED BY: C
REVIEWED BY: Q

**TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
BETHPAGE, NEW YORK**

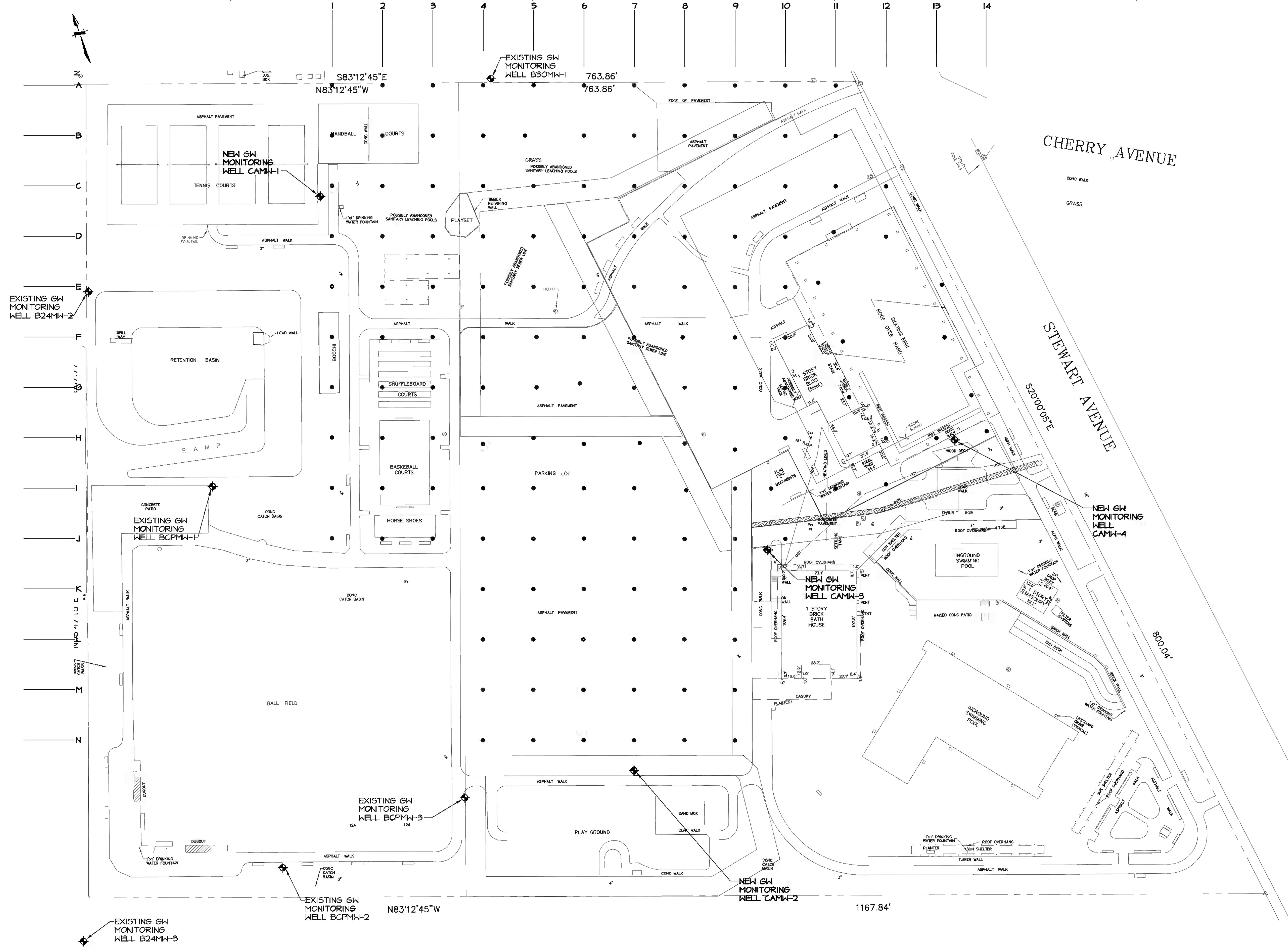
**CONSTRUCTION AREA
IRM INVESTIGATION
UTILITY MARKOUT
SITE PLAN**

CONTRACT

SHEET TITLE

SHEET NUMBER

FIGURE 3



LEGEND

- • SOIL SAMPLING POINT
- ◈ GROUND WATER MONITORING WELL

NOTES:

1. BASEMAP SOURCE: SIDNEY B. BOWNE & SON, LLP, PROJ. NO. 10408802, SEPT. 2004

H2M GROUP
HOLZMACHER, McLENDON & MURRELL, P.C.
575 Broad Hollow Road, Melville, New York 11747
ENGINEERS • ARCHITECTS • PLANNERS • SCIENTISTS • SURVEYORS
E-mail: h2m@h2m.com
www.h2m.com
MELVILLE, N.Y. (631) 756-8000
TOTOWA, N.J. (973) 942-0700

"ALTERATION OF THIS DOCUMENT, EXCEPT BY A LICENSED PROFESSIONAL, IS ILLEGAL"

MARK	DATE	DESCRIPTION
Δ	-	-

ISSUE:	
PROJECT NO:	TOBY 0402
DATE:	NOVEMBER 2004
CAD DWG FILE:	fig4-site.dwg
XREF DWG FILE:	xr_EXCAVATION.dwg
SCALE:	1"= 50'
FILE LOCATION:	
DESIGNED BY:	PJS
DRAWN BY:	DP
CHECKED BY:	C
REVIEWED BY:	Q

**TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
BETHPAGE, NEW YORK**

**CONSTRUCTION AREA
IRM INVESTIGATION
SOIL SAMPLING AND
MONITORING WELL
LOCATIONS**

CONTRACT

SHEET TITLE

SHEET NUMBER

FIGURE 4

M:\codd\TOBY\0402\9-19-05 drawings\fig5-site-new.dwg Last Modified: Feb 15, 2007 - 10:03am Plotted on: Jul 08, 2008 - 1:10pm By jnb

LEGEND

Cr (2-4) 1290 ● SOIL SAMPLING POINT - METAL CONTAMINANT (DEPTH IN FEET) CONCENTRATION IN mg/kg

◆ GROUND WATER MONITORING WELL

NOTES:

1. BASEMAP SOURCE: SIDNEY B. BOWNE & SON, LLP, PROJ. NO. 10408802, SEPT. 2004
2. CONCENTRATIONS SHOWN IN MG/KG (PPM) FOR ALL METALS DETECTED ABOVE NYSDEC TAGM 4046 RECOMMENDED SOIL CLEAN UP OBJECTIVES.

H2M GROUP
HOLZMACHER, McLENDON & MURRELL, P.C.
575 Broad Hollow Road, Melville, New York 11747
ENGINEERS • ARCHITECTS • PLANNERS • SCIENTISTS • SURVEYORS
E-mail: h2m@h2m.com
www.h2m.com
MELVILLE, N.Y. (631) 756-8000 ■
TOTOWA, N.J. (973) 942-0700 □

MARK	DATE	DESCRIPTION
△	-	-

ISSUE:	
PROJECT NO:	TOBY 0402
DATE:	NOVEMBER 2004
CAD DWG FILE:	fig5-site.dwg
XREF DWG FILE:	xr_EXCAVATION.dwg
SCALE:	1"= 50'
FILE LOCATION:	
DESIGNED BY:	PJS
DRAWN BY:	DP
CHECKED BY:	
REVIEWED BY:	

TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
BETHPAGE, NEW YORK

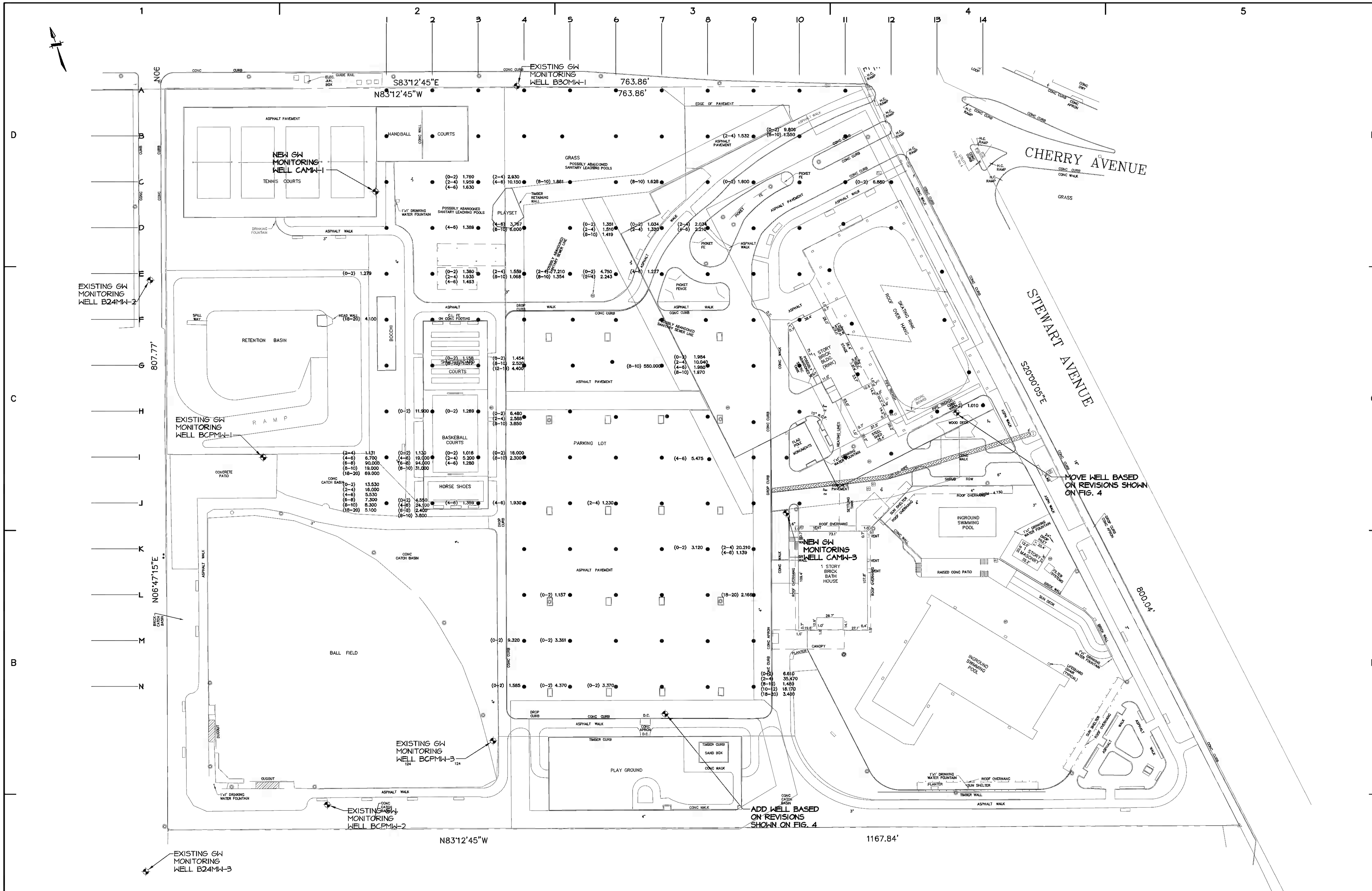
CONTRACT

SHEET TITLE

CONSTRUCTION AREA IRM INVESTIGATION SOIL SAMPLING RESULTS FOR METALS

SHEET NUMBER

FIGURE 5



LEGEND

(0-2) 4.370 ● SOIL SAMPLING POINT - (DEPTH IN FEET) CONCENTRATION OF PCB's IN mg/kg

GROUND WATER MONITORING WELL

NOTES:

1. BASEMAP SOURCE: SIDNEY B. BOWNE & SON, LLP, PROJ. NO. 10408802. SEPT. 2004
2. CONCENTRATIONS OF PCBS SHOWN IN MG/KG (PPM).

H2M GROUP
HOLZMACHER, McLENDON & MURRELL, P.C.
575 Broad Hollow Road, Melville, New York 11747
ENGINEERS • ARCHITECTS • PLANNERS • SCIENTISTS • SURVEYORS
E-mail: h2m@h2m.com
www.h2m.com
MELVILLE, N.Y. (631)-756-8000
TOTOWA, N.J. (973)-942-0700

MARK	DATE	DESCRIPTION

ISSUE:
PROJECT NO: TOBY 0402
DATE: NOVEMBER 2004
CAD DWG FILE: fig6-site.dwg
XREF DWG FILE: xr_EXCAVATION.dwg
SCALE: 1"= 50'
FILE LOCATION:
DESIGNED BY: PJS
DRAWN BY: DP
CHECKED BY:
REVIEWED BY:

TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
BETHPAGE, NEW YORK

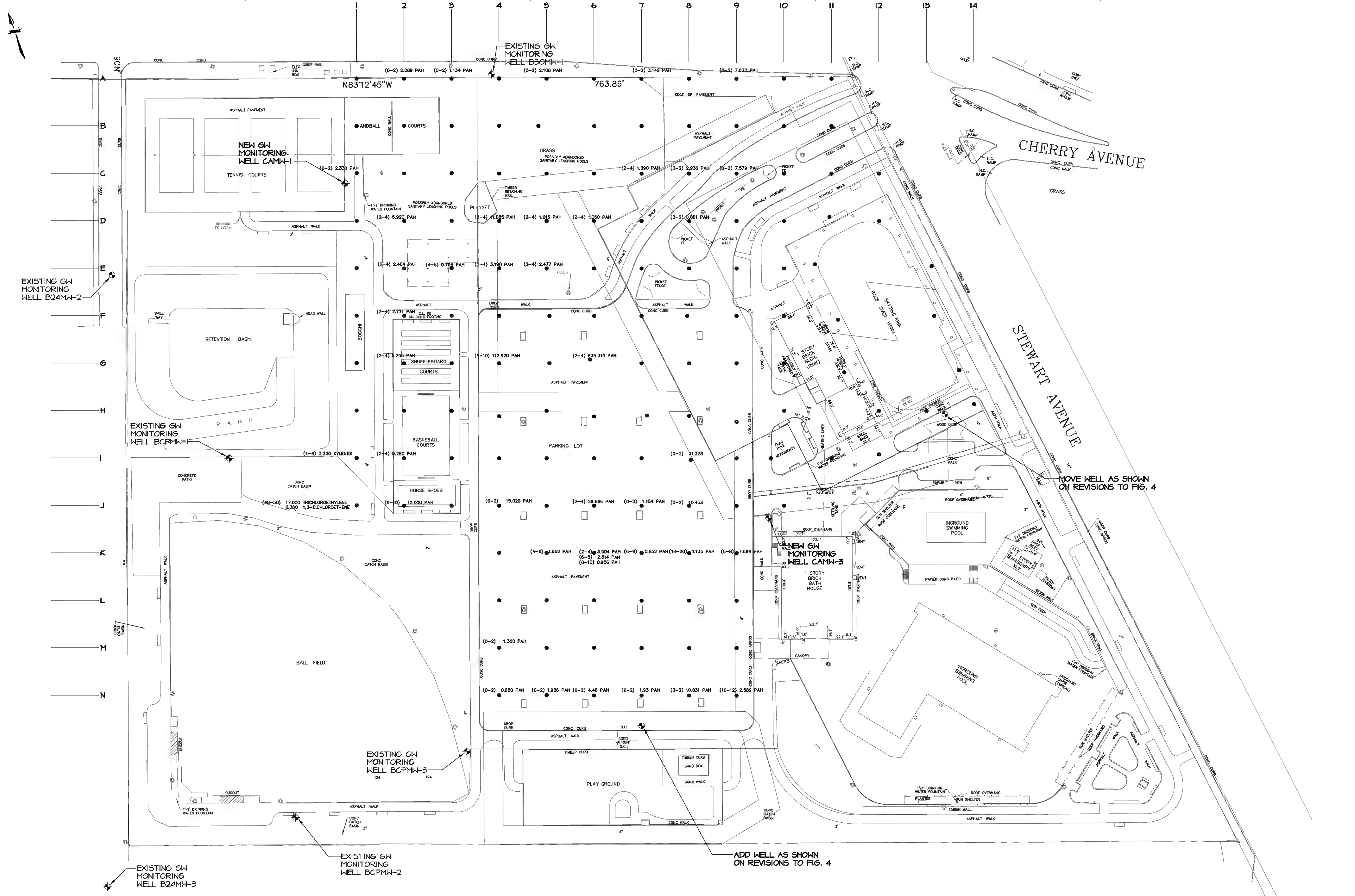
CONSTRUCTION AREA IRM INVESTIGATION SOIL SAMPLING RESULTS FOR PCBS

CONTRACT

SHEET TITLE

SHEET NUMBER

FIGURE 6



LEGEND

(0-2) 1-360 PAH ● SOIL SAMPLING POINT - (DEPTH IN FEET) CONCENTRATION OF PCB's IN mg/kg

◆ GROUND WATER MONITORING WELL

NOTES:

1. BASEMAP SOURCE: SIDNEY B. BOWNE & SON, LLP, PROJ. NO. 10408802, SEPT. 2004
2. CONCENTRATION SHOWN IN MG/KG (PPM).

H2M GROUP
HOLZMACHER, McLENDON & MURRELL, P.C.
575 Broad Hollow Road, Melville, New York 11747
ENGINEERS • ARCHITECTS • PLANNERS • SCIENTISTS • SURVEYORS
E-mail: h2m@h2m.com
www.h2m.com
MELVILLE, N.Y. (631) 756-8000 ■
TOTOWA, N.J. (973) 942-0700 □

MARK	DATE	DESCRIPTION

ISSUE:	
PROJECT NO:	TOBY 0402
DATE:	NOVEMBER 2004
CAD DWG FILE:	fig7-site.dwg
XREF DWG FILE:	xr_EXCAVATION.dwg
SCALE:	1"= 50'
FILE LOCATION:	
DESIGNED BY:	PJS
DRAWN BY:	DP
CHECKED BY:	C
REVIEWED BY:	Q

TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
BETHPAGE, NEW YORK

CONSTRUCTION AREA
IRM INVESTIGATION
SOIL SAMPLING
RESULTS FOR
VOCS AND SVOCS

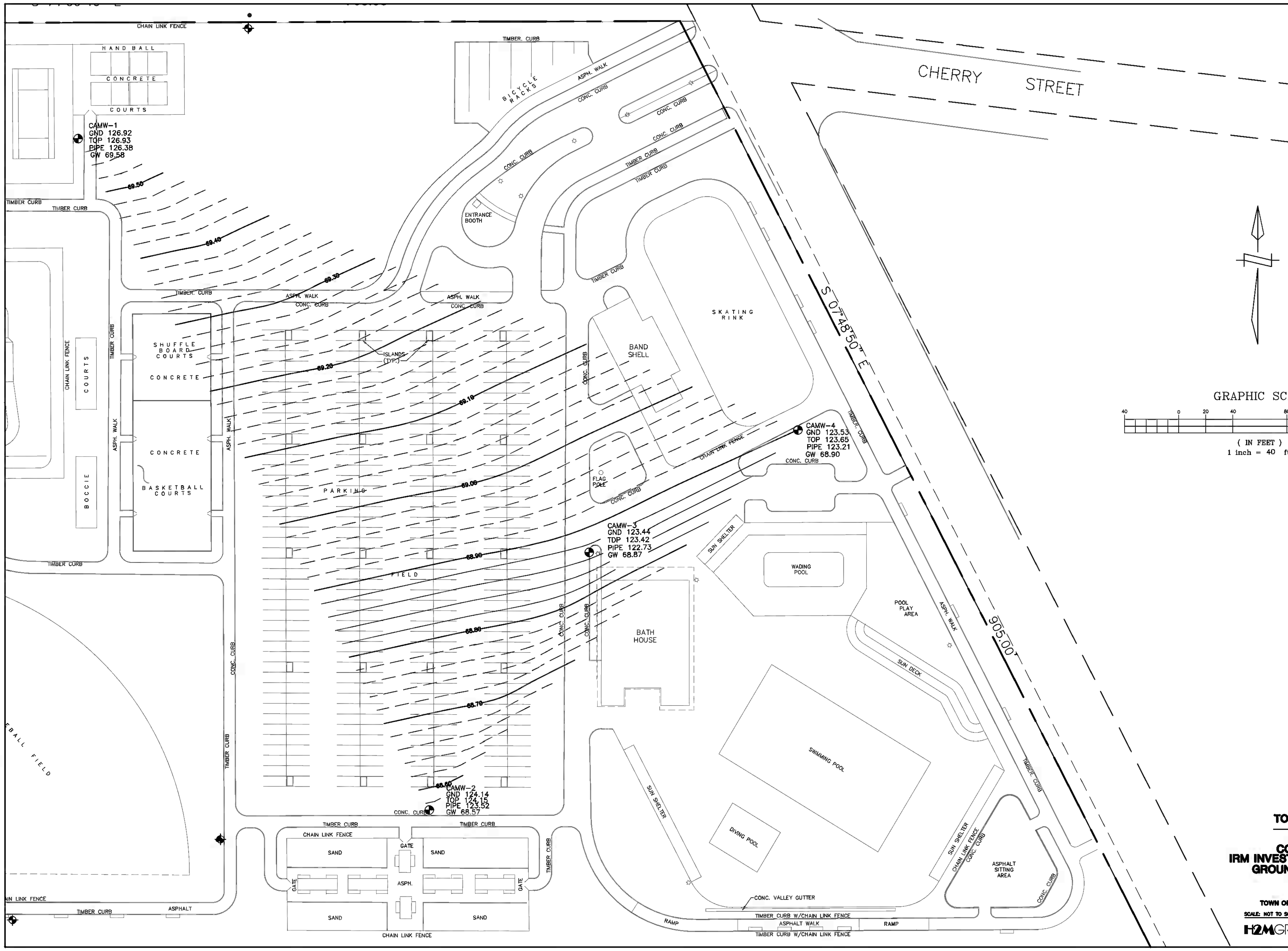
CONTRACT

SHEET TITLE

SHEET NUMBER

FIGURE 7

M:\SURVEY\TOBY\0402\TOBY-0402R2.DWG AUGUST 23, 2005 CJG



UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW. COPIES OF THIS SURVEY MAP NOT BEARING THE LAND SURVEYOR'S INKED SEAL OR EMBOSSED SEAL SHALL NOT BE CONSIDERED TO BE A VALID TRUE COPY.

CERTIFICATIONS INDICATED HEREON SHALL RUN ONLY TO THE PERSON FOR WHOM THE SURVEY IS PREPARED AND ON HIS BEHALF, TO THE TITLE COMPANY, GOVERNMENTAL AGENCY AND LENDING INSTITUTION LISTED HEREON AND TO THE ASSIGNEES OF THE LENDING INSTITUTION. CERTIFICATIONS ARE NOT TRANSFERABLE TO ADDITIONAL INSTITUTIONS OR SUBSEQUENT OWNERS.

ABSTRACT OF TITLE AND EASEMENTS FOR SUBJECT PARCEL AND ADJOINING PARCELS NOT PROVIDED FOR THE PREPARATION OF THIS SURVEY. ANY EASEMENTS OTHER THAN THAT PROVIDED AND SHOWN HEREON ARE NOT GUARANTEED.

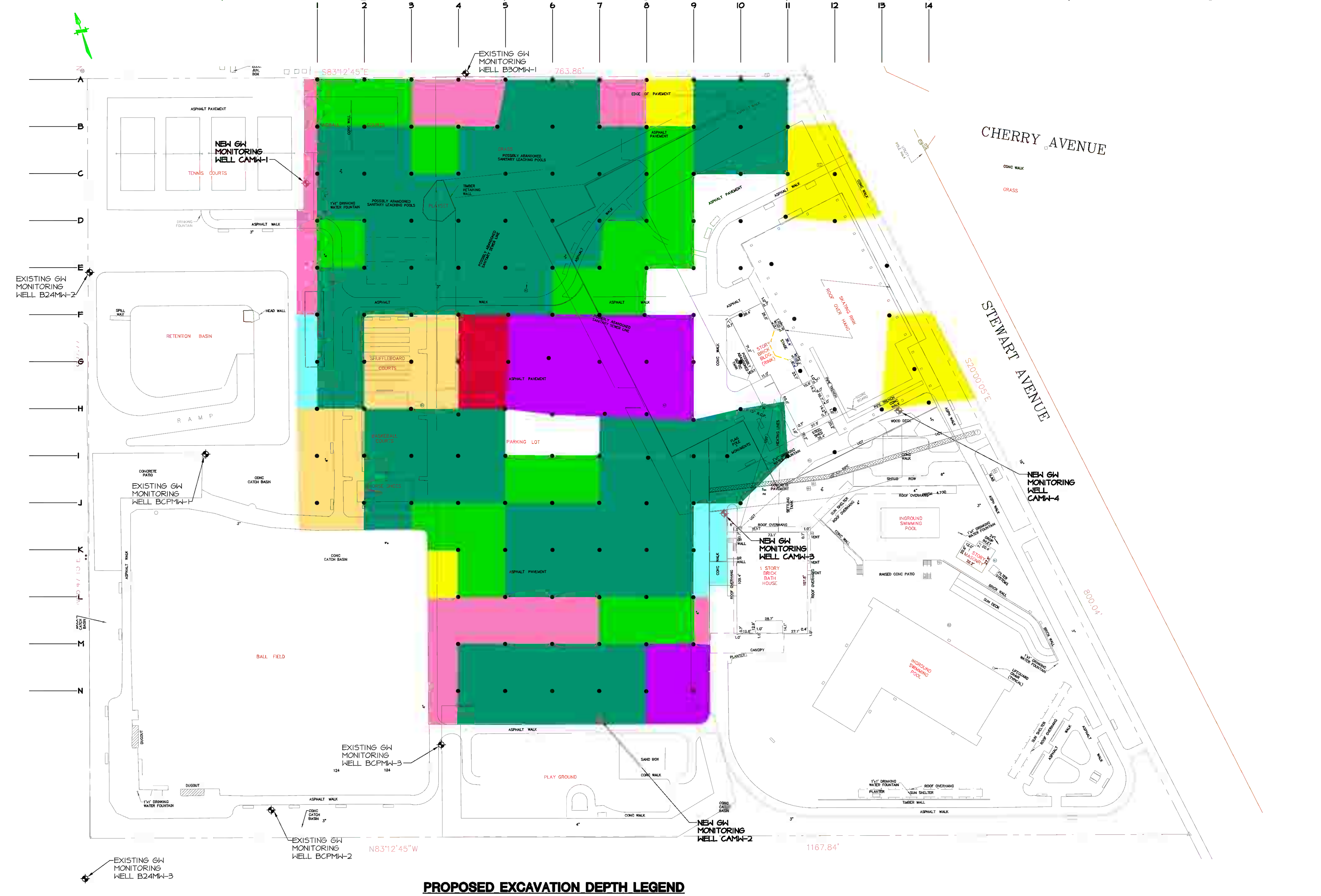
TOWN OF OYSTER BAY

FIGURE 8
CONSTRUCTION AREA
IRM INVESTIGATION POTENTIOMETRIC
GROUNDWATER SURFACE MAP

SITUATED AT
BETHPAGE
TOWN OF OYSTER, NASSAU COUNTY, NEW YORK

SCALE: NOT TO SCALE PROJ. No. TOBY-0402 DATE: AUGUST 2005

H2M GROUP Holzmacher, McLendon & Murrell, P.C.



PROPOSED EXCAVATION DEPTH LEGEND

Color	Depth
(white)	NO EXCAVATION REQUIRED
Pink	2'
Yellow	4'
Green	6'
Cyan	8'
Dark green	10'
Purple	12'
Red	14'
Tan	20'

LEGEND

- • SOIL SAMPLING POINT
- ◈ GROUND WATER MONITORING WELL

NOTES:

1. BASEMAP SOURCE: SIDNEY B. BOWNE & SON, LLP, PROJ. NO. 10408602, SEPT. 2004

H2M GROUP
HOLZMACHER, McLENDON & MURRELL, P.C.
575 Broad Hollow Road, Melville, New York 11747
ENGINEERS • ARCHITECTS • PLANNERS • SCIENTISTS • SURVEYORS
E-mail: h2m@h2m.com
www.h2m.com
MELVILLE, N.Y. (631)-756-8000
TOTOWA, N.J. (973)-942-0700

"ALTERATION OF THIS DOCUMENT, EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL"

MARK	DATE	DESCRIPTION
△	-	-

ISSUE:	
PROJECT NO:	TOBY 0402
DATE:	NOVEMBER 2004
CAD DWG FILE:	FIGURE 9.DWG
XREF DWG FILE:	xr_EXCAVATION.dwg
SCALE:	1"= 50'
FILE LOCATION:	
DESIGNED BY:	PJS
DRAWN BY:	DP/PB
CHECKED BY:	
REVIEWED BY:	

TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
BETHPAGE, NEW YORK

CONSTRUCTION AREA
IRM INVESTIGATION

CONTRACT

SHEET TITLE

PROPOSED REMEDIAL STRATEGY EXCAVATION PLAN

SHEET NUMBER

FIGURE 9

H2M GROUP

TABLES