INTERIM REMEDIAL MEASURE WORK PLAN

BETHPAGE COMMUNITY PARK
CONSTRUCTION AREA
BETHPAGE, NEW YORK

May 2005

Prepared For:

Town of Oyster Bay
Department of Public Works

Prepared By:

Holzmacher, McLendon & Murrell, P.C.
Melville, New York

H2M GROUP

Engineers • Architects • Scientists • Planners • Surveyors

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

H2M GROUP

INTERIM REMEDIAL MEASURE WORK PLAN

Bethpage Community Park
Construction Area
Bethpage, New York

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

INTERIM REMEDIAL MEASURE WORK PLAN

Bethpage Community Park
Construction Area
Bethpage, New York

1.0 INTRODUCTION

This Work Plan outlines the proposed scope of work for the completion of a remedial investigation in support of an Interim Remedial Measure (IRM) at the Bethpage Community Park located off Stewart Avenue in Bethpage, New York. The site is currently owned by the Town of Oyster Bay and was formerly owned and operated by Grumman Aircraft Engineering Corporation, a predecessor to Northrop Grumman Corporation. Site investigation reports prepared on behalf of Northrop Grumman Corporation have indicated that the site had been utilized by Grumman for waste disposal activities, including the following:

- Industrial wastewater treatment sludge disposal
- Spent paint booth rag disposal
- Possible used oil disposal
- Fire training activity which included ignition of waste oil and jet fuel

Previously conducted site investigations prepared on behalf of Northrop Grumman Corporation have documented significant impacts to site soils 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 document volatile organic compound impacts to groundwater at the site.

It is understood that the New York State Department of Environmental Conservation (NYSDEC) is in the process of negotiating an Order on Consent with Northrop Grumman Corporation, as the responsible party, related to further investigation and remediation of the subject property. The Town of Oyster Bay, in an effort to expedite remediation of a portion of the property, is pursuing its own consent order agreement with the state. The Town proposes to further investigate and remediate an approximate 7-acre portion of the 18-acre Park, prior to redevelopment and as an interim remedial measure. The 7-acre portion of the Park that is addressed herein and is the subject of the interim remedial measure is referred to as the construction area.

The proposed IRM investigation will provide data on current site conditions and will identify and delineate potential areas of concerns. Based upon available data from prior investigations, and the proposed redevelopment activity for the construction area, it has been precluded that the likely remediation strategy will involve the excavation and off-site disposal of impacted soils, followed by installation of clean fill and site redevelopment. The depth and extent of excavation, and strategy for disposal will be determined by the IRM investigation. In addition, the IRM investigation will focus on identifying any continuing sources of groundwater contamination in the construction area as well as any soil gas concerns.

The primary objectives of the IRM investigation are to:

- Better define the nature and extent of contamination in the unsaturated soils.
- Evaluate soil conditions in previously identified areas of contamination and determine whether other areas of soil contamination are present.
- Determine whether on-site groundwater quality has been impacted.
- Evaluate the potential qualitative risks to human health and the environment of site-related contaminants.
- Determine the most appropriate remedial technology to implement interim remedial measures as necessary to redevelop the construction area.

Analytical data will be collected to achieve the IRM investigation objectives using methods in accordance with NYSDEC protocols. All soil and groundwater samples will be analyzed by approved methods of the New York State Department of Health (NYSDOH) Analytical Services Protocol (ASP). The investigation will draw upon data acquired in previous investigations conducted at the site as well as the new data acquired during this study to the maximum extent possible.

A site-specific Health and Safety Plan (HASP) and a Quality Assurance Project Plan (QAPP) have also been prepared as part of this Work Plan and are included herein as appendices.

2.0 BACKGROUND

The Bethpage Community Park is located in Bethpage, New York, west of Stewart Avenue. The site is located within the Town of Oyster Bay in Nassau County. See Figure 1, Location Map. 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 Corporation. According to reports prepared on behalf of Northrop Grumman Corporation[1], Grumman utilized the property for waste disposal purposes including industrial wastewater treatment sludge, spent paint operations rags and possibly used oil. In addition, the site was utilized by Grumman 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 site was activity utilized by the community 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. The most recent site investigations have been conducted by Dvirka and Bartilucci, Consulting Engineers,

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

on behalf of Northrop Grumman Corporation. 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 reports include data points in the subject area and will be referenced in the IRM investigation report.

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. Redevelopment activities will include the construction of a new building of approximately 100,000 sf., and upgrading of surrounding parking areas. The proposed redevelopment will require excavation to varying depths, as illustrated in Figure 2.

3.0 TECHNICAL WORK PLAN

The following scope of work has been developed to further characterize and evaluate the environmental conditions in the 7-acre construction area of the Bethpage Community Park. It will incorporate existing data, publicly available data, and data acquired through the IRM investigation field work. The data will be used to evaluate the potential risks to human health, potential risk to the environment, and for preparation of a Remedial Action Plan. This IRM Work Plan outlines field investigation procedures and methodologies as well as quality control and health and safety procedures.

The IRM investigation has been focused to allow for the collection of data to adequately characterize the site to facilitate remediation and planned site redevelopment. Remedial activity will likely include excavation and off-site disposal of impacted soils from the surface, and to depths required for site redevelopment. The intent of the IRM investigation is to determine if any additional remediation is required, relative to the construction area. The IRM investigation will include soil sampling and analysis as well as a groundwater investigation.

A detailed description of the site investigation is presented below. All field work will be conducted in accordance with the HASP (Appendix A) under the oversight of a qualified professional. A minimum of five business days notice will be given to NYSDEC prior to the start of field work.

The initial IRM investigation tasks will allow for the characterization of the nature and extent of on-site contamination in both soil and groundwater. It relies heavily on the use of both direct push (i.e. Geoprobe) and hollow stem auger sampling techniques.

3.1 Survey and Utility Clearance

A survey of the subject area will be conducted for the purpose of accurately locating and documenting sample points. The survey will establish a 50-foot on center sampling grid to be utilized for surface sampling and subsurface drilling. A utility clearance survey, using electromagnetic and ground penetrating radar techniques, will be conducted for the entire 7-acre area. The survey will be utilized to identify any subsurface anomalies and to minimize the potential for sampling activity to impact existing underground utilities. The geophysical survey will cover all accessible areas of the construction area. The survey will result in a map identifying utilities and subsurface anomalies. The survey and associated field observations will also be utilized to identify and evaluate potential subsurface anomalies and/or buried structures and debris.

3.2 Soil Sampling Program

As proposed, soil borings will be conducted on a grid of approximately 50-feet on center with soil samples collected at varying depth intervals to delineate the area and depth extent of contamination. Figure 3 shows the grid layout and numbering system. Results of previous site investigations were taken into account in establishing the sampling grid and selecting soil boring locations. The grid may be altered as required in the field due to existing structures, which would impede the sampling. Sampling intervals at each soil boring take into account the anticipated excavation depths of the site redevelopment and construction activities. While each soil boring will be advanced as deep as required to establish the depth extent of contamination, the soil sampling intervals will be more frequent in areas where soils excavation is anticipated and less frequent in areas where excavation for construction is not anticipated. Where suspected fill material is encountered, borings will be advanced until native soils are encountered, or the depth identified in this Plan, whichever is greater. Table 1 includes a summary of the proposed borings. Each of the boring locations identified on Figure 3 is included in Table 1 along with the proposed depth, sampling intervals and proposed laboratory analysis.

Soil samples will be visually inspected and screened with a photo ionization detector (PID) for evidence of contamination as each soil boring is advanced. All soil samples will be analyzed for PCBs and RCRA metals, which are the primary contaminants of concern. Based upon the criteria outlined in Table 1, the analyses of a number of samples will be expanded to include Target Analyte List (TAL) metals (including hexavalent chromium and cyanide), Target Compound List (TCL) volatile organic compounds (VOCs) and TCL semi-volatile organic compounds (SVOCs). In addition, blind duplicates, matrix/matrix spike duplicates, field blank and trip blank samples will be collected and analyzed in accordance with standard QA/QC procedures. All lab analyses will be conducted by H2M Labs following Contract Laboratory Protocols (CLP) for NYSDEC ASP Category B deliverables.

Geoprobe Drilling

Locations identified for shallow soil borings (grade surface to ten beet below grade) will be advanced by direct-push (i.e., Geoprobe) drilling techniques using 2-inch outside diameter "macro core" barrels to retrieve subsurface soil samples. The core barrels, fitted with a cutting shoe, will be advanced with a slid hammer into the ground to the desired sampling depth. The macro-core sampler will extract samples into the barrel fitted with an acetate liner. As the barrels are withdrawn from the ground, the acetate liner will be removed and the sample collected for field screening and laboratory analysis. Samples will be transferred directly into the dedicated glassware provided by the analytical laboratory. Representative samples will be transferred to the glassware with minimal mixing and disruption. All direct-push soil sampling will be performed in accordance with American Society for Testing and Materials (ASTM) D6282-98, Guide for Direct Push Soil Sampling for Environmental Site Characterizations."

Split Spoon Sampling

Locations identified for deep soil borings (grade surface to approximately 50 - 60 feet below grade surface) will be advanced using hollow stem auger drilling techniques. Split spoon soil samples will be collected from the intervals identified in Table 1. Split spoon samples are used to obtain representative soil samples for identification purposes and laboratory tests. Split spoon samples will also be measured for the resistance of the soil to penetration of the sampler by counting blow counts. ASTM procedures D1586-99 will be used for the collection of split spoon samples. Samples will be contained in laboratory prepared sample jars and labeled. Samples will be placed in appropriate containers and transported to H2M Labs for analysis. Care will be taken to not exceed sample holding times.

A summary of the ASTM 1586-99 procedures is listed below.

- Clear out hole to sampling elevation using equipment that will ensure that the material is not disturbed by the operation.

- With the decontaminated split spoon sampler resting on the bottom, drive the sampler with blows from a 180-pound hammer falling 30-inches until either 18-inches has been penetrated or 100 blows have been applied.

- This operation will be repeated at select intervals during boring or well installation.

- Record the number of blows required to effect each 6-inches of penetration or fractions thereof.

- Bring the sampler to the surface and open. Scan with a PID. Record the PID response, collect typical samples of soils recovered with respect to composition, structure, consistency, color and soil condition; fill the appropriate sample jars and seal to prevent evaporation of soil moisture.

- Collect and retain in appropriate glassware the soil samples selected for chemical analyses.

Field Reporting

Data obtained from soil and groundwater sampling will be recorded in the boring log and include the following:

- Name, location and job number
- Date of boring (start, finish)
- Name of driller
- Boring number
- Sample number and depth
- Method of advancing sampler, penetration, recovery and blow count
- Type and size of sampler
- PID reading during field screening
- Description of soil
- Thickness of observed layer
- Depth to water surface
- Type and make of equipment (drill rig, etc.) used

3.3 Groundwater Monitoring Well Installation and Sampling

One of the objectives of the site investigation will be to determine whether or not impacted soils in the Park are a source of groundwater contamination. Accordingly, H2M will implement a groundwater monitoring program to assess groundwater quality beneath the Park. At present, there is one existing groundwater monitoring well within the Park and three monitoring wells around the perimeter of the Park. We have assumed that these wells still exist and that permission will be granted for access to the off-site wells. The existing monitoring well network will be supplemented with the installation of four additional monitoring wells to target and isolate upgradient and downgradient groundwater quality relative to the construction area.

This task includes the installation of four (4) new groundwater monitoring wells and the inspection/sampling of 4 existing wells. As part of the IRM investigation, we expect to install one upgradient and three downgradient monitoring wells as shown on Figure 3. The wells will be constructed of 4″ PVC and have an approximate depth of 70′ bgs (i.e., 10′ into the water table).

Well Drilling and Construction

The contractor for drilling and related well installation activities will be a licensed New York State monitoring well driller. The driller will be made aware of the nature of the drilling activities and will be experienced in soil/groundwater investigations of this nature. The monitoring wells will be installed by use of a hollow stem drill rig under the direction of a qualified H2M hydrogeologist.

Prior to commencement of drilling, site-specific underground structures, overhead structures and other surface features which may impede drilling will be identified. Appropriate utilities will be contacted for mark outs. Drill cuttings (soils) generated during the installation of the wells will be placed in 55 gallon drums or roll-off bins, pending analytical characterization. Upon characterization of the soils, they will be disposed of at an approved facility.

All drilling equipment will be steam cleaned prior to work and in between boring locations. An on-site potable water supply will be available for steam cleaning and other purposes as necessary. All decontamination water will be containerized and characterized for disposal. The well screen and casing will be decontaminated by steam cleaning unless the well materials have been cleaned and sealed at the factory.

The proposed groundwater monitoring wells will be constructed with 4-inch I.D. PVC flush-joint risers with a 20 foot section of 0.010 inch (#10) slot-size PVC well screen, 10 feet above the water table and 10 feet below. A hollow stem auger rig will be utilized to drill these wells in accordance with NYSDEC specifications for wells in unconsolidated formations. Split spoon samples will be collected at nominal intervals according to the procedures described above.

The annular space around the well screens will be filled with a sand filter pack extending from 6-inches below the bottom of the screen to a height of 2 feet above the top of screen. A 3 foot thick seal of bentonite pellets will be placed above the filter pack. The bentonite pellets will be continuously hydrated for sixty minutes prior to installation of the cement/bentonite grout. The depth to the bottom and top of each seal will be measured in the borehole to the nearest 0.1 foot using a weighted tape. The remaining annular space will be grouted with a bentonite/cement slurry using the tremie method. The tremie pipe will be fitted with an elbow to deflect the grout towards the sidewall. A cement/bentonite surface seal will be constructed by filling the annular space of the borehole and will extend from approximately three feet below-grade to grade where a flush mounted well manhole will be installed. A water tight locking cap will be attached to the top of the PVC casing. A 6-inch diameter protective steel casing in a cement collar will be installed over each well. A flush to grade steel cover assembly will be set around the well casing. This steel cover will be set into a sloped concrete pad, after the grout has been allowed to set.

Wells will be developed by pumping or bailing. Specific conductivity and pH measurements will be taken of the discharge until both parameters stabilize to confirm adequate development. Stabilization will be established when two consecutive well volume readings are within 10% of one another. Turbidity will also be monitored and the well will be developed until a measurement of less than 50 nephelometric turbidity units (NTU) is achieved or until turbidity stabilizes. Depth to groundwater measurements will be made before and after well development. Field data will be recorded on pre-printed field forms.

All investigative-derived waste (IDW) including drill cuttings, well development and well purge water will be containerized in 55-gallon drums and disposed of at an approved disposal/treatment facility.

Upon completing the new monitoring well installations, the locations and top of casing elevations for the newly installed wells and existing wells will be surveyed to the nearest reference datum to allow for the preparation of an accurate potentiometric surface map of the upper glacial aquifer. After use in each well, the measuring device will be decontaminated to prevent cross contamination between wells. The probe will be cleaned with a phosphate-free detergent and rinsed with distilled water in between each measurement point.

Following a minimum of one week after well development, representative groundwater samples will be collected from the monitoring wells and analyzed by H2M Labs, Inc. for PCBs, TAL metals (including hexavalent chromium and cyanide), TCL VOCs and TCL SVOCs.

3.4 Soil Gas Survey

A soil gas screening event will be conducted to determine if soil and/or groundwater contamination is producing significant levels of volatile organic compounds in the vadose zone. Certain borehole locations previously identified for soil sampling activity will also be utilized for soil gas sampling. Bore hole locations E3, E5, E12, G12, I3, and I5 as identified in Figure 3 have been identified for soil gas collection. Samples will be collected using a direct push sampling rig set up with a post run tubing system. Samples will be collected from approximately ten feet below grade and will be stored and transported for analysis in Summa canisters. The Summa canisters will be fitted with flow restrictors to provide a sampling flow not greater than 0.2 liters per minute. Each sample will be analyzed for Target Compound list VOCs via USEPA Method TO-15. One ambient air sample will be collected and analyzed for VOCs for each day that soil gas sampling is conducted. If significant levels of VOCs are detected in the soil gas, potential exposure pathways (e.g. via soil vapor intrusion) will be evaluated.

3.5 Field QA/QC

All soil and groundwater analytical results, including QA/QC sample results, will be subjected to the required independent data validation in accordance with the NYSDEC Data Usability Summary Report guidelines. Laboratory data packages will be reviewed for quality control parameters including, but not limited to, custody documentation, holding times, surrogate and matrix spike recoveries, duplicate correlation, calibration standard and blank performance, instrument performance, blank contamination, matrix interferences and method compliance. Upon completing the data evaluation, a Data Usability Summary Report (DSUR) will be prepared. Data validation services would be subcontracted to an independent data validator.

3.6 Community Air Monitoring

A copy of the NYSDEC Community Air Monitoring Plan (CAMP) is incorporated into this Work Plan as Appendix C. The CAMP will be implemented during any drilling, soil sampling, well construction and/or groundwater sampling activity.

4.0 DATA MANAGEMENT

The Data Quality Objectives (DQOs) for the IRM investigation are to collect data of sufficient quality and quantity for site soil and groundwater characterization to support the development of an interim remedial measure necessary for the redevelopment of the Park.

The type of information to be developed from the IRM investigation include soil and groundwater quality data, groundwater flow data and geologic data. This data will be used to characterize the nature and extent of on-site soil and groundwater contamination to facilitate remediation and site redevelopment.

This project is being conducted under NYSDEC ASP CLP procedures. As part of these procedures, differing levels of work are defined. For this project, it is anticipated that Level I (Screening) will be used during soil sampling or groundwater monitoring well installation and sampling. Level I includes screening for total VOC vapors, using a Photoionization Detector (PID). Field screening results will be utilized for determining soil sampling locations and selection of soil samples to be laboratory tested for select parameters. Appropriate laboratory methods for inorganics and organics will be used in order to achieve parts per billion (ppb) level detection limits.

The analytical data to be obtained for this project will be analyzed by a NYSDOH certified laboratory and will conform to Contract Laboratory Protocols (CLP). The data will be used for site characterization, evaluation of alternatives, reporting, and remedial design. Independent data validation will be conducted on the analytical results. A Data Usability Summary Report (DUSR) will be completed for the project and included in the Remedial Action Plan.

5.0 PROJECT MANAGEMENT

Holzmacher, McLendon & Murrell, P.C. (H2M), as a professional engineering corporation, has been retained by the Town of Oyster Bay to conduct the IRM investigation. H2M will oversee all contractors and/or subconsultants conducting the work outlined in this IRM Work Plan. H2M will be directly responsible for on-site sample and data collection, as well as reporting. Additional organizational details as they relate to quality assurance are provided in Appendix B.

A qualified representative from H2M will be on site during all field activities.

6.0 PROJECT REPORTING

Following the collection of data, a Remedial Action Plan (RAP) must be developed which will define the methodology and technique to be utilized in remediating the soil contamination found in the construction area for the new ice skating facility. H2M will prepare the Remedial Action Plan based on the needs and plans of the Town and to meet and/or exceed the requirements of the NYSDEC. The Remedial Action Plan will document the field activity and analytical results obtained during the IRM investigation and will be submitted to the NYSDEC for review and concurrence. If deemed necessary, the RAP may include additional soil and/or groundwater sampling and analysis for the purpose locating or better delineating contaminated or suspect contaminated areas. H2M will attend meetings with the NYSDEC as necessary to review and obtain approval of the Remedial Action Plan.

Provided below is the anticipated contents of the report to be utilized to document the IRM investigation and to present the Remedial Action plan (RAP).

- Introduction
- Site History and Description
- Description of Work Completed
- Nature and Extent of Contamination
- Comparison with Standards, Criteria and Guidance
- Data Useability
- Human Exposure Assessment
- Remedial Action Plan
- Summary and Conclusions

7.0 PROJECT SCHEDULE

A project schedule has been prepared to track the implementation of this remedial investigation and remedial action program. The schedule is shown on the following page (Figure 4) including key project tasks, timelines and milestones. A minimum of five business days notice will be given to NYSDEC prior to commencing field work.

8.0 CITIZEN PARTICIPATION

The Town will manage all citizen participation activities. The following citizen participation activities will be conducted at a minimum:

- Conduct information seminars for local residents.
- Prepare a letter describing the anticipated investigation and remediation phases and time frames to be mailed to every resident in the Park District, as well as other identified Park users.
- Periodic press releases to local media with updates on site activity and project status reports.
- Additional public outreach efforts will be implemented by the Town prior to any remedial action, so as to inform the public of the outcome of the investigation phase and the plan for remedial action. Details of the additional public outreach efforts will be included in the Remedial Action Plan

H2M GROUP

TABLES

Table 1

Bethpage Community Park
IRM Work Plan

Proposed Soil Boring Matrix

Grid Coordinate	Construction Excavation Depth	Soil Sampling Intervals and Analytical Notes									
		0-2'	2'-4'	4'-6'	6'-8'	8'-10'	18'-20'	28'-30'	38'-40'	48'-50'	58'-60'
A-1 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
A-2 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
A-3 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
A-4 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
A-5 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
A-6 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
A-7 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
A-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
A-9 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
A-10 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
A-11 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
B-1 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
B-2 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
B-3 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
B-4 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
B-5 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
B-6 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
B-7 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
B-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
B-9 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
B-10 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
B-11 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
C-1 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
C-2 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
C-3 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
C-4 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
C-5 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
C-6 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
C-7 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
C-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
C-9 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
C-10 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
C-11 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
C-12 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
D-1 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4) (6)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4) (6)
D-2 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
D-3 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
D-4 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
D-5 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
D-6 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
D-7 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)

Table 1

Bethpage Community Park
IRM Work Plan

Proposed Soil Boring Matrix

Grid Coordinate	Construction Excavation Depth	Soil Sampling Intervals and Analytical Notes									
		0-2'	2'-4'	4'-6'	6'-8'	8'-10'	18'-20'	28'-30'	38'-40'	48'-50'	58'-60'
D-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
D-9 (5)	8 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
D-10 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
D-11 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
D-12 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
E-1 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
E-2 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
E-3 (5) (6)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4) (6)	-	-	-	-	-
E-4 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
E-5 (5) (6)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4) (6)	-	-	-	-	-
E-6 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
E-7 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
E-8 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
E-9 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
E-10 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
E-11 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
E-12 (5) (6)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4) (6)	-	-	-	-	-
E-13 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
F-1 (5)	8 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
F-2 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
F-3 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
F-4 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
F-5 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
F-6 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
F-7 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
F-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
F-9 (5)	8 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
F-10 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
F-11 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
F-12 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
F-13 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
G-1 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
G-2 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
G-3 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
G-4 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4) (6)	-	-	-	-	(6)
G-5 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
G-6 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
G-7 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
G-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	(1) (3)	-	-	-	-
G-9 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
G-10 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-

Table 1

Bethpage Community Park
IRM Work Plan

Proposed Soil Boring Matrix

Grid Coordinate	Construction Excavation Depth	Soil Sampling Intervals and Analytical Notes									
		0-2'	2'-4'	4'-6'	6'-8'	8'-10'	18'-20'	28'-30'	38'-40'	48'-50'	58'-60'
G-11 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
G-12 (5) (6)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4) (6)	-	-	-	-	-
G-13 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
H-1 (5)	8 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
H-2 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
H-3 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
H-4 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
H-5 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
H-6 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
H-7 (5)	8 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
H-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
H-9 (5)	8 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
H-10 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
H-11 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
H-12 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
H-13 (5)	8 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4) (6)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4) (6)
H-14 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
I-1 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	-	-	-	-
I-2 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
I-3 (5) (6)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4) (6)	-	-	-	-	-
I-4 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
I-5 (5) (6)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4) (6)	-	-	-	-	-
I-6 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
I-7 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
I-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
I-9 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
I-10 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
I-11 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
I-12 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
J-1 (5)	8 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4) (6)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4) (6)
J-2 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
J-3 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
J-4 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
J-5 (5)	4 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
J-6 (5)	4 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
J-7 (5)	8 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
J-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
J-9 (5)	8 feet	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4) (6)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4) (6)
J-10 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
K-4 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
K-5 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-

Table 1

Bethpage Community Park
IRM Work Plan

Proposed Soil Boring Matrix

Grid Coordinate	Construction Excavation Depth	Soil Sampling Intervals and Analytical Notes									
		0-2'	2'-4'	4'-6'	6'-8'	8'-10'	18'-20'	28'-30'	38'-40'	48'-50'	58'-60'
K-6 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
K-7 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
K-8 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	-	-	-	-
K-9 (5)	8 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	-	-	-	-	-
L-4 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
L-5 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
L-6 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
L-7 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
L-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
L-9 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
M-4 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
M-5 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
M-6 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
M-7 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
M-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
M-9 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
N-4 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4) (6)	-	-	-	-	(6)
N-5 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)
N-6 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
N-7 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4) (6)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4) (6)
N-8 (5)	2 feet	(1) (3) (4)	(1) (3) (4)	(1) (3) (4)	(1) (3)	(1) (3) (4)	-	-	-	-	-
N-9 (5)	2 feet	(2) (3) (4)	(2) (3) (4)	(2) (3)	(2) (3)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)	(2) (3) (4)

Notes: (1) Geoprobe drilling methods.
(2) Hollow stem auger drilling methods.
(3) Visually inspect soils, characterize geology and screen for VOCs with PID.
(4) Analyze sample for PCBs and RCRA metals.
(5) Analyze sample with highest PID response and/or visual/olfactory evidence of impact for expanded list of parameters including PCBs, TAL metals (including hexavalent chromium and cyanide), TCL VOCs and TCL SVOCs. If no field screening impacts, analyze sample from anticipated excavation depth for expanded list of parameters.
(6) Soil gas sampling point. Sample via geoprobe. Collect sample in Summa canister for VOC analysis. Deep sample to be collected above groundwater interface.

H2M GROUP

FIGURES

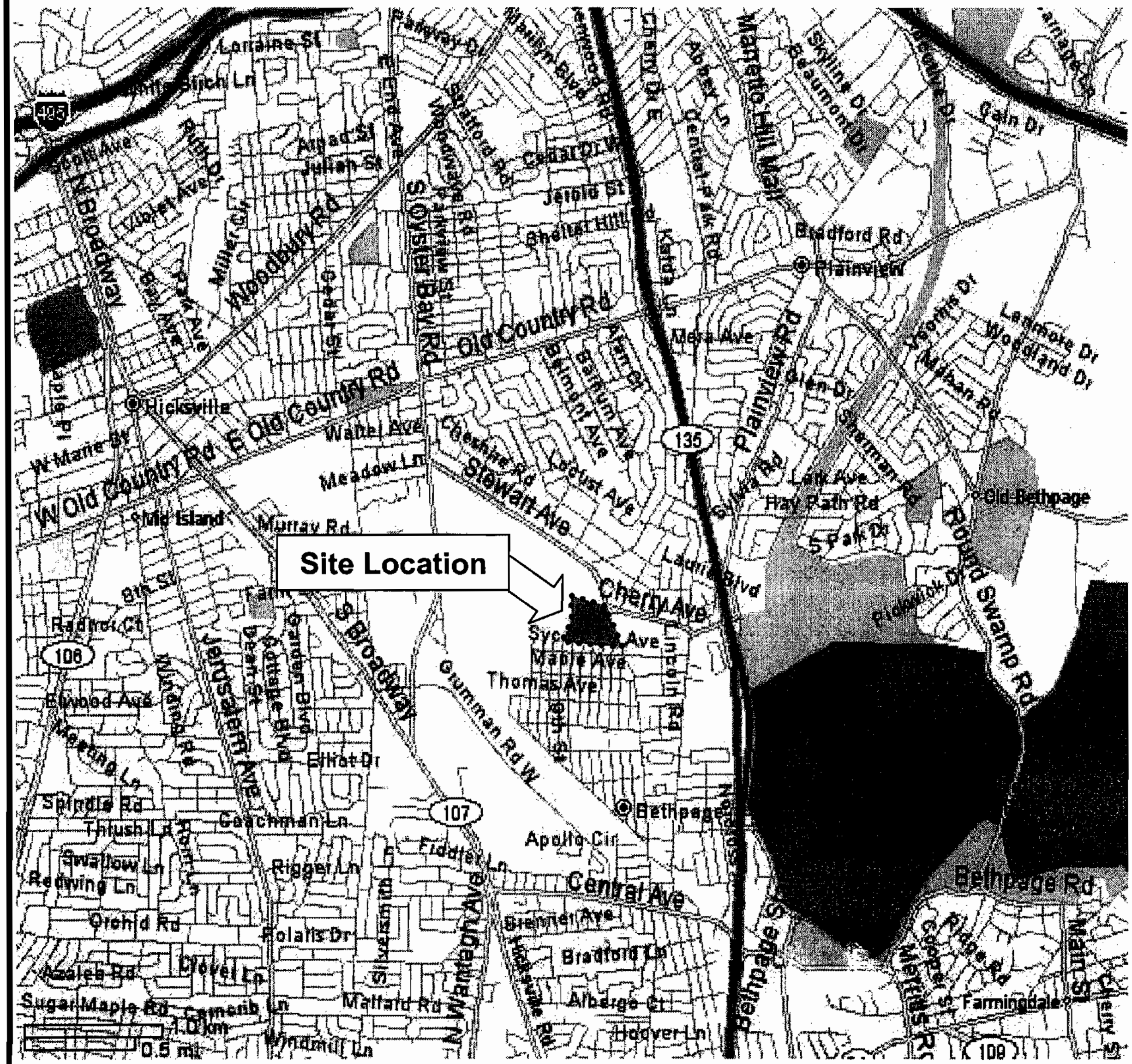


Figure1. Site Location

Town of Oyster Bay Bethpage Community Park Bethpage, New York	N	H2MGROUP ENGINEERS • ARCHITECTS • SCIENTISTS • PLANNERS • SURVEYORS

H2M GROUP

Town of Oyster Bay
Bethpage Community Park

Construction Area
IRM Work Plan Schedule

ID	Task Name	% Compl	Duration
1	**Construction Area Remediation Project**	27%	377 days
2	Work Plan Preparation	100%	10 days
3	Work Plan Review by Town Personnel and Attorneys	100%	5 days
4	Work Plan Submittal to NYSDEC	100%	0 days
5	NYSDEC Review and Approval of Work Plan	90%	110 days
6	IRM field work	0%	40 days
7	Data compilation and Remedial Action Plan (RAP) report preparation	0%	40 days
8	Town Review of RAP Report	0%	10 days
9	RAP report submittal to NYSDEC for review and Approval	0%	1 day
10	NYSDEC Review of RAP Report	0%	10 days
11	Site Remediation Activity	0%	120 days
12	Remediation Report Preparation	0%	60 days
13	Town Review of Remediation Report	0%	10 days
14	Submittal of Remediation Report to NYSDEC	0%	1 day
15	NYSDEC Review and Approval of Remediation Report	0%	10 days
16	Site Clear for Construction	0%	1 day

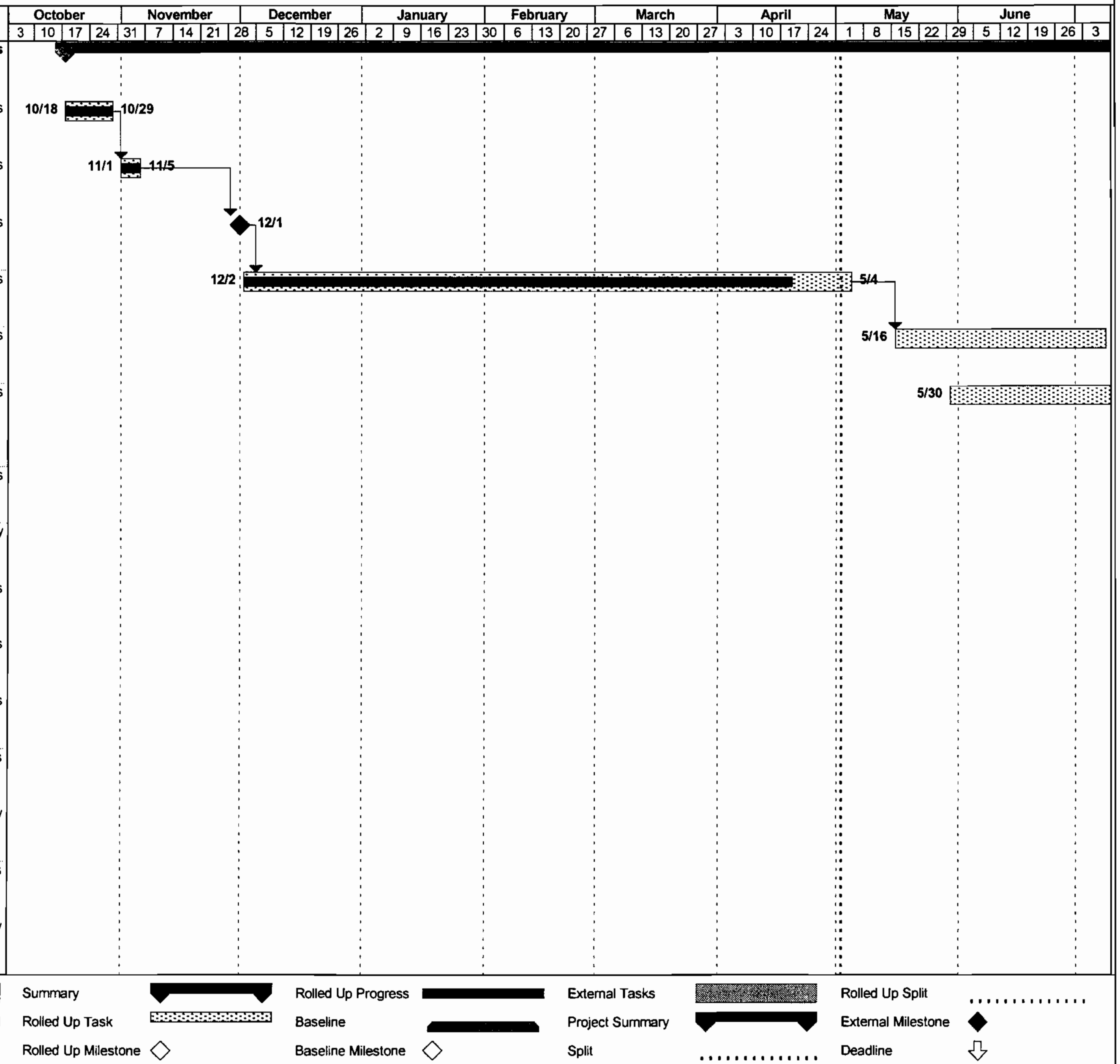


FIGURE 4
April 2005

H2M GROUP

Town of Oyster Bay
Bethpage Community Park

Construction Area
IRM Work Plan Schedule

ID	Task Name	% Compl	Duration
1	**Construction Area Remediation Project**	**27%**	**377 days**
2	Work Plan Preparation	100%	10 days
3	Work Plan Review by Town Personnel and Attorneys	100%	5 days
4	Work Plan Submittal to NYSDEC	100%	0 days
5	NYSDEC Review and Approval of Work Plan	90%	110 days
6	IRM field work	0%	40 days
7	Data compilation and Remedial Action Plan (RAP) report preparation	0%	40 days
8	Town Review of RAP Report	0%	10 days
9	RAP report submittal to NYSDEC for review and Approval	0%	1 day
10	NYSDEC Review of RAP Report	0%	10 days
11	Site Remediation Activity	0%	120 days
12	Remediation Report Preparation	0%	60 days
13	Town Review of Remediation Report	0%	10 days
14	Submittal of Remediation Report to NYSDEC	0%	1 day
15	NYSDEC Review and Approval of Remediation Report	0%	10 days
16	Site Clear for Construction	0%	1 day

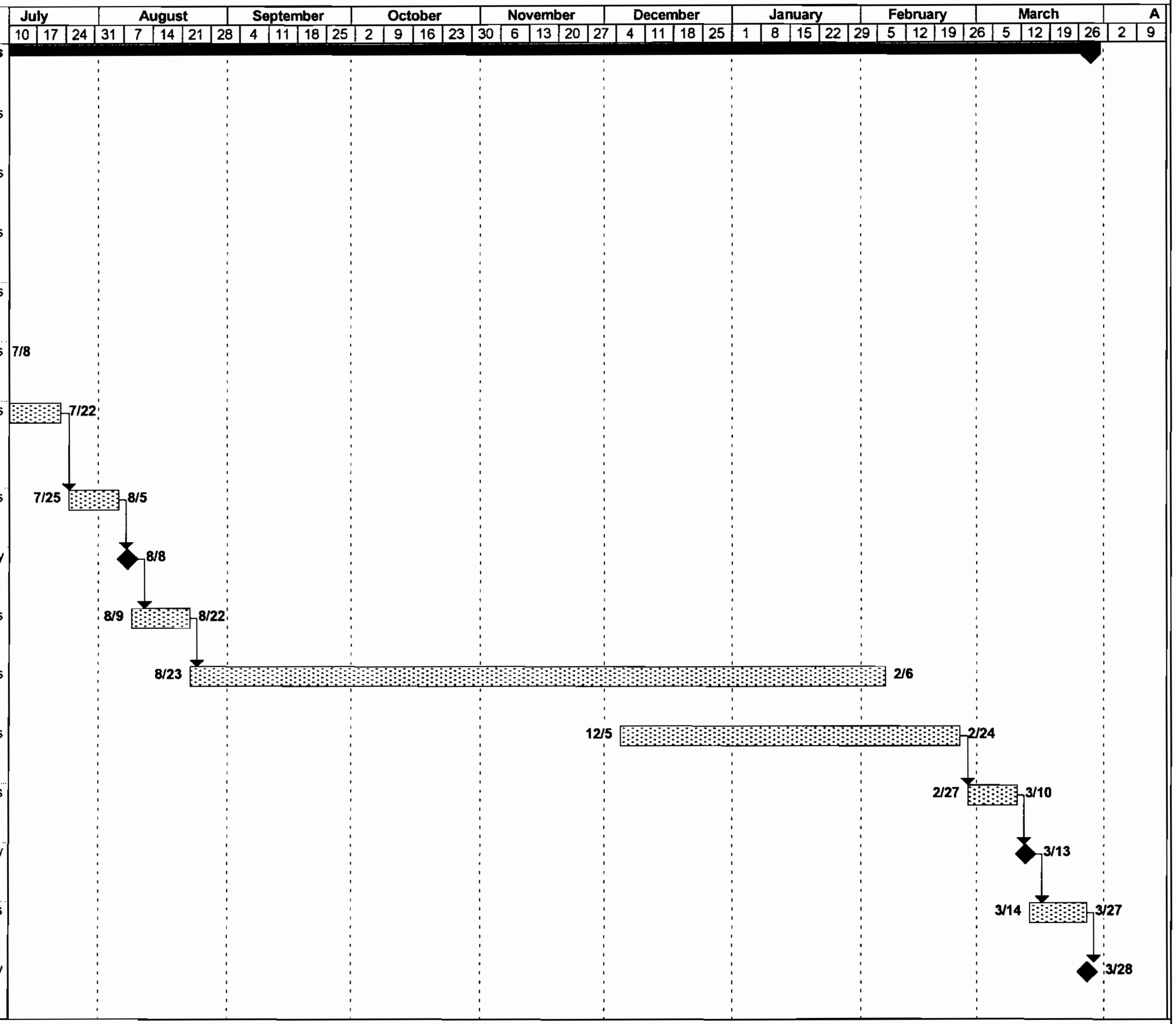
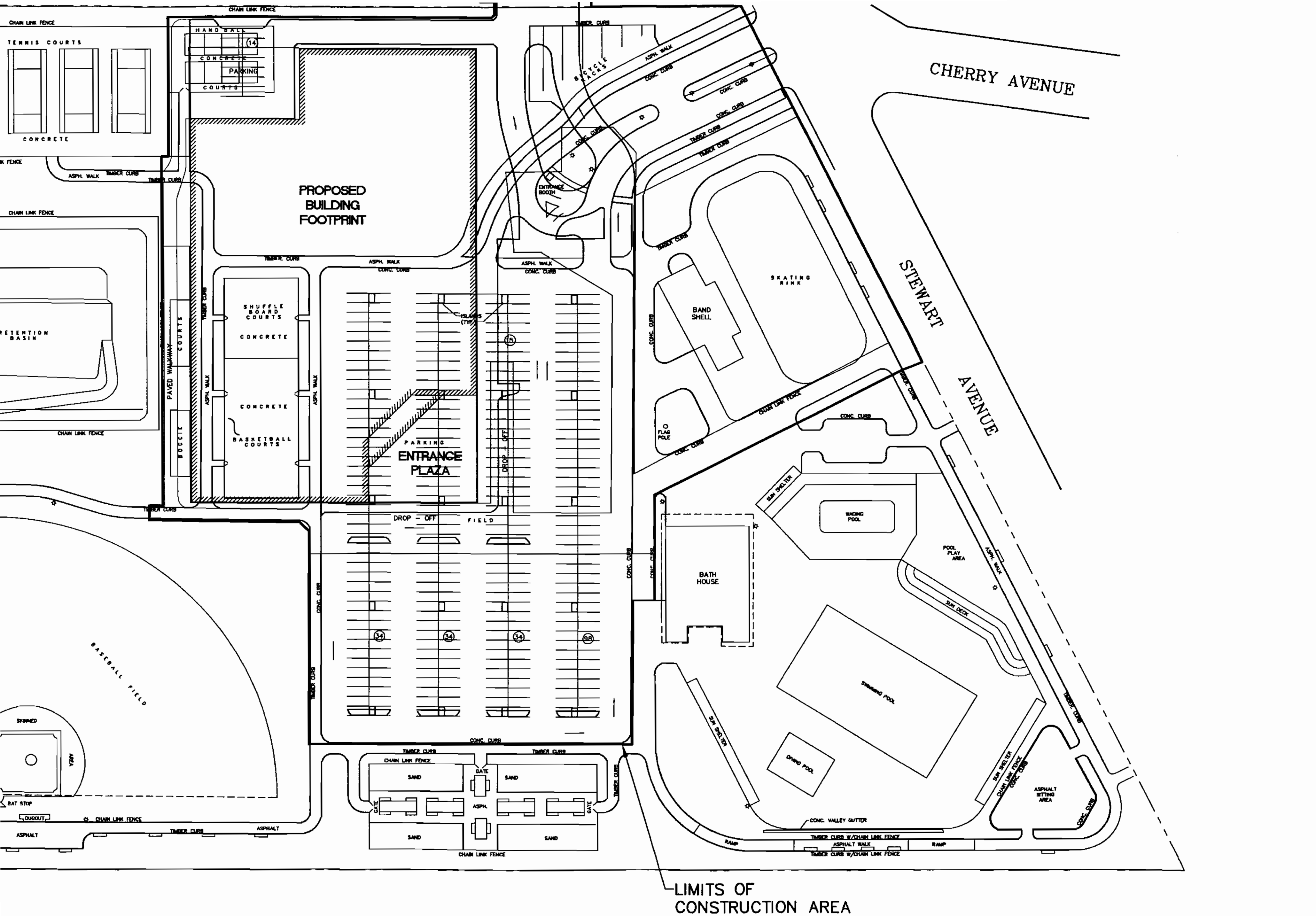


FIGURE 4
April 2005

Task		Summary		Rolled Up Progress		External Tasks		Rolled Up Split	
Progress		Rolled Up Task		Baseline		Project Summary		External Milestone	
Milestone		Rolled Up Milestone		Baseline Milestone		Split		Deadline	



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

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

MARK	DATE	DESCRIPTION

ISSUE:	
PROJECT NO:	TOBY 0402
DATE:	NOVEMBER 2004
CAD DWG FILE:	fig2-site.dwg
XREF DWG FILE:	–
SCALE:	NO SCALE
FILE LOCATION:	
DESIGNED BY:	PJS
DRAWN BY:	DP
CHECKED BY:	
REVIEWED BY:	

TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
BETHPAGE, NEW YORK

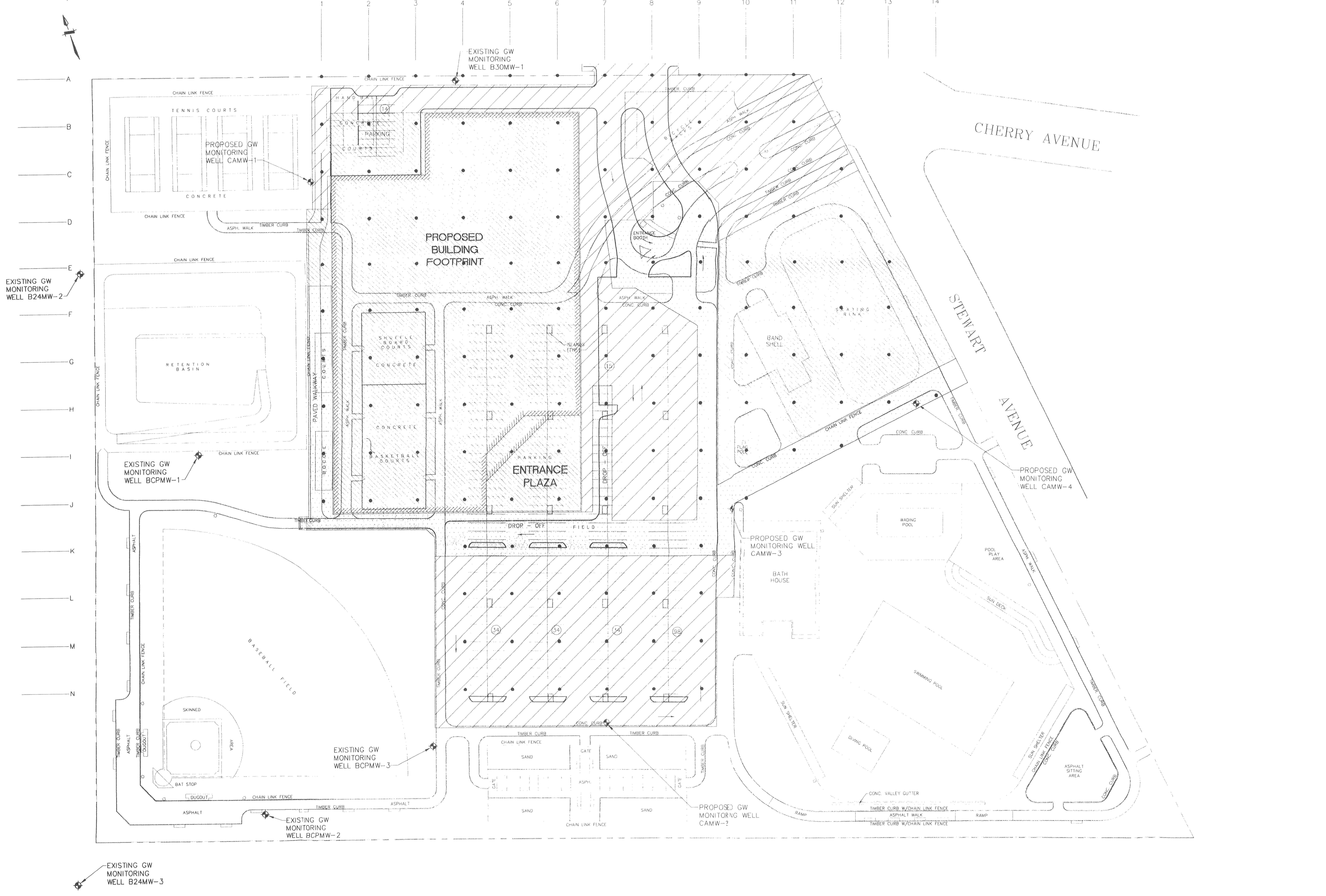
IRM
WORK PLAN

CONSTRUCTION AREA

CONTRACT

NOT FOR CONSTRUCTION

SHEET TITLE



LEGEND

- • SOIL SAMPLING POINT
- GROUND WATER MONITORING WELL
- ANTICIPATED CONSTRUCTION RELATED AREA OF DISTURBANCE (2 FT DEPTH)
- ANTICIPATED CONSTRUCTION RELATED AREA OF DISTURBANCE (4 FT DEPTH)
- ANTICIPATED CONSTRUCTION RELATED AREA OF DISTURBANCE (8 FT DEPTH)

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

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:	DP
CHECKED BY:	
REVIEWED BY:	

TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
BETHPAGE, NEW YORK

CONSTRUCTION AREA IRM INVESTIGATION SOIL SAMPLING AND MONITORING WELL LOCATIONS

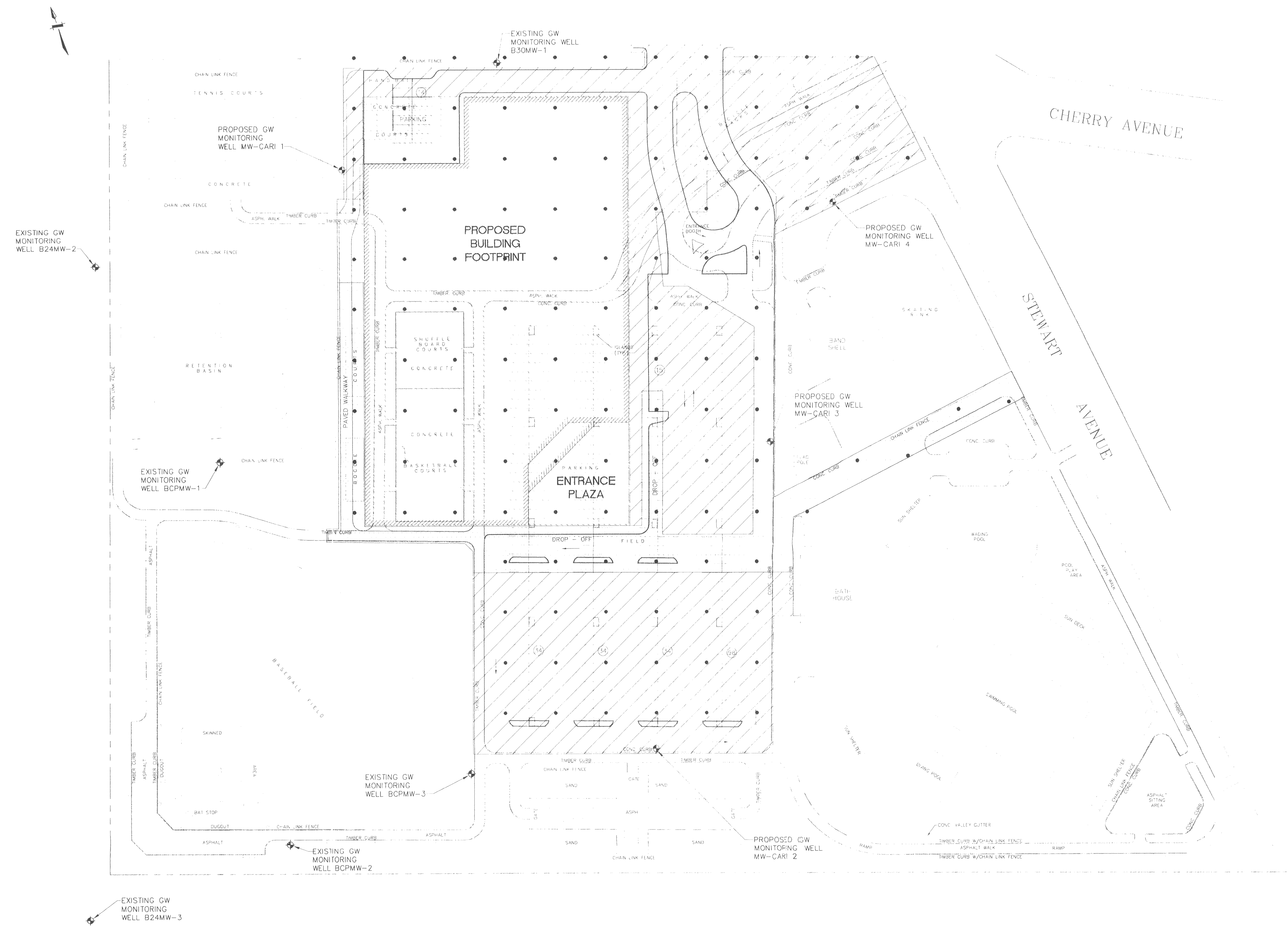
CONTRACT

NOT FOR CONSTRUCTION

SHEET TITLE

SHEET NUMBER

FIGURE 3



LEGEND

- SOIL SAMPLING POINT
- GROUND WATER MONITORING WELL
- ANTICIPATED CONSTRUCTION RELATED AREA OF DISTURBANCE (2 FT DEPTH)
- ANTICIPATED CONSTRUCTION RELATED AREA OF DISTURBANCE (4 FT DEPTH)
- ANTICIPATED CONSTRUCTION RELATED AREA OF DISTURBANCE (8 FT DEPTH)

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

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:	DP
CHECKED BY:	
REVIEWED BY:	

TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
BETHPAGE, NEW YORK

CONSTRUCTION AREA REMEDIAL INVESTIGATION SOIL SAMPLING AND MONITORING WELL LOCATIONS

CONTRACT

NOT FOR CONSTRUCTION

SHEET TITLE

SHEET NUMBER

FIGURE 3

H2M GROUP

APPENDIX A

HEALTH AND SAFETY PLAN

INTERIM REMEDIAL MEASURE
HEALTH AND SAFETY PLAN

BETHPAGE COMMUNITY PARK
CONSTRUCTION AREA
BETHPAGE, NEW YORK

April 2005

Prepared For:

Town of Oyster Bay
Department of Public Works

By:

Holzmacher McLendon & Murrell, P.C.
Melville, New York

H2M GROUP

INTERIM REMEDIAL MEASURE
HEALTH AND SAFETY PLAN

Bethpage Community Park
Construction Area
Bethpage, New York

TABLE OF CONTENTS

H2M GROUP

INTERIM REMEDIAL MEASURE
HEALTH AND SAFETY PLAN

Bethpage Community Park
Construction Area
Bethpage, New York

TABLE OF CONTENTS (cont'd.)

H2M GROUP

INTERIM REMEDIAL MEASURE
HEALTH AND SAFETY PLAN

Bethpage Community Park
Construction Area
Bethpage, New York

TABLE OF CONTENTS (cont'd.)

APPENDICES

INTERIM REMEDIAL MEASURE
HEALTH AND SAFETY PLAN

Bethpage Community Park
Construction Area
Bethpage, New York

1.0 PURPOSE

The purpose of this Health and Safety Plan (HASP) is to establish protocols for protecting H2M and other on-site and off-site personnel from incidents that may arise while performing field activities during the Interim Remedial Measure (IRM) to be conducted at the Bethpage Community Park in Bethpage, New York. This HASP has been prepared in accordance with the United States Environmental Protection Agency (US EPA) document, "Emergency and Remedial Response Division's Standard Operating Safety Guides", November 1984. The plan establishes personnel protection standards, mandatory operations procedures, and provides contingencies for situations that may arise while field work is being conducted at the site. All H2M field personnel will be required to abide by the procedures set forth in this HASP.

Personnel performing the environmental field work involving chemical substances may encounter conditions that are unsafe or potentially unsafe. In addition to the potential risks associated with the physical, chemical, biological and toxicological properties of the material(s) which may be encountered, other types of hazards (i.e., electricity, water, temperature, heavy equipment, falling objects, loss of balance, tripping, etc.) can have an adverse effect on the health and safety of personnel. It is important that personnel protective equipment (PPE) and safety requirements be appropriate to protect against potential and/or known hazards. PPE will be selected based on the type(s), concentration(s), and routes of personnel exposure from hazardous substances at a site. In situations where the type of materials and possibilities of contact are unknown or the potential hazards are not clearly identifiable, a more subjective (but conservative) determination will be made of the PPE required for initial safety.

Adherence to this HASP will minimize the possibility that personnel at the site or the surrounding community will be injured or exposed to site-related contaminants during field activities.

2.0 SITE CONDITIONS

The Bethpage Community Park is located in Bethpage, New York, west of Stewart Avenue. The site is located within the Town of Oyster Bay in Nassau County. 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 Corporation. According to reports prepared on behalf of Northrop Grumman Corporation[1], Grumman utilized the property for waste disposal purposes including industrial wastewater treatment sludge, spent paint operations rags and possibly used oil. In addition, the site was utilized by Grumman 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 site was activity utilized by the community 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.

2.1 Proposed Field Activities

The field work will consist of surface soil sampling, drilling of soil borings, subsurface soil sampling and installation of monitoring wells, developing and sampling of these monitoring wells and field surveying of well locations and elevations. The primary site related contaminants of concern, based on prior sampling results, are volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs) and heavy metals,

---

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

including hexavalent chromium, and cyanide. The routes of potential exposure for field personnel undergoing these activities include inhalation, ingestion and adsorption through dermal contact. At the work site, the most probable route of exposure, if any, is via the inhalation or dermal contact of these contaminants of concern from soils or groundwater and adsorption through dermal contact. All proposed work will be completed using Level D PPE. Ambient air will be monitored using a photoionization detector (PID) and a Miniram particulate/dust monitor which will be utilized during any intrusive activities. If 5 ppm or more of the above referenced contaminants are detected during the work, PPE will be immediately upgraded to EPA Level C (air purifying respirators).

3.0 PERSONAL SAFETY

Personnel involved in field operations must often make complex decisions regarding safety. To make these decisions correctly requires more than elementary knowledge. For example, selecting the most effective PPE requires not only expertise in the technical areas of respirators, protective clothing, air monitoring, physical stress, etc., but also experience and professional judgment. Only competent, qualified personnel having the technical judgment to evaluate a particular situation and determine the appropriate safety requirements will perform field investigations at the site. These individuals, through a combination of professional education, on-the-job experience, specialized training, and continual study, have the expertise to make sound decisions. In addition, each individual must sign an appendix to the Health and Safety Plan, indicating they have read and understood its contents (included in HASP Appendix A).

3.1 Training and Medical Surveillance

All personnel involved in field work will be trained to carry out their designated field operations. Training will be provided in the use of all equipment, including respiratory protection apparatus and protective clothing; safety practices and procedures; general safety requirements; and hazard recognition and evaluation. Each individual involved with the field work must provide documentation of training and medical surveillance, as per 29 CFR 1910.120. A copy of the documentation must be maintained at the job site for the duration of the project.

3.2 Health and Safety Manager

The Health and Safety Manager shall be responsible for overall implementation and coordination of the Health and Safety Program for field personnel at the site. Responsibilities include providing adequate staffing, materials, equipment, and time needed to safely accomplish the tasks under the site investigation. The Health and Safety Manager is also responsible for taking appropriate corrective actions when unsafe acts or practices arise. The Health and Safety Manager for this investigation project is Philip J. Schade, P.E. of H2M.

3.3 Site Health and Safety Officer

A designated individual will perform the function of the project Site Health and Safety Officer (SHSO). Chris Flynn will serve as the Site Health and Safety Officer during the site work. At all times the Site Health and Safety Officer will report directly to the Health and Safety Manager. As a minimum, the Site Health and Safety Officer will be responsible for the following:

1. Conducting and documenting daily site safety briefings for field personnel.
2. Assuring that all personnel protective equipment is available and properly utilized by all field personnel at the site.
3. Assuring that all personnel are familiar with standard operating safety procedures and additional instructions contained in the Health and Safety Plan.
4. Assuring that all personnel are aware of the hazards associated with the field operations.
5. Inspecting and documenting the site for hazards before field operations.
6. Conducting daily work area inspections to determine the effectiveness of the site HASP and identify and correct unsafe conditions in the responsible work area. Daily inspections and corrective actions taken shall be documented on daily inspection forms.
7. Determining personal protection levels including clothing and equipment for personnel and periodic inspection of protective clothing and equipment.
8. Monitoring of site conditions prior to initiation of field activities, and at various intervals during on-going operations as deemed necessary for any changes in site hazard conditions. (Monitoring parameters include, but are not limited to, volatile organic contaminant levels in the atmosphere, chemical hazard information, and weather conditions.)
9. Executing decontamination procedures.
10. Monitoring the work parties for signs of stress such as cold exposure, heat stress, or fatigue.
11. Prepare reports pertaining to incidents resulting in physical injuries or exposure to hazardous materials.

4.0 LEVELS OF PROTECTION

Anyone entering the investigation site must be protected against potential hazards. The purpose of the personal protective clothing and equipment is to minimize exposure to hazards while working on site. Careful selection and use of adequate PPE should protect the respiratory system, skin, eyes, face, hands, feet, head, body and hearing of all personnel.

The appropriate level of protection is determined prior to the initial entry on site based on available information and preliminary monitoring of the site. Subsequent information may warrant changes in the original level selected. Appropriate equipment to protect personnel against exposure to known or anticipated chemical hazards has been divided into four categories according to the degree of protection afforded.

4.1 Level A Protection

The highest degree of protection is used in a Level A situation. It should be worn when the highest available level of respiratory, skin and eye protection is needed. This level of protection is placed in effect when there is no historic information about the site and it is assumed that the worst possible conditions exist.

4.1.1 Personal Protective Equipment

a. Pressure demand, self-contained breathing apparatus approved by the National Institute of Occupational Safety and Health (NIOSH).

b. Fully encapsulating chemical-resistant suit.

c. Coveralls*.

d. Long cotton underwear*.

e. Gloves (inner and outer), chemical-resistant.

f. Boots, chemical-resistant, steel toe and shank. (Depending on suit construction, worn over or under suit boot.)

g. Hard hat* (under suit).

h. Disposable protective suit, gloves and boots* (worn over fully-encapsulating suit).

i. Two-way radio communications (intrinsically safe).

*Optional

4.1.2 Criteria for Selection

Meeting any of the criteria listed below warrants use of Level A protection:

a. The chemical substance(s) has been identified and requires the highest level of protection for skin, eyes and the respiratory system based on:

   (1) Measured (or potential for) high concentrations of atmospheric vapors, gases, or particulates; or

   (2) Site operations and work functions involving high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates.

b. Extremely hazardous substances are known or suspected to be present and skin contact is possible.

c. The potential exists for contact with substances that destroy skin.

d. Operations must be conducted in confined, poorly ventilated areas until the absence of hazards requiring Level A protection is demonstrated.

e. An oxygen deficient atmosphere where the oxygen level is less than 19.5 percent (%) by volume as measured with an oxygen meter. This condition, existing alone, could result in a downgrade to EPA Level B PPE.

f. Total atmospheric readings on photoionization detector indicate readings above 500 parts per million (ppm) of calibration gas equivalents (cge) of unidentified substances.

4.1.3 Limiting Criteria

a. Fully encapsulating suit material must be compatible with the substances involved.

4.1.4 Minimum Decontamination Procedure

Station 1:	Segregated equipment drop.
Station 2:	Outer garment, boots and gloves wash and rinse.
Station 3:	Outer boot and glove removal.
Station 4:	Tank change.
Station 5:	Boots, gloves and outer garment removal.
Station 6:	SCBA removal.
Station 7:	Field wash.

4.2 Level B Protection

Level B protection will be used by all personnel entering confined spaces and/or if the conditions outlined in Section 4.2.2 are encountered.

4.2.1 Personal Protective Equipment

a. Pressure-demand, self-contained breathing apparatus or cascade supplied air system (NIOSH approved).

b. Chemical-resistant clothing (coveralls and long-sleeved jacket; coveralls, hooded, one or two-piece chemical-splash suit; disposable chemical-resistant coveralls).

c. Coveralls.*

d. Gloves (outer), chemical-resistant.

e. Gloves (inner), chemical-resistant.

f. Boots, chemical-resistant, steel toe and shank.

g. Boots (outer), chemical resistant (disposable*).

h. Hard hat (face shield*).

i. Two-way radio communications (intrinsically safe).

*Optional

4.2.2 Criteria for Selection

Meeting any one of these criteria warrants use of Level B protection:

a. The type(s) and atmospheric concentration(s) of toxic substances have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection than is required with Level A. These would be atmospheres:

(1) With concentrations immediately dangerous to life and health (IDLH); or

(2) Exceeding limits of protection afforded by a full-face, air-purifying mask; or

(3) Containing substances for which air-purifying canisters do not exist or have low removal efficiency; and/or

(4) Containing substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard.

b. The atmosphere contains less than 19.5 percent oxygen.

c. Site operations make it highly unlikely that the small, unprotected area of the head or neck will be contacted by splashes of extremely hazardous substances.

d. Total atmospheric concentrations in the breathing zone of unidentified vapors or gases range from 50 ppm to 500 ppm (calibration gas equivalence units) on monitoring instruments, and vapors are not suspected of containing high levels of chemicals toxic to skin.

4.2.3 Limiting Criteria

a. Use only when the vapor or gases present are not suspected of containing high concentrations of chemicals that are harmful to skin or capable of being absorbed through skin contact.

b. Use only when it is highly unlikely that the work being done will generate high concentrations of vapors, gases, or particulates or splashes of material that will affect exposed skin.

4.2.4 Minimum Decontamination Procedures

Station 1: Equipment drop.
Station 2: Outer garment, boots and gloves wash and rinse.
Station 3: Outer boot and glove removal.
Station 4: Tank change.
Station 5: Boot, gloves and outer glove removal.
Station 6: SCBA removal.
Station 7: Field wash.

4.3 Level C Protection

Level C protection will be used by all personnel if the conditions outline in Section 4.3.2 are encountered.

4.3.1 Personal Protective Equipment

a. Full-face, air purifying, canister-equipped respirator (NIOSH approved).

b. Chemical-resistant clothing (coveralls; hooded, two-piece chemical splash suits; chemical-resistant hood and apron; disposable chemical-resistant coveralls).

c. Coveralls.*

d. Gloves (outer), chemical-resistant.

e. Gloves (inner), chemical resistant

f. Boots, steel toe and shank.

g. Boots cover (outer), chemical-resistant (disposable*).

h. Hard hat (face shield*).

i. Escape mask*.

j. Two-way radio communications (intrinsically safe).

*Optional

4.3.2 Criteria for Selection

Meeting all of these criteria permits use of Level C Protection:

a. Measured air concentrations of identified substances will be reduced by the respirator to, at or below the substance's exposure limit, and the concentration is within the service limit of the canister.

b. Atmospheric contaminant concentrations do not exceed IDLH levels.

c. Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.

d. Job functions have been determined not to require self-contained breathing apparatus.

e. Total vapor readings register between 5 ppm cge and 50 ppm cge above background on instruments.

f. Air will be monitored periodically.

g. Cartridges are available and are approved by NIOSH and MSHA for the specific chemical(s) encountered.

4.3.3 Limiting Criteria

a. Atmospheric concentration of chemicals must not exceed IDLH levels.

b. The atmosphere must contain at least 19.5 percent oxygen.

c. Must have sufficient information available regarding specific compounds, and their concentrations, likely to be encountered.

4.3.4 Minimum Decontamination Procedures

Station 1: Equipment drop.

Station 2: Outer boot and glove removal.

Station 3: Canister or mask change.

Station 4: Boots, gloves and outer garment removal.

Station 5: Face piece removal.

Station 6: Field wash.

4.4 Level D Protection

Level D protection has been selected for personnel for this project except during confined space entries. Should conditions change, re-evaluation of personnel protection will be conducted.

4.4.1 Personal Protective Equipment

a. General work clothes or coveralls.

b. Gloves*.

c. Boots/shoes, leather or chemical-resistant, steel toe and shank.

d. Boots (outer), chemical/resistant (disposable)*.

e. Safety glasses or chemical splash goggles*.

f. Hard hat (face shield*).

g. Escape mask*.

*Optional

4.4.2 Criteria for Selection

Meeting any of these criteria allows use of Level D protection:

a. No hazardous air pollutants have been measured.

b. Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

c. Extensive information on suspected hazards/risks are known.

4.4.3 Limiting Criteria

a. The atmosphere must contain at least 20.9 percent oxygen.

4.4.4 Minimum Decontamination Procedure

Station 1: Equipment drop.

Station 2: Hand and face wash.

4.5 Duration of Work Period

The anticipated duration of the work period will be established prior to daily activities. The work will only be performed during daylight hours. Other factors that affect the length of time personnel may work include:

a. Air supply consumption (SCBA assisted work);

b. Suit/ensemble, air purifying chemical cartridge, permeation and penetration by chemical contaminants; and

c. Ambient temperature and weather conditions.

5.0 DETERMINATION OF THE SITE-SPECIAL LEVEL OF HAZARD

Categories of personnel protection required depend on the degree of hazard and probability of exposure by a route of entry into the body. For this site, the most probable potential route of entry is via inhalation of vapors and/or dust, and potentially by dermal adsorption of contaminates released from field activities. The site-specific chemical contaminants of greatest concern are volatile organic compounds, PCBs and heavy metals (including hexavalent chromium),

It has been determined that the appropriate level of protection for the site is Level D, the minimal level of protection. Synthetic gloves with low permeability to liquids and Tyvek suits will be used by all personnel in contact with on-site soil or water to prevent dermal contact.

The determination of Level D protection is based on the fact that field work will be performed in open, well-ventilated areas and that the potential for accidents and injuries due to obstructions caused by and/or magnified by the use of level A, B, or C protection (i.e., slip/trip hazards) is greater than the potential for problems associated with potential exposure from contaminants using level D protection. Level C protection will be used if ambient air monitoring results warrant a protective equipment upgrade (above Level D conditions). The Site Health and Safety Officer will be responsible for requesting an upgrade in the level of personnel protection. The final decision will be made by the Health and Safety Manager in conjunction with the Project Manager and the appropriate regulatory authorities.

A PID and Miniram particulate/dust monitor will be used to monitor air quality throughout the course of field work. If necessary (based upon field equipment readings), the work zone will be evacuated and consideration will be given to upgrading the level of protection. An upgrade to the appropriate level of protection for field personnel will be required before re-entering the work zone if hazardous conditions persist.

In addition to potential chemical hazards, there also exists potentially greater physical hazards associated with the fields investigation activities. Due to the nature of the field investigation, heavy equipment including drilling rigs will be utilized on the job site. Therefore, all personnel should always be aware of vehicular traffic while working at the facility. Further, hard hats and steel-toed safety boots must be worn at all times around heavy equipment. All work must be performed in strict accordance with OSHA regulations.

5.1 Community Air Monitoring Plan

Due to the proximity of nearby residences, real time air monitoring for volatile organic compounds and particulate levels at the perimeter of the work area is necessary. A Community Air Monitoring Plan will be implemented with the following provisions:

5.1.1 Frequency of Monitoring

All suspected contaminants of concern must be monitored at the downwind perimeter of the work area daily at 2 hour intervals. If total vapor or particulate levels exceed 5 ppm above background, work activities must be halted and monitoring continued under the provisions of an Emission Response Plan. All readings must be recorded and be available for State (DEC and DOH) personnel to review.

5.1.2 Emission Response Plan

If the ambient air concentration of organic vapors or particulates exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the level decreases below 5 ppm above background, work activities can resume but more frequent intervals of monitoring, as directed by the Site Health and Safety Officer, must be conducted. If the levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- the vapor level 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background, and
- more frequent intervals of monitoring, as directed by the Site Health and Safety Officer, are conducted.

If the vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Health and Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

5.1.3 Major Vapor Emission

If any levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structures (20 Foot Zone).

If efforts to abate the emission source are unsuccessful and if the following levels persist for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect;

- if vapor levels are approaching 5 ppm above background.

However, the Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

5.1.4 Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. Appropriate Emergency Response Contacts, as listed in the Health and Safety Plan of the Work Plan, will be contacted.

2. The local police authorities will immediately be contacted by the Health and Safety Officer and advised of the situation.

3. Frequent air monitoring will be conducted at 30 minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Health and Safety Officer.

6.0 DESIGNATED WORK ZONES

Work zones will be determined prior to commencement of a specific field activity. An area large enough to encompass the activity will be delineated as the work zone. Only qualified field personnel involved in the field activity, with the proper PPE, will be allowed into the designated work zone. Within the work zone, ambient air quality will be periodically monitored using a PID and Miniram particulate/dust monitor to determine any changes from background air quality. If subsequent measurements suggest a significant change in air quality (greater than 5 ppm), the work area will be immediately evacuated. An upgrade to the appropriate level of PPE for field personnel will be required before re-entering the work zone.

7.0 DECONTAMINATION STATIONS

Decontamination stations will be located in fixed areas to be used for the cleaning of all heavy equipment, vehicles, tools and supplies required for the completion of field operations. Personnel decontamination procedures for the appropriate levels of protection are described in Section 4.0.

All drilling equipment (rigs, augers, etc.) will be steam cleaned between each soil boring and well installation. The staged decontamination area will be located at the northeast corner of the facility property. All decontamination procedures will take place in this area.

8.0 SITE ACCESS CONTROL

Appropriate traffic controls and barricades will used in areas of vehicular and pedestrian traffic. Local requirements for traffic control will be adhered to (e.g., obtaining appropriate permits, and provisions for a flagman), as may be warranted.

9.0 PERSONAL HYGIENE

The following personal hygiene rules must be followed while performing work at the site:

1. Eating, drinking, chewing gum or tobacco, smoking, or any other practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the work area.

2. Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or any other activities.

3. Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

4. No excessive facial hair (i.e., beards), which interferes with a satisfactory fit of the mask-to-face seal, is allowed on personnel required to wear respiratory protective equipment.

5. Contact with contaminated or suspected contaminated surfaces will be avoided. Whenever possible, walking through puddles, mud and discolored surfaces; kneeling on ground; leaning, sitting, or placing equipment on drums, containers, vehicles, or the ground will be avoided.

6. Medicine and alcohol can increase the effects from exposure to toxic chemicals. Prescribed drugs will not be taken by personnel on site where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Alcoholic beverage intake will be prohibited during all on-site field operations.

10.0 CONTINGENCY PLAN

Section 10.0 shall serve as the investigation Contingency Plan. It has been developed to identify precautionary measures, possible emergency conditions, and emergency procedures. The plan shall be implemented by the Site Health and Safety Officer.

10.1 Emergency Medical Care and Treatment

This section addresses emergency medical care and treatment of field personnel, resulting from possible exposures to toxic substances and injuries due to accidents. The following items will be included in emergency care provisions:

a. Name, address and telephone number of the nearest medical treatment facility will be conspicuously posted. Directions for locating the facility, plus the travel time, will be readily available (see Appendix C).

b. Names and telephone numbers of ambulance service, police and fire departments, and procedures for obtaining these services will be conspicuously posted (see Appendix C).

c. Procedure for prompt notification of the H2M Site Health and Safety Officer.

d. Emergency eyewash fountains and first aid equipment will be readily available on site and located in an area known to all personnel.

e. Specific procedures for handling personnel with excessive exposure to chemicals or contaminated soil or water.

f. Readily available dry-chemical fire extinguisher.

10.2 Off-Site Emergency Medical Care

The Site Health and Safety Officer shall pre-arrange for access to emergency medical care services at a convenient and readily accessible medical facility and establish emergency routes. The Site Health and Safety Officer shall establish emergency communications with emergency response services.

10.3 Personnel Accidents

Bodily injuries which occur as a result of an accident during the operation at the site will be handled in the following manner:

a. First aid equipment will be available on site for minor injuries. If the injuries are not considered minor, proceed to the next step.

b. The local first aid squad rescue unit, a paramedic unit, the local hospital and the Site Health and Safety Officer shall be notified of the nature of the emergency.

c. The injured employee shall be transported by the local emergency vehicle to the local hospital.

d. A written report shall be prepared by the Site Health and Safety Officer detailing the events and actions taken during the emergency within 24 hours of the accident.

10.4 Personnel Exposure

In the event that any person is splashed or otherwise excessively contaminated by chemicals, the following procedure will be undertaken:

a. Disposable clothing contaminated with observable amounts of chemical residue is to be removed and replaced immediately.

b. In the event of direct skin contact in Level D, the affected area is to be washed immediately with soap and water, or other solutions as directed by medical personnel.

c. The Site Health and Safety Officer or other individuals who hold a current first aid certificate will determine the immediate course of action to be undertaken. This may involve using the first aid kit and/or eyewash stations.

10.4.1 Weather

Adverse weather conditions are an important consideration in planning and conducting site operations. Hot or cold weather can cause physical discomfort, loss of efficiency, and personal injury. Of particular importance is heat stress resulting when protective clothing decreases natural body ventilation. One or more of the following will help reduce heat stress:

a. Provide plenty of liquids. To replace body fluids (water and electrolytes) lost because of sweating, use a 0.1 percent salt water solution, more heavily salted foods, or commercial mixes. The commercial mixes may be preferable for those employees on a low sodium diet.

b. Provide cooling devices to aid natural body ventilation. These devices, however, add weight, and their use should be balanced against worker efficiency. Long cotton underwear help absorb moisture and protect the skin from direct contact with heat absorbing protective clothing.

c. Install mobile showers and/or hose down facilities to reduce body temperature and cool protective clothing.

d. In extremely hot weather, conduct operations in the early morning or evening.

e. Ensure that adequate shelter is available to protect personnel against heat, cold, rain, snow, etc.

f. In hot weather, rotate shifts of workers wearing impervious clothing.

10.4.2 Heat Stress

If field operations are conducted in the warm summer months, heat related fatigue will be closely monitored. Monitoring of personnel wearing impervious clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates are indicated. When temperatures exceeds 85 degrees Fahrenheit, workers should be monitored for heat stress after every work period. The following screening mechanism will be used to monitor for heat stress:

> Heart rate (HR) will be periodically measured by the radial pulse for 30 seconds during a resting period. The HR should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by 33 percent. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by 33 percent.

Heat-related illnesses range from heat fatigue to heat stroke, the most serious. Heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing may have to be cut off. Less serious forms of heat stress require prompt attention or they may lead to a heat stroke. Unless the victim is obviously contaminated, decontamination should be omitted or minimized and treatment begun immediately. Heat-related problems can be categorized into:

Heat Rash: Caused by continuous exposure to hot and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat as well as being a nuisance.

Heat Cramps: Caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs: muscle spasm and pain in the extremities and abdomen.

Heat Exhaustion: Caused by increased stress on various organs to meet increased demands to cool the body. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.

Heat Stroke: The most severe form of heat stress. The body must be cooled immediately to prevent severe injury and/or death. Signs and symptoms are: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

Some of the symptoms of heat stress are: hot dry skin, fever, nausea, cramps, red or spotted skin, confusion, lightheadedness, delirium, rapid pulse, convulsions and unconsciousness.

For workers suffering from heat stress, the following actions should be taken:

1. Remove the victim to a cool area
2. Loosen clothing
3. Thoroughly soak the victim in cool water or apply cold compresses
4. Call for medical assistance.

10.4.3 Cold Stress

If field operations are conducted in the cold winter months, cold stress will be monitored. Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10 degrees Fahrenheit air with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18 degrees Fahrenheit.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

Frost Nip or

Incipient Frostbite: Characterized by suddenly blanching or whitening of skin.

Superficial Frostbite: Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

Deep Frostbite: Tissues are cold, pale and solid; extremely serious injury.

Hypothermia: Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperatures. Its symptoms are usually exhibited in five stages: (1) shivering; (2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body temperature to less than 95 degrees Fahrenheit; (3) unconsciousness, glassy stare, slow pulse and slow respiratory rate; (4) freezing of the extremities; and finally, (5) death.

10.5 Fire

The telephone number to the local fire department will be posted along with other emergency numbers conspicuously on-site at all times. (see Appendix C). In the event of a fire occurring at the site, the following actions will be undertaken by the Site Health and Safety Officer and the designated fire control personnel:

a. Evacuate all unnecessary personnel from the area of the fire and site, if necessary.

b. Contact the local fire and police departments informing them of the fire and any injuries if they have occurred.

c. Contact the local hospital of the possibility of fire victims.

d. Contact the Site Health and Safety Officer, Health and Safety Manager, and the H2M Project Manager.

11.0 SUMMARY

The Health and Safety Plan establishes practices and procedures to be followed so that the welfare and safety of workers and the public are protected. It is important that personal equipment and safety requirements be appropriate to protect against the potential or known hazards at a site. Protective equipment will be based upon the type(s), concentration(s), and routes of personal exposure from substances at the site, as well as the potential for hazards due to heavy equipment use, vision impairment, weather, etc. All site operation planning incorporates an analysis of the hazards involved and procedures for preventing or minimizing the risk to personnel. The following summarizes the rules which must be obeyed:

a. The Health and Safety Plan will be made available to all personnel doing field work on site. All personnel must sign this plan, indicating they have read and understood its terms.

b. All personnel will be familiar with standard operating safety procedures and additional instructions contained in the Health and Safety Plan.

c. All personnel going on site will be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures and communications.

d. Any required respiratory protective devices and protective clothing will be worn by all personnel going into work areas.

e. Prior to commencement of work activities, notification to local police, fire and potential rescue personnel will be made.

H2M GROUP

HASP APPENDIX A

HEALTH AND SAFETY ACKNOWLEDGEMENT FORM

H2M GROUP

I have read the Health and Safety Plan (HASP) for the Field Investigation at the Bethpage Community Park, and I have reviewed and understand the potential hazards and the precautions/contingencies of each potential hazard.

I agree to abide by the stipulations of this HASP and further agree to hold H2M Group harmless from, and indemnify against, any accidents which may occur as a result of activities in the site regardless of whether or not they were covered in the HASP.

Name	Date	Name	Date

H2M GROUP

HASP APPENDIX B

EMERGENCY RESPONSE INFORMNATION

H2M GROUP

EMERGENCY TELEPHONE NUMBERS

HOSPITAL

North Shore Hospital-Central General 888 Old Country Road Plainview, New York 11803	(516) 719-3000

POLICE DEPARTMENT

Emergency	911
Non-emergency	(516) 264-0400

FIRE DEPARTMENT

Emergency	911

AMBULANCE

Emergency	911
Non-emergency	(516) 226-1212

H2M GROUP	(631) 756-8000
Project Manager	Philip J. Schade, P.E. (H2M) Office: ext. 1623 Mobile: (631) 242-3785
Health & Safety Officer	Philip J. Schade, P.E. (H2M) Office: ext. 1623 Mobile: (631) 242-3785
Site Safety Officer	Chris Flynn (H2M) Office: ext. 1484 Mobile: (516) 641-2428

H2M GROUP

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

INTERIM REMEDIAL MEASURE
QUALITY ASSURANCE PROJECT PLAN

BETHPAGE COMMUNITY PARK
CONSTRUCTION AREA
BETHPAGE, NEW YORK

April 2005

Prepared For:

Town of Oyster Bay
Department of Public Works

By:

Holzmacher, McLendon & Murrell, P.C.
Melville, New York

INTERIM REMEDIAL MEASURE
QUALITY ASSURANCE PROJECT PLAN

Bethpage Community Park
Construction Area
Bethpage, New York

TABLE OF CONTENTS

INTERIM REMEDIAL MEASURE
QUALITY ASSURANCE PROJECT PLAN

Bethpage Community Park
Construction Area
Bethpage, New York

TABLE OF CONTENTS (continued)

LIST OF FIGURES

LIST OF TABLES

APPENDICES

1.0 QUALITY ASSURANCE PROJECT PLAN (QAPP)

The overall Quality Assurance/Quality Control (QA/QC) objective for the Bethpage Community Park remedial investigation is to produce data at the highest level to provide direct support for the development of a Remedial Action Plan (RAP) and implementation of an Interim Remedial Measure (IRM), as necessary to allow for the redevelopment of the Park property. All sampling activities used directly to support the remedial investigation will use Level IV Data Quality Objectives. These activities include shallow soil, subsurface soil and groundwater sampling.

Specifically, all data will be gathered or developed using procedures appropriate for the intended use. Standard procedures are used so that known and acceptable levels of accuracy, precision, representatives, completeness and comparability are maintained for each data set. Descriptions of these criteria are presented in the following subsections.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Holzmacher, McLendon & Murrell, P.C. (H2M), as a professional engineering corporation, has been retained by the Town of Oyster Bay to conduct a remedial investigation of the Bethpage Community Park including the performance of all field sampling activities.

For projects involving a field investigation program, a project team is assembled with each team member responsible for specific elements of the work. To ensure that every project is completed with the highest degree of quality, each member of the project team must be aware of the quality assurance objectives for his/her specific element of the work. An H2M organization chart for the Bethpage Community Park remedial investigation, is presented in Figure 1.

As indicated in Figure 1, the Project Director is the direct contact between H2M and the Town of Oyster Bay. The Project Director is responsible for overall project technical direction and quality assurance, including:

- Defining project objectives;
- Allocation of resources;

- Establishing chains of command; and
- Periodic evaluation of project.

H2M's Project Manager is responsible for directing and overseeing all technical and administrative elements of the project. This includes:

- Day to day direction, communication and coordination with the project team;
- Review of all project documents;
- Monitoring overall work progress, schedules, project costs; and
- Day to day direction of QA/QC activities.

Reporting directly to the Project Manager is the Field Team Supervisor, who is responsible for directing all field investigation activities. Depending upon the specific project requirements, the field investigation work is carried out by staff engineers, geologists, hydrogeologists and/or field technicians.

The Field Team Supervisor is responsible for ensuring that the work performed by the field investigation staff is carried out in a manner consistent with the project QA requirements. The Field Team Supervisor is also responsible for direction and coordination of subcontractors, which may be utilized for surveying, drilling and geophysical investigations, and acts as an intermediary between the field staff and the analytical laboratory.

The Quality Assurance Officer (QAO) operates independently of the Project Manager, reporting directly to the Project Director. The primary responsibilities of the QAO are as follows:

- Assist in the development of the work plan and evaluate its effectiveness;
- Monitor work to ensure conformance with the requirements of the work plan;
- Evaluate the need for and, if necessary, conduct field and laboratory QA audits;
- Supervise data validation and review all report deliverables.

3.0 QA OBJECTIVES

The primary aim of this QAPP is to establish policies and procedures to be followed by project personnel when conducting field sampling and laboratory analyses in support of the remedial investigation. Quality assurance requires careful planning, organization and the dedication of every member of the firm to the concepts of Quality Assurance/Quality Control (QA/QC). This must be accompanied by the understanding and coordination of the roles of all personnel involved in a particular project, if this quality objective is to be met. The overall QA objective for the Bethpage Community Park remedial investigation is to produce data at the highest level to provide direct support for the development of a Remedial Action Plan (RAP) and implementation of an Interim Remedial Measure (IRM), as necessary to allow for the redevelopment of the Park property.

4.0 FIELD SAMPLING ACTIVITIES

Two general types of environmental media sampling will be conducted as part of the Bethpage Community Park remedial investigation. Shallow soil sampling will be conducted from grade surface to ten feet below grade to assess soil quality at depths where soils may be potentially disturbed during the planned re-development of the Park. Deeper subsurface soil sampling will be conducted from grade to the groundwater table to assess soil quality at deeper depths. In addition, groundwater sampling will be conducted to assess groundwater quality beneath the Park.

4.1 Shallow Soil Sampling

Shallow soil borings (grade surface to approximately ten beet below grade) will be advanced by direct-push (i.e., Geoprobe) drilling techniques using 2-inch outside diameter "macro core" barrels to retrieve subsurface soil samples. The core barrels, fitted with a cutting shoe, will be advanced with a slid hammer into the ground to the desired sampling depth. The macro-core sampler will extract samples into the barrel fitted with an acetate liner. As the barrels are withdrawn from the ground, the acetate liner will be removed and the sample collected for field screening and laboratory analysis. Samples will be transferred directly into the dedicated glassware provided by the analytical laboratory. Representative samples will be transferred to the glassware with minimal mixing and disruption. All direct-push soil sampling will be performed in accordance with American Society for Testing and Materials (ASTM) D6282-98, Guide for Direct Push Soil Sampling for Environmental Site Characterizations."

Soils samples from each boring will be field screened using a photoionization detector (PID). The PID instrument will permit the detection of volatile organic compounds (VOCs), which have been detected in subsurface soils at the Park during previous investigations.

Non-dedicated sampling equipment that requires re-use will be cleaned and decontaminated between sampling points using the following procedure:

1. Detergent wash (e.g., Alconox®) and potable tap water rinse,
2. Double rinse with distilled deionized water.

All decontamination fluids and rinse water will be containerized on-site and characterized for off-site disposal.

An on-site geologist will log each soil boring. Physical characteristics will be documented using preprinted boring log forms, as shown in Appendix A, and will include the following:

- Project name, location and job number,
- Date of boring (start, finish),
- Boring number and driller,
- Sample number and depth,
- Method of advancing sampler,
- Type and size of sampler,
- Description of soil,
- Thickness of observed layers,
- Type and make of equipment (i.e., drill rig, etc.) used, and
- Identification of any samples collected and submitted for laboratory analysis.

Soil boring descriptions will be made in accordance with the Unified Soil Classification System (USCS). A quick reference sheet detailing the USCS is provided in Appendix B.

4.2 Subsurface Soil Sampling

Subsurface soil sampling from grade surface to the water table, estimated to be approximately 50 to 60 feet below grade surface, will be conducted using hollow stem auger drilling techniques. Split spoon soil samples will be collected as each boring is advanced downward for field screening, identification and laboratory analysis. All split spoon soil sampling will be performed in accordance with ASTM D1586-99, Test Method for Penetration Test and Split-Barrel Sampling of Soils.

An on-site geologist will log each soil boring. Physical characteristics will be documented using preprinted boring log forms, as shown in Appendix A and described in Section 4.1.

4.3 Groundwater Sampling

There are four existing groundwater monitoring wells within or immediately adjacent to the Bethpage Community Park. Four additional monitoring wells will be installed as part of the remedial investigation to provide a more thorough evaluation of groundwater quality beneath the Park. After the monitoring wells have been developed, one round of groundwater sampling will be conducted.

All sampling equipment will be placed on a sheet of clean poly plastic to minimize the possibility of cross contaminating sampling equipment with the surrounding soils. Upon opening the monitoring well, a PID will be used to screen the headspace of the well and the ambient air for VOCs.

Procedures for groundwater sampling will be as follows:

1. Prior to purging the wells for sample collection, a synoptic static water level measurement to the nearest hundredth (0.01) of a foot will be recorded for each monitoring well.
2. A volume of water equal to at least three times the standing volume in the well's screened interval will be purged from the well before sample collection using either a decontaminated stainless steel submersible pump or dedicated polyethylene bailer. Purge water will be containerized for characterization and off-site disposal.
3. A dedicated, laboratory cleaned, polyethylene, disposal bailer is lowered into the well. The appropriate sample bottles are filled directly from the bailer as soon as it is removed from the well. The samples are immediately placed on ice in a cooler.

4.4 Sample Locations

As proposed, soil borings will be conducted based on a pre-established grid over the approximate 7-acre portion of the Park to be redeveloped. In areas where soil excavation is anticipated during construction activities, a 50-foot on center grid will be utilized. Prior to commencing drilling activities, a site survey will be conducted to establish the 50-foot on center sampling grid. Boring locations will be adjusted as necessary due to existing structures within the Park. A total of approximately 145 soil borings will be conducted throughout the study area.

As indicated previously, there are three to four existing groundwater monitoring wells located within or immediately adjacent to the Park. An additional four monitoring wells will be installed in appropriate locations to provide a sufficient number of upgradient and downgradient samples for an evaluation of groundwater quality beneath the Park.

4.5 Number of Samples

As indicated above, approximately 145 soil borings will be conducted during of the remedial investigation. Soil sampling intervals at each soil boring will take into account the anticipated excavation depths of the site redevelopment and construction activities, as well as results from previous site investigations. While each soil boring will be advanced as deep as required to establish the depth extent of contamination, the soil sampling intervals will be more frequent in areas where soil excavation is anticipated and less frequent in areas where excavation is not anticipated. With an average of four to eight samples per soil boring (sampling from grade surface to roughly 50-feet below grade surface), approximately 700 soil samples will be collected for laboratory analysis.

Based on a soil boring program of ten to fifteen days, approximately 48 to 72 soil samples will be collected each day for laboratory analysis. Depending on the number of field samples collected, between three and four sets of QA/QC samples including a trip blank, field blanks, blind duplicates, matrix spike and matrix spike duplicates will be collected each day.

One round of groundwater sampling will be conducted during the remedial investigation. Based on the number of existing and proposed monitoring wells, eight groundwater samples, plus the appropriate QA/QC samples will be collected for laboratory analysis.

4.6 Field QA/QC

In order to ensure that data collected in the field is consistent and accurate, standardized forms will be utilized for repetitive data collection, such as depth to water in wells, well locations, etc. These field forms include Well Logging, Field Sampling and Water Level Data Records.

The accuracy of the data collected will be checked by using an additional degree of definition than the minimum wherever possible. For example, if two distances are needed to locate a well, three will be used so that if one distance is inaccurate, the well can still be located and the field measurements can be re-taken. For measurements where this is not possible (i.e., depth to water), measurements will be taken and recorded three times.

4.7 Field Records

All information pertinent to any field activity will be recorded in bound, waterproof field notebooks. Duplicates of all notes will be prepared and kept in a secure place away from the site. Proper documentation will consist of all field personnel maintaining records of all work accomplished including the items listed below:

- Date and time of work events
- Purpose of work
- Description of methods
- Description of samples
- Number of size and samples
- Description of sampling point
- Date and time of collection of sample
- Sample collector's name
- Field observations
- Any field measurements obtained with portable instruments

Each sample collected in the field will be labeled using waterproof ink. Each bottle will be labeled with a number, location, parameter to be analyzed, sampling time and date. Packaging, shipping and chain-of-custody requirements for the samples shall be in accordance with National Enforcement Investigation Center (NEIC) procedures (see Section 5.0).

5.0 DOCUMENTATION AND CUSTODY

Sample preparation, documentation and custody are important elements of any QA/QC program. Without proper sample preparation and accurate documentation and tracking of sample custody, even well planned and properly implemented field sampling programs can generate data open to interpretation. For the purposes of this QAPP, sample preparation and custody include containerization, preservation, container transfer to field personnel, field handling and sample custody, sample transfer to the laboratory, and internal laboratory custody during sample analysis.

Sample custody is initiated at the designated laboratory where appropriate sample containers with preservatives, if required, are prepared by the analytical laboratory for use by field personnel.

5.1 Sample Containers

Sample containers will be provided by the analytical laboratory. The wide scopes of analyses performed during field and sampling investigations necessitate the use of several different types of sample containers. Container materials are selected so that there will be no interference with the analysis to be performed on the given sample. Each sample container will have a label that contains the information necessary to identify the sample. Care will be taken to ensure that the sample location designations precisely match those on the container and the Chain of Custody. The information to be provided on the container label will include the following, at a minimum:

- A unique laboratory identification number,
- Sample identification,
- Sample location (and depth, if appropriate),
- Sampler's name,
- Date and time of collection, and
- Identification of any preservatives, if applicable.

CLP bottles, as used during this remedial investigation, are prepared using only CLP approved cleaning techniques with quality control certified by the vendor. Verification data is maintained on file at the laboratory.

5.2 Sample Preservation

Sample preservation is dependent upon the specific type or suite of analyses to be performed. A summary of sample container types and preservation methods is presented in Section 7.2. Sample preservatives will be added in the laboratory prior to shipment and identified on the sample bottle labels. Field personnel are responsible for verifying the addition of preservatives by visually examining the sample bottles, sample bottle labels, and the chain of custody. Any discrepancies should be reported immediately to the laboratory and field personnel should not use the bottles in question.

After samples are collected and transferred into their respective sample bottles by field personnel, the samples are packed on ice, maintained at 4°C, and delivered to the laboratory within twenty-four hours of collection. Samples will be maintained in a refrigerator (4°C) in the laboratory prior to analysis.

5.3 Preparation of Sample Bottles and Coolers

Coolers used for sample transport will be scrubbed clean prior to use with a non-contaminating detergent followed by a thorough rinse with organic-free distilled water. Coolers will then dried before packing and use. All sample bottles are purchased new and specially cleaned and certified by the vendor. As per CLP requirements, the sample bottles for this sampling program will be used once for the specific job intended. All glass containers to be used will be individually packaged in "bubble-wrap" to prevent breakage during transport.

5.4 Custody Transfer to Field Personnel

A standard chain of custody form will be utilized for documenting the receipt, tracking and compilation of sample data. In general, the chain of custody (COC) procedure begins with the preparation of the sample bottles. After the sample bottles have been prepared, the cooler to be used will be sealed with custody tape and an external chain of custody form prepared. The following information, at a minimum, will be included on the COC at the time of shipment to field personnel:

- Container types including preservatives, if required;
- Number of containers required at each sample location for each analysis, including matrix spike/matrix spike duplicates (MS/MSD), trip blanks and field blanks;
- Any distinctive sample identification requirements;
- Sample custodian's signature with a date and time of relinquishment;
- Receiver's signature with a date and time of receipt.

Sample coolers will be picked up by field personnel at the laboratory. At this point, field personnel are in custody of the sample bottles.

5.5 Custody Transfer to Laboratory

Upon completion of field sampling, field personnel will pack the sample bottles, including any blank or duplicate samples, and seal the cooler with custody tape. Any breakage of bottles will be noted on the comment section of the COC. If lab prepared glassware is not to be submitted back to the laboratory for analysis, the line designating the unused sample bottles will be crossed-out with a single line through the entry, and the correction initialed by the person in custody of the samples. All corrections to the COC will be made with a single line through the incorrect entry and will be accompanied by the initials of the person in custody of the samples.

Field personnel will verify that the identification labels on the sample bottles and the COC are identical, and that all sample bottles are accounted for. Any discrepancies will be resolved before relinquishing custody of the samples. Once the field personnel are satisfied that the samples are ready for submittal to the lab, the cooler will be returned to the laboratory.

Upon receipt of the sample cooler at the laboratory, the sample custodian will examine the exterior of the cooler to ensure that sample integrity has not been adversely impacted. Once the laboratory is satisfied that the sample integrity has not been compromised, a lab sample custodian will sign and date the COC to acknowledge receipt of the samples. The field personnel when hand delivering samples, as for this project, will also sign and date the COC acknowledging that they have transferred custody of the samples to the laboratory.

6.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) SAMPLES

There are generally three types of QA/QC samples collected during field sampling programs: blank samples, duplicate samples and spiked samples. Each of these types of samples serves a specific purpose. Blank samples provide a measure of contamination that may have been introduced into a sample set in either of two ways:

- In the field while the samples were being collected or transported, or
- In the laboratory during sample preparation or analysis.

Duplicate samples provide a quantitative measurement of the reproducibility of sample results and as such, provide a mechanism for measuring the accuracy of sample collection and laboratory analysis procedures. Spiked samples can be used in several ways; the most common of which are the determination of parameter recoveries and reproducibility of results. Parameter recoveries are important in discussing data usability and the possible use of pseudo-correction factors for site sample results.

6.1 Blanks

There are four basic types of blank samples: trip blanks, field blanks, laboratory calibration blanks, and laboratory reagent (or method) blanks. Only trip blanks and field blanks are utilized by field sampling personnel.

Trip blanks are used to indicate potential contamination due to migration of volatile organic compounds (VOCs) from the air on the site or in the sample shipping containers into the sample. A trip blank consists of laboratory distilled and deionized water in a 40 ml glass vial sealed with a Teflon septum. The blank accompanies the empty sample bottles to the field as well as the samples returning to the laboratory for analysis. Trip blanks are typically included in field sampling events where VOC analysis is to be performed and the sample matrix is water.

Field blanks, also identified as "equipment blanks," are used to determine if certain field sampling or cleaning procedures (e.g., decontamination of field equipment) result in cross-contamination of site samples. Like the trip blank, the field blank is a sample of distilled and deionized water taken to the field with empty sample bottles and analyzed with the site samples. However, unlike the trip blank, the field blank sample is prepared in the field. The field blank will be poured through or over the sampling equipment after the equipment has been decontaminated between sampling points. The field blank will be containerized and labeled in the same manner as other site samples.

Field blanks will be submitted to the laboratory for the same analysis parameters as the field samples. Field blanks will be collected at a frequency of one set per every twenty field samples, but not less than one set per day.

6.2 Duplicate Samples

Duplicate samples are used to assess the accuracy and repeatability of field procedures and laboratory analytical procedures. Duplicate site samples are generally collected so that the laboratory is "blind" to the source of the duplicate. Duplicate samples should be collected by sampling the given matrix in accordance with the procedures established for the project, except that approximately double the quantity of sample should be collected. Since sample recoveries are often a limiting factor as to which samples can be collected as duplicates, initial planning is important to ensure that sufficient sample volume is available for an accurate duplicate.

After collection, the sample will be divided evenly so that each half sample is representative of the whole (i.e., the two samples should be as close to identical as possible). Each sample will then be labeled. The first sample will be labeled with the actual sample location and description. The second sample will be labeled with a fictitious sample identifier known only to the sampler and those responsible for data interpretation. The laboratory should not be informed of the presence of a duplicate sample. Both samples will then submitted in an identical manner and documented on the COC. Analysis should include all parameters required for the original site sample. Blind duplicate samples will be collected at a frequency of one per twenty field samples, but not less than one per day.

6.3 Matrix Spiked Samples

Spiked samples are utilized to potentially improve combined sampling and analytical accuracy. For matrix spiked samples, a selected field sample is collected in triplicate following the same procedure as used for duplicate samples, discussed in Section 6.2. In the laboratory, two of the field samples are spiked with a known concentration of a contaminant of interest. The recovery of the spiked compound is determined after laboratory analysis. The recovery serves as an indicator of the efficiency of the laboratory analysis, and more importantly from the standpoint of the field sampling personnel; the percent recovery can be used as a pseudo-correction factor for other sample results. Sample recoveries outside of a pre-determined control limit can also be used by the personnel responsible for data interpretation to assess the usability of site data.

The two spiked samples are identified as matrix spike and matrix spike duplicate (MS/MSD). MS/MSD samples to be collected as part of this remedial investigation sampling program will be collected in the field at a frequency of one set per twenty field samples, but not less than one per day.

A summary of spiking compounds, method, low and high QC limits for spike recovery and relative percent difference values (RPD) for all matrices are included in Appendix D. Tables listing surrogate compounds, method, and acceptability QC limits for all samples matrices are also included.

7.0 ANALYTICAL PROCEDURES AND LABORATORY TESTING

7.1 Analytical Laboratory

All environmental samples will be analyzed by H2M Labs, Inc., a New York ELAP approved and ASP certified laboratory.

7.2 Sample Analysis

All soil samples will be analyzed by H2M Labs and will include a NYSDEC ASP Category B data package that documents the quality of the analytical work.

As discussed in Section 4.4, a total of approximately 145 soil borings will be conducted with four to eight soil samples retained from varying depths at each boring. Utilizing multiple drill rigs, soil borings will be conducted over a two to three week period with approximately eight to twelve Geoprobe soil borings and four to six hollow stem auger soil borings conducted each day. Based on a soil boring program of ten to fifteen days, approximately 48 to 72 soil samples will be collected each day for laboratory analysis. Depending on the number of field days, between three and four sets of QA/QC samples including a trip blank, field blank, blind duplicate, matrix spike and matrix spike duplicate will be collected each day.

Each soil sample soil sample will be analyzed for polychlorinated biphenyls (PCBs) and RCRA metals. In addition, approximately 20% of the soil samples will also be analyzed for Target Analyte List (TAL) metals (including cyanide and hexavalent chromium), Target Compound List (TCL) volatile organic compounds (VOCs) and TCL semi-volatile organic compounds (SVOCs). Groundwater samples will be analyzed for PCBs, TAL metals (including cyanide and hexavalent chromium), TCL VOCs and TCL SVOCs. Table 1 of the IRM Work Plan includes a summary matrix identifying the proposed number of samples and associated laboratory analyses for each bore hole location.

Analytical results for soil samples will be compared with Recommended Soil Cleanup Objectives identified in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046. Analytical results for groundwater samples will be compared to the NYSDEC Class GA Water Quality Standards.

A summary of the analytical parameters, methods of analysis, required sample containers, preservatives and maximum holding times are shown in Table 7.2.1 for a soil matrix, and Table 7.2.2 for a water matrix.

Table 7.2.1. Soil Matrix Analysis Requirements and Methods

Parameter	Method	Container	Preservative	Max. Holding Time[1]
PCBs	ASPB 10/95 8082	4 oz jar	Cool, 4°C	Extraction completed within 10 days Analysis within 40 days of extraction
TAL Metals	ASPB 10/95 6010B	4 oz jar	Cool, 4°C	6 months
Hex. Chromium	ASPB 10/95 7196A	4 oz jar	Cool, 4°C	24 hours
Mercury	ASPB 10/95 245.1	2 oz jar	Cool, 4°C	26 Days
Cyanide	ASPB 10/95 335.2	4 oz jar	Cool, 4°C	12 days
TCL VOCs	ASPB 10/95 8260B	4 oz jar	Cool, 4°C	10 days
TCL SVOCs	ASPB 10/95 8270C	4 oz jar	Cool, 4°C	Extraction completed within 10 days Analysis within 40 days of extraction

[1] All holding times from VTSR as per NYSDEC ASP Category B

Table 7.2.2. Water Matrix Analysis Requirements and Methods

Parameter	Method	Container	Preservative	Max. Holding Time[1]
PCBs	ASPB 10/95 8082	1-liter amber glass	Cool, 4°C	Extraction within 5 days Analysis within 40 days of extraction
TAL Metals	ASPB 10/95 6010B	1-liter HDPE	Cool, 4°C; HNO_3 to pH<2	6 months
Hex. Chromium	ASPB 10/95 7196A	1-liter HDPE	Cool, 4°C	24 hours
Mercury	ASPB 10/95 245.1	500 ml HDPE	Cool, 4°C; HNO_3 to pH<2	26 days
Cyanide	ASPB 10/95 335.2	250 ml HDPE	Cool, 4°C; NaOH to pH>12	12 days
TCL VOCs	ASPB 10/95 8260B	40ml vial	Cool, 4°C	7 days
TCL SVOCs	ASPB 10/95 8270C	1-liter amber glass	Cool, 4°C	Extraction within 5 days Analysis within 40 days of extraction

[1] All holding times from VTSR as per NYSDEC ASP Category B

8.0 CALIBRATION PROCEDURES

8.1 Calibration Practices

Instruments and equipment to be used in the analytical laboratory are controlled by a formal calibration program. The program verifies that the equipment is of the proper type, range, accuracy and precision to provide data compatible with the desired requirements. All instruments and equipment that measure a quantity with performance expected at a stated level are subject to calibration. Calibration may be performed by lab personnel using reference standards or externally by calibration agencies or equipment manufacturers.

Implementation of the laboratory calibration program is the responsibility of the Laboratory Manager and Analysts. The analytical laboratory's QA Manager shall review the implementation of the program.

There are two types of calibration pertinent to the laboratory procedures to be utilized during the analysis of samples from the Bethpage Community Park remedial investigation. These are operational and periodic.

1. Operational calibration, which is routinely performed as part of the instrument usage, such as the development of a standard curve for use with an Atomic Absorption (AA) Spectrophotometer or Inductively Coupled Plasma (ICP) Spectrophotometer. Operation calibration is generally performed for instrument systems.
2. Periodic calibration is performed at prescribed intervals for equipment such as balances and controlled ovens. In general, equipment that can be calibrated periodically is considered a distinct single purpose unit and is relatively stable in performance.

Whenever possible recognized procedures, such as those published by ASTM, USEPA or the equipment manufacturers shall be utilized.

8.2 Calibration Frequency

Instruments and equipment shall be calibrated at prescribed intervals and/or as part of the operational use of the equipment. Frequency shall be based on the type of equipment, inherent stability, manufacturer's recommendations, values provided in recognized standards, intended use, effect of error upon the measurement process and prior experience.

8.3 Calibration Reference Standards

Two (2) types of reference standards are used by H2M Labs for calibration. These are physical and chemical.

- Physical Standards, such as weights for calibrating balances and certified thermometers for calibrating working thermometers and ovens, are generally used for periodic calibration.
- Chemical Standards are primarily used for operational calibration.

Whenever possible, physical and chemical reference standards shall have known relationships to nationally recognized standards (e.g., National Bureau of Standards) or accepted values of natural physical constants. If national standards do not exist, the basis for the reference standard shall be documented.

8.4 Calibration Failure

Equipment that fails calibration or becomes inoperable during use shall be removed from service and segregated to prevent inadvertent use, or shall be tagged to indicate it is out of calibration. Such equipment shall be repaired and satisfactorily recalibrated before reuse.

8.5 Calibration Records

Records shall be prepared and maintained for each piece of equipment subject to calibration. Records demonstrating accuracy of reference standards shall also be maintained.

For instruments and equipment that are calibrated on an operational basis, calibration generally consists of determining instrumental response against compounds of known composition and concentration or the preparation of a standard response curve of the same compound at different concentrations. Records of these calibrations can be maintained in several ways:

1. The calibration data can be kept with analytical sample data.
2. A logbook can be prepared for each instrument that contains all calibration data.

Method 1 provides response factor information, etc., directly with the analytical data so that the data can be readily processed and verified. Also, the raw data package is completed as a unit.

Method 2 provides an on-going record of calibration undertaken for a specific instrument. However, to process and verify the analytical data, the log must be used in conjunction with the raw data.

For operational calibration of instrumentation used for this project, calibration data will be included with the raw analytical data and maintained in project files.

9.0 DATA REDUCTION, VALIDATION AND REPORTING

9.1 Data Reduction

Laboratory data reduction and analysis for organic analyses involves relating a "peak area" to the mass of a constituent. This is accomplished by digital computers. The computer hardware and software is designed to allow the analyst to create libraries or files of calibration standards, and then compare raw sample data against these libraries to produce a report that contains the identification and qualification of constituents present in the sample. The analysts manually check the computer-reduced data.

Inorganic analyses are performed with instruments of varying electronic sophistication, but in all instances, data reduction and analysis involves essentially the generation of a standard calibration curve, and then comparing the instrument readout against the calibration curve to obtain a "Quantity" of constituent. The concentration is then manually calculated. The calculated results are manually entered into the computer system.

9.2 Data Validation

Data validation is a process in which field and analytical data quality is assessed relative to the data quality objectives. The validation process examines the acceptability or validity of data, and assesses data usability. Although data validation usually refers to analytical laboratory data, the same review process is applied to all field-generated data.

In order to ensure that data collected in the field is consistent and accurate, standard reporting forms (Soil Boring Logs, Groundwater Sampling/Development Logs, etc.) are utilized. These forms are then checked by the Field Team Supervisor to confirm that the information is complete and that any calculations are correct. A minimum of 20% of the field data reports is checked in this manner. If, during the initial review process, errors are identified, the remaining 80% of the data set are reviewed. Items to be checked by the reviewer will be dependent on the type of data being reported, but in general include the following:

- Proper sampling methods and equipment were employed
- Proper sample preservation methods were followed
- Chain of custody information is complete
- Proper QA/QC samples were utilized.
- Equipment decontamination procedures were followed, and
- Instruments were properly calibrated.

9.3 Data Reporting

The following are applicable to data presentation:

1. The final presentation shall be checked in accordance with data verification requirements and approved by the Laboratory QA Manager.

2. Data presentation will include:

   a) Sample identification number used by H2M Labs and/or the sample identification provided to the laboratory (if different).

   b) Chemical parameters analyzed, reported values, and units of measurements.

   c) Detection limit of the analytical procedure, if the reported value is less than the detection limit.

   d) Data for a chemical parameter are reported with consistent significant figures for all samples.

   e) Results of QA/QC sample analysis, if appropriate.

   f) Footnotes referenced to specific data, if required to explain reported values.

The format for reporting will follow the NYSDEC ASP category B data package.

9.4 Laboratory Data Validation

All soil and groundwater analytical results, including QA/QC sample results will be subjected to independent data validation following the NYSDEC Data Usability Summary Report guidelines. Independent data validation will be performed by Ms. Judy Harry of Data Validation Services. Laboratory data packages will be reviewed for quality control parameters including, but not limited to custody documentation, holding times, surrogate and matrix spike recoveries, duplicate correlation, calibration standard and blank performance, instrument performance, blank contamination, matrix interferences and method compliance. Upon completing the data evaluation, a Data Usability Summary Report (DSUR) will be prepared. The DUSR will be included in the project Remedial Action Plan.

H2MGROUP

QAPP FIGURE 1

ORGANIZATION CHART FOR FIELD SAMPLING AND ANALYSIS PROGRAM

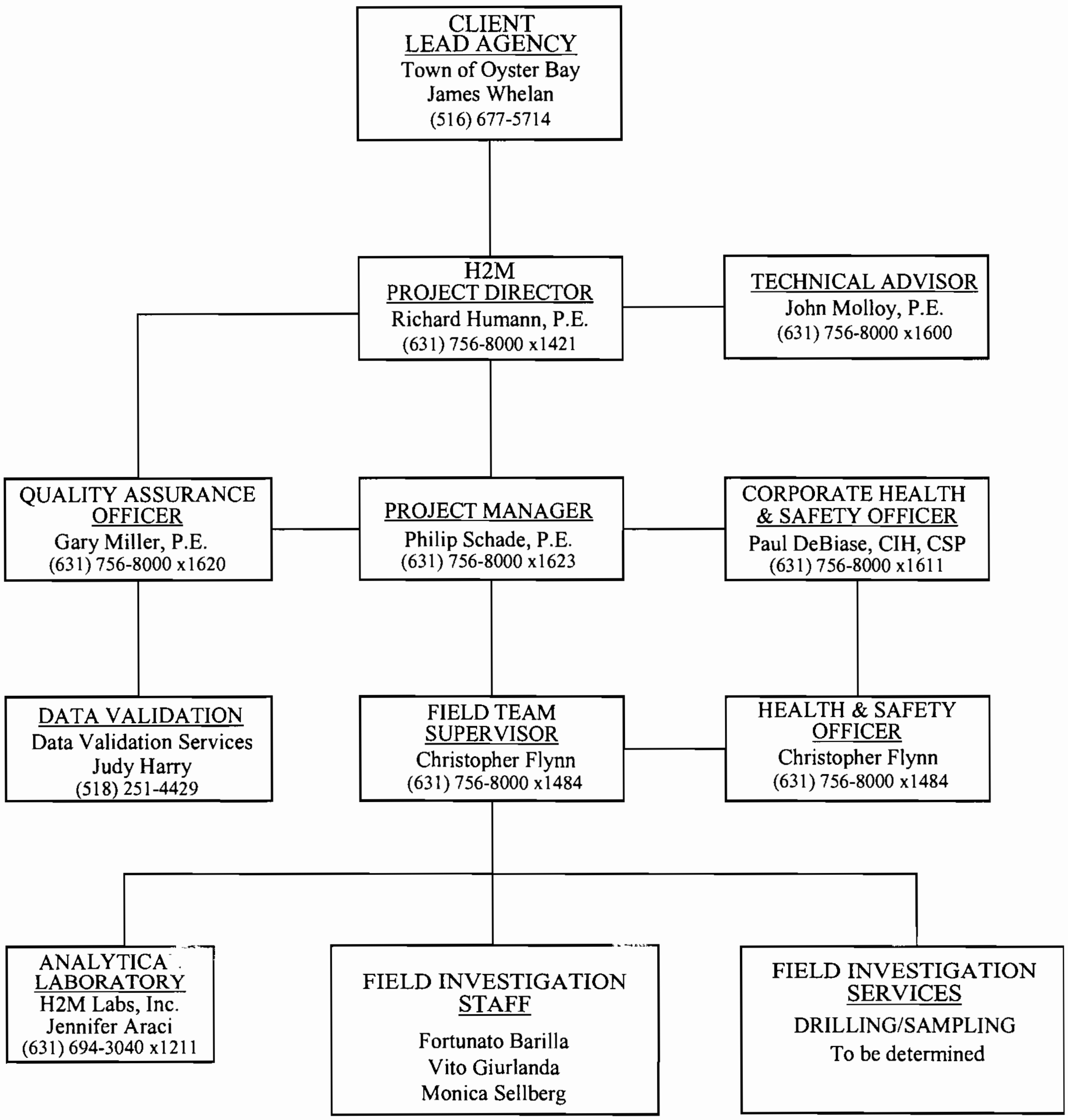


Figure1. Organizational Chart for Field Sampling and Analysis Program

H2M GROUP

QAPP APPENDIX A

SOIL BORING LOG FORM

H2MGROUP

SOIL BORING LOG

H2MGROUP

Sketch Map of Site Area With Drilling Locations

Boring #	MW#	Sheet	of
Project:			
Job#	Site:		
Logged by:	Proj. Eng:	Edited by:	
Drilling Contractor:			
Drill Rig Type/Method:			
Drillers Name:			
Borehole Diam/Drill Bit Type	Total Depth		
	Ref. Elev.		
Hammer Wt:	Drop:		
Start Time:	Date:		
Completion Time:	Date:		
Backfill Time:	Date:		

	1st Water			
Boring Depth (ft.)				
Casing Depth (ft.)				
Water Depth (ft.)				
Time				
Date				

PID/OVA	Sampler Type & Depth	Blow Counts / 6 in	Advance (in.)	Recovered (in.)		Casing Type & Size	Annulus Filler	Depth: Sample Rec. Analyses	Depth: Feet	

H2M GROUP

QAPP APPENDIX B

USCS REFERENCE SHEET

H2MGROUP

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	SECONDARY DESCRIPTIONS
COARSE GRAINED SOILS (GRAINS VISIBLE TO NAKED EYE)	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (<15% FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION >.187" (4.75mm)	GRAVELS WITH FINES (>15% FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SAND (<15% FINES)		SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION <.187" (4.75mm)	SANDS WITH FINES (>15% FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS (GRAINS NOT VISIBLE TO NAKED EYE)	SILTS AND CLAYS	LOW PLASTICITY FINES (Modifiers used at ≥30%)		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OR LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	HIGH PLASTICITY FINES		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

Estimated Percentages

Order of Descriptions:
Soil Type (USCS), color, density/consistancy,moisture, lithology (fines thru coarse), est. K, miscellaneous

Density (Sand and Gravel)

Term	Blows/ft 1.4"ID	2.0"ID	2.5"ID
Very loose	0-4	0-6	0-7
loose	4-10	5-12	7-18
medium dense	10-29	12-37	18-51
dense	29-47	37-60	51-88
very dense	>47	>60	>88

Consistency (Silt and Clay)

Term	Blows/ft 1.4"ID	2.0"ID	2.5"ID
very soft	0-2	0-2	0-2
soft	2-4	2-4	2-4
medium stiff	4-8	4-9	4-9
stiff	8-15	9-17	9-18
very stiff	15-30	17-39	18-42
hard	30-60	39-78	42-85
very hard	>60	>78	>85

Depth to water in boring (time)

Depth to water in well (time and date)

Grain Size Table: 0.003" 0.018" 0.079" 0.187" 0.75" 3.0" 12.0"

Fines (silt and clay)	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

Notes:

Well Graded = Poorly Sorted
Poorly Graded = Well Sorted

H2M GROUP

QAPP APPENDIX C

PARAMETER REPORTING LIMITS
AND LEVELS OF CONCERN

PARAMETER REPORTING LIMITS AND LEVELS OF CONCERN

Matrix: Soil			
Analyte	MDL (mg/kg)	PQL (mg/kg)	Cleanup Objective[1] (mg/kg)
Target Analyte Metals (Method ASPB 10/95 6010A)			
Aluminum (Al)	5.79	20	SB[2]
Antimony (Sb)	1.10	6.0	SB[2]
Arsenic (As)	0.23	1.0	7.5
Barium (Ba)	0.88	20	300
Beryllium (Be)	0.29	0.5	0.16
Cadmium (Cd)	0.32	0.5	1
Calcium (Ca)	6.07	500	SB[2]
Chromium (Cr)	0.22	1.0	10
Cobalt (Co)	0.73	5.0	30
Copper (Cu)	0.22	2.5	25
Iron (Fe)	6.07	10	2,000
Lead (Pb)	0.27	0.3	200-500
Magnesium (Mg)	5.68	500	50
Manganese (Mn)	0.13	1.5	SB[2]
Nickel (Ni)	0.48	4.0	13
Potassium (K)	9.67	500	SB[2]
Selenium (Se)	0.42	0.5	2.0
Silver (Ag)	0.12	1.0	SB[2]
Sodium (Na)	7.92	500	SB[2]
Thallium (Tl)	0.62	1.0	SB[2]
Vanadium V)	0.66	5.0	150
Zinc (Zn)	0.32	2.0	20
Hexavalent Chromium (Method ASPB 10/95 7196A)			
Hex. Chromium (Cr^{+6})	0.15	1.0	-
Mercury (Method ASPB 10/95 245.1)			
Mercury (Hg)	0.02	0.2	0.1
Cyanide (Method ASPB 10/95 335.2)			
Cyanide	0.09	0.5	-

[1] NYSDEC TAGM #4046
[2] Soil background

PARAMETER REPORTING LIMITS AND LEVELS OF CONCERN

Matrix: Water			
Analyte	IDL (mg/l)	PQL (mg/l)	Class GA Water Quality Standards [1] (mg/l)
Target Analyte Metals (Method ASPB 10/95 6010A)			
Aluminum (Al)	0.0163	0.2	-
Antimony (Sb)	0.0024	0.06	0.003
Arsenic (As)	0.0036	0.01	0.025
Barium (Ba)	0.0040	0.2	1.0
Beryllium (Be)	0.0002	0.005	0.003
Cadmium (Cd)	0.0003	0.005	0.005
Calcium (Ca)	0.0149	5.0	-
Chromium (Cr)	0.0006	0.01	0.05
Cobalt (Co)	0.0015	0.05	-
Copper (Cu)	0.0010	0.025	0.2
Iron (Fe)	0.0153	0.1	0.3
Lead (Pb)	0.0012	0.003	0.025
Magnesium (Mg)	0.0140	5.0	35.0
Manganese (Mn)	0.0005	0.015	-
Nickel (Ni)	0.0016	0.04	0.1
Potassium (K)	0.0157	5.0	-
Selenium (Se)	0.0021	0.005	0.01
Silver (Ag)	0.0005	0.01	0.05
Sodium (Na)	0.0658	5.0	20.0
Thallium (Tl)	0.0028	0.01	0.0005
Vanadium V)	0.0017	0.05	-
Zinc (Zn)	0.0011	0.02	2.0
Mercury (Method ASPB 10/95 245.1)			
Mercury (Hg)	0.0001	0.0001	0.0007
Hexavalent Chromium (Method ASPB 10/95 7196A)			
Hex. Chromium (Cr^{+6})	0.0067	0.02	0.05
Cyanide (Method ASPB 10/95 335.2)			
Cyanide	0.00147	0.01	0.2

[1] NYSDEC Class GA Water Quality Standards

PARAMETER REPORTING LIMITS AND LEVELS OF CONCERN

Matrix: Soil			
Analyte	MDL (ug/kg)	PQL (ug/kg)	Cleanup Objective[1] (ug/kg)
Volatile Organic Compounds (Method ASPB 10/95 8260B)			
1,1,1-Trichloroethane	0.55	10	800
1,1,2,2-Tetrachloroethane	0.40	10	600
1,1,2-Trichloroethane	0.18	10	-
1,1-Dichloroethane	0.47	10	200
1,1-Dichloroethene	0.59	10	400
1,2-Dichloroethane	0.47	10	100
1,2-Dichloroethene (total)	0.95	10	250
1,2-Dichloropropane	0.20	10	-
2-Butanone	0.74	10	300
2-Hexanone	0.42	10	-
4-Methyl-2-pentanone	0.39	10	1,000
Acetone	1.68	10	200
Benzene	0.31	10	60
Bromodichloromethane	0.16	10	-
Bromoform	0.25	10	-
Bromomethane	0.31	10	-
Carbon disulfide	0.54	10	2,700
Carbon tetrachloride	0.12	10	600
Chlorobenzene	1.12	10	1,700
Chloroethane	0.60	10	1,900
Chloroform	0.39	10	300
Chloromethane	0.77	10	-
cis-1,3-Dichloropropene	0.17	10	-
Dibromochloromethane	0.14	10	-
Ethylbenzene	0.17	10	5,500
Methylene chloride	3.51	10	100
Styrene	0.08	10	-
Tetrachloroethene	0.84	10	1,400
Toluene	0.11	10	1,500
trans-1,3-Dichloropropene	0.15	10	-
Trichloroethene	0.31	10	700
Vinyl chloride	0.58	10	200
Xylene (total)	0.20	10	1,200

[1] NYSDEC TAGM #4046

PARAMETER REPORTING LIMITS AND LEVELS OF CONCERN

Matrix: Water			
Analyte	MDL (ug/l)	PQL (ug/l)	Class GA Water Quality Standards [1] (ug/l)
Volatile Organic Compounds (Method ASPB 10/95 8260B)			
1,1,1-Trichloroethane	0.48	10	5.0
1,1,2,2-Tetrachloroethane	0.22	10	5.0
1,1,2-Trichloroethane	0.28	10	1.0
1,1-Dichloroethane	0.49	10	5.0
1,1-Dichloroethene	0.60	10	5.0
1,2-Dichloroethane	0.36	10	6.0
1,2-Dichloroethene (total)	0.75	10	-
1,2-Dichloropropane	0.39	10	1.0
2-Butanone	0.73	10	50
2-Hexanone	0.23	10	50
4-Methyl-2-pentanone	0.20	10	-
Acetone	0.58	10	50
Benzene	0.28	10	1.0
Bromodichloromethane	0.36	10	50
Bromoform	0.25	10	50
Bromomethane	0.61	10	5.0
Carbon disulfide	0.45	10	-
Carbon tetrachloride	0.32	10	5.0
Chlorobenzene	0.27	10	5.0
Chloroethane	0.63	10	5.0
Chloroform	0.32	10	7.0
Chloromethane	0.65	10	5.0
cis-1,3-Dichloropropene	0.14	10	-
Dibromochloromethane	0.25	10	5.0
Ethylbenzene	0.25	10	5.0
Methylene chloride	1.09	10	5.0
Styrene	0.16	10	5.0
Tetrachloroethene	1.49	10	5.0
Toluene	0.34	10	5.0
trans-1,3-Dichloropropene	0.20	10	5.0
Trichloroethene	0.48	10	5.0
Vinyl chloride	0.90	10	2.0
Xylene (total)	0.21	10	5.0

[1] NYSDEC Class GA Water Quality Standards

PARAMETER REPORTING LIMITS AND LEVELS OF CONCERN

Matrix: Soil			
Analyte	MDL (ug/kg)	PQL (ug/kg)	Cleanup Objective[1] (ug/kg)
Semi-Volatile Organic Compounds (Method ASPB 10/95 8270C)			
Phenol	38	330	30
Bis(2-chloroethyl)ether	31	330	-
2-Chlorophenol	35	330	800
1,3-Dichlorobenzene	33	330	1,600
1,4-Dichlorobenzene	38	330	8,500
1,2-Dichlorobenzene	32	330	7,900
2-Methylphenol	36	330	100
2,2'-oxybis(1-chloropropane)	37	330	-
4-Methylphenol	35	330	900
N-Nitroso-di-n-propylamine	35	330	-
Hexachloroethane	36	330	-
Nitrobenzene	35	330	200
Isophorone	33	330	4,400
2-Nitrophenol	36	330	330
2,4-Dimethylphenol	35	330	-
Bis(2-chloroethoxy)methane	44	330	-
2,4-Dichlorophenol	31	330	400
1,2,4-Trichlorobenzene	32	330	3,400
Naphthalene	34	330	13,000
4-Chloroaniline	32	330	220
Hexachlorobutadiene	36	330	-
4-Chloro-3-methylphenol	31	330	240
2-Methylnaphthalene	31	330	36,400
Hexachlorocyclopentadine	31	330	-
2,4,6-Trichlorophenol	28	330	-
2,4,5-Trichlorophenol	25	830	100
2-Chloronaphthalene	34	330	-
2-Nitroaniline	29	830	500
Dimethylphthalate	23	330	2,000
Acenaphthylene	27	330	41,000
2,6-Dinitotoluene	21	330	1,000
3-Nitroaniline	26	830	500
Acenaphthene	28	330	50,000
2,4-Dinitrophenol	22	830	200
4-Nitrophenol	22	830	100
Dibenzofuran	31	330	6,200
2,4-Dinitrotoluene	24	330	-
Diethylphthalate	25	330	7,100
4-Chlorophenyl-phenylether	28	330	-
Fluorene	22	330	50,000
4-Nitroaniline	23	830	500
4,6-Dinitro-2-methylphenol	20	830	-
N-Nitrosodiphenylamine	25	330	-
4-Bromophenyl-phenylether	28	330	-
Hexachlorobenzene	29	330	410
Pentachlorophenol	19	330	1,000
Phenanthrene	27	330	50,000
Anthracene	22	330	50,000
Carbazole	39	330	-
Di-n-butyl phthalate	27	330	8,100
Fluoranthene	26	330	50,000
Pyrene	25	330	50,000
Butyl benzyl phthalate	24	330	50,000
3,3'-Dichlorobenzidine	24	330	-
Benzo(a)anthracene	26	330	224
Chrysene	23	330	-
Bis(2-ethylhexyl)phthalate	18	330	50,000
Di-n-octyl phthalate	28	330	50,000
Benzo(b)fluoranthene	56	330	224
Benzo(k)fluoranthene	106	330	224
Benzo(a)pyrene	29	330	61
Indeno(1,2,3-cd)pyrene	27	330	3,200
Dibenzo(a,h)anthracene	26	330	140
Benzo(g,h,I)perylene	30	330	50,000

1 NYSDEC TAGM #4046

PARAMETER REPORTING LIMITS AND LEVELS OF CONCERN

Matrix: Water			
Analyte	MDL (ug/l)	PQL (ug/l)	Class GA Water Quality Standards [1] (ug/l)
Semi-Volatile Organic Compounds (Method ASPB 10/95 8270C)			
Phenol	1.89	10	1.0
Bis(2-chloroethyl)ether	2.20	10	5.0
2-Chlorophenol	1.85	10	-
1,3-Dichlorobenzene	1.81	10	3.0
1,4-Dichlorobenzene	1.91	10	3.0
1,2-Dichlorobenzene	2.04	10	3.0
2-Methylphenol	1.82	10	-
2,2'-oxybis(1-chloropropane)	2.20	10	-
4-Methylphenol	2.99	10	-
N-Nitroso-di-n-propylamine	2.70	10	50
Hexachloroethane	2.08	10	5.0
Nitrobenzene	1.82	10	0.4
Isophorone	2.01	10	50
2-Nitrophenol	2.08	10	-
2,4-Dimethylphenol	2.02	10	50
Bis(2-chloroethoxy)methane	2.17	10	5.0
2,4-Dichlorophenol	2.05	10	5.0
1,2,4-Trichlorobenzene	1.87	10	5.0
Naphthalene	1.75	10	10
4-Chloroaniline	2.22	10	5.0
Hexachlorobutadiene	2.07	10	0.5
4-Chloro-3-methylphenol	2.50	10	-
2-Methylnaphthalene	2.04	10	-
Hexachlorocyclopentadine	1.13	10	5.0
2,4,6-Trichlorophenol	1.43	10	-
2,4,5-Trichlorophenol	1.53	25	-
2-Chloronaphthalene	1.40	10	10
2-Nitroaniline	1.73	25	5.0
Dimethylphthalate	2.45	10	50
Acenaphthylene	1.47	10	-
2,6-Dinitotoluene	1.95	10	5.0
3-Nitroaniline	1.80	25	5.0
Acenaphthene	1.62	10	20
2,4-Dinitrophenol	1.08	25	10
4-Nitrophenol	2.71	25	-
Dibenzofuran	1.76	10	-
2,4-Dinitrotoluene	2.45	10	50
Diethylphthalate	2.84	10	50
4-Chlorophenyl-phenylether	2.22	10	-
Fluorene	1.83	10	50
4-Nitroaniline	1.95	25	5.0
4,6-Dinitro-2-methylphenol	1.73	25	-
N-Nitrosodiphenylamine	2.85	10	50
4-Bromophenyl-phenylether	1.83	10	-
Hexachlorobenzene	1.52	10	0.04
Pentachlorophenol	1.82	10	5.0
Phenanthrene	1.35	10	50
Anthracene	1.54	10	50
Carbazole	0.51	10	-
Di-n-butyl phthalate	1.74	10	-
Fluoranthene	1.92	10	50
Pyrene	1.50	10	50
Butyl benzyl phthalate	1.58	10	50
3,3'-Dichlorobenzidine	1.14	10	5.0
Benzo(a)anthracene	1.42	10	0.002
Chrysene	1.43	10	0.002
Bis(2-ethylhexyl)phthalate	2.19	10	5.0
Di-n-octyl phthalate	2.15	10	50
Benzo(b)fluoranthene	1.70	10	0.002
Benzo(k)fluoranthene	1.40	10	0.002
Benzo(a)pyrene	1.45	10	ND
Indeno(1,2,3-cd)pyrene	1.13	10	0.002
Dibenzo(a,h)anthracene	1.16	10	-
Benzo(g,h,I)perylene	1.19	10	-

[1] NYSDEC Class GA Water Quality Standards

PARAMETER REPORTING LIMITS AND LEVELS OF CONCERN

Matrix: Soil			
Analyte	MDL (ug/kg)	PQL (ug/kg)	Cleanup Objective [1] (ug/kg)
Polychlorinated Biphenyls (PCBs) (Method ASPB 10/95 8082)			
Aroclor 1016	0.395	33	1,000/10,000 [2]
Aroclor 1221	*	67	1,000/10,000 [2]
Aroclor 1232	*	33	1,000/10,000 [2]
Aroclor 1242	*	33	1,000/10,000 [2]
Aroclor 1248	*	33	1,000/10,000 [2]
Aroclor 1254	0.583	33	1,000/10,000 [2]

1 NYSDEC TAGM #4046
2 1,000 ug/kg Surface/10,000 ug/kg Sub-surface
* PCB-1010/1260 covers range of all aroclors

Matrix: Water			
Analyte	MDL (ug/l)	PQL (ug/l)	Class GA Water Quality Standards [1] (ug/l)
Polychlorinated Biphenyls (PCBs) (Method ASPB 10/95 8082)			
Aroclor 1016	0.101	1.0	0.09
Aroclor 1221	*	2.0	0.09
Aroclor 1232	*	1.0	0.09
Aroclor 1242	*	1.0	0.09
Aroclor 1248	*	1.0	0.09
Aroclor 1254	0.123	1.0	0.09

1 NYSDEC Class GA Water Quality Standards
* PCB-1016/1260 covers range of all aroclors

H2M GROUP

QAPP APPENDIX D

QC LIMITS FOR SPIKING AND SURROGATE COMPOUNDS

Volatile Organics – Method ASPB 10/95 8260B
(NYSDEC ASP Category B)

Matrix: Soil

Analyte	SPK* (ug/kg)	QC Limits Low	QC Limits High
1,1,1-Trichloroethane	50	78	127
1,1,2,2-Tetrachloroethane	50	72	152
1,1,2-Trichloroethane	50	80	139
1,1-Dichloroethane	50	67	141
1,1-Dichloroethene	50	65	142
1,2-Dichloroethane	50	65	147
1,2-Dichloroethene (total)	100	57	150
1,2-Dichloropropane	50	81	132
2-Butanone	50	30	226
2-Hexanone	50	59	163
4-Methyl-2-pentanone	50	64	170
Acetone	50	50	187
Benzene	50	71	142
Bromodichloromethane	50	78	137
Bromoform	50	81	142
Bromomethane	50	58	144
Carbon disulfide	50	52	143
Carbon tetrachloride	50	70	136
Chlorobenzene	50	85	128
Chloroethane	50	33	153
Chloroform	50	68	140
Chloromethane	50	33	149
cis-1,3-Dichloropropene	50	78	131
Dibromochloromethane	50	82	136
Ethylbenzene	50	80	129
Methylene chloride	50	46	157
Styrene	50	85	126
Tetrachloroethene	50	67	144
Toluene	50	83	129
trans-1,3-Dichloropropene	50	59	147
Trichloroethene	50	72	145
Vinyl chloride	50	20	164
Xylene (total)	150	79	133

Matrix Spike / Matrix Spike Duplicate Spiking Information:

Analyte	SPK* (ug/kg)	QC Limits Low	QC Limits High	RPD**
1,1-Dichloroethene	50	59	172	22
Benzene	50	66	142	21
Chlorobenzene	50	60	133	21
Toluene	50	59	139	21
Trichloroethene	50	62	137	24

Matrix Spike / Matrix Spike Duplicate Surrogate Information:

Analyte	SPK* (ug/kg)	QC Limits Low	QC Limits High
1,2-Dichloroethane-d4	50	70	121
4-Bromofluorobenzene	50	59	113
Toluene-d8	50	84	138

* SPK = Spike concentration
** RPD = Relative Percent Difference

Volatile Organics – Method ASPB 10/95 8260B

(NYSDEC ASP Category B)

Matrix: Water

Analyte	SPK* (ug/l)	QC Limits Low	QC Limits High
1,1,1-Trichloroethane	50	66	126
1,1,2,2-Tetrachloroethane	50	77	120
1,1,2-Trichloroethane	50	82	116
1,1-Dichloroethane	50	77	114
1,1-Dichloroethene	50	67	120
1,2-Dichloroethane	50	76	120
1,2-Dichloroethene (total)	100	78	128
1,2-Dichloropropane	50	81	115
2-Butanone	50	74	121
2-Hexanone	50	76	119
4-Methyl-2-pentanone	50	79	121
Acetone	50	71	125
Benzene	50	77	116
Bromodichloromethane	50	78	118
Bromoform	50	75	121
Bromomethane	50	50	136
Carbon disulfide	50	61	126
Carbon tetrachloride	50	64	126
Chlorobenzene	50	72	124
Chloroethane	50	71	116
Chloroform	50	75	119
Chloromethane	50	70	114
cis-1,3-Dichloropropene	50	79	116
Dibromochloromethane	50	75	125
Ethylbenzene	50	68	128
Methylene chloride	50	80	112
Styrene	50	72	124
Tetrachloroethene	50	59	133
Toluene	50	70	125
trans-1,3-Dichloropropene	50	77	120
Trichloroethene	50	72	121
Vinyl chloride	50	66	117
Xylene (total)	150	78	133

Matrix Spike / Matrix Spike Duplicate Spiking Information:

Analyte	SPK* (ug/l)	QC Limits Low	QC Limits High	RPD**
1,1-Dichloroethene	50	61	145	14
Benzene	50	76	127	11
Chlorobenzene	50	75	130	13
Toluene	50	76	125	13
Trichloroethene	50	71	120	14

Matrix Spike / Matrix Spike Duplicate Surrogate Information:

Analyte	SPK* (ug/l)	QC Limits Low	QC Limits High
1,2-Dichloroethane-d4	50	76	114
4-Bromofluorobenzene	50	86	115
Toluene-d8	50	88	110

* SPK = Spike concentration
** RPD = Relative Percent Difference

Semi-Volatile Organics – Method ASPB 10/95 8270C

(NYSDEC ASP Category B)

Matrix: Soil

Analyte	SPK* (ug/kg)	QC Limits Low	QC Limits High
Phenol	1667	25	131
Bis(2-chloroethyl)ether	1667	39	111
2-Chlorophenol	1667	48	116
1,3-Dichlorobenzene	1667	39	111
1,4-Dichlorobenzene	1667	25	123
1,2-Dichlorobenzene	1667	28	116
2-Methylphenol	1667	41	131
2,2'-oxybis(1-chloropropane)	1667	28	146
4-Methylphenol	1667	37	137
N-Nitroso-di-n-propylamine	1667	40	124
Hexachloroethane	1667	48	126
Nitrobenzene	1667	48	126
Isophorone	1667	33	131
2-Nitrophenol	1667	39	135
2,4-Dimethylphenol	1667	39	135
Bis(2-chloroethoxy)methane	1667	20	148
2,4-Dichlorophenol	1667	46	130
1,2,4-Trichlorobenzene	1667	25	129
Naphthalene	1667	47	117
4-Chloroaniline	1667	25	133
Hexachlorobutadiene	1667	11	135
4-Chloro-3-methylphenol	1667	45	135
2-Methylnaphthalene	1667	13	151
Hexachlorocyclopentadiene	1667	13	119
2,4,6-Trichlorophenol	1667	53	131
2,4,5-Trichlorophenol	1667	48	132
2-Chloronaphthalene	1667	47	123
2-Nitroaniline	1667	41	131
Dimethylphthalate	1667	10	162
Acenaphthylene	1667	36	132
2,6-Dinitotoluene	1667	48	136
3-Nitroaniline	1667	11	167
Acenaphthene	1667	51	133
2,4-Dinitrophenol	1667	11	100
4-Nitrophenol	1667	22	156
Dibenzofuran	1667	45	131
2,4-Dinitrotoluene	1667	48	134
Diethylphthalate	1667	24	156
4-Chlorophenyl-phenylether	1667	50	130
Fluorene	1667	55	129
4-Nitroaniline	1667	14	136
4,6-Dinitro-2-methylphenol	1667	47	107
N-Nitrosodiphenylamine	1667	27	135
4-Bromophenyl-phenylether	1667	50	142
Hexachlorobenzene	1667	56	154
Pentachlorophenol	1667	12	161
Phenanthrene	1667	57	154
Anthracene	1667	61	135
Carbazole	1667	47	143
Di-n-butyl phthalate	1667	44	144
Fluoranthene	1667	61	135
Pyrene	1667	58	136
Butyl benzyl phthalate	1667	49	135
3,3'-Dichlorobenzidine	1667	20	132
Benzo(a)anthracene	1667	56	136
Chrysene	1667	38	170
Bis(2-ethylhexyl)phthalate	1667	33	193
Di-n-octyl phthalate	1667	45	155
Benzo(b)fluoranthene	1667	43	147
Benzo(k)fluoranthene	1667	53	159
Benzo(a)pyrene	1667	47	141
Indeno(1,2,3-cd)pyrene	1667	26	156
Dibenzo(a,h)anthracene	1667	15	185
Benzo(g,h,l)perylene	1667	25	153

Matrix Spike / Matrix Spike Duplicate Spiking Information:

Analyte	SPK* (ug/kg)	QC Limits Low	QC Limits High	RPD**
1,2,4-Trichlorobenzene	1667	38	107	23
1,4-Dichlorobenzene	1667	28	104	27
2,4-Dinitrotoluene	1667	28	89	47
2-Chlorophenol	2500	25	102	50
4-Chloro-3-methylphenol	2500	26	103	33
4-Nitrophenol	2500	11	114	50
Acenaphthene	1667	31	137	19
N-Nitro-di-n-propylamine	1667	41	126	38
Pentachlorophenol	2500	17	109	47
Phenol	2500	26	90	35
Pyrene	1667	35	142	36

Matrix Spike / Matrix Spike Duplicate Surrogate Information:

Analyte	SPK* (ig/kg)	QC Limits Low	QC Limits High
1,2-Dichlorobenzene-d4***	1667	20	130
2,4,6-Tribromophenol	2500	19	122
2-Chlorophenol-d4***	2500	20	130
2-Fluorobiphenol	1667	30	115
2-Fluorophenol	2500	25	121
4-Terphenyl-d4	1667	18	137
Nitrobenzene-d5	1667	23	120
Phenol-d5	2500	24	113

* SPK = Spike concentration
** RPD = Relative Percent Difference
*** Advisory

Semi-Volatile Organics – Method ASPB 10/95 8270C

(NYSDEC ASP Category B)

Matrix: Water

		QC Limits	
Analyte	SPK* (ug/l)	Low	High
Phenol	50	25	131
Bis(2-chloroethyl)ether	50	39	111
2-Chlorophenol	50	48	116
1,3-Dichlorobenzene	50	18	122
1,4-Dichlorobenzene	50	25	123
1,2-Dichlorobenzene	50	28	116
2-Methylphenol	50	41	131
2,2'-oxybis(1-chloropropane)	50	28	146
4-Methylphenol	50	37	137
N-Nitroso-di-n-propylamine	50	40	124
Hexachloroethane	50	41	119
Nitrobenzene	50	48	126
Isophorone	50	33	131
2-Nitrophenol	50	41	121
2,4-Dimethylphenol	50	39	135
Bis(2-chloroethoxy)methane	50	20	148
2,4-Dichlorophenol	50	46	130
1,2,4-Trichlorobenzene	50	25	129
Naphthalene	50	47	117
4-Chloroaniline	50	25	133
Hexachlorobutadiene	50	11	135
4-Chloro-3-methylphenol	50	45	135
2-Methylnaphthalene	50	13	151
Hexachlorocyclopentadiene	50	13	119
2,4,6-Trichlorophenol	50	53	131
2,4,5-Trichlorophenol	50	48	132
2-Chloronaphthalene	50	47	123
2-Nitroaniline	50	41	131
Dimethylphthalate	50	10	162
Acenaphthylene	50	36	132
2,6-Dinitotoluene	50	48	136
3-Nitroaniline	50	11	167
Acenaphthene	50	51	133
2,4-Dinitrophenol	50	11	101
4-Nitrophenol	50	22	156
Dibenzofuran	50	45	131
2,4-Dinitrotoluene	50	48	134
Diethylphthalate	50	24	156
4-Chlorophenyl-phenylether	50	50	130
Fluorene	50	55	129
4-Nitroaniline	50	14	136
4,6-Dinitro-2-methylphenol	50	47	107
N-Nitrosodiphenylamine	50	27	135
4-Bromophenyl-phenylether	50	50	142
Hexachlorobenzene	50	56	154
Pentachlorophenol	50	12	124
Phenanthrene	50	57	135
Anthracene	50	61	135
Carbazole	50	10	135
Di-n-butyl phthalate	50	44	144
Fluoranthene	50	61	135
Pyrene	50	58	136
Butyl benzyl phthalate	50	49	135
3,3'-Dichlorobenzidine	50	20	132
Benzo(a)anthracene	50	56	136
Chrysene	50	38	170
Bis(2-ethylhexyl)phthalate	50	33	193
Di-n-octyl phthalate	50	45	155
Benzo(b)fluoranthene	50	43	147
Benzo(k)fluoranthene	50	53	159
Benzo(a)pyrene	50	47	141
Indeno(1,2,3-cd)pyrene	50	26	156
Dibenzo(a,h)anthracene	50	15	185
Benzo(g,h,l)perylene	50	25	153

Matrix Spike / Matrix Spike Duplicate Spiking Information:

Analyte	SPK* (ug/l)	QC Limits Low	QC Limits High	RPD**
1,2,4-Trichlorobenzene	50	39	98	28
1,4-Dichlorobenzene	50	36	97	28
2,4-Dinitrotoluene	50	24	96	38
2-Chlorophenol	75	27	123	40
4-Chloro-3-methylphenol	75	23	97	42
4-Nitrophenol	75	10	80	50
Acenaphthene	50	46	118	31
N-Nitro-di-n-propylamine	50	41	116	38
Pentachlorophenol	75	9	103	50
Phenol	75	12	110	42
Pyrene	50	26	127	31

Matrix Spike / Matrix Spike Duplicate Surrogate Information:

Analyte	SPK* (ug/l)	QC Limits Low	QC Limits High
1,2-Dichlorobenzene-d4***	50	16	110
2,4,6-Tribromophenol	75	10	123
2-Chlorophenol-d4***	75	33	110
2-Fluorobiphenol	50	43	116
2-Fluorophenol	75	21	110
4-Terphenyl-d4	50	33	141
Nitrobenzene-d5	50	35	114
Phenol-d5	75	10	110

* SPK = Spike concentration
** RPD = Relative Percent Difference
*** Advisory

Polychlorinated Biphenyls (PCBs) – Method ASPB 10/95 8082
(NYSDEC ASP Category B)

Matrix: Soil

Analyte	SPK* (ug/kg)	QC Limits Low	QC Limits High
Aroclor 1016	166.7	52	124
Aroclor 1260	166.7	62	118

Matrix Spike / Matrix Spike Duplicate Spiking Information:

Analyte	SPK* (ug/kg)	QC Limits Low	QC Limits High	RPD**
Aroclor 1016	166.7	52	124	40
Aroclor 1260	166.7	62	118	40

Matrix Spike / Matrix Spike Duplicate Surrogate Information:

Analyte	SPK* (ug/kg)	QC Limits Low	QC Limits High
Decachlorobiphenyl	13.33	30	150
Tetrachloro-m-xylene	13.33	30	150

* SPK = Spike concentration
** RPD = Relative Percent Difference

Polychlorinated Biphenyls (PCBs) – Method ASPB 10/95 8082
(NYSDEC ASP Category B)

Matrix: Water

Analyte	SPK* (ug/l)	QC Limits Low	QC Limits High
Aroclor 1016	5	42	134
Aroclor 1260	5	34	146

Matrix Spike / Matrix Spike Duplicate Spiking Information:

Analyte	SPK* (ug/l)	QC Limits Low	QC Limits High	RPD**
Aroclor 1016	5	42	134	40
Aroclor 1260	5	34	146	40

Matrix Spike / Matrix Spike Duplicate Surrogate Information:

Analyte	SPK* (ug/l)	QC Limits Low	QC Limits High
Decachlorobiphenyl	0.2	30	150
Tetrachloro-m-xylene	0.2	30	150

* SPK = Spike concentration
** RPD = Relative Percent Difference

Target Analyte Metals and Cyanide
Concentration Levels for Spiked Sample Analyses

Analyte	Water Matrix (ug/l)	Soil Matrix (ug/kg)
Aluminum (Al)	2,000	-
Antimony (Sb)	500	50,000
Arsenic (As)	40	4,000
Barium (Ba)	2,000	200,000
Beryllium (Be)	50	5,000
Cadmium (Cd)	50	5,000
Calcium (Ca)	-	-
Chromium (Cr)	200	20,000
Hex. Chromium (Cr^{+6})	200	200
Cobalt (Co)	500	50,000
Copper (Cu)	250	25,000
Iron (Fe)	1,000	100,000
Lead (Pb)	20	2,000
Magnesium (Mg)	-	-
Manganese (Mn)	500	50,000
Mercury (Hg)	1.0	500
Nickel (Ni)	500	50,000
Potassium (K)	-	-
Selenium (Se)	10	1,000
Silver (Ag)	50	5,000
Sodium (Na)	-	-
Thallium (Tl)	50	5,000
Vanadium (V)	500	50,000
Zinc (Zn)	500	50,000
Cyanide (CN)	100	100,000

QC Limits: 75 – 125 As per NYSDEC ASP Requirements.
RPD Value: 20% +/- CRDL As per NYSDEC ASP Requirements.

H2M GROUP

APPENDIX C

COMMUNITY AIR MONITORING PLAN

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

<u>Community Air Monitoring Plan</u>

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all <u>ground intrusive</u> activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during <u>non-intrusive</u> activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

<u>VOC Monitoring, Response Levels, and Actions</u>

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring partculate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level *and in* preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.