ADDITIONAL INVESTIGATION REPORT

5140 Site
Yorkville, New York

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Client

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1 Introduction

WSP Environment & Energy, now part of WSP USA Corp., on behalf of 5140 Commercial Drive, LLC, has prepared this report documenting additional investigation activities performed at the 5140 Site in Yorkville, New York. The focus of the investigations was polychlorinated biphenyl-impacted (PCB-impacted) soil that had been previously detected at the site, primarily around a concrete pad on the east side of the facility's main building. Remedial excavations performed in 2011 removed a significant amount of affected soil near the north and south sides of the pad; however, structural concerns associated with the pad and building foundations prevented removal of all of the soil containing PCBs at concentrations above the relevant New York State standard for industrial sites. The remaining impacted soils were undefined and the residual concentrations were high enough to suggest a potential groundwater impact, either as mobile constituents (i.e., dissolved or sorbed to mobile colloids) or as a light non-aqueous phase liquid (LNAPL). Previous investigations had reported concentrations of dissolved PCBs in groundwater samples from the site; however, the sampling methods and the integrity of the existing monitoring well network were suspect.

The additional investigations were performed to delineate the residual PCB-affected soil and assess the water quality at the site and included the installation of direct-push soil borings near the concrete pad, an evaluation of the existing monitoring well network, and, during a follow-up phase of work, installation and sampling of four newly-installed groundwater monitoring wells. The work also included an evaluation of soil piles along the southern property line, which were reportedly excavated and placed onsite by the adjacent property owner. These soils were uncharacterized. A detailed description of the activities and the results are presented below.

All of the activities were undertaken with the objective of completing the site characterization and preparing the property for enrollment in the New York State Department of Environmental Conservation's (NYSDEC's) Brownfield Cleanup Program (BCP). It is the intention of 5140 Commercial Drive, LLC, to complete the remaining remedial activities (detailed in the *Conclusions and Recommendations* section below) under the oversight of the Department with the goal obtaining a Certificate of Completion and redeveloping the property for sale to a commercial/light industrial user (already under contract) in 2013.

1.1 Report Organization

The format and content of this *Additional Investigation Report* was developed based on the guidance in the NYSDEC's *Technical Guidance for Site Investigation and Remediation (DER-10),* dated May 2010. The report is divided into five sections, including this introduction (Section 1):

- Section 2 describes the site location and setting, the operational history, and provides background on the previous investigation and remedial measures implemented at the site.
- Section 3 details the additional investigation activities performed to complete the site characterization.
- Section 4 provides a summary of the investigation results.
- Section 5 summarizes the findings of the investigations and presents WSP's recommendations for additional remedial work at the site.

It is important to note that this report builds on investigation and remediation work previously performed at the site, some of which was not available for first-hand review at the time this document was prepared. As such, the previous work summary included in the background section of this report relies primarily on summaries provided by the Palmerton Group Inc., of East Syracuse, New York, in the following reports:

- Soil Excavation Work Plan, dated August 1, 2011
- Soil Excavation Summary Report and Request for Spill Closure (Spill Number 1107657), dated October 18, 2011

Both reports were submitted by Palmerton Group to the NYSDEC Region 6 SPILLS Division in Watertown, New York, for review and approval. Additional information for the site background was obtained through outside sources, such as publically-available databases.

2 Background

The 5140 Site is situated on 1.9 acres in a commercial and industrial area along the Utica –Yorkville city limits in the eastern portion of Oneida County (Figure 1). Originally constructed in 1957 for Westinghouse Electric Corporation, the facility building consists of 23,000 square feet of manufacturing and office space that was used by Westinghouse to perform electrical equipment repair. Westinghouse operated the facility for 29 years, after which it was sold in 1986 to Eastern Electric Apparatus Repair Company. Eastern Apparatus operated at the facility for 12 years selling the property to the Grand Eagle Motor Repair Company in 1998. The property was purchased by 5140 Commercial Drive, LLC in 2002, and leased to KJ Electric, which conducted electrical equipment repair at the site until 2009. The property has been vacant since 2009 and is currently under contract for sale to a company for warehousing and assembly operations.

Prominent site features include an 18,000-square-foot concrete block and sheet metal main manufacturing building with an attached 5,000-square-foot single story concrete block office building (northeast corner) and a 50-foot-wide by 60-foot-long elevated (between 3 to 4 feet above the ground surface) concrete pad on the eastern side of the building near the southeast corner (Figure 2). A paved entranceway and parking area are present along the east side of the property with the paved drive extending around the southern portion of the building to what was reportedly the loading dock and rail bay. A series of soil piles forming a 5- to 6-foot-high berm, reportedly created by the adjacent landowner, marks the southern and eastern property lines (the southern berm encroaches on the 5140 Site and is the subject of an investigation discussed below). The balance of the site is covered by grass and landscaped areas.

The Site is adjoined to the west by Meelan's Carpet One Floor & Home, a residential flooring center; and to the east by two narrow (approximately 50 feet wide) strips of vacant land owned by DI Highway Sign & Structure, Inc., (directly adjacent) and the 5150 Corporation (further east), and beyond those properties, by Yorkville Battery, a discount battery retailer (Figure 2). The site is bounded to the south and southwest by O.W. Hubbell & Sons, Inc., and by DI Highway Sign & Structure. Portions of the Hubbell property (Hubbell Galvanizing) also extend to the northwest fronting on commercial drive directly west of Meelan's Carpet. The site is bounded to the north by Commercial Drive and Route 5A and further to the north by Harbor Freight & Tools, a discount tool retailer. The Site is in a light industrial and commercially-zoned area.

2.1 Previous Investigation

The 5140 Site has been the subject of several environmental investigations focused on PCBs dating back to the mid-1990s, including:

- a 1995 Phase I Environmental Assessment performed by GaiaTech, Inc., of Chicago, Illinois
- a 2010 Phase I Environmental Assessment by Sanborn, Head, & Associates (SHA) of Concord, New Hampshire
- a 2010 Phase II investigation conducted by Geoscience Technical Services, Inc., of Clinton, New York
- a 2011 follow-up investigation and remedial excavation performed by the Palmerton Group, Inc., of East Syracuse, New York

GaiaTech's initial evaluation identified PCBs as a potential concern at the site and, during a limited follow-up investigation south of the main building, confirmed that PCBs were present in soil samples at concentrations ranging from 9,000 to 148,000 micrograms per kilogram (µg/kg; Figure 2). The report also indicated that "a (PCB) cleanup had been performed at the site but no documentation was found" and that the site had reportedly been listed under the NYSDEC's inactive hazardous waste program for "suspected PCB contamination" since 1986. However, neither GaiaTech nor successive investigators (including WSP) were able to confirm the listing. GaiaTech speculated that the PCB cleanup may have resolved the listing.

As part of a potential sale of the property, SHA performed a Phase I and Geoscience performed Phase II work. The SHA Phase I indicated that the adjacent property owner, O.W. Hubbell & Sons, Inc., performed a remedial action in 2000 to address "widespread PCB contamination" on a narrow strip of land along the southern property line that was formerly part of the 5140 Site (Figure 2). Hubbell reported that 232 tons[1] of affected soil was removed from the purchased parcel and shipped offsite as hazardous waste for disposal at a permitted disposal facility.

The follow-up Phase II investigation performed by Geoscience later that year confirmed PCBs were present in the soil south of the main building and in areas east of the main building. The highest concentrations of PCBs, up to 2,930,000 µg/kg, were detected in soil samples collected directly north and south of the concrete pad (Figure 2). Evidence of PCBs was noted as shallow as 18 inches below ground surface (bgs) suggesting a surface release near the pad. Geoscience also installed four 1-inch-diameter groundwater monitoring wells: two along the southern property line (designated MW-1 and MW-2) and two along the northern property line (designated MW-3 and MW-4; Figure 3). Saturated conditions were encountered between 6 and 9 feet bgs; the well screens were installed between 5 and 15 feet bgs. Purge water collected from the two southern wells reportedly contained evidence of petroleum contamination (oil as a separate phase visible in the purge water) and one PCB congener, Aroclor 1260, was detected at 141 micrograms per liter (µg/l) in a groundwater sample collected from one of the southern wells. No information was available on the sampling methodology or the groundwater flow direction.

The work performed by the Palmerton Group in March and September 2011 expanded on the Geoscience investigation results revealing substantive PCB-affected soil in the subsurface directly adjacent the concrete pad. Twenty-eight soil borings were installed to depths of up to 4 feet bgs north and south of the pad (near the previous borings installed by Geoscience) to delineate the extent of PCBs over the 25,000 µg/kg standard used for screening (no borings were installed beneath the pad). Although the investigation data indicated that the PCBs in soil were defined, visibly-stained soil was discovered during the subsequent remedial excavations that extended below 4 feet bgs (See Excavation Limits on Figure 3). Additional affected soil was removed from both the northern and southern excavations, which eventually exposed the footers of the concrete pad at 5.5 feet bgs. Confirmation soil samples collected from the floor of the excavations, and test pits subsequently excavated adjacent to each side of the pad, indicated that soils containing concentrations as high as 5,800,000 µg/kg were present as deep as 8 feet bgs. The affected soils were left in place due to concerns about the structural integrity of the pad and the adjacent building foundations.

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[1] WSP reviewed the NYSDEC's Hazardous Waste Manifest Database and confirmed that, in 2000, O.W. Hubbell shipped 210,279 kilograms (232 tons) of soil classified as B007 – Other PCB wastes, including contaminated soil, solids, sludge, clothing, rags, and dredge material.

3 Investigation

The previous investigations and remedial work indicated that PCBs remained a potential environmental concern east of the main building near the concrete pad. Soil containing PCB concentrations above the (protection to public health) screening level were left in place around the footprint of the pad due to structural concerns and, because of the way investigation and remedial excavation unfolded, the residual soils were undefined both horizontally and vertically (i.e., the excavation and test pits depths of 5.5 feet and 8 feet bgs exceeded the depth of the surrounding delineation points at 4 feet bgs). Moreover, the pre-excavation sampling did not evaluate the soils beneath or directly east of the pad.

Of equal concern was the disposition of the affected soils directly above the saturated zone, which suggested the potential for impact to the groundwater either as LNAPL, mobile constituents, or both. Evidence of a separate oily phase was noted in purge water recovered from one of the site wells shortly after it was installed and dissolved PCBs were detected in a groundwater sample collected from the site. The existing wells, however, did not appear to have been installed or sampled using methods appropriate for evaluating PCB impacts to groundwater. WSP suspected that the PCB detections in groundwater were due to the presence of suspended particles in the sample as a result of poor well construction and inappropriate sampling techniques. Traditional high-volume purge methods, using submersible pumps or bailers, agitate the water column and artificially suspend sediment and colloidal material (where hydrophobic or generally immiscible compounds like PCBs are typically sorbed) within the well casing resulting in samples that do not represent the actual mobile load in the formation (i.e., the samples are biased high). More importantly, the wells were not installed in locations that would provide any useful information (beyond the groundwater elevation and flow direction) about the concrete pad area where the highest concentrations of PCBs in soil were detected.

The soil piles along the southern property line that were reportedly excavated from the adjacent parcel and placed on the site by the adjacent property owner also present a potential concern. No data was available to confirm the whether the soils contained PCBs.

3.1 Scope of Work

WSP conducted a series of investigations at the site in the summer and fall of 2012 designed to complete the soil and groundwater characterization at the site. Specifically, the investigations were performed to:

- evaluate the extent of PCB-affected soil adjacent to and potentially beneath the concrete pad
- characterize the PCBs (if present) in the soil piles along the southern property line
- determine the groundwater elevation and flow direction
- evaluate the water quality at the site near the concrete pad and in the area where PCBs were previously reported to be dissolved in groundwater

The work was conducted in two phases, the first of which, performed in July 2012, included a soil investigation of the concrete pad area, and evaluation of the soil piles along the southern property line, and a preliminary groundwater assessment using the existing monitoring well network. The concrete pad investigation included the installation of 20 direct-push soil borings directly north and south of the pad where the highest concentrations of PCBs were detected, in the area directly east of the pad, and beneath the pad itself. The borings were positioned to delineate the known extent of affected soil and, by collecting samples from the soil interval directly above the water table, evaluate the area for evidence of LNAPL (i.e., visual inspection). A detailed explanation of the borings and the sampling scheme are presented in the *Concrete Pad Investigation* section below.

The soil pile evaluation included the installation of four hand auger borings within the soil piles along the southern property line (no samples were collected from the soil piles along the eastern boundary of the site, which do not encroach on the 5140 Site property). The preliminary groundwater evaluation was limited to an assessment of the integrity of the wells installed in the northern and southern portions of the site. These wells were installed by

Geoscience in 2010 with little documentation regarding their construction (e.g., screened interval, seal placement, etc.) and WSP was unable to verify in advance of the field event whether the wells were appropriate for analytical sampling. Thus, for the first phase of investigation, WSP inspected the wells to see if they were serviceable, collected groundwater elevation measurements, checked the wells for LNAPL using an interface meter and, after a survey, used the elevations to determine the flow direction at the site. These data were used to aid in locating additional monitoring wells during the follow-up phase of work described below.

The second phase of work was performed in November and early December 2012 and included the installation and sampling of four new monitoring wells at the site. The wells were positioned to provide water quality data directly adjacent to and downgradient of the areas where the highest concentrations of PCBs were detected in soil. All of the wells were sampled in accordance with the U.S. Environmental Protection Agency's (EPA's) 1996 Low Flow (Minimum Drawdown) Ground-Water Sampling Procedures to minimize the amount of artificially suspended colloidal material in the well.

WSP also abandoned the existing monitoring wells (i.e., wells MW-1 through MW-4) concurrent with the new well installation activities (Figure 3). These wells were not positioned appropriately with respect to the concrete pad, were not, based on the results of the July evaluation, suitable for analytical (PCB) sampling, and, because of the poor construction, were potential conduits for vertical migration of affected soil or surface water to the underlying groundwater. The wells were abandoned in accordance with the New York State well decommissioning guidelines, which are summarized below.

All of the work was performed in accordance with the NYSDEC's DER-10; the NYSDEC's Commissioners Policy CP-51, dated October 21, 2010 (specifically for the hand auger investigation), Commissioner's Policy CP-43, dated November 3, 2009 (well abandonment only); and WSP's Standard Operating Procedures (SOPs; Appendix A). Downhole equipment was decontaminated before work began, between each borehole, and at the end of site activities using a portable steam jenny or non-phosphate soap and laboratory-supplied deionized water, as appropriate, in accordance with WSP's SOPs 15, 16, 18 and 19. Analytical sampling included the collection of quality assurance/quality control samples, such as laboratory-blind duplicates, equipment blanks, and matrix spike and matrix spike duplicate samples (in accordance with WSP's SOP 21), and third party data validation. Validation of the laboratory data was performed by ECT.Con, Inc., of Palm Coast, Florida, in accordance with the National Functional Guidelines for data review. The laboratory data and data usability summary reports are presented in Appendices B and C, respectively.

WSP's approach for the investigations was designed to assess the nature and extent of PCB-affected media at the site and use that data to select the most appropriate regulatory path within the BCP. The BCP allows for the use of published, land use-based cleanup criteria or site-specific criteria, depending on the cleanup tract selected. For the investigations described below, WSP used the New York State protection to groundwater value of 3,200 µg/kg as an interim criterion to evaluate the soil investigation results. This standard provides a conservative benchmark to compare the analytical results, based on the anticipated future land use.

3.1.1 Concrete Pad Investigation

A total of 20 soil borings were installed to delineate the horizontal and vertical extent of PCB affected soil in the concrete pad area. Sixteen soil borings, designated SB-1 through SB-16, were advanced from the ground surface to the top of the water table in a series of concentric rings around the pad (Figure 3). The innermost ring, consisting of borings SB-1 through SB-3, was installed directly adjacent to the pad, with borings SB-1 and SB-3 placed in those areas where the highest concentrations were detected in samples recovered from the test pits. The samples were collected from below the bottom depth of the test pits in the 2-foot-thick depth interval directly above the water table (i.e., approximately 9 to 11 feet bgs) to provide vertical delineation of PCB-affected soils.

The second and third rings were positioned further to the north, south, and east of the pad. For the areas north and south of the pad, the second ring borings, SB-4 and SB-5 in the north and SB-8 through SB-10 in the south, were installed along the boundaries of the remedial excavations (Figure 3). Samples were collected from the 2-foot-thick depth interval directly above the water table to provide information on the horizontal extent of the PCB-affected soil detected in the test pit samples. Similar samples were collected from the borings installed east of the pad (i.e., borings SB-6 and SB-7); although the positions were not tied to the previous excavation bounds (no excavation was conducted east of the pad). The third, outer ring of soil borings, designated SB-11 through SB-16, was installed to provide additional delineation beyond the areas that were excavated, if necessary. Samples were collected from the same 2-foot-thick depth interval as the inner rings with additional samples from shallower soils if any evidence of a release was noted.

The remaining four borings, designated SB-17 through SB-20, were drilled through the concrete pad to evaluate the soils beneath the structure (Figure 3). Borings SB-17 and SB-18 were installed in the northwest and northeast corners of the pad, respectively, to characterize the soils adjacent to the northern excavation with borings SB-19 and SB-20 installed in the opposite corners to evaluate the soil directly adjacent to the southern excavation. All four borings were advanced through core holes in the concrete created using an electric coring machine. Samples were collected from the same 2-foot-thick depth interval as the borings installed adjacent to the pad (as measured from the elevated surface of the structure) with additional samples to be collected from the shallower soils if any evidence of a release was noted.

The soil borings were drilled using a track-mounted direct-push drill rig operated by Zebra Environmental, Inc., of Albany, New York. Continuous soil samples were collected by advancing a 4-foot-long, 2-inch inside-diameter (ID) macro-core sampler equipped with a single use acetate liner from the ground surface (or in the case of the pad samples, though the holes cored in the concrete) to the water table in accordance with WSP's SOP 24 (Appendix A). Upon retrieving each sample, the acetate liner was cut open to access the sample and the soil was logged for grain size, color, moisture content, staining (if present), and odor. The soil cores were subdivided into 2-foot increments for headspace analysis using a photoionization detector to determine if any volatile organic compounds were present in the vadose zone (WSP SOP 22). Logs for the borings are presented in Appendix D.

Analytical samples were collected from the macro-core sampler using a dedicated stainless steel spoon. The soil was placed in a dedicated stainless steel bowl and homogenized in accordance with WSP's SOP 11 before being transferred to the laboratory-supplied glassware (Appendix A). The samples were then packed in coolers with wet ice and delivered by WSP directly to Accutest Laboratories' (Accutest) service center in Syracuse, New York. The samples were shipped from the service center via overnight courier to Accutest's Marlborough, Massachusetts, location, for analysis of PCB's by U.S. Environmental Protection Agency (EPA) Method 8020. All of the samples were handled in accordance with WSP's SOP 20.

The borings were backfilled with hydrated bentonite and capped with material to match the surrounding grade once the sampling activities were completed. Each boring location was marked with a pin-flag or white spray paint and later surveyed by Richard Rybinski, of Manlius, New York, a New York-licensed land surveyor.

3.1.2 Soil Pile Characterization

Four hand auger borings, designated HA-1 through HA-4, were installed in the soil piles along the southern property boundary to assess their PCB content, if any (Figure 3). The sampling scheme was based on the estimated volume of the material (approximately 250 cubic yards; 5 feet wide, 5 feet tall, and 250 feet long) and the recommended sampling frequency for imported or exported soils outlined in Table 4 of the NYSDEC's *CP-51 – Soil Cleanup Guidance*. The sample locations were positioned near the top of the triangular-shaped piles at roughly equidistant points along the long axis.

The soil samples were collected by advancing the hand auger from the surface of the pile to a depth of approximately 2 feet below the top of the pile in accordance with WSPs SOP 9. The sample was homogenized, transferred to the appropriate laboratory-supplied glassware, and delivered to the Accutest facility in Syracuse, New York, using the same procedures listed above. Each sample location was backfilled with native soil at the conclusion of the sampling activities and marked with a pin-flag. Mr. Rybinski surveyed the locations after the onsite activities were completed.

3.1.3 Preliminary Groundwater Assessment

Four existing monitoring wells, MW-1 through MW-4, were gauged using an electronic interface probe to measure the depth to water, verify the total depth of the well, and evaluate the potential presence of LNAPL (Figure 3). Each well was uncapped prior to conducting the gauging activities and the water level was allowed to equilibrate with the ambient barometric pressure for a period of 15 minutes. WSP performed an inspection during the equilibration period to verify the integrity of the well components, including the casing plug, concrete pad and protective cover, and the annular seal, if visible.

Depth-to-water and total depth measurements were recorded in the field notebook for later use in determining the elevation of the groundwater surface and flow direction. All of the wells were surveyed by Mr. Rybinski after the onsite gauging activities were completed.

3.1.4 Monitoring Well Installation

Four new monitoring wells, designated MW-5 through MW-8, were installed at the site to evaluate the water quality (Figure 4). Two of these wells were positioned directly adjacent to the remedial excavation limits to evaluate the groundwater quality near the test pits excavated north (MW-5) and south (MW-6) of the concrete pad where the highest soil concentrations were detected during the remedial excavations. The wells were placed outside the previous remedial excavation limits to ensure the wells would not be damaged should future remedial excavations become necessary. A third well, MW-7, was installed northeast of the pad to characterize the downgradient water quality, based on the groundwater flow direction interpreted during the preliminary investigations. The fourth well, MW-8, was installed south of the pad adjacent to well MW-2. Samples from this well would be used to evaluate the water quality in the area where the potential LNAPL and dissolved PCBs were previously reported. All of the newly installed wells were subsequently sampled using the low flow protocol to ensure that samples were representative of the true mobile load (i.e., the dissolved constituents, if any, and those that are found partitioned to the mobile colloidal fraction). The groundwater monitoring wells were installed on November 15 and 16, 2012, by Parratt Wolff, Inc., of Syracuse, New York, using a vehicle-mounted drill rig equipped with 4.25-inch ID hollow-stem augers (HSAs). The boreholes for the wells were advanced from the ground surface to a maximum depth of 18 feet bgs. Continuous soil samples were collected ahead of the HSAs using a 2-inch ID split-spoon sampler to allow for soil classification (grain size, color, moisture content, density, and visible staining, if present), headspace screening (using a photoionization detector), and identification of the water table in accordance with WSP's SOPs 22 and 24 (Appendix A). Boring logs for each well are included in Appendix D.

Upon reaching the target depth, the borings were converted to groundwater monitoring wells by installing 10 feet of 2-inch ID 0.010-inch continuous-wrap polyvinyl chloride (PVC) screen fitted with a section of 2-inch ID PVC riser sufficient to reach the surface. Each well casing was positioned in the borehole such that several feet of the screen extended above the water table to ensure that the well would intercept any LNAPL that may be present at the groundwater interface. The total depth of each well ranged from 17 to 18 feet bgs (Table 1). The annulus surrounding the screened interval of each well was then backfilled with clean silica filter sand (to a level approximately 2 feet above the top of the screen), sealed with hydrated bentonite pellets, and completed with a flush-mounted steel protective casing. Well as-built diagrams are included with the boring logs in Appendix D.

The wells were developed using surge blocks and electric submersible pumps. WSP collected water quality measurements during development of the wells to monitor the temperature, pH, specific conductance, turbidity, and dissolved oxygen (DO) using a portable water quality meter. The development activities continued until all the monitoring parameters (except turbidity and DO) had stabilized. Turbidity was monitored until the measured value declined below 100 nephelometric turbidity units (NTUs) and the purge water appeared clear. Development of monitoring well MW-5 was problematic due to slow recharge, and ultimately, the process was terminated after approximately five well volumes were removed and the purge water appeared clear. WSP believes that the formation around MW-5 is of slightly lower permeability than elsewhere in the study area resulting in the low yield. The difficulties in development likely resulted in the higher than anticipated NTUs during the November sampling event (see discussion below).

The newly installed wells were allowed to stand undisturbed (for equilibration) for approximately two weeks before gauging or sampling activities were performed (see below). The location and top of casing elevation of each well was surveyed by Mr. Rybinski. Location and elevation data for the wells are presented in Table 2.

3.1.5 Abandonment of Existing Wells

The four previously existing monitoring wells, MW-1 through MW-4, were abandoned using the case-pulling methodology presented in CP-43 (Figure 3). The bottom of the 1-inch ID PVC well was first knocked out using steel rods inserted into the well bore. The casing was then pulled using the winch on the drill rig while simultaneously installing grout (through the well case and out the bottom of the well) as the PVC was removed from the ground. Each borehole was backfilled with grout to a depth of approximately 1 foot bgs. The top of each well, including the concrete pad and metal protective casing, was then excavated, and ferrous utility markers were embedded in the excavation to warn any future excavator of the position of the former well. The surface excavations were then backfilled with clean topsoil fill and the surface was restored to match the surrounding grade. The well casings, concrete pad, and other debris were placed in DOT-approved 55-gallon steel drums for later offsite disposal in accordance with state and federal regulations.

3.1.6 Well Gauging and Low Flow Groundwater Sampling

Newly installed monitoring wells MW-5 through MW-8 were gauged and sampled on November 29, 2012 (Figure 4). Each well was uncapped and allowed to stand undisturbed (for equilibration with the atmosphere) for a minimum of 1 hour before gauging and sampling. The measurements were made to the nearest 0.01-foot using an electronic interface meter (to determine if LNAPL was present at the groundwater interface), and the results were recorded in the field notebook. Groundwater elevations are presented in Table 1.

The wells were sampled using the low flow purge protocol in accordance with WSP's SOP 3B and the techniques outlined in the EPA's 1996 Low Flow (Minimum Drawdown) Ground-Water Sampling Procedures. The wells were purged using a peristaltic pump fitted with a length of dedicated 3/8-inch outside-diameter tubing with the intake set at the midpoint of the saturated screened interval in each well. Purge rates were limited to between 0.2 and 0.5 liters per minute, as per the guidance. Temperature, pH, specific conductance, DO, turbidity, oxygen-reduction potential (ORP), and drawdown were monitored every 3 to 5 minutes during the purge process using a flow-through cell and an electronic water-level indicator. Groundwater sampling monitoring forms for the purge process are presented in Appendix E.

Water quality samples were collected directly from the pump once the field parameters stabilized (±10-percent for temperature, turbidity, DO, and ORP; ±0.1 unit for pH; ± 3-percent for specific conductance; and drawdown variance less than 0.3 feet) and the turbidity readings were less than 10 NTUs. The exception was well MW-5, where WSP was unable to achieve a turbidity level below 27.8 NTUs. Subsequent analysis of the MW-5 samples showed trace concentrations of PCBs, which were likely related to the elevated NTUs (see results section below). In response, WSP returned to the site on December 20, 2012, and resampled MW-5 to verify the results. Samples collected from the well during the follow-up event were below the recommended NTU levels for the low flow protocol.

All of the samples from both sampling events were labeled, packed on ice, and shipped by overnight carrier to Accutest Laboratories for analysis of PCBs by EPA Method 8082. All samples were maintained and shipped in accordance with WSP's SOP 20 (Appendix A). Analytical laboratory and data usability reports are presented in Appendices B and C, respectively.

4 Findings

The investigations at the 5140 Site included the installation of 24 soil borings (including those later converted to wells) in the southeast portion of the site to depths between 12 and 18 feet bgs. Soil logs from the borings installed outside of the remedial excavation boundaries indicate that the site is generally underlain by sand and sand and gravel mixtures at the surface, a silt unit extending as deep as 8 feet bgs, and an interval of gravelly sand extending to a minimum depth of approximately 18 feet bgs (i.e., the depth of the deepest monitoring well). The silt is typically light brown to brown, moderately dense, and locally reworked (especially near the building and concrete pad) at the surface. The silt grades with depth to sandy silt, typically between 4 to 6 feet bgs. The underlying sandy gravel interval typically consists of brown fine to medium-grained sand and sub-rounded gravel with varying amounts of silt. The unit is medium dense to dense. Medium-grained sand (fill material) was encountered directly beneath the concrete pad overlying the native soil and areas within the remedial excavation appeared to be backfilled with loose sand and gravel. Logs for the borings and monitoring wells installed at the site are provided in Appendix D.

Saturated conditions were encountered in the sandy gravel unit between approximately 8.5 and 11.5 feet bgs. This broad range in water table depth observed during drilling is partially due to variations in surface elevation, and the vagaries of estimating the groundwater interface based on soil cores, some of which may have poor recoveries due to the wet conditions. Nevertheless, this range of depths to saturated soil is consistent with previous observations at the site and is in-line with the measured groundwater depths presented below. No staining, odors, or other evidence of LNAPL was noted in the soil profiles.

4.1 Concrete Pad Results

The analytical results from the concrete pad investigation indicate that PCBs were present in a number of the samples; however, the concentrations detected were significantly lower than those detected during earlier investigations and were below the protection to groundwater standard for industrial sites of 3,200 µg/kg. Total PCB concentrations, for example, ranged from non-detectable levels in a number of the outer ring samples to a high of only 2,677 µg/kg in the sample from SB-19 at the southwest corner of the concrete pad (Table 1; Figure 5). The highest concentrations were generally detected in borings directly adjacent to the concrete pad with lower or non-detectable concentrations further from the pad consistent with the previous results.

4.2 Soil Piles Investigation Results

Concentrations of total PCBs in the soil samples collected from the four hand auger borings installed along the axis of the southern soil piles were similar in magnitude to those detected in the concrete pad investigations. Trace levels of PCBs were detected in all of the borings except HA-3 (8,090 µg/kg) where the concentrations were above the protection to groundwater standard of 3,200 µg/kg (Table 3, Figure 5).

4.3 Preliminary Groundwater Investigation Results

The results of the preliminary groundwater investigation indicated that all four wells were constructed of 1-inch polyvinyl chloride casing that appeared to have been installed in borings drilled during a direct-push investigation. Although the well covers were in good condition and all four wells were fitted with plugs, WSP was unable to confirm whether the wells were installed using proper well construction techniques. The borehole annulus surrounding the casing in at least one of the wells, MW-4, was observed to be open with no apparent annular seal (Figure 3).

Depth to water measurements collected from each well ranged from 9.85 to 10.92 feet below top of casing (Table 2). Total depths ranged from 13.70 to 14.45 feet below top of casing, and the bottom of each well was noted to be soft due to potential silt deposition in the screened interval. No LNAPL was measured on the groundwater surface in any of the wells, nor was residual oil observed on the interface probe during the well gauging activities.

Groundwater elevations calculated from the depth to water measurements ranged from 414.39 feet above mean sea level (amsl) at MW-4 in the northeast corner of the property to 414.73 feet amsl at MW-1 at the southwest corner of the site (Table 2; Figure 6). These elevations, when plotted, yield a groundwater flow direction towards the northeast. This interpretation places monitoring well MW-1, upgradient of the concrete pad investigation area with wells MW-2, MW-3, and MW-4 located side gradient of this area.

4.4 Follow-up Groundwater Investigation Results

Depth to water measurements collected on November 29, 2012, from the newly installed wells ranged from 9.67 to 10.51 feet below top of casing (Table 2). Groundwater elevations calculated from these measurements range from 414.28 feet amsl in MW-5 and MW-7 northeast of the concrete pad to 414.55 feet amsl at MW-8 near the southern property boundary (Figure 7). During follow-up sampling on December 20, 2012, depth to water measurements ranged from 8.41 to 9.31 feet below top of casing, indicating an increase in elevation of the water table by approximately one foot between sampling events. Groundwater elevations in December ranged from 415.46 feet amsl in MW-7 to 415.81 feet amsl in MW-8. No LNAPL was measured on the groundwater surface in any of the wells during either sampling event, nor was residual oil observed on the interface probe during the well gauging activities.

The groundwater elevation data collected during both the November and December 2012 sampling events indicate a groundwater flow direction that is consistent with the southwest to northeast groundwater flow direction determined during the July 2012 preliminary groundwater investigation, which is shown on Figure 6. The gradient at the site, as measured between wells MW-7 and MW-8, was a relatively shallow 0.0026.

4.4.1 Groundwater Analytical Results

PCBs were not detected above the reporting limits or the method detection limits in the samples collected from MW-6, MW-7, and MW-8 on November 29, 2012 (Table 4; Figure 4). The analytical results indicate that two PCB Aroclors were present in the sample collected from MW-5 on November 29th, at estimated concentrations of 0.14 µg/l (Aroclor 1254) and 0.20 µg/l (Aroclor 1260). Both of these concentrations exceeded the evaluation criterion of 0.09 µg/l for PCBs in groundwater; however, the concentrations detected were likely biased high by the presence of elevated turbidity in the sample collected from this well. The follow-up sample from MW-5, which had measured NTUs within the limits specified by the low flow protocol, did not contain detectable levels of PCBs.

5 Conclusions and Recommendations

The investigations at the 5140 Site confirm that PCBs are present at the site. Analytical data collected for the concrete pad investigation, however, show that the affected soils that were left in place after the remedial excavation are limited in extent and do not appear to extend beneath the pad. Concentrations of PCBs detected in samples collected beneath and directly adjacent to these soils are four orders of magnitude lower, are below the protection to groundwater standard of 3,200 µg/kg, and are surrounded by trace to non-detectable levels of PCBs in samples collected from the outer ring of borings. These data define the residual PCB-affected soils both horizontally and vertically. Moreover, the lack of any visual staining, odors, or other evidence of impacted soil at the water table strongly suggests that the majority of the PCB mass remains within the vadose zone.

The groundwater investigations indicate that PCBs are not present as mobile constituents in the groundwater and there is no evidence of LNAPL at the site. These results are consistent with the soil findings and also support the conclusion that the detections of dissolved-phase PCBs from well MW-2 reported by Geoscience in 2010 were likely due to inappropriate sampling methods (i.e., the previous detection of dissolved PCBs were a false positive related to the agitation of the water column and the suspension of colloidal material in the well casing). Based on these data, no additional soil or groundwater investigation is warranted.

Analytical data from the soil piles investigation indicate that PCBs are present. Although relatively low in comparison to the residual PCB concentrations near the concrete pad, the concentrations at HA-3 are more than twice the protection to groundwater standard and, thus, represent a potential ongoing source of PCBs to the groundwater.

5.1 Technical Recommendations

The investigations performed at the site beginning in the 1990s, including those performed by WSP in 2012, have demonstrated that the extent of PCBs at the site is limited. Soil borings installed in 2010 and 2011 revealed that the bulk of the PCB mass was located adjacent to the facility’s concrete pad and subsequent remedial excavations removed most, but not all of the impacted soil. WSP’s 2012 soil evaluation showed that the residual PCBs detected at the base of those remedial excavations were confined to a discrete interval within the soil profile (above the water table) and did not extend horizontally beyond the bounds of the excavation. The follow-up groundwater investigation described above demonstrated that the PCBs have not impacted the groundwater quality at the site.

It is important to note, however, that, while these results indicate the extent of PCB-affected media is limited, PCBs were detected at concentrations above the protection to groundwater standard in several samples recovered from the base of the 2011 remedial excavations. WSP is proposing to excavate those residual soils for offsite disposal. These excavations would likely require shoring or other engineering control to ensure the safe removal of the affected soil without destabilizing the concrete pad or the building. Removal of the impacted soil would minimize the potential threat to the environment and limit the number of restrictions on the future use of the site. An impermeable cap, such as asphalt paving or other appropriate cover system, should also be considered for those areas of the site south of the pad and the main building where low levels of PCBs were detected (during previous investigations) in the surface soils. The cover system would minimize any potential exposure and limit infiltration and the risk for future impact to the site groundwater.

Offsite disposal should also be considered for the southern soil piles. Samples from at least one location show that the soil contains PCBs at concentrations above the protection to groundwater standard. Additional sampling below the piles may be necessary depending on the type and condition of the surface below the piles (i.e., whether the piles were placed on paved or other impermeable surfaces or on uncovered ground).

5.2 Regulatory Recommendations

WSP believes that these results, along with those from the previous investigations, are sufficient to demonstrate that the site is eligible to enter the BCP. All of the data gaps that were identified during WSP’s initial review of the site, including the extent of PCBs adjacent to and beneath the concrete pad, the nature and extent of PCBs in the soil piles along the southern property line, and the extent of groundwater impact (including the potential for LNAPL) have been addressed. WSP proposes that the application and enrollment process be completed before performing the proposed remedial action or any additional work at the site. This will provide an opportunity for the NYSDEC to review and comment on the presumptive remedy before it is implemented.

6 Acronyms

amsl	above mean sea level
BCP	Brownfield Cleanup Program
bgs	below ground surface
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
HAS	hollow stem auger
ID	internal diameter
LNAPL	light non-aqueous phase liquid
µg/kg	micrograms per kilogram
µg/l	micrograms per liter
NTU	nephelometric turbidity unit
NYSDEC	New York State Department of Environmental Conservation
ORP	oxygen-reduction potential
PCB	polychlorinated biphenyls
PVC	polyvinyl chloride
SOP	standard operating procedure

Figures

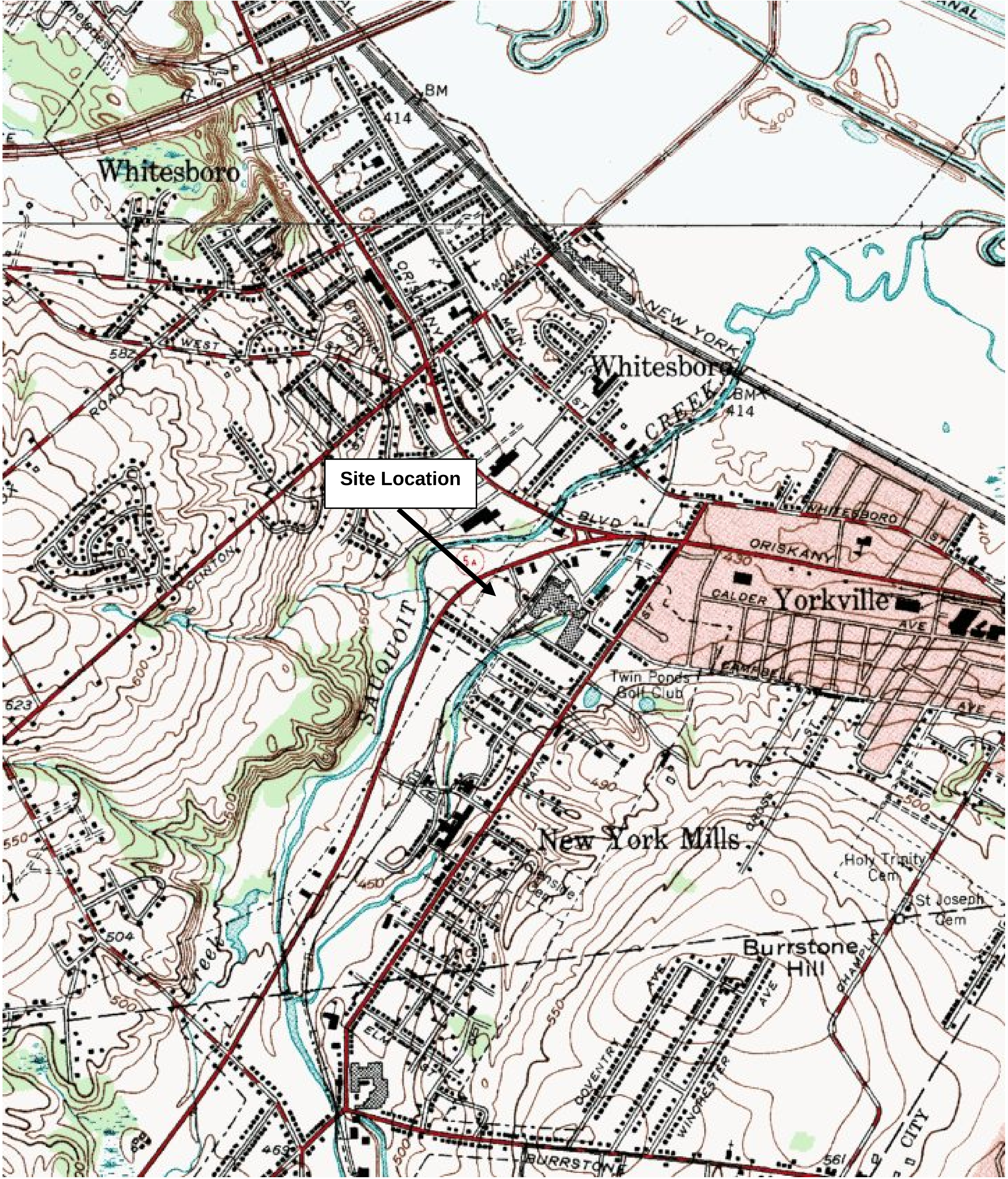
DWG Name:

Checked:

Approved:

Drawn By:

A



REFERENCE:
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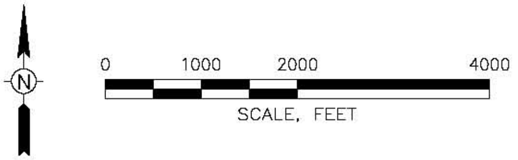

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(315) 655-3900

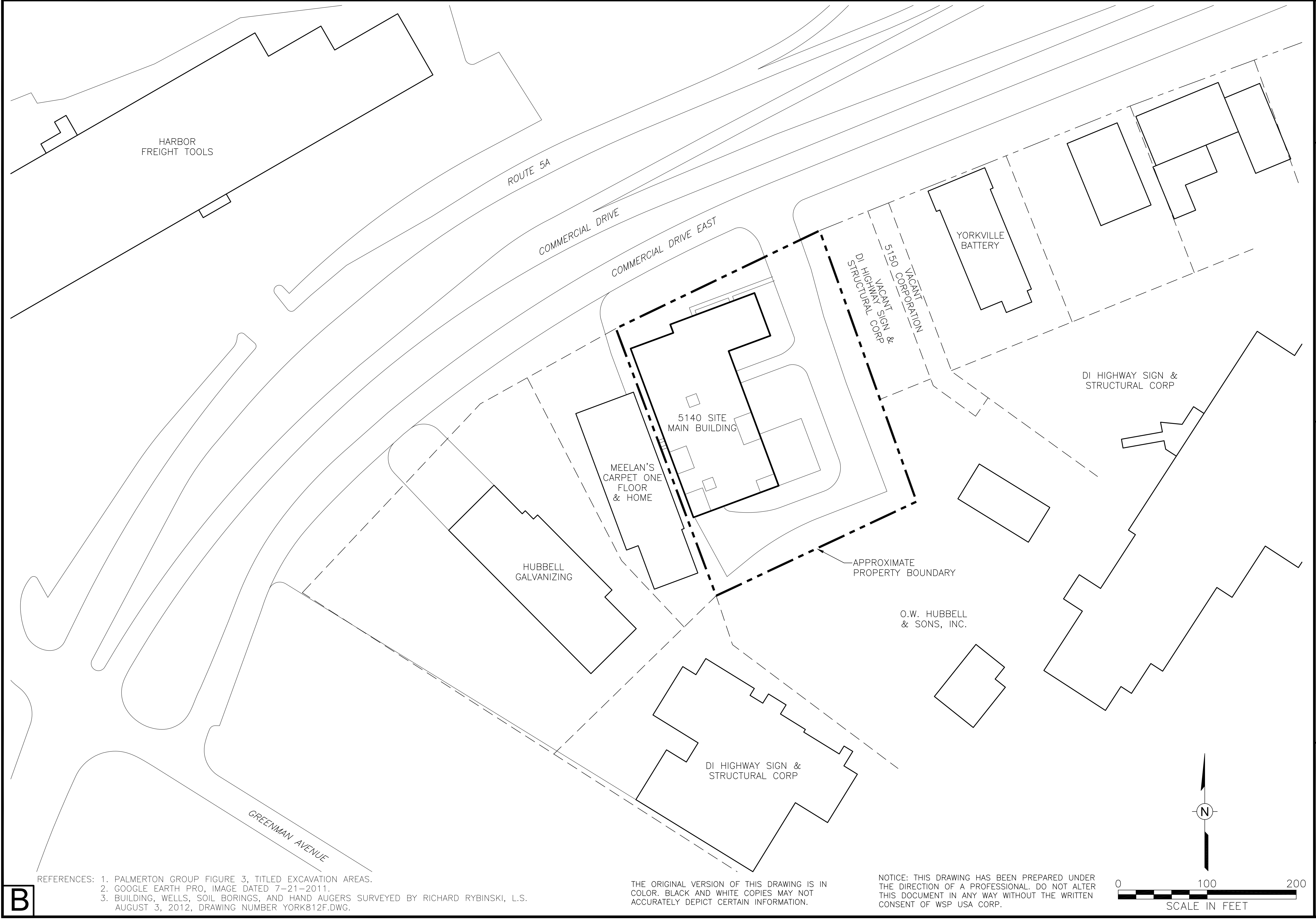
FIGURE 1

SITE LOCATION MAP

5140 COMMERCIAL DRIVE EAST
YORKVILLE, NEW YORK

PREPARED FOR

5140 COMMERCIAL DRIVE, LLC
YORKVILLE, NEW YORK



REFERENCES:
1. PALMERTON GROUP FIGURE 3, TITLED EXCAVATION AREAS.
2. GOOGLE EARTH PRO, IMAGE DATED 7-21-2011.
3. BUILDING, WELLS, SOIL BORINGS, AND HAND AUGERS SURVEYED BY RICHARD RYBINSKI, L.S. AUGUST 3, 2012, DRAWING NUMBER YORK812F.DWG.

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Checked:
Approved: 9/12/2012
DWG Name: 00032927-007

5140 SITE
YORKVILLE, NEW YORK
PREPARED FOR
5140 COMMERCIAL DRIVE, LLC
YORKVILLE, NEW YORK

Figure 2

SITE LAYOUT
AND ADJACENT PROPERTIES

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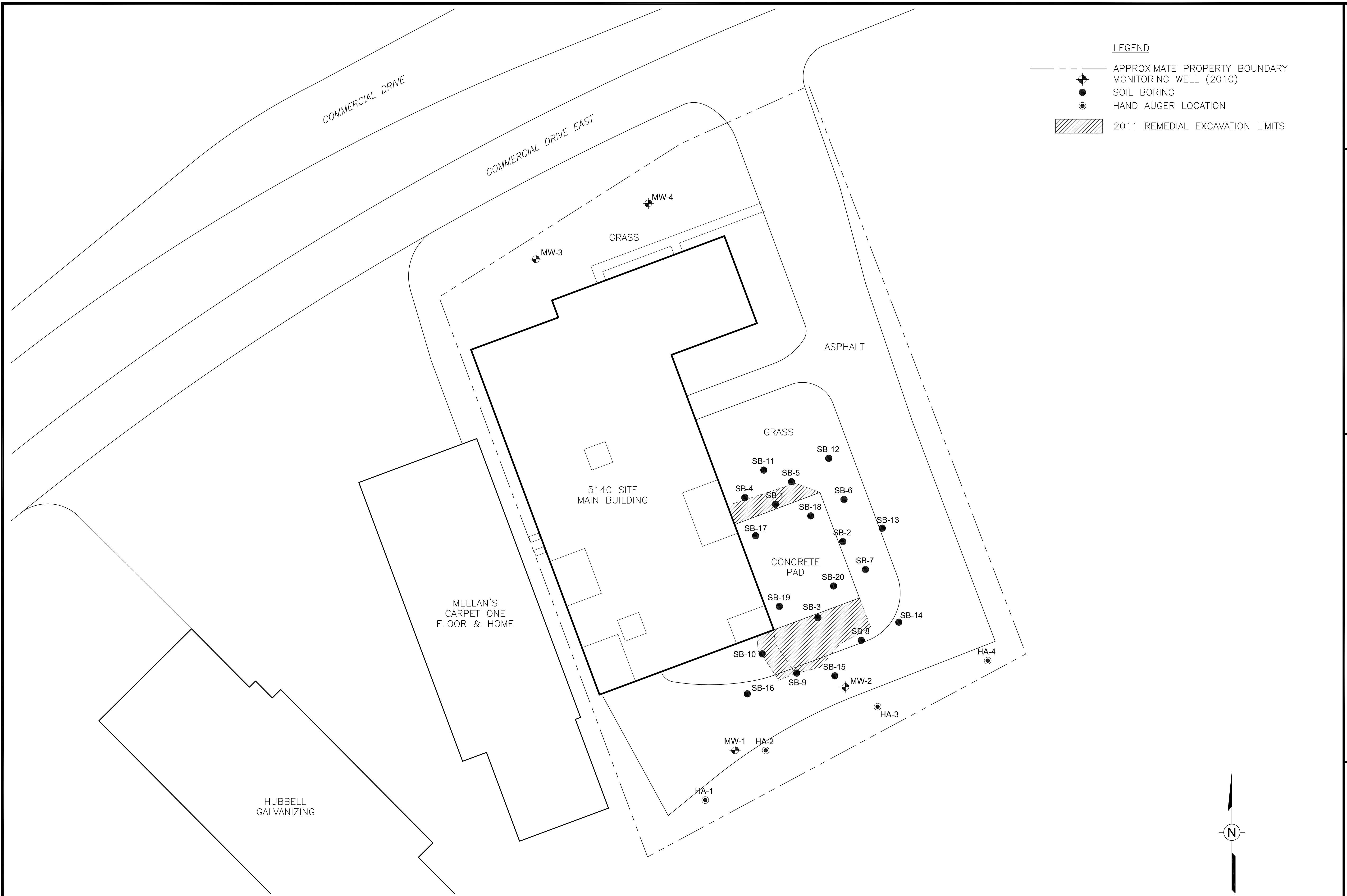

LEGEND

- - - - — APPROXIMATE PROPERTY BOUNDARY
MONITORING WELL (2010)
● SOIL BORING
◉ HAND AUGER LOCATION
▨ 2011 REMEDIAL EXCAVATION LIMITS

REFERENCES:
1. PALMERTON GROUP FIGURE 3, TITLED EXCAVATION AREAS.
2. GOOGLE EARTH PRO, IMAGE DATED 7-21-2011.
3. BUILDING, WELLS, SOIL BORINGS, AND HAND AUGERS SURVEYED BY RICHARD RYBINSKI, L.S. AUGUST 3, 2012, DRAWING NUMBER YORK812F.DWG.

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5140 SITE
YORKVILLE, NEW YORK
PREPARED FOR
5140 COMMERCIAL DRIVE, LLC
YORKVILLE, NEW YORK

Figure 3
SOIL BORING AND EXISTING WELL LOCATIONS

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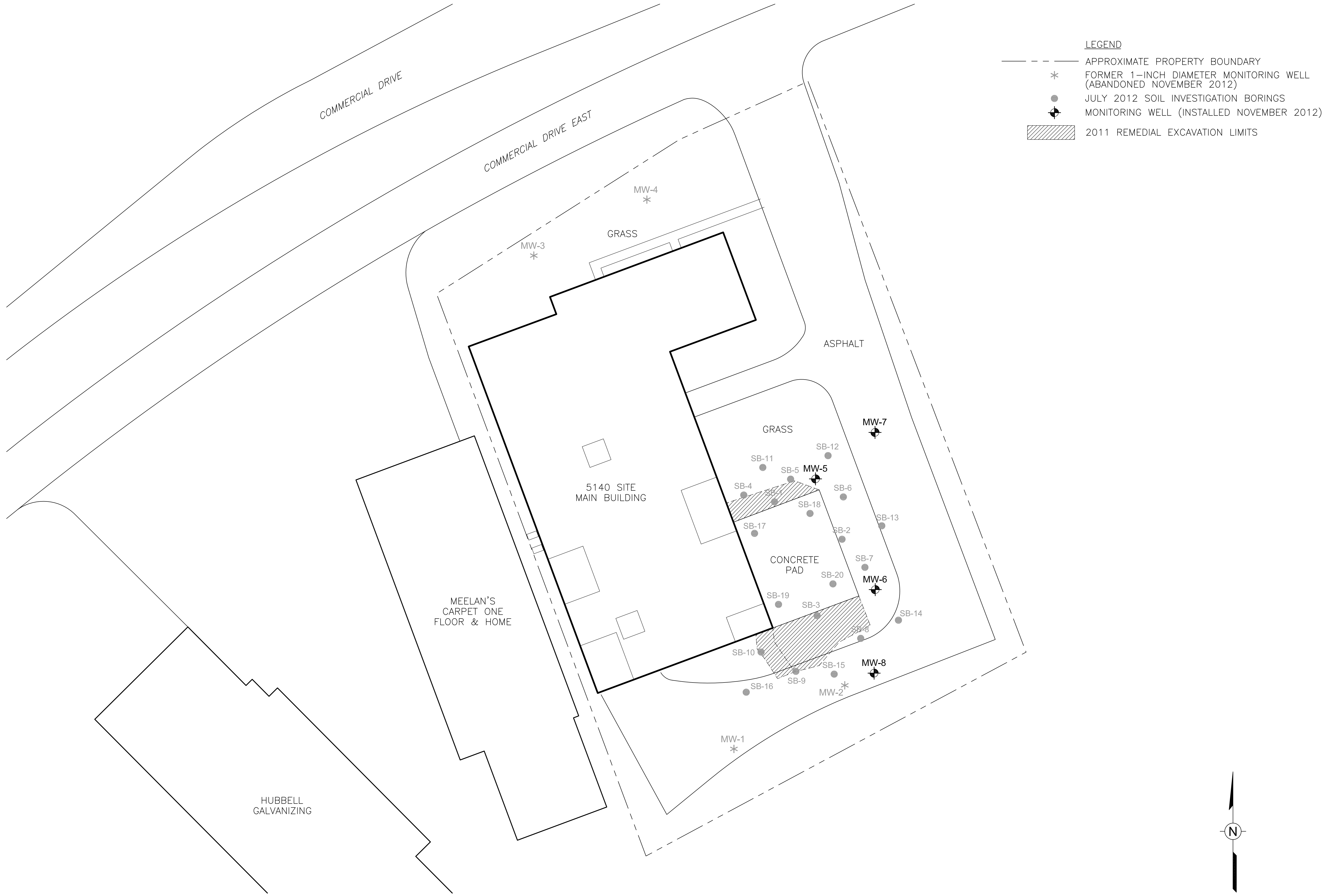

LEGEND

- – – – APPROXIMATE PROPERTY BOUNDARY
- ✳ FORMER 1–INCH DIAMETER MONITORING WELL (ABANDONED NOVEMBER 2012)
- ● JULY 2012 SOIL INVESTIGATION BORINGS
- ⊕ MONITORING WELL (INSTALLED NOVEMBER 2012)
- ▨ 2011 REMEDIAL EXCAVATION LIMITS

REFERENCES:
1. PALMERTON GROUP FIGURE 3, TITLED EXCAVATION AREAS.
2. GOOGLE EARTH PRO, IMAGE DATED 7–21–2011.
3. BUILDING, WELLS, AND SOIL BORINGS SURVEYED BY RICHARD RYBINSKI, L.S. AUGUST 3, 2012, DRAWING NUMBER YORK812F.DWG.

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5140 SITE
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Figure 4
MONITORING WELL LOCATIONS

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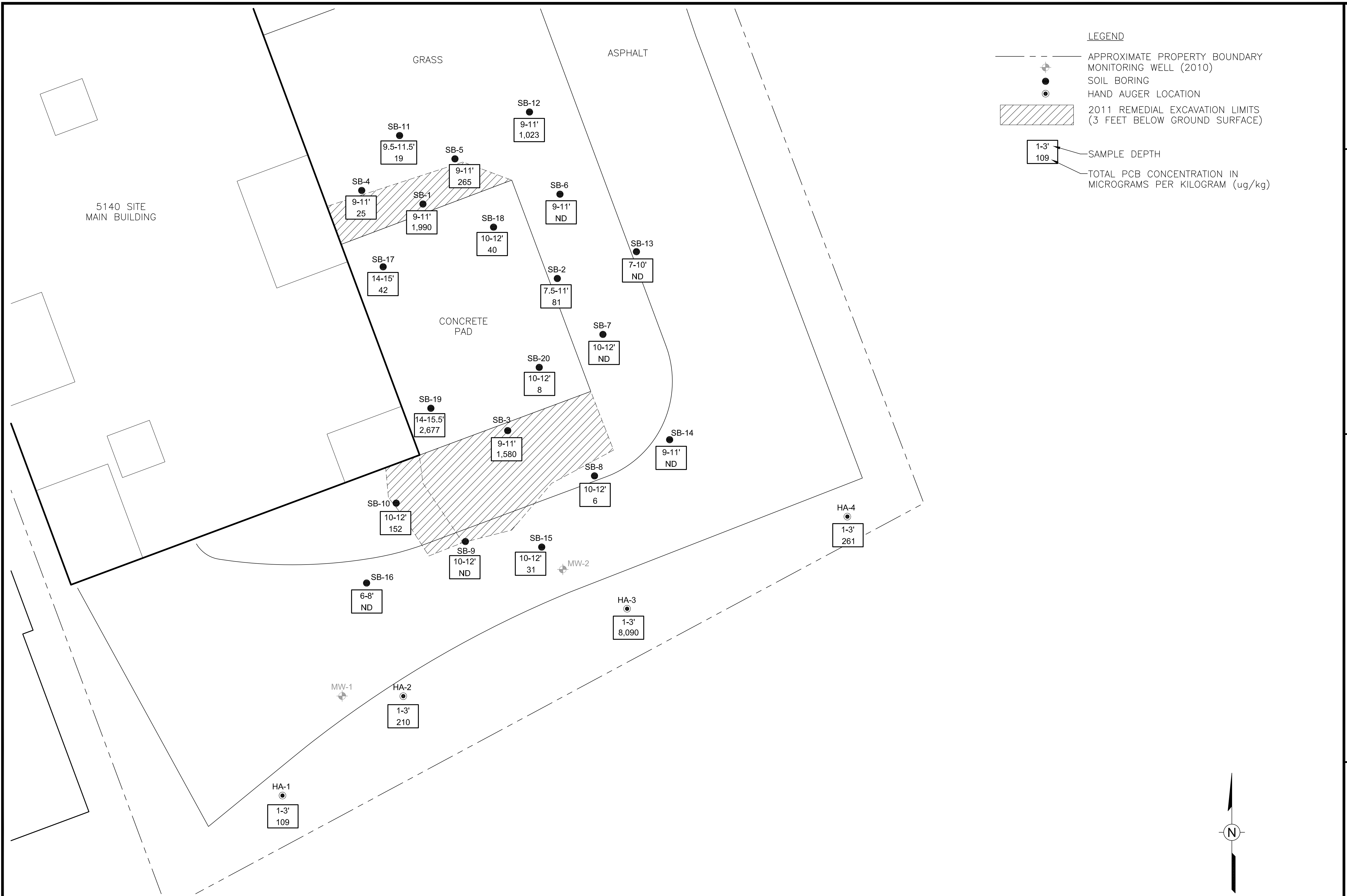

REFERENCES:
1. PALMERTON GROUP FIGURE 3, TITLED EXCAVATION AREAS.
2. GOOGLE EARTH PRO, IMAGE DATED 7-21-2011.
3. BUILDING, WELLS, SOIL BORINGS, AND HAND AUGERS SURVEYED BY RICHARD RYBINSKI, L.S. AUGUST 3, 2012, DRAWING NUMBER YORK812F.DWG.

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5140 SITE
YORKVILLE, NEW YORK
PREPARED FOR
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YORKVILLE, NEW YORK

Figure 5

PCB SOIL SAMPLING RESULTS

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REFERENCES:
1. PALMERTON GROUP FIGURE 3, TITLED EXCAVATION AREAS.
2. GOOGLE EARTH PRO, IMAGE DATED 7-21-2011.
3. BUILDING, WELLS, SOIL BORINGS, AND HAND AUGERS SURVEYED BY RICHARD RYBINSKI, L.S. AUGUST 3, 2012, DRAWING NUMBER YORK812F.DWG.

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5140 SITE
YORKVILLE, NEW YORK

PREPARED FOR
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YORKVILLE, NEW YORK

Figure 6

PRELIMINARY GROUNDWATER
ELEVATION CONTOURS
JULY 2012

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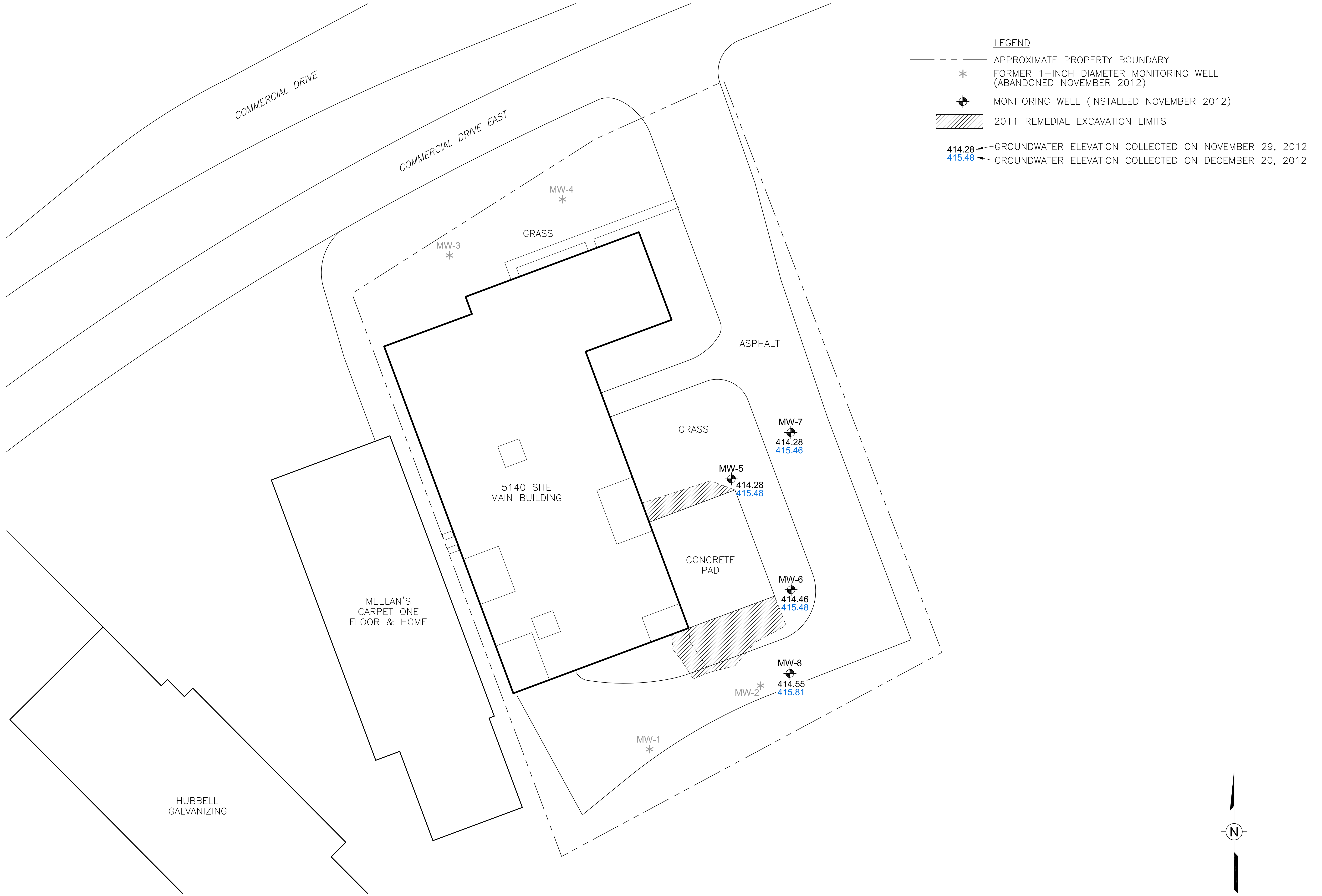

REFERENCES:
1. PALMERTON GROUP FIGURE 3, TITLED EXCAVATION AREAS.
2. GOOGLE EARTH PRO, IMAGE DATED 7–21–2011.
3. BUILDING, WELLS, AND SOIL BORINGS SURVEYED BY RICHARD RYBINSKI, L.S. AUGUST 3, 2012, DRAWING NUMBER YORK812F.DWG.

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Checked: EGC
Approved: 1/11/2013
DWG Name: 00032927–006

5140 SITE
YORKVILLE, NEW YORK
PREPARED FOR
5140 COMMERCIAL DRIVE, LLC
YORKVILLE, NEW YORK

Figure 7

GROUNDWATER ELEVATIONS
(NOVEMBER AND DECEMBER 2012)

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Tables

Table 1

Soil Boring Results
5140 Site
Yorkville, NY (a)

Sample ID:	**Evaluation**	**SB-1-(9-11)**	**SB-2-(7.5-10.5)**	**SB-3-(9-11)**	**SB-4-(9-11)**	**SB-5-(9-11)**	**SB-6-(9-11)**	**SB-7-(10-12)**
Sample Depth (ft bgs):	**Criteria**	9-11	7.5-11	9-11	9-11	9-11	9-11	10-12
Date Sampled:	**(b)**	7/17/2012	7/17/2012	7/17/2012	7/17/2012	7/17/2012	7/17/2012	7/17/2012
Polychlorinated biyphenyls (µg/kg)								
Aroclor 1016	-	14 U	15 U	14 U	15 U	14 U	14 U	14 U
Aroclor 1221	-	15 U	16 U	15 U	15 U	15 U	15 U	15 U
Aroclor 1232	-	20 U	21 U	20 U	21 U	20 U	20 U	20 U
Aroclor 1242	-	7.2 U	7.5 U	7.2 U	7.3 U	7.1 U	7 U	7.2 U
Aroclor 1248	-	2.7 U	2.9 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U
Aroclor 1254	-	16 U	17 U	16 U	17 U	16 U	16 U	16 U
Aroclor 1260	-	1,990	80.5 J	1,580	24.9 J	265	3.9 U	4 U
Total PCBs	25,000	1,990	80.5	1,580	24.9	265	ND	ND

Sample ID:	**Evaluation**	**SB-8-(10-12)**	**SB-9-(10-12)**	**SB-10-(10-12)**	**SB-11-(9.5-11.5)**	**SB-12-(9-11)**	**SB-13-(7-10)**	**SB-14-(9-11)**
Sample Depth (ft bgs):	**Criteria**	10-12	10-12	10-12	9.5-11.5	9-11	7-10	9-11
Date Sampled:	**(b)**	7/16/2012	7/16/2012	7/16/2012	7/17/2012	7/17/2012	7/17/2012	7/17/2012
Polychlorinated biyphenyls (µg/kg)								
Aroclor 1016	-	14 U	15 U	14 U	15 U	15 U	15 U	14 U
Aroclor 1221	-	15 U	16 U	15 U	15 U	16 U	15 U	15 U
Aroclor 1232	-	20 U	21 U	20 U	21 U	21 U	21 U	20 U
Aroclor 1242	-	7 U	7.3 U	89 J	7.3 U	7.4 U	7.3 U	7 U
Aroclor 1248	-	2.7 U	2.8 U	2.7 U	2.8 U	296 a	2.8 U	2.7 U
Aroclor 1254	-	16 U	17 U	15 U	17 U	17 U	17 U	16 U
Aroclor 1260	-	5.8 J	4.1 U	63.3 J	19 J	727	4.1 U	3.9 U
Total PCBs	25,000	5.8	ND	152.3	19	1,023	ND	ND

Sample ID:	**Evaluation**	**SB-15-(10-12)**	**SB-16-(6-8)**	**SB-17-(14-15)**	**SB-18-(10-12)**	**SB-18-(10-12)DUP**	**SB-19-(14-15.5)**	**SB-20-(10-12)**
Sample Depth (ft bgs):	**Criteria**	10-12	6-8	14-15	10-12	10-12	14-15.5	10-12
Date Sampled:	**(b)**	7/16/2012	7/16/2012	7/16/2012	7/16/2012	7/16/2012	7/16/2012	7/16/2012
Polychlorinated biyphenyls (µg/kg)								
Aroclor 1016	-	15 UJ	14 UJ	15 U	15 U	15 U	14 U	16 U
Aroclor 1221	-	16 UJ	15 UJ	16 U	15 U	16 U	15 U	17 U
Aroclor 1232	-	21 UJ	20 UJ	21 U	20 U	21 U	20 U	23 U
Aroclor 1242	-	7.4 UJ	7 UJ	7.4 U	7.2 U	7.4 U	297 a	8 U
Aroclor 1248	-	2.8 UJ	2.7 UJ	2.8 U	2.8 U	2.8 U	2.7 U	3.1 U
Aroclor 1254	-	17 UJ	16 UJ	17 U	16 U	17 U	16 U	18 U
Aroclor 1260	-	31.1 J	3.9 UJ	42.1 J	39.8 J	45 J	2,380	7.7 J
Total PCBs	25,000	31.1	ND	42.1	39.8	45	2,677	7.7

---

a/ PCBs = polychorinated biphenyls; ft bgs = feet below ground surface; µg/kg = micrograms per kilogram; U = analyted not detected above laboratory detection limits;
J = estimated value; ND = not detected.

b/ Evaluation Criteria are from Title 6 New York Codes, Rules and Regulations, (NYCRR) Part 375 Industrial Restricted Use Soil Cleanup Objectives.

Table 2

Groundwater Elevations
5140 Site
Yorkville, New York (a)

Well ID	Northing (feet)	Easting (feet)	Top of Casing Elevation (ft aMSL)	Casing Diameter (inches)	Total Depth (ft btoc)	Depth to Water (ft btoc) 7/17/2012	Depth to Water (ft btoc) 11/29/2012	Depth to Water (ft btoc) 12/20/2012	Groundwater Elevation (ft amsl) 7/17/2012	Groundwater Elevation (ft amsl) 11/29/2012	Groundwater Elevation (ft amsl) 12/20/2012
Abandoned 1-inch Diameter Monitoring Wells											
MW-1	1136845.3	1165468.3	424.58	1	14.30	9.85	-	-	414.73	-	-
MW-2	1136880.1	1165528.9	424.56	1	14.03	10.01	-	-	414.55	-	-
MW-3	1137115.2	1165358.9	425.50	1	13.70	10.92	-	-	414.58	-	-
MW-4	1137145.8	1165420.7	424.60	1	14.45	10.21	-	-	414.39	-	-
Newly-Installed 2-Inch Diameter Monitoring Wells											
MW-5	1136993.1	1165513	424.79	2	17.21	-	10.51	9.31	-	414.28	415.48
MW-6	1136932.4	1165545.4	424.94	2	17.82	-	10.48	9.46	-	414.46	415.48
MW-7	1137018.4	1165545.3	424.12	2	16.71	-	9.84	8.66	-	414.28	415.46
MW-8	1136886.7	1165544.8	424.22	2	16.98	-	9.67	8.41	-	414.55	415.81

---

a/ ft amsl = feet above mean sea level; ft btoc = feet below top of casing; "-"= not Applicable/not measured; NP = no product present in well.

Table 3

Hand Auger Boring Results
5140 Site
Yorkville, NY (a)

Sample ID: **Sample Depth (ft bgs):** **Date Sampled:**	**Evaluation Criteria (b)**	**HA-1** **1-3** **7/17/2012**	**HA-1(DUP)** **1-3** **7/17/2012**	**HA-2** **1-3** **7/17/2012**	**HA-3** **1-3** **7/17/2012**	**HA-4** **1-3** **7/17/2012**
Polychlorinated biyphenyls (µg/kg)						
Aroclor 1016	-	14 U	14 U	14 U	15 U	14 U
Aroclor 1221	-	15 U	15 U	14 U	16 U	15 U
Aroclor 1232	-	19 U	20 U	19 U	21 U	20 U
Aroclor 1242	-	6.9 U	7 U	6.8 U	7.4 U	7.1 U
Aroclor 1248	-	2.6 U	2.7 U	2.6 U	340	2.7 U
Aroclor 1254	-	85.1 J	79.8 J	111	17 U	206
Aroclor 1260	-	23.7 J	22.2 J	98.6 J	7,750	54.7 J
Total PCBs	25,000	108.8	102	209.6	8,090	260.7

---

a/ PCBs = polychorinated biphenyls; ft bgs = feet below ground surface; µg/kg = micrograms per kilogram; U = analyted not detected above laboratory detection limits; J = Estimated value.

b/ Evaluation Criteria are from Title 6 New York Codes, Rules and Regulations, (NYCRR) Part 375 Industrial Restricted Use Soil Cleanup Objectives.

Table 4

Groundwater Results
5140 Site
Yorkville, New York (a)

Sample ID:	**Evaluation**	**MW-5**	**MW-5**	**MW-6**	**MW-7**	**MW-8**	**MW-8 DUP (c)**
Date Sampled:	**Criteria (b)**	**11/29/12**	**12/20/12**	**11/29/12**	**11/29/12**	**11/29/12**	**11/29/12**
PCBs (μg/l)							
Aroclor 1016	0.09	0.27 U	0.27 U	0.26 U	0.27 U	0.26 U	0.27 U
Aroclor 1221	0.09	0.27 U	0.27 U	0.26 U	0.27 U	0.26 U	0.27 U
Aroclor 1232	0.09	0.27 U	0.27 U	0.26 U	0.27 U	0.26 U	0.27 U
Aroclor 1242	0.09	0.27 U	0.27 U	0.26 U	0.27 U	0.26 U	0.27 U
Aroclor 1248	0.09	0.27 U	0.27 U	0.26 U	0.27 U	0.26 U	0.27 U
Aroclor 1254	0.09	**0.14 a,J**	0.27 U	0.26 U	0.27 U	0.26 U	0.27 U
Aroclor 1260	0.09	**0.20 J**	0.27 U	0.26 U	0.27 U	0.26 U	0.27 U

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a/ PCBs = polychlorinated biphenyls; ft bgs = feet below ground surface; μg/l = micrograms per liter; U = analyte not detected above laboratory detection limits; J = estimated value; a = estimated value due to the presence of other Arochlor pattern.

b/ Concentrations in bold text exceed evaluation criteria. Evaluation criteria are the New York State Ambient Water Quality Standards or Guidance Values for Class GA groundwater provided in the New York State Department of Environmental Conservation Division of Water Technical and Operational Guidance Series (1.1.1), dated June 1998.

c/ MW-8 Dup was originally designated MW-1112 for analysis as a blind duplicate.

Appendix A – Standard Operating Procedures

WSP ENVIRONMENT & ENERGY

STANDARD OPERATING FIELD PROCEDURES

Standard Operating Procedure – 3b

Groundwater Sampling Using Low – Flow Submersible Pump

Materials:

Sampling notebook/Field log book
Groundwater monitoring data log forms
Well key
Adjustable wrench or manhole wrench
Photoionization detector (PID)
Flashlight or mirror
Electronic water level indicator
pH, conductivity, temperature meter
Oxidation potential meter (Eh)
Dissolved oxygen meter
Turbidity meter
Sample bottles, sample tags or labels, indelible markers, and clear tape
Appropriate power supply
Redi-Flo 2 submersible pump (or equivalent) and Teflon® tubing
Flow-through cell for pump or appropriate-sized beakers for meters
Buckets or drum for water storage
Pocket knife or scissors
Level C or Level D Personal Protective Equipment
Nitrile or latex gloves

Note: This SOP is only to be used if the applicable state of federal agency approves of purging and sampling groundwater using a submersible pump.

Procedure:

1. Verify locations of wells, media to be sampled, and parameters to be analyzed as specified in the sampling plan.

2. Prepare field log book with description of site, weather, participants, and other relevant observations (Refer to SOP-1)

3. As the following steps are completed, fill-in both front and back of the groundwater monitoring data log (Attachment 1 in SOP-1).

4. With the field personnel in Level D personal protective equipment, unless historical data, information, or suspicious warrants upgrading to Level C protective equipment, survey around the base of the well and wellhead with a PID; remove well cap, place probe of PID in wellhead, and record PID response in field book. Survey breathing zone to ensure that the level of personal protection is appropriate. Note observations on the groundwater monitoring data log. (See Site Health and Safety Plan for appropriate measuring techniques and upgrade requirements).

5. Inspect water surface in the well; use flashlight if necessary. Note any observable floating product and record observations in the field book.

6. Measure and record the extent of the top of the well riser above the ground. If well is a flush mount, measure and record the top of the well riser below the ground. Measure the casing (riser) inside diameter (CID) and record in inches. From the top of the riser, measure the depth (in feet) to water (DTW) with an electronic water level indicator and record on the groundwater monitoring data log. Static water level measurements must be recorded from the surveyor's mark at the top of the riser, if present. If no mark is present, mark a location with a metal file or indelible marker on the north side of the riser for future reference. Measure and record the total depth (TD, in feet) to the bottom of the well.

7. Check for light non-aqueous phase liquids (LNAPLs) and dense non-aqueous phase liquids (DNAPLs). Measure thickness with a oil/water interface probe in accordance with the RCRA Groundwater Monitoring Technical Enforcement Guidance Document (November 1992).

8. Monitoring wells should be purged/sampled by starting with the upgradient (or clean wells) and proceeding downgradient (in the order from least to most contaminated wells) for the remaining monitoring wells.

9. If LNAPL was observed, carefully lower a bailer attached to an appropriate length of new nylon rope into the well and allow the bottom to sink 1 foot below the water surface to capture LNAPL only. Remove bailer and dispose of LNAPL appropriately. Record the quantity of LNAPL removed in the field book.

10. Place plastic sheeting around the wellhead. Carefully lower the pump into the well and place the pump intake in the center of the saturated screen interval, near the top of the well screen if the screen is submerged.

11. Begin purging the well at 0.2 to 0.5 L/min (0.05 to 0.13 gal/min). The water level should optimally be monitored continuously, but at a minimum, every 3 to 5 minutes during purging. Ideally, a steady flow rate should be maintained that results in a stabilized water level (less than 0.3 feet of variation). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. However, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate ad the water level measured immediately after each adjustment.

12. If the recharge rate of the well is very low, care should be taken to avoid loss of pressure in the tubing line, cascading through the sand pack, or pumping the well dry. In these cases, purging should be interrupted before the water in the well reaches a level below the top of the pump. Sampling should commence as soon as the volume in the well has recovered sufficiently to permit collection of samples.

13. During purging of the well, monitor the following geochemical parameters every 3 to 5 minutes: turbidity, dissolved oxygen, redox potential (Eh), temperature, specific conductance, and pH. In-line analyzers and continuous readout displays are highly recommended. The well is considered stabilized and ready for sample collection once turbidity, redox potential, and dissolved oxygen in in-line or downhole analyses of groundwater have stabilized within approximately 10% over at least two measurements – for example, over two successive measurements made three minutes apart. Turbidity should be less than 50 NTUs (decrease pumping rate to lower turbidity measurements). Dissolved oxygen and Eh must be obtained in a manner in which the sample is not exposed to air prior to the measurement. Other parameters may be taken in a clean container, such as a glass beaker.

14. If a well is purged to dryness before removing three well volumes, allow well to recharge and proceed to collect sample. If full recovery exceeds 2 hours, the well should be sampled as soon as sufficient volume is available or within a maximum of 3 hours from purging dry.

15. Collect groundwater samples after purging is completed. Collect the samples using the sampling pump operated at a maximum rate of 0.25 L/min (0.07 gal/min)(or to the rate of the purging activities) to avoid agitating the water. Sample first for VOCs, taking care to remove all air bubbles from the vial and minimize agitation. Collect remaining organic samples then inorganic samples.

    The recommended order of sample collection is as follows:

    In-field measurements (e.g., temperature, pH, Eh, specific conductance, dissolved oxygen, turbidity)
    Volatile organic compounds (VOCs)
    Purgeable organic carbon (POC)
    Purgeable organic halogens (POX)
    Total organic halogens (TOX)
    Total organic carbon (TOC)
    Extractable organics
    Pesticides and herbicides
    Total metals
    Dissolved metals
    Phenols
    Cyanide
    Sulfate and chloride
    Nitrate and ammonia
    Radionuclides

16. Affix a sample tag or label to each sample container and complete all required information (sample no., date, time, sampler’s initials, analysis, preservatives). Place clear tape over the tag or label. Record sample designation, date, time, and the sampler’s initials on the sample tracking form and in the field book. Complete chain-of-custody forms with appropriate sampling information.

17. Remove the pump and tubing from the well. Inspect the well for soundness of protective casing and surface ground seal. Record water color, suspended particulates, discoloration of casing, any unusual occurrences during sampling, and any pertinent weather details on the groundwater monitoring data log.

18. Thoroughly decontaminate all equipment used before proceeding to the next well. See SOP No. 16 for details on decontamination procedures. Discard used towels, tubing, gloves, etc., in a plastic bag. Refer to the Investigation Derived Waste Management Plan for the site for appropriate storage and disposal methods of these materials.

Standard Operating Procedure – 9

Soil Sampling Using Bucket Auger

Materials:

Field log book
Personal protective equipment (PPE)
Bucket augers
Auger extension rods
Auger handle
Pipe wrenches (for threaded connections)
Push pins (for snap connections)
Stainless steel spoons or trowels
Mixing tray or bowl
Plastic sheeting
Expanding ruler or tape measure

Note: Decontamination is not required for dedicated sampling equipment.

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Remove all vegetation or other surface material (e.g., gravel) with a hand trowel or other tool (e.g., shovel).

3. Advance the borehole to the desired sampling depth (i.e., the top of the sample interval). Attach a decontaminated auger bucket to collect the soil sample.

4. Place the auger bucket in the borehole. Grip the cross-handle with both hands and twist it clockwise to advance the auger.

5. Withdraw the auger bucket from the borehole and place it on plastic sheeting. For VOC samples, use a decontaminated stainless steel spoon or trowel to transfer the sample material directly into the appropriate sample container. A closed-system sampler (e.g., Encore Sampler) should be used, if necessary, to collect sludge samples for VOC analysis using EPA Method 5035 for preservation.

6. Remove the retrieved soil from the bucket with a decontaminated stainless steel spoon or trowel and place the material in a decontaminated mixing tray or bowl. If additional soil is needed to provide sufficient sample volume, repeat Step 4.

7. If necessary, screen the lead end of the auger with a PID/OVA or perform headspace analysis in accordance with SOP 22. Record the reading in the field logbook.

8. Describe the remaining sample material in accordance with ASTM International Standard D 2488 and the Unified Soil Classification System. Record the sample description in the field logbook.

9. For all other parameters, the sample material should be transferred into a decontaminated mixing tray or bowl. Use the stainless steel spoon to separate large clumps of soil material and mix the contents of the tray to a homogeneous particle size and texture.

10. Examine the contents of the tray and remove coarse gravel, organic material (e.g., roots, grass, and woody material) and any other debris with the stainless steel spoon.

11. Transfer the tray contents to the appropriate sample container using a stainless steel spoon.

12. Label the containers, cover the labels with tape, and immediately place the containers in a cooler maintained at an ambient temperature of 4° Celsius with wet ice. Freezer packs or dry ice should not be used for sample preservation.

13. Measure and record the sample depth in the field logbook, along with the sample location, sampler name, and the requested analytical parameters.

14. Complete the chain-of-custody form with appropriate sampling information.

15. Samples should be maintained and shipped in accordance with SOP 20.

16. Properly manage all PPE and investigation-derived wastes in accordance with state and federal requirements.

Standard Operating Procedure - 11

Soil Sampling Using Hand Trowel

Application:

To collect surface or shallow subsurface soil samples with a hand trowel.

Materials:

Field log book
Personal protective equipment (PPE)
Stainless steel trowels or spoons
Mixing tray or bowl
Plastic sheeting

Note: Decontamination is not required for dedicated sampling equipment.

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Remove the resealable plastic bag and aluminum foil from a decontaminated stainless steel trowel or spoon.

3. Remove any vegetation or other surface material (e.g., gravel) from the sample location with a trowel or other tool (e.g., shovel).

4. Push the trowel or spoon into the soil to the desired sampling depth. If sampling a loose gravelly or sandy soil, carefully remove the trowel so that the blade approaches a horizontal position to prevent soil from falling off the blade. If sampling a stiff silty or clayey soil, it may be necessary to remove and reinsert the trowel to loosen the soil. Shallow subsurface soil samples can be collected by digging a hole (e.g., with a shovel or trowel) and collecting a soil sample at the desired depth. A decontaminated stainless steel trowel or spoon should be used for sample collection.

5. Repeat Step 4 if more soil is needed to provide sufficient sample volume.

6. If required, screen the recovered soil with a PID/OVA or perform headspace analyses in accordance with SOP 22. Record the reading in the field logbook.

7. For VOC samples, transfer soil directly into the sample container with the stainless steel trowel. A closed-system sampler (e.g., Encore Sampler) should be used, if necessary, to collect sludge samples for VOC analysis using EPA Method 5035 for preservation.

8. Describe the remaining sample material in accordance with ASTM International Standard D 2488 and the Unified Soil Classification System. Record the sample description in the field logbook.

9. If soil samples will be collected for non-volatile parameters, use the stainless steel spoon to chop apart clumps of soil material and mix the contents of the tray to a homogeneous particle size and texture.

10. Examine contents of the tray and remove pebbles, organic material, (e.g., roots, grass, and woody material), and other debris with a stainless steel trowel or spoon.

11. Transfer the tray contents to the appropriate sample container using a stainless steel spoon.

12. Label the containers, cover the labels with tape, and immediately place the containers in a cooler maintained at an ambient temperature of 4° Celsius with wet ice. Freezer packs or dry ice should not be used for sample preservation.

13. Record the sample location, sample depth, sampler name, and the requested analytical parameters in the field log book.

14. Complete the chain-of-custody form with appropriate sampling information.

15. Samples should be maintained and shipped in accordance with SOP 20.

16. Properly manage all PPE and investigation-derived wastes in accordance with state and federal requirements.

Standard Operating Procedure - 15

Decontamination of Drilling Equipment

Materials:

Canvas or plastic tarp(s)
4-mil polyethylene liner
Pressurized steam cleaner (steam jenny)
55-gallon steel drums with bung (closed) tops
55-gallon steel drums with open tops, rings, lids, ring-nut and ring-bolt
Hammer, nails, duct tape, extension cord(s)
Wood boards - 4” x 4”, 2” x 4” or 2” x6”
Portable wet/dry vacuum
Shovel, funnel, and squeegee

Construction of Decontamination Basin:

1. Place tarp(s) on flat, firm surface in an accessible area of the site away from areas of surface contamination. Use enough tarp to accommodate the rear of the drilling rig and hollow stem augers and to prevent overspray from the steam jenny from falling onto adjacent soil surfaces. If necessary, place more than one tarp on the ground. Overlap tarp edges and secure with duct tape. Area should be slightly inclined toward one corner so that the decontamination water will pool in one corner for easier pumping to the containment drums.

2. Place a layer of polyethylene liner on top of the tarp(s). If one sheet cannot completely cover the tarp, use another one. Overlap the sheets at the edges and secure with duct tape.

3. Place 4” x 4” boards along the tarp’s outer edges to form a square or rectangular basin. Roll each 4” x 4” board toward the center so the tarp and polyethylene wrap completely around it at least once. Secure the tarp and liner to the top of the boards with nails, tacks or heavy-duty staples.

4. Place the drums, steam cleaner, and wet/dry vacuum adjacent to one side of the basin on the outside.

Decontamination Procedure:

1. Unload drilling equipment from the drilling rig and place in one side of the basin.

2. Activate the steam cleaner. Personnel performing steam cleaning should don rubber boots, Tyvek or Saranex suits, rubber gloves, and a hard hat with a face shield for splash protection.

3. Clean each piece of drilling equipment, including auger bits, drill bits, portable power augers, hollow stem augers, auger holders, split spoons, rod lifters, and drilling rods, by holding the nozzle of the steam cleaner a few inches away. Wood 2” x 4”s can be placed on the basin floor to prevent drilling equipment from coming into contact with solids that will build up beneath it as it is being steam cleaned.

4. After each piece is cleaned, place it on rows of 2” x 4” boards in a separate area of the basin.

5. If space allows, position the rear of the drill rig in the basin and use the steam cleaner to clean off rig surfaces and the hoist and derrick as needed.

6. Reload drilling equipment onto rig and drive it out of the basin.

7. Vacuum up liquids on the basin floor with the flexible hose of the portable wet/dry vacuum. A long-handled squeegee can be used to pool liquid together to aid vacuuming.

8. Remove accumulated solids from the basin floor with a shovel and place in open-top drums. During removal of the accumulated solids, be careful so that the polyethylene liner is not torn, cut, or punctured with the shovel.

9. Empty the canister of the wet/dry vacuum into a bung-top drum using a funnel.

10. Secure and tighten tops of drums and apply appropriate hazardous waste or nonhazardous waste labels to each drum. The accumulation date should be placed on each drum. An inventory of all onsite drums should be entered into the field log book by field personnel. All drums should be marked, numbered, or labeled with an indelible marker for future reference.

11. On completion of onsite work, the properly labeled and inventoried drums should be stored within a newly constructed pad or basin until disposal is arranged. This containment area should be constructed of wooden boards with a polyethylene liner, as described above.

12. Materials used in construction of the decontamination basin or pad should be disassembled and placed into a properly labeled drum for future disposal.

13. All drilling equipment and the drill rig should be decontaminated on arrival onsite and before the start of any drilling activity. On completion of site work, the drilling equipment and rig should be decontaminated by the drilling contractor before departure from the site.

Standard Operating Procedure - 16

Decontamination of Submersible Pumps

Materials:

Field logbook
Personal protective equipment (PPE)
Polyethylene sheeting
Garbage bags
Nonphosphate detergent (e.g., Liquinox or Alconox)
Tap water
Deionized water
Two containers (e.g., garbage cans, buckets, plastic tubs)
Nylon brushes
Isopropanol
Spray bottles
Paper towels

Note: To limit the potential for cross-contamination between wells, wells should be pumped in the order of increasing constituent concentrations whenever possible. This SOP assumes that dedicated tubing is being used at each well. If dedicated tubing is not being used, the tubing should also be decontaminated using the following procedures.

Decontamination Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Prepare a decontamination area by spreading polyethylene sheeting on a firm, flat surface (if possible). Create a berm around the decontamination area to contain inadvertent spillage. A berm can be created by rolling under the edges of the polysheeting or by draping the plastic over a wooden frame, etc.

3. Place two clean containers (e.g., garbage cans, buckets, plastic tubs) on the polysheeting. Place tap water in one container with non-phosphate detergent. Place only tap water in the second container. The containers may also be lined with garbage bags.

4. If an oily film or residue is observed on the pump or leads when they are removed from the well, the pump should be sprayed with isopropanol to remove the oil and then wiped clean with paper towels before proceeding with Step 5 below. The oily rinsate should be contained in a separate container for proper disposal.

5. Place the pump and wire leads in the container of non-phosphate detergent and tap water and scrub the exterior of the pump with a brush. Circulate the soapy solution through the pump for at least 5 minutes. Rinse the exterior of the pump and leads with additional tap water to remove excess soap (if necessary) before proceeding with Step 6.

6. Place the pump and leads in the container of tap water and run the pump for a least 5 minutes. Run water through the pump until all residual detergent has been removed. The soapy solution and rinse water should be changed when it becomes oily or too silty.

7. Remove the pump and leads from the rinse water. Spray off the pump thoroughly with deionized water and wipe it dry with clean paper towels. Wipe off the wire leads with a paper towel soaked with deionized water.

8. Wrap the pump and leads in plastic sheeting or a new plastic garbage bag to prevent possible contamination during transportation. Label the sheeting or bag with the date of decontamination for future reference.

9. Properly manage all PPE and decontamination rinsate in accordance with state and federal requirements (See SOP 26). The spent wash water and rinse water can potentially be placed in the facility’s waste water treatment system. However, field personnel should obtain approval from facility personnel and from the local POTW.

Standard Operating Procedure - 18

Decontamination of Interface Probe

Materials:

Field logbook
Personal protective equipment (PPE)
Nonphosphate detergent (e.g., Liquinox or Alconox)
Deionized water
Isopropanol
Two buckets
Spray bottles
Paper towels

Decontamination Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. If the groundwater is grossly contaminated (i.e., LNAPL or DNAPL is present), the tape should be pulled out of the well, NOT reeled up, and placed directly into a bucket of nonphosphate detergent and tap water. The tape and probe should be scrubbed with a brush to remove visible contamination. The tape and probe should then be rinsed in a bucket of tap water before proceeding with Step 3. If persistent stains or oily films remain, apply isopropanol to a paper towel and wipe the tape and probe until clean.

3. Thoroughly wet a paper towel with deionized water from a spray bottle. Fold the paper towel over the tape and wipe it as the tape is reeled up.

4. The interface probe should be sprayed with deionized water and wiped dry with a clean paper towel.

5. Place the interface probe in the clean carrying case or in a clean plastic bag to prevent contamination during transportation.

6. Properly manage all PPE, used paper towels, and decontamination rinsates in accordance with state and federal requirements (See SOP 26).

Standard Operating Procedure - 19

Decontamination of Sampling Equipment

Materials:

Field logbook
Personal protective equipment (PPE)
Deionized water
10% nitric acid solution
Nylon brushes
Containers (e.g., garbage cans, buckets, plastic tubs)
Nonphosphate detergent (e.g., Liquinox or Alconox)
Isopropanol
Aluminum foil
Polyethylene sheeting
Plastic garbage bags
Paper towels
Spray bottles
Duct tape

Note: All sampling equipment must be decontaminated before shipment to the office.

Decontamination Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Prepare a decontamination area by spreading polyethylene sheeting on a firm, flat surface (if possible). Create a berm around the decontamination area to contain inadvertent spillage. A berm can be created by rolling under the edges of the polysheeting or by draping the plastic over a wooden frame, etc.

3. Prepare a solution of nonphosphate detergent and tap water in a container.

4. Wipe sampling equipment with paper towels to remove residual soil or gross contamination. Heavy oils or grease may be removed with paper towels soaked with isopropanol.

5. Disassemble sampling equipment (e.g., split-spoon samplers and bailers). Wash equipment thoroughly in a nonphosphate detergent and hot tap water (if available) solution. Teflon bailers must be disassembled and the inside washed with a long-handled bottle brush or short-handled brush pulled through the bailer with rope.

6. Rinse the equipment with hot tap water (if available).

7. If the equipment will be used to collect samples for metals analysis, follow the tap water rinse with a 10% nitric acid solution rinse. Carbon steel equipment (e.g., bucket augers, split-spoons) should be rinsed with 1% nitric acid solution to reduce the potential for oxidizing the metal surfaces. Collect the nitric acid rinse in a separate bucket for proper disposal. Rinse the equipment with tap water.

8. Thoroughly rinse the equipment with deionized water.

9. Spray the equipment with isopropanol and allow to completely air dry. The solvent rinse must be collected in a separate bucket. Isopropanol is the recommended solvent for organic contaminants because it is readily available and is not a Department of Transportation hazardous material. However, other solvents (e.g., acetone, hexane, methanol) may be more effective in removing certain contaminants, such as oils or PCBs. Please note that many state programs and USEPA regions specify the solvents to be used for equipment decontamination.

10. Rinse the equipment with deionized water using at least five times the volume of solvent used in the previous step.

11. After the equipment has been allowed to completely air dry, each piece must be individually wrapped with aluminum foil (shiny side out), and then wrapped in plastic.

    Note: Decontamination solvents may introduce contaminants to environmental samples. It is very important to ensure that the equipment has completely dried before use or storage.

12. After the final decontamination event on a project, label each piece of equipment with the date of decontamination, the initials of decontamination personnel, and the type of decontamination solutions used.

13. Note any discrepancies from standard decontamination procedures in the field logbook.

14. Field decontamination presents unique problems in disposal of decontamination solutions. The spent wash water and rinse water can potentially be placed in the facility's waste water treatment system. However, field personnel should obtain approval from facility personnel and from the local POTW. If no wastewater treatment system is present onsite, or if approval cannot be obtained from the facility and local POTW, the wash water should be containerized for offsite disposal in accordance with state and federal requirements. The volume of spent solvent generated during field decontamination should be minimal. Solvents should be collected in separate buckets and allowed to evaporate. See SOP 26 for information on managing investigation-derived wastes.

15. Paper towels soaked with solvent should be allowed to air dry and be disposed of with the general trash. Under no circumstances should any decontamination solution be disposed of on soil surfaces.

Standard Operating Procedure – 20

Sample Shipping Procedures

Materials:

Suitable shipping container (e.g., plastic cooler or lab supplied styrofoam cooler)
Chain-of-custody forms
Custody seals
WSP mailing labels
Strapping, clear packing, or duct tape
Ziploc® plastic bags
Knife or scissors
Permanent marker
Latex or nitrile gloves
Large plastic garbage bag
Wet ice
Bubble wrap or other packing material
Universal sorbent materials
Sample container custody seals (if required)
Federal Express form (with WSP account number)
Vermiculite (or commercially available cat litter)

Procedures:

For shipping purposes, samples are segregated into two classes; environmental samples and restricted articles (i.e., hazardous materials). Environmental samples can also be categorized based on expected or historical analyte levels (i.e., low or high). An environmental sample is one that is not defined as a hazardous material by the Department of Transportation (DOT, 49 CFR Part 171.8). The DOT defines a "hazardous material" as a substance which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. Any material of a suspected hazardous nature, previously characterized as hazardous, or known to be hazardous is considered a restricted article.

In general, the two major concerns in shipping samples are protecting the samples from incidental breakage during shipment and complying with applicable DOT and courier requirements for restricted article shipments.

Protecting the samples from incidental breakage can be achieved using "common sense." All samples should be packed in a manner that will not allow them to freely move about in the cooler or shipping container. Glass surfaces should not be allowed to contact each other. When possible, repack the samples in the same materials that they were originally received in from the laboratory. Each container should be cushioned with plastic bubble wrap, styrofoam, or other nonreactive cushioning material. Shipping hazardous materials should conform to the packaging, marking, labeling, and shipping instructions identified in 49 CFR Parts 172 & 173.

Environmental samples shall be packed for shipment using the following procedures:

1. Line the shipping container with a large, heavy-duty plastic garbage bag. Place universal sorbent materials (e.g., sorbent pads) between the cooler and the heavy-duty plastic bag. The amount of sorbent material should be sufficient to absorb the volume of wet ice and aqueous samples. If using a plastic cooler, securely tape the drain plug closed on the outside of the cooler.

2. Place 2-4 inches of bubble wrap or other packing material inside the heavy-duty plastic bag in the bottom of the cooler.

3. The sample packer should wear latex or nitrile gloves when handling the samples during the packing process.

4. Place the bottles in the cooler with sufficient space to allow for the addition of more bubble wrap or other packing material between the bottles. Large or heavy sample containers should be placed on the bottom of the cooler with lighter samples (i.e., VOAs) placed on top to eliminate breakage.

5. Place the "wet ice" inside two sealed heavy-duty zipper-style plastic bags and package the bags of ice on top of or between the samples. Pack enough ice in the cooler to chill the samples during transit. If the cooler is shipped on a Friday or Saturday for Monday delivery, double the amount of ice placed in the cooler (Monday delivery should be used only as a last resort). Fill all remaining space with bubble wrap or other packing material. Securely close and seal with tape the top of the heavy-duty plastic bag.

6. Place chain-of-custody form (and, if applicable, CLP traffic reports) into a Ziploc® plastic bag and affix to the cooler's inside lid, then close the cooler. Securely fasten the top of the cooler shut with tape. Place two signed and dated chain-of-custody seals on the top and sides of the cooler so that the cooler cannot be opened without breaking the seals.

7. Once cooler is sealed, shake test the cooler to make sure that there are no loose sample containers in the cooler. If loose samples are detected, open the cooler and repack the samples.

8. Using clear tape, affix a mailing label with WSP’s return address to the top of the cooler.

9. Ship samples via priority overnight express to the contracted analytical laboratory for next morning delivery. If applicable, check the appropriate box on the airbill for Saturday delivery.

10. Declare value of samples on the shipping form for insurance purposes. The declared value should reflect the cost to recollect the samples.

11. Record the tracking numbers from the Federal Express forms in the field notebook and on the chain of custody form. Also, retain the customer's copy of the Federal Express airbill.

Hazardous materials should be packed according to the above procedures with the following additions:

1. Place samples in individual Ziploc® plastic bags and secure with a plastic tie or tape.

2. Place samples in paint cans in a manner which would prevent bottle breakage (i.e., do not place glass against glass).

3. Place vermiculite or other absorbent packing material in the paint can around the samples. The amount of packing material used should be sufficient to absorb the entire contents of the sample if the container is broken during shipment.

4. Secure a lid to the paint can with can clips and label the outside of the can with sample numbers and quantity. Mark the paint can with "This End Up" and arrow labels that indicate the proper upward position of the paint can.

5. Package the paint cans in DOT-authorized boxes or coolers, with appropriate DOT shipping labels and markings on two adjacent sides of the box or cooler.

6. Ship the restricted articles via overnight courier following the courier's documentation requirements. A special airbill must be completed for each shipment. Retain a copy of the airbill for WSP records and tracking purposes, if necessary.

Standard Operating Procedure – 21

Field Quality Assurance/Quality Control Samples

Materials:

Field logbook
Personal protective equipment (PPE)
Sample containers
Sample labels
Clear tape
Laboratory analyte free water
Clean or dedicated sampling equipment

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Select the appropriate glassware for the field Quality Assurance/Quality Control (QA/QC) samples. Refer to the WSP Standard Operating Procedure for Sample Container, Preservatives, and Holding Times to determine the appropriate bottles to use.

3. Field QA/QC samples include the following:

   trip blanks
   duplicate samples
   equipment blanks

4. Trip blanks should be provided by the analytical laboratory for all projects where samples are being collected for analysis of volatile organic compounds (VOCs). Trip blanks should accompany the sample bottles from the analytical laboratory to the site, accompany the sample containers at all times during the sampling event, and return to the laboratory with the sample containers. One trip blank should be submitted to the analytical laboratory with each shipment containing samples for VOC analysis. The trip blank should be analyzed only for VOCs.

5. One duplicate sample should be collected for every 20 samples of each matrix (e.g., soil and groundwater) collected during each sampling event. Duplicate samples of soil and other solid matrices should be collected by dividing the sample material in half and alternately filling the two sample bottle sets. Duplicate samples of groundwater and other aqueous matrices should be collected by alternately filling the two sample bottle sets from the same sampling vessel (e.g., bailer). The appropriate SOP should be followed for the collection of each sample type (soil, groundwater, sediment, sludge). Duplicate samples should be analyzed for all the analytes that are being analyzed for during the sampling event.

6. One equipment blank should be collected in the field at a rate of one per type of equipment per decontamination event not to exceed one per day. If dedicated sampling equipment is used, the equipment blanks should be prepared in the field before sampling begins. If field decontamination of sampling equipment is required, the equipment blanks should be prepared after the equipment has been used and field-decontaminated at least once. Equipment blanks should be prepared by filling or rinsing the precleaned equipment with analyte-free water and

collecting the rinsate in the appropriate sample containers. The samples should be labeled, preserved, and filtered (if required) in the same manner as the environmental samples. Equipment blanks should be analyzed for all the analytes for which the environmental samples are being analyzed. Decontamination of the equipment following equipment blank procurement is not required.

7. All QA/QC samples should be submitted to the analytical laboratory with unique sample numbers. Therefore, the QA/QC samples should be labeled as separate environmental samples following the same numbering scheme used during that particular sampling event. However, the QA/QC samples should be clearly identified on WSP's copy of the chain-of-custody form and in the field logbook.

Standard Operating Procedure - 22

Soil Head Space Screening (Field Technique)

Materials:

PPE
Field logbook
Photoionization detector (PID) and/or Flame Ionization Detector (FID)
Aluminum foil
Clear 8-oz to 16-oz glass large-mouth containers with lids
Stainless steel spoon
Zipper-style plastic bags

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Check PID to ensure that it is working properly.

3. Using WSP's standard operating procedure (SOP) for collecting soil, sludge, or sediment, half-fill a clean glass jar with sample. Place a piece of aluminum foil over the top of the jar and tightly seal the jar. Label the jar indicating the sampling location, depth, and date. Store the jar upside down until the sample is analyzed.

4. If jars are not available, collect the sample using a zipper-style plastic bag (e.g., Ziploc®). Seal and label the bag as specified in item 3.

5. Shake the sample vigorously for approximately 15 seconds.

6. If necessary, warm the sample to room temperature (70°F) by placing the jar in a heated room or vehicle. This step is very important when the ambient temperature is below 32°F.

7. After waiting approximately 15 minutes, carefully unscrew the lid of the jar without disturbing the aluminum foil. Pierce a hole through the aluminum foil using the tip of the PID. If using zipper-style bags, open the bag slightly and place the tip of the probe into the opening. Do not insert the probe into the soil and avoid the uptake of water droplets.

8. Following probe insertion, record the highest meter response. Using the foil seal/probe insertion method, maximum response should occur between 2 seconds and 5 seconds. Erratic PID response may result from high organic vapor concentrations or elevated headspace moisture. If these conditions exist, the headspace data should be qualified or discounted.

9. Record the sample location, depth, soil texture (i.e., clay or sand), and PID reading in the field notebook. Also record the ambient temperature, humidity, and whether moisture was present in the jar or plastic bag. These points are important because on very cold days volatilization of organic compounds is reduced and water vapor present in the jar may cause the PID to give a false reading. Be consistent in your procedure and in your recording of the data.

10. Duplicate 10 % of the headspace samples by collecting two samples from the same location and following items 2 through 9 above. The headspace screening data from both jars should be recorded and compared. Generally, replicate values should be consistent to plus or minus 20%.

11. Samples collected for headspace screening should not be retained for laboratory analysis. Dispose of the soil and jar appropriately.

Standard Operating Procedure – 24

Soil Sampling Using GeoProbe® System or Equivalent

Application:

To perform depth-discrete soil sampling with 2-foot or 4-foot long samplers using hydraulically-driven soil sampling equipment (GeoProbe® System or Equivalent).

Materials:

Stainless steel soil sampler (2-foot or 4-foot long)
Clear acetate liners
Tape measure or expandable ruler
Utility knife
Photoionization detector (PID)
Stainless steel spoons
Aluminum tray or stainless steel mixing bowl[a]
Nitrile or latex gloves
Field notebook

Procedure:

1. Calibrate the PID in accordance to the manufacturer's instructions. Decontaminate all down-hole sampling equipment and the utility knife, spoons, and mixing bowl per SOP 19 before initiating any boring activities. Ensure that the location is clear of all underground utilities and pipelines.

2. Attach a decontaminated 2-foot or 4-foot long stainless steel sampler fitted with a new, clear acetate liner and a decontaminated removable cutting shoe to small-diameter rods. Lower the stainless steel sampler to the top of the desired sampling depth.

3. Advance the stainless steel sampler through the desired sample interval. Record in the dedicated field notebook the interval through which the sampler was pushed.

4. After the sampler has reached the desired depth, retrieve the sampler by first removing the rods and then disconnecting the sampler. Remove the cutting shoe and acetate liner containing the soil column from the sampler. Measure the length of the material recovered relative to the interval the sampler was advanced, and record this information in the field notebook.

5. Cut the acetate liner using a utility knife to expose the recovered soil. Quickly scan the recovered soil with the PID and if necessary, immediately collect samples for VOC analysis. If the plan indicates the collection of samples for headspace analysis, collect this sample after obtaining the sample for VOC analysis per SOP 22. Record the PID readings in the field notebook.

6. For VOC samples, transfer soil directly from the acetate liner into the sample containers with a clean, stainless steel spoon. Fill the VOC sample container with a representative sample from the entire length of the recovered sample core, or other designated sample interval[a]. Fill the VOC container completely, leaving no headspace.

7. Describe the recovered soil using the Unified Soil Classification System or standard geological descriptions. Record the sample description in the field notebook.

8. If it is necessary to mix the sample, transfer the soil from the acetate liner to a clean aluminum tray or decontaminated stainless steel mixing bowl with a decontaminated stainless steel spoon**[b]**.

9. Examine contents of the tray/bowl and remove rock fragments and organic debris, such as roots, grass, and woody material, with the stainless steel spoon. Use the same spoon to chop apart clumps of dirt and mix the contents of the tray to a homogeneous particle size and soil texture. Transfer the tray/bowl contents to the appropriate sample containers using the stainless steel spoon.

10. The sample container(s) should be sealed, labeled, and placed in a cooler with ice or freezer packs to maintain 4° Celsius for shipment to the analytical laboratory.

11. Complete the chain-of-custody form with the appropriate sampling information.

    a) NJDEP's Field Sampling Procedures Manual requires the collection of soil samples for VOC analysis from the 0.5-foot interval that exhibits the highest reading during the field (PID) screening.

    b) U.S. Environmental Protection Agency (EPA) Region 4 requires a glass bowl for homogenizing soil for sample collection.

Appendix B – Analytical Laboratory Reports

Appendix C – Data Usability Reports

Appendix D – Boring Logs

Boring Log: SB-01

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/17/2012

Surface Elevation (feet AMSL*): 425.35

Total Depth (feet): 12

Borehole Diameter (inches): 2

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery
2	1	(0-2) 0.0 (2-4) 0.0	- - - -	88
4				
6	2	0.0	- - - -	38
8				
10	3	0.0	- - - -	50
12				
14				
16				
18				
20				

Subsurface Profile

Description

Ground Surface

Poorly-Graded Gravel with Sand (GP)
Gray (7.5YR 4/1) gravel, some fine to coarse-grained sand; loose; dry.

Well-Graded Sand (SW)
Strong brown (7.5YR 5/6) fine to medium-grained sand, trace gravel; loose; dry.

Poorly-Graded Gravel with Sand (GP)
Brown (7.5YR 4/4) subrounded gravel, some fine to coarse-grained sand, little silt; dense; dry, moist between between 11.2 feet to 11.8 feet, wet below.

Bottom of Boring at 12 feet

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: *SB-02*

Project: 5140 Site

Project No.:

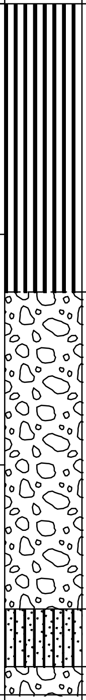
Location: Yorkville, NY

Completion Date: 7/17/2012

Surface Elevation (feet AMSL*): 425

Total Depth (feet): 12

Borehole Diameter (inches): 2

Sample Data					Subsurface Profile
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology
2	1	0.0	- - - -	50	
4					
6	2	0.0	- - - -	50	
8					
10	3	0.0	- - - -	50	
12					
14					
16					
18					
20					

Description

Ground Surface

Silt (ML)
Brown (7.5YR 5/4) silt, trace fine to coarse-grained sand, trace brave, trace rootlets.

Poorly-Graded Gravel with Sand (GP)
Brown (7.5YR 4/4) subrounded gravel, some fine to coarse-grained sand, trace silt; dense dry, moist between 6 and 6.1 feet and between 7.5 and 7.7 feet.

Silty Sand (SM)
Brown (7.5YR 4/4) fine to medium-grained sand, little silt and clay; loose; wet.

Poorly-Graded Gravel with Sand (GP)
Brown (7.5YR 4/4) gravel, some coarse-grained sand; dense; wet.

Bottom of Boring at 12 feet

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

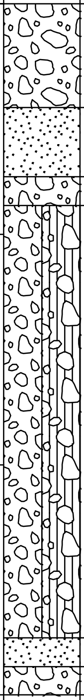
WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: SB-03

Project: 5140 Site
Project No.:
Location: Yorkville, NY
Completion Date: 7/17/2012

Surface Elevation (feet AMSL*): 424.72
Total Depth (feet): 12
Borehole Diameter (inches): 2

Sample Data					Subsurface Profile
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology
0–4	1	(0-2) 0.0 (2-4) 0.0	- - - -	75	
4–8	2	0.0	- - - -	50	
8–12	3	0.0	- - - -	50	



Description

Ground Surface

Poorly-Graded Gravel (GP)
Gray (7.5YR 4/1) gravel, some fine to coarse-grained sand; loose; dry.

Poorly-Graded Sand (SP)
Strong brown (7.5YR 4/6) fine to coarse-grained sand, trace gravel; loose; dry.

Poorly-Graded Gravel with Sand (GP)
Strong brown (7.5YR 4/6) gravel, some fine to coarse-grained sand; loose; dry.

Poorly-Graded Gravel with Silt and Sand (GP-GM)
Brown (7.5YR 4/4) gravel, some fine to coarse-grained sand, little silt; medium dense to dense; dry, becoming moist between 10.8 and 11 feet.

Poorly-Graded Sand (SP)
Brown (7.5YR 4/4) medium to coarse-grained sand, trace to little gravel; medium dense; wet.

Poorly-Graded Gravel (GP)
Brown (7.5YR 4/4) gravel, trace fine to coarse-grained sand; dense; wet.

Bottom of Boring at 12 feet

Depth scale: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: SB-04

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/17/2012

Surface Elevation (feet AMSL*): 424.83

Total Depth (feet): 12

Borehole Diameter (inches): 2

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description Ground Surface
						Poorly-Graded Gravel with Sand (GP) Gray (7.5YR 4/1) gravel, some fine to coarse-grained sand; loose; dry.
2	1	(0-2) 0.0 (2-4) 0.0	- - - -	75		
						Well-Graded Sand (SW) Strong brown (7.5YR 5/6) fie to medium-grained sand, trace gravel; loose; dry.
4						***Poorly-Graded Gravel with Sand (GP)*** Brown (7.5YR 4/4) subrounded gravel, some fine to coarse-grained sand, little silt; dense; dry, moist between 3.7 and 4 feet and between 10.5 feet to 11 feet, wet between 11 and 12 feet.
6	2	0.0	- - - -	50		
8						
10	3	0.0	- - - -	67		
12						Bottom of Boring at 12 feet
14						
16						
18						
20						

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: SB-05

Project: 5140 Site
Surface Elevation (feet AMSL*): 425.24
Project No.:
Total Depth (feet): 12
Location: Yorkville, NY
Borehole Diameter (inches): 2
Completion Date: 7/17/2012

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
						Poorly-Graded Gravel with Sand (GP) Gray (7.5YR 4/1) gravel, some fine to coarse-grained sand; loose; dry.
2	1	(0-2) 0.0 (2-4) 0.0	- - - -	100		***Silt (ML)*** Strong brown (7.5YR 5/6) silt, trace sand; stiff; dry.
4						
6	2	0.0	- - - -	3		***Poorly-Graded Gravel with Sand (GP)*** Brown (7.5YR 4/4) subrounded gravel, little to some fine to coarse-grained sand, little silt; dense; dry, moist between between 11 feet to 11.5 feet, wet below.
8						
10	3	0.0	- - - -	50		
12						Bottom of Boring at 12 feet
14						
16						
18						
20						

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: *SB-06*

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/17/2012

Surface Elevation (feet AMSL*): 424.88

Total Depth (feet): 12

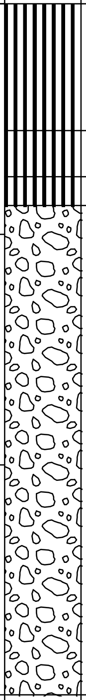
Borehole Diameter (inches): 2

Sample Data

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery
0–4	1	(0-2) 0.0 (2-4) 0.0	- - - -	67
4–8	2	0.0	- - - -	50
8–12	3	NA	- - - -	50

Subsurface Profile

Lithology



Description

Ground Surface

Silt (ML)
Light brown (7.5YR 6/3) silt, trace fine to coarse-grained sand and gravel, trace rootlets.

Sandy Silt (ML)
Brown (7.5YR 4/4) silt; some fine co coarse-grained sand and gravel; dense ;d dry.

Silt (ML)
Brown (7.5YR 4/4) silt; stiff; dry.

Poorly-Graded Gravel with Sand (GP)
Brown (7.5YR 4/4) gravel, some fine to coarse-grained sand, trace to little silt; dense; dry, moist between 6 and 6.1 feet and between 7.9 and 8 feet, becoming wet between 11 and 12 feet.

Bottom of Boring at 12 feet

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: SB-07

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/17/2012

Surface Elevation (feet AMSL*): 425.1

Total Depth (feet): 16

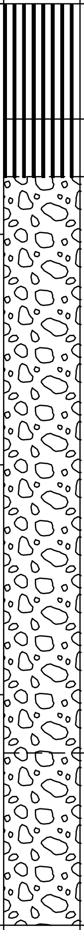
Borehole Diameter (inches): 2

Sample Data

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery
0–4 (2)	1	(0-2) 0.0 (2-4) 0.0	- - - -	100
4–8 (6)	2	0.0	- - - -	50
8–12 (10)	3	0.0	- - - -	50
12–16 (14)	4	0.0	- - - -	50

Subsurface Profile

Lithology



Description

Ground Surface

Silt (ML)
Brown (7.5YR 4/4) silt, trace fine-grained sand, little rootlets; medium dense; dry.

Silt with Sand (ML)
Brown (7.5YR 5/4) silt, little fine to coarse-grained sand, trace gravel; medium dense; dry.

Poorly-Graded Gravel with Sand (GP)
Brown (7.5YR 4/4) fine to coarse-grained sand and gravel, trace silt; medium dense to dense; dry, moist from 6 to 6.3 feet.

Poorly-Graded Gravel with Sand (GP)
Brown (7.5YR 4/4) gravel, some fine to coarse-grained sand; dense; wet.

Bottom of Boring at 16 feet

Depth scale: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: *SB-08*

Project: 5140 Site

Project No.:

Location: Yorkville, NY

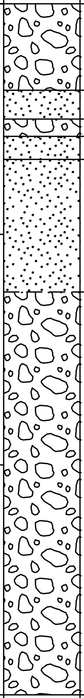
Completion Date: 7/16/2012

Surface Elevation (feet AMSL*): 424.86

Total Depth (feet): 12

Borehole Diameter (inches): 2

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–4	1	(0-2) 0.0 (2-4) 0.0	- - - - -	75		
4–8	2	0.0	- - - -	50		
8–12	3	0.0	- - - -	50		



Poorly-Graded Gravel (GP)
Gray (7.5YR 4/1) gravel, little fine to coarse-grained sand; loose; dry.

Poorly-Graded Sand (SP)
Brown (7.5YR 4/4) fine to medium-grained sand; loose; dry.

Poorly-Graded Gravel (GP)
Brown (7.5YR 5/3) gravel; loose; dry.

Poorly-Graded Sand (SP)
Brown (7.5YR 5/3) fine to coarse-grained sand; loose; dry.

Poorly-Graded Sand with Gravel (SP)
Brown (7.5YR 5/4) fine to medium-grained sand; little gravel; loose; dry.

Poorly-Graded Gravel (GP)
Brown (7.5YR 4/4) gravel, little fine to coarse-grained sand; dense; dry, becoming wet between 11.7 and 12 feet bgs.

Bottom of Boring at 12 feet

Depth scale: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: SB-09

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/16/2012

Surface Elevation (feet AMSL*): 424.81

Total Depth (feet): 12

Borehole Diameter (inches): 2

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
2	1	(0-2) 0.0 (2-4) 0.0	- - - -	100		***Poorly-Graded Gravel (GP)*** Gray (7.5YR 5/1) gravel, little fine to coarse-grained sand; medium dense; dry. ***Poorly-Graded Sand with Gravel (SP)*** Brown (7.5YR 4/4) fine to coarse-grained sand, little gravel; medium dense; dry, becoming moist between 3.7 and 4.0 feet.
4						
6	2	0.0	- - - -	50		***Poorly-Graded Gravel (GP)*** Brown (7.5YR 4/4) sub-rounded gravel;, some fine to coarse-grained sand; dense; dry, moist between 7.5 and 7.6 feet, becoming wet between 11.5 and 12 feet.
8						
10	3	0.0	- - - -	50		
12						Bottom of Boring at 12 feet
14						
16						
18						
20						

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: SB-10

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/16/2012

Surface Elevation (feet AMSL*): 424.95

Total Depth (feet): 12

Borehole Diameter (inches): 2

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description Ground Surface
2	1	(0-2) 0.0 (2-4) 0.0	- - - -	63		***Poorly-Graded Gravel with Sand (GP)*** Light gray (7.5YR 7/1) gravel, some fine to medium-grained sand, plastic sheeting and woody debris at 2 feet; loose; dry. ***Poorly-Graded Gravel with Sand (GP)*** Strong brown (7.5YR 4/4) gravel, some medium to coarse-grained sand, trace silt and fine-grained sand; dense; dry, becoming wet at 12 feet.
4						
6	2	0.0	- - - -	50		
8						
10	3	0.0	- - - -	50		
12						Bottom of Boring at 12 feet
14						
16						
18						
20						

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: *SB-11*

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/17/2012

Surface Elevation (feet AMSL*): 424.98

Total Depth (feet): 12

Borehole Diameter (inches): 2

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
2	1	0.0	- - - -	50	▥	***Silt (ML)*** Light brown (7.5YR 6/4) silt, trace sand and gravel, trace rootlets; loose; dry.
4						
6	2	0.0	- - - -	25	⁘	***Poorly-Graded Gravel with Silt and Sand (GP-GM)*** Brown (7.5YR 4/4) gravel, some fine to coarse-grained sand; little silt; loose, becoming dense between 8 and 12 feet; dry becoming most between 10.5 and 11.5 feet and wet between 11.5 and 12 feet.
8						
10	3	0.0	- - - -	50	⁘	
12						Bottom of Boring at 12 feet
14						
16						
18						
20						

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: *SB-12*

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/17/2012

Surface Elevation (feet AMSL*): 425.01

Total Depth (feet): 12

Borehole Diameter (inches): 2

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
2	1	(0-2) 0.0 (2-4) 0.0	- - - -	100		**Silt (ML)** Light brown (7.5YR 6/4) silt, trace fine-grained sand; loose; dry.
4						**Poorly-Graded Sand with Gravel (SP)** Brown (7.5YR 4/4) fine to coarse-grained sand, some gravel; loose; dry.
6	2	0.0	- - - -	50		**Poorly-Graded Gravel with Silt and Sand (GP-GM)** Brown (7.5YR 4/4) gravel, some sand, trace silt; dense; dry, becoming wet between 11 and 12 feet.
8						
10	3	0.0	- - - -	50		
12						Bottom of Boring at 12 feet
14						
16						
18						
20						

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: SB-13

Project: 5140 Site
Project No.:
Location: Yorkville, NY
Completion Date: 7/17/2012

Surface Elevation (feet AMSL*): 424.78
Total Depth (feet): 12
Borehole Diameter (inches): 2

Sample Data					Subsurface Profile
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Description
					Ground Surface
2	1	(0-2) 0.0 (2-4) 0.0	- - - -	100	***Asphalt*** ***Silt (ML)*** Brown (7.5YR 4/4) silt; stiff; dry. ***Sandy Silt (ML)*** Brown (7.5YR 4/4) silt, some fine to coarse-grained sand and gravel; dense; dry.
6	2	0.0	- - - -	50	***Poorly-Graded Gravel with Sand (GP)*** Brown (7.5YR 4/4) gravel, some fine to coarse-grained sand, trace to little silt; dense; dry, becoming moist between 9.5 and 10.3 feet and wet below.
10	3	0.0	- - - -	67	
12					Bottom of Boring at 12 feet

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: SB-14

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/17/2012

Surface Elevation (feet AMSL*): 424.74

Total Depth (feet): 12

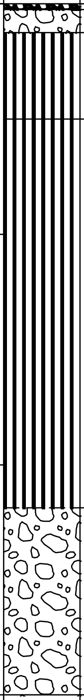
Borehole Diameter (inches): 2

Sample Data

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery
0-4	1	(0-2) 0.0 (2-4) 0.0	- - - -	100
4-8	2	0.0	- - - -	50
8-12	3	0.0	- - - -	67

Subsurface Profile

Lithology



Description

Ground Surface

Asphalt

Poorly-Graded Gravel with Sand (GP)
Gray (7.5YR 4/1) gravel, some fine to coarse-grained sand; loose; dry.

Silt (ML)
Dark brown (7.5YR 3/3) silt, little clay; hard; dry.

Silt with Gravel (ML)
Brown (7.5YR 4/4) silt, some fine to coarse-grained sand and gravel; dense; dry.

Poorly-Graded Gravel with Sand (GP)
Brown (7.5YR 4/4) gravel, some fine to coarse-grained sand, trace silt; dry, becoming moist between 10.8 and 11.3 feet, and wet between 11.3 and 12 feet.

Bottom of Boring at 12 feet

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: SB-15

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/16/2012

Surface Elevation (feet AMSL*): 424.85

Total Depth (feet): 12

Borehole Diameter (inches): 2

Sample Data					Subsurface Profile
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Description
					Ground Surface
2	1	(0-2) 0.0 (2-4) 0.0	- - - - -	75	***Poorly-Graded Gravel (GP)*** Gray (7.5YR 4/1) gravel with fine to coarse-grained sand; loose; dry. ***Silt (ML)*** Dark brown (7.5YR 3/2) and reddish-yellow (7.5YR 6/8) silt; hard; dry. ***Poorly-Graded Sand with Gravel (SP)*** Brown (7.5YR 4/4) fine to coarse-grained sand, some gravel; loose to medium dense; dry.
4					
6	2	0.0	- - - -	50	***Poorly-Graded Gravel (GP)*** Brown (7.5YR 4/4) sub-rounded gravel, some fine to coarse-grained sand; medium dense to dense; dry, becoming wet between 11.5 and 12 feet.
8					
10	3	0.0	- - - -	50	
12					Bottom of Boring at 12 feet
14					
16					
18					
20					

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

WSP Environment & Energy
5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: SB-16

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/16/2012

Surface Elevation (feet AMSL*): 424.83

Total Depth (feet): 12

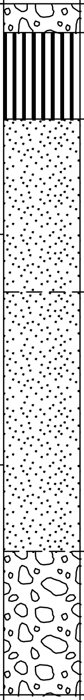
Borehole Diameter (inches): 2

Sample Data

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery
2	1	(0-2) 0.0 (2-4) 0.0	- - - -	100
6	2	0.0	- - - -	50
10	3	NA	- - - -	25

Subsurface Profile

Lithology



Description

Ground Surface

Poorly-Graded Gravel (GP)
Gray (7.5YR 5/1) gravel; loose; dry.

Silt (ML)
Dark brown (7.5YR 3/2) and reddish-yellow (7.5YR 6/8) mottled silt; little clay; hardy; dry.

Poorly-Graded Sand (SP)
Brown (7.5YR 4/4) fine to medium-grained sand, little gravel from 2 to 2.5 feet and from 3.8 to 4 feet; loose; dry.

Poorly-Graded Sand with Gravel (SP)
Brown (7.5YR 4/4) fine to medium-grained sand, some subrounded gravel; loose to medium dense; dry.

Poorly-Graded Gravel (GP)
Brown (7.5YR 5/4) gravel, little coarse-grained sand; loose; wet.

Bottom of Boring at 12 feet

Depth: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

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5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: *SB-17*

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/16/2012

Surface Elevation (feet AMSL*): 428.22

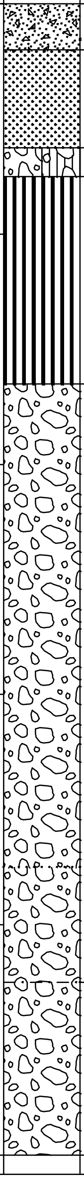
Total Depth (feet): 20

Borehole Diameter (inches): 2

Sample Data				
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery
2	1	(0-2) 0.0 (2-4) 0.0	- - - -	100
4				
6	2	0.0	- - - -	50
8				
10	3	0.0	- - - -	25
12				
14	4	0.0	- - - -	50
16				
18	5	NA	- - - -	50
20				

Subsurface Profile

Lithology



Description

Ground Surface

Concrete

Well-Graded Sand (SW)
Strong brown (7.5YR 4/6) fine to medium-grained sand; loose; dry.

Poorly-Graded Gravel with Silt (GP-GM)
Gravel, some fine to coarse-grained sand, little silt; medium dense; dry.

Silt (ML)
Dark brown (7.5YR 2/3 to 3/3) silt, little clay, trace organics; stiff; dry.

Poorly-Graded Gravel (GP)
Reddish-brown (5YR 4/3) 0.25 to 1-inch diameter sub-rounded gravel; little silt and fine to coarse-grained angular sand; loose; dry.

Poorly-Graded Gravel (GP)
Brown (7.5YR 5/3) gravel, little fine to coarse-grained sand; medium dense; wet.

Poorly-Graded Gravel (GP)
Dark gray (7.5YR 4/1) sub-rounded gravel, little coarse-grained sand; loose; wet.

Bottom of Boring at 20 feet

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

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5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: *SB-18*

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/16/2012

Surface Elevation (feet AMSL*): 428.17

Total Depth (feet): 16

Borehole Diameter (inches): 2

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
2	1	(0-2) 0.0 (2-4) 0.0	- - - -	100		***Concrete*** ***Well-Graded Sand (SW)*** Strong brown (7.5YR 5/6) fine to medium-grained sand; loose; dry. ***Silt (ML)*** Dark brown (7.5YR 2/3 to 3/3) silt,trace gravel, very stiff; dry.
4						
6	2	(4-6) 0.0 (6-8) 0.0	- - - -	75		***Poorly-Graded Gravel (GP)*** Dark brown (7.5YR 3/4), becoming reddish-yellow (7.5YR 6/8) between 11.8 and 12 feet, becoming very dark gray (7.5YR 3/1) between 15.8 and 16 feet; fine to medium-grained sand, little silt, some 0.25 to 2-inch diameter sub-rounded gravel; dense; dry, becoming moist between 11.8 and 16 feet.
8						
10	3	0.0	- - - -	75		
12						
14	4	0.0	- - - -	25		
16						Bottom of Boring at 16 feet
18						
20						

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

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5 Sullivan Street
Cazenovia, New York 13035
(315) 655-3900

Boring Log: *SB-19*

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/16/2012

Surface Elevation (feet AMSL*): 428.12

Total Depth (feet): 16

Borehole Diameter (inches): 2

Sample Data					Subsurface Profile
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Description
					Ground Surface
					Concrete
2	1	(0-2) 0.0 (2-4) 0.0	- - - -	100	***Well-Graded Sand (SW)*** Strong brown (7.5YR 4/6) fine to medium-grained sand; loose; dry.
4					***Silt (ML)*** Dark brown (7.5YR 2/3 to 3/3) silt, little clay, trace organics; medium stiff; dry.
6	2	(4-6) 0.0 (6-8) 0.0	- - - -	75	***Poorly-Graded Gravel (GP)*** Yellowish-red (5YR 4/6) coarse-grained sand and 0.25 to 2-inch diameter sub-rounded to sub-angular gravel; little fine to medium-grained angular sand; loose; dry.
8					
10	3	0.0	- - - -	30	
12					
14	4	0.0	- - - -	50	***Poorly-Graded Gravel (GP)*** Very dark gray (5YR 3/1) sub-rounded gravel, some coarse-grained sand, trace fine to medium-grained sand; dense; moist.
16					***Poorly-Graded Gravel (GP)*** Strong brown (7.5YR 5/6) gravel, little coarse-grained sand; loose; wet. Bottom of Boring at 16 feet
18					
20					

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

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(315) 655-3900

Boring Log: *SB-20*

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 7/16/2012

Surface Elevation (feet AMSL*): 428.07

Total Depth (feet): 16

Borehole Diameter (inches): 2

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description Ground Surface
2	1	0.0	- - - -	50		***Concrete*** ***Silt with Gravel (ML)*** Dark brown (7.5YR 3/3) silt, little fine to coarse-grained sand, little angular gravel; dense; dry. ***Silt (ML)*** Dark brown (7.5YR 3/4) silt, little clay; stiff; dry.
4						
6	2	0.0	- - - -	50		***Poorly-Graded Sand with Gravel (SP)*** Brown (7.5YR 4/4) fine to coarse-grained sand, trace silt, some 0.25 to 2-inch diameter subrounded gravel; dense; dry, becoming reddish-yellow (7.5YR 6/8) and moist at 11.8 feet bgs.
8						
10	3	0.0	- - - -	50		
12						
14	4	NA	- - - -	50		***Poorly-Graded Gravel (GP)*** Yellowish-brown (10YR 5/4) gravel, some fine to coarse-grained sand; wet; medium dense.
16						Bottom of Boring at 16 feet
18						
20						

Geologist(s): Erik S. Reinert
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Phil Orsi
Method: Direct Push

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5 Sullivan Street
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(315) 655-3900

Boring Log: MW-5

Project: 5140 Site
Project No.:
Location: Yorkville, NY
Completion Date: 11/16/2012

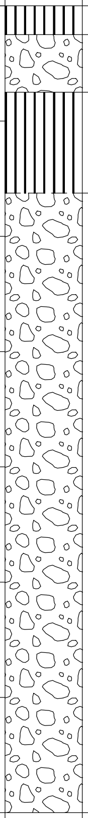
Surface Elevation (feet AMSL*): 425.2
TOC Elevation (feet AMSL*): 424.79
Total Depth (feet): 17.5
Borehole Diameter (inches): 8.25
**AMSL = Above mean sea level*

Sample Data

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery
	1	0.0	- - - -	100
2	2	0.0	- - - -	0
4	3	0.0	- - - -	25
6	4	0.0	- - - -	25
8	5	0.0	- - - -	25
10	6	0.0	- - - -	25
12	7	NA	- - - -	25
14				
16				
18				
20				

Subsurface Profile

Lithology



Description

Ground Surface

Sandy Silt (ML)
Brown (7.5YR 4/4) silt, little fine-grained sand, trace rootlets; medium dense; dry.

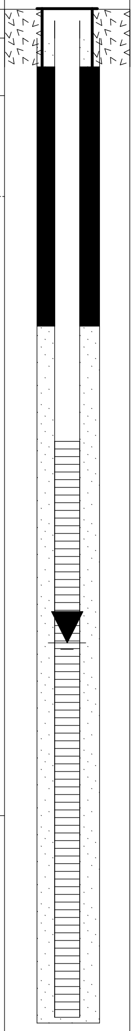
Poorly-Graded Gravel with Sand (GP)
Dark gray (7.5YR 4/1) angular gravel, some medium to coarse-grained sand; medium dense; dry.

Silt (ML)
Strong brown (7.5YR 5/6) silt; stiff; dry.

Poorly-Graded Gravel with Sand (GP)
Brown (7.5YR 4/4) sub-rounded gravel, little coarse-grained sand, trace silt; medium dense, becoming loose between 7 and 14 feet; dr, becoming wet at approximately 11 feet.

Bottom of Boring at 17.5 feet

Well Details



Geologist(s): Erik S. Reinert
Subcontractor: Parratt Wolff, Inc.
Driller/Operator: Layne Peche
Method: Hollow Stem Auger

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Boring Log: MW-6

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 11/15/2012

Surface Elevation (feet AMSL*): 425.36

TOC Elevation (feet AMSL*): 424.94

Total Depth (feet): 18

Borehole Diameter (inches): 8.25

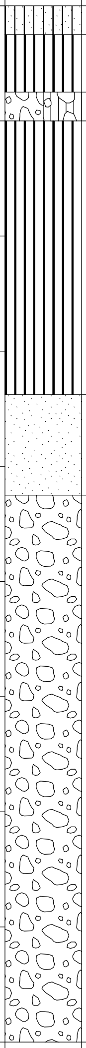
**AMSL = Above mean sea level*

Sample Data

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery
2	1	0.0	- - - -	100
4	2	0.0	- - - -	100
6	3	0.0	- - - -	25
8	4	0.0	- - - -	25
10	5	0.0	- - - -	50
12	6	0.0	- - - -	50
14	7	NA	- - - -	50
16	8	NA	- - - -	0
18	9	NA	- - - -	50
20				

Subsurface Profile

Lithology



Description

Ground Surface

Silty Sand (SM)
Brown (7.5YR 4/3) fine to medium-grained sand, little silt, trace rootlets; loose; dry.

Silt (ML)
Strong brown (7.5YR 5/8) and dark gray (7.5YR 4/1) silt, little clay; medium dense; dry.

Poorly-Graded Gravel with Silt and Sand (GP-GM)
Strong brown (7.5YR 5/6) 0.5 to 2-inch diameter gravel, little sand and silt; loose; dry.

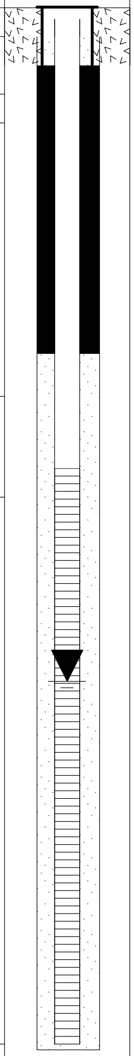
Sandy Silt with Gravel (ML)
Brown (7.5YR 4/3) silt, some fine to medium-grained sand, trace to little gravel; medium dense; dry.

Poorly-Graded Sand with Gravel (SP)
Brown (7.5YR 4/3) medium to coarse-grained sand, trace silt, little sub-rounded 0.1 to 1.8-inch diameter gravel; loose; dry.

Poorly-Graded Gravel with Sand (GP)
Brown (7.5YR 4/3), becoming gray (7.5YR 5/1) at approximately 16 feet, 0.2 to 2-inch sub-rounded gravel, some coarse-grained sand; dense, becoming medium dense at approximately 12 feet, and becoming loose at approximately 16 feet; dry, becoming wet at 11.7 feet.

Bottom of Boring at 18 feet

Well Details



Geologist(s): Erik S. Reinert

Subcontractor: Parratt Wolff, Inc.

Driller/Operator: Layne Peche

Method: Hollow Stem Auger

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Boring Log: MW-7

Project: 5140 Site
Project No.:
Location: Yorkville, NY
Completion Date: 11/16/2012

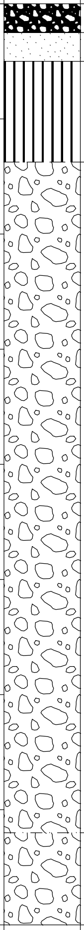
Surface Elevation (feet AMSL*): 424.5
TOC Elevation (feet AMSL*): 424.12
Total Depth (feet): 17
Borehole Diameter (inches): 8.25
**AMSL = Above mean sea level*

Sample Data

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery
2	1	0.0	- - - -	100
4	2	0.0	- - - -	25
6	3	0.0	- - - -	25
8	4	0.0	- - - -	50
10	5	0.0	- - - -	50
12	6	NA	- - - -	40
14	7	NA	- - - -	50
16	8	NA	- - - -	60
18				
20				

Subsurface Profile

Lithology



Description

Ground Surface

Asphalt

Poorly-Graded Sand with Gravel (SP)
Brown (7.5YR 4/4) fine to coarse-grained sand, little angular gravel up to 2-inches in diameter, trace silt; loose; dry.

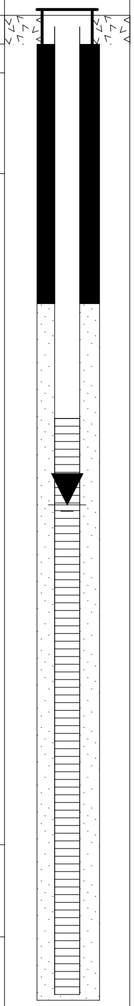
Silt (ML)
Strong brown (7.5YR 5/6) silt, trace sub-rounded gravel; very stiff to hard; dry.

Poorly-Graded Gravel with Sand (GP)
Strong brown (7.5YR 4/6) 0.1 to 2-inch diameter sub-rounded gravel, some coarse-grained sand, trace silt and fine to medium-grained sand; loose, becoming medium dense at approximately 8.5 feet; dry, becoming wet at approximately 8.5 feet.

Poorly-Graded Gravel with Sand (GP)
Strong brown (7.5YR 4/6), becoming dark gray (7.5YR 4/1) at 15.7 feet, medium to coarse-grained sand grading to 0.25 to 2-inch diameter gravel at 15.2 feet; dense; wet.

Bottom of Boring at 17 feet

Well Details



Geologist(s): Erik S. Reinert
Subcontractor: Parratt Wolff, Inc.
Driller/Operator: Layne Peche
Method: Hollow Stem Auger

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Boring Log: MW-8

Project: 5140 Site

Project No.:

Location: Yorkville, NY

Completion Date: 11/15/2012

Surface Elevation (feet AMSL*): 424.67

TOC Elevation (feet AMSL*): 424.22

Total Depth (feet): 17

Borehole Diameter (inches): 8.25

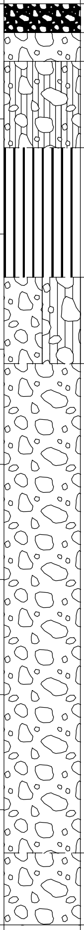
**AMSL = Above mean sea level*

Sample Data

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery
	1	0.0	- - - -	100
2	2	0.0	- - - -	50
4	3	0.0	- - - -	25
6	4	0.0	- - - -	75
8	5	0.0	- - - -	25
10	6	NA	- - - -	50
12	7	NA	- - - -	100
14	8	NA	- - - -	25
16				
18				
20				

Subsurface Profile

Lithology



Description

Ground Surface

Asphalt

Poorly-Graded Gravel with Sand (GP)

Very dark gray (7.5YR 7/1) 0.25 to 0.5-inch diameter sub-angular gravel, little medium to coarse-grained sand, trace silt, medium dense; dry.

Silty Gravel with Sand (GM)

Gray (7.5YR 5/1) 0.5 to 2-inch diameter sub-angular gravel, some medium to coarse-grained sand and silt; loose; dry.

Silt with Sand (ML)

Brown (7.5YR 4/4) silt, little fine to coarse-grained sand, few 0.1 to 0.2-inch diameter sub-rounded gravel, medium dense; dry.

Poorly-Graded Gravel with Silt and Sand (GP-GM)

Brown (7.5YR 4/4) 2-inch diameter sub-rounded gravel, little silt and coarse-grained sand; dense; dry.

Poorly-Graded Gravel with Sand (GP)

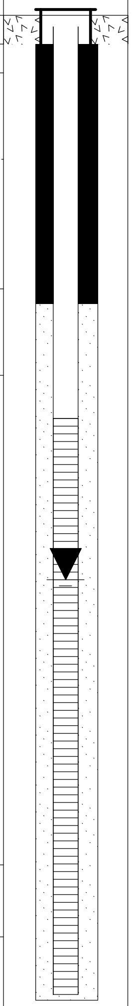
Brown (7.5YR 4/4) 0.1 to 2-inch diameter sub-rounded gravel, little to some coarse-grained sand; loose; dry, becoming wet at 9.8 feet.

Poorly-Graded Gravel (GP)

Gray (7.5YR 5/1) gravel; loose; wet.

Bottom of Boring at 17 feet

Well Details



Geologist(s): Erik S. Reinert

Subcontractor: Parratt Wolff, Inc.

Driller/Operator: Layne Peche

Method: Hollow Stem Auger

WSP Environment & Energy

Appendix E – Groundwater Monitoring Forms

WSP Environment & Energy
5 Sullivan Street
Cazenovia, NY 13035 (315) 655-3900 • Fax (315) 655-3907

Groundwater Sampling Monitoring Form

Well ID	MW-5	**Site ID:**	5140 Site	**Sample Date:**	12/20/2012
Well Diameter	2 in	**Sampling Event:**	Groundwater Investigation		
Depth to Water	9.31 ft				
Total Well Depth	17.2 ft	**Samplers**	Erik Reinert		
Screen Length	10 ft	**Weather Conditions and Notes:**	clear + cold		
Pump Intake	12.5 ft	**Flow Rate**			

Instrument Calibration Information

pH Meter Calibration			Horiba U52 with flow-through cell
7.00 Stand.	pH 4.01 Stand	Slope (mV/pH)	Notes on calibration: Calibrated to manufacturer's specifications using auto-calibration standard solution
Air temp =	30 °F		

Well Purging Information

Start purge: 0845 End purge: Pump Type:

Time	DTW	Purge Volume (L)	pH	Conductivity (mS/cm)	Turbidity (NTU)	D.O. (mg/l)	T (°C)	ORP (mV)	Appearance of Purge Water	Flow Rate (mL/min)
0905	9.38	0.5	7.26	1.30	13.8	1.82	9.58	34	clear	100
0910	9.40	~1.2	7.13	1.28	8.8	1.73	10.52	27	clear	125
0915	9.40	~1.8	7.12	1.28	5.8	1.70	10.72	24	clear	125
0920	9.40	~2.5	7.12	1.28	2.5	1.75	10.98	22	clear	125
0925	9.40	~3.1	7.11	1.27	1.7	1.97	11.11	21	clear	125
0930	9.40	~3.7	7.11	1.26	1.5	2.19	11.28	22	clear	125
0935	9.40	~4.3	7.10	1.24	1.3	2.37	11.24	24	clear	125
0940	9.40	~5.0	7.11	1.23	1.1	2.55	11.27	26	clear	125
0945	9.40	~5.6	7.12	1.22	0.7	2.69	11.18	27	clear	125
0950	9.40	~6.2	7.12	1.21	0.4	2.95	11.42	30	clear	125
0955	9.40	~6.9	7.11	1.20	0.3	3.06	11.42	32	clear	125
1000	9.40	~7.5	7.10	1.19	0.1	3.24	11.49	33	clear	125
1005	9.40	~8.1	7.10	1.18	0.0	3.30	11.46	35	clear	125
1006	Collect sample. All parameters stable except DO which is increasing due to air in flow-through cell									

Laboratory Analysis Information

Sample ID	Analytes		Bottle Count	Bottle Type	Preservative	Analytical Lab	Sample Time	Comments
MW-5	PCBs 8020		2	1L Amber	none	Accutest	1006	none

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Groundwater Sampling Monitoring Form

Well ID	MW-5	**Site ID:**	**5140 Site**	**Sample Date:**	11/29/2012
Well Diameter	2 in	**Sampling Event:**	**Groundwater Investigation**		
Depth to Water	10.51 ft				
Total Well Depth	17.2 ft	**Samplers**	Erik Reinert		
Screen Length	10 ft	**Weather Conditions and Notes:**	clear + cold		
Pump Intake	12.5 ft	**Flow Rate**			

Instrument Calibration Information

pH Meter Calibration			**Horiba U52 with flow-through cell**
7.00 Stand.	pH 4.01 Stand.	Slope (mV/pH)	Notes on calibration:
			Calibrated to manufacturer's specifications using auto-calibration standard solution
Air temp =	43	°F	

Well Purging Information

Start purge: 1550 End purge: 1611 Pump Type:

Time	DTW	Purge Volume (L)	pH	Conductivity (mS/cm)	Turbidity (NTU)	D.O. (mg/l)	T (°C)	ORP (mV)	Appearance of Purge Water	Flow Rate (mL/min)
1550	11.65	Init	7.25	1.36	21.8	1.42	10.84	181	clear	125
1555	11.66	0.6	7.19	1.43	23.5	1.43	10.81	174	clear	125
1600	11.68	1.3	7.16	1.41	33.3	0.81	10.83	169	clear	125
1605	11.68	1.9	7.15	1.40	32.3	0.81	10.84	166	clear	125
1610	11.68	2.6	7.14	1.36	27.8	0.82	10.82	162	clear	125
1611	Collect sample									

Laboratory Analysis Information

Sample ID	Analytes		Bottle Count	Bottle Type	Preservative	Analytical Lab	Sample Time	Comments
MW-5	PCBs		2	1L Amber	none	Accutest	1611	

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Groundwater Sampling Monitoring Form

Well ID	MW - 6	**Site ID:**	**5140 Site**	**Sample Date:**	11/29/2012
Well Diameter	2 in	**Sampling Event:**	**Groundwater Investigation**		
Depth to Water	10.48 ft				
Total Well Depth	17.82 ft	**Samplers**	Erik Reinert		
Screen Length	10 ft	**Weather Conditions and Notes:**	Clear and cold		
Pump Intake	12.8 ft	**Flow Rate**	350		

Instrument Calibration Information

pH Meter Calibration			**Horiba U52 with flow-through cell**
7.00 Stand.	pH 4.01 Stand.	Slope (mV/pH)	Notes on calibration:
			Calibrated to manufacturer's specifications using auto-calibration standard solution
Air temp = ~~35~~	35 °F		

Well Purging Information Start purge: 1515 End purge: 1531 Pump Type: Peristaltic

Time	DTW	Purge Volume (L)	pH	Conductivity (mS/cm)	Turbidity (NTU)	D.O. (mg/l)	T (°C)	ORP (mV)	Appearance of Purge Water	Flow Rate (mL/min)
1515	10.51	Init	7.11	1.18	15.6	1.32	12.25	169	clear	350
1520	10.51	1.75	7.03	1.17	8.2	0.86	13.05	165	clear	350
1525	10.51	3.5	7.01	1.17	2.3	0.73	13.21	159	clear	350
1530	10.51	5.25	6.99	1.17	0.0	0.73	13.21	155	clear	350
1531	Collect sample									

ER

Laboratory Analysis Information

Sample ID	Analytes		Bottle Count	Bottle Type	Preservative	Analytical Lab	Sample Time	Comments
MW-6	PCBs 8260		2	1L Amber	none	Accutest	1531	

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Groundwater Sampling Monitoring Form

Well ID	MW-7	**Site ID:**	5140 Site	**Sample Date:**	11/29/12
Well Diameter	2 in	**Sampling Event:**	Groundwater Sampling		
Depth to Water	9.84 ft				
Total Well Depth	16.71 ft	**Samplers**	ESR		
Screen Length	10 ft	**Weather Conditions and Notes:**	Clear + cold		
Pump Intake	12.5 ft	**Flow Rate**	350 ml/min		

Instrument Calibration Information

pH Meter Calibration			**Horiba U52 with flow-through cell**
7.00 Stand.	pH 4.01 Stand.	Slope (mV/pH)	Notes on calibration:
			Calibrated to manufacturer's specifications using auto-calibration standard solution
Air temp =	38 °F		

Well Purging Information

Start purge: 1639 End purge: 1701 Pump Type: Peristaltic

Time	DTW	Purge Volume (L)	pH	Conductivity (mS/cm)	Turbidity (NTU)	D.O. (mg/l)	T (ºC)	ORP (mV)	Appearance of Purge Water	Flow Rate (mL/min)
1639	9.84	Init	7.17	1.32	41.3	1.03	12.54	178	clear	350
1645	9.84	1.75	7.13	1.24	24.2	1.22	13.15	173	clear	350
1650	9.84	3.5	7.13	1.21	14.9	1.42	13.16	170	clear	350
1655	9.84	5.25	7.12	1.20	8.4	1.56	13.21	169	clear	350
1700	9.84	7.0	7.12	1.19	7.8	1.60	13.18	168	clear	350
1701	Collect sample									

Laboratory Analysis Information

Sample ID	Analytes		Bottle Count	Bottle Type	Preservative	Analytical Lab	Sample Time	Comments
MW-7	PCBS 8082		2	1 L Amb	none	Accutest	1701	

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Groundwater Sampling Monitoring Form

Well ID	MW-8	**Site ID:**	**5140 Site**	**Sample Date:**	11/21/2012
Well Diameter	2 in	**Sampling Event:**	**Groundwater Investigation**		
Depth to Water	9.67 ft				
Total Well Depth	17.98 ft	**Samplers**	Erik Reinert		
Screen Length	10 ft	**Weather Conditions and Notes:**	Clear & cool		
Pump Intake	12 ft	**Flow Rate**	200 increased to 350 so Sampling could be completed in a timely manner		

Instrument Calibration Information

pH Meter Calibration			**Horiba U52 with flow-through cell**
7.00 Stand.	pH 4.01 Stand.	Slope (mV/pH)	Notes on calibration:
			Calibrated to manufacturer's specifications using auto-calibration standard solution
Air temp =	40 °F		

Well Purging Information Start purge: 1340 End purge: Pump Type: Peristaltic

Time	DTW	Purge Volume (L)	pH	Conductivity (mS/cm)	Turbidity (NTU)	D.O. (mg/l)	T (°C)	ORP (mV)	Appearance of Purge Water	Flow Rate (mL/min)
1351	9.69	~~200~~0	7.11	1.16	92.2	1.25	11.03	189	clear	200
1356	9.69	~~200~~1.2	7.00	1.17	57.6	0.32	11.70	185	clear	200
1401	9.69	2.2	6.97	1.18	39.6	0.72	11.82	181	clear	200
1406	9.69	3.2	6.96	1.18	28.3	0.66	11.86	175	clear	200
1411	9.69	4.2	6.95	1.17	22.2	0.60	12.01	170	clear	200
1416	9.69	5.2	6.95	1.18	17.7	0.56	11.99	163	Clear	200
1421	9.69	6.2	6.94	1.18	15.6	0.55	12.01	159	clear	200
1426	9.71	7.95	6.94	1.18	19.2	0.51	12.49	155	clear	350
1431	9.72	9.7	6.93	1.28	11.0	0.50	12.73	149	clear	350
1436	9.72	10.5	6.93	1.35	3.7	0.49	12.75	139	clear	350
1445	9.72	14	6.94	1.37	2.2	0.45	12.79	131	clear	350
1450	9.72	15.75	6.94	1.39	1.7	0.45	12.77	125	clear	350
1455	9.72	17.5	6.93	1.41	1.4	0.43	12.83	121	clear	350
1456	Collect sample									

Laboratory Analysis Information

Sample ID	Analytes		Bottle Count	Bottle Type	Preservative	Analytical Lab	Sample Time	Comments
MW-8	PCBs 8082		2	1 L amber	none	Accutest	1456	
MW-8MS/MSD	PCBs 8082		2	↓	↓	↓	1456	MS/MSD
MW-1112	PCBs 8082		2	↓	↓	↓	1500 ~~1456~~ False time	Blind dup

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