REMEDIAL INVESTIGATION WORK PLAN

For the Property Located at 505 W27th Street, New York, NY 10001
NYSDEC BCP No. C231082

Prepared for
28th and 10th Associates, LLC
60 Columbus Circle
New York, NY 10023

Prepared by

267 Broadway
Fifth Floor
New York, NY 10007

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Affiliated with Integral Consulting Inc.

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CERTIFICATION

I Kevin McCarty, P.G. certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Signature

Apr. 9, 2013
Date

1 INTRODUCTION

On behalf of 28th and 10th Associates, LLC (Volunteer), Integral Engineering P. C. (Integral) is requesting acceptance of the property located at 505 West 27th Street (Block 699, Lots 43 and 44), New York, NY (the "Site") into the Brownfield Cleanup Program (BCP). This document comprises a Remedial Investigation Work Plan (RIWP) to be implemented at the Site and is being submitted to the New York State Department of Environmental Conservation (NYSDEC) along with a completed Brownfield Cleanup Program Application (under separate cover).

This Draft RIWP includes a summary of Site history, a summary of previous environmental assessments and investigations, a description of the Site geologic and hydrogeologic setting, a summary of subsurface features, and a plan of action for further delineation of areas of concern identified previously by Integral and others.

The information and data collected during the two previous investigations demonstrates that chlorinated solvent contamination is present in the groundwater and soil vapor beneath the Site. However, active Site operations restricted the amount of testing that was performed, so that significant portions of the Site, where contamination is anticipated to exist, have not been evaluated. A full characterization of the Site will be performed as part of the Remedial Investigation.

1.1 SITE DESCRIPTION

The Site is located in a commercial and residential area of the West Chelsea section of the Borough of Manhattan. The Site is comprised of an approximately 20,000-square foot P-shaped parcel located in the middle of the block and is bounded to the north by West 28th Street; to the east by 10th Avenue; to the south by West 27th Street and to the west by 11th Avenue. Adjacent properties include mixed use commercial and residential buildings to the south, west and east; manufacturing to the south; and the Highline Park (former elevated rail structure) to the east. The Site is identified on New York City tax maps as Block 699, Lots 43 and 44. A Site location map is provided as Figure 1. A map showing the Site property boundaries is included as Figure 2.

The Site was previously occupied by a scrap yard (Lot 43) and a separate car rental establishment (Lot 44). These businesses ceased operations in December 2012. The Site is not currently improved with any buildings; but utilized a large trailer body, sheds, and storage areas. The majority of the Site surface is covered by a non-uniform, uneven concrete surface that ranges in thickness from 12 to 48 inches. The remainder contains both patches of asphalt paving and open soil cover. There is a nearly 20 foot high sheet metal wall located on Lot 44, approximately 25 feet west of the Lot 44/43 boundary. This wall separated the scrap yard and car rental operations on both Lots.

The trailer body on Lot 44 was used as office space, while the sheds housed equipment reported to maintain the rental cars. It was reported by the Site representative that major maintenance of the vehicles was not performed on the property. The storage on Lot 43 (scrap yard) consisted of large piles of scrap metal and sheds that contained various pieces of metal and equipment (e.g., refrigeration units and generators).

According to previous investigations and reports conducted and prepared by Impact Environmental (Impact) in 2007, there are presently two inactive underground storage tanks (USTs) on the southern portion of Lot 44. Both USTs are registered with NYSDEC as having stored gasoline, but have no recorded capacity. Additionally, there are two inactive 550-gallon diesel USTs located in the northeastern corner of Lot 42, upgradient and immediately offsite[1]. Impact's Phase I Environmental Site Assessment (ESA) indicated that the New York City Department of Building (NYCDOB) had issued a gasoline tank permit in 1934; no permit information was available regarding the diesel USTs. Additionally, no documentation was available regarding the proper decommissioning or testing associated with any of the USTs. According to Impact's Phase I, one onsite spill (#9109614) was reported to the NYSDEC in December 1991. The cause of the spill was a gasoline tank overfill of ten gallons. The spill was closed in December 2003. No other spills were reported having occurred onsite.

The Site is currently zoned C6-3 for mixed commercial use. It is anticipated that future re-development of the Site will consist of a multi-story mixed use building with a basement.

Based on a review of the New York City Mayor's Office of Environmental Remediation's (OER's) Searchable Property Environmental E-Database (SPEED), no hospitals, day care facilities, or schools are present within 500 feet of the Site.

1.1.1 Purchase Property Tax Lot Clarification

Three investigations have been performed for the Site defined as 505 West 27th Street: a Phase I ESA and a Phase II ESA were performed by Impact in 2007 and a Supplemental Site Investigation (SSI) performed by ELM Engineering (ELM) in 2012. Since the performance of Impact ESAs, the definition of the Site has changed in the following ways:

- In 2007, the Site consisted of four tax Lots (44, 25, 26, and 27);
- In 2012, the Site was redefined as only including Lot 44 and a portion of Lot 27. This definition of the Site was applied during ELM's SSI, performed in September 2012;
- Since the performance of the SSI, Lot 27 had been formally subdivided into three tax Lots (Lots 43, 42, and 27), with the current Site only incorporating a portion of the former Lot 27, now designated Lot 43 (see Figure 3).

[1] During the performance of the Phase I this area was considered part of the Site and was mapped as part of Lot 27 Presently, this part of Lot 27 has been remapped as Lot 42.

1.1.1.1 Project Implications

- While the SSI performed in 2012, included an investigation within the current Site limits, the Lot numbers had yet to be changed, therefore any reference to Lot 27 in the SSI Report, should be considered interchangeable with Lot 43;
- Impact's Phase II ESA included the collection of a number of samples outside of the newly defined Site boundary. These samples (Soil SB-1 – SB-5 and Groundwater GWP-1 and GWP-2) are not included as part of Integral's conceptual site model;
- Impact's Phase I ESA identified the presence of four USTs onsite. The current Site boundary only encompasses two USTs (indentified on Lot 44). The other two USTs now fall outside of the Site boundary and are located hydraulically upgradient of the eastern Site boundary.

1.2 REGULATORY INTERACTION

As part of the West Chelsea re-zoning, approved by the City on June 23, 2005, a Hazardous Materials E-Designation was assigned to both tax lots that formally comprised the Site (Lots 27 and 44); it is our understanding that the E-Designation follows the property, therefore since Lot 27 was assigned an "E", and subsequently divided into three tax lots, all three Lots (27, 42, and 43) retain that E-Designation. Additionally, a Noise E-Designation has been assigned to tax Lot 44. E-Designations are assigned to development sites identified by a lead agency during the City Environmental Quality Review (CEQR) of a proposed zoning action in order to apply environmental requirements related to potential hazardous materials, air quality, or noise impacts resulting from the proposed action.

The E-Designation program is designed to ensure that the provisions set forth during rezoning actions are implemented to avoid significant adverse impacts to human health or the environment through exposure to potential hazardous materials, unwanted sound on sensitive noise receptors, and mobile or stationary pollutants in ambient air quality. The E-Designation program is administered by OER.

1.3 SITE HISTORY

Based on the Phase I ESA conducted by Impact Environmental and dated July 15, 2007, historic usage of the Site included the following: residential, wood yard, laundry, auto repair shop, motor freight station, automobile garage and scrap yard.

According to the Phase I ESA, the Site was used as a scrap yard since 1982 and had maintained an automobile repair shop and/or automobile garage since approximately 1950.

1.4 PURPOSE

The Draft RIWP has been developed to achieve the following BCP objectives:

- To define the nature and extent of contamination on the Site.
- To identify if residual contaminant source areas are present on the Site.
- To determine whether remedial action is needed to protect human health and the environment.
- To produce data of sufficient quantity and quality to support the remediation of the Site, if warranted.

This Draft RIWP was developed in general accordance with the NYSDEC's Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10), dated May 2010.

Specifically, this Draft RIWP provides a summary of environmental conditions including the following:

- Relevant information from existing environmental reports and previously conducted Site investigations
- Technical overview and findings from previous reports
- Planned investigation activities as outlined in Section 3 for the Draft RIWP (including soil, soil vapor, and groundwater investigations)
- Site base mapping, supporting figures presenting sampling results/data, and locations of planned investigational activities.
- Quality Assurance Project Plan (QAPP)
- Site Specific Health & Safety Plan (HASP)
- Community Air Monitoring Plan (CAMP)
- Field Sampling Plan (FSP)
- Citizen Participation Plan (CPP)

References used in assessment of this Site and for development of this Work Plan are identified in the References section at the end of this document.

2 BACKGROUND

2.1 SUMMARY OF PREVIOUS INVESTIGATIONS AND ASSESSMENTS

In accordance with the DER-10, this Draft RIWP incorporates a summary of the previous Environmental Site Assessments and Site Investigations, which provide the basis for identifying the areas of concern (AOCs) and the principal constituents of concern (COCs) on the Site.

2.1.1 Phase I Environmental Site Assessment

A Phase I ESA conducted by Impact and dated July 15, 2007, identified the following recognized environmental conditions (RECs) in connection with the Site:

- The Site has been used since 1899 for commercial purposes including wood yard, laundry cleaning, metal works, manufacturing, motor freight storage, automobile repair and a scrap yard. Each of those facilities stored and utilized a variety of chemical and petroleum products.
- Four USTs are located at the Site[2]; all four USTs are reported to be inactive. No tank closure documentation exists, nor is there any specific documentation that indicates when the tanks were taken out of service. The tanks include two abandoned 550-gallon diesel fuel tanks and two abandoned gasoline tanks of unknown capacity.

  NYCDOB records also indicated the issuance of a gasoline tank permit in 1934 (GT 81-34). According to the current owner, two abandoned USTs had a reported capacity of 550 gallons each, and were used historically for the storage of diesel fuel. Further, a fill port (labeled as gasoline) was observed in the sidewalk, immediately north of these diesel USTs. The two inactive USTs maintained on the southwestern portion of the Site (with an unknown capacity) were reportedly utilized for the storage of gasoline. A fill port labeled as gasoline was observed in the sidewalk immediately to the south of these abandoned gasoline USTs. No documentation was available regarding the abandonment, decommissioning, closure assessment or tightness testing associated with these USTs.

  The Phase I report concluded that further assessment would be necessary to determine if the presence of the tanks and associated piping had an impact to the quality of soils or groundwater at the Site. Impact's Phase I ESA is included as Appendix A.

[2] At the time that the Impact Phase I was conducted, the boundaries of the Site were defined differently. The Site as defined by this RIWP includes 2 gasoline USTs, with 2 diesel USTs being approximately 15-25 feet upgradient of the eastern Site boundary.

Subsequent subsurface investigations conducted by Impact and ELM, are summarized in sections 2.2.2.1 and 2.2.2.2 below. Additional investigations to further evaluate the USTs will be conducted as part of this Remedial Investigation.

2.1.2 Subsurface Investigations

Subsurface investigations were conducted at the Site by Impact in 2007 and ELM in 2012. The investigations included the completion of a total of 10 soil borings, three[3] (3) temporary wells, four (4) groundwater monitoring wells, and three (3) soil vapor probes. Sample locations from all previous investigations are depicted on Figure 4. Soil sample analytical exceedences, from all previous investigations, are depicted on Figures 5 and 6. Groundwater sample analytical exceedences, from all previous investigations, are depicted on Figure 7. Soil vapor sample analytical exceedences, from ELM's investigation, are depicted on Figure 8 (no soil vapor samples were collected as part of Impact's ESA).

2.1.2.1 Impact Environmental Limited Phase II ESA

Scope of Work

Prior to implementation of the subsurface sampling program, Impact performed a geophysical survey over portions of the Site utilizing ground penetrating radar (GPR). The survey was performed to determine the orientation and precise location of the inactive onsite USTs.

A total of ten (10) soil borings were advanced, using a truck mounted Geoprobe, to depths ranging from 10 to 12 feet below grade (ftbg). Soil borings locations were chosen based on the areas of concern identified in the Phase I ESA and a general Site characterization gridding pattern. A total of ten (10) soil samples were collected (one from each boring) from depths between 2 to 12 ftbg. Soil samples were analyzed for the following: volatile organic compounds (VOCs); semi-volatile organic compounds (SVOCs); metals; polychlorinated biphenyls (PCBs) and; pesticides. Soil sample results were compared against NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046, Determination of Soil Cleanup Objectives (SCOs). Since the date of this report, TAGM SCOs have been replaced with the NYSDEC Commissioner's Policy 51 (CP-51) soil cleanup levels (SCLs), which serve to supplement the 6 NYCRR Part 375-6.8(b) cleanup objectives (SCOs).

Additionally, three (3) temporary groundwater probes were installed utilizing a Geoprobe Screen Point. One (1) grab groundwater sample was collected from each probe and analyzed for the aforementioned parameters. Groundwater sample analysis was compared against NYSDEC Division of Water Technical Operational Guidance

[3] Number of soil boring and temporary wells excludes locations that were conducted outside of the current Site boundary

Series (TOGS) 1.1.1, Class GA Water Quality Standards and Guidance Values (Class GA Standards).

Findings

- Two (2) soil samples indicated elevated levels (above Unrestricted SCOs) of SVOCs consistent with historic fill. No SVOCs were detected above Restricted Residential SCOs;
- All of the soil samples indicated elevated levels of various metals consistent with current and historic Site operations;
- One (1) soil sample SB-11[3-5'] indicated elevated levels of total xylenes, 1,2,4-trimethylbenzene and 1,2,5-trimethylbenzene above TAGM SCOs. When compared to Part 375 Restricted Residential SCOs; the concentration of total xylenes is below its respective SCO of 100 parts per million (ppm), 1,2,4-trimethylbenzene is exceeds its respective SCO of 52 ppm, and there is no available SCO for 1,2,5-trimethylbenzene;
- One (1) groundwater grab sample, GWSP-4, indicated elevated levels of cis-1,2-Dichloroethene (DCE), Phenanthrene and 2-Methylnaphthalene exceeding TOGS Class GA Standards.

Impact's soil and groundwater analytical table is included as Table 1. Impact's Phase II ESA Report is included as Appendix B.

2.1.2.2 ELM Supplemental Site Investigation

Scope of Work

ELM conducted a Supplemental Site Investigation in August 2012 to further evaluate the nature and extent of soil and groundwater impacts identified in the initial Limited Phase II ESA and to close data gaps in Impact's investigation. The Site was an operating scrap yard at the time of this investigation and samples were collected only from accessible locations. ELM's Supplemental Site Investigation Report is included as Appendix C.

Soil

A total of five soil borings were advanced, using a track-mounted Geoprobe, to depths ranging from 9 to 15 ftbg. The locations of the borings were chosen based on the results of previous sampling data (2007), Site conditions, and access. Two (2) soil samples were collected from each completed boring to account for observed soil conditions in the shallow and deeper elevations of the soil/fill profile. As a default, one (1) sample was collected from the shallow zone (0-2 ftbg) and one (1) sample was collected from the interval directly above the groundwater table. However, in the event the soil or fill material exhibited obvious signs of impacts, sample intervals were adjusted to bias

collection from the greatest possible contamination zone. Soil samples were analyzed for VOCs, SVOCs, Metals, PCBs and Pesticides.

Groundwater

Four (4) permanent monitoring wells were installed onsite during this investigation: one (1) upgradient monitoring well (MW-4) and one (1) believed to be crossgradient (MW-3), were installed to assess the potential for offsite impacts to groundwater beneath the Site; and two (2) downgradient monitoring wells (MW-1 and MW-2) were installed to identify if offsite migration of contaminants was occurring at the Site.

Monitoring wells were installed using a track mounted Geoprobe, outfitted with 4¼" auger attachments to approximately 15 ftbg. All of the wells were constructed of 2" diameter PVC riser with 10' of .020" slotted PVC screen. The screen was installed with the intention of straddling the groundwater table from approximately 5' above to 5' below the groundwater/soil interface. Monitoring wells were installed concurrent with four (4) soil boring locations and were developed on the day of their installation.

One week following the installation of the monitoring wells, groundwater samples were collected. Sampling was conducted according to EPA's *Low Flow Purging and Sampling Procedures for the Collection of Groundwater Samples from Monitoring Wells* (Low Flow Procedures, January 2010). On August 10, 2012, four (4) groundwater samples were collected and analyzed for the aforementioned parameters.

Additionally, one (1) groundwater sample was analyzed for New York City Department of Environmental Protection (NYCDEP) Discharge Effluent Parameters in order to evaluate the presence of dissolved-phase constituents subject to the effluent limitations under the NYCDEP sewer discharge permit and to provide information to inform the potential need for a dewatering pre-treatment system.

Soil Vapor

A total of four (4) soil vapor samples were proposed onsite. Temporary soil vapor point installation and sampling was conducted on August 1, 2012 by Viridian Inc. During this portion of the SSI investigation refusal was encountered in three pre-cored locations. Subsequently, the soil vapor sampling locations were relocated to the nearest pre-cored soil boring location. Ultimately, one (1) of the four (4) soil vapor samples (SV-2), was eliminated due to the presence of high moisture within the sampling tube, making the sample collection unacceptable for proper analysis.

Soil vapor samples were collected using a probe with a retractable slotted tip advanced through the subsurface at the site and installed at a depth of approximately five (5) ftbg. As required by the New York State Department of Health (NYSDOH) Guidance, a helium (He) tracer was used as part of the sampling process, and the testing followed the NYSDOH guidance. Prior to sample collection, a multi-gas meter was used to measure the concentration of O_2, CO_2, and CH_4 in each probe, to assess the persistence of

hydrocarbon vapors. Soil vapor samples were collected over a period of two hours and analyzed for VOCs.

Findings

Soil

The results of the soil analysis were compared to NYSDEC Part 375 Unrestricted Use and Restricted Residential Use SCOs in conjunction with CP-51 SCLs. The Unrestricted Use SCOs are listed in 6 NYCRR Part 375-6.8(a). The Restricted-Residential Use SCOs are listed in 6 NYCRR Part 375-6.8(b) and October 21, 2010 NYSDEC Policy CP-51. The Unrestricted Use SCOs are generally the NYSDEC's most conservative cleanup objectives and represent the concentration of a contaminant in soil which, when present at or below this level on a site, will require no use restrictions for the protection of public health, groundwater and ecological resources. The Restricted Residential SCOs are use-based criteria that are compatible with the surrounding area and take into account the future usage of the Site combined with the implementation of institutional and/or engineering controls.

ELM's soil analytical results tables are included as Tables 2-6. Analytical results for soil samples indicate the following:

- No VOCs were detected above Restricted Residential SCOs. Acetone (a common laboratory contaminant) was detected at concentrations exceeding its respective Unrestricted SCO in both samples collected from boring SB-1. Its presence is believed to be a laboratory artifact;
- Shallow soil samples collected across the Site indicate the presence of several SVOCs consistent with those found in historic fill;
- Lead was detected above Unrestricted SCOs in samples SB-1(13.5') and SB-4(4'). Mercury was detected above Unrestricted SCOs in samples SB-1(13.5'), SB-2(4'), SB-3(3') and SB-4(4'). Barium was detected above Restricted Residential SCOs in samples SB-3(3') and SB-4(4') and zinc was detected above Unrestricted SCOs in samples SB-3(3') and SB-4(4'); and
- PCBs and pesticides exceeded Unrestricted SCOs in one sample, SB-4(4');

Groundwater

Groundwater results were compared to TOGS Class GA Standards. The Class GA Standards represent levels that are protective of the groundwater as a source of drinking water; however, groundwater in New York City is not considered a potable source of water.

ELM's groundwater analytical results tables are included as Tables 7-11. Analytical results for groundwater samples indicate the following:

- Elevated concentrations of DCE and 1,1-dichloroethane above Class GA Standards were detected in sample MW-2 and the quality control/quality assurance (QA/QC) duplicate sample taken from the same well;
- No concentrations of VOCs were detected above Class GA Standards in groundwater samples collected from the other three wells; and
- Trace to low level concentrations of SVOCs exceeding Class GA Standards were detected in samples MW-1 and MW-2.

Soil Vapor

The soil vapor results were compared to the NYSDOH indoor air guidance values (AGVs) found in the *Guidance for Evaluating Soil Vapor Intrusion in New York State* (NYSDOH 2006) and the NYSDOH Memorandum dated June 25, 2007 which added three additional VOCs to the soil vapor/indoor air decision matrix.

ELM's soil vapor analytical results table is included as Tables 12. Analytical results for soil vapor samples indicate the following:

- PCE exceeded its AGV and 1,1,1-Trichloroethane was detected in all three (3) soil vapor samples;
- TCE exceeded its AGV in two (2)of three (3) samples; and
- DCE was detected in one (1) of three (3) samples.

2.1.2.3 Summary of Previous Investigations

The following conclusions are based on the results of the investigations conducted to date:

- SVOCs found in the shallow soils onsite are consistent will those found in historic fill;
- Heavy metals present in Site soils could be the result of current and historic Site usage; metals could also be attributed to the presence of fill across the Site;
- Preliminary redevelopment plans include the option for excavation and removal of all fill material within the Site boundary to the proposed development depth of 12 ftbg. Excavation and proper disposal of Site soils will serve as the remedial alternative for addressing any compound exceedances in the soil;
- Waste characterization for excavated material that will be removed from the Site will be required. This should take into account varying types, sizes and classifications of fill material to appropriately manage the disposal effort;

- Dissolved metal concentrations in the groundwater beneath the Site are consistent with concentrations found in areas containing historic fill throughout the urban areas of New York City;
- Analysis of groundwater at the Site indicates a hydraulically downgradient (northwestern corner), localized presence of contamination consistent with degraded chlorinated solvents. Lack of detections of chlorinated VOCs in the central, northern and southern wells (MW-1, MW-3, and MW-4) indicate that upgradient groundwater had not been impacted;
- Based on the existing information there is no identified onsite source (e.g. a former drycleaner or tank); additional onsite investigation would need to be conducted in order to delineate the extent of the impact;
- Chlorinated solvent concentrations were detected in all three (3) soil vapor samples collected. Additional investigation (i.e. sub-slab and indoor air) will be necessary in order to evaluate the potential of actions associated with these results;
- Proposed excavation below the groundwater table for building construction will essentially eliminate any sources of vapor that originate above the water table and may allow for mitigation through engineering controls including a vapor barrier/passive venting system.

2.2 PHYSICAL SETTING

The Site incorporates approximately .51 acres of fairly level land situated in the City of New York, New York County, New York. The Site is mapped on the *Weehawken, NY-NJ* Quadrant 7.5 Minute Topographic Map, published by the United States Geological Survey (USGS). Review of the topographic map indicates that the Site is located approximately 15 feet above sea level (NAVD 88).

2.2.1 Geologic Setting

The shallow subsurface at the Site consists of sands and silts, glacial till and/or fill materials. The fill has been identified from current and prior borings to consist of; concrete, brick, cinders and other construction debris mixed, silt, sand and gravel and was generally present from 1-10 ftbg. Soils encountered during ELM's Supplemental Site Investigation were mainly sands, silts and glacial till intermixed with lean clays. The till included poorly sorted sand and gravel and was generally present below the fill from 10-15 ftbg.

The Site is situated within the Manhattan Prong region of the Highlands Province characterized by highly deformed Paleozoic to Proterozoic metasedimentary and

metaigneous rocks. The crystalline rocks of the Manhattan Prong are separated by complexly deformed, northeast-trending ductile thrust faults mapped as the St. Nicholas thrust and Cameron's Line (Merguerian, 1983a; Merguerian and Baskerville, 1987) which separate contrasting sequences of metamorphosed Lower Paleozoic strata formerly lumped together as the Manhattan Schist formation.

Depth to bedrock beneath the Site has not been identified. It is mapped as the structurally highest, upper schist unit (€-Oh) which is a dominantly well layered, gray-weathering, fine- to coarse-grained, muscovite-quartz - biotiteplagioclase-kyanite-garnet schist, gneiss, and granofels with cm- and m-scale layers of greenish amphibolite±garnet.

2.2.2 Hydrogeologic Setting

Groundwater has been measured at depths ranging from approximately 8.5 to 11 ftbg, which is above the proposed excavation depth. The local groundwater flow is assumed to be west/southwest toward the Hudson River. The topography of the Site is relatively flat. No formal elevation survey has been conducted to provide exact groundwater elevations; a formal elevation survey will be performed as part of this Remedial Investigation. No wetlands or surface water bodies are present at the Site. The nearest surface water body is the Hudson River, located approximately 1,800 feet to the west. Groundwater flow is expected to be in the overall westerly direction towards the Hudson River.

2.2.3 Subsurface Features

Two gasoline USTs of unknown capacity are located in the southern portion of Lot 44. The Phase I ESA indicated that the NYCDOB issued a gasoline tank permit in 1934. No documentation was available regarding the age, condition, period of usage, proper decommissioning or any tightness testing associated with these USTs. The tanks are not registered with NYSDEC.

3 REMEDIAL INVESTIGATION

The work described in this Draft RIWP will be conducted in accordance with 6 NYCRR Part 375 Brownfield Cleanup Regulations, and in general conformance with the NYSDEC DER-10. The Remedial Investigation (RI) work will also comply with the QAPP and FSP appended to this Draft RIWP. The investigation process will involve sampling of soil/fill, native soil, concrete, soil vapor and groundwater. Exploration and testing locations may be modified during the field program based on observations made in the field, access or subsurface obstruction.

As discussed in the Introduction of this Work Plan, the information and data collected during the two previous investigations demonstrates that chlorinated solvent contamination is present in the groundwater and soil vapor beneath the Site. However, active Site operations restricted the amount of testing that was performed, so that significant portions of the Site, where contamination is anticipated to exist, have not been evaluated. A full characterization of the Site will be performed as part of the Remedial Investigation.

3.1 PURPOSE AND OBJECTIVES

The purpose of this Draft RIWP is to define the nature and extent of contamination on the Site; to determine whether contamination is present that warrants remedial action; and to provide data of sufficient quantity and quality to support development of a Remedial Action Alternatives Analysis, if remedial action is warranted for the Site. This Draft RIWP was developed to meet the following specific objectives:

- Define the nature and extent of the historical fill at the Site
- Delineate the extent of potential sources of residual contaminants identified in previous assessments and investigations
- Further delineate the extent of chlorinated solvents in groundwater at the Site in accordance with the requirements of the BCP and determine the source
- Evaluate the potential for soil vapor to migrate offsite via preferred pathways, if present

3.2 SCOPE OF REMEDIAL INVESTIGATIONS

The RI will begin after NYSDEC approval of this RIWP and after the 30 day public comment period is satisfied. The RI will include the performance of concrete coring and the installation of twenty-four (24) soil borings[4], two (2) monitoring wells and eight (8) soil vapor points, within formerly identified RECs/AOCs and other areas of the Site that have not been previously investigated. The type, location, and rationale for each exploration are detailed in the sections

[4] Four (4) of the 24 soil boring are contingent based upon the presence of obvious impacts to borings installed in the same area of concern

below. Installation of soil borings, groundwater monitoring wells, and soil gas sampling points will be completed in accordance with Sections 3.4 .1, 3.5.1 and 3.6.1 below and the standard procedures included in the FSP, included as Appendix D.

A summary table of all proposed sampling locations and QA/QC samples is included as Table 13.

3.3 CONCRETE CORING

Due to the presence of a non-uniform and uneven concrete surface covering a majority of the Site that ranges in thickness from 12 to 48 inches, all proposed sampling locations will be pre-drilled using a concrete corer.

Samples of the concrete will be collected and analyzed for PCBs via USEPA Method 8082. Concrete sample analysis will be used to provide initial information related to potential offsite disposal of this material. The specific core sections that will be submitted for analysis will be determined in the field and may include surface sections as well as deeper intervals within the concrete. It is initially proposed that a total of six (6) samples will be collected for analysis.

3.4 SOIL SAMPLING

In order to further characterize the soil at the Site, the following scope of work will be implemented:

- Advance an estimated twenty-four (24) soil borings at the Site to further evaluate the historic fill above the water table including; the area adjacent to the USTs, various locations throughout the Site to evaluate source or hot spot conditions to assist in the evaluation and comparison of groundwater and soil gas data for remedial alternatives, and characterization for soil disposal;
- Evaluate physical characteristics of the entire soil/fill column in each boring and identify appropriate intervals from which samples will be collected;
- Analyze soil/fill samples for:
    - VOCs via United States Environmental Protection Agency (USEPA) Method 5035/5035A;
    - SVOCs via USEPA Method 8270C;
    - Target Analyte List (TAL) Metals via USEPA Method 6010B/7470A;
        - Plus Cyanide via EPA Method 9013;
        - Plus Hexavalent Chromium via EPA Method 3060A;
    - Polychlorinated Biphenyls (PCBs) via USEPA Method 8082; and

- Pesticides via USEPA 8081A.

Toxicity Characteristic Leaching Procedure (TCLP) for metals analysis may be conducted, dependent upon the results of the TAL Metals analysis, on a per sample basis. This analysis is generally performed specifically for disposal classification and the logistics of project excavation will be used to determine if this analysis is reasonable at this time.

The following is a description and rationale for the placement of specific borings or groups of borings across the Site. These locations are specifically proposed to investigate the potential of onsite soil sources, further evaluate previously indentified RECs/AOCs, and investigate areas of the Site that have not been previously investigated and are identified as data gaps. All proposed soil boring locations are shown on Figure 9.

3.4.1 Proposed Boring Locations and Rationale for Placement

- SB-6 – located upgradient of the chlorinated solvent contamination just outside of the northeastern Site boundary. The results will aid in determining if an offsite source is present;
- SB-7 and SB-9 - SB-11 – located in the northwestern portion of the Site where chlorinated solvents were previously detected in groundwater and soil vapor, SB-11 is a contingent boring, its installation is dependent on obvious signs of impact to either SB-7, SB-9, or SB-10 and its installation will be determined in the field;
- SB-8, SB-12 through SB-15, SB-22, SB-23 and SB-25 through SB-28 – located in areas that were not previously accessible and were not investigated /soil characterization for disposal;
- SB-17 and SB-18 – located to the north and west of the onsite inactive gasoline USTs (location identified by Impact in 2007 via GPR);
- SB-19, SB-20, and SB-21 – contingent borings radiating out from the gasoline USTs, to be conducted if there are obvious signs of impacts to SB-6 and SB-7; and
- SB-24 – located onsite and downgradient of two inactive 550-gallon diesel USTs in order to assess conditions along the eastern Site border and aid in the determining if an offsite source is present.

Based on field measurements and observations, boring locations may be moved or added. Prior to modifications being made with regard to the above-described placement, coordination with NYSDEC will take place.

Soil boring will be advanced subsequent to the performance of concrete coring at each location. The concrete surface varies in thickness over the Site, grade is considered to begin at the underlying soil surface beneath the concrete. It is expected that two (2) soil samples will be collected from each completed boring. As a default, one (1) sample will be collected from the shallow zone (0-2 ftbg) and one (1) sample will be collected directly above the groundwater interface (8-10 ftbg). However, in the event the soil or fill material at a different interval above the water table exhibits obvious signs of impacts, one (1) sample will be collected from the area

of highest suspected contamination. In the event additional impacted or questionable zones are identified, samples will be collected from those areas for analysis. All samples are expected to be collected from two (2) foot intervals but the intervals may be expanded or contracted based upon material collected and identification of impacts.

Impact will be determined in the field by a qualified environmental professional via screening for VOCs using a photoionization detector (PID) and visual/olfactory indication.

Soil borings will be installed using a track mounted Geoprobe® utilizing direct push technology to the groundwater interface depth, approximately 8 to 10 ftbg. Continuous soil samples will be collected using five (5) foot macrocore samplers fitted with dedicated acetate liners. The soil/fill retrieved from each sampler will be field screened with a PID for VOCs and described by Integral field personnel on boring logs. Evidence of contamination (e.g., Non Aqueous Phase Liquid [NAPL], sheens, odors, staining, elevated PID readings) will be documented by Integral field personnel. Product samples, if encountered, will be submitted for gas chromatography-mass spectrometer fingerprint analysis.

Soil samples selected for laboratory analysis will be placed in laboratory supplied containers, sealed and labeled, and placed in a cooler and chilled to 4°C for transport under chain-of-custody procedures. Soil samples will be submitted to a NYSDOH ELAP-certified laboratory via courier service under standard chain-of-custody protocol and analyzed for all of the compounds included in NYCRR Part 375 SCOs and Final CP-51 SCLs. Laboratory analytical parameters and methods are outlined above, in Section 3.4. QA/QC procedures to be followed are described in the QAPP included as Appendix E.

3.5 GROUNDWATER SAMPLING

The following scope of work is proposed to further characterize the groundwater at the Site:

- Install two additional (2) groundwater monitoring wells screened across the groundwater interface;
- Survey the four (4) existing and two (2)proposed wells;
- Collect one (1) round of depth-to-groundwater measurements from existing and newly-installed wells;
- Purge all wells in accordance with DER-10 requirements and collect samples for lab analysis. All purging and sampling will be performed in accordance with proper program protocols. Samples will be collected from each of the six (6) wells; and
- Analyze groundwater samples for:
    - VOCs via USEPA Method 8260B;
    - SVOCs via USEPA Method 8270C;
    - TAL Metals via USEPA Method 6010B/7470A (filtered and unfiltered);
    - PCBs via USEPA Method 8082 (only new wells); and

- Pesticides via USEPA 8081A (only new wells).

The locations of the proposed wells and rationale for placement are listed below. All well locations will be installed concurrent with a soil boring location. Proposed well locations are shown on Figure 9.

3.5.1 Proposed Monitoring Well Locations and Rationale for Placement

- MW-5 – located in a position believed to be upgradient of the area showing detections of chlorinated solvents. This well is being placed just beyond of the northeastern Site boundary in order to evaluate the potential for onsite migration of containments from an offsite source.
- MW-6 –located in what is believed to be an area crossgradient of the chlorinated solvent detections. The purpose is to provide more definitive information on the extent and degree of elevated groundwater concentrations of chlorinated solvents in well MW-2.

Monitoring well construction will be similar to MW-1 through MW-4 and will follow the protocol described below. Monitoring wells will be installed using a track mounted Geoprobe, outfitted with 4¼" hollow-stem auger attachments. Wells will be installed approximately 5.5' below the groundwater table (expected to be approximately 8-10 ftbg) in order to collect samples in the shallow saturated zone. The wells will be constructed of 2" diameter PVC riser with 10' of .020" slotted PVC screen. The screen interval will straddle the groundwater interface. The annular space around the well will be filled with No. 2 Morie quartz sand to a depth of 2' above the top of the well screen, followed by 2' of bentonite, then backfilled with screened (uncontaminated) soil cuttings to approximately 6" below grade. The wells will be finished with 6" of bentonite pellets placed below a locking flush-mounted road box, set in a cement apron. Monitoring wells will be developed on the same day they are installed.

Sampling of the monitoring wells is anticipated to take place approximately one week following their installation. Following purging, one (1) representative groundwater sample will be collected from each well, using dedicated polyethylene tubing attached to a peristaltic pump capable of low flow control. Water quality indicators (pH, temperature, specific conductivity, and turbidity) will be monitored periodically while purging. Groundwater samples will be collected according to EPA's *Low Flow Purging and Sampling Procedures for the Collection of Groundwater Samples from Monitoring Wells* (Low Flow Procedures, January 2010).

The groundwater samples will be pumped directly into laboratory-supplied sample bottles. Samples will be collected, cooled, properly packaged to prevent breakage, and submitted to a NYSDOH ELAP-certified laboratory via courier service under standard chain-of-custody protocol. Laboratory analytical parameters and methods are outlined above, in Section 3.5. QA/QC procedures to be followed are described in the QAPP included as Appendix E.

3.6 SOIL VAPOR SAMPLING

As discussed in Section 1.1, as part of the proposed development, the entire footprint of Site is going to be excavated to a depth at least reaching the groundwater table and possibly reaching approximately 12 ftbg. This excavation will remove any onsite soil source of soil vapor contamination, if either is present. The scope of work proposed for the characterization of soil vapor onsite, focuses on the potential for offsite migration as well as the potential for onsite migration of contaminants from offsite sources. The results of which will assist in evaluating future onsite engineering controls.

The following scope of work is proposed to further characterize the soil vapor at the Site:

- Install eight (8) soil vapor points;
- Purge and collect soil vapor samples from eight (8) points;
- Collect one (1) ambient air sample;
- Analyze all soil vapor and ambient air samples for TO-15 VOCs.

The locations of the proposed samples and rationale for placement are listed below. All sample locations will be installed concurrent with a soil boring location. Proposed soil vapor sampling locations are shown on Figure 9. All soil vapor samples will be collected at least 24 hours after the installation of the points.

3.6.1 Proposed Soil Vapor Locations and Rationale for Placement

- SV-5 – located in an area believed to be upgradient of the area where chlorinated solvents were detected. This is very near but just outside of the northeastern Site boundary. The results will aid in determining if an offsite source is present;
- SV-6, SV-7 and SV-9 – located along the downgradient Site boundary. The results will aid in assessing potential impacts to the adjacent building;
- SV-8, SV-10 and SV-11 – located along the southern site boundary. The results will aid in assessing and determining if an offsite source is present or if there is potential for residual onsite contamination , if present, to migrate offsite; and
- SV-12 – located to along the eastern Site boundary. The results will further aid in determining if an offsite source is present.

Each soil vapor probe will be installed using dedicated 1/8" Teflon tubing. The tubing will be implanted into the hole and the annular space sealed with bentonite to prevent ambient air from entering the area around the probe. Once the seal is secure, a "T" fitting and valve will be connected on the above-surface end of the tubing. A syringe will be used to purge the vapors in the probe and tubing of three volumes. As required by the NYSDOH, a helium (He) tracer will be used as part of the sampling process and all testing will follow the NYSDOH Soil Vapor Guidance[5]. Prior to sample collection, the He vapor will be screened using a field meter and the

[5] *Guidance for Evaluating Soil Vapor Intrusion in the State of New York, Final*. October 2006.

measurement recorded at each soil vapor sampling location (NYSDOH allows for 10% as a measure to determine a competent seal). Prior to sample collection, a multi-gas meter will be used to measure the concentration of O_2, CO_2, and CH_4 in each probe, to assess the persistence of hydrocarbon vapors. Following this procedure, the soil vapor samples will be collected in clean, batch certified, two (2) liter Summa™ canisters at flow rates no greater than 200 ml/min.

Soil vapor samples will be collected over a period of two (2) hours. Soil vapor samples will be analyzed for VOCs via USEPA Method TO-15 at a NYSDOH ELAP-certified analytical laboratory.

Ambient Air Sample

Background (ambient) air commonly contains VOCs at measurable but low concentrations, and can contribute a positive bias to soil vapor samples. To characterize such "background" concentrations, an ambient working conditions air sample will be collected along with the soil vapor samples. The ambient air sample will be collected using a clean, batch certified Summa™ canister over an 8-hour period. The Summa™ canister will be placed at a height of 5-7 feet above grade to simulate breathing zone elevation.

3.7 INVESTIGATION DERIVED WASTE

It is anticipated that soil cuttings and groundwater will be generated during Site characterization activities. The cuttings from drilling operations will be placed on the ground and covered with poly tarps unless NAPL is identified. In which case this material will be segregated and stored adjacent to other material. Following completion of the entire investigation, the method for proper disposal will be presented. Groundwater will be disposed of in a controlled manner within an area that is unpaved. In addition, wastes, such as used personal protective equipment (PPE), will be generated during sampling and drilling activities. Used PPE and other non hazardous materials will be disposed of in municipal trash dumpster's onsite.

3.8 QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

Samples will be collected in accordance with the QAPP included as Appendix E.

Sample analysis will be performed by a NYSDOH ELAP certified laboratory. The laboratory will report sample results on a 5-day turnaround time. An independent sub-consultant will validate sample results and a Data Usability Summary Report (DUSR) will be prepared.

3.9 SUMMARY TABLE OF PROPOSED SAMPLING LOCATIONS

As required by Section 3.3(b) 3 of DER-10, a sampling and analysis table with all proposed sampling locations and QA/QC samples is included as Table 13.

3.10 QUALITATIVE EXPOSURE ASSESSMENT

Following receipt of the sample results, a qualitative exposure assessment (EA) will be completed. The assessment will be performed in accordance with Section 3.3(c) 4 of DER-10 and the NYSDOH guidance for performing a qualitative EA (NYSDEC DER-10; Technical Guidance for Site Investigation and Remediation; Appendix 3 B). The results will be included in the RI report.

3.11 HEALTH AND SAFETY PLAN (HASP)

All work at the Site will be completed in accordance with the Health and Safety Plan (HASP) included in Appendix F.

3.12 AIR MONITORING

The NYSDOH Generic Community Air Monitoring Plan (CAMP), included as Appendix 1A of DER-10, will be implemented during all ground-intrusive sampling activities. Details of the CAMP are included in the HASP (Appendix F).

3.13 REPORTING

A RI report describing the investigation will be prepared to document Site conditions and will meet the requirements of DER-10. The report will include details of the sampling, tabulated sample results and an assessment of the data and conclusions. If warranted, recommendations for additional actions will be included.

Soil sample results will be compared to the Unrestricted SCOs and Restricted Residential SCO as included in Part 375-6.8 and CP-51. Groundwater sample results will be compared to the Class GA Standards. Soil vapor sample results will be compared to the NYSDOH AGVs and matrices.

The report will also include the qualitative exposure assessment, CAMP results, laboratory data packages, DUSR, geologic logs, well construction diagrams and well purging/sampling logs. All data will also be submitted electronically to NYSDEC via the Environmental Information Management System (EIMS) in EqUIS format.

4 SCHEDULE

Based upon current knowledge of the Site, the following Remedial Investigation schedule, subject to change, is proposed. A minimum of 5-day notice will be provided to NYSDEC in advance of field sampling.

December 2012	*Submit Brownfield Application*
December 2012	*Submittal of Draft Remedial Investigation Work Plan (RIWP)*
January 2013	*Public Notice completed*
First Quarter 2013	*Acceptance into Brownfield Program, Execution of Brownfield Cleanup Agreement*
First Quarter 2013	*Final Remedial Investigation Work Plan is approved by NYSDEC*
Second Quarter 2013	*Remedial Investigation field work commences*
Second Quarter 2013	*Draft Remedial Investigation Report Submitted to NYSDEC*

5 REFERENCES

NYSDEC 2010. New York State Department of Environmental Conservation, Division of Environmental Remediation. DER Technical Guidance for Site Investigation and Remediation (DER-10). 2010.

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New York State Department of Environmental Conservation, (2007). Guidance for the Development of Quality Assurance Plans and Data Usability Summary Reports (DUSR), September 2007.

New York State Department of Environmental Conservation (undated), DER-23 Citizen Participation Handbook for Remedial Programs, Division of Environmental Remediation.

Merguerian, C., and Baskerville, C., 1987, The geology of Manhattan Island and the Bronx, New York City, New York: in D.C. Roy, ed.,Northeastern Section of the Geological Society of America, Centennial Fieldguide, p. 137-140.

"Phase I Environmental Site Assessment, 505 West 27th Street, New York, New York," dated June 15, 2007. Prepared by Impact Environmental.

"Phase II Environmental Site Assessment, Limited Subsurface Investigation, 505 West 27th Street, New York, New York," dated June 22, 2007. Prepared by Impact Environmental.

"Supplemental Site Investigation Report, 505 West 27th Street, New York, New York 10001," dated September 5, 2012. Prepared by ELM Engineering, P.C.