DRAFT REMEDIAL ACTION WORK PLAN

For the Property Located at
514-520 West 28th Street
New York, NY 10001
NYSDEC BCP No. C231082

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
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ACRONYMS AND ABBREVIATIONS

AGV	Air Guidance Values
AOC	Area of Concern
AWQS	Ambient Water Quality Standards
BCA	Brownfields Cleanup Agreement
BCP	Brownfields Cleanup Program
BOA	Brownfield Opportunity Area
COC	Certificate of Completion
CP-51	NYSDEC Commissioner's Policy 51
DER	Department of Remediation
EA	Exposure Assessment
EC	Engineering Control
ECs/ICs	Engineering and Institutional Controls
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Accreditation Program
Elev.	Elevation
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FER	Final Engineering Report
FSP	field sampling plan
ftbg	feet below ground
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
IC	Institutional Control
IRM	Interim Remedial Measure
NYCDEP	New York City Department of Environmental Protection
NYCRR	New York Codes Rules and Regulations
NYCOER	New York City Office of Environmental Remediation
NYSDEC	New York State Department of Environmental Conservation

NYSDOH	New York State Department of Health
OSHA	Occupational Safety and Health Administration
PCBs	Polychlorinated Biphenyls
PID	Photoionization Detector
ppm	Parts per Million
QAPP	Quality Assurance Program Plan
QA/QC	Quality Assurance/Quality Control
RAOs	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RE	Remedial Engineer
REC	Recognized Environmental Condition
RI	Remedial Investigation
RIR	Remedial Investigation Report
SCO	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SCL	Soil Cleanup Level
SMP	Site Management Plan
SOE	Support of Excavation
sqft	Square Feet
SVOC	Semi-Volatile Organic Compound
TOGS	Technical and Operational Guidance Series
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

CERTIFICATION

I, Keith P. Brodock, P.E., certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Remedial Action 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).

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

Date signed and sealed:

Keith P. Brodock, P.E.
NY License #089004

1 INTRODUCTION

Integral Engineering P. C. (Integral) has prepared this Remedial Action Work Plan (RAWP) on behalf of 28th Highline Associates, L.L.C. (Volunteer) for the property located at 514-520 West 28th Street (Block 699, Lot 43[1]), New York, NY (Site). The Site is currently enrolled in the New York State Brownfield Cleanup Program (BCP) as site #C231082.

This RAWP summarizes the nature and extent of contamination at the Site, as determined from data gathered during current, as well as prior investigations, and presents the recommended remedial activities to be implemented in coordination with the NYSDEC and in conjunction with Site development.

1.1 SITE DESCRIPTION

The Site is located in a commercial and residential area in the West Chelsea section of the Borough of Manhattan. The Site covers an area of approximately 22,220 square feet (sqft) on a P-shaped parcel located in the central portion of the block. It 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 surrounding properties include mixed use, commercial and residential buildings to the south, west and east; manufacturing to the south; and the High Line Park (former elevated rail structure) to the east. The Site is identified on New York City tax maps as Block 699, Lot 43. A Site location map is provided as Figure 1. A Site Plan showing the property boundaries under the BCP is included as Figure 2.

The Site was previously and most recently occupied by a scrap yard (eastern portion of the Site) and separate car rental establishment (western portion of the Site). Both businesses ceased operations in December 2012, prior to entrance into the BCP. The Site is not currently improved with any buildings. The majority of the surface is covered by a non-uniform, uneven layer of concrete that ranges in thickness from 12 to 48 inches. The remainder of the property contains both patches of asphalt paving and open soil cover. A trailer body and various sheds that previously occupied portions of the Site have been removed, and the Site is currently vacant. The 20 foot high sheet metal wall separating the respective businesses and described in the Remedial Investigation Work Plan (RIWP) has also been removed.

Structures associated with the operation of the rental car establishment including, a trailer and various sheds, were used as office space and equipment storage for the maintenance of rental cars,[2] respectively. It was reported by the Site representative that major maintenance of the vehicles was not performed on the property. Storage associated with the scrap yard consisted

[1] On May 14, 2013 an application was filed with the NYC Department of Finance to merge Lots 43 and 44. On May 15, 2013 the merger was recorded and Lot 44 was dropped. The Site is currently defined as Block 699, Lot 43.
[2] As reported by the Site representative

of large piles of scrap metal and sheds that contained various pieces of metal and equipment (e.g., refrigeration units and generators).

On August 1, 2013, Integral implemented an Interim Remedial Measure (IRM) at the Site. The IRM included the excavation and decommissioning of two 550-gallon USTs located in the southwestern portion of the Site. No impacts, staining, or odor were noted and no perforations or defects in either tank were identified. Presently, there are two inactive 550-gallon diesel USTs located in the northeastern corner of Lot 42, upgradient and immediately offsite.[3]

The Site is currently zoned C6-3 for mixed commercial use. The future re-development of the Site will consist of a multi-story mixed use building with a full 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 assessments/investigations have been performed for the Site defined as 505 West 27th Street: a Phase I Environmental Site Assessment (ESA) and a Phase II ESA performed by Impact Environmental (Impact) in 2007, and a Supplemental Site Investigation (SSI) performed by ELM Engineering (ELM) in 2012. Since the performance of Impact's investigations, the formal lot 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).

On May 14, 2013 an application was filed with the NYC Department of Finance to merge Lots 43 and 44. On May 15, 2013 the merger was recorded and the designation for Lot 44 was eliminated. The Site is currently defined as Block 699, Lot 43 (see Figure 2).

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;

[3] During the performance of the Phase I, this area was considered part of the Site and was mapped as part of Lot 27. Subsequently, this part of Lot 27 was remapped as Lot 42.

- For the purposes of re-defining the Site as consisting of one Lot, former Lot 44 will be described as the "western portion" of the Site;
- 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; and
- Impact's Phase I ESA identified the presence of four USTs onsite. The current Site boundary only encompassed two USTs, both of which were removed in August 2013. The other two USTs now fall outside of the Site boundary and are located immediately adjacent to, and hydraulically upgradient of the eastern Site boundary.

1.2 SITE GEOLOGY AND HYDROLOGY

The Site includes 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). Based on the available survey data, Site elevations vary between approximately Elev. +10 and Elev. +12. All elevations in this report are in feet and refer to the Borough President of Manhattan Datum, in which Elev. 0.0 is equal to 2.75 feet above Mean Sea Level at Sandy Hook, New Jersey, 1929.

1.2.1 Geologic Setting

The Site is located in the Manhattan prong of the New England Upland physiographic province. Overburden soils at the Site consist of Pleistocene age glacial deposits that extend to bedrock of Early Paleozoic age. Underlying a layer of manmade fill in the project area are glacial deposits comprising stratified sands and silts. USGS maps indicate bedrock in the area consists of mainly schistose gneiss which is part of the Hartland Formation.

The shallow subsurface at the Site consists of a thick layer of manmade fill which was used as backfill over the historic river bottom and tidal marsh deposits. Geotechnical borings performed by Mueser Rutledge Consulting Engineers (MRCE), the Volunteer's geotechnical engineer, indicated that the bottom of the fill layer might be locally intermixed with organic silts (the original river bottom or marsh deposit). MRCE notes that a separate stratum of the organic silt was not encountered in the project borings as the silts were likely displaced by the fill. However, those soft compressible silts may still be locally present underneath the fill layer.

The fill stratum typically consists of medium compact, brown fine to coarse sand with various amounts of gravel, silt and miscellaneous debris (brick, concrete, asphalt, wood, glass). The fill stratum is typically 7 to 16 feet deep across the Site. Full construction excavation for the basement of the new building will be in excess of 18 feet below existing grade, or deeper. The foundation will extend into natural sands and silts underlying the fill material, with portions of the foundation extending into bedrock.

The fill stratum is underlain by silts, sands, and glacial till. Bedrock is present at depths ranging from 15-25 feet below grade (ftbg) and consists of intermediate to hard, slightly weathered to unweathered (with some weathered zones) gray gneissic schist, with occasional white pegmatite and other schistose rock zones (MRCE, 2013).

1.2.2 Hydrogeologic Setting

Groundwater has been measured at depths ranging from approximately 8.5 to 11 ftbg (approximately Elev. +0 to Elev. +2), which is several feet shallower than the proposed excavation depth. The topography of the Site is relatively flat, but generally slopes to the southwest. Given the relatively shallow depth to groundwater, the near absence of infiltration, and the existence of numerous subsurface structures and infrastructure, groundwater flow is expected to have significant, but local, influences that are not identifiable from the surface. A formal elevation survey was conducted on June 14, 2013[4] by Langan Engineering and Environmental Services, Inc. (Langan) to provide groundwater elevations. The local groundwater flow is west/southwest toward the Hudson River. A groundwater contour map is included as Figure 4.

The entire Site, as well as the surrounding area, is developed and no large areas of open land exist. The largest open parkland exists above grade on the High Line. Wetlands on or near the Site were evaluated by reviewing the National Wetlands Inventory and NYDEC regulated wetlands. There are no wetlands on or adjacent to the Site.

According to Federal Emergency Management Agency (FEMA) flood maps, the Site is located within the 500 year flood plain and approximately 140 feet east of the 100 year flood plain. The nearest surface water body is the Hudson River, located approximately 1,800 feet to the west.

1.3 SITE HISTORY

The Site was used as a metal scrap yard from 1982 until 2012. An automobile repair shop and/or automobile garage was located on a portion of the Site from approximately 1950 until 2012. The Site has been used since 1899 for commercial purposes including a 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.

One onsite spill (#9109614) was reported to the NYSDEC in December 1991. The cause of the spill was reported as a ten gallon overfill of a gasoline tank. The spill was closed in December 2003. There was no specific record of the investigation or work to close this spill and it is assumed to have been a surficial issue that was satisfactorily addressed.

The southwestern portion of the Site historically contained two 550-gallon gasoline USTs prior to their removal in August 2013.

[4] This survey was updated on July 29, 2013 to include offsite well MW-6

In April 2013, during the performance of the Remedial Investigation (RI), a second onsite spill (#1300765) was reported when non-aqueous phase liquid (NAPL) was observed in an onsite monitoring well (MW-1), located approximately 25 feet west of the USTs. No impacts were noted during the installation of the borings or during monitoring well development. Laboratory analysis of the NAPL indicated that the material content was representative of lubricating, motor, or a synthetic oil-like product. On June 21, 2013 a permanent groundwater monitoring well (MW-6) was installed in the sidewalk along 27th Street, downgradient of the onsite USTs. This well was installed during the offsite phase of work in order to further evaluate the conditions that led to the reporting of the petroleum release mentioned above. On July 2, Integral gauged MW-6 and observed approximately 1" of what appeared to be NAPL; the NAPL appeared to be consistent with the NAPL observed in MW-1 in April 2013. Based on the understanding that both onsite USTs were historically used for the storage of gasoline, the oil identified in the wells was not considered representative of an onsite source emanating from the USTs.

On August 1, 2013, Integral implemented an IRM to address the excavation and proper decommissioning of the onsite USTs. The IRM Work Plan was submitted to NYSDEC on July 11, 2013 and approved by NYSDEC on July 23, 2013. The IRM was conducted, in part, to confirm that the NAPL observed in onsite well MW-1 and offsite well MW-6 was not originating from the USTs. During the excavation of the tanks, Integral confirmed that both 550-gallon USTs were previously utilized for the containment of gasoline, completely encased in concrete, filled with water, and showed no signs of leakage. They were therefore determined, not to be source of the NAPL found in the wells. A detailed description of the IRM findings is included in Section 1.4.6. Closure of the spill will be addressed in a spill closure report, which for reasons discussed in Section 1.5.2, will be prepared subsequent to full construction excavation of the Site.

1.4 PREVIOUS ENVIRONMENTAL REPORTS

Environmental reports prepared for the Site are provided in Appendix A and the locations of all previously collected samples are depicted on Figure 5. Previous environmental reports include the following:

- Phase I Environmental Site Assessment, dated July 2007, prepared by Impact Environmental
- Phase II Environmental Site Assessment , dated June 2007, prepared by Impact Environmental
- Supplemental Site Investigation Report, dated September 2012, prepared by ELM Engineering, P.C.

- Offsite Quantitative Evaluation Work Plan, dated May 24, 2013, prepared by Integral Engineering, P.C.
- Remedial Investigation Report, dated June 23, 2013, prepared by Integral Engineering, P.C.
- Interim Remedial Measure Work Plan, dated July 11, 2013, prepared by Integral Engineering, P.C.

1.4.1 Phase I Environmental Site Assessment, July 2007

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 and industrial purposes including wood yard, laundry cleaning, metal works, manufacturing, motor freight storage, automobile repair and a scrap yard. Each of those facilities stored, handled, and utilized a variety of chemical and petroleum products.
- Four USTs are located at the Site;[5] 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 diesel tanks have been reported to have been abandoned in place and filled with sand. 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 located on the adjacent property had a reported capacity of 550 gallons each, and were used historically for the storage of diesel fuel. These two tanks were abandoned in place and filled with sand. A fill port (labeled as gasoline) was observed in the sidewalk, immediately north of the diesel USTs, indicating their usage may have changed over time.

The two inactive USTs maintained on the southwestern portion of the Site were utilized for the storage of gasoline. A fill port labeled as gasoline was observed in the sidewalk immediately to the south of the abandoned gasoline USTs. No documentation was available regarding the abandonment, replacement, 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 their associated piping had impacted soil or groundwater at the Site.

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

1.4.2 Supplemental Site Investigation, June 2007

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 attempt to identify and determine the orientation and approximate 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 ftbg. Soil borings locations were chosen based on the RECs identified in the Phase I ESA. In addition, a general Site characterization gridding pattern was added to provide more general coverage of the Site. Based on the Site usage, large areas were not accessible. 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); and metals. 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 New York Codes Rules and Regulations (NYCRR) Part 375-6.8(b) soil cleanup objectives.

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 Series (TOGS) 1.1.1, Ambient Water Quality Standards and Guidance Values (AWQSs).

Findings

- Laboratory analysis of two (2) soil samples indicated elevated levels (above Unrestricted SCOs) of SVOCs consistent with historic fill. No SVOCs were detected above Restricted Residential SCOs;
- Laboratory analysis of 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'] collected beneath the concrete surface indicated elevated levels of total xylenes, 1,2,4-trimethylbenzene and 1,2,5-trimethylbenzene above TAGM SCOs was present. 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 exceeds its respective SCO of 52 ppm, and there is no available SCO for 1,2,5-trimethylbenzene; and
- Laboratory analysis of one (1) groundwater grab sample, GWSP-4, indicated elevated levels of cis-1,2-Dichloroethene (DCE), Phenanthrene and 2-Methylnaphthalene exceeding TOGS AWQSs .

1.4.3 Supplemental Site Investigation, August 2012

Scope of Work

ELM conducted a Supplemental Site Investigation (SSI) 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.

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 visually identified worst case intervals. Soil samples were analyzed for VOCs, SVOCs, Metals, polychlorinated biphenyls (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) crossgradient monitoring well (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 to remove silt and sediment from the sand pack.

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 VOCs, SVOCs, Metals, PCBs and Pesticides.

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. All sampling was overseen by Integral. Locations required pre-coring through concrete to allow installation. During this portion of the SSI 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 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 (2) hours and analyzed for VOCs.

<u>Findings</u>

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 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.

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 and historic Site usage;

- 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 AWQSs. The TOGS AWQSs 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.

Analytical results for groundwater samples indicate the following:

- Elevated concentrations of DCE and 1,1-dichloroethane above TOGS AWQSs were detected in sample MW-2 and the quality assurance/quality control (QA/QC) duplicate sample taken from the same well;
- No concentrations of VOCs were detected above TOGS AWQSs in groundwater samples collected from the other three wells; and
- Trace to low level concentrations of SVOCs exceeding TOGS AWQSs 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). While AGVs are guidance values for indoor air concentrations, they are used here as a screening level for soil vapor.

Analytical results for soil vapor samples indicate the following:

- PCE exceeded its respective indoor air AGV of 100 μg/m3 and 1,1,1-Trichloroethane was detected in all three (3) soil vapor samples;
- TCE exceeded its respective indoor air AGV of 5 μg/m3 in two (2) of three (3) samples; and;
- DCE was detected in one (1) of three (3) samples.

1.4.4 Remedial Investigation, April 2013

Integral performed a remedial investigation (RI) at the Site from April 16 through April 23, 2013. The RI scope of work included the advancement of 20 soil borings, the installation of one (1) permanent monitoring well, and the sampling of soil/fill, native soil, concrete, soil vapor and groundwater. The objective of the RI was to define the nature and extent of Site contamination,

identify if residual contaminant source areas are present on the Site, and determine whether remedial action is needed to protect human health and the environment.

Integral prepared a Draft Remedial Investigation Report (RIR) in June 2013. The RIR presented environmental data and findings from the previous environmental reports prepared by Impact and ELM, and data obtained by Integral. Conclusions from the RI are used to support the proposed remedial plan presented in this RAWP. The RI findings and conclusions were as follows:

Soil

SVOC and metal concentrations in Site soils are consistent with historic fill and Site operations. Minor VOC and PCB exceedences are believed to indicate localized impacts rather than area-wide issues. The overall results do not indicate significant issues or releases from the former Site operations. No visual or physically identifiable petroleum related impacts were identified in soil samples collected from borings advanced in the vicinity of the onsite USTs.

Current redevelopment plans for the Site include excavation and removal of soil and fill material to a depth of 18 ftbg (or deeper) within the Site boundary. Excavation of Site soil/fill will extend into native sands, as well as several feet into the water table, and will address issues in the unsaturated zone.

Groundwater

Concentrations of chlorinated solvents show a wide variation and indicate a potential offsite source. Chlorinated solvent contamination is not consistent with historic Site operations and is not present Site-wide. DCE was identified in crossgradient well MW-2 in June of 2012 and not detected in April of 2013, but identified in newly installed MW-5. Of note, is that the Site is currently (and has been for decades) capped with a concrete slab that varies in thickness from 12 to 48", but is relatively consistent across the Site. This cap functions as an impermeable barrier for potential onsite releases. In addition, a historic onsite release would provide more consistent detectable results than the current groundwater data indicates.

Existing in the area of the Site are well documented upgradient and cross-gradient sources of chlorinated contamination, and the sporadic concentrations in onsite monitoring wells are indicative of a more distant impact. There is potential for isolated shallow impacts that can be identified in soil vapor; however, these impacts would not be expected to be seen in groundwater with such a degree of variability.

Soil Vapor

Concentrations of TCE and PCE are present in soil vapor around the western and southern Site perimeters. These concentrations may be the result of off-gassing from groundwater, localized

shallow hot spots, or migration from offsite sources.

The redevelopment project incorporates excavation and removal of all material within the Site boundary several feet into groundwater table, which will effectively eliminate any onsite soil/fill source of soil vapor contamination.

1.4.5 Offsite Quantitative Evaluation, May 2013

Evaluation of the RI soil vapor and groundwater results demonstrated that further investigation would be necessary on the western adjacent property (Lot 49) and established PCE and TCE as Site-specific constituents of concern (COCs).

The scope of work outlined in the original offsite work plan included soil vapor and groundwater sampling inside of the building located on Lot 49. On May 22, Integral sent a letter to the owner of Lot 49 requesting access to perform sampling. Subsequently, Integral was not granted access, and an alternate scope of work, approved both verbally and via email by NYSDEC on June 10, was implemented.

Scope of Work

On June 20, 2013, Integral installed three (3) temporary soil vapor points along the sidewalk in front of Lot 49 on West 27th Street. Three (3) soil vapor samples, one (1) ambient air and one duplicate sample were collected.

A permanent groundwater monitoring well (MW-6) was also installed in the sidewalk on West 27th Street, approximately 75 feet downgradient of the onsite USTs. This well, while installed during the offsite implementation, was not part of the offsite scope of work; rather, its installation was associated with the implementation of the onsite IRM which was designed, in part, to address the onsite petroleum spill. Installation of MW-6 during the offsite phase of work enabled sufficient time for stabilization (prior to the UST removal) and provided added efficiency to the project schedule.

Findings

Low concentrations of both TCE and PCE, consistent with area wide background concentrations, were detected in all three (3) soil vapor samples. TCE concentrations ranged from 1.07 µg/m3 in sample SV-13 to 5.37 µg/m3 in SV-14. PCE concentrations ranged from 6.78 µg/m3 in sample SV-14 to 16.5 µg/m3 in SV-15.

Offsite concentrations of TCE and PCE were lower than TCE and PCE concentrations found onsite. This would indicate that if any onsite hot spots exist, they are not contributing in a meaningful way to the area-wide lower concentrations.

1.4.6 Interim Remedial Measure, August 2013

On June 20 and 21, test pits were excavated onsite by ARRCO Environmental Services Corp. (AARCO) for the purpose of delineating the onsite USTs and to assist the geotechnical engineers in determining if their removal might require structural support for the adjacent building and roadway. In addition to Integral staff, a representative from MRCE was onsite to observe the test pitting. The performance of test pitting enabled isolation of the tanks and also provided information that indicated both tanks were encased in concrete. The surface of the concrete appeared level and was thought to be part of a vault. MRCE determined that the tanks could be removed without structural support if the eastern and southern walls of the vault remained in place.

Prior to the excavation of the USTs, Integral placed absorbent socks in both wells MW-1 and MW-6 on July 30, 2013. The placement of the socks served a dual purpose: 1) to remove the existing NAPL in both wells in order to facilitate their sampling, and; 2) to evaluate whether the NAPL would return after its initial removal. On July 31, 2013, Integral removed the socks from both wells and collected groundwater samples for analysis of VOCs, SVOCs, and total metals.

On August 1, 2013, Integral implemented a NYSDEC approved IRM at the Site. The IRM included the excavation and decommissioning of two (2) 550-gallon USTs located in the southwestern portion of the Site. The IRM was conducted, in part, to confirm if the NAPL observed in onsite well MW-1 and offsite well MW-6 was originating from the onsite USTs.

Scope of Work for Tank Removal

On August 1, 2013 Integral oversaw and inspected the excavation of both onsite USTs. The excavation and decommissioning was conducted by AARCO, a FDNY licensed contractor. A backhoe was used to scrape off the overlying three (3) feet of fill and sand and to trench along the northern and western sides of the concrete vault. Two (2) fill ports were observed extending from the concrete vault. Both fill caps were removed to allow access to the USTs for removal of any residual contents prior to clearing away the concrete. Both tanks were completely full of water and their contents removed and containerized for proper disposal. The concrete top and sides along the northern and western sides were cleared to a depth at the bottom of the concrete. Following the exposure of the concrete vault, a hydraulic hammer was used to break up and remove the outer sections and allow access for removal of the tanks.

When each tank was cleared of encasement, they were lifted from the excavation and placed on the ground. Each was cleaned of residual waste, degassed and then cut open final cleaning. Once removed and cleaned, the USTs were cut open, inspected, and photographed. Two (2) endpoint samples were collected from the bottom of the northern and western sidewalls of the excavation and analyzed for VOCs and SVOCs. The southern, eastern, and bottom portions of the concrete encasement were left in place to maintain structural integrity of the adjacent

building and sidewalk/roadway. A large steel H-beam gate was in place directly over the southeastern corner of the tank and this footing was protected from collapse as well. The excavation was backfilled with concrete, imported recycled concrete aggregate (RCA) and excavated historic fill and will be fully removed during the full construction excavation.

Findings

Excavation confirmed the presence of two (2) 550-gallon USTs. Both USTs were completely encased in concrete and filled with water. Both vents and fill pipes were found fully intact. Vent pipes were covered and appeared to be in good condition. The fill pipes were set in clean tan sand with fill covers that were sealed tightly and showed no outward signs of loss of integrity. The sand surrounding the fill pipes was obviously distinct from the historic fill and showed no evidence of any current or historic tank overfill. There was a very small amount of weathered gasoline (approximately 5") in the upper portion of each fill pipe, with the remaining contents of the tanks, consisting of water. The contents of both USTs were removed using a vacuum truck and disposed of at a licensed facility; waste manifests will be included in the spill closure report. No impacts were observed as the cover fill and concrete were removed from around the tanks. No staining or odor was noted and no perforations or defects to either tank were identified. Confirmation that both tanks were previously utilized for the containment of gasoline, indicates that they are not the source of the NAPL found in onsite well (MW-1) and offsite well (MW-6).

On August 1, 2013, 24 hours following the removal of the absorbent socks from wells MW-1 and MW-6, Integral gauged both wells for the presence of NAPL. Onsite well MW-1 contained no measurable NAPL, offsite well MW-6 contained approximately .1' of NAPL. Integral placed a new absorbent sock in MW-6.

On August 7, 2013, Integral retuned to the Site to gauge both wells. During this gauging event approximately .05' of NAPL was measured in both wells. On August 8, 2013, Integral placed new absorbent socks in both MW-1 and MW-6.

Endpoint Samples

Two (2) endpoint samples were collected from the bottom of the northern and western sidewalls of the UST excavation in order to document post excavation soil conditions. Both samples were analyzed for VOCs and SVOCs. No VOCs were detected in either endpoint sample above Unrestricted Use SCOs. Concentrations of SVOCs, consistent with historic fill, were detected above Unrestricted SCOs, but below Restricted Residential SCOs, in the sidewall sample collected from the northern wall of the excavation.

Groundwater Samples

On July 31, 2013, after the removal of absorbent socks from wells MW-1 and MW-6, Integral purged and sampled both wells for VOCs, SVOCs, total metals, and dissolved metals. The results of the sampling indicated the following:

- No VOCs or SVOCs were detected above TOGS AWQSs; and
- Concentrations of dissolved metals, consistent with the presence of historic fill, were found in both samples above TOGS AWQSs.

Tabulated results and laboratory analytical reports for endpoint and groundwater samples will be provided in an addendum to the RIR.

1.5 SUMMARY OF IDENTIFIED AREAS OF CONCERN

Based upon a review of the Site history and the findings of several environmental studies, two (2) areas of concern (AOCs) have been identified at the Site. Historic fill throughout the Site has been indicated as a source of onsite metals and SVOCs contamination and has been identified as an AOC. The presence of NAPL in an onsite well from an unknown source and the subsequent reporting of an onsite spill has also been identified as an AOC.

1.5.1 Historic Fill

Elevated SVOC and metal concentrations have been observed in soil and fill material throughout the Site. The SVOC and metal contamination in onsite soil and fill is consistent with concentrations found in historic fill throughout urban areas of New York City that are in or around waterfront and industrial areas. While the shallow groundwater is not separated from any deeper aquifer or water supply, it has been identified on the 1865 Egbert L. Viele map that a significant portion of the Site is east of the historic Manhattan shoreline and would have been filled in as part of the west side extension of Manhattan. This fill extends in many areas into the upper reaches of the shallow saturated zone. Fine particulates from ash and cinders that has been in contact with shallow groundwater often leads to consistent excursions of dissolved metal concentrations in groundwater in comparison to potable criteria. Additionally, dissolved metal concentrations detected in groundwater at the Site are consistent with metal concentrations found in similar areas beneath sites with historic fill placed above and in the shallow water table.

1.5.2 Onsite Petroleum Spill

Previous investigations conducted around USTs found no obvious petroleum impacts indicative of a release. However, following the completed installation of the onsite downgradient monitoring well, MW-1, Integral observed approximately 1/8" of what appeared

to be NAPL in the well. The well was installed approximately 25 feet west of the onsite USTs and adjacent to the property boundary. Subsequently, on April 23, 2013, Integral reported a spill and NYSDEC assigned Spill No. 1300765 to the Site.

A NAPL sample was collected for fingerprint analysis in order to attempt to identify the type of petroleum present. During collection of the NAPL, it was noted that the material appeared unlike gasoline in both viscosity and with respect to odor. The fingerprint analysis was not performed specifically to identify individual chemical concentrations, but to provide an overall carbon range of the material. Individual fuels and petroleum products have a very specific and limited signature with respect to carbon makeup; following a review of the results, the material was determined to be dissimilar from gasoline, with a signature similar to lubricating, motor, or a synthetic oil-like product.

On June 21, 2013 a permanent offsite groundwater monitoring well (MW-6) was installed in the sidewalk along 27th Street, approximately 75 feet downgradient of the onsite USTs. On July 2, 2013, Integral gauged MW-6 and observed approximately 1" of what appeared to be NAPL; the NAPL appeared to be consistent with the product observed in MW-1 in April 2013. Subsequent to the removal of NAPL via absorbent socks, both wells were sampled for VOCs and SVOCs. Analytical results indicate that the presence of NAPL has not impacted groundwater on-or-offsite.

On August 1, 2013, Integral oversaw the excavation and decommissioning of the onsite USTs as part of an IRM, performed in part, to address Spill No. 1300765. The excavation confirmed that both USTs formerly contained gasoline, in that a very small amount of material clearly identifiable as gasoline, was found in the tank fill pipes. Additionally, the tanks had been filled with water and showed no holes, leaks or signs of overfill.

Based on the results of the NAPL fingerprint, the tanks have been determined not to be the source of the NAPL associated with the onsite spill. Presently, the source of the NAPL is unknown. During the project excavation, an effort will be focused on determining if there is any other unknown source within the Site. If no source is identified, Integral will request that the spill be closed with respect to its identification at the Site address.

Integral continues to monitor the occurrence of NAPL in wells MW-1 and MW-6. Absorbent socks have been installed in both wells, in an effort to eliminate the presence of NAPL or mitigate a potential continuing source.

1.6 PROPOSED DEVELOPMENT

The proposed development consists of an eleven (11) story residential and commercial mixed use building that will occupy the entire of the footprint of the Site (approximately 22,220 sqft), with the exception of offsets from the foundation wall from the property line to the southern adjacent structures. The proposed development will include a new residential tower with retail spaces along West 28th and West 27th Street frontages. The development will include the

construction of a basement that will occupy the entire footprint of the building. The depth of the basement will be in excess of 18 feet below the existing grade, or deeper to accommodate the proposed basement. The basement will be set in bedrock across portions of the Site and in native sands where bedrock is deeper than the proposed excavation depth. The basement will be set several feet below the groundwater table and will be used for parking, mechanical rooms, and residential amenities. The ground floor of the building will include approximately 9,700 sqft of retail space, a lobby, and a 1,558 sqft garden set atop the ceiling of the basement. Floors 2 through 11 will be residential, and are expected to include 37 units.

1.7 HUMAN EXPOSURE POTENTIAL

To evaluate contaminant fate and transport and potential human exposure on the Site, this section discusses the nature and extent of contamination, identifies receptor populations and exposure pathways, and provides a human health exposure assessment. A qualitative human health exposure assessment for the Site was initially presented in the June 2013 RI Report.

1.7.1 Nature and Extent of Contamination

The RI Report identified contamination in Site soil, groundwater, and soil vapor. The contaminants of concern at the Site include SVOCs, metals, and chlorinated solvents, specifically PCE, TCE and DCE. SVOCs and metals have been detected in soil/fill above applicable regulatory levels. Metals and DCE have been detected in groundwater above applicable regulatory levels, and PCE and TCE have been detected in soil vapor.

1.7.1.1 Soil

Previous investigations indicate SVOC and metal concentrations in Site soil/fill consistent with historic fill and historic Site operations. Minor VOC and PCB exceedences could represent the presence of hot spots. The results, however, do not indicate significant issues or releases from the former Site operations. No petroleum related impacts were found in soil samples collected from borings advanced in the vicinity of the former onsite USTs or endpoints samples collected subsequent to their removal.

1.7.1.2 Groundwater

Previous investigations show that elevated concentrations of chlorinated solvents vary significantly and indicate a potential offsite source. Chlorinated solvent contamination is not consistent with historic Site operations and is not present Site-wide. DCE was identified in crossgradient well MW-2 in June of 2012 and not detected in April of 2013, but identified in newly installed MW-5.

No onsite source has been identified and the lack of chlorinated solvent impacts to soil across the Site does not support the presence of onsite source. The Site is covered by a significant concrete cap, and while there is variability in its thickness, it has existed for a significant period of time. No other major disturbance of the soil and groundwater has occurred in this period, and in light of documentation of well-known chlorinated solvent impacts emanating from an upgradient source in the area, it is likely that the chlorinated solvent impacts to groundwater are the result of an offsite or background source.

Laboratory analysis of groundwater indicates that the presence of NAPL in wells located on the southwestern portion of the Site and hydraulically downgradient of the Site, has not resulted in impacts to groundwater, on-or-offsite.

1.7.1.3 Soil Vapor

The results of the soil vapor investigation indicate that elevated concentrations of chlorinated solvents are present in soil vapor around the western and southern Site perimeters. PCE was detected in all seven (7) soil vapor samples collected onsite, and TCE was detected in five (5) of seven (7) soil vapor samples. These concentrations may be the result of off-gassing from groundwater, localized hot spots, or migration from offsite sources.

1.7.2 Receptor Populations

The receptors identified under the proposed remedy include:

- Onsite workers: adult (remediation and construction workers);
- Temporary workers: adult (utility worker/inspector, subcontractors, sampler/remediation inspector); and
- Authorized guests.

The receptors identified under the proposed remedy and future Site use as a residential/commercial development include:

- Adult and child residents of the apartment units;
- Onsite workers: adult maintenance workers; and
- Temporary workers: adult (utility worker/inspector, landscape worker, construction worker).

1.7.3 Exposure Pathways

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: (1) a contaminant source; (2) contaminant release and transport mechanisms to an exposed

population; (3) a receptor population; (4) a route of exposure; and (5) a point of exposure to a receptor population. The sections below detail potential on-site exposure pathways under current Site conditions, during remedial and construction activities, and proposed future conditions.

1.7.3.1 Current Conditions

The Site is currently vacant and with the majority of the ground surface covered with an asphalt or concrete cap. The cap effectively limits dermal contact and inhalation of SVOCs and metals present in onsite soil.

Concentrations of DCE were detected in groundwater above TOGS AWQSs, which were developed to be protective of public health based upon groundwater as a potential drinking water source. While concentrations of DCE exceed TOGS AWQSs, exposure to contaminants via drinking water does not represent a complete exposure pathway because groundwater is not a potable source of water in New York City.

Elevated concentrations of chlorinated solvents have been detected in soil vapor at the Site. Inhalation of volatilized chlorinated solvents does not represent a complete exposure pathway because the Site is vacant, undeveloped, and the majority of the Site is capped.

1.7.3.2 Construction/Remediation Activities

Construction and remediation activities may result in potential exposures to Site contaminants. The same contaminants exist as identified in Current Conditions. Construction and remedial activities include the excavation and sampling of impacted soil during remediation activities; therefore, the potential exists for exposure pathways to soil COCs for construction and remediation workers via dermal absorption, ingestion, and inhalation. Workers will encounter groundwater during dewatering, excavation, and sampling activities. There is a potential exposure pathway to groundwater COCs for construction and remediation workers via dermal absorption, ingestion, or inhalation. A potential pathway exists for exposure to soil vapor VOCs for construction and remediation workers via inhalation.

1.7.3.3 Proposed Future Conditions

The proposed development will include a mix of residential and commercial use. Redevelopment plans for the Site include excavation and removal of all fill material above and into the water table within the entire Site boundary. Excavation of Site soils will address compound exceedences or potential hot spots. Excavation of the Site into and below the groundwater table will eliminate any onsite soil source of soil vapor contamination, therefore, the exposure pathway is incomplete for soil and soil vapor contaminants.

The entire Site will be capped with a concrete basement slab inclusive of a waterproofing membrane, preventing exposure of building inhabitants and workers to soil vapor impacts from

offsite sources. The Site will not use groundwater as a source of drinking water. Drinking water for the Site will be obtained through the New York City water supply provider, which is sourced from reservoirs in upstate New York; therefore, the exposure pathway is incomplete with respect to groundwater contaminants.

1.7.3.4 Potential Exposure Pathways – Offsite

Soils have a very low potential to be transported offsite by wind in the form of dust or on equipment leaving the Site during development and remediation activities because all of the exposed soils are below grade and not accessible to vehicles. VOC vapors have the potential to volatilize and migrate offsite, creating a potential inhalation exposure pathway to the public adjacent to the Site. However, the potential offsite migration of site contaminants is not expected to result in a complete exposure pathway for current, construction and remediation, or future conditions for the following reasons:

- Air monitoring will be conducted for particulates (i.e., dust) and VOCs during all intrusive activities as part of a community air monitoring program. Dust and/or vapor suppression techniques will be employed to limit potential for offsite migration of site soils and vapors;
- Engineering controls will be employed to limit dust and emissions for material that may be encountered and found to contain identifiable concerns; and
- Contaminated equipment will be washed as necessary prior to leaving the Site to prevent tracking material offsite.

1.7.4 Human Health Exposure Assessment

The following table summarizes the environmental media and potential exposure routes and presents a human exposure assessment for each:

Potential Exposure Route	Human Exposure Assessment
Dermal contact with soil/ Inhalation of dust	• Construction/Remediation Activities: Exposure would be avoided by having workers conducting subsurface work be properly trained and using procedures specified in a HASP.
Ingestion of groundwater	• Groundwater is not used as a potable source for the Site or surrounding community.
Dermal contact with groundwater/ Inhalation of volatile groundwater constituents	• Construction/Remediation Activities: Exposure would be avoided by dewatering operations and having environmental professionals sampling groundwater adhering to a HASP.
Inhalation of vapors	• Elevated ambient levels are not currently present. • Proposed Future Conditions: Potential exposure of future building residents and workers to VOCs in indoor air will be avoided by the installation of a concrete foundation and waterproofing membrane

Human Health Exposure Assessment Conclusions

The following conclusions were developed from this human health exposure assessment:

1. There is a low to moderate risk of exposure during construction and remediation activities. This risk can be minimized by following the appropriate health and safety monitoring, along with engineering controls to mitigate and suppress vapor and dust issues, and Site security measures.
2. The existence of a complete exposure pathway for Site contaminants to human receptors during proposed future conditions is unlikely, as all of the soil within the Site boundary and several feet into the water table will be excavated for offsite disposal; chlorinated solvent impacted groundwater at the Site is inconsistent and transitory; and any potential onsite soil source of soil vapor contamination will be eliminated during full Site excavation. Additionally, a continuous concrete slab with waterproofing membrane (impervious site cap) will be installed across the building footprint.
3. It is unlikely that a complete exposure pathway exists for the migration of Site contaminants to offsite human receptors for current, construction phase, or future conditions. Monitoring and control measures will be used during construction to

prevent completion of this pathway.

2 REMEDIAL ACTION ALTERNATIVES ANALYSIS

This Section presents an analysis of two remedial actions that can potentially be achieved under the BCP. The proposed SCOs will be the generic Track 1 Part 375 Unrestricted Use SCOs for Alternative I and Track 2 Restricted Use for Alternative II. Alternative II contemplates a scenario in which Alternative I cannot be achieved.

Alternative I consists of the removal of all soil/fill material that exceeds Track 1 Unrestricted Use SCOs to a minimum of 15 ftbg over the entire of the Site, with the majority of the excavation extending 18 ftbg (several feet below the water table) and into bedrock across portions of the Site. Alternative I incorporates a SOE design that achieves complete removal of soil/fill, while maintaining the structural integrity of the adjacent buildings to the south, and assumes that the western adjacent building will be demolished prior to full scale construction excavation. Alternative II would be implemented in the event that Unrestricted Use SCOs are not achieved.

Due to the excavation of the entire Site footprint to a depth several feet below the groundwater table, both Alternatives will also include the placement of a waterproofing membrane beneath the building slab and along foundation side walls. This waterproofing membrane will also serve as a mitigation method for the potential intrusion of soil vapor coming from known and unknown offsite impacts.

This section is organized as follows:

- Section 2.1 describes the remedial goals and objectives;
- Sections 2.2 and 2.3 provide technical descriptions of:
    - Alternative I, a BCP Unrestricted Use Track 1 Model; and
    - Alternative II, a BCP Restricted Use Track 2 Model.
- Section 2.4 evaluates the remedial alternatives based on the BCP Remedy Selection Evaluation Criteria; and
- Section 2.5 discusses the recommended remedial alternative

2.1 STANDARDS, CRITERIA AND GUIDANCE (SCGS) AND REMEDIAL ACTION OBJECTIVES (RAOS)

In accordance with DER-10 and ECL § 27-1415, the objectives of the remedial action are to: (1) reduce the concentrations of contaminants of concern at the Site to meet those levels that will protect public health and the environment, and (2) isolate the Site from migration of contaminated groundwater and soil vapor from potential on and offsite sources. Where identifiable sources of contamination are found on the Site, the sources will be removed or eliminated to the greatest extent feasible, regardless of presumed risk or intended use of the Site.

Also in accordance with DER-10, the Remedial Action Objectives (RAO) for this Site are defined as medium-specific objectives for the protection of public health and the environment and are developed based on contaminant-specific standards, criteria, and guidance (SCGs). The SCGs for the Site include:

- NYSDEC – Brownfield Cleanup Program Guide (draft 2004);
- NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (2010);
- NYSDEC TAGM No. 4031– Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Waste Sites (1989);
- NYSDEC TOGS 1.1.1 – Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (1998);
- NYSDEC TOGS 5.1.8 – New York State Stormwater Management Design Manual (2008);
- NYSDEC TOGS 5.1.10 – New York Standards and Specifications for Erosion and Sediment Controls (2005);
- NYSDOH – Guidance for Evaluating Soil Vapor Intrusions in the State of New York (2006);
- New York State Codes, Rules and Regulations (NYCRR) Title 6 Part 364 – Waste Transporter Permits;
- 6 NYCRR Part 370 – Hazardous Waste Management System;
- 6 NYCRR Part 375 – Environmental Remediation Program (December 2006);
- 6 NYCRR Part 376 – Land Disposal Restrictions;
- 6 NYCRR Part 750 – State Pollutant Discharge Elimination System (SPDES) Regulations;
- Code of Federal Regulations (CFR) Title 29 Part 1910.120 - Hazardous Waste Operations and Emergency Response Standard;
- CFR Title 29 Part 1926 - Safety and Health Regulations for Construction; and
- NYSDEC CP-51 - Soil Cleanup Guidance (2010).

In addition to the SCGs listed above, the RAOs were developed from information derived from previous environmental investigations referenced in Section 1.4, including identified contaminated media and potential public health and environmental exposure pathways, which were summarized in Section 1.7. The RAOs for this RAWP are the following:

<u>For Public Health Protection</u>:

a. Prevent ingestion and direct contact with contaminated soil.
b. Prevent inhalation of or exposure from contaminants volatilizing or associated with dust from contaminated soil.

c. Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.

d. Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

For Environmental Protection:

a. Prevent impacts to biota and animals from ingestion and direct contact with the contaminated soil.

b. Remove soil exceeding the SCOs to the greatest extent practicable.

c. Monitor VOC concentrations in groundwater.

2.2 TECHNICAL DESCRIPTION OF ALTERNATIVE I

Alternative I, a Track 1 remedy, includes the following tasks:

- Removal of all onsite soil/fill exceeding Unrestricted Use SCOs;
- Importation of clean fill meeting Unrestricted Use SCOs;
- Design and construction of a combination of a small sheeted pits and a secant pile wall along the perimeter of the southern adjacent buildings;
- Complete removal of the UST vault and petroleum impacted soil;
- Dewatering and treatment of impacted groundwater;
- NAPL source identification/recovery;
- Collection and analysis of endpoint soil samples to confirm and document removal of targeted materials;
- Placement of a waterproofing membrane beneath the building slab and along foundation side walls as part of new construction; and
- Development and execution of plans for the protection of on-site workers, community, and environment during remediation and construction activities.

The requirements for each of the above tasks are described in the following sections.

2.2.1 Soil Removal

SVOC and Metal exceedences of Part 375 Unrestricted Use SCOs were reported throughout the footprint of the Site. To achieve Track 1, soil removal and disposal would extend a minimum of 15 ftbg over the entire Site, with the majority of the excavation extending 18 ftbg and into bedrock throughout portions of the Site. In areas where bedrock is deeper than the proposed excavation depth, the excavation would extend into native sands, below the water table. Soil removal along the southern Site boundary would extend to a minimum depth of 15 ftbg where

bedrock is not encountered. Construction excavation would require dewatering and structural support measures (e.g., secant wall and sheeting/shoring) to protect buildings and roadways immediately adjacent to the Site. The estimated volume of soil and fill removal for offsite disposal for a Track 1 cleanup is approximately 14,800 cubic yards. Figure 6 depicts the extent of excavation under Alternative I.

2.2.2 Importation of Backfill

SOE design along the southern Site boundary where adjacent buildings are present includes the excavation and backfill of approximately 650 cubic yards of material in order to maintain the structural integrity of the adjacent buildings. In order to achieve a Track 1 Cleanup, all imported soil, used as backfill, would meet Track 1 Unrestricted Use SCOs[6]. For purposes of this project, backfill does not include standard material used as engineering/structural elements (e.g. concrete, stone, clean sand, etc.). Import of materials to be used for backfill and cover would be in compliance with the Soil Materials Management Plan (SMMP) and in accordance with applicable laws and regulations. The SMMP is provided in Appendix B.

The FER will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

2.2.3 Support of Excavation Design

In order to allow for the removal of all soil/fill within the Site boundary, several small (approximately 3'x5') sheeted pits will be installed directly against the southern adjacent building foundations of lots 22, 23, 24, 25 and 26. These pits will be excavated to a minimum depth of 15 ftbg, unless bedrock is encountered, and backfilled with clean fill in order to maintain the structural integrity of the adjacent buildings. After the pits are backfilled, a secant pile wall will be constructed approximately 3 to 4 feet from the boundary of the above-referenced lots.

The Site is bounded to the north by West 28th Street and to the east by Lot 42, which contain no buildings and is expected to be redeveloped concurrently with the Site. SOE for the north and east Site boundaries would be accomplished utilizing sheeting and shoring. It is anticipated that the western adjoining building on Lot 49 will be demolished prior to excavation of the Site. Therefore, it is expected that sheeting and shoring would be utilized along the western Site boundary as well. Without structural concerns in the form of adjacent buildings, sheeting would be driven directly on (or just outside) the bounds of the Site, leaving no residual soil/fill onsite.

[6] Standard construction materials, such as concrete, flowable fill (concrete/clean sand mixture), stone, etc., will not be subject to analytical testing.

SOE Design Drawings SOE-1.00 – SOE 9.00 depict the SOE design and SOE excavation sequence and are provided in Appendix C.

If the building on Lot 49 has not been demolished prior to full construction excavation of the Site, the SOE design for the southern Site boundary will be implemented along the western Site boundary.

2.2.4 UST Vault Excavation and Removal/Disposal of PCS

As discussed in Section 1.4.6, the removal and proper decommissioning of the onsite USTs was addressed during the implementation of the first phase of an IRM in August 2013. Due to structural constraints the IRM had to be performed in two phases, leaving the main portion of the vault removal to be performed during full construction excavation. In order to achieve Track 1, the remainder of the vault and all PCS would need to be removed and disposed of in accordance with applicable City, State, and Federal regulations. The removal of the vault and excavation of PCS would require SOE around the southwestern section of the Site parameter.

Endpoint sample collection is discussed below in Section 2.2.7.

2.2.5 Dewatering and Groundwater Treatment

The remedial excavation would extend several feet into the water table and would require dewatering. Dewatering would be accomplished via a designed and engineered system of sump pumps. Due to the presence of NAPL in groundwater beneath the Site, pre-treatment may be required in order to discharge water into the NYC sewer system. Depending on groundwater conditions at the time of excavation, treatment may be accomplished using a one or a combination of: carbon units, a settling tank, and/or an oil water separator. Once treated, the water would discharge to the New York City sewer. All discharge would be required to meet NYCDEP limitations for effluent to sanitary or combined sewers.

2.2.6 NAPL Source Identification and Recovery

The development will include a full basement that covers the entire building footprint and extends several feet into the water table. The placement of onsite wells would not prove to be a viable way to monitor groundwater beneath the Site. Further, under Alterative I, the excavation of the onsite UST vault and the removal of all soil/fill exceeding Unrestricted Use SCOs within the Site boundary, would eliminate any onsite soil source of NAPL, if one was found to be present.

Onsite residual groundwater impacts would be addressed via the construction dewatering system. Prior to the decommissioning of the dewatering system, a water sample would be collected from an upgradient and downgradient sump location to document final conditions

after the remedy is complete. If sampling of the dewatering system is not possible, due to its final layout, sampling would be performed in the offsite downgradient well (MW-6). The samples would be submitted to an NYSDOH ELAP-accredited laboratory for analysis of VOCs and SVOCs. Based upon groundwater sample results showing either, a lack of VOC concentrations (current conditions), or a transitory trend in dissolved concentrations of chlorinated related groundwater impacts (due to documented upgradient offsite sources), a request would be made to NYSDEC to discontinue sampling and consider the groundwater remedy complete. The results will be presented in the Final Engineering Report (FER) to document final conditions at the Site and their applicability with regard to the Track cleanup being recommended.

2.2.7 Endpoint Soil Sampling

Per NYSDEC Department of Environmental Remediation (DER) policy, confirmation soil sample collection would be completed two (2) feet above the groundwater table for every 30 linear feet of sidewall. Due to the removal of all soil/fill within the boundary of the Site, sidewall samples would be collected in order to document offsite soil conditions. In addition to the collection of sidewall samples, excavation bottom samples would be collected at a rate of one (1) sample per every 900 sqft. Bottom endpoint samples would not be collected in areas where the excavation extends into bedrock.

Under Alternative I, sidewall samples along the northern and eastern Site boundaries would be collected during the installation of the SOE or outside the Site perimeter using a Geoprobe or equivalent method. Sidewall samples along the southern and western Site boundaries where adjacent building foundations are present would not require sidewall endpoint sampling. Offsite perimeter sampling along these boundaries is not viable due to the presence of multiple buildings.

Based on the interval criteria listed above, and the sample restrictions with regard to the southern and western Site boundaries, approximately twelve (12) sidewall samples and approximately twenty-one (21) bottom samples, plus required QA/QC samples, would be collected. Endpoint soil samples would be analyzed for Part 375 VOCs, SVOCs, pesticides, PCBs, and metals by an NYSDOH ELAP-certified laboratory. Figure 7 depicts endpoint locations under Alternative I.

Upon completion of the endpoint sampling, no further soil remediation would be necessary. The results of the endpoint samples would be documented in the FER, along with a request to NYSDEC to consider the soil remedy complete.

2.2.8 Waterproofing Membrane

A waterproofing membrane would be installed beneath the building slab and along foundation side walls as part of new construction and because the excavation of the basement will extend several feet below the groundwater table. Excavation of the Site footprint several feet into the water table, along with the removal of all fill/soil exceeding Unrestricted Use SCOs within the entire footprint of the Site, will eliminate any onsite soil source of soil vapor contamination. However, the potential exists for intrusion of offsite VOC impacted soil vapor into the proposed Site building. This waterproofing membrane would also serve as a mitigation method for the potential intrusion of soil vapor coming from known and unknown offsite impacts. The membrane system would be installed along the entire footprint of the Site beneath the foundation slab, and would extend along the sides of the foundation slab from the base of the excavation to surface grade level. The waterproofing membrane may be up to 20 mil thick and would be installed as a continuous sub-slab membrane with seams overlapping seams. The membrane system would provide protection against moisture and vapor infiltration into the building.

2.2.9 On-Site Worker, Public Health, and Environmental Protection

A Site-specific HASP will be developed and enforced to protect onsite workers from accidents and acute and chronic exposures from the identified contaminated media. Public health would be protected by implementing and enforcing dust, odor, and organic vapor control and monitoring procedures included in the Community Air Monitoring Program (CAMP). The CAMP would include continuous perimeter monitoring of dust and organic vapor utilizing DustTrak aerosol monitors (or equivalent) and PIDs capable of recording data and calculating 15-minute averages. A field inspector would monitor Site perimeters for visible dust and odors. The environment would be protected by implementing and enforcing the appropriate soil erosion prevention measures.

2.3 TECHNICAL DESCRIPTION OF ALTERNATIVE II

Alternative II, a Track 2 remedy, includes the following tasks:

- Removal of all onsite soil exceeding Restricted Residential Use SCOs to 15 feet below grade, or deeper;
- Importation of clean fill meeting the NYSDEC DER-10 soil criteria;
- Design and construction of a combination of a small sheeted pits and a secant pile wall along the perimeter of the southern adjacent buildings;
- Complete removal of the UST vault and petroleum impacted soil;
- NAPL source identification/recovery;

- Dewatering and treatment of impacted groundwater;
- Collection and analysis of endpoint soil samples to confirm and document removal of targeted materials;
- Placement of a waterproofing membrane beneath the building slab and along foundation side walls as part of new construction;
- Implementation of long-term Institutional Controls in the form of an Environmental Easement; and
- Development and execution of plans for the protection of on-site workers, community, and environment during remediation and construction activities.

2.3.1 Soil Removal

SVOC and Metal exceedences of Part 375 Restricted Residential Use SCOs were reported infrequently throughout the footprint of the Site. To achieve Track 2 Restricted Residential Use SCOs, all soil/fill within the Site boundary would be excavated to a minimum of 15 ftbg over the entire Site, with the majority of the excavation extending 18 ftbg and into bedrock throughout portions of the Site. In areas where bedrock is deeper than the proposed excavation depth, the excavation would extend into native sands, below the water table. Construction excavation would require dewatering and structural support measures (e.g., secant wall and sheeting/shoring) to protect buildings and roadways immediately adjacent to the Site. The estimated volume of soil and fill removal for offsite disposal for a Track 2 cleanup is approximately 14,800 cubic yards. Figure 6 depicts the extent of excavation under Alternative II.

2.3.2 Importation of Backfill

SOE design along the southern Site boundary where adjacent buildings are present includes the excavation and backfill of approximately 650 cubic yards of material in order to maintain the structural integrity of the adjacent buildings. In order to achieve a Track 2 Cleanup all imported soil, to be used as backfill, would meet the NYSDEC DER-10 soil criteria (Appendix 5 - Allowable Constituent Levels for Imported Fill or Soil Subdivision 5.4(e)) applicable to Restricted Residential Use SCO[7]. In doing so, the material will meet the lower of the Restricted Residential SCOs or Protection of Groundwater SCOs. For purposes of this project, backfill does not include standard material used as engineering/structural elements (e.g. concrete, stone, clean sand, asphalt etc.). Import of materials to be used for backfill and cover would be in compliance with the SMMP and in accordance with applicable laws and regulations. The SMMP is provided in Appendix B.

[7] Standard construction materials, such as concrete, flowable fill (concrete/clean sand mixture), stone, etc., will not be subject to analytical testing.

The FER will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

2.3.3 Support of Excavation Design

In order to allow for the removal of all soil/fill within the Site boundary, several small (approximately 3'x5') sheeted pits will be installed directly against the southern adjacent building foundations of lots 22, 23, 24, 25 and 26. These pits will be excavated to a minimum depth of 15 ftbg, unless bedrock is encountered, and backfilled with clean fill in order to maintain the structural integrity of the adjacent buildings. After the pits are backfilled, a secant pile wall will be constructed approximately 3 to 4 feet from the boundary of the above-referenced lots.

The Site is bounded to the north by West 28th Street and to the east by Lot 42, which contain no buildings and is expected to be redeveloped concurrently with the Site. SOE for the north and east Site boundaries would be accomplished utilizing sheeting and shoring. It is anticipated that the western adjoining building on Lot 49 will be demolished prior to excavation of the Site. Therefore, it is expected that sheeting and shoring would be utilized along the western Site boundary as well. Without structural concerns in the form of adjacent buildings, sheeting would be driven directly on (or just outside) the bounds of the Site, leaving no residual soil/fill onsite.

SOE Design Drawings SOE-1.00 – SOE 9.00 depict the SOE design and SOE excavation sequence and are provided in Appendix C.

If the building on Lot 49 has not been demolished prior to full construction excavation of the Site, the SOE design for the southern Site boundary will be implemented along the western Site boundary.

2.3.4 UST Vault Excavation and Removal/Disposal of PCS

As discussed in Section 1.4.6, the removal and proper decommissioning of the onsite USTs was addressed during the implementation of the first phase of an IRM in August 2013. Due to structural constraints the IRM had to be performed in two phases, leaving the main portion of the vault removal, to be performed during full construction excavation. In order to achieve Track 2, the remainder of the vault and all PCS would need to be removed and disposed of in accordance with applicable City, State, and Federal regulations. The removal of the vault and excavation of PCS would require SOE around the southwestern section of the Site parameter.

Endpoint sample collection is discussed below in Section 2.3.7.

2.3.5 Dewatering and Groundwater Treatment

The remedial excavation would extend several feet into the water table and would require dewatering. Dewatering would be accomplished via a designed and engineered system with a series of sumps distributed around the Site. Due to the presence of NAPL in groundwater beneath the Site, pre-treatment may be required in order to discharge water into the NYC sewer system. Depending on groundwater conditions at the time of excavation, treatment may be accomplished using a one or a combination of: carbon units, a settling tank, and/or an oil water separator. Once treated, the water would discharge to the New York City sewer. All discharge would be required to meet NYCDEP limitations for effluent to sanitary or combined sewers.

2.3.6 NAPL Source Identification and Recovery

The development will include a full basement that covers the entire building footprint and extends several feet into the water table. The placement of onsite wells would not prove to be a viable way to monitor groundwater beneath the Site. Further, under Alterative II, the excavation of the onsite UST vault and the removal of all soil/fill to a minimum depth of 15 feet below grade within the Site boundary would eliminate any onsite soil source of NAPL, if one was found to be present.

Onsite residual groundwater impacts would be addressed via the construction dewatering system. Prior to the decommissioning of the dewatering system, a water sample would be collected from an upgradient and downgradient sump location to document final conditions after the remedy is complete. If sampling of the dewatering system is not possible, due to its final layout, sampling would be performed in the offsite downgradient well (MW-6). The samples would be submitted to an NYSDOH ELAP-accredited laboratory for analysis of VOCs and SVOCs. Based upon groundwater sample results showing, either a lack of VOC concentrations (current conditions), or a transitory trend in dissolved concentrations of chlorinated related groundwater impacts (due to documented upgradient offsite sources), a request would be made to NYSDEC to discontinue sampling and consider the groundwater remedy complete. The results will be presented in the FER to document final conditions at the Site and their applicability with regard to the Track cleanup being recommended.

2.3.7 Endpoint Samples

Per NYSDEC-DER policy, confirmation soil samples would be collected 2' above the groundwater table from of each sidewall, for every 30 linear feet of sidewall. Due to the removal of all soil/fill within the boundary of the Site, sidewall samples would be collected in order to document offsite soil conditions. In addition to the collection of sidewall samples, excavation bottom samples would be collected at a rate of one (1) sample per every 900 sqft. Bottom endpoint samples would not be collected in areas where the excavation extends into bedrock.

Under Alternative II, sidewall samples along the northern and eastern Site boundaries would be collected during the installation of the SOE or outside the Site perimeter using a Geoprobe or equivalent method. Sidewall samples along the southern and western Site boundaries where adjacent building foundations are present would not require sidewall endpoint sampling. Offsite perimeter sampling along these boundaries is not viable due to the presence of multiple buildings.

Based on the interval criteria listed above, and the sample restrictions with regard to the southern and western Site boundaries, approximately twelve (12) sidewall samples and approximately twenty-one (21) bottom samples, plus required QA/QC samples, would be collected. Endpoint soil samples would be analyzed for Part 375 VOCs, SVOCs, pesticides, PCBs, and metals by an NYSDOH ELAP-certified laboratory. Figure 7 depicts endpoint locations under Alternative II.

Upon completion of the endpoint sampling, no further soil remediation would be necessary. The results of the endpoint samples would be documented in the FER, along with a request to NYSDEC to consider the soil remedy complete.

2.3.8 Waterproofing Membrane

A waterproofing membrane would be installed beneath the building slab and along foundation side walls as part of new construction and because the excavation of the basement will extend several feet below the groundwater table. Excavation of the Site footprint several feet into the water table, along with the removal of all fill/soil to a minimum depth of 15 ftbg within the footprint of the Site, will eliminate any onsite soil source of soil vapor contamination. However, the potential exists for intrusion of offsite VOC impacted soil vapor into the proposed Site building. This waterproofing membrane would also serve as a mitigation method for the potential intrusion of soil vapor coming from known and unknown offsite impacts. The membrane system would be installed along the entire footprint of the Site beneath the foundation slab, and would extend along the sides of the foundation slab from the base of the excavation to surface grade level. The waterproofing membrane may be up to 20 mil thick and would be installed as a continuous sub-slab membrane with seams overlapping seams. The membrane system would provide protection against moisture and vapor infiltration into the building.

A waterproofing/vapor membrane would be installed beneath the building slab and along foundation side walls to mitigate potential soil vapor intrusion, and because the excavation of the basement will extend several feet below the groundwater table. The excavation of the majority of the Site several feet into the water table should eliminate any onsite soil source of soil vapor contamination; however, the potential exists for intrusion into the proposed Site building via residual soil left in place along the southern Site boundary and via VOC impacted soil vapor intrusion from offsite sources. This waterproofing/vapor membrane would serve as a

mitigation method for the potential intrusion of soil vapor and would constitute an engineering control for the Site. The membrane system would be installed along the entire footprint of the Site beneath the foundation slab, and would extend along the sides of the foundation slab from the base of the excavation to surface grade level. The waterproofing membrane may be up to 20 mil thick and would be installed as a continuous sub-slab membrane with seams overlapping seams. The membrane system would provide protection against vapor and moisture infiltration into the building.

2.3.9 Institutional Controls

An Environmental Easement would be recorded referencing institutional controls that are part of the selected remedy, which would be binding upon all subsequent owners and occupants of the property. The institutional controls (ICs) would restrict the Site's use to Restricted Residential and Commercial. .

2.3.10 On-Site Worker, Public Health, and Environmental Protection

A Site-specific HASP would be developed and enforced to protect onsite workers from accidents and acute and chronic exposures from the identified contaminated media. Public health would be protected by implementing and enforcing dust, odor, and organic vapor control and monitoring procedures included in the CAMP. The CAMP would include continuous perimeter monitoring of dust and organic vapor utilizing DustTrak aerosol monitors (or equivalent) and PIDs capable of recording data and calculating 15-minute averages. A field inspector would monitor Site perimeters for visible dust and odors. The environment would be protected by implementing and enforcing the appropriate soil erosion prevention measures**.**

2.4 EVALUATION OF THE PROPOSED REMEDY

The following is an evaluation of the proposed remedy based on the NYSDEC BCP remedy evaluation criteria listed below. The first two criteria are considered "threshold criteria" and the remaining criteria are "balancing criteria." A remedial alternative must meet the threshold criteria in order to be considered and evaluated further under the balancing criteria.

Threshold Criteria:

1. Protection of Human Health and Environment; and
2. Standards, Criteria, and Guidance (SCG).

Balancing Criteria:

3. Short-Term Effectiveness and Permanence;
4. Long-Term Effectiveness and Permanence;

5. Reduction of Toxicity, Mobility, or Volume;
6. Implementability;
7. Cost Effectiveness;
8. Community Acceptance; and
9. Land Use

Each criterion evaluation is prefaced by the NYSDEC description as provided in the DER-10 guidance document.

2.4.1 Protection of Public Health and the Environment

This criterion is an evaluation of the remedy's ability to protect public health and the environment, and an assessment of how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, and implementation of engineering controls and institutional controls. Protection of public health and the environment must be achieved for all approved remedial actions.

Alternative I would result in removal of soil and fill with contaminant concentrations above Track 1 SCOs within the entire footprint of the Site. This Remedial Action is consistent with the RAOs and would provide overall protection of public health and the environment in consideration of current and potential future land use by eliminating the following:

- Risk of ingestion exposures or other direct contact with contaminated onsite soils consistent with remedial action objectives;
- Risk of leaching into groundwater and ingestion exposures or direct contact with groundwater with contamination derived from the Site consistent with remedial action objectives; and
- Potential sources for onsite production of soil vapors, and prevent migration of onsite derived vapors into occupied structures and eliminate associated inhalation exposures consistent with remedial action objectives.

Alternative II would achieve equivalent protections by:

- Establishing Restricted SCOs for the entire Site;
- Removal of all soil/fill within the footprint of the Site to a minimum depth of 15 ftbg and approximately 18 ftbg over the majority of the Site; and
- Placement of an Environmental Easement that would restrict Site use to restricted residential and commercial use(s).

For both Alternatives, a waterproofing membrane and composite cover system would mitigate potential soil vapor intrusion from offsite sources. Public health would be protected during

remediation activities by implementing a HASP/CAMP and enforcing dust, odor, and organic vapor control and monitoring procedures during all soil disturbance activities. Potential exposure to contaminated soils during construction would be minimized by implementing an approved Soil Materials Management Plan (SMMP).

2.4.2 Standards, Criteria, and Guidance (SCG)

Remediating the Site to Track 1 Unrestricted Use SCOs would ensure compliance with all applicable SCGs listed in Section 2.1 due to the removal of all impacted onsite materials. All soil/fill excavated from the Site would be managed and disposed of in accordance with applicable regulations.

In the event that Unrestricted Use SCOs are not achieved, Alternative II was designed to meet the requirements of a Track 2 Cleanup. Removal of all soil and fill within the Site boundary to a minimum depth of 15 ftbg and remediating the Site to Track 2 Restricted Residential SCOs would ensure compliance with all applicable SCGs listed in Section 2.1.

Similar to the Track 1 Alternative, focused attention on means and methods employed during the Remedial Action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs.

2.4.3 Short-Term Effectiveness and Permanence

This evaluation criterion assesses the effects of the alternative during the construction and implementation phase until remedial action objectives are met. Under this criterion, alternatives are evaluated with respect to their effects on public health and the environment during implementation of the remedial action, including protection of the community, environmental impacts, time until remedial response objectives are achieved, and protection of workers during remedial actions.

Both Alternative I and II would result in short-term impacts associated with excavation, handling, load out of materials, and truck traffic.

The most significant short-term adverse impacts and risks to the community would be the potential complications involved with designing support of excavation for buildings and roadways adjoining the Site. Increased short-term truck traffic and operational noise levels would be necessary to haul out the soil excavated and support excavation dewatering. The operation is estimated to require several hundred truck trips to haul soil offsite for disposal. Truck traffic would be routed on the routes that are more direct in order to help limit traffic impacts.

The Track 1 and Track 2 Alternatives would both employ appropriate measures to prevent short term impacts, including a CAMP and a SMMP, during all on-site soil disturbance activities and would effectively prevent the release of significant contaminants into the

environment. The effects of potential adverse impacts to the community, workers and the environment would be minimized by implementing their respective control plans. Work would be modified or stopped according to the action levels set in the CAMP. Construction workers operating under appropriate management procedures and a Construction Health and Safety Plan (CHASP) would be protected from on-site contaminants (personal protective equipment would be worn consistent with the documented risks within the respective work zones).

2.4.4 Long-Term Effectiveness and Permanence

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of ECs/ICs that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of engineering controls.

Both Alternatives I and II would remove all soil/fill within the Site boundary several feet into the water table and to a minimum depth of 15 ftbg, with the majority of the excavation extending 18 ftbg. The potential exists for residual VOC concentrations in groundwater and soil vapor due to offsite sources. Potential exposure via VOC impacted soil vapor intrusion would be prevented by the installation of a waterproofing membrane beneath, and along the other foundation of the proposed development. In addition, groundwater in this area of New York City is not a potable source of water. Therefore, the long-term effectiveness of both remedies would eliminate risks and satisfy the objectives of this criterion.

2.4.5 Reduction of Toxicity, Mobility, and Volume

This evaluation criterion assesses the remedial alternative's use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Both Alternatives I and II would permanently and significantly reduce the toxicity, mobility, and volume of contamination, by removal of all soil/fill within the footprint of the Site to a minimum depth of 15 ftbg. Alternative I would remove all soil/fill above Unrestricted Use SCOs and Alternative II would remove all soil/fill to a minimum depth of 15 ftbg and achieve Restricted Residential SCOs. Any soil source contributing to VOCs in soil vapor or the presence

of NAPL, would be addressed during Site-wide excavation. Residual groundwater contamination would be addressed via the dewatering system. Post remediation groundwater sampling would confirm the effectiveness of the remedy.

Alternative I would eliminate a greater total mass of contaminants on Site.

2.4.6 Implementability

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the selected technology, ease of undertaking remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

Both Alternatives are feasible and implementable. They use standard materials and services and well established technology. The reliability of these remedies is also high. There are no specific difficulties associated with any of the activities proposed, which utilize standard industry methods.

2.4.7 Cost Effectiveness

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and site management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

Based on the assumptions detailed for each Alternative, including removal of all soil within the Site boundary to a minimum depth of 15 ftbg, with the majority of the excavation extending to 18 ftbg, dewatering, and installation of a waterproofing barrier, the estimated remediation costs for both cleanups are commensurate and approximately $12,685,200 million. As the Site would be remediated to either a Track 1 or Track 2 Cleanup, there are no operations, maintenance, or monitoring costs associated with the proposed remedy. Table 1 details the individual cost component used for the estimate.

In both scenarios, appropriate public health and environmental protections are achieved.

2.4.8 Community Acceptance

This evaluation criterion addresses community opinion and support for the remedial action. Observations here will be supplemented by public comment received on the RAWP.

Based on the overall goals of the remedial program and initial observations by the project team, either Alternative would be acceptable to the community. This RAWP will be subject to and undergo public review under the NYSBCP and will provide the opportunity for detailed public

input on the remedial alternatives and the selected remedial action. This public comment will be considered by NYSDEC prior to approval of this plan.

2.4.9 Land Use

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the Site.

Both Alternatives are comparable with respect to the proposed use and to land uses in the vicinity of the Site. The proposed use is consistent with the existing zoning designation for the property and is consistent with recent development patterns. Improvements in the current brownfield condition of the property achieved by both Alternatives are also consistent with the State's goals for cleanup of contaminated land and bringing such properties into productive reuse. Additionally, both Alternatives are protective of natural resources and cultural resources. Review of previous environmental and public documents for the Site has led to the following conclusions:

1. The current and proposed use of the Site and its surroundings would be compatible with the selected remedy. The proposed development of the Site and the use of its surroundings have been documented by the Volunteer in the BCP application.
2. The use proposed for the Site conforms to applicable zoning laws or maps or the reasonably anticipated future use of the Site.
3. The proposed use conforms to historical and/or recent development patterns in the area.
4. To the best of our knowledge, the Site does not fall within the boundaries of an existing BOA.
5. According to the New York City Planning Commission Zoning Map 8b, the Site is located in a C6-3 commercial district, which allows for residential use. The proposed use is consistent with this planning initiative.
6. The Site is located in an urban setting that is characterized by residential, commercial office, commercial retail developments, and parks. There are no areas zoned for agricultural use in the proximity of the Site.

7. To the best of our knowledge, there are no environmental justice concerns.
8. There are no federal or state land designations.
9. The population growth patterns and projections support the proposed land use.
10. The Site is accessible to existing infrastructure.
11. There are several City Landmarks listed within ½ mile of the Site. There were no Interior Landmarks (INT L) or Properties Listed on National Register (NR) of Historic Places within approximately ½ mile of the Site. The below table lists City Landmarks (L), within approximately ½ mile of the Site:

Property/Site	Address
Church of the Holy Apostles	298 9th Avenue
Starrett-Lehigh Building	200 Joe Dimaggio Highway
459 West 24th Street House	459 West 24th Street
457 West 24th Street House	457 West 24th Street
455 West 24th Street House	455 West 24th Street
453 West 24th Street House	453 West 24th Street
451 West 24th Street House	451 West 24th Street
449 West 24th Street House	449 West 24th Street
447 West 24th Street House	447 West 24th Street
445 West 24th Street House	445 West 24th Street
443 West 24th Street House	443 West 24th Street
441 West 24th Street House	441 West 24th Street
439 West 24th Street House	439 West 24th Street
437 West 24th Street House	437 West 24th Street

12. The Hudson River is located approximately 1,800 feet west of the Site. The High Line Park, an elevated and open recreational walkway, runs adjacent to the eastern Site border.
13. Municipal water supply wells are not present in this area of New York City; therefore, groundwater from the Site cannot affect municipal water supply wells or recharge areas. Groundwater flow is the area is generally west, toward the Hudson River.

14. According to FEMA flood maps, the Site is located within the 500 year flood plain and approximately 140 feet east of the 100 year flood plain.
15. There are no known current institutional controls in effect at the Site.

2.5 RECOMMENDED REMEDIAL ALTERNATIVE SELECTION

Based on the evaluation of the remedial Alternatives described above, both Alternatives would be protective of human health and the environment and meet the remedy selection criteria. Further, both Alternatives propose excavation of Site soils to a minimum depth of 15 ftbg, with the majority of the excavation extending approximately 18 ftbg (several feet below the water table) and into bedrock across portions of the Site. And costs associated with the implementation of both Alternatives are essentially the same.

While both Alternatives are similar, based on this evaluation, Alternative I is the preferred Alternative and will achieve protection of public health and the environment for the intended use of the property. Alternative I will achieve all of the Remedial Action objectives established for the project and addresses applicable SCGs. The preferred Remedial Action Alternative is effective in both the short-term and the long-term and reduces mobility, toxicity and volume of contaminants. The preferred Remedial Action Alternative is implementable and uses standard methods that are well established in the industry. In the event that Unrestricted Use SCOs cannot be achieved, Alternative II would be implemented.

3 TECHNICAL PLANS FOR THE PROPOSED REMEDY

The Remedial Engineer, defined in Section 7, will oversee remedial action planning and implementation that are part of the proposed remedy. The Remediation Engineer is responsible for ensuring that the remedial work conforms to the terms defined in this RAWP. The Remediation Engineer will prepare plans and specifications as required to implement the RAWP, select an experienced Remediation Contractor and oversee implementation of the work.

The Remedial Engineer will provide representatives for full-time oversight of all remedial activities. The activities that occur during Site remediation will be properly documented in periodic reports and in the FER as described in Section 6.

Site development activities are prohibited from interfering or otherwise impairing remedial activities that are part of this RAWP. 28th Highline Associates L.L.C. and associated parties preparing the remedial document submitted to the State will retain parties performing this work that are responsible for the safe performance of all invasive work and the structural integrity of structures that may be affected by remediation operations (such as building foundations, roadways, sidewalks, utilities, etc.).

3.1 EMERGENCY CONTACT INFORMATION

An emergency contact sheet providing names and phone numbers is included in Table 2. This table defines the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

3.2 REMEDIAL ACTION COSTS

The total estimated cost of the Remedial Action is $12,685,200 million. An itemized and detailed summary of estimated costs for all remedial activities is attached as Table 1. This will be revised based on actual costs and submitted as an appendix to the FER.

3.3 REMEDIAL FACILITIES

A fence placarded with the appropriate signs will be installed and/or maintained around the Site to control access. A project sign will be erected at the entrance to the Site prior to the start of any remedial activities, provided that there shall be no requirement that the sign specify that the project is being performed under the New York State BCP. Sign details and specifications will be provided to the NYSDEC Project Manager prior to its commissioning. Sidewalks adjacent to the Site will be maintained with barriers to protect the public.

3.3.1 Utility Marker and Easements Layout

The Volunteer and its contractors are solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this RAWP. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Volunteer and its contractors must obtain any local, State or Federal permits or approvals pertinent to such work that may be required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

3.3.2 Site Fencing

The Site perimeter will be secured with gated fencing. The purpose of the fencing is to limit Site access to authorized personnel, protect pedestrians from Site activities, and maintain Site security.

3.4 WASTE CHARACTERIZATION

Waste characterization for excavated material that will be removed from the Site will be required to meet disposal facility requirements. This will take into account varying types, sizes and classifications of fill material to appropriately manage the disposal effort. This activity will be coordinated and overseen by the Remediation Engineer. Samples will be collected to be representative of the specific volumes of material to be disposed with frequencies of various testing consistent with disposal facility requirements.

Laboratory tests for characterization of a waste stream typically include all or a subset of the following list. The actual testing will be determined by the facility's permit requirements.

- Total petroleum hydrocarbons (TPH) by gas chromatograph/photoionization device (GC/PID)
- Total VOCs via USEPA Method 8260B;
- Total SVOCs via USEPA Method 8270C;
- TAL Metals via USEPA Method 6010B/7470A;
- Total PCBs via USEPA Method 8082;
- Pesticides via USEPA 8081A;
- Total Cyanide;
- Hexavalent Chromium;
- Paint Filter;

- RCRA characteristics (ignitability, corrosivity, and reactivity);
- Toxic Characteristics Leaching Procedure (TCLP) VOCs, SVOCs, metals, pesticides, and herbicides; and
- Diesel Range Organics (DRO) and Gasoline Range Organics (GRO).

Characterization samples collected will be submitted to an ELAP-approved laboratory for analysis. Analytical reports will be maintained and copies will be available for inspection in the field and will be included in the FER (described in Section 6).

3.5 PRE-DESIGN SOIL SAMPLING

Based on Site-specific conditions (historic fill with no localized sources that would impact the underlying native soil) and common chemical characteristics of native soils, it is reasonable to assume that un-impacted native soil will meet Unrestricted SCOs. However, soil samples have not been collected at the proposed excavation depth (18 ftbg) as part of any previous investigation.

Prior to the implementation of the Remedial Action, 11 soil samples will be collected at the anticipated excavation depth of 18 ftbg and 2 soil samples will be collected at varying depths below 15 ftbg (depending on depth of native soil) within the area of excavation backfill. The purpose of this sampling will be to confirm the extents to which the Remedial Action will need to be implemented to meet Track 1 Unrestricted Use SCOs.

Pre-design soil samples will be collected as pre-excavation endpoint samples and will be analyzed for:

- Total VOCs via USEPA Method 8260B;
- Total SVOCs via USEPA Method 8270C;
- TAL Metals via USEPA Method 6010B/7470A;
- Total PCBs via USEPA Method 8082;
- Pesticides via USEPA 8081A;

Samples that meet Unrestricted SCOs will serve as the final endpoint samples for each 900 sq ft section from which they were collected. A figure depicting proposed pre-design soil sampling locations is included as Figure 8.

3.6 SOIL MATERIALS MANAGEMENT PLAN

Soil and materials management onsite and offsite, including excavation, handling, importation, and disposal, will be conducted in accordance with the Soil Materials Management Plan. Soil removal and disposal across the entire Site will extend to a minimum depth of 15 ftbg, with the

majority of the excavation extending approximately 18 ftbg (or deeper) and into bedrock throughout portions of the Site. The estimated volume of soil and fill removal for offsite disposal for this Remedial Action is approximately 14,800 cubic yards. The estimated volume of imported material for the Remedial Action is 650 cubic yards. Figure 6 depicts the extent of excavation under the proposed Remedial Action.

Soil and sediment erosion controls will be required considering the large volume of material that will be excavated and removed from the Site. Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris offsite. Such actions may include use of cleaned asphalt or concrete roads or use of stone or other aggregate-based egress paths between the truck inspection station and the property exit. Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris. The SMMP is included as Appendix B.

3.7 COMMUNITY AIR MONITORING PLAN

This community air monitoring plan (CAMP) was developed in accordance with the NYSDOH Generic CAMP and OSHA standards for construction (29 CFR 1926). Remediation activities will be monitored for dust and odors by the Remediation Engineer's field inspector. Continuous monitoring on the perimeter of the work zones for odor, VOCs, and dust will be required for all ground intrusive activities such as Site remediation operations and handling activities. The work zone is defined as the general area in which machinery is operating in support of remediation activities. Two stationary air monitoring stations will be set up at Site perimeters (one upwind and one downwind) during intrusive Site work for continuous monitoring. Each station will include a PID and a DustTrak aerosol monitor or equivalent. A portable PID will be used to monitor the work zone and for periodic monitoring for VOCs during activities such as soil sampling. Action levels for the protection of the community and visitors are set forth in the CAMP that will be included in the HASP. Action levels for site worker respiratory use will also be set forth in the HASP.

Work practices to minimize odors and vapors will be used during all remediation activities. Offending odor and organic vapor controls may include the application of foam suppressants or tarps over the odor or VOC source areas. Foam suppressants may include biodegradable foams applied over the source material for short-term control of the odor and VOCs.

3.8 CONTINGENCY PLAN

Contingency plans have been developed to effectively deal with unexpected discoveries of additional contaminated media on site. During remedial activities, soil will be continuously monitored by the Remediation Engineer's field representatives using a PID and visual and olfactory field screening techniques. Remediation derived waste material will be disposed offsite at a permitted facility able to receive the material based on the characterization data.

3.9 HEALTH AND SAFETY PLAN (HASP)

The Remedial Engineer has prepared a Site-specific HASP, included as Appendix D. The HASP will apply to all remedial and construction related work onsite. The HASP provides a mechanism for establishing the minimum onsite safe working conditions, safety organization, procedures, and personal protective equipment requirements. The HASP meets the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65). The HASP includes, but is not limited to, the following components:

- Organization and identification of key personnel;
- Training requirements;
- Medical surveillance requirements;
- Potential site hazards;
- Excavation safety;
- Work zone descriptions;
- Personal safety equipment and protective clothing requirements;
- Decontamination requirements;
- Standard operating procedures;
- Contingency Plan;
- Community air monitoring plan; and
- Material Safety Data Sheets.

3.10 QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

The Remedial Engineer has prepared a Quality Assurance Project Plan (QAPP) that describes the quality control components that will ensure that the proposed remedy accomplishes the remedial goals, remedial action objectives, and is completed in accordance with the design specifications. The QAPP is provided as Appendix E and includes:

- Responsibilities of key personnel and their organizations for the proposed remedy;
- Qualifications of the quality assurance officer;
- Sampling requirements including methodologies, quantity, volume, locations, frequency, acceptance and rejection criteria; and
- Description of the reporting requirements for quality assurance activities including weekly quality assurance review reports, periodical quality assurance and quality control (QA/QC) audits, and other report and data submissions.

3.11 FIELD SAMPLING PLAN

The Remediation Engineer has prepared a Field Sampling Plan (FSP) that defines the methods and procedures to be used for conducting any field sampling at the Site. The FSP is provided as Appendix F and includes:

- Soil sample collection, identification, and custody procedures;
- Overview of field instruments and calibration requirements;
- Decontamination procedures for field equipment and sampling supplies; and
- Air monitoring and general field guidelines.

3.12 CITIZEN PARTICIPATION PLAN

Before the RAWP is approved by the NYSDEC, the Remedial Engineer, on behalf of 28th Highline Associates, L.L.C., will place the draft RAWP, along with a Fact Sheet provided by NYSDEC, in the document repository. The Fact Sheet will also be mailed to all of the entities on the Site Contact List found in the Citizen Participation Plan. These notifications will precede a 45-day public comment period on the RAWP. After the NYSDEC approves the RAWP, the Remedial Engineer, on behalf of 28th Highline Associates, L.L.C., will mail a Pre-Construction Notice, including a project Fact Sheet provided by NYSDEC, to all entities on the Site Contact List.

After the remedial action has been completed, a FER will be prepared by a New York State licensed Professional Engineer, and submitted to NYSDEC for review and final approval. Upon submission of this report to NYSDEC and prior to its approval, the Remedial Engineer, on behalf of 28th Highline Associates, L.L.C., will provide notice to all entities on the Site Contact List, in the form of a cover letter and associated Fact Sheet (provided by NYSDEC), indicating that the remedy is complete and the FER has been submitted for final review.

4 SCHEDULE

Implementation of remedial activities is anticipated to take approximately 9 months. Within 90 days of completion of all remedial activities at the Site, a FER will be submitted to NYSDEC as detailed in Section 5.2. A Gantt chart showing a detailed project schedule is included as Appendix G.

5 INSTITUTIONAL CONTROLS

Institutional Controls (IC) are not required for a Track 1 Cleanup. If a Track 2 Cleanup is implemented then, IC's will be incorporated into this Remedial Action to limit the use of the Site to restricted residential and commercial use(s) only. Institutional Controls are listed below. Long-term employment of ICs would be established in an Environmental Easement assigned to the property by the title holder.

The Environmental Easement renders the Site a Controlled Property. The only Institutional Control required for a Track 2 Cleanup is a restriction on Site usage. These controls are implemented to restrict the use of the Site to commercial and restricted residential use(s) only. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement.

Adherence to these Institutional Controls for the Site is mandated by the Environmental Easement. The Site restrictions that apply to the Controlled Property are:

- The Controlled Property may be used for usage restricted residential and commercial use only; and
- The Controlled Property may not be used for a higher level of use, such as unrestricted, use without an amendment or extinguishment of this Environmental Easement.

6 REPORTING

Periodic reports and a Final Engineering Report will be required for the Remedial Action. The Project Remedial Engineer responsible for certifying all reports will be an individual licensed to practice engineering in the State of New York. Keith P. Brodock, P.E. of Integral Engineering P.C., will be the Remedial Engineer for this project. Should Mr. Brodock become unable to fulfill this responsibility, another suitably qualified New York State professional engineer will take his place. In addition to the periodic reports and the FER, copies of all the contractor documents will be submitted to the NYSDEC.

6.1 PROGRESS REPORTING

Periodic progress reports will be provided by electronic media to NYSDEC's project manager weekly during remedial action, and monthly during general construction activities, until all ground surfaces have been covered with barriers or acceptable soil. Initial submissions will be electronic and a hard copy of all the reports will be included in the FER, which is submitted at the end of all remediation activities. Information included in the periodic progress reports will, in accordance with DER-10, include:

1. Reporting of all remedial actions accomplished during the reported period;
2. Proposed modifications to the approved RAWP;
3. Reporting of problems and delays to the RAWP, along with proposed corrections and a revised schedule;
4. Planned remedial activities during the next work period;
5. Tabulation and preliminary analysis of sample results received;
6. Listing of all types and quantities of waste generated and disposed of during the reporting period; and
7. Support documentation as required.

6.2 FINAL ENGINEERING REPORT

A FER will be submitted to the NYSDEC Project Manager with 90 days of completing the remedial action. This FER will include the following:

1. Certification by the Project Remedial Engineer that the data generated was useable and met the remedial requirements;
2. Certification by the Project Remedial Engineer that any financial assurance mechanisms required by the NYSDEC have been executed;

3. Certification by the Project Remedial Engineer that the remedial work conformed to the RAWP;
4. Certification by the Project Remedial Engineer that dust, odor, and vapor control measures were implemented during invasive work and conformed with the RAWP;
5. Certification by the Project Remedial Engineer that all the remedial waste was transported and disposed in accordance with the RAWP;
6. Certification by the Project Remedial Engineer that the source approval and sampling of imported acceptable fill was completed in a manner consistent with the methodology of the RAWP;
7. Summary of the remedy from the decision document;
8. Summary by area of concern of all remedial actions completed;
9. Description of any problems encountered and their resolutions;
10. Description of changes to the design documents and the reasons for them;
11. Quantities and concentration of contaminants removed;
12. Description of the deviations from the approved RAWP;
13. Listing of waste streams, quantity of materials disposed, and where they were disposed;
14. Analytical QA/QC completed for the environmental media sampling during the remedial activities, including DUSR or other data validation;
15. List of the remediation standards applied to the remedial actions;
16. List of all applicable local, regional, and national governmental permits, certificates, or other approvals required for the remedial and development work;
17. Tables and figures containing all pre- and post-remedial data, including volumes of soil removed (as applicable);
18. Description of source and quality of fill (as applicable);
19. "As-built" drawings including remediation areas, waterproofing barrier , and permanent composite cover structures;
20. Air quality and dust monitoring screening data and map;
21. Copies of all the submitted periodic reports; and
22. Copies of all manifests of off-site transport of waste material.

All documents and reports submitted to the NYSDEC will be in both hard copy and in digital format on CD. These digital documents shall be in PDF form and, where appropriate, supplemented by photos and Microsoft Excel files. Laboratory analytical data will be submitted

in an electronic data deliverable (EDD) format that complies with the NYSDEC's electronic data warehouse standards.

7 PROJECT ORGANIZATION

This Section presents the anticipated project organization and associated roles, including key personnel, descriptions of duties, and lines of authority in the management of the RAWP. Information regarding the organizations/personnel and their associated responsibilities is provided below.

7.1 NYSDEC

NYSDEC, Albany Division of Remediation, will serve as the lead regulatory agency for this remediation. The NYSDEC Project Manager, Mr. Michael MacCabe, will provide and coordinate regulatory oversight and direction.

7.2 OWNER/DEVELOPER/VOLUNTEER

As owner of the Site, 28th Highline Associates, L.L.C. will be responsible for implementing the voluntary cleanup of the Site. General responsibilities of 28th Highline Associates, L.L.C. are set forth in the BCP agreement. To assist in the remediation implementation, 28th Highline Associates, L.L.C. has contracted with an environmental engineering company, Integral Engineering, P.C., and will contract with a Construction Manager.

7.3 REMEDIAL ENGINEER

The Remedial Engineer will coordinate the work of other contractors and subcontractors to 28th Highline Associates, L.L.C. for the services associated with the Site preparation, soil characterization, removal and disposal, air monitoring, emergency spill response services (if necessary), and management of waste transport and disposal. The Remedial Engineer selected by 28th Highline Associates, L.L.C. for this project, Mr. Keith Brodock, P.E., of Integral Engineering, P.C., will provide full-time engineering observation services for the duration of the remedial activities. The Remedial Engineer will document that the remedial activities are conducted in accordance with this RAWP and associated plans submitted by the Construction Manager. The Remedial Engineer will be responsible for certifying the construction was completed in substantial conformance with the approved RAWP, and/or approved field changes.

7.4 ANALYTICAL LABORATORY AND DATA VALIDATION CONTRACTOR

A NYSDOH-certified, ELAP-accredited laboratory will provide analytical services required for this project. The laboratory will be provided with the necessary information to complete the quality control measures in accordance with procedures described in the QAPP. The Data Validation Contractor will be a third party contractor qualified in data analysis.

7.5 OFFSITE DISPOSAL FACILITY

Any contaminated excavated materials will be transported to and disposed of at licensed, permitted disposal facilities. Transportation to these facilities will be via legally permitted (such as permits required in NYCRR Part 364 and NYCRR Part 360) and NYSDEC-acceptable methods. Excavation, transportation and disposal of Site materials will performed in accordance with applicable City, State, and Federal regulations and in compliance with the SMMP.

8 REFERENCES

Code of Federal Regulations (CFR) Title 29 Part 1910.120 - Hazardous Waste Operations and Emergency Response Standard.

CFR Title 29 Part 1926 - Safety and Health Regulations for Construction.

"Geotechnical Report, W27th -W28th Street Project, New York, NY" dated June 3, 2013. Prepared by Mueser Rutledge Consulting Engineers.

"Interim Remedial Measure Work Plan, 514-520 West 28th Street, New York, New York 10001" dated July 11, 2013. Prepared by Integral Engineering. P.C.

NYSDEC – Brownfield Cleanup Program Guide (draft 2004).

NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (2010).

NYSDEC - Guidance for the Development of Quality Assurance Plans and Data Usability Summary Reports (DUSR), September 2007.

NYSDEC (undated), DER-23 Citizen Participation Handbook for Remedial Programs, Division of Environmental Remediation.

NYSDEC TAGM No. 4031– Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Waste Sites (1989).

NYSDEC TOGS 1.1.1 – Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (1998).

NYSDEC TOGS 5.1.8 – New York State Stormwater Management Design Manual (2008).

NYSDEC TOGS 5.1.10 – New York Standards and Specifications for Erosion and Sediment Controls (2005).

NYSDEC CP-51 - Soil Cleanup Guidance (2010).

NYSDOH – Guidance for Evaluating Soil Vapor Intrusions in the State of New York (2006).

New York State Department of Environmental Conservation, (2006). 6 NYCRR Part 375 Environmental Remediation Programs. Division of Environmental Remediation, December, 2006.

New York State Codes, Rules and Regulations (NYCRR) Title 6 Part 364 – Waste Transporter Permits.

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.

"Offsite Quantitative Evaluation Work Plan, 514-520 West 28th Street, New York, New York 10001" dated May 24, 2013. Prepared by Integral Engineering. P.C.

"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.

"Remedial Investigation Work Plan, 505 West 27th Street, New York, New York 10001," dated April 9, 2013. Prepared by Integral Engineering. P.C.

"Remedial Investigation Report, 514-520 West 28th Street, New York, New York 10001" dated June 26, 2013. Prepared by Integral Engineering. P.C.

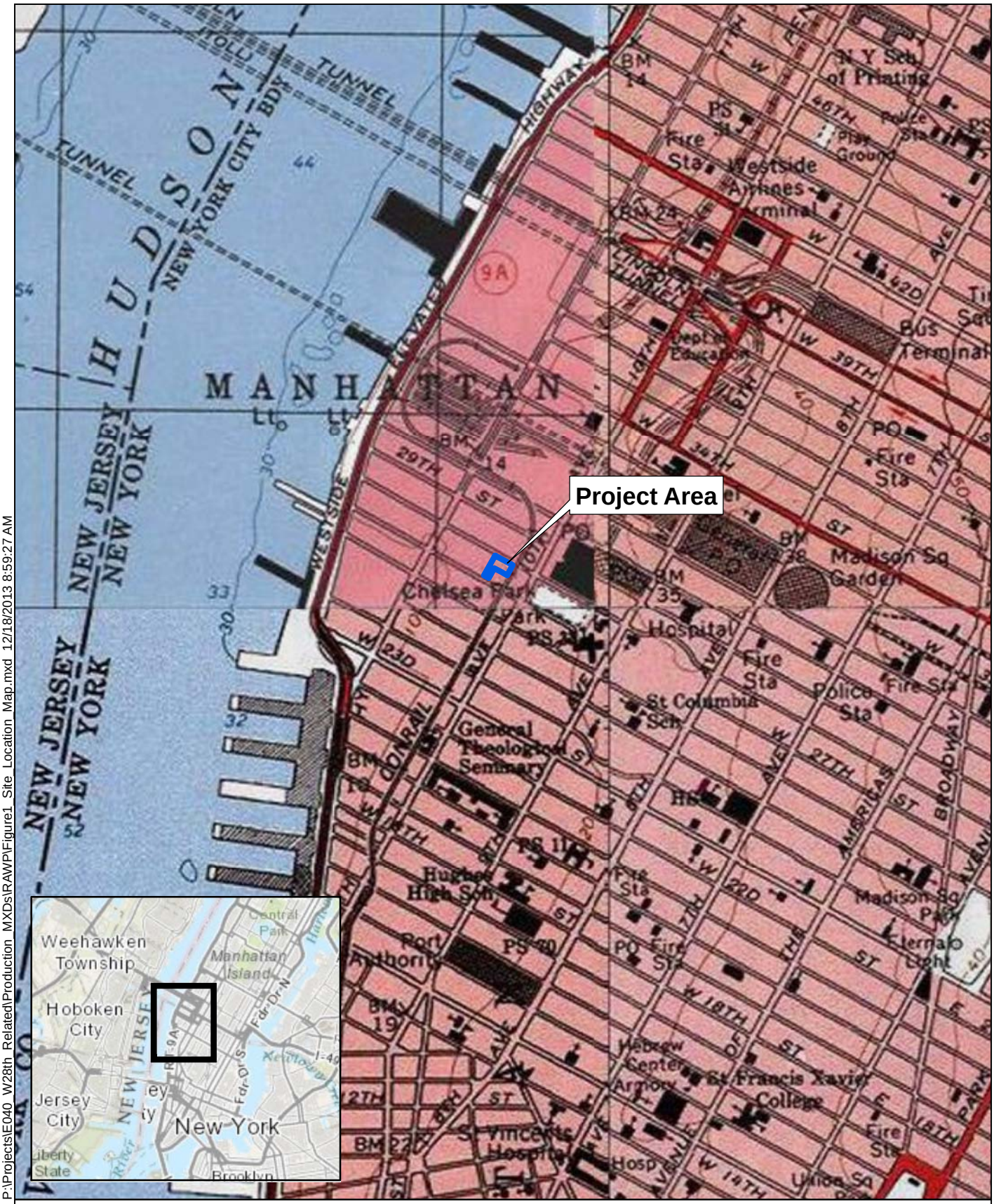
6 NYCRR Part 370 – Hazardous Waste Management System.

6 NYCRR Part 375 – Environmental Remediation Program (December 2006).

6 NYCRR Part 376 – Land Disposal Restrictions;

6 NYCRR Part 750 – State Pollutant Discharge Elimination System (SPDES) Regulations.

FIGURES



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Sources:
USGS 7.5' Topographic Quadrangles Jersey City, NY-NJ and Brooklyn, NY

Figure 1.
Site Location Map
514-520 West 28th Street, New York, NY
Remedial Action Work Plan

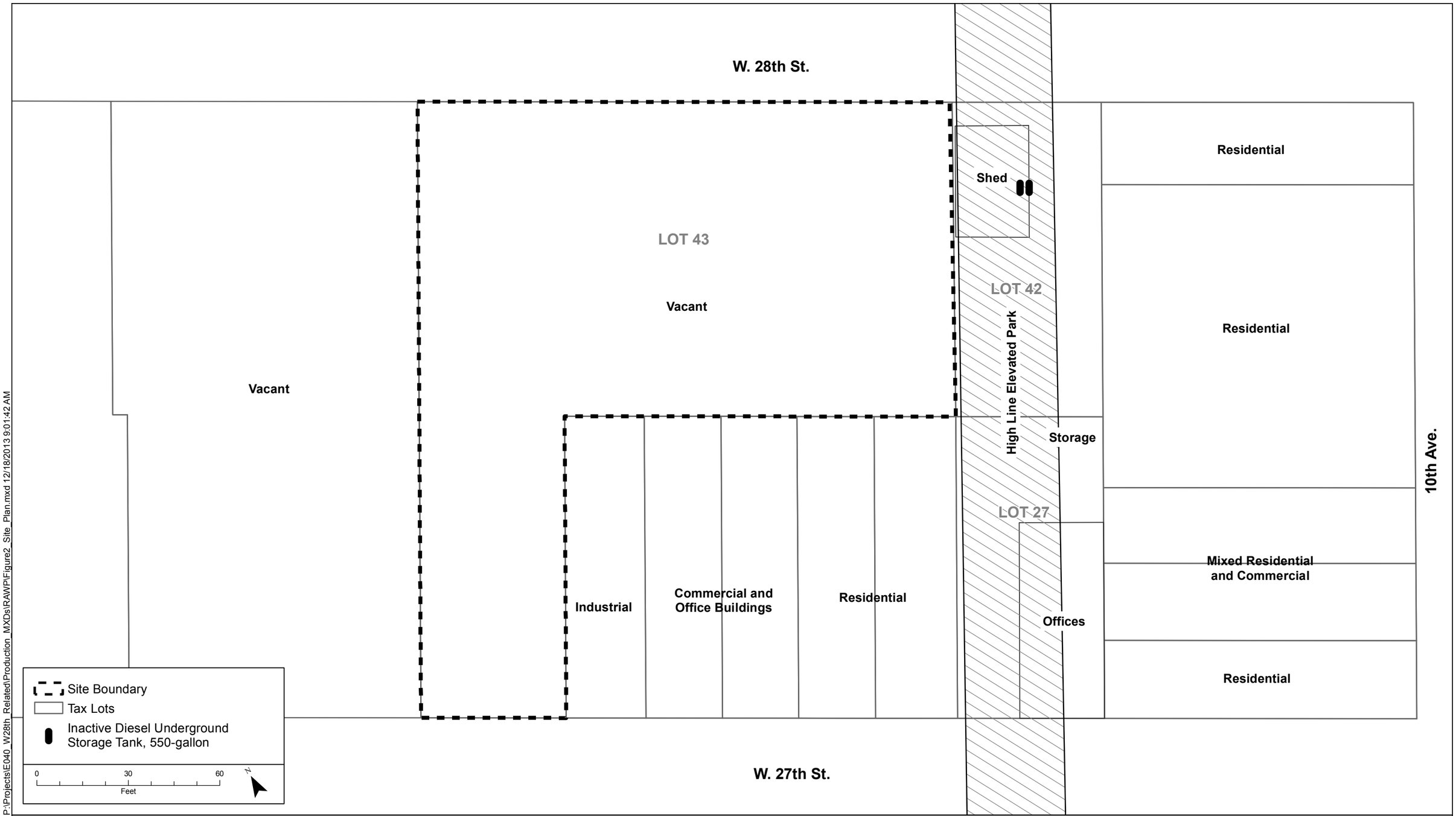

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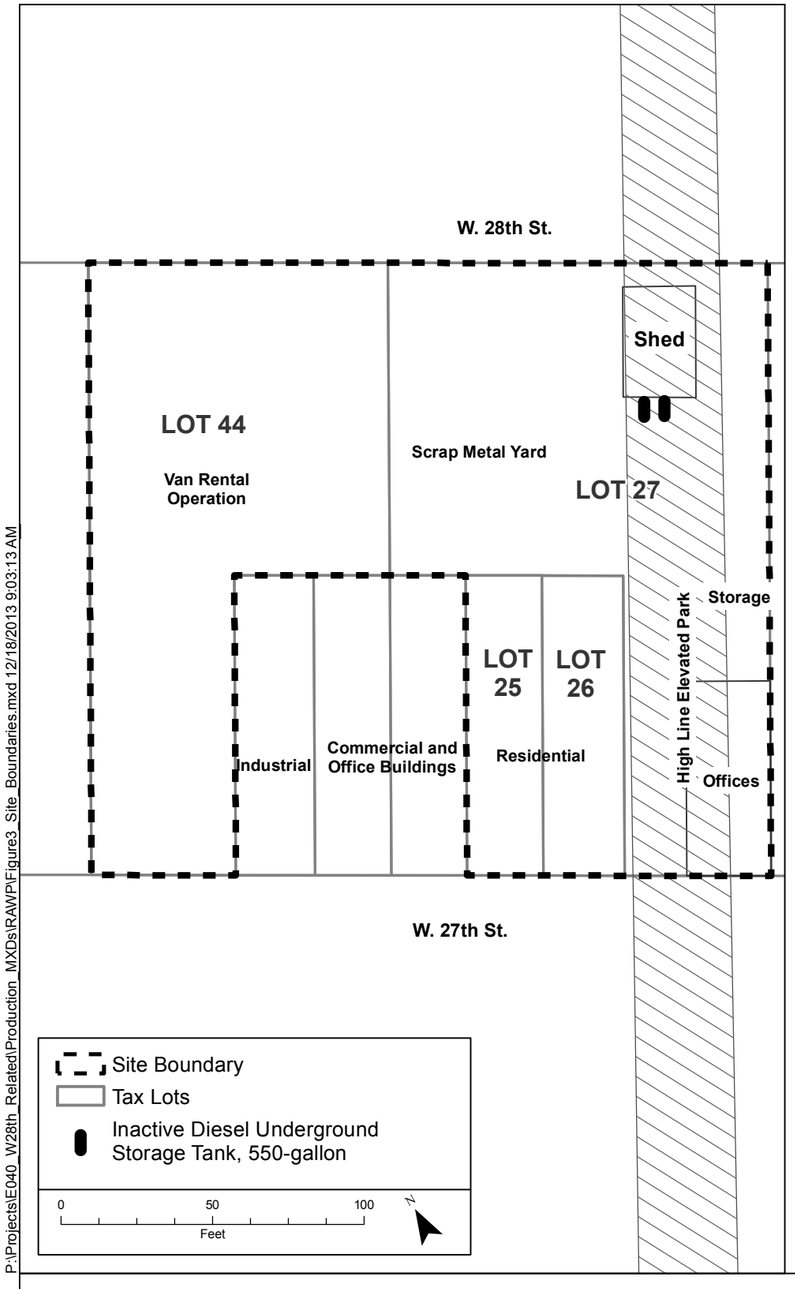
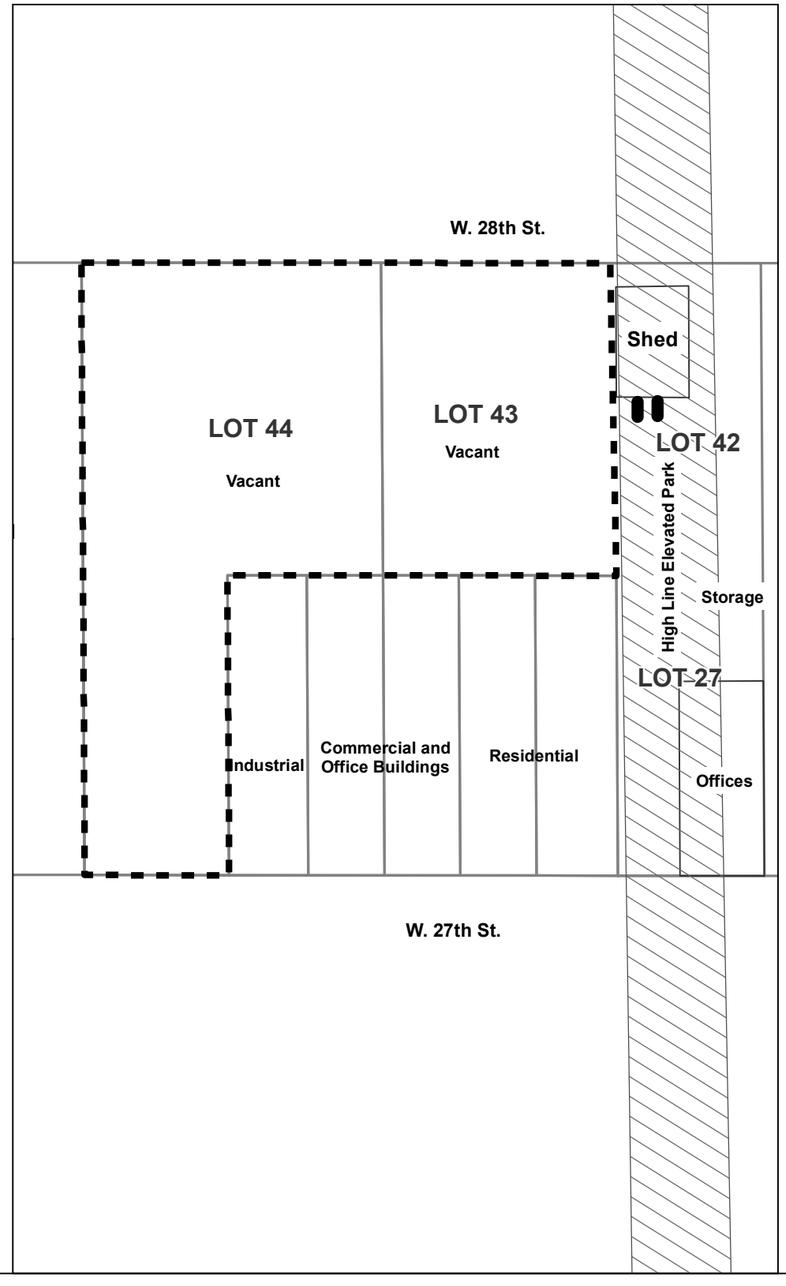
Figure 2.
Site Plan
514-520 West 28th Street, New York, NY
Remedial Action Work Plan

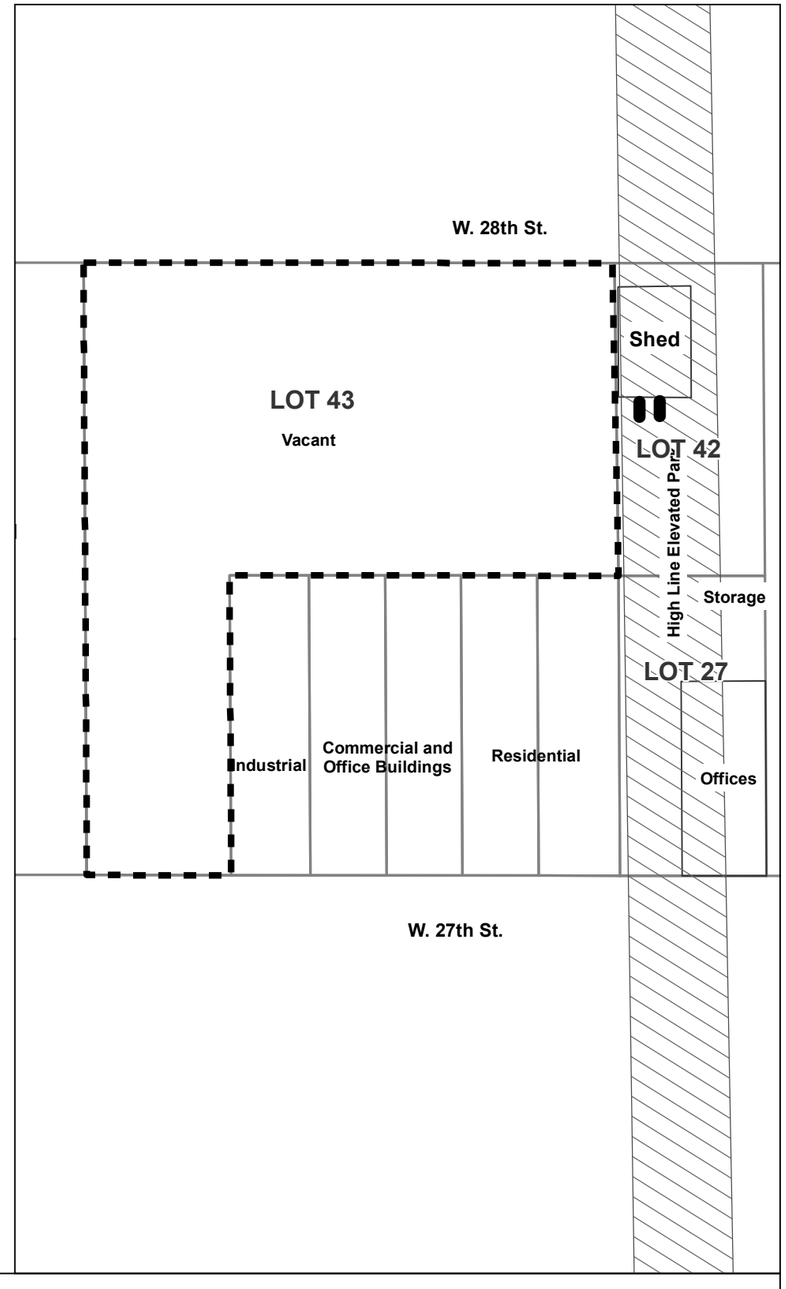
Site Boundary and Tax Lot Delineation for Impact's 2007 Investigations



Site Boundary and Tax Lot Delineation for ELM 2012 Investigation and Integral's 2013 Investigations



Current Site Boundary and Tax Lot Delineation



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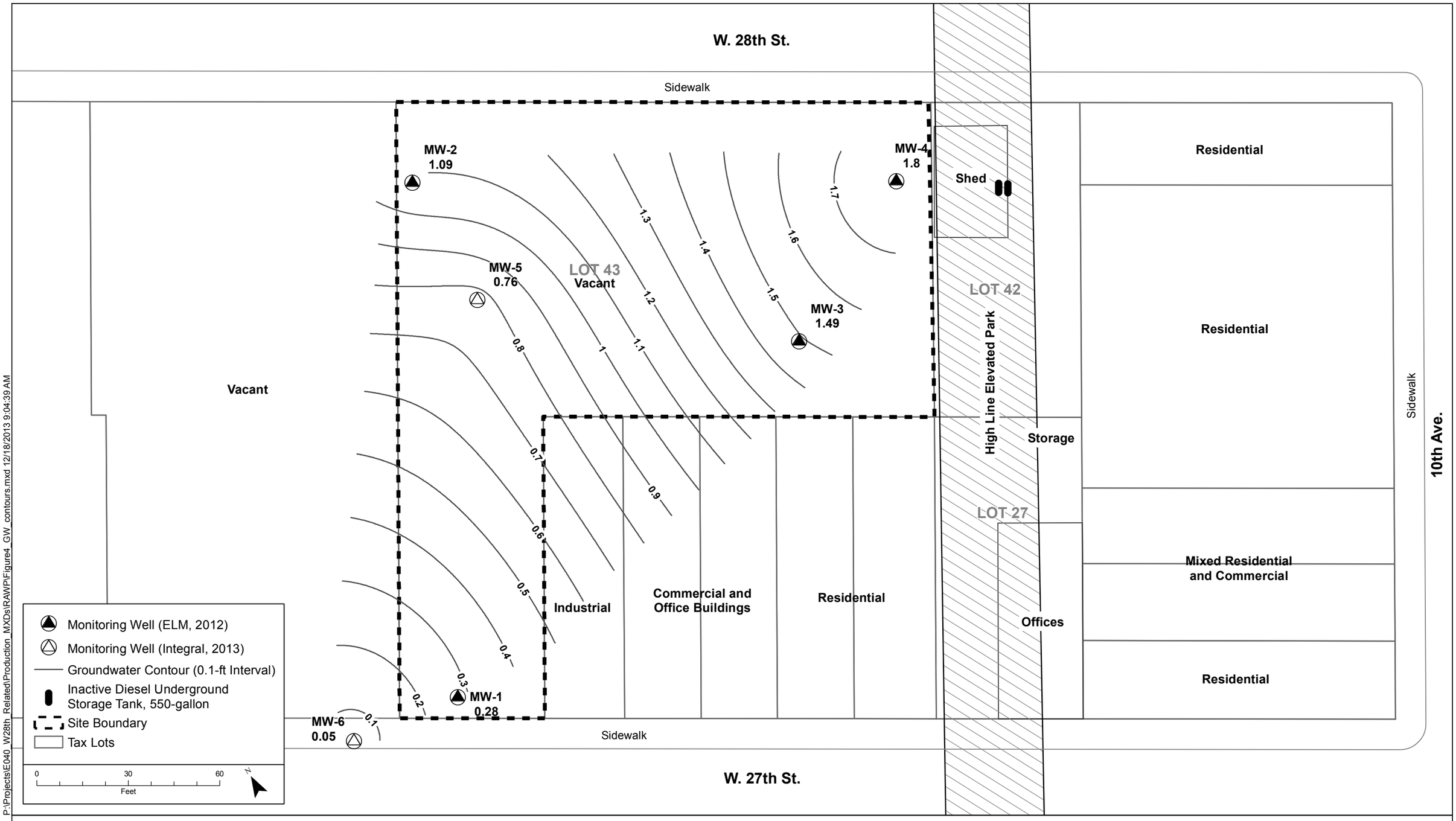
Note:
1. Lots 43 and 44 were merged in May 2013

Figure 3.
Current and Previous Site Boundaries
514-520 West 28th Street, New York, NY
Remedial Action Work Plan



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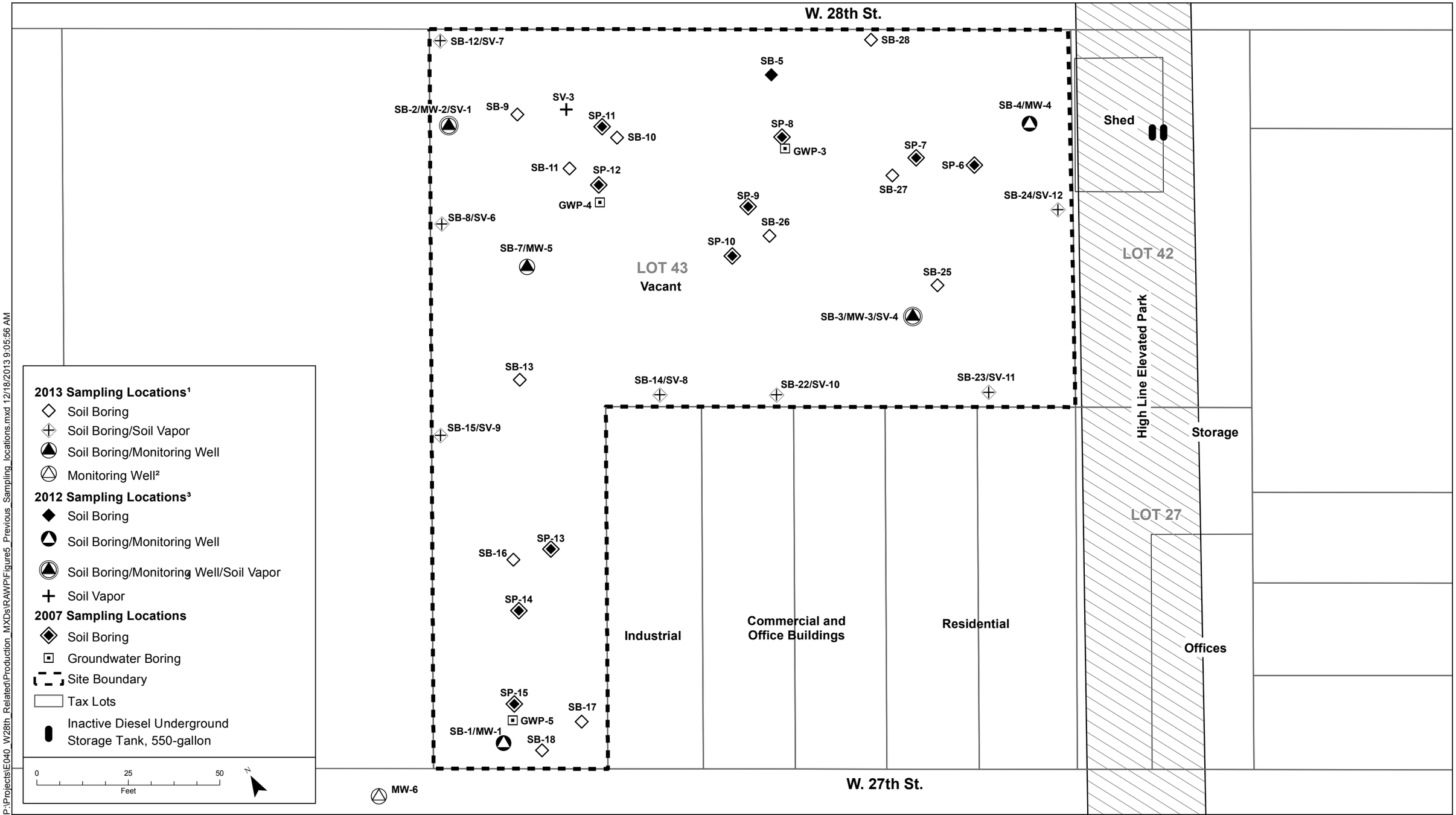
Notes:
1. Elevations are referenced to the Manhattan Borough Datum, which is 2.75 feet above mean sea level at Sandy Hook, NJ as established by the U.S. Coast and Geodetic Survey.
2. MW-1 - MW-5 elevations from Monitoring Well Survey, Langan, Drawing 07.05, 3/22/2013
3. MW-6 elevation from Offsite Quantitative Evaluation, May 24, 2013

Figure 4.
Groundwater Contour Map
514-520 West 28th Street, New York, NY
Remedial Action Work Plan



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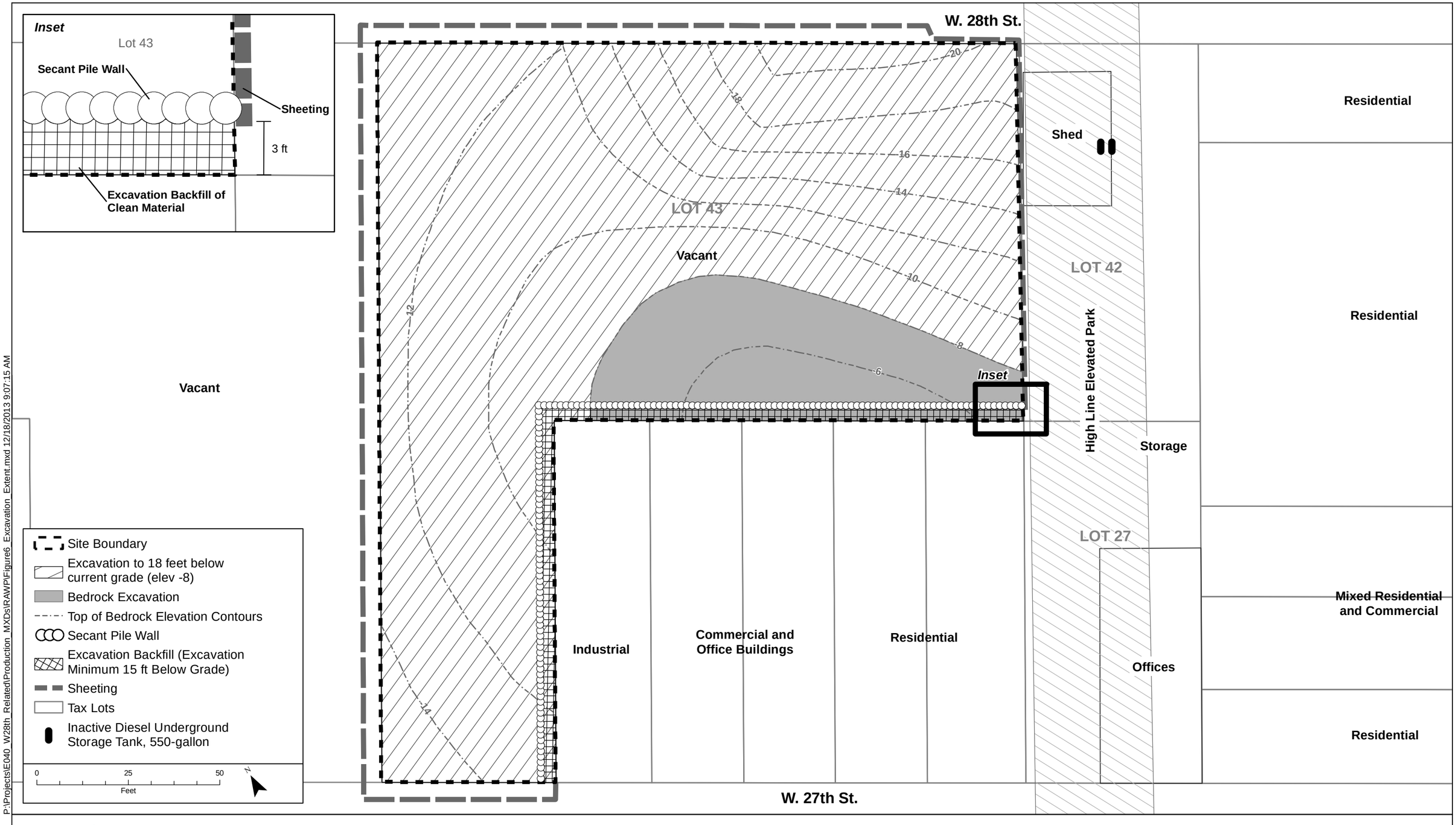
[1] Remedial Investigation, Integral Engineering, 2013
[2] Offsite Quantitative Evaluation, Integral Engineering, May 2013
[3] Supplemental Site Investigation, ELM Engineering, 2012
[4] Phase II Environmental Site Assessment, Impact Environmental, 2007

Figure 5.
Previous Sample Location Layout Map
514-520 West 28th Street, New York, NY
Remedial Action Work Plan



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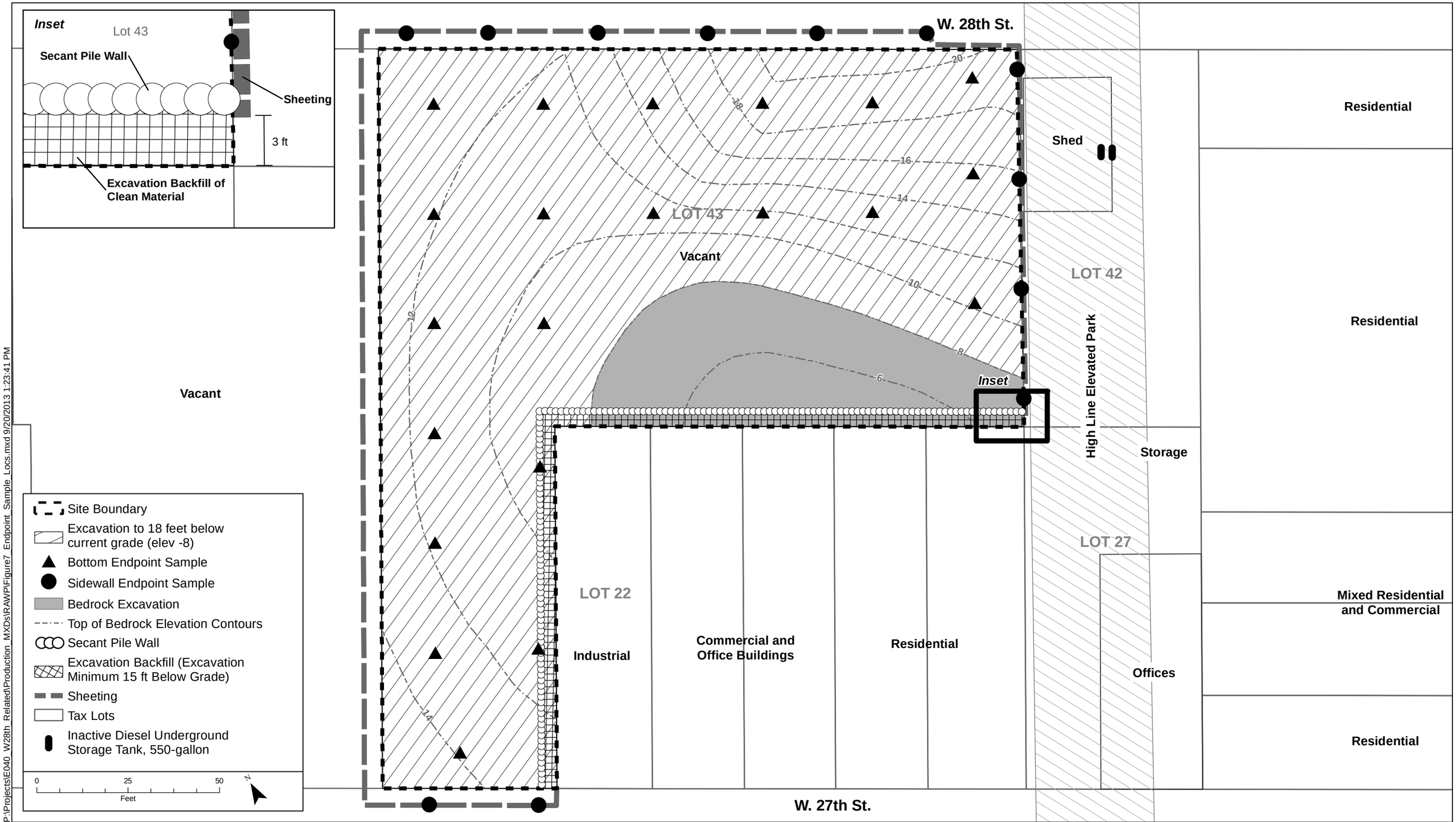
Note:
1. Excavation backfill accomplished by using 3 ft x 5 ft sheeted pits.

Figure 6.
Extent of Excavation for Alternatives I and II
514-520 West 28th Street, New York, NY
Remedial Action Work Plan



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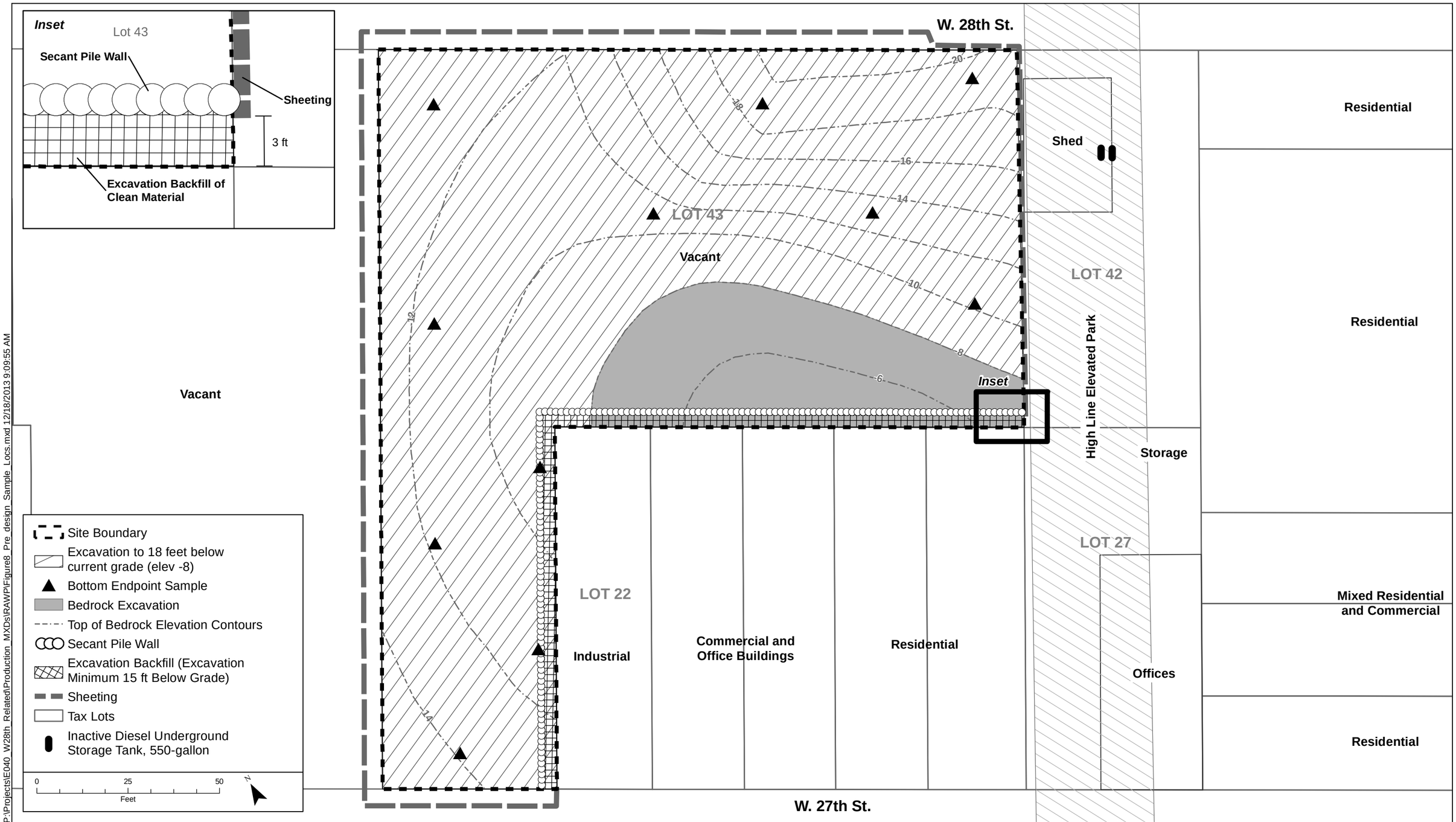
Note:
1. Excavation backfill accomplished by using 3 ft x 5 ft sheeted pits.
2. Endpoint samples are not required for excavation into bedrock
3. Due to excavation of all onsite soils to a minimum depth of 15 ftbg and the presence of adjacent building foundations to the south and west, sidewall samples are not required to be collected in these areas.

Figure 7.
Endpoint Sample Locations for Alternatives I and II
514-520 West 28th Street, New York, NY
Remedial Action Work Plan



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Note:
1. Endpoint samples are not required for excavation into bedrock
2. Due to excavation of all onsite soils to a minimum depth of 15 ftbg and the presence of adjacent building foundations to the south and west, sidewall samples are not required to be collected in these areas.

Figure 8.
Pre-Design Soil Sample Location Map
514-520 West 28th Street, New York, NY
Remedial Action Work Plan

TABLES

Table 1
REMEDIAL COST ESTIMATE fOR ALTERNATIVES I AND II
TRACK 1
NYSDEC BCP No. C231082
514-520 West 28th Street
New York, NY

Item No.	Description of Environmental Premium Item	Quantity	Premium Unit Price	Estimated Premium
CONTRACTOR FEES				
1	Remediation Facilities, Mobilization, Demobilization, Permits, and Site Maintenance - Remediation and decontamination facilities include trailer, truck cleaning facilities, etc.		Allowance	$50,000
2	Excavation of Site Material - Accounts for excavation of material containing concentrations exceeding Unrestricted Use Soil Cleanup Objectives	200 Days	$4,500 per Day	$.9M
3	Transport of Excavated Material	740	$850 per Load	$630,000
4	Disposal of Contaminated/Hazardous Material - Includes disposal of petroleum-impacted soil at a permitted facility. 80% non-haz, 20% haz.	22,200 Tons	17,760 tons @ $80 = $1.4M, 4,440 tons @$141 = $.6M	$2M
5	Sheeting and Shoring - Accounts for foundation stabilization of the site, adjoining buildings, and sidewalks during remediation excavation.	sqft	$70/sqft	$1.5M
6	Secant Pile Wall	sqft	$180/sqft	$1.2M
7	Excavation pits for Southern Boundary SOE		Allowance	$350,000
8	Imported Material		Lump Sum	$80,000
9	Foundation Slab and Waterproofing Barrier		Lump Sum	$3.5M
10	Dewatering - Includes approximately 9 months of dewatering		Lump Sum	$.7M
			SUBTOTAL	**$10,910,000**
ENGINEERING FEES				
1	Preliminary Waste Characterization -Includes in-situ characterization of soil for off-site disposal in accordance with the criteria of most disposal facilities. Pre- characterization of the material to be removed as part of development/remedial excavation will assist in obtaining pre-approval from disposal facilities and understanding disposal cost. Includes contractor bid support / specifications		Allowance	$60,000
2	Endpoint Sampling - To document residual site conditions following source material removal (assumes analysis for VOCs, SVOCs, PCBs, Pesticides, and Metals for each sample.		Allowance	$50,000
3	Remedial Oversight / Dust, Odor and Vapor Control - Includes CAMP impementation during the soil disturbance activites material and Daily Reporting. Assumes 2 CAMP Stations. Includes engineering oversight during the imstallation of the waterproofing membrane	10 months	$38,000 per month	$380,000
5	Dewatering Sampling Events (During and Post Remedial) Includes Analytical Analysis	4 events	$8,000 per Event	$32,000
6	BCP Engineering Services - Remedial Design, Closure Reporting; Includes engineering oversight during the installation of the waterproofing membrane		Allowance	$100,000
			SUBTOTAL	**$622,000**
			Remediation Contingency (10% of Contractor Fee Subtotal)	$1,153,200
			ENVIRONMENTAL BCP ESTIMATE	**$12,685,200**

Assumptions and Conditions:

Soil volumes based on excavating the Site to approximately 18 feet below current grade.
The density used for conversion from cubic yards to tons was 1.5 tons per cubic yard.
Number of loads based on 30 tons per truck
Unit price per ton is based on averaging costs for PCS and non-contaminated soil
Dewatering Costs do not include transport vehicles or the disposal of petroleum-impacted water at a permitted facility

Table 2 - Emergency Site Contacts
514-520 West 28th Street
NYSDEC BCP No. C231082
Remedial Action Work Plan

Contact Name	Email	Phone
New York State Department of Environmental Conservation		
Michael MacCabe, Project Manager	mdmaccab@gw.dec.state.ny.us	(518) 402-9687
New York State Department of Health		
Christopher M. Doroski	BEEI@health.state.ny.us	(518) 402-7860
Integral Engineering P.C.		
Kevin McCarty, Principal	kmccarty@integral-corp.com	(212) 440-6714 (o); (917) 510-5147 (m)
Alana Carroll, Project Manager	acarroll@integral-corp.com	(212) 440-6706 (o); (646) 895-1430 (m)
Samuel McTavey, Field Team Leader	smctavey@integral-corp.com	(212) 440-6715 (o); (914) 643-1057 (m)
28th Highline Associates, L.L.C. (Site Owner)		
Michael Giuliano, Project Manager	michael.giuliano@related.com	(646) 582-2216 (o); (215) 397-6818