DECISION DOCUMENT

2420 and 2430 Amsterdam Avenue
Brownfield Cleanup Program
New York, New York County
Site No. C231088
July 2017

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT - DECISION DOCUMENT

2420 and 2430 Amsterdam Avenue
Brownfield Cleanup Program
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Site No. C231088
July 2017

Statement of Purpose and Basis

This document presents the remedy for the 2420 and 2430 Amsterdam Avenue site, a brownfield cleanup site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the 2420 and 2430 Amsterdam Avenue site and the public's input to the proposed remedy presented by the Department.

Description of Selected Remedy

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Excavation

The existing on-site buildings will be demolished and materials which cannot be beneficially reused on site will be taken off-site for proper disposal in order to implement the remedy.

Excavation and off-site disposal of all on-site soils which exceed unrestricted SCOs as defined by 6 NYCRR Part 375-6.8 will occur to the depth of bedrock, which ranges from 6 to 27 feet below grade. Approximately 19,000 cubic yards of contaminated soil will be removed from the site. If encountered, underground storage tanks (USTs), fuel dispensers, underground piping or other structures will be removed. Additionally, approximately 830 cubic yards of bedrock, potentially containing petroleum contamination, will be removed and disposed off-site.

The base of the excavation will be below the groundwater table, therefore dewatering and groundwater treatment prior to discharge, or on-site collection for transport to an off-site treatment facility will be required.

As necessary, clean fill meeting the requirements for unrestricted use as defined by 6 NYCRR Part 375-6.7(d) will be brought in to replace excavated soil and establish the designed grades at the site.

3. Groundwater Treatment

Following analysis of groundwater samples collected upon completion of the excavation, in-situ chemical oxidation (ISCO) may be implemented to treat remaining petroleum-related VOCs in shallow/perched groundwater above the bedrock surface. A chemical oxidant would be placed in the excavation to destroy the contaminants in an approximately 12,000-square-foot area located in the northern corner of the site where petroleum-related VOCs were elevated in the groundwater above the bedrock surface.

Enhanced biodegradation may also be employed to treat the remaining petroleum-related VOCs present in shallow groundwater within the same 12,000 square foot area mentioned above. The biological breakdown of contaminants through aerobic respiration would be enhanced by the placement of an oxygen release compound (ORC).

Following building construction, groundwater will be at an elevation above the sub-cellar basement slab which will require the slab be designed as a pressure slab or with an under-drain. If an under-drain is constructed and post-excavation groundwater concentrations indicate treatment is necessary, it would consist of groundwater collection in a settling tank and treatment through liquid activated carbon, before the effluent is finally discharged to the municipal sewer under a NYCDEP discharge permit.

4. Vapor Intrusion Evaluation

As part of the Track 1 remedy, a soil vapor intrusion evaluation will be completed. The evaluation will include a provision for implementing actions recommended to address exposures related to soil vapor intrusion, if identified.

The intent of the remedy is to achieve Track 1 unrestricted use; therefore no environmental easement or site management plan is anticipated. If the soil vapor intrusion (SVI) evaluation is not completed prior to completion of the Final Engineering Report, then a Site Management Plan (SMP) and Environmental Easement (EE) will be required to address the SVI evaluation and implement actions as needed; if a mitigation or monitoring action is needed, a Track 1 cleanup can only be achieved if the mitigation system or other required action is no longer needed within 5 years of the date of the Certificate of Completion.

If no EE or SMP is needed to achieve soil, groundwater, or soil vapor RAOs, then the following local use restriction will be relied upon to prevent ingestion of groundwater: Article 141 of the NYCDOH code, which prohibits potable use of groundwater without prior approval.

In the event that Track 1 unrestricted use is not achieved, including the achievement of groundwater and soil vapor remedial objectives, the following contingent remedial elements will be required and the remedy will achieve a Track 2 restricted residential cleanup:

5. Institutional Controls

Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allows the use and development of the controlled property for restricted residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- requires compliance with the Department approved Site Management Plan.

6. Site Management Plan

A Site Management Plan, which would include the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 6 above.

This plan includes, but may not be limited to:

- descriptions of the provisions of the environmental easement including any land use, and/or groundwater and/or surface water use restrictions;

• a provision for evaluation of the potential for soil vapor intrusion for the existing on-site buildings should they become occupied before they are demolished and for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
• provisions for the management and inspection of the identified engineering controls;
• maintaining site access controls and Department notification; and
• the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

• monitoring of groundwater to assess the performance and effectiveness of the remedy;
• a schedule of monitoring and frequency of submittals to the Department; and
• monitoring for vapor intrusion for any buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

Declaration

The remedy conforms with promulgated standards and criteria that are directly applicable, or that are relevant and appropriate and takes into consideration Department guidance, as appropriate. The remedy is protective of public health and the environment.

7/3/2017

Date

Gerard Burke, Director
Remedial Bureau B

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Site No. C231088
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SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of contaminants at the site has resulted in threats to public health and the environment that would be addressed by the remedy. The disposal or release of contaminants at this site, as more fully described in this document, has contaminated various environmental media. Contaminants include hazardous waste and/or petroleum.

The New York State Brownfield Cleanup Program (BCP) is a voluntary program. The goal of the BCP is to enhance private-sector cleanups of brownfields and to reduce development pressure on "greenfields." A brownfield site is real property, the redevelopment or reuse of which may be complicated by the presence or potential presence of a contaminant.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repositories:

Fort Washington Library
Attn: Kenneth Wright or Sumie Otu
535 West 179th Street
New York, NY 10033
Phone: 212-927-3533

Manhattan Community Board 12
Attn: Ebenezer Smith
Community Board 12 Office
530 W 166th Street, 6th floor

New York, NY 10032
Phone: 212-568-8500

Receive Site Citizen Participation Information by Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The site is comprised of two parcels on the city block bordered by West 181st Street to the north, Amsterdam Avenue to the east, West 180th Street to the south, and Audubon Avenue to the west. The site is approximately 0.76 acres in size.

Site Features: The site is occupied by a former Shell gasoline convenience store and former vehicle repair building. The former underground tanks and dispensers have been removed. The nearest surface water bodies are the Harlem River to the east, and the Hudson River to the west.

Current Zoning and Land Use: The site (Lots 83 and 77) is currently occupied by two vacant buildings and used for parking. The site is zoned as C8-3 and R7-2 district. C8-3 districts are intended for commercial and manufacturing uses that often require large amounts of land. The R7-2 residential zoning encourages lower apartment buildings on smaller zoning lots and, on larger lots, taller buildings with less lot coverage.

Past Use of Site: The area in which the site is located has been developed since the late 1800s and originally contained residential dwellings. In 1935 the site was utilized as a bus terminal. In 1950 the site is described as a filling station with five gasoline tanks. From 1968 through 1977, the site is described as a gasoline station and used automobile sales. From 1978 through 2008 the site was utilized as a gasoline station and automotive repair facility. In 2008 a spill occurred on-site, which resulted in removal of over 5,000 tons of petroleum contaminated soil down to bedrock in the northeast portion of the site. The site was divested in 2008 and was vacant until 2010, at which time the site was renovated into a Shell gasoline filling station. In 2011 the filling station's underground tanks and dispensers were removed.

Site Geology and Hydrogeology: The site is underlain by a layer of historic fill, which is comprised of fine to coarse sand with gravel, silt, clay, brick, and concrete fragments. The fill extends to depths ranging from 5 to 7 feet below grade and is underlain by glacial till consisting of fine to coarse sand with gravel, silt, and clay at depths ranging from 6 to 25 feet below grade. Below the overburden materials lies weathered bedrock consisting of Manhattan Schist. Shallow groundwater is found at approximately 10 feet below grade and was shown to flow to the west,

following the bedrock surface which slopes to the west.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to commercial use (which allows for industrial use) as described in Part 375-1.8(g) were/was evaluated in addition to the selected alternative which would allow for unrestricted use of the site.

A comparison of the results of the Remedial Investigation (RI) to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is available in the RI Report.

SECTION 5: ENFORCEMENT STATUS

The Applicant(s) under the Brownfield Cleanup Agreement is a/are Volunteer(s). The Applicant(s) does/do not have an obligation to address off-site contamination. If identified, off-site contamination will be addressed under the Spills Program as appropriate. However, the Department has determined that this site does not pose a significant threat to public health or the environment; accordingly, no enforcement actions are necessary.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A remedial investigation (RI) serves as the mechanism for collecting data to:

- characterize site conditions;
- determine the nature of the contamination; and
- assess risk to human health and the environment.

The RI is intended to identify the nature (or type) of contamination which may be present at a site and the extent of that contamination in the environment on the site, or leaving the site. The RI reports on data gathered to determine if the soil, groundwater, soil vapor, indoor air, surface water or sediments may have been contaminated. Monitoring wells are installed to assess groundwater and soil borings or test pits are installed to sample soil and/or waste(s) identified. If other natural resources are present, such as surface water bodies or wetlands, the water and sediment may be sampled as well. Based on the presence of contaminants in soil and groundwater, soil vapor will also be sampled for the presence of contamination. Data collected in the RI influence the development of remedial alternatives. The RI report is available for review in the site document repository and the results are summarized in section 6.3.

The analytical data collected on this site includes data for:

- groundwater
- soil
- soil vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a contaminant that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized below. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified at this site is/are:

benzo(a)anthracene
benzo(a)pyrene
benzo(b)fluoranthene
1,3,5-trimethylbenzene
1,2,4-trimethylbenzene
ethylbenzene
xylene (mixed)
benzene
toluene
chrysene
dibenz[a,h]anthracene
indeno(1,2,3-CD)pyrene
anthracene
fluoranthene
phenanthrene
pyrene
lead
benzo(g,h,i)perylene
naphthalene
n-propylbenzene
n-butylbenzene
sec-butylbenzene
tert-butylbenzene
p-isopropyltoluene
butylbenzene
styrene
MTBE (methyl-tert-butyl ether)
benzo[k]fluoranthene
acenaphthene
benzo(g,h,i)perylene
fluorene
barium
mercury
acenaphthene
tetrachloroethene (PCE)
trichloroethene (TCE)
copper
chromium

The contaminant(s) of concern exceed the applicable SCGs for:

-soil
-groundwater

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Decision Document.

There were no IRMs performed at this site during the RI.

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water. The RI report presents a detailed discussion of any existing and potential impacts from the site to fish and wildlife receptors.

Site soil and groundwater has been analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, poly-chlorinated biphenyls (PCBs), and metals. Soil vapor has been analyzed for VOCs.

Based upon investigations conducted to date, the primary contaminants of concern are petroleum-related VOCs, poly-cyclic aromatic hydrocarbons (PAHs), and metals.

Soil: Petroleum-related VOCs were primarily found in the northwest corner of the site at depths greater than 17 feet below grade at concentrations exceeding unrestricted use soil cleanup objectives (UUSCOs). Benzene was detected up to 1.8 parts per million (ppm) (UUSCO is 0.06 ppm), 1,2,4-trimethylbenzene up to 780 ppm (UUSCO is 3.6 ppm), 1,3,5-trimethylbenzene up to 230 ppm (UUSCO is 8.4 ppm), ethylbenzene up to 660 ppm (UUSCO is 1), toluene up to 1,300 ppm (UUSCO is 0.7 ppm), xylene up to 1,300 ppm (UUSCO is 0.26 ppm), n-propylbenzene up to 35 ppm (UUSCO is 3.9 ppm), n-butylbenzene up to 14 ppm (UUSCO is 12 ppm), and sec-butylbenzene up to 26 ppm (UUSCO is 11 ppm). Based on the post-excavation samples from the previous spill remediation, it appears there's one location (sample collected at 20 feet, below ground surface with elevated residual petroleum in the soil adjacent to the sidewalk that could not be removed without undermining the sidewalk; in that area, soil contamination may extend under the sidewalk.

PAHs were found throughout the upper 15 feet of the site at concentrations indicative of historic fill, however much higher concentrations were found toward the southern corner of the site, in the vicinity of the location of a former waste oil UST. Acenaphthene was detected at concentrations up to 72.1 ppm (UUSCO is 20 ppm), anthracene up to 154 ppm (UUSCO is 100 ppm), benz(a)anthracene up to 309 ppm (UUSCO is 1 ppm), benzo(a)pyrene up to 335 ppm (UUSCO is 1 ppm), benzo(b)fluoranthene up to 235 ppm (UUSCO is 1 ppm), benzo(k)fluoranthene up to 239

ppm (UUSCO is 0.8 ppm), chrysene up to 292 ppm (RRSCO is 3.9 ppm), dibenz(a,h)anthracene up to 69.8 ppm (UUSCO is 0.33 ppm), naphthalene up to 66.9 ppm (UUSCO is 12 ppm), flouranthene up to 744 ppm (UUSCO is 100 ppm), benzo(g,h,i)perylene up to 238 ppm (UUSCO is 100 ppm), phenanthrene up to 548 ppm (UUSCO is 100 ppm), and pyrene up to 639 ppm (UUSCO is 100 ppm). It is likely historic fill is present off-site. The PAHs noted in the southern part of the site associated with the former waste oil UST do not extend off-site.

Metals, most likely due to the presence of historic fill, were detected in the upper 15 feet, including lead at concentrations up to 1,850 ppm (UUSCO is 63 ppm), barium up to 1,560 ppm (UUSCO is 350 ppm), chromium up to 134 ppm (UUSCO is 30 ppm), copper up to 289 ppm (UUSCO is 50 ppm), nickel up to 96.9 ppm (UUSCO is 30 ppm), selenium up to 12.5 ppm (UUSCO is 3.9 ppm), zinc up to 844 ppm (UUSCO is 109 ppm), and mercury up to 26 ppm (UUSCO is 0.18 ppm).

PCBs were detected in one location at a concentration of 0.199 ppm (UUSCO is 0.1 ppm). Two pesticides, 4,4'-DDE, and 4,4'DDT were detected at concentrations up to 0.0077 ppm (UUSCO is 0.0033 ppm), and 0.0133 ppm (UUSCO is 0.0033 ppm), respectively.

Groundwater: Petroleum-related VOCs were detected above groundwater standards with the highest concentrations located in the northern part of the site, including benzene at concentrations up to 1,100 parts per billion (ppb) (compared to standard of 1 ppb NYSDEC Groundwater Quality Standards), 1,2,4-trimethylbenzene up to 2,400 ppb (standard of 5 ppb), 1,3,5-trimethylbenzene up to 610 ppb (standard of 5 ppb), ethylbenzene up to 4,100 ppb (standard of 5 ppb), isopropylbenzene up to 1,000 ppb (standard of 5 ppb), p-isopropyltoluene up to 280 ppb (standard of 5 ppb), n-propylbenzene up to 2,900 ppb (standard of 5 ppb), n-butylbenzene up to 1,100 ppb (standard of 5 ppb), tert-butylbenzene up to 9.7 ppb (standard of 5 ppb), sec-butylbenzene up to 620 ppb (standard of 5 ppb), m,p-xylene up to 8,900 ppb (standard of 5 ppb), o-xylene up to 3,900 ppb (standard of 5 ppb), MTBE up to 62 ppb (standard of 10 ppb), styrene up to 120 ppb (standard of 5 ppb), toluene up to 2,500 ppb (standard of 5 ppb). Based on the investigation results, the groundwater contamination may extend off-site, but access is limited in a portion of the downgradient direction.

Trichloroethene (TCE) was detected in one location at 9.8 ppb (standard of 5 ppb).

Several SVOCs were also detected above groundwater standards, including naphthalene up to 1,200 ppb (standard of 10 ppb), phenanthrene up to 638 ppb (standard of 50 ppb), 2,4-dimethylphenol up to 245 ppb (standard of 50 ppb), benzo(a)anthracene up to 0.153 ppb (standard of 0.002 ppb), benzo(a)pyrene up to 0.118 ppb (standard of 0.002 ppb), chrysene up to 0.165 ppb (standard of 0.002 ppb), benzo(b)fluoranthene up to 0.106 ppb (standard of 0.002 ppb), and benzo(k)fluoranthene up to 0.094 ppb (standard of 0.002 ppb).

Only two pesticides were detected at one location in the northern corner, 4,4'-DDE at 0.327 ppb (standard of 0.2 ppb), and 4,4'-DDD at 3.61 ppb (standard of 0.3 ppb). No PCBs were detected above standards in site groundwater.

Iron, manganese, and sodium were also detected above standards in site groundwater, but are likely naturally occurring and/or due to road salt application.

Soil Vapor: Petroleum-related VOCs were detected throughout the site, with higher concentrations located in the vicinity of the soil excavation conducted under the Spill program. Total VOCs in that location were 4,533 micrograms per cubic meter (ug/m3) and consisted of primarily petroleum-related VOCs. Tetrachloroethene (PCE) was detected at 8 of the 10 sample locations at concentrations ranging from 12 to 170 ug/m^3. Sampling indicates that soil vapor intrusion is not a concern off-site.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure*.

The site is fenced which restricts access. People may come into contact with site-related soil and groundwater contamination if they dig below the surface, which is currently covered by asphalt or concrete. People are not drinking the contaminated groundwater because the area is served by a public water supply that is not affected by this contamination. Volatile organic compounds in the groundwater and/or soil may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. The potential exists for people to inhale site contaminants due to soil vapor intrusion for any future on-site redevelopment and occupancy. Environmental sampling indicates that soil vapor intrusion is not a concern for off-site buildings.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

SECTION 7: ELEMENTS OF THE SELECTED REMEDY

The alternatives developed for the site and the evaluation of the remedial criteria are presented in the Alternative Analysis. The remedy is selected pursuant to the remedy selection criteria set forth in DER-10, Technical Guidance for Site Investigation and Remediation and 6 NYCRR Part 375.

The selected remedy is a Conditional Track 1 remedy.

The selected remedy is referred to as the excavation and potential groundwater treatment remedy.

The elements of the selected remedy, as shown in Figure 2, are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Excavation

The existing on-site buildings will be demolished and materials which cannot be beneficially reused on site will be taken off-site for proper disposal in order to implement the remedy.

Excavation and off-site disposal of all on-site soils which exceed unrestricted SCOs as defined by 6 NYCRR Part 375-6.8 will occur to the depth of bedrock, which ranges from 6 to 27 feet below grade. Approximately 19,000 cubic yards of contaminated soil will be removed from the site. If encountered, underground storage tanks (USTs), fuel dispensers, underground piping or other structures will be removed. Additionally, approximately 830 cubic yards of bedrock, potentially containing petroleum contamination, will be removed and disposed off-site.

The base of the excavation will be below the groundwater table, therefore dewatering and groundwater treatment prior to discharge, or on-site collection for transport to an off-site treatment facility will be required.

As necessary, clean fill meeting the requirements for unrestricted use as defined by 6 NYCRR Part 375-6.7(d) will be brought in to replace excavated soil and establish the designed grades at the site.

3. Groundwater Treatment

Following analysis of groundwater samples collected upon completion of the excavation, in-situ chemical oxidation (ISCO) may be implemented to treat remaining petroleum-related VOCs in shallow/perched groundwater above the bedrock surface. A chemical oxidant would be placed in the excavation to destroy the contaminants in an approximately 12,000-square-foot area located in the northern corner of the site where petroleum-related VOCs were elevated in the groundwater above the bedrock surface.

Enhanced biodegradation may also be employed to treat the remaining petroleum-related VOCs present in shallow groundwater within the same 12,000 square foot area mentioned above. The biological breakdown of contaminants through aerobic respiration would be enhanced by the placement of an oxygen release compound (ORC).

Following building construction, groundwater will be at an elevation above the sub-cellar basement slab which will require the slab be designed as a pressure slab or with an under-drain. If an under-drain is constructed and post-excavation groundwater concentrations indicate treatment is necessary, it would consist of groundwater collection in a settling tank and treatment through liquid activated carbon, before the effluent is finally discharged to the municipal sewer under a NYCDEP discharge permit.

4. Vapor Intrusion Evaluation

As part of the Track 1 remedy, a soil vapor intrusion evaluation will be completed. The evaluation will include a provision for implementing actions recommended to address exposures related to soil vapor intrusion, if identified.

The intent of the remedy is to achieve Track 1 unrestricted use; therefore no environmental easement or site management plan is anticipated. If the soil vapor intrusion (SVI) evaluation is not completed prior to completion of the Final Engineering Report, then a Site Management Plan (SMP) and Environmental Easement (EE) will be required to address the SVI evaluation and implement actions as needed; if a mitigation or monitoring action is needed, a Track 1 cleanup can only be achieved if the mitigation system or other required action is no longer needed within 5 years of the date of the Certificate of Completion.

If no EE or SMP is needed to achieve soil, groundwater, or soil vapor RAOs, then the following local use restriction will be relied upon to prevent ingestion of groundwater: Article 141 of the NYCDOH code, which prohibits potable use of groundwater without prior approval.

In the event that Track 1 unrestricted use is not achieved, including the achievement of groundwater and soil vapor remedial objectives, the following contingent remedial elements will be required and the remedy will achieve a Track 2 restricted residential cleanup:

5. Institutional Controls

Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allows the use and development of the controlled property for restricted residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- requires compliance with the Department approved Site Management Plan.

6. Site Management Plan

A Site Management Plan, which would include the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 6 above.

This plan includes, but may not be limited to:

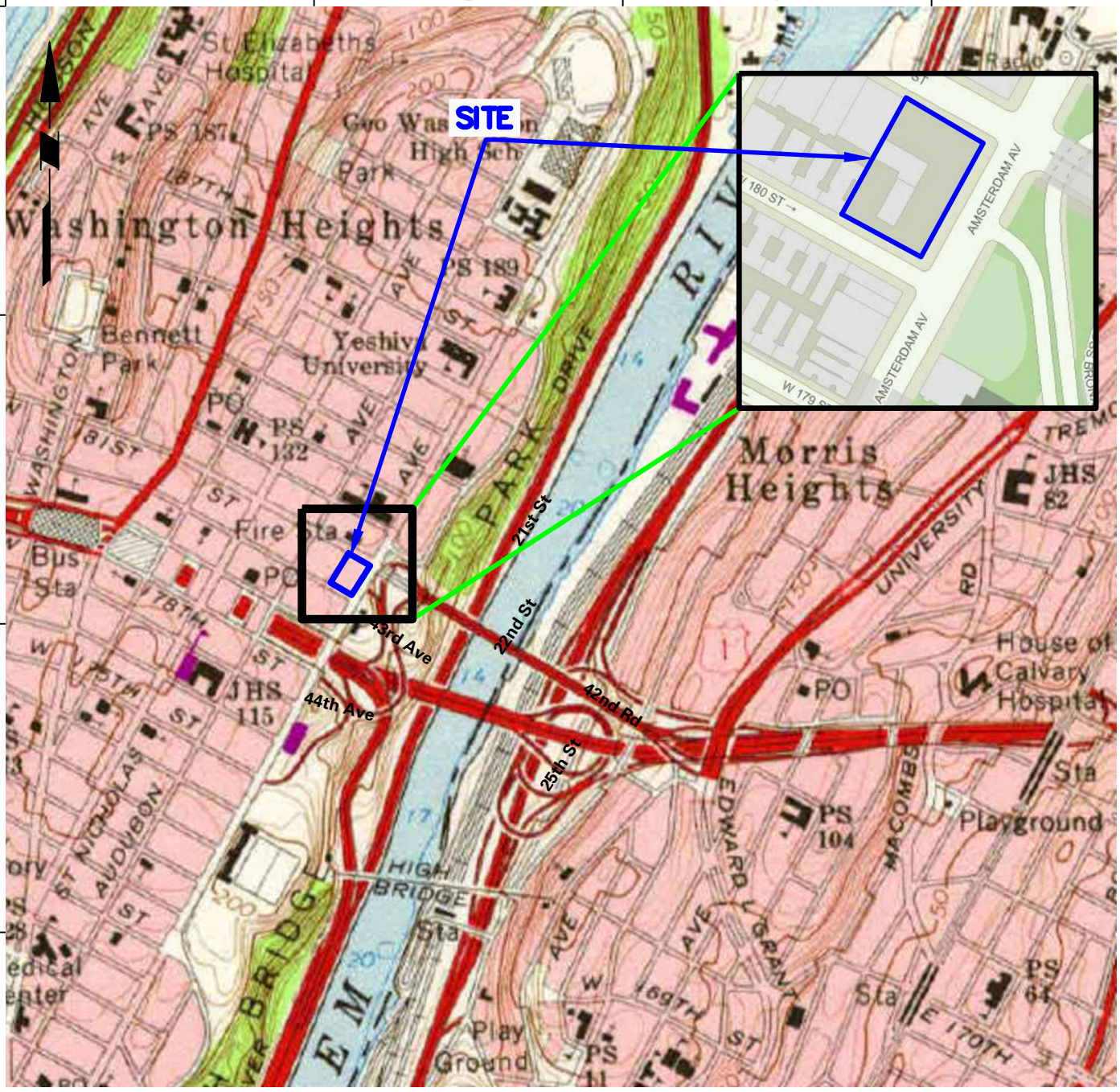
- descriptions of the provisions of the environmental easement including any land use, and/or groundwater and/or surface water use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for the existing on-site

buildings should they become occupied before they are demolished and for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;

- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- monitoring of groundwater to assess the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency of submittals to the Department; and
- monitoring for vapor intrusion for any buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above.



LEGEND:

SITE BOUNDARY

REFERENCES:

1. BASE MAP: UNITED STATES GEOLOGICAL SURVEY (USGS) CENTRAL PARK, NEW YORK 7.5-MINUTE SERIES TOPOGRAPHIC QUADRANGLE, DATED 1979

2. INSET MAP: http://maps.nyc.gov/doitt/nycitymap/

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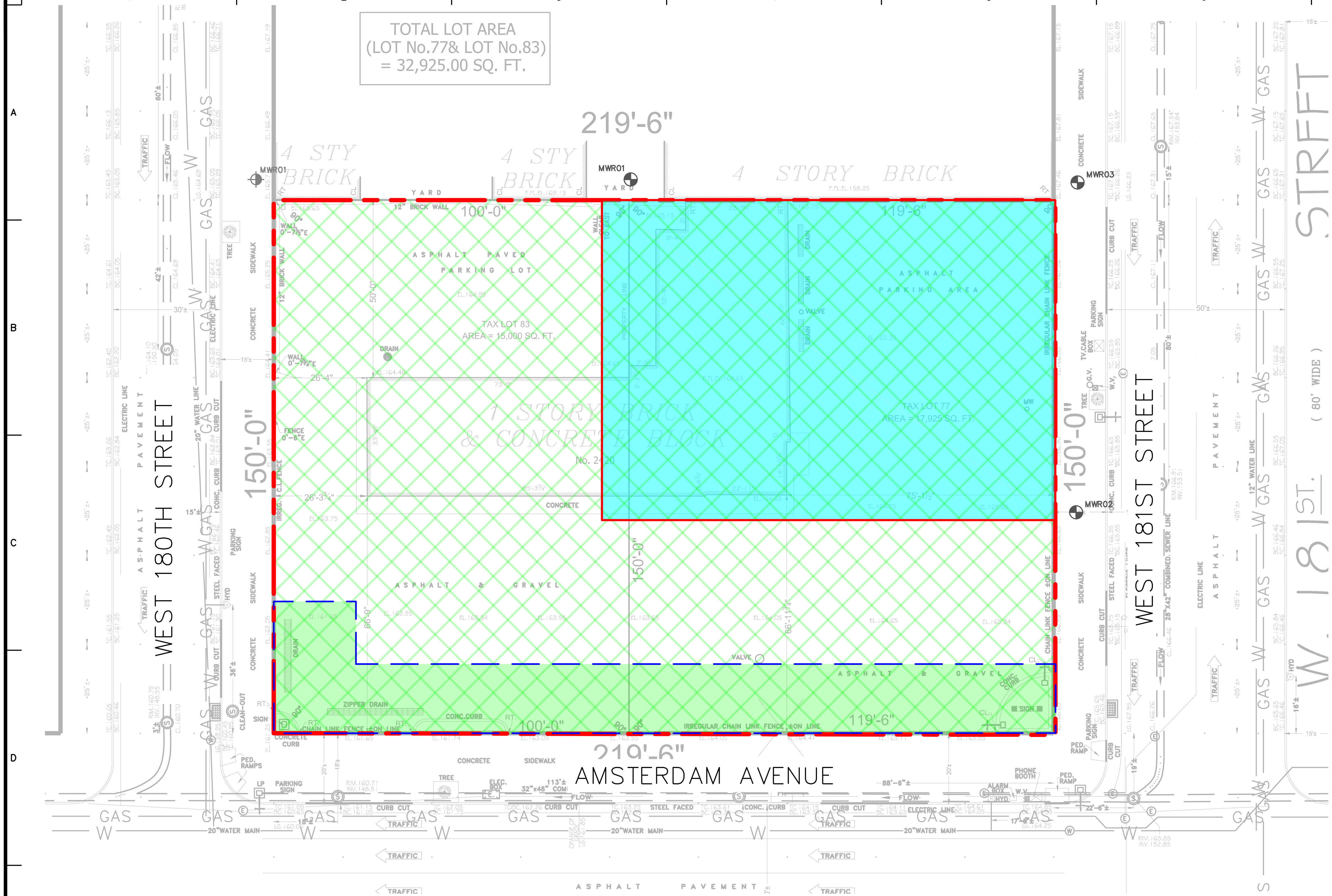
Project	2420 & 2430 AMSTERDAM AVENUE BLOCK No. 2152 LOT Nos. 77 & 83 NEW YORK NEW YORK
Figure Title	SITE LOCATION MAP
Project No.	170283401
Date	04/17/2017
Scale	NTS
Drawn By / Checked By	JPA / SK
Figure No.	1
Sheet	1 of 18

Filename: \\langan.com\data\NY\data4\170283401\Cadd Data - 170283401\2D-DesignFiles\RAWP\Figure 1 - Site Location Map.dwg Date: 4/18/2017 Time: 11:01 User: jquintana Style Table: Langan.stb Layout: ANSIA-BP



LEGEND

- SITE AND PROPERTY BOUNDARY
- APPROXIMATE AREA OF ISCO AND ORC APPLICATION
- APPROXIMATE AREA OF REMEDIATION EXCAVATION TO BEDROCK (6 TO 27) FT BGS
- AREA OF OVER–EXCAVATION TO BEDROCK, BELOW DEVELOPMENT SUB–GRADE
- MWR02 PROPOSED LOCATION OF OFF–SITE GROUNDWATER MONITORING WELL
- MWR01 PROPOSED LOCATION OF CONTINGENCY OFF–SITE GROUNDWATER MONITORING WELL

GENERAL NOTES

1. BASE MAP: ARCHITECTURAL SURVEY, DATED 12 OCTOBER 2012 BY APPLE SURVEYING.
2. REMEDIAL EXCAVATION ACROSS SITE WILL EXTEND TO BEDROCK (6 TO 27 FT BGS) TO ACHIEVE TRACK 1 USE SCOs. RESIDUAL CONTAMINATED SOIL WILL NOT REMAIN FOLLOWING REMEDIATION.
3. ISCO = IN–SITU CHEMICAL OXIDATION
4. ORC = OXYGEN RELEASE COMPOUND
5. FT BGS = FEET BELOW GRADE SURFACE

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Project	Figure Title	Project No.	Figure No.
2420 & 2430 AMSTERDAM AVENUE BLOCK No. 5152, LOT Nos. 77 &83 NEW YORK NEW YORK	ALTERNATIVE I - TRACK I CLEAN UP PLAN	170283401 Date: 04/17/2017 Scale: 1":30' Drawn By: JCQ Checked By: SK Submission Date:	2 Sheet 14 of 18