DECISION DOCUMENT

CE - W. 45th St. Gas Works
Operable Unit Number 02: Northern Holder/ Intrepid Lot
Manufactured Gas Plant Program
New York, New York County
Site No. 231109
July 2021

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

DECLARATION STATEMENT – DECISION DOCUMENT

CE - W. 45th St. Gas Works
Operable Unit Number: 02
Manufactured Gas Plant Program
New York, New York County
Site No. 231109
July 2021

Statement of Purpose and Basis

This document presents the remedy for Operable Unit Number: 02 (OU2): Northern Holder/Intrepid Lot of the CE - W. 45th St. Gas Works site, a former manufactured gas plant (MGP) remediation 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 and is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for OU2 of the CE - W. 45th St. Gas Works 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.
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

2. Excavation

The top five feet of soil/fill material will be excavated from the site and transported off-site for disposal to facilitate the in-situ solidification (ISS) program outlined in element 3. Approximately 3,935 cubic yards of material will be removed from the site. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to provide protection of the ISS soils, complete backfilling and establish the designed grades at the site post ISS.

3.In-Situ Solidification (ISS)

ISS will be implemented on remaining source materials five feet below grade (ft bg). As shown on the attached Figure 3, the treatment zone will extend from approximately five ft bg to approximately 15 ft bg, to approximately 30 ft bg and to bedrock, depending upon the location. ISS is a process that binds the soil particles in place creating a low permeability mass. The contaminated soil will be mixed in place together with solidifying agents (typically Portland cement) or other binding agents using an excavator or jet grouting with augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. Quality assurance and control procedures will be performed to ensure the effectiveness of ISS after field implementation is complete. The solidified mass will then be covered with a cover system as described in element 4 to prevent direct exposure to the solidified mass. The resulting solid matrix reduces or eliminates mobility of contamination and reduces or eliminates the matrix as a source of groundwater contamination.

4. Cover System

A site cover will be required to allow for commercial use of the site, and to protect the ISS component of the remedy. In the ISS areas, the function of this cover will be to provide sufficient thermal protection of the solidified mass from seasonal freeze/thaw cycles and prevent contact with the ISS material.

A site cover currently exists in the form of asphalt pavement and will be maintained in areas where excavation and ISS are not performed to allow for commercial use of the site. Any site redevelopment will maintain the existing site cover. The site cover may include paved surface parking areas, sidewalks or soil where the upper one foot of exposed surface soil meets the applicable soil cleanup objectives (SCOs) for commercial use. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6NYCRR part 375-6.7(d). Where the soil cover is required over the ISS treatment area, it will consist of a minimum of four

feet of soil meeting the SCOs for commercial use. For areas where solidified material underlies the cover, the solidified material itself will serve as the demarcation layer due to the nature of the material.

5. Institutional Control

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

- Require 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);
- Allow the use and development of the controlled property for commercial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- Restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the New York State Department of Health (NYSDOH) or New York City Department of Health and Mental Hygiene (NYCDOHMH); and
- Require compliance with the Department approved Site Management Plan.

6. Site Management Plan

A Site Management Plan is required, which includes 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 item 5.
Engineering Controls: The cover system discussed in item 4.

This plan includes, but may not be limited to:

- An Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- Descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
- A provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, and off-site locations including those that previously did not respond or refused sampling offers, and include a 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 developed on the site, and off-site locations including those that previously did not respond or refused sampling offers, as may be required by the Institutional and Engineering Control Plan discussed above.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

7/27/2021
Date

Janet E. Brown, P.E., Director
Remedial Bureau C

DECISION DOCUMENT

CE - W. 45th St. Gas Works
New York, New York County
Site No. 231109
July 2021

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 hazardous wastes 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 hazardous wastes at this site, as more fully described in this document, has contaminated various environmental media. Contaminants include hazardous waste and/or petroleum.

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:

DECInfo Locator - Web Application/On-line Repository
https://www.dec.ny.gov/data/DecDocs/231109
https://www.dec.ny.gov/data/DecDocs/V00532

Manhattan Borough President
1 Centre Street
New York, NY 10007
Phone: 212-669-8300

Manhattan Community Board 4
330 W. 42nd St, 26th Floor
New York, NY 10036
Phone: 212-736-4536

Mid-Manhattan Library
455 Fifth Avenue
New York, NY 10016
Phone: 212--340-0863

Please note that in-person repositories may have limited hours or be temporarily unavailable due to COVID-19 precautions.

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 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 West 45th Street Gas Works site is located on the west side of mid-town Manhattan in an urban area. The site occupies the western half of the blocks between 11th and 12th Avenue, between West 45th and West 46th Streets.

Site Features: The site is a paved parking area with an access ramp to the pedestrian walkway over the West Side Highway.

Current Zoning and Land Use: The site is zoned M2 for manufacturing and is currently utilized as a parking area for visitors to the Intrepid Sea-Air-Space Museum. The surrounding parcels are a highly urbanized combination of commercial, industrial, and residential uses.

Past Use of the Site: The site was operated as a manufactured gas plant (MGP) by the Consolidated Gas Company from 1877 to 1913. By-products of the gas production (i.e., coal tar) are the main sources of contamination that were found to be associated with the historic MGP structures in the subsurface. Since the MGP was demolished, 12th Avenue has been relocated and widened, and the rebuilt roadway now covers many of the original MGP structures.

Operable Units: An operable unit represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. The footprint of the historic MGP was split into two Operable Units (OU); Operable Unit 02 (OU2) is the subject of this document. Operable Unit 01 (OU1) includes the original MGP site except for the northeastern portion of the site (OU2), and adjacent off-site areas where MGP contamination has spread. OU1 includes the area west of OU2 currently covered by 12th Avenue. A Record of Decision was issued for OU1 in September 2016. The selected remedy for OU1 includes a cover system and institutional controls, including an Environmental Easement and Site Management

Plan. OU2 consists of the northeastern portion of the original MGP plant, which once held two gas holders and a purifying house.

Site Geology/Hydrogeology: The entire site and its surroundings lie on fill materials which were placed in the Hudson River to extend the shoreline westward prior to construction of the MGP. Thus, the soils immediately beneath the ground surface consist of varying thicknesses of urban fill, ranging in thickness from 5 to 10 feet. Beneath that are layers of peat, sand, silt, and some gravel. Competent bedrock is encountered between 8 and 60 feet below the ground surface.

Groundwater at the site is typically found at depths of two to eight feet below the ground surface. Groundwater generally flows westward toward the Hudson River, however, there is a mounding effect apparent near the middle of the site, where artesian conditions have been encountered.

A site location map is attached as Figure 1. A site layout plan is attached as Figure 2.

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 that restrict the use of the site to commercial use as described in Part 375-1.8(g) were evaluated.

A comparison of the results from the site characterization (SC), remedial investigation (RI) and pre-design investigation (PDI) 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 SC, RI and PDI Reports.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

Consolidated Edison Company of New York, Inc.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the Site Characterization Report (December 2003), Data Summary Report (May 2006) and Pre-Design Investigation Report (November 2016), collectively referred to as the "RI reports". These reports are available for review in the site document repository and the results are summarized in section 6.3.

Key project documents are also included on DEC Info Locator/On-line repository at:

https://www.dec.ny.gov/data/DecDocs/231109
https://www.dec.ny.gov/data/DecDocs/V00532

The following general activities were conducted during the RI:

- Research of historical information;
- Geophysical survey to determine the lateral extent of wastes;
- Test pits, soil borings, and monitoring well installations;
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor;
- Sampling of surface water and sediment; and
- Ecological and Human Health Exposure Assessments.

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. The tables found in Exhibit A list the applicable SCGs in the footnotes. 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 Reports contain a full discussion of the data. The contaminants of concern identified at this site are:

- coal tar
- total polycyclic aromatic hydrocarbons (PAHS)
- benzene, toluene, ethylbenzene and xylenes (BTEX)

The contaminants 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.

Nature and Extent of Contamination: Based on investigations conducted to date, the chemicals of concern at the site are the constituents of manufactured gas plant (MGP) tar which leaked from gas holders, tar tanks, and subsurface pipes. MGP tar is a black, oily liquid which was produced as a byproduct of the gas manufacturing process. The principal contaminants in the tar are benzene, toluene, ethylbenzene, xylene (collectively referred to as BTEX compounds); and polycyclic aromatic hydrocarbons (PAHs). BTEX and PAHs have been found in the soil and groundwater at the site at levels exceeding applicable SCGs. The MGP tar is found in proximity to historic MGP structures in the subsurface, including the original gas holder foundations and the former tar storage tanks and skimmer pump locations, at depths ranging from 3.5 to 43 feet below grade. Bedrock is shallow, six (6) to 10 feet below grade, in the northeastern corner of the site and at one location along the southern site boundary, with depths across the remaining portions of the site ranging from 21 to 60 feet below grade. Bedrock is deeper (between 35 and 45 feet below grade) around the perimeter of the former large gas holder and decreases towards the center of the holder (approximately 15 feet below grade), forming a bedrock trough in a ring shape around the entirety of the bedrock high. This bedrock topography serves as a natural barrier to off-site migration, as evidenced by the remaining presence of tar that leaked decades ago.

Soil: Impacted soils were encountered at depths ranging from 3.5 to 43 feet below grade. In general, coal tar was observed along the perimeter of the gas holders in the vicinity of the former tar tanks/skimmer pumps. Total BTEX concentrations range from non-detect to 9,830 parts per million (ppm) and were found at depths up to 43 feet below grade in the overburden. PAHs are primarily co-located with the BTEX contamination, adjacent to the coal tar, with values ranging from non-detect to 3,530 ppm. These levels of both BTEX and PAHs are well in excess of the commercial or protection of groundwater soil cleanup objectives (CSCOs and PGSCOs, respectively), as applicable, for these contaminants. Benzene was detected up to 1,900 ppm compared to the PGSCO of 0.06 ppm. Ethylbenzene was detected up to 770 ppm compared to the PGSCO of 1 ppm. Toluene was detected up to 3,900 ppm compared to the PGSCO of 0.7 ppm. Xylenes were detected up to 3,600 ppm compared to a PGSCO of 1.6 ppm. Total PAHs ranged

from non-detect to 3,529.8 ppm, compared to a total PAH guidance value of 500 ppm, with naphthalene detected up to 2,200 ppm compared to the PGSCO of 12 ppm. Benzo[a]anthracene and benzo(a)pyrene were both detected up to 110 ppm compared to PGSCOs of 1 ppm and 22 ppm, respectively. Bedrock is shallow, five (5) to 15 feet below grade along the majority of the OU2 boundary, with depth to bedrock increasing around the perimeter of the former large gas holder to between 35 and 45 feet below grade, before rising again towards the center of the holder to approximately 15 feet below grade, forming a bedrock trough in a ring shape around the entirety of the bedrock high. This bedrock topography serves as a natural barrier to off-site contaminant migration. Data does not indicate off-site migration of soil contamination related to this site.

Groundwater: Groundwater is encountered between three (3) and ten feet below grade with a mounding affect apparent inside of the former larger gas holder; artesian conditions are encountered within and adjacent to the south and southwest portions of the former large gas holder.

Recoverable coal tar has been identified in several monitoring wells adjacent to the large gas holder. Each of these wells were screened within two (2) to 12 or four (4) to 14.5 feet below grade. The maximum detected coal tar thickness was 3.6 feet, occurring in 2003. Measurable coal tar was observed in two wells as recently as 2012.

The highest levels of groundwater contamination are encountered immediately outside the former larger gas holder walls, primarily impacted with BTEX and PAHs. Total BTEX concentrations range from non-detect to 151,000 parts per billion (ppb). Benzene was detected up to 55,000 ppb compared to an ambient water quality standard of 1 ppb. Toluene was detected up to 66,000 ppb compared to a standard of 5 ppb. Ethylbenzene was detected up to 13,000 ppb compared to a standard of 5 ppb. Xylene was detected up to 27,200 ppb compared to a standard of 5 ppb. Total PAH concentrations range from 34 ppb to 5,316 ppb, with naphthalene detected up to 4,600 ppb compared to a standard of 10 ppb. Groundwater containing MGP constituents is migrating off-site; this is addressed via the Site Management Plan Institutional Control as part of the remedy for OU1.

Soil Vapor: Soil vapor samples were collected along the northern and eastern boundaries of the site. The samples showed a range of contaminants, including benzene (18,000 micrograms per cubic meter [ug/m3]), ethylbenzene (20,000 ug/m3), toluene (62,000 ug/m3), xylene (13,000 ug/m3), isopentane (1,000 ug/m3), 2,2,4-trimethylpentane (1,200 ug/m3), acetone (1,200 ug/m3), heptane (1,700 ug/m3) and hexane (1,500 ug/m3), the maximum detected concentration of each compound provided in parenthesis. While some of the contaminants (specifically the BTEX compounds) are related to the former MGP plant, many were not. Soil vapor containing MGP constituents is likely migrating off-site. However, access was not granted to sample off-site properties for potential soil vapor intrusion.

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.*

Within OU1 and OU2, direct contact with contaminants in the soil is unlikely because the site is covered with buildings and pavement. 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 soil vapor (air spaces within the soil) may move into 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 in indoor air due to soil vapor intrusion in any future on-site building's development and occupancy. In addition, the potential exists for people to inhale site contaminants in indoor air due to soil vapor intrusion in 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 or surface 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 or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Soil Vapor

RAOs for Public Health Protection

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

SECTION 7: SUMMARY OF THE SELECTED REMEDY

The alternatives developed for the site and the evaluation of the remedial criteria are presented in the Alternatives Analysis Report. 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 referred to as the Excavation, ISS, Cover System, Institutional Controls and Site Management Plan remedy.

The elements of the selected remedy, as shown on Figure 3, 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; and
- Incorporating green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

2. Excavation

Some excavation work will be required prior to the implementation of the in-situ solidification (ISS) program to allow for bulking of the subsurface material. The top five feet of material will be excavated from the site and transported off-site for disposal. Approximately 3,935 cubic yards of material will be removed from the property. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to provide protection of the ISS soils, complete backfilling and establish the designed grades at the site post ISS.

3.In-Situ Solidification

In-situ solidification will be implemented on remaining source materials below five ft bg. As shown on the attached Figure 3, the treatment zone will extend from approximately five ft bg to approximately 15 feet bg, to approximately 30 ft bg and to bedrock, depending upon the location. ISS is a process that binds the soil particles in place creating a low permeability mass. The contaminated soil will be mixed in place together with solidifying agents (typically Portland cement) or other binding agents using an excavator or jet grouting with augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. Quality assurance and control procedures will be performed to ensure the effectiveness of ISS after field implementation is complete. The solidified mass will then be covered with a cover system as described in element 4 to prevent direct exposure to the solidified mass. The resulting solid matrix reduces or eliminates mobility of contamination and reduces or eliminates the matrix as a source of groundwater contamination.

4. Cover System

A site cover will be required to allow for commercial use of the site, and to protect the ISS component of the remedy. In the ISS areas, the function of this cover will be to provide sufficient thermal protection of the solidified mass from seasonal freeze/thaw cycles and prevent contact with the ISS material.

A site cover currently exists in the form of asphalt pavement and will be maintained in areas where excavation and ISS are not performed to allow for commercial use of the site. Any site redevelopment will maintain the existing site cover. The site cover may include paved surface parking areas, sidewalks or soil where the upper one foot of exposed surface soil meets the applicable soil cleanup objectives (SCOs) for commercial use. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6NYCRR part 375-6.7(d). Where the soil cover is required over the ISS treatment area, it will consist of a minimum of four feet of soil meeting the SCOs for commercial use. For areas where solidified material underlies the cover, the solidified material itself will serve as the demarcation layer due to the nature of the material.

5. Institutional Control

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

- Require 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);
- Allow the use and development of the controlled property for commercial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- Restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or NYCDOH; and
- Require compliance with the Department approved Site Management Plan.

6. Site Management Plan

A Site Management Plan is required, which includes 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 noted in item 5.
Engineering Controls: The cover system discussed in item 4.

This plan includes, but may not be limited to:

- An Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- Descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
- A provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, and off-site locations including those that previously did not respond or refused sampling offers, and include provisions 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 developed on the site, and off-site locations including those that previously did not respond or refused sampling offers, as may be required by the Institutional and Engineering Control Plan discussed above.

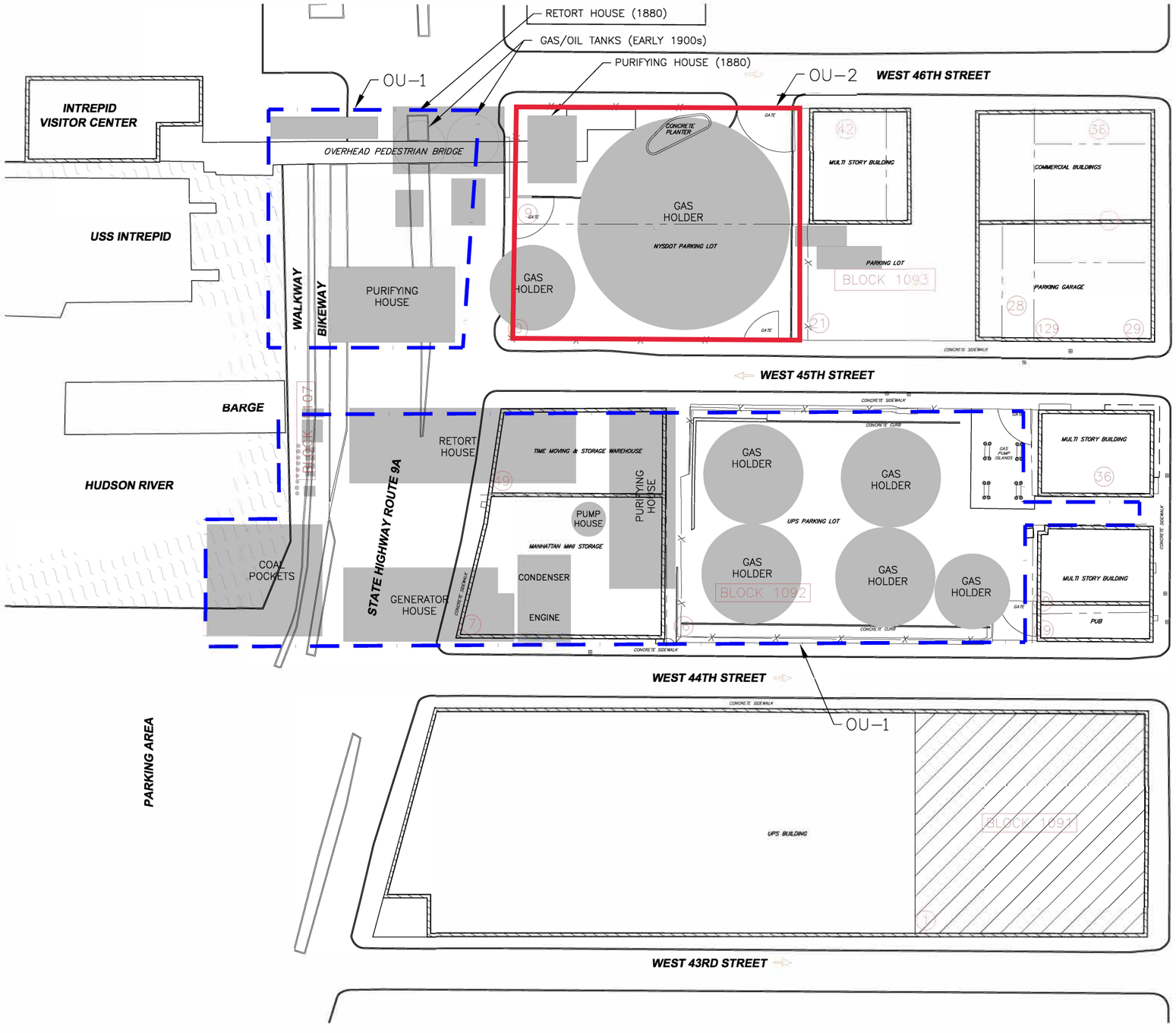
FIGURE 1

FORMER WEST 45TH STREET
GAS WORKS - OPERABLE UNIT 2

NEW YORK, NEW YORK

SITE LOCATION MAP

SITE NO. 231109



LEGEND:

- CURRENT FEATURES
- HISTORICAL FEATURES (LOCATIONS ARE APPROXIMATE)
- EXISTING BUILDING
- CHAIN LINK FENCE
- LIMITS OF OU–1
- LIMITS OF OU–2
- BLOCK 1093 — TAX BLOCK NUMBER
- 21 — TAX LOT NUMBER FOR PARCELS WITHIN FORMER MGP
- TAX LOT BOUNDARIES
- APPROXIMATE EXTENT OF UPS PARKING GARAGE

100 50 0 100 200

SCALE: 1"=100'

FIGURE 2

FORMER WEST 45th STREET
GAS WORKS - OPERABLE UNIT 2
NEW YORK, NEW YORK

SITE PLAN

SITE NO. 231109

WEST 46th STREET
(TRAFFIC FLOW ⇒)

CONCRETE SIDEWALK
STEEL FACED CURB

12th AVENUE – STATE HIGHWAY 9A (TRAFFIC FLOW ⇒)

⇐ TRAFFIC FLOW) WEST 45th STREET

MW-19 PDI-32 MW-1 PDI-1 MW-22 PW-2 PDI-2 PDI-3 SB-3 PDI-5 SB-6 PDI-4 SB-7 PDI-8 PDI-7 MW-3 SB-5 PDI-33 PDI-34 MW-2 CONT-1 CONT-7 CONT-2 SB-9 SB-10 PDI-9 SB-12 PDI-10 PDI-11 PDI-28 PDI-27 SB-1 PDI-30 PDI-29 SB-13 SB-16 RDI-26 CONT-5 MW-24 PW-1 PDI-22 SB-8 PDI-21 CONT-8 SB-15 CONT-3 PDI-12 SB-17 PDI-13 PDI-18/ MW-23 MW-4 MW-5 PDI-19 PDI-16 MW-6 PDI-25 SB-18 PDI-23 PDI-24/ MW-21 SB-23 SB-22 SB-19 SB-20 SB-21 PDI-15 CONT-4 RDI-20 SB-24 RDI-17 PDI-31

A1 A2 A3

OVERHEAD DECK OVERHEAD CANOPY OVERHEAD PEDESTRIAN BRIDGE CONCRETE RAMP STAIRS CHAIN LINK FENCE GATE SLIDING GATE ASPHALT PARKING LOT CONCRETE TRENCH DRAIN SHED GAS HOLDER TP-10 GAS HOLDER GRANITE CURB CONCRETE SIDEWALK

LEGEND:

- PROPERTY BOUNDARY
- APPROXIMATE LOCATION OF FORMER MGP STRUCTURES
- SOIL BORING LOCATION
- MONITORING WELL LOCATION
- ABANDONED MONITORING WELL
- ABANDONED PUMPING WELL
- EXISTING PUMPING WELL
- TEST PIT LOCATION
- BEDROCK CONTOURS (DASHED IF INFERRED)
- ISS TO 15'
- ISS TO 30'
- ISS TO BEDROCK

AREA	Area (sf)	ISS TO 15 FT BGS VOLUME (cy)	ISS 15-30 FT BGS VOLUME (cy)	ISS >30 FT BGS VOLUME (cy)	TOTAL REMEDIATION VOLUME (cy)
AREA 1	820	900	600	0	1,500
AREA 2	9,910	5,500	5,100	600	11,200
AREA 3	10,520	5,800	4,300	40	10,140
TOTAL	21,250	12,200	10,000	640	22,840

30 15 0 30 60

SCALE: 1"=30'

FIGURE 3

FORMER WEST 45th STREET GAS WORKS - OPERABLE UNIT 2

NEW YORK, NEW YORK

SELECTED REMEDY

SITE NO. 231109