DECISION DOCUMENT

141 3rd Street
Brownfield Cleanup Program
Brooklyn, Kings County
Site No. C224336
December 2023

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

DECLARATION STATEMENT - DECISION DOCUMENT

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Brownfield Cleanup Program
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Statement of Purpose and Basis

This document presents the remedy for the 141 3rd Street 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 NYSDEC) for the 141 3rd Street site and the public's input to the proposed remedy presented by the NYSDEC.

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;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent

feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

As part of the remedial design program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis will be completed. The environmental footprint analysis will be completed using an accepted environmental footprint analysis calculator such as SEFA (Spreadsheets for Environmental Footprint Analysis, USEPA), SiteWise™ (available in the Sustainable Remediation Forum [SURF] library) or similar Department accepted tool. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use will be estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be incorporated into the remedial design program, as appropriate. The project design specifications will include detailed requirements to achieve the green and sustainable remediation goals. Further, progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the Final Engineering Report (FER), including a comparison to the goals established during the remedial design program.

Additionally, the remedial design program will include a climate change vulnerability assessment, to evaluate the impact of climate change on the project site and the proposed remedy. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress and drought), flooding, and sea level rise will be identified, and the remedial design program will incorporate measures to minimize the impact of climate change on potential identified vulnerabilities.

2. Excavation

Excavation and off-site disposal of contaminant source areas to 2 feet below grade, including:

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- non-aqueous phase liquids (NAPL);
- soil with visual waste material or NAPL;
- soils which exceed the protection of groundwater soil cleanup objectives (PGSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards;
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G; and
- any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination.

In addition, all soils in the upper two feet which exceed the restricted residential SCOs will be excavated and transported off-site for disposal, as well as excavation of site soils to a depth of four feet below grade in the portion of the site subject to the in-situ solidification (ISS) treatment described in remedy element 5. Approximately 340 cubic yards of soil will be excavated to

facilitate ISGS implementation. A total of approximately 4,000 cubic yards of contaminated soil will be removed from the site. Collection and analysis of documentation samples at the remedial excavation depth will be used to verify that SCOs for the site have been achieved. If confirmation sampling indicates that SCOs were not achieved at the stated remedial depth, the Applicant must notify the NYSDEC, submit the sample results and, and in consultation with the NYSDEC, determine if further remedial excavation is necessary. Further excavation for development will proceed after confirmation samples demonstrate that SCOs for the site have been achieved.

To ensure proper handling and disposal of excavated material, waste characterization sampling will be completed for all identified contaminated site material. Waste characterization sampling will be performed exclusively for the purposes of off-site disposal in a manner suitable to receiving facilities and in conformance with applicable federal, state and local laws, rules, and regulations and facility-specific permits.

3. Backfill

Clean fill meeting the requirements for 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and establish the designed grades at the site.

The site will be re-graded to accommodate installation of a cover system as described in Paragraph 4.

4. Cover System

A site cover will be required in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs), to allow for future restricted residential use of the site. Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

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 restricted residential use and/or be covered by the new building slab.

5. In-Situ Solidification /In-Situ Geochemical Stabilization

In-Situ Solidification

In-situ solidification (ISS) will be implemented in an approximately 2,300 square foot area located on the eastern portion of the site beneath the proposed building foundation. The

treatment zone will be in areas where grossly contaminated material and non-aqueous phase liquid (GCM/NAPL) consisting of coal tar is present below the groundwater table to a terminal elevation of approximately -23 feet NAVD88. 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 augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. The solidified mass will then be covered with a cover system as described in Paragraph 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.

In-Situ Geochemical Stabilization In-situ Geochemical Stabilization (ISGS) will be e implemented in an approximately 8,800 square foot area located on the eastern portion of the site along the bulkhead. The treatment zone will be in areas where grossly contaminated material and non-aqueous phase liquid (GCM/NAPL) consisting of coal tar is present below the groundwater table to a terminal elevation of approximately -23 feet NAVD88. ISGS is a process that uses a stabilizing agent which chemically changes contamination to make it less soluble, and in this case will also include permanganate to oxidize and break down contaminants within the soil mass. The contaminated soil will be mixed in place with the geochemical stabilizing and oxidizing agents using direct push method for injection. The stabilized soil will then be covered with a cover system as described in Paragraph 4 to prevent direct exposure and preserve the integrity of the treated soils. This treatment changes the contamination from a soluble form to a stable, insoluble compound to reduce or eliminate the matrix as a source of groundwater contamination.

6. NAPL Recovery

Installation and operation of recovery wells will be installed across the remaining NAPL horizon along the bulkhead on the eastern boundary of the site to remove potentially mobile NAPL from the subsurface. The number, depth, type and spacing of the recovery wells will be determined during the design phase of the remedy. NAPL will be collected periodically from each well; however, if wells are determined by the NYSDEC to accumulate large quantities of coal tar over extended time periods, they can be converted to automated collection.

7. Soil Vapor Mitigation

Any on-site buildings and off-site buildings impacted by the site will be required to have a sub-slab depressurization system, or other acceptable measures, to mitigate the migration of vapors into the building from the subsurface.

In addition, a soil vapor intrusion assessment will be completed at off-site buildings as part of this remedy.

8. Soil Vapor Extraction

Soil vapor extraction (SVE) will be implemented around the perimeter of the site to remove volatile organic compounds (VOCs) from the subsurface and prevent off-site migration of

vapors. VOCs will be physically removed from the soil by applying a vacuum to wells that have been installed into the vadose zone (the area below the ground but above the water table). The vacuum draws air through the soil matrix which carries the VOCs from the soil to the SVE well. The air extracted from the SVE wells is then treated as necessary prior to being discharged to the atmosphere.

9. Engineering and Institutional Controls

Imposition of an institutional control in the form of an environmental easement, and a Site Management Plan, as described below, will be required. The remedy will achieve a Track 4 restricted residential cleanup at a minimum and will include imposition of a site cover, ISS, ISGS, NAPL recovery system, SVE and vapor mitigation systems as engineering controls.

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 NYSDEC 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 restricted residential 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 NYCDOHMH; and
- require compliance with the NYSDEC approved Site Management Plan.

10. 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 Paragraph 9 above.
   – Engineering Controls: The soil cover discussed in Paragraph 4, the ISS and ISGS discussed in Paragraph 5, the NAPL recovery system discussed in Paragraph 6, the sub-slab depressurization system discussed in Paragraph 7, and the soil vapor extraction system discussed in Paragraph 8 above.

   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 that should a building foundation or building slab be removed in the future, a cover system consistent with that described in Paragraph 4 above will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
- No soils exceeding Protection of Groundwater SCOs may be placed below the stormwater infiltration basin or any such device;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and NYSDEC notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

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

- monitoring of groundwater, NAPL and soil vapor/indoor air to assess the performance and effectiveness of the remedy; and
- a schedule of monitoring and frequency of submittals to the NYSDEC.

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
- procedures for operating and maintaining the remedy;
- compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and NYSDEC notification; and
- providing the Department access to the site and O&M records.

Declaration

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

December 22, 2023
Date

R. Scott Deyette
Scott Deyette, Director
Remedial Bureau B

DECISION DOCUMENT

141 3rd Street
Brooklyn, Kings County
Site No. C224336
December 2023

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the NYSDEC), 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, where a contaminant is present at levels exceeding the soil cleanup objectives or other health-based or environmental standards, criteria or guidance, based on the reasonably anticipated use of the property.

The NYSDEC 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 NYSDEC 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 NYSDEC 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
https://gisservices.dec.ny.gov/gis/dil/index.html?rs=C224336

Carroll Gardens Branch Library
396 Clinton Street
Brooklyn, NY 11231
Phone: (718) 596-6972

Brooklyn Community Board 6

250 Baltic Street
Brooklyn, NY 11201
Phone: (718) 643-3027

Receive Site Citizen Participation Information By Email

Please note that the NYSDEC'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 site is in an urban area surrounded historically by mainly industrial properties. The site is bounded to the south by 3rd Street; to the east by the Gowanus Canal, a USEPA National Priorities List (NPL) site; to the north by 2nd Street followed by BCP site C224174, 365 Bond Street; and to the west by BCP site C224346, Third Street Gowanus.

Site Features:

The 1.193-acre site is currently vacant. The site was previously occupied by a one-story office building and construction materials storage with a paved parking lot and bulkhead along the Gowanus Canal. The building has been demolished but the foundation slab remains. The steel sheet pile bulkhead was installed along the eastern boundary of the site and completed in August 2017. As part of the construction, dead man piles were installed about 50 feet inland of the canal, connected to the bulkhead with double channel wales. Sheet piles were installed to approximately elevation -34 feet NAVD88.

Current Zoning and Land Use:

The site is currently zoned as M1-4 (manufacturing)/R7-2 (residential). Prior to the zoning change that went into effect in December 2021, the site was zoned M2-1. The M2-1 designation is a district characterized as between light and heavy industrial areas. The surrounding parcels have also been re-zoned and presently are within the M1-4/R7-2 designation as well.

Past Use of the Site:

The site historically operated as a grain and feed mill and woodworking facility from as early as 1886 until at least 1928, a coal company from as early as 1928 until at least 1950, and an

automobile salvage yard from as early as 1977 until at least 1986. From 1986 until current vacancy and building demolition, the site was occupied by a one-story office building and construction materials storage with a paved parking lot.

Site Geology and Hydrogeology:

The ground surface within the site is generally flat, and the elevation of the property is approximately +10 (NAVD-88) feet. Investigation reports prepared for the site characterized subsurface soil as historic fill material consisting of fine-grained sand with varying amounts of gravel, brick and concrete. The fill material was encountered from surface grade to about 11.5 to 16 feet below grade surface (bgs). Fine-grained silty sand with varying amounts of clay, shells fragments, organics, and gravel, was observed below the fill. Bedrock was not encountered during the remedial investigations. Bedrock is expected to exist 150± feet below ground surface.

Groundwater is present at depths ranging from 6 to 9 feet below ground surface (bgs). Based on the remedial investigation, groundwater flows to the east toward the Gowanus Canal, which abuts the site. Groundwater is likely tidally influenced.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The NYSDEC 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 restricted-residential use (which allows for commercial use and industrial use) as described in Part 375-1.8(g) were/was evaluated in addition to an 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 under the Brownfield Cleanup Agreement is a Participant. The Applicant has an obligation to address on-site and off-site contamination. The Department has determined that this site poses a significant threat to public health or the environment.

A soil vapor intrusion assessment will be completed at off-site buildings as part of this remedy. Off-site properties identified requiring mitigation will be addressed by the Applicant.

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
-sub-slab vapor
-indoor air

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 NYSDEC 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:

benzene
ethylbenzene
toluene
xylene
tetrachloroethene (PCE)
trichloroethene (TCE)
1,1,1-trichloroethane
cis-1,2-dichloroethene
vinyl chloride
benzo(a)anthracene
benzo(a)pyrene
benzo(b)fluoranthene
benzo(k)fluoranthene
chrysene
naphthalene
mercury
lead

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

- groundwater
- soil
- soil vapor intrusion

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.

Nature and Extent of Contamination:

Soil and groundwater were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), per- and polyfluoroalkyl substances (PFAS), and pesticides. Soil vapor was analyzed for VOCs. Based on the investigations conducted to date, the primary contaminants of concern are grossly contaminated material (GCM) consisting of coal tar, VOCs, SVOCs and metals in soil; coal tar and non-aqueous phase liquid (NAPL), VOCs, SVOCs and metals in groundwater; and VOCs in soil vapor.

Soil - GCM/NAPL associated with MGP coal tar contamination from the Gowanus Canal NPL site has been encountered in on-site borings and delineated along the bulkhead and inland on the eastern portion of the site. Soil data were compared to Restricted-Residential Soil Cleanup

Objectives (RRSCOs) and Protection of Groundwater Soil Cleanup Objectives (PGSCOs). No pesticides were detected at concentrations exceeding the RRSCOs or PGWSCOs. VOCs, SVOCs, polychlorinated biphenyls (PCBs), and metals were found at concentrations exceeding the applicable RRSCOs and/or PGSCOs including benzene (maximum [max] of 6.10 parts per million (ppm); RRSCO is 4.8 ppm and PGSCO is 0.06 ppm), ethylbenzene (max of 130 ppm; RRSCO is 41 ppm and PGSCO is 1 ppm), tetrachloroethylene (PCE) (max of 32 ppm; RRSCO is 19 ppm), toluene (max of 37 ppm; RRSCO is 100 ppm and PGSCO is 0.7 ppm), total PCBs (max of 4.11 ppm; RRSCOs 1 ppm), benzo(a)anthracene (max of 490 ppm; RRSCO is 1 ppm and PGSCO is 1 ppm), benzo(a)pyrene (max of 350 ppm; RRSCO is 1 ppm and PGSCO is 22 ppm), benzo(b)fluoranthene (max of 260 ppm; RRSCO is 1 ppm and PGSCO is 1.7 ppm), benzo(k)fluoranthene (max of 79 ppm; RRSCO is 3.9 ppm and PGSCO is 1.7 ppm), chrysene (max of 450 ppm; RRSCO is 3.9 ppm and PGSCO is 1 ppm), naphthalene (max of 3,200 ppm; RRSCO is 100 ppm and PGSCO is 12 ppm), mercury (max is 0.892 ppm; RRSCO is 0.81 ppm), arsenic (max is 31.1 ppm; RRSCO is 16 ppm) and lead (max of 83,800 ppm; RRSCO is 400 ppm).

GCM was encountered in soil borings along the eastern boundary of the site along the bulkhead and delineated in-land to the west.

1,4-dioxane was not detected above the reporting limit. Perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) were reported at concentrations below soil cleanup guidance values for restricted residential use and protection of groundwater. Data does not indicate any off-site impacts in soil related to this site.

Groundwater - Groundwater data was compared to the Ambient Groundwater Quality Standards and Guidance Values (AWQSGVs). No PCBs or pesticides exceeded their water quality standards in groundwater. Exceedances of the AWQSGVs for VOCs and SVOCs including benzene (max of 36 parts per billion (ppb); AWQSGV of 1 ppb), ethylbenzene (max of 210 ppb; AWQSGV of 5 ppb), toluene (max of 14 ppb; AWQSGV of 5 ppb), benzo(a)anthracene (max of 2.20 ppb; AWQSGV of 0.002 ppb), benzo(a)pyrene (max of 2.20 ppb; AWQSGV of 0.002 ppb), benzo(b)fluoranthene (max of 2.80 ppb; AWQSGV of 0.002 ppb), benzo(k)fluoranthene (max of 0.86 ppb; AWQSGV of 0.002 ppb), chrysene (max of 1.8 ppb; AWQSGV of 0.002 ppb), and naphthalene (max of 1,800 ppb; AWQSGV of 10 ppb). PCE, TCE, cis-1,2- dichloroethane, and vinyl chloride were not detected above AWQSGVs in groundwater.

NAPL was encountered during monitoring well development and groundwater sampling. Groundwater impacts have the potential to migrate off-site into the Gowanus Canal. 1,4-Dioxane was detected at a maximum of 82.7 ppb (AWQSGV is 0.35 ppb). No source of 1,4-Dioxane was identified. PFOS was detected at a maximum concentration of 1,340 parts per trillion (ppt) compared to the AWQSGV of 2.7 ppt. PFOA was detected at a maximum concentration of 501 ppt compared to the AWQSGV of 6.7 ppt. PFOS and PFOA concentrations Data indicate off-site impacts in groundwater related to this site.

Soil Vapor – Five sub-slab vapor samples and five indoor air samples were collected on-site. The maximum sub-slab vapor concentration and indoor air concentration of trichloroethylene (TCE) was 1,000 micrograms per cubic meter (ug/m3) a .118 ug/m3 respectively. The

maximum sub-slab vapor concentration and indoor air concentration of tetrachloroethylene (PCE) was 7,660 ug/m3 and 1.44 ug/m3 respectively. The maximum sub-slab vapor concentration of cis-1,2-dichloroethene was 781 ug/m3. No cis-1,2-dichloroethene was detected in indoor air. The maximum sub-slab vapor concentration of vinyl chloride was 2.24 ug/m3. No vinyl chloride was detected in indoor air.

Twenty-nine soil vapor samples were collected on- and off-site which identified elevated concentrations of chlorinated VOCs. The maximum concentration of TCE was 1,070 micrograms per cubic meter (ug/m3), PCE was 7,800 ug/m3, cis-1,2-dichloroethene was 4,280 ug/m3, and vinyl chloride was 2,860 ug/m3. Data indicates there are off-site impacts in soil vapor related to this 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 completely fenced, which restricts public access, and covered by former building slabs, asphalt or concrete. People will not come in contact with site-related soil and groundwater contamination unless they dig below the ground surface. Contaminated groundwater at the site is not used for drinking or other purposes and the site is served by a public water supply that obtains water from a different source 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. Since the site is vacant, soil vapor intrusion is not a current concern. The potential exists for the inhalation of site contaminants due to soil vapor intrusion in any future on-site redevelopment or occupancy. Furthermore, environmental sampling indicates soil vapor intrusion may be 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.

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.
- Prevent the discharge of contaminants to surface water.
- 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.

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 Track 4: Restricted use with site-specific soil cleanup objectives remedy.

The selected remedy is referred to as the excavation, in-situ solidification/geochemical stabilization, site cover, soil vapor extraction and soil vapor mitigation remedy.

The elements of the selected remedy, as shown in 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;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

As part of the remedial design program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis will be completed. The environmental footprint analysis will be completed using an accepted environmental footprint analysis calculator such as SEFA (Spreadsheets for Environmental Footprint Analysis, USEPA), SiteWise^{TM} (available in the Sustainable Remediation Forum [SURF] library) or similar Department accepted tool. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use will be estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be incorporated into the remedial design program, as appropriate. The project design specifications will include detailed requirements to achieve the green and sustainable remediation goals. Further, progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the Final Engineering Report (FER), including a comparison to the goals established during the remedial design program.

Additionally, the remedial design program will include a climate change vulnerability assessment, to evaluate the impact of climate change on the project site and the proposed remedy. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress and drought), flooding, and sea level rise will be identified, and the remedial design program will incorporate measures to minimize the impact of climate change on potential identified vulnerabilities.

2. Excavation

Excavation and off-site disposal of contaminant source areas to 2 feet below grade, including:
- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- non-aqueous phase liquids (NAPL);

- soil with visual waste material or NAPL;
- soils which exceed the protection of groundwater soil cleanup objectives (PGSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards;
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G; and
- any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination.

In addition, all soils in the upper two feet which exceed the restricted residential SCOs will be excavated and transported off-site for disposal, as well as excavation of site soils to a depth of four feet below grade in the portion of the site subject to the in-situ solidification (ISS) treatment described in remedy element 5. Approximately 340 cubic yards of soil will be excavated to facilitate ISGS implementation. A total of approximately 4,000 cubic yards of contaminated soil will be removed from the site. Collection and analysis of documentation samples at the remedial excavation depth will be used to verify that SCOs for the site have been achieved. If confirmation sampling indicates that SCOs were not achieved at the stated remedial depth, the Applicant must notify the NYSDEC, submit the sample results and, and in consultation with the NYSDEC, determine if further remedial excavation is necessary. Further excavation for development will proceed after confirmation samples demonstrate that SCOs for the site have been achieved.

To ensure proper handling and disposal of excavated material, waste characterization sampling will be completed for all identified contaminated site material. Waste characterization sampling will be performed exclusively for the purposes of off-site disposal in a manner suitable to receiving facilities and in conformance with applicable federal, state and local laws, rules, and regulations and facility-specific permits.

3. Backfill

Clean fill meeting the requirements for 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and establish the designed grades at the site.

The site will be re-graded to accommodate installation of a cover system as described in Paragraph 4.

4. Cover System

A site cover will be required in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs), to allow for future restricted residential use of the site. Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components

may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

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 restricted residential use and/or be covered by the new building slab.

5. In-Situ Solidification /In-Situ Geochemical Stabilization

In-Situ Solidification

In-situ solidification (ISS) will be implemented in an approximately 2,300 square foot area located on the eastern portion of the site beneath the proposed building foundation. The treatment zone will be in areas where grossly contaminated material and non-aqueous phase liquid (GCM/NAPL) consisting of coal tar is present below the groundwater table to a terminal elevation of approximately -23 feet NAVD88. 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 augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. The solidified mass will then be covered with a cover system as described in Paragraph 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.

In-Situ Geochemical Stabilization In-situ Geochemical Stabilization (ISGS) will be e implemented in an approximately 8,800 square foot area located on the eastern portion of the site along the bulkhead. The treatment zone will be in areas where grossly contaminated material and non-aqueous phase liquid (GCM/NAPL) consisting of coal tar is present below the groundwater table to a terminal elevation of approximately -23 feet NAVD88. ISGS is a process that uses a stabilizing agent which chemically changes contamination to make it less soluble, and in this case will also include permanganate to oxidize and break down contaminants within the soil mass. The contaminated soil will be mixed in place with the geochemical stabilizing and oxidizing agents using direct push method for injection. The stabilized soil will then be covered with a cover system as described in Paragraph 4 to prevent direct exposure and preserve the integrity of the treated soils. This treatment changes the contamination from a soluble form to a stable, insoluble compound to reduce or eliminate the matrix as a source of groundwater contamination.

6. NAPL Recovery

Installation and operation of recovery wells will be installed across the remaining NAPL horizon along the bulkhead on the eastern boundary of the site to remove potentially mobile NAPL from the subsurface. The number, depth, type and spacing of the recovery wells will be determined during the design phase of the remedy. NAPL will be collected periodically from each well; however, if wells are determined by the NYSDEC to accumulate large quantities of coal tar over extended time periods, they can be converted to automated collection.

7. Soil Vapor Mitigation

Any on-site buildings and off-site buildings impacted by the site will be required to have a sub-slab depressurization system, or other acceptable measures, to mitigate the migration of vapors into the building from the subsurface.

In addition, a soil vapor intrusion assessment will be completed at off-site buildings as part of this remedy.

8. Soil Vapor Extraction

Soil vapor extraction (SVE) will be implemented around the perimeter of the site to remove volatile organic compounds (VOCs) from the subsurface and prevent off-site migration of vapors. VOCs will be physically removed from the soil by applying a vacuum to wells that have been installed into the vadose zone (the area below the ground but above the water table). The vacuum draws air through the soil matrix which carries the VOCs from the soil to the SVE well. The air extracted from the SVE wells is then treated as necessary prior to being discharged to the atmosphere.

9. Engineering and Institutional Controls

Imposition of an institutional control in the form of an environmental easement, and a Site Management Plan, as described below, will be required. The remedy will achieve a Track 4 restricted residential cleanup at a minimum and will include imposition of a site cover, ISS, ISGS, NAPL recovery system, SVE and vapor mitigation systems as engineering controls.

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 NYSDEC 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 restricted residential 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 NYCDOHMH; and
- require compliance with the NYSDEC approved Site Management Plan.

10. Site Management Plan

A Site Management Plan is required, which includes the following:

d. 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 9 above.
- Engineering Controls: The soil cover discussed in Paragraph 4, the ISS and ISGS discussed in Paragraph 5, the NAPL recovery system discussed in Paragraph 6, the sub-slab depressurization system discussed in Paragraph 7, and the soil vapor extraction system discussed in Paragraph 8 above.

This plan includes, but may not be limited to:

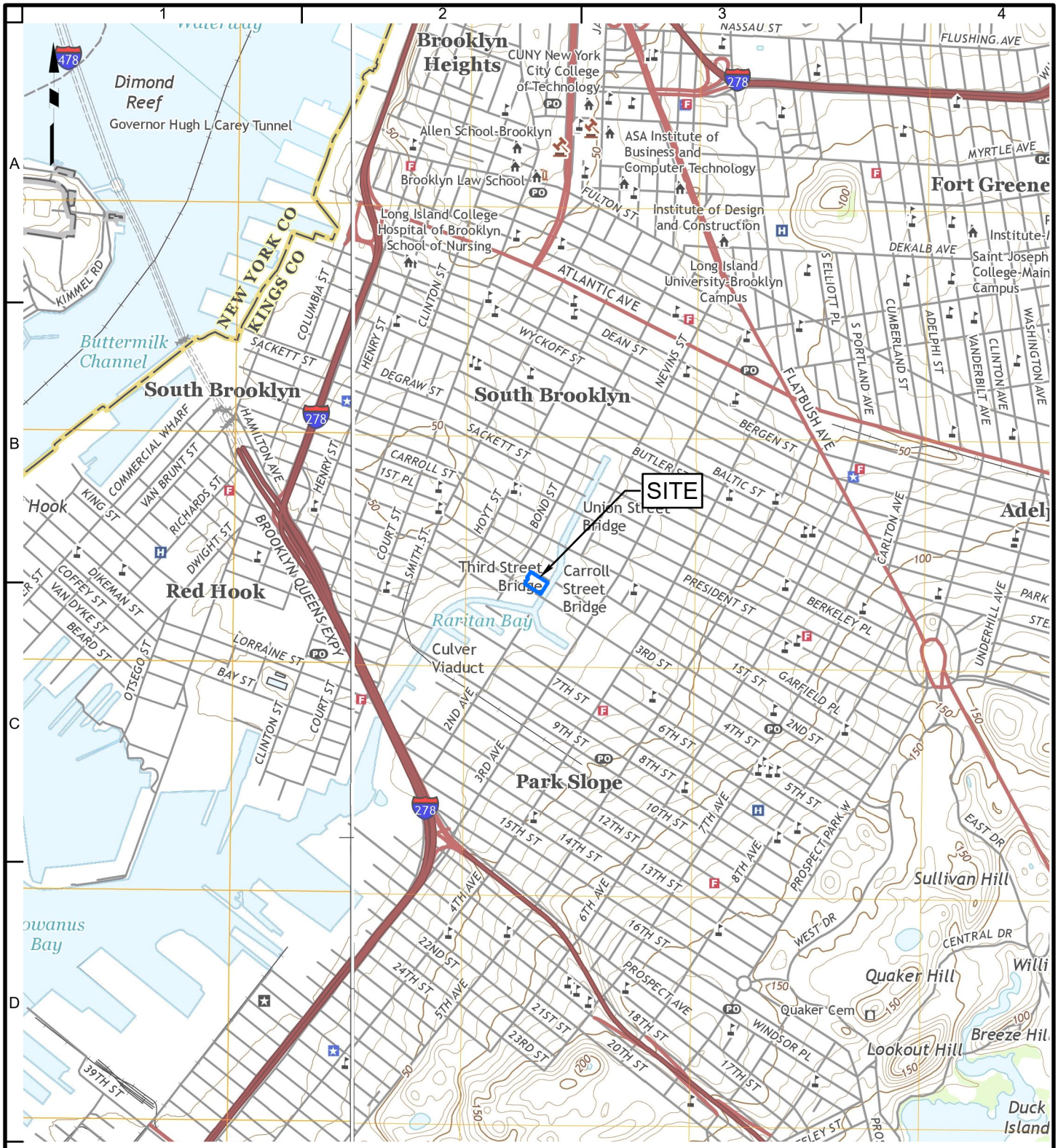
- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
- a provision that should a building foundation or building slab be removed in the future, a cover system consistent with that described in Paragraph 4 above will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
- No soils exceeding Protection of Groundwater SCOs may be placed below the stormwater infiltration basin or any such device;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and NYSDEC notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

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

- monitoring of groundwater, NAPL and soil vapor/indoor air to assess the performance and effectiveness of the remedy; and
- a schedule of monitoring and frequency of submittals to the NYSDEC.

f. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

- procedures for operating and maintaining the remedy;
- compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and NYSDEC notification; and
- providing the Department access to the site and O&M records.



Legend

Approximate Site Boundary

2,000 0 2,000

SCALE IN FEET

Notes:

1. Basemap adapted from United States Geological Survey (USGS) 7.5-Minute Series Topographical Maps, Brooklyn, New York, Quadrangle, Dated 2016.

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Langan International LLC

Collectively known as Langan

Project	141 3rd STREET BLOCK No. 462, LOT No. 12 BROOKLYN NEW YORK
Figure Title	SITE LOCATION MAP
Project No.	170390001
Date	11/8/2022
Scale	1"=2,000'
Drawn By	MG
Submission Date	
Figure No.	1

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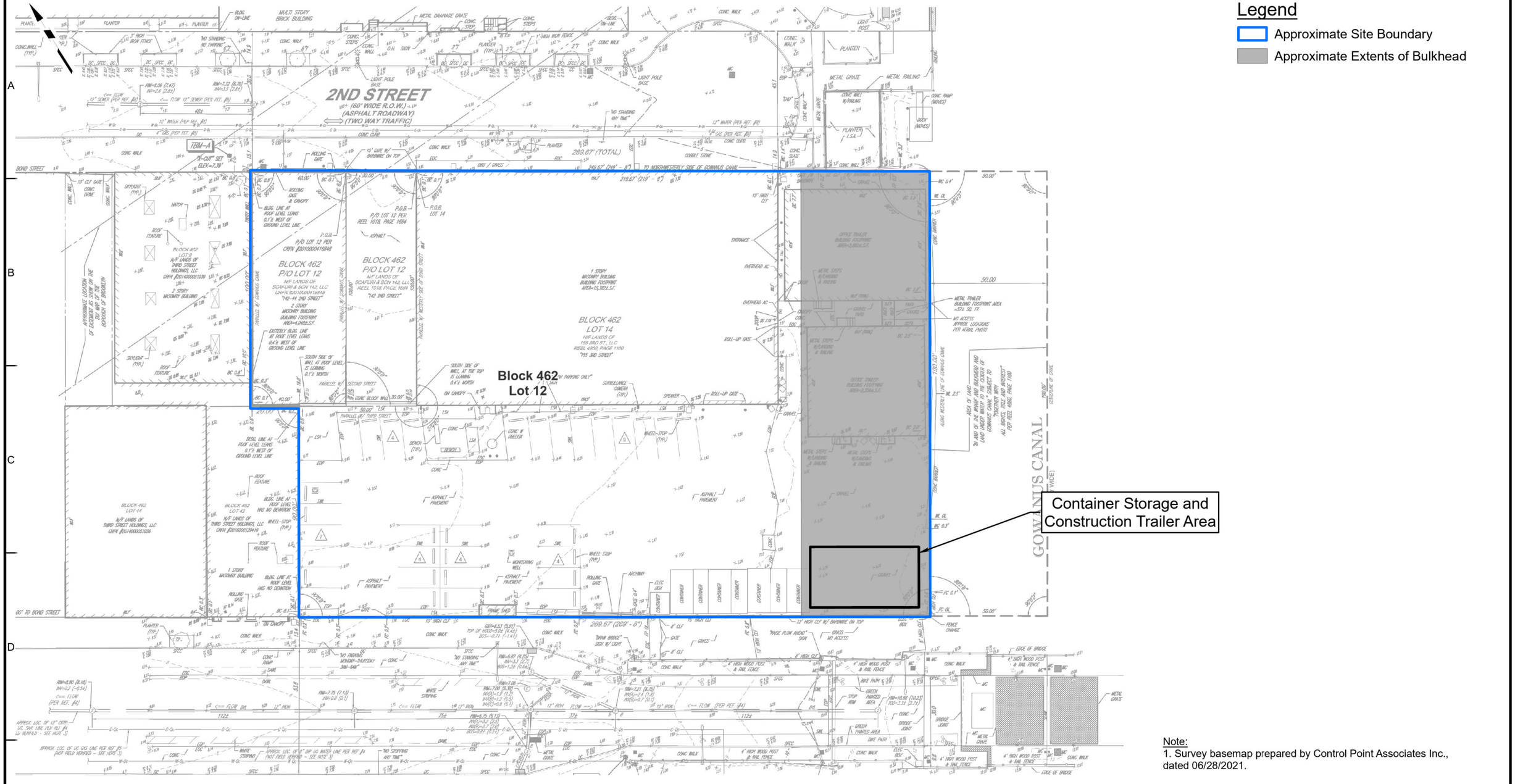

Note:
1. Survey basemap prepared by Control Point Associates Inc., dated 06/28/2021.

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SCALE IN FEET

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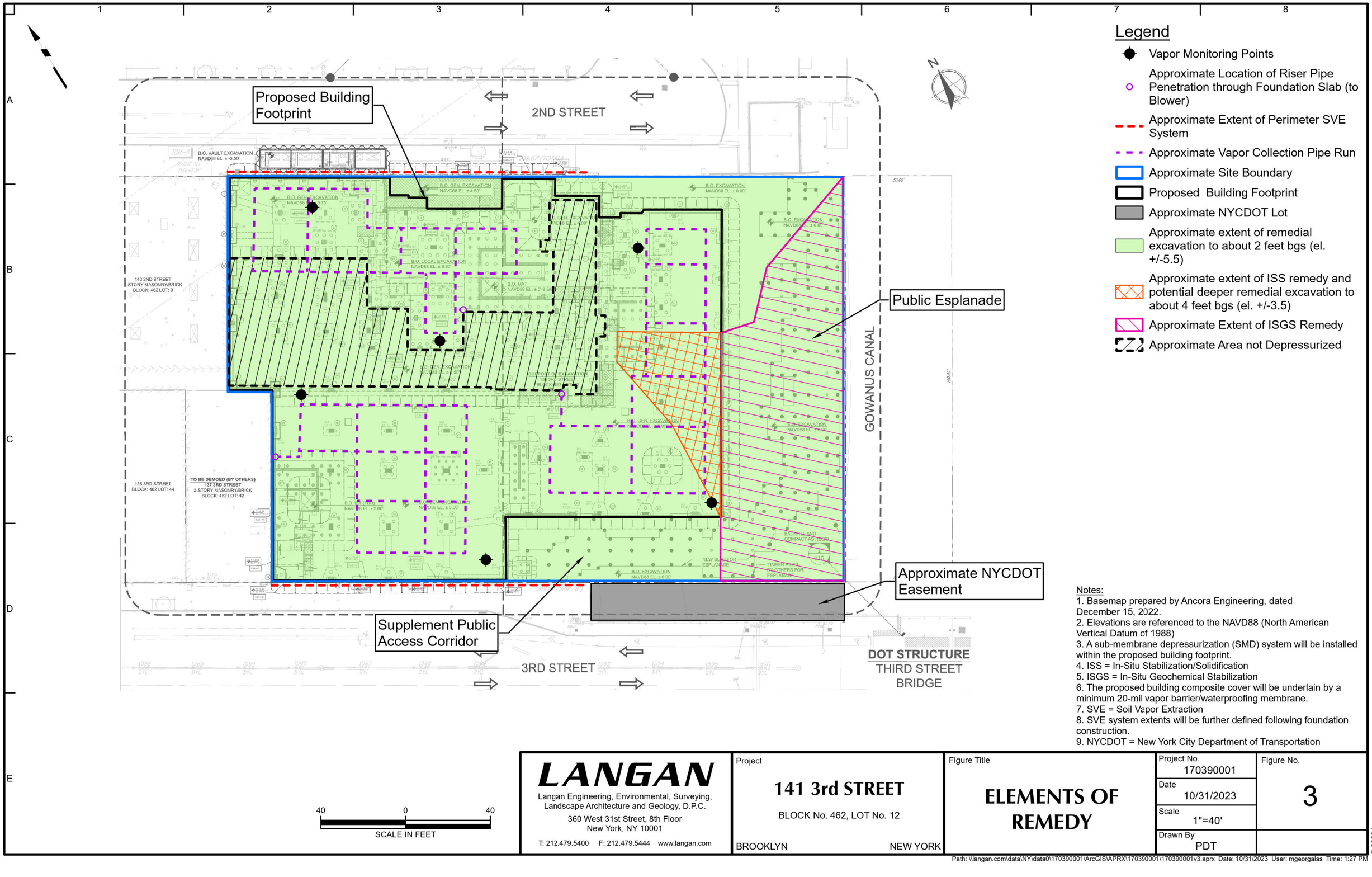
Project	141 3rd STREET BLOCK No. 462, LOT No. 12 BROOKLYN NEW YORK
Figure Title	CURRENT SITE LAYOUT
Project No.	170390001
Date	10/31/2023
Scale	1"=40'
Drawn By	PDT
Figure No.	2



Legend

- Vapor Monitoring Points
- Approximate Location of Riser Pipe Penetration through Foundation Slab (to Blower)
- Approximate Extent of Perimeter SVE System
- Approximate Vapor Collection Pipe Run
- Approximate Site Boundary
- Proposed Building Footprint
- Approximate NYCDOT Lot
- Approximate extent of remedial excavation to about 2 feet bgs (el. +/-5.5)
- Approximate extent of ISS remedy and potential deeper remedial excavation to about 4 feet bgs (el. +/-3.5)
- Approximate Extent of ISGS Remedy
- Approximate Area not Depressurized

Notes:
1. Basemap prepared by Ancora Engineering, dated December 15, 2022.
2. Elevations are referenced to the NAVD88 (North American Vertical Datum of 1988)
3. A sub-membrane depressurization (SMD) system will be installed within the proposed building footprint.
4. ISS = In-Situ Stabilization/Solidification
5. ISGS = In-Situ Geochemical Stabilization
6. The proposed building composite cover will be underlain by a minimum 20-mil vapor barrier/waterproofing membrane.
7. SVE = Soil Vapor Extraction
8. SVE system extents will be further defined following foundation construction.
9. NYCDOT = New York City Department of Transportation

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Project
141 3rd STREET
BLOCK No. 462, LOT No. 12
BROOKLYN NEW YORK

Figure Title
ELEMENTS OF REMEDY

Project No.	Figure No.
170390001	3
Date: 10/31/2023	
Scale: 1"=40'	
Drawn By: PDT	

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