DECISION DOCUMENT

470 Kent Avenue
Brownfield Cleanup Program
Brooklyn, Kings County
Site No. C224053
October 2023

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

DECLARATION STATEMENT - DECISION DOCUMENT

470 Kent Avenue
Brownfield Cleanup Program
Brooklyn, Kings County
Site No. C224053
October 2023

Statement of Purpose and Basis

This document presents the remedy for the 470 Kent Avenue 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 470 Kent 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;
- 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, including:

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G;
- soils which exceed the protection of groundwater soil cleanup objectives (PGWSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards; and
- any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination. All soils in the upper two feet which exceed the restricted residential soil cleanup objectives (RRSCOs) will be excavated and transported off-site for disposal. In addition, petroleum-impacted material where volatile organic compounds (VOCs) exceed PGWSCOs and RRSCOs will be excavated from six

source areas throughout the site to depths ranging from 9 to 23 feet below grade and taken off-site for proper disposal.

Approximately 11,500 cubic yards of contaminated soil will be removed from the site. Collection and analysis of confirmation samples at the remedial excavation depths in the source areas will be used to verify that SCOs for those areas have been achieved. If confirmation sampling indicates that SCOs were not achieved at the stated remedial depth, the Applicant must notify NYSDEC, submit the sample results and, and in consultation with DEC, determine if further action is necessary. For the rest of the site outside the identified source areas documentation samples would be collected at the base of development excavation areas to document the quality of soil remaining below the cover system.

3. **Secant Pile Wall**

Design and installation of a secant pile wall along a portion of the northern property border of the site to prevent recontamination from off-site non-aqueous phase liquid (NAPL). A remedial design work plan will be required and submitted to the Department for review, including anticipated depths and size of the wall. The wall will be installed as part of the remediation of the site.

4. Backfill

On-site soil which does not exceed the above excavation criteria may be used below the cover system described in remedy element 5 to backfill the excavation to the extent that a sufficient volume of on-site soil is available. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to complete the backfilling of the excavation and establish the designed grades at the site.

5. **Cover System**

A site cover will be required in areas where the upper two feet of exposed surface soil will exceed the applicable SCOs for 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.

6. **Enhanced Bioremediation**

In-situ enhanced biodegradation will be employed to treat petroleum-related compounds in groundwater in an approximately 4,000 square foot area in the central and western portions of the site. The biological breakdown of contaminants through in-situ aerobic bioremediation will be enhanced by the placement of Oxygen Release Compound (ORC) in excavation areas via direct

mixing, prior to backfilling. The total approximate treatment area is 9,000 square feet, which includes 5,000 square feet treatment area under the IRM. Monitoring will be required within the treatment areas, including monitoring for dissolved oxygen and oxidation/reduction potential.

7. Vapor Mitigation

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

8. 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 minimum.

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 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 NYCDOH; and
- require compliance with the Department approved Site Management Plan.

9. 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 8 above.
- Engineering Controls: The secant pile wall discussed in Paragraph 3, the cover system discussed in Paragraph 5 and the vapor mitigation system(s) discussed in Paragraph 7, 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 water use restrictions;
- 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 and indoor air to assess the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency of submittals to the Department;

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, inspection, and reporting of any mechanical or physical components of the active vapor mitigation system(s). The plan includes, but is not limited to:
- procedures for operating and maintaining the system(s); and
- compliance inspection of the system(s) to ensure proper O&M as well as providing the data for any necessary reporting.

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.

October 13, 2023
Date

R. Scott Deyette, Director, Remedial Bureau B

DECISION DOCUMENT

470 Kent Avenue
Brooklyn, Kings County
Site No. C224053
October 2023

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, 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 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
https://gisservices.dec.ny.gov/gis/dil/index.html?rs=C224053

Brooklyn Public Library
Williamsburg Branch
240 Division Avenue
Brooklyn, NY 11211
Phone: 718-302-3485

Brooklyn Community Board 1
435 Graham Avenue
Brooklyn, NY 11211
Phone: 718-389-0009

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 site is located in the South Williamsburg neighborhood of Brooklyn, NY, at the northwest corner of Kent Avenue and Division Street. Multi-unit residential housing (condominiums) and a school are present north of the site; Kent Avenue, multi-unit residential housing, a park, and commercial properties are located to the east; commercial properties are located to the south; and the East River and Wallabout Channel are located adjacent to the west side of the site.

Site Features: The site consists of two tax parcels identified as a Block 2134, Lots 1 and 150. The site is approximately 3.7 acres in size and is vacant. The entirety of the site is currently being developed for new residential buildings.

Current Zoning and Land Use: The site has an approved New York City zoning amendment with Special Permit modifications for residential (R7-3) zoning designation from the current manufacturing designation (M3-1) with a commercial (C2-4) overlay. This zoning designation typically denotes medium-density apartment houses with commercial uses that serve a wide range of uses, such as restaurants, funeral homes and repair services. The site is currently under construction and being redeveloped.

Past Use of the Site: A manufactured gas plant (K-Peoples Works, site no. 224053), formerly operated on the northern portion of the site prior to 1868 and ceased operations between 1893 and 1896. Other past uses include a stave yard, molasses storage, sugar refining, warehouse storage, and a brewing company. Most recently the site was used as a lumberyard and retail home center. In 2021, the two buildings and their footings and foundations were demolished.

Site Geology and Hydrogeology: The surface topography slopes down to the west towards Wallabout Channel. The site is underlain by four to 15 feet of soil classified as historic fill material consisting of asphalt, concrete, rock fragments and fine- to medium-grained, silty sand. The fill material is underlain by native layers of sand and silt with increasing silty clay to clay to the west

toward Wallabout Channel. The approximate depth to bedrock is 100 feet below grade surface.

Groundwater has been measured at depths ranging from approximately five to 15 feet below grade and flows in a westerly direction toward Wallabout Channel. Groundwater is tidally influenced.

A site location map is attached as Figure 1 and site layout 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(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 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 Volunteer. The Applicant does not have an obligation to address off-site contamination. 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.

The Department will seek to identify any parties (other than the Volunteers) known or suspected to be responsible for contamination at or emanating from the site, referred to as Potentially Responsible Parties (PRPs) to address off-site contamination in Wallabout Channel. The Department will bring an enforcement action against the PRPs. If an enforcement action cannot be brought or does not result in the initiation of a remedial program by any PRPs, the Department will evaluate the off-site contamination for action under the State Superfund. The PRPs are subject to legal actions by the State for recovery of all response costs the State incurs or has incurred.

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 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:

mercury
lead
fluoranthene
benzo(a)anthracene
benzene
benzo(b)fluoranthene
chrysene
total xylenes
1,2,4-trimethylbenzene
1,3,5-trimethylbenzene
toluene
ethylbenzene
naphthalene

trichloroethene (TCE)

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

groundwater
soil
soil vapor intrusion
indoor air

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.

The following IRM(s) have been completed at this site based on conditions observed during the RI.

Phase 1 Excavation (2022-2023)

Excavation and off-site disposal of soil/fill to a depth of two feet across the southern half of the site to support a Track 4 restricted residential cleanup. A deeper remedial excavation was also completed to approximately 10 feet below grade in the area of soil boring BMW-2 (Figure 3) to remove soil containing concentrations of SVOCs greater than PGWSCOs. Documentation samples were collected and analyzed to document the remaining soil quality across the 2-foot excavation area, and confirmation end-point samples were collected and analyzed to verify that PGWSCOs in the deeper excavation had been met. To ensure proper handling and disposal of excavated material, waste characterization sampling was completed for all site material for the purposes of off-site disposal in conformance with applicable federal, state and local laws, rules and regulations and facility-specific permits.

Approximately 4,200 cubic yards of soil/fill was removed as part of this IRM excavation and disposed of off-site. The excavation was backfilled with an approved crushed stone. The results of this IRM will be documented in the Final Engineering Report.

Underground Storage Tank (UST) Removal (2021)

The IRM consisted of demolition of the existing building as part of site preparation, removal of two petroleum USTs and appurtenant piping, and removal of associated petroleum-contaminated soil beneath the tanks to a depth of 15 feet below ground surface (bgs). Confirmation end-point samples were taken to demonstrate remaining soil meets PGWSCOs. In-situ enhanced biodegradation was employed to treat petroleum-related compounds in groundwater. The biological breakdown of contaminants through in-situ aerobic bioremediation was enhanced by the placement of Oxygen Release Compound (ORC) into the 5,000 square foot excavation treatment area located near the west central portion of the site (Figure 6). Approximately 1,900 cubic yards of soil/fill was removed as part of this IRM excavation and disposed of off-site. Monitoring will be required within the treatment areas, including monitoring for dissolved oxygen

and oxidation/reduction potential. The results of this IRM will be documented in the Final Engineering Report.

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 the 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. Sub-slab soil vapor and indoor air were analyzed for VOCs. Based upon investigations conducted to date, the primary contaminants of concern include petroleum VOCs, SVOCs and metals in soil, petroleum VOCs and metals in groundwater, and VOCs in soil vapor.

Soil - Sample results were compared with the 6 NYCRR Part 375 Restricted-Residential Use SCOs (RRSCOs). Those compounds detected in groundwater above the 6 NYCRR Part 703 Ambient Water Quality Standards (AWQS) were also compared to the Protection of Groundwater SCOs (PGWSCOs). PFAS results were compared with the Restricted Residential Guidance Values (RRGV) and/or Protection of Groundwater Guidance Values (PGGV) established by NYSDEC in June 2021.The soil analytical results are discussed below.

The following maximum petroleum-related VOCs were detected in soil samples in the western and central areas of the site to a depth of 23 feet bgs above the applicable regulatory standards: benzene at 69 parts per million (ppm) compared to the PGWSCO of 0.06 ppm, toluene at 150 ppm (PGWSCO of 0.7 ppm), ethylbenzene at 300 ppm (PGWSCO of 1 ppm), total xylenes at 220 ppm (PGWSCO of 1.6 ppm), naphthalene at 11,000 ppm (PGWSCO of 12 ppm), 1,3,5-trimethylbenzene at 52 ppm (PGWSCO of 8.4 ppm), and 1,2,4-trimethylbenzene at 110 ppm (PGWSCO of 3.6 ppm).

Several SVOCs were detected in soil samples in the western and northern areas of the site to a depth of 23 feet below ground surface (bgs) at levels exceeding the RRSCOs and/or PGWSCOs: fluoranthene at 2,200 ppm (RRSCO of 100 ppm), naphthalene at 1,100 ppm (PGWSCO of 12 ppm), benzo(a)anthracene at 940 ppm (PGWSCO of 1 ppm), benzo(b)fluoranthene at 960 ppm (PGWSCO of 1.7 ppm), chrysene at 920 ppm (PGWSCO of 1 ppm), phenanthrene at 2,800 ppm (RRSCO of 100 ppm), and pyrene at 2,000 ppm (RRSCO of 100 ppm).

Metals were detected in soil samples in the southern half of the site to a depth of 18 feet below ground surface (bgs) at levels exceeding RRSCOs: lead at 21,900 ppm (RRSCO of 400 ppm), and mercury at 3.51 ppm (RRUSCO of 0.81 ppm),

Grossly contaminated material (GCM) as defined a 6NYCRR Part 375-1.2(u) has been identified along the northern boundary of the site to a depth of 15 feet below grade surface.

No PCBs or Pesticides were detected in soil samples above RRSCOs.

No PFAS were detected at concentrations exceeding the applicable guidance values.

Data does not indicate any off-site impacts in soil related to this site.

Groundwater - Groundwater sample results were compared with the 6 NYCRR Part 703 Ambient Water Quality Standards (AWQS). PFAS results were compared with the Maximum Contaminant Limit (MCL or drinking water standard).

VOCs were detected in groundwater samples in the northern and eastern areas of the site at concentrations which exceed AWQS: benzene at 2,500 parts per billion (ppb) compared to the AWQS of 1 ppb, toluene at 140 ppb (AWQS of 5 ppb), ethylbenzene at 490 ppb (AWQS of 5 ppb), p/m-xylene at 1,200 ppb (AWQS of 5 ppb), o-xylene at 380 ppb (AWQS of 5 ppb), naphthalene at 2300 ppb (AWQS of 10 ppb), 1,3,5-trimethylbenzene at 83 ppb (AWQS of 5 ppb), 1,2,4-trimethylbenzene at 370 ppb (AWQS of 5 ppb), cis-1,2-dichloroethene at 13 ppb (AWQS of 5 ppb), vinyl chloride at 38 ppb (AWQS of 2 ppb), tetrachloroethene (PCE) at 13 ppb (AWQS of 5 ppb), and trichloroethene (TCE) at 15 ppb (AWQS of 5 ppb).

SVOCs were detected in groundwater samples in the northern half of the site at concentrations which exceed AWQS: benzo(a)anthracene at 16 ppb (AWQS of 0.002 ppb), benzo(a)pyrene at 24 ppb (AWQS of 0 ppb), benzo(b)fluoranthene at 23 ppb (AWQS of 0.002 ppb), benzo(k)fluoranthene at 7.5 ppb (AWQS of 0.002 ppb), and chrysene at 12 ppb (AWQS of 0.002 ppb).

Dissolved metals were detected in groundwater samples in the southern half of the site at concentrations which exceed AWQS: lead at 144 ppb (AWQS of 25 ppb).

PFAS were detected in groundwater samples in the southern half of the site at concentrations which exceed MCLs: perfluorooctanoic acid (PFOA) at 63.4 parts per trillion (ppt) compared to the MCL of 10 ppt.

Data does not indicate any off-site impacts in groundwater related to this site.

Sediment - Wallabout Channel is considered to be off-site and was not investigated as part of the site's RI. However, previous investigations of the sediments in the channel adjacent to the site identified MGP-related olfactory and visual impacts. These potential impacts will be further investigated and addressed under a separate program and are not addressed by the remedy presented in this document.

Soil Vapor, Sub-Slab Soil Vapor and Indoor Air:
Sub-slab and indoor air samples were collected within the two former on-site buildings. PCE was detected in sub-slab soil vapor sample locations at a maximum concentration of 219 micrograms

per cubic meter (ug/m3) and a maximum of 0.875 ug/m3 was detected in a co-located indoor air sample. TCE was detected in two samples at concentrations requiring mitigation. Sample concentrations of 102 and 2160 ug/m3 were detected in sub-slab soil vapor samples but was not detected in co-located indoor air sample. Actions are needed to address the potential for exposures related to soil vapor intrusion based on the sampling

The data do not indicate any 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.*

Since the site is fenced which restricts public access. However, persons who enter the site could contact contaminants in the soil by walking on the site, digging, or otherwise disturbing the soil. 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. Because there is no on-site building, inhalation of site contaminants in indoor air due to soil vapor intrusion does not represent a concern for the site in its current condition. However, the potential exists for the inhalation of site contaminants due to soil vapor intrusion for any future on-site development. In addition, environmental sampling indicates soil vapor intrusion from site-contamination 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, soil, and soil vapor

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 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, Enhanced Bioremediation and Vapor Mitigation remedy.

The elements of the selected remedy, as shown in Figures 3-8, 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, including:
- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G;
- soils which exceed the protection of groundwater soil cleanup objectives (PGWSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards; and
- All soils in the upper two feet which exceed the restricted residential soil cleanup objectives (RRSCOs) will be excavated and transported off-site for disposal. In addition, petroleum-

impacted material where volatile organic compounds (VOCs) exceed PGWSCOs and RRSCOs will be excavated from six source areas throughout the site to depths ranging from 9 to 23 feet below grade and taken off-site for proper disposal.

Approximately 11,500 cubic yards of contaminated soil will be removed from the site. Collection and analysis of confirmation samples at the remedial excavation depths in the source areas will be used to verify that SCOs for those areas have been achieved. If confirmation sampling indicates that SCOs were not achieved at the stated remedial depth, the Applicant must notify NYSDEC, submit the sample results and, and in consultation with DEC, determine if further action is necessary. For the rest of the site outside the identified source areas documentation samples would be collected at the base of development excavation areas to document the quality of soil remaining below the cover system.

3. Secant Pile Wall

Design and installation of a secant pile wall along a portion of the northern border of the site to prevent recontamination from off-site non-aqueous phase liquid (NAPL). A remedial design work plan will be required and submitted to the Department for review, including anticipated depths and size of the wall. The wall will be installed as part of the remediation of the site.

4. Backfill

On-site soil which does not exceed the above excavation criteria may be used below the cover system described in remedy element 5 to backfill the excavation to the extent that a sufficient volume of on-site soil is available. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to complete the backfilling of the excavation and establish the designed grades at the site.

5. Cover System

A site cover will be required in areas where the upper two feet of exposed surface soil will exceed the applicable SCOs for 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.

6. Enhanced Bioremediation

In-situ enhanced biodegradation will be employed to treat petroleum-related compounds in groundwater in an approximately 4,000 square foot area in the central and western portions of the site. The biological breakdown of contaminants through in-situ aerobic bioremediation will be

enhanced by the placement of Oxygen Release Compound (ORC) in excavation areas via direct mixing, prior to backfilling. The total approximate treatment area is 9,000 square feet, which includes 5,000 square feet treatment area under the IRM. Monitoring will be required within the treatment areas, including monitoring for dissolved oxygen and oxidation/reduction potential.

7. Vapor Mitigation

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

8. 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 minimum.

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 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 NYCDOH; and
- require compliance with the Department approved Site Management Plan.

9. 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 8.
- Engineering Controls: The secant pile wall in Paragraph 3, the cover system discussed in Paragraph 5 and the vapor mitigation system discussed in Paragraph 7, above.

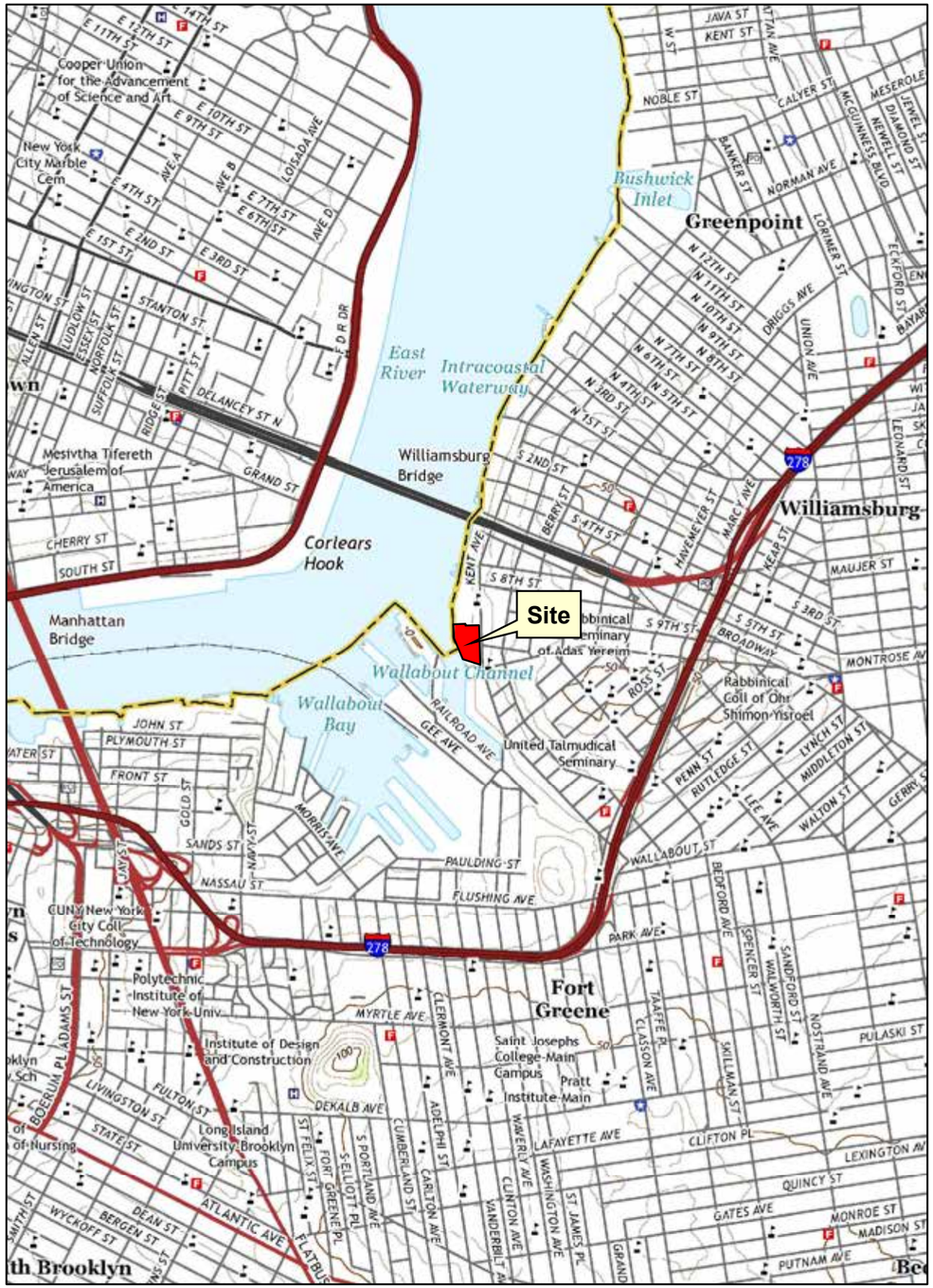
This plan includes, but may not be limited to:

- 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 water use restrictions;
- 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 and indoor air to assess the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency of submittals to the Department;

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, inspection, and reporting of any mechanical or physical components of the active vapor mitigation system(s). The plan includes, but is not limited to:
- procedures for operating and maintaining the system(s); and
- compliance inspection of the system(s) to ensure proper O&M as well as providing the data for any necessary reporting.



Basemap: USGS Topographic Map, 7.5 Minute Quadrangles, Brooklyn, NY, 2016

Site Location

0 1,000 2,000 4,000 Feet

http://gis.nyc.gov/taxmap/map.htm

Department of Finance Digital Tax Map

0 200 400 800 Feet

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NYC Department of City Planning, Information Technology Division

Department of City Planning MapPLUTO - 2020 v6

0 200 400 800 Feet

Site

470 Kent Avenue
Brooklyn, New York
Block 2134, Lots 1 & 150

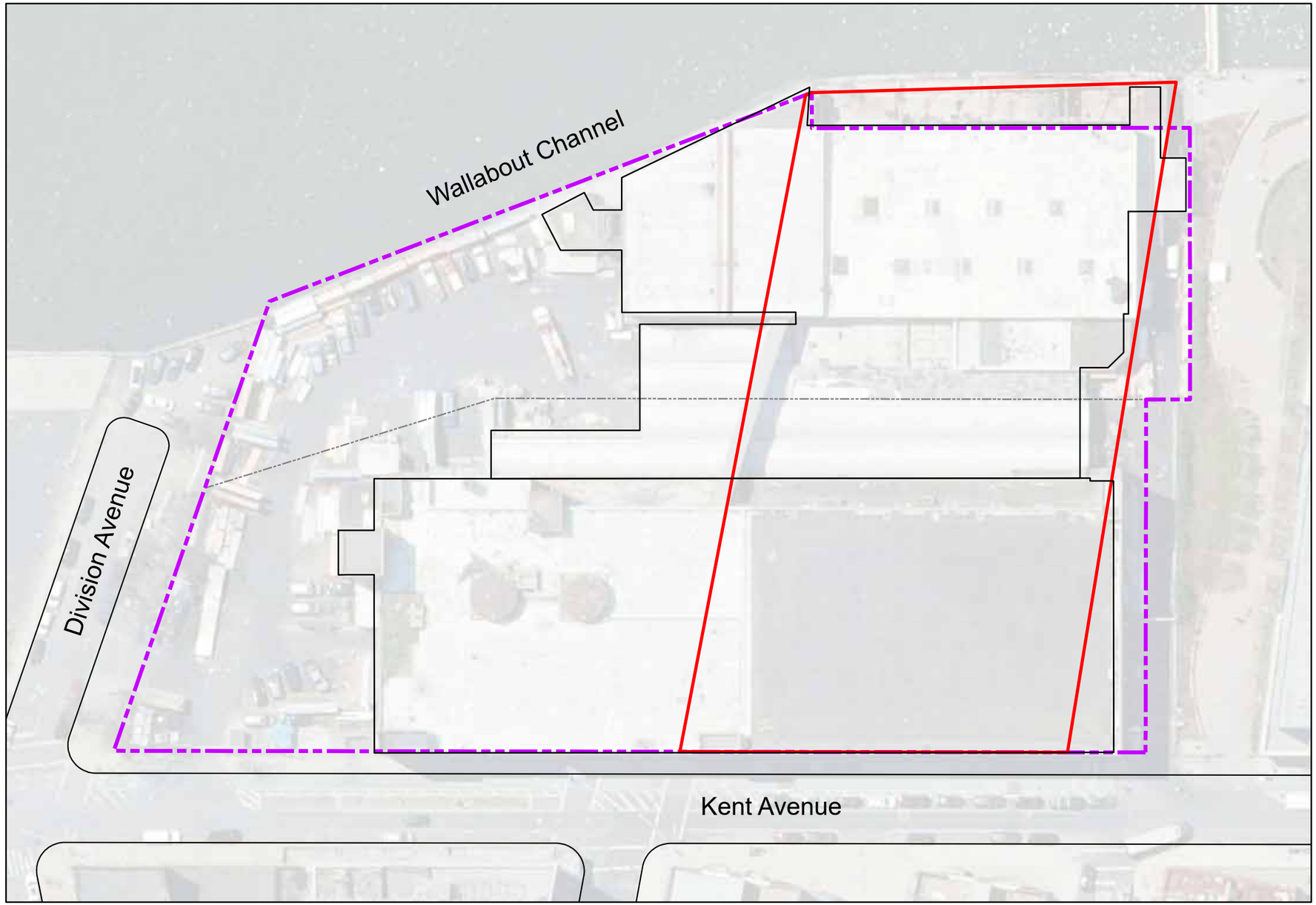
TENEN ENVIRONMENTAL

Tenen Environmental, LLC
121 West 27th Street
Suite 702
New York, NY 10001
O: (646) 606-2332
F: (646) 606-2379

Drawn By	Checked By	Date	Scale
LM	MC	Septmeber 2021	As Noted

Drawing Title: **Site Location Map**

Drawing No: **Figure 1**



Legend

- Approximate Former MGP Boundary
- Site Boundary
- Lot Line

0 30 60 120 Feet

Service Layer Credits: NYS ITS GIS Program Office

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Suite 702
New York, NY 10001
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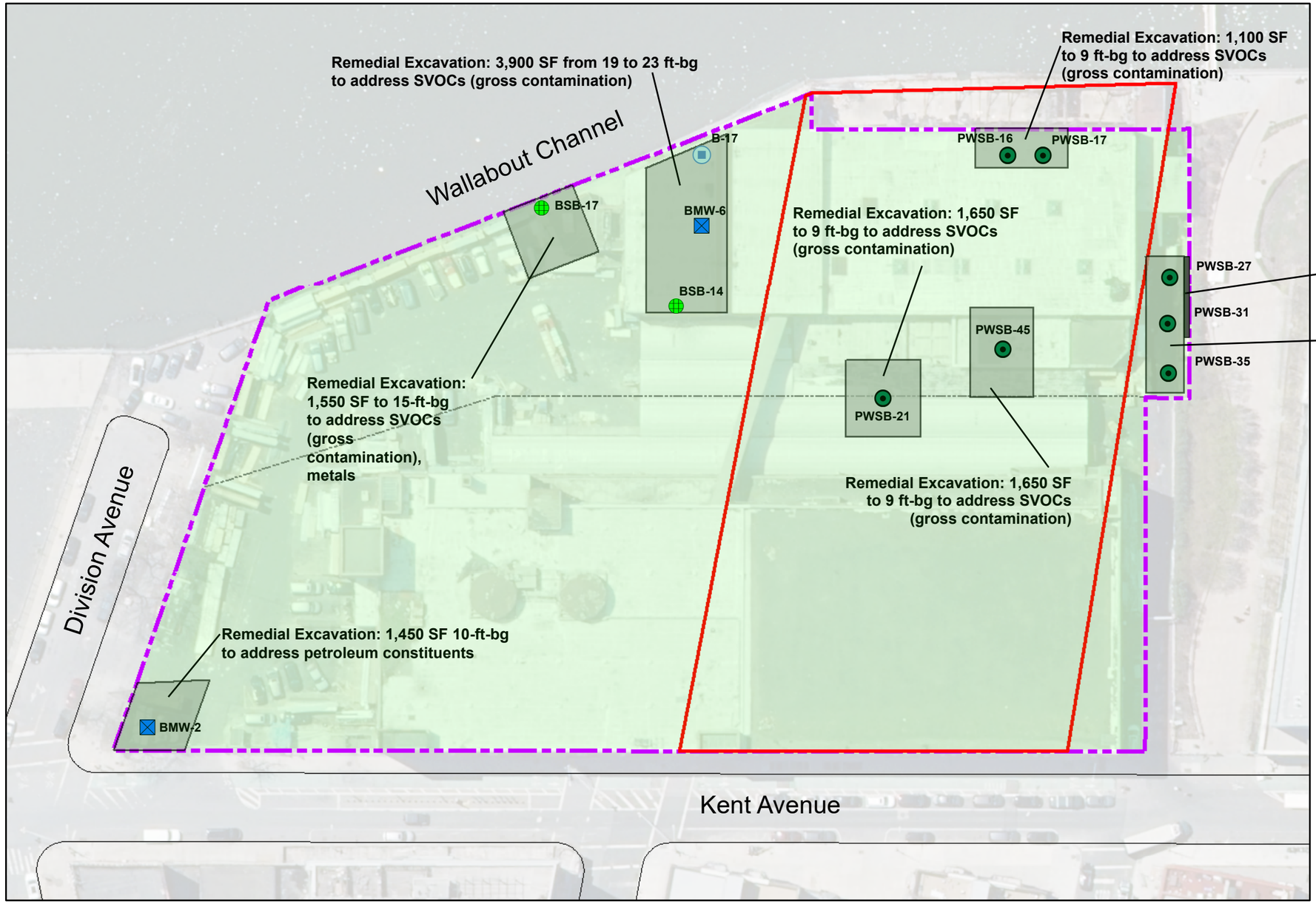
Drawing Title: **Site Layout**

Drawing No: **Figure 2**



Secant Pile Wall to 15 ft-bg to Prevent NAPL Recontamination

Remedial Excavation: 1,600 SF to 9 to 15 ft-bg (east to west) to address SVOCs (gross contamination and NAPL)

Remedial Excavation: 2 ft-bg across the Site

Legend

- Geotechnical Borings
- Southern Soil Boring
- Groundwater Monitoring Well Location
- Northern MGP Boring
- Approximate Former MGP Boundary
- Site Boundary
- Lot Line
- Deep Remedial Excavation

0 30 60 120 Feet

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New York, NY 10001
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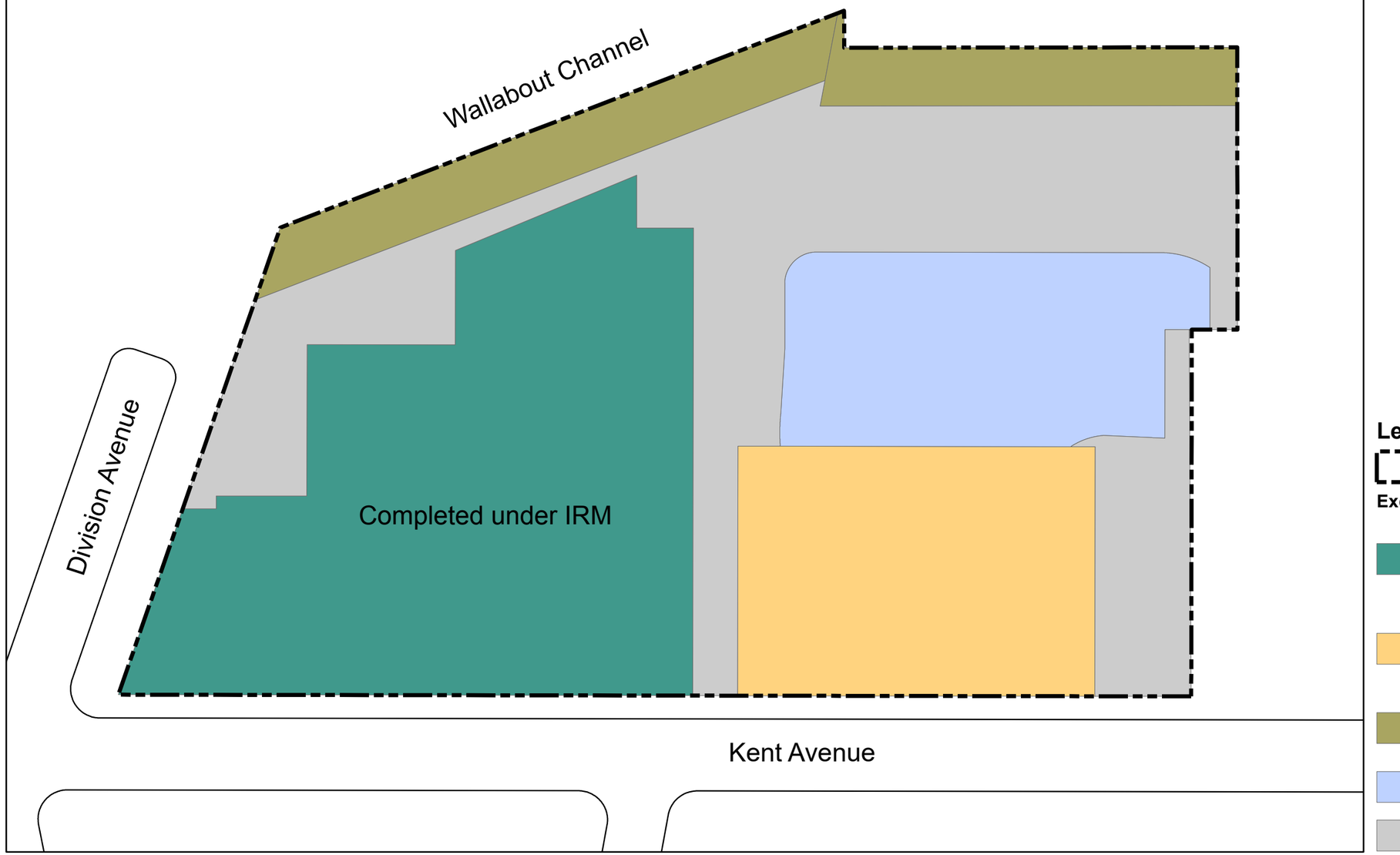
Drawing Title: **Extent of Remedial Excavation**

Drawing No: **Figure 3**



Legend

- Site Boundary

Excavation Areas

- First Phase: Excavation to approximate El +1 foot (9 to 19 feet below existing grade)
- Second Phase; Excavation to approximate El +1 foot (9 to 19 feet below existing grade)
- Excavation of Trenches to Install Tie-Backs for new Bulkhead under IRM Work Plan
- Excavation to 1 to 7 feet below existing grade.
- Minimal excavation to support installation of utilities

Feet
0 30 60 120

Service Layer Credits:

Site

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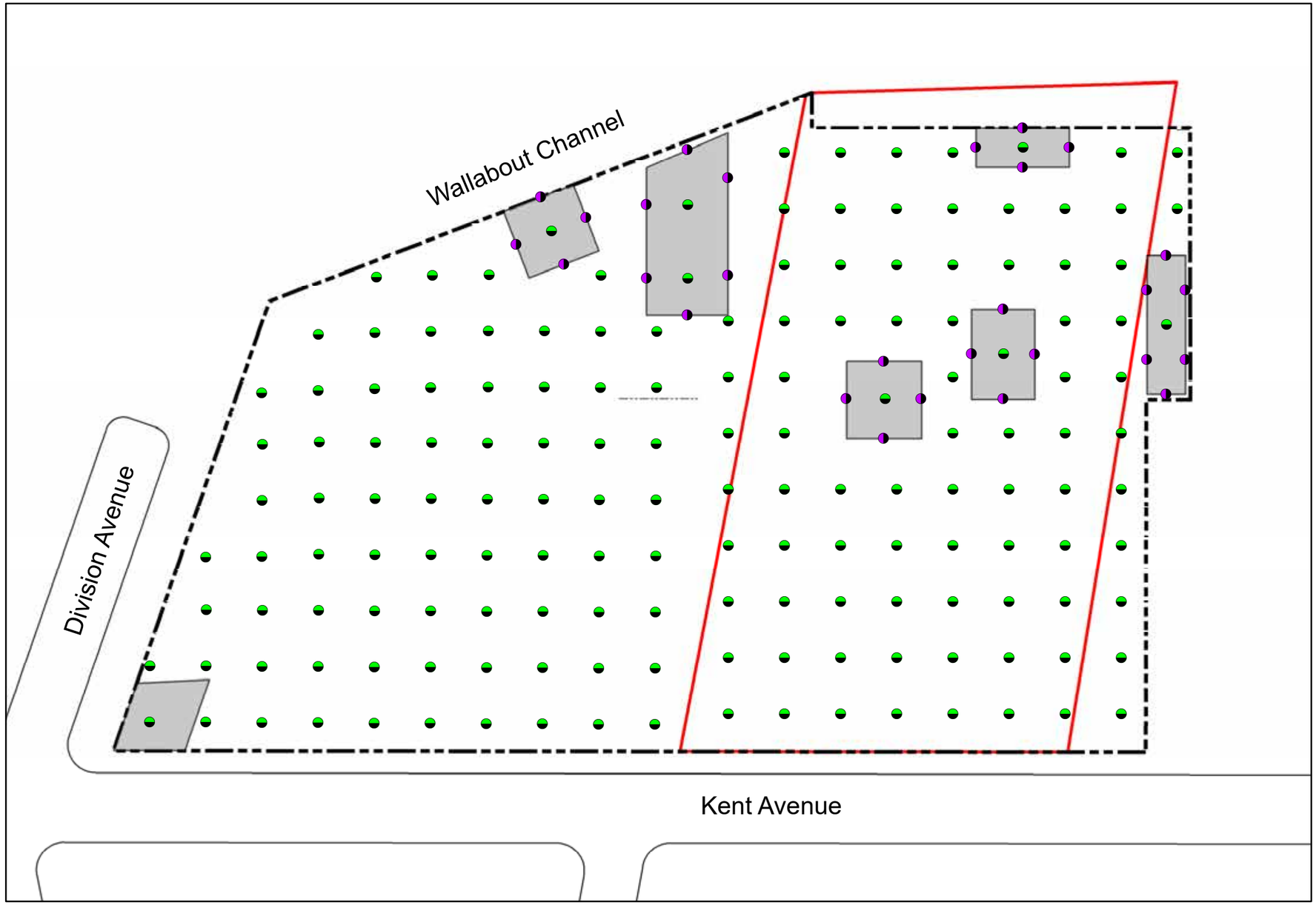
TENEN ENVIRONMENTAL
Tenen Environmental, LLC
121 West 27th Street
Suite 702
New York, NY 10001
O: (646) 606-2332
F: (646) 606-2379

Drawn By	Checked By	Date	Scale
LM	MC	September 2021	As Noted

Drawing Title: **Extent of Development Excavation**

Drawing No: **Figure 4**



Legend

- Sidewall Samples
- Bottom Endpoint Samples
- Site Boundary
- Approximate Former MGP Boundary
- Deep Remedial Excavation

0 30 60 120 Feet

Site

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121 West 27th Street
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New York, NY 10001
O: (646) 606-2332
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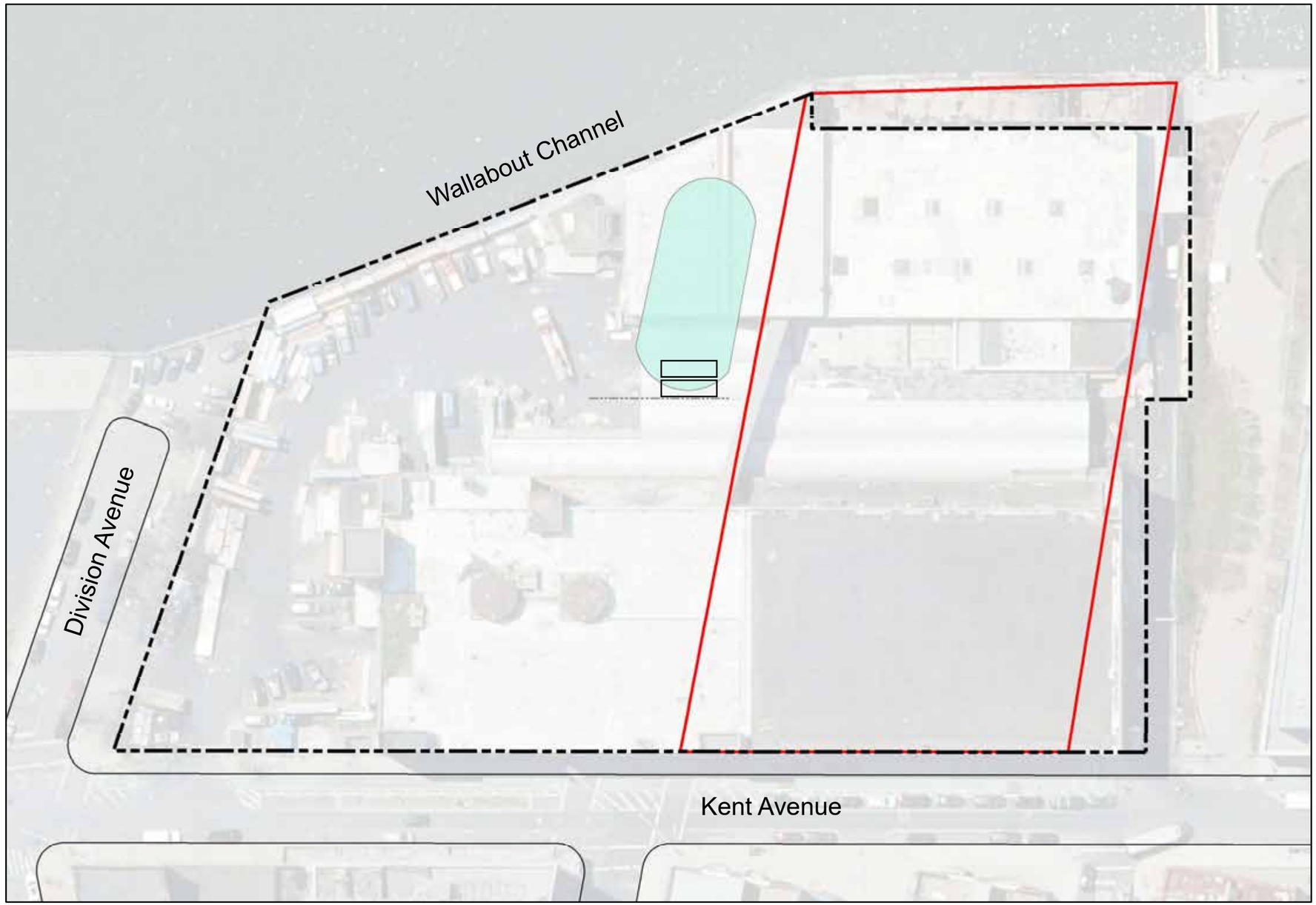
Drawing Title: **End-point Sample Locations**

Drawing No: **Figure 5**



Note: If residual petroleum is encountered below development depth, groundwater treatment will be applied prior to releasing hydraulic control

Service Layer Credits: NYS ITS GIS Program Office

Legend

- Groundwater Treatment Area
- Site Boundary
- Approximate Former MGP Boundary
- Approximate UST Location

0 30 60 120 Feet

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O: (646) 606-2332
F: (646) 606-2379

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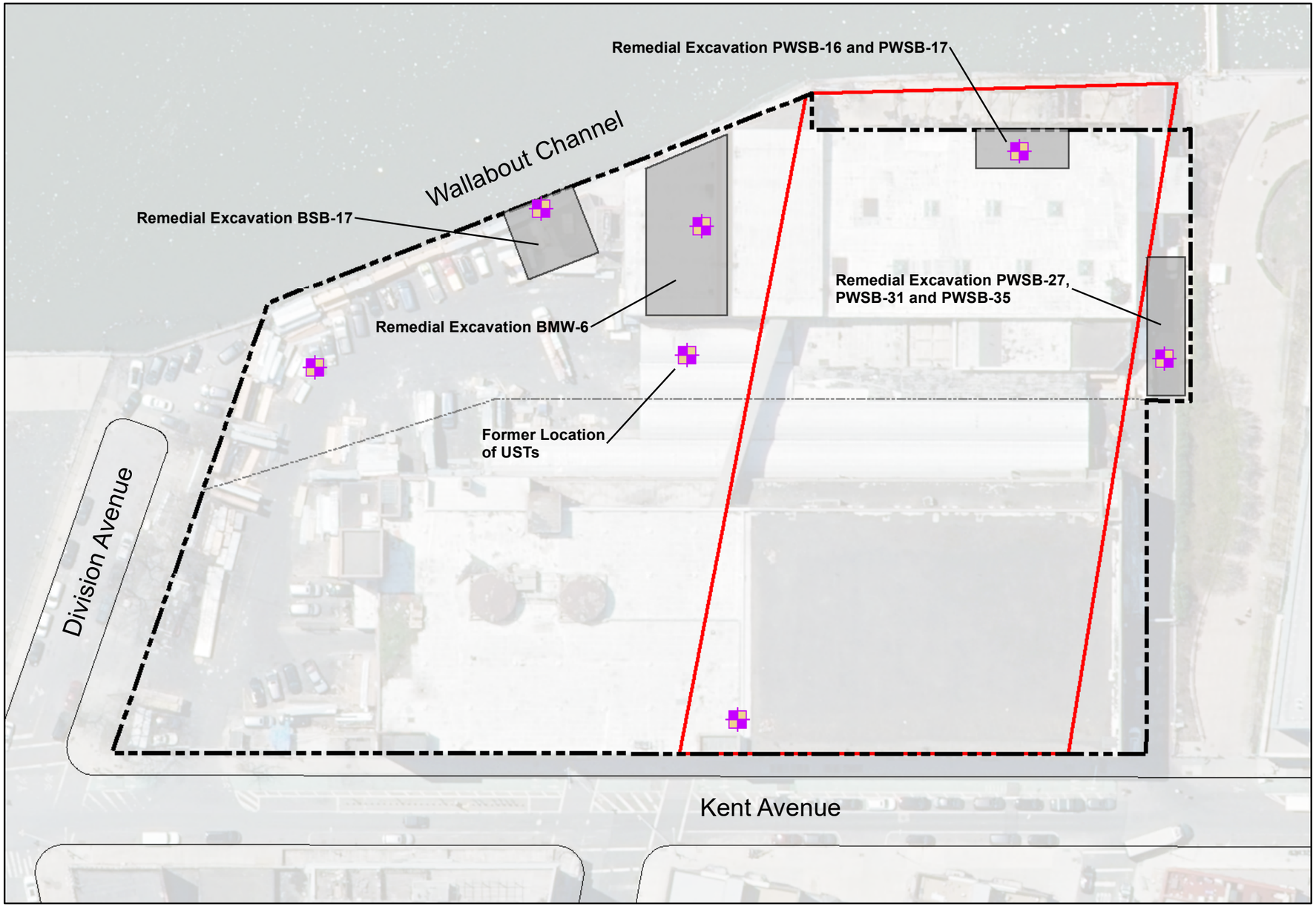
LM	MC	September 2021	As Noted

Drawing Title: **Groundwater Treatment Areas**

Drawing No: **Figure 6**



Legend

- Post-Remedial Groundwater Monitoring Well Location
- Site Boundary
- Approximate Former MGP Boundary

Feet

0 30 60 120

Service Layer Credits: NYS ITS GIS Program Office

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121 West 27th Street
Suite 702
New York, NY 10001
O: (646) 606-2332
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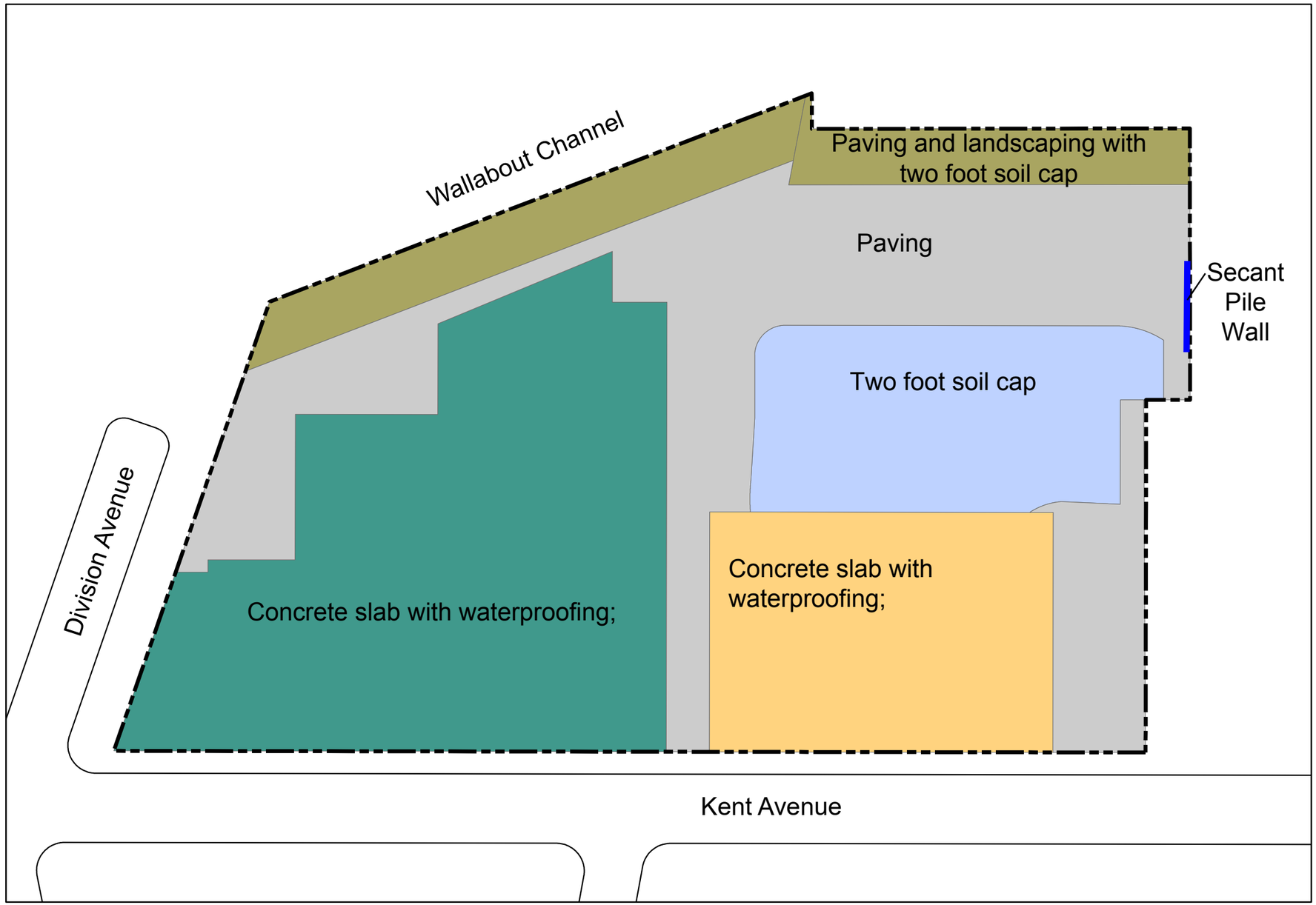
LM	MC	May 2023	As Noted

Drawing Title
Post-Remedial Groundwater Monitoring Well Location

Drawing No
Figure 7



Legend

Site Boundary

Service Layer Credits:

N

Feet

0 30 60 120

Site

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Tenen Environmental, LLC
121 West 27th Street
Suite 702
New York, NY 10001
O: (646) 606-2332
F: (646) 606-2379

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Drawing Title: **Post-Remedial Engineering Controls**

Drawing No: **Figure 8**