DECISION DOCUMENT

Queens Plaza Residential Development – Site B
Brownfield Cleanup Program
Long Island City Queens County
Site No. C241151
December 2015

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

DECLARATION STATEMENT - DECISION DOCUMENT

Queens Plaza Residential Development - Site B
Brownfield Cleanup Program
LONG ISLAND CITY, Queens County
Site No. C241151
December 2015

Statement of Purpose and Basis

This document presents the remedy for the Queens Plaza Residential Development – Site B site, a brownfield cleanup site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the Queens Plaza Residential Development – Site B site and the public's input to the proposed remedy presented by the Department.

Description of Selected Remedy

The elements of the selected remedy are as follows:

1. Remedial Design

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

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

2. Excavation

The excavation is currently being implemented under an IRM; refer to Section 6.2 of the Decision Document. A Track 2 restricted-residential remedy will be achieved over the majority of the site. Areas along the perimeter of the site where structural reasons prevent meeting restricted-residential SCOs to 15 fbg, a Track 4 restricted-residential remedy will be achieved (Refer to Figure 2).

3. NAPLRecovery

Installation and operation of creosote NAPL recovery wells along the western and southern boundaries of the site to remove potentially mobile creosote NAPL from bedrock as required by the Department. The number, depth, type and spacing of the recovery wells will be determined during the design phase of the remedy. Creosote NAPL will be collected periodically from each well; however, if wells are determined by the Department to accumulate large quantities of creosote NAPL over extended time periods, they can be converted to automated collection.

4. Cover System

A site cover will be required to allow for restricted residential use of the site in areas where Track 4 is achieved. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

5. Institutional Control

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

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for 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.

6. Site Management Plan

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

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

Institutional Controls: The Environmental Easement discussed in Paragraph 5 above.

Engineering Controls: The NAPL recovery system discussed in Paragraph 3 and the soil cover discussed in Paragraph 4.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land and groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion future buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

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

- monitoring of soil vapor and groundwater to assess the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency of submittals to the Department;
- monitoring for vapor intrusion for any future buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.
- compliance inspection of the system(s) to ensure proper O&M as well as providing the data for any necessary reporting.

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;
- maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

Contingent Remedial Element:

The Support of Excavation (SOE) installed at the site may limit the ability to excavate all contamination and meet the PGWSCOs. If contamination in the overburden remains, a groundwater extraction and treatment system will be implemented to treat contaminants in groundwater and to ensure contaminated groundwater does not migrate off-site. The groundwater extraction system will be designed and installed so that the capture zone is sufficient to intercept the groundwater contaminant plume to stop further migration. The extraction system will create a depression of the water table so that contaminated groundwater is directed toward the extraction wells within the site. Groundwater will be extracted from the subsurface along the down-gradient edges (the western and southern site boundaries) of the groundwater contaminant plume. If required, further details of the extraction system will be determined during the remedial design and any O&M requirements will be incorporated into the SMP described in paragraph 6 above.

Declaration

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

December 23, 2015

Date

Robert Cozzy, Director
Remedial Bureau B

DECISION DOCUMENT

Queens Plaza Residential Development – Site B
LONG ISLAND CITY, Queens County
Site No. C241151
December 2015

SECTION 1: SUMMARY AND PURPOSE

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

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

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (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 repository:

Queens Borough Public Library - Court Square Branch
Attn: Allison McKenna-Miller
25-01 Jackson Avenue
Long Island City, NY 11101
Phone: 718-937-2790

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going

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

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The Queens Plaza Residential Development - Site B is located in an urban area at 28-10 Jackson Avenue in Long Island City. This site was a portion of the NYSDEC Voluntary Cleanup Program (#V00081) site known as the Outlet City. This site encompasses a group of parcels bounded on the north by the Queens Plaza Residential Development BCP site (C241105) and Jackson Avenue; to the west by Orchard Street; to the south by the Long Island Railroad (LIRR) Sunnyside Yard property and to the east by Queens Boulevard.

Site Features: The site is currently vacant. Prior to demolition in late 2014, the site consisted of nine buildings related to prior manufacturing and/ or commercial activities, a narrow unpaved area along the LIRR Sunnyside Yard and two asphalt parking lots.

Current Zoning and Land Use: The site is currently unoccupied and is zoned M1-6/R10 (Manufacturing and Residential) under the special Long Island City Mixed Use District. According to the NYC Department of City Planning website, “The Special Long Island City Mixed Use District (LIC) promotes the development and expansion, at varying densities, of the longstanding mix of residential, commercial, industrial and cultural uses found in its four subdistricts—Court Square, Queens Plaza, Hunters Point and Dutch Kills.”

Past Use of the site: The West Chemical Company operated at the site from the early 1900’s until their closure in 1977. The company manufactured commercial and household products such as disinfectants, insecticides, soaps, floor wax and Kotex dispensing machines. Bulk quantities of pine oil, mineral oil, hydrochloric acid, cresylic acid, tar acid, caustic potash, terpene solvent, Shell E-407 solvent, ortho nitro toluene, kerosene and creosote were stored and used on-site. In 1977, the site was transferred to the Modell Company and used for commercial purposes under the company name Outlet City. Multiple previous environmental investigations were conducted on-site since the mid-1980's leading up to the property owner at the time, Outlet City, signing Voluntary Clean-up Agreements with the Department on February 10, 1997 and again on April 18, 2001. The property was again sold and it entered the BCP on May 20, 2014. The former West Chemical/ Outlet City property now consists of three BCP sites: C241105, C241151 and C241169.

Site Geology/Hydrogeology: Site B is located on gently sloping land with the high point along Jackson Avenue sloping down approximately 7 feet in elevation to the border with the LIRR property to the south. Depth to bedrock varies from approximately 5 -50 feet below grade (fbg) and consists predominantly of gray gneiss with varying degrees of weathering. Surface soils consist of a fill layer approximately 4 – 12 feet in thickness. This fill is a mixture of fine to medium sand, with some silt and gravel and traces of brick, cinders, concrete, cobbles, and

wood. The fill is underlain by silty sand and glacial deposits followed by a layer of fine sand with intermittent seams of silt and clay. Additionally, a till layer is present over portions of the site beginning from approximately 10 fbg and extending to the top of bedrock

The groundwater table ranges from approximately 3 to 12 fbg over the site. Based on groundwater elevation data collected in 2014, groundwater appears to flow west, south and north.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to restricted-residential (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(s) under the Brownfield Cleanup Agreement is a/are Volunteer(s). The Volunteer does not have an obligation to address off-site contamination. The Department has determined that this site poses a significant threat to human health and the environment and there are off-site impacts that require remedial activities; accordingly, enforcement actions were necessary.

The Department and LIC Operator Co. L.P. entered into a Consent Order on April 6, 2015. The Order obligates the remedial party to implement a full remedial program (remedial investigation and remedial action) for Off-site Areas.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

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

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

The RI is intended to identify the nature (or type) of contamination which may be present at a site and the extent of that contamination in the environment on the site, or leaving the site. The RI reports on data gathered to determine if the soil, groundwater, soil vapor, indoor air, surface water or sediments may have been contaminated. Monitoring wells are installed to assess groundwater

and soil borings or test pits are installed to sample soil and/or waste(s) identified. If other natural resources are present, such as surface water bodies or wetlands, the water and sediment may be sampled as well. Based on the presence of contaminants in soil and groundwater, soil vapor will also be sampled for the presence of contamination. Data collected in the RI influence the development of remedial alternatives. The RI report is available for review in the site document repository and the results are summarized in section 6.3.

The analytical data collected on this site includes data for:

- groundwater
- soil
- soil vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

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

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

6.1.2: RI Results

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

phenol
benzene
1,2-dichloroethane
dieldrin
4,4'-DDD
lead
arsenic
naphthalene
acenaphthene
xylene
creosote
1,1,1-Trichloroethane
1,4-dichlorobenzene

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.

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

IRM - Vaults and Kettles

During the remedial investigation, 45 subsurface vaults and kettles were identified on-site which contained various chemicals/products from the site's former operation as West Chemical. An IRM was implemented to properly dispose of the material in preparation for site excavation. The IRM was completed in March 2015 and consisted of the following:

- The collection of physical and chemical characteristics from liquid in each of the kettles and vaults to assess whether the contents were hazardous and whether toxic or explosive vapors were present; and

- The removal and disposal of the liquid content of each vault and kettle to render it safe for remediation. Approximately 160,000 gallons of various liquids were properly disposed of at off-site facilities.

The Department approved a Construction Completion Report for this IRM on May 15, 2015.

IRM - Excavation

Excavation is the main component of the site remedy and is currently being conducted site-wide either to bedrock or to pre-determined depths based on data collected during the remedial investigation. Excavation began in February 2015 and is scheduled to continue through January 2016. The IRM consists of the following:

- On-site soil in the upper 15 feet which exceed the lower of restricted-residential SCOs or the applicable protection of groundwater soil cleanup objectives (PGWSCOs), as defined by 6 NYCRR Part 375-6.8, will be excavated and transported off-site for disposal.

- On-site soil below 15 feet in depth which exceed the applicable PGWSCOs will be excavated to the extent feasible. Applicable PGWSCOs refers to a list of contaminants detected in groundwater during the remedial investigation above their respective Ambient Water Quality Standards and Guidance Values (AWQSGVs).

- Approximately 50,000 cubic yards of contaminated soil will be removed from the site and properly disposed. The IRM was designed to remove all sources of contamination, as defined in 6 NYCRR Part 375-1.2(au), to the extent feasible.

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

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), and pesticides. Based on the remedial investigation conducted at the site in 2014, the primary contaminants of concern are related to creosote and petroleum releases although chlorinated VOCs, pesticides and metals contamination are also present. The greatest impact was encountered in the central processing and storage areas on the west side of site where various chemicals were stored during and after West Chemical's operation at the property. Creosote Dense Non-Aqueous Phase Liquid (DNAPL), petroleum Light Non-Aqueous Phase Liquid (LNAPL) as well as a hybrid mixture of the two, in the form of LNAPL, are present on-site. The impacted media for this site are groundwater, soil and soil vapor.

Groundwater:

Total on-site VOC's, including both chlorinated and petroleum compounds, are present in groundwater from non-detect to over 15,000 parts per billion (ppb). Compounds detected exceeding AWQSGVs include xylene up to 1,460 ppb (compared to a groundwater standard of 5 ppb) and 1,2-dichloroethane up to 4,280 ppb (compared to a groundwater standard of 0.6 ppb).

Total on-site SVOCs (semi-volatile organic compounds) are present in groundwater from non-detect to over 30,000 ppb. Compounds detected exceeding AWQSGVs include naphthalene up to 11,400 ppb (compared to a groundwater guidance value of 10 ppb), and phenol up to 3,630 ppb (compared to a groundwater standard of 1 ppb).

Several pesticides were detected over AWQSGVs including dieldrin detected up to 2 ppb (compared to a groundwater standard of 0.004 ppb) and 4,4'-DDD up to 4.5 ppb (compared to a groundwater standard of 0.3 ppb).

Several metals were detected over AWQSGVs including arsenic up to 162 ppb (compared to a groundwater standard of 25 ppb) and lead up to 303 ppb (compared to a groundwater standard of 25 ppb).

The 2014 remedial investigation included the collection of overburden groundwater samples only. Subsequent to the remedial investigation, a limited bedrock evaluation was conducted and DNAPL was encountered in weathered bedrock in the southwestern portion of the site. Additional information will be collected in this area and presented in the Remedial Design Report.

During the remedial investigation, contaminated groundwater was confirmed to be migrating off-site.

Soil:

Total VOCs in soil range from non-detect over 250 parts per million (ppm). Compounds exceeding their restricted residential soil cleanup objectives (RRSCOs) include xylene up to 147 ppm (RRSCO of 100 ppm) and 1,4-dichlorobenzene up to 29.2 ppm (RRSCO of 13 ppm).

Total SVOCs in soil range from non-detect over 5,000 ppm. Compounds exceeding their RRSCO's include acenaphthene up to 267 ppm (RRSCO of 100 ppm) and naphthalene up to 2,150 ppm (RRSCO of 100 ppm).

Several metals exceeded their RRSCO's including arsenic up to 104 ppm (RRSCO of 16 ppm) and lead up to 3,890 ppm (RRSCO of 400 ppm). The highest metals concentrations were encountered in surface soil samples collected adjacent to on-site railroad tracks.

The only pesticide detected above RRSCOs was dieldrin up to 0.77 ppm (RRSCO of 0.2 ppm).

PCB's were detected in soil at concentrations below the restricted-residential SCO.

Offsite soil contamination above unrestricted SCOs was confirmed during previous investigations.

Soil Vapor:

Elevated petroleum and chlorinated VOCs were detected in soil vapor. For example, the petroleum-VOC benzene was detected up to 3,480 micrograms per cubic meter (ug/m3) and the chlorinated-VOC 1,1,1-trichloroethane was detected up to 25,000 ug/m3.

The site was determined to represent a significant threat to public health and the environment.

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*.

Persons who dig below the ground surface will come into contact with contamination in subsurface soils. Access to the site is restricted. However, contact with contaminated groundwater is likely

if people dig below the surface. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Because the site is vacant, the inhalation of site-related contaminants due to soil vapor intrusion does not represent a current concern. An evaluation of the potential for soil vapor intrusion to occur will be completed as the site use changes. In addition, 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.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- 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.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into 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 remedy selected is a dual-track cleanup which consists of both a Track 2 restricted-residential use with generic soil cleanup objectives area and a Track 4 restricted-residential use with generic soil cleanup objectives area.

The selected remedy is referred to as an excavation to restricted-residential SCOs, cover system, and NAPL recovery remedy.

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

1. Remedial Design

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

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

2. Excavation

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3. NAPLRecovery

Installation and operation of creosote NAPL recovery wells along the western and southern boundaries of the site to remove potentially mobile creosote NAPL from bedrock as required by the Department. The number, depth, type and spacing of the recovery wells will be determined during the design phase of the remedy. Creosote NAPL will be collected periodically from each well; however, if wells are determined by the Department to accumulate large quantities of creosote NAPL over extended time periods, they can be converted to automated collection.

4. Cover System

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5. Institutional Control

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

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for 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.

6. Site Management Plan

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

B. 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 5 above.

Engineering Controls: The NAPL recovery system discussed in Paragraph 3 and the soil cover discussed in Paragraph 4.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land and groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion future buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

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

- monitoring of soil vapor and groundwater to assess the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency of submittals to the Department;
- monitoring for vapor intrusion for any future buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.
- compliance inspection of the system(s) to ensure proper O&M as well as providing the data for any necessary reporting.

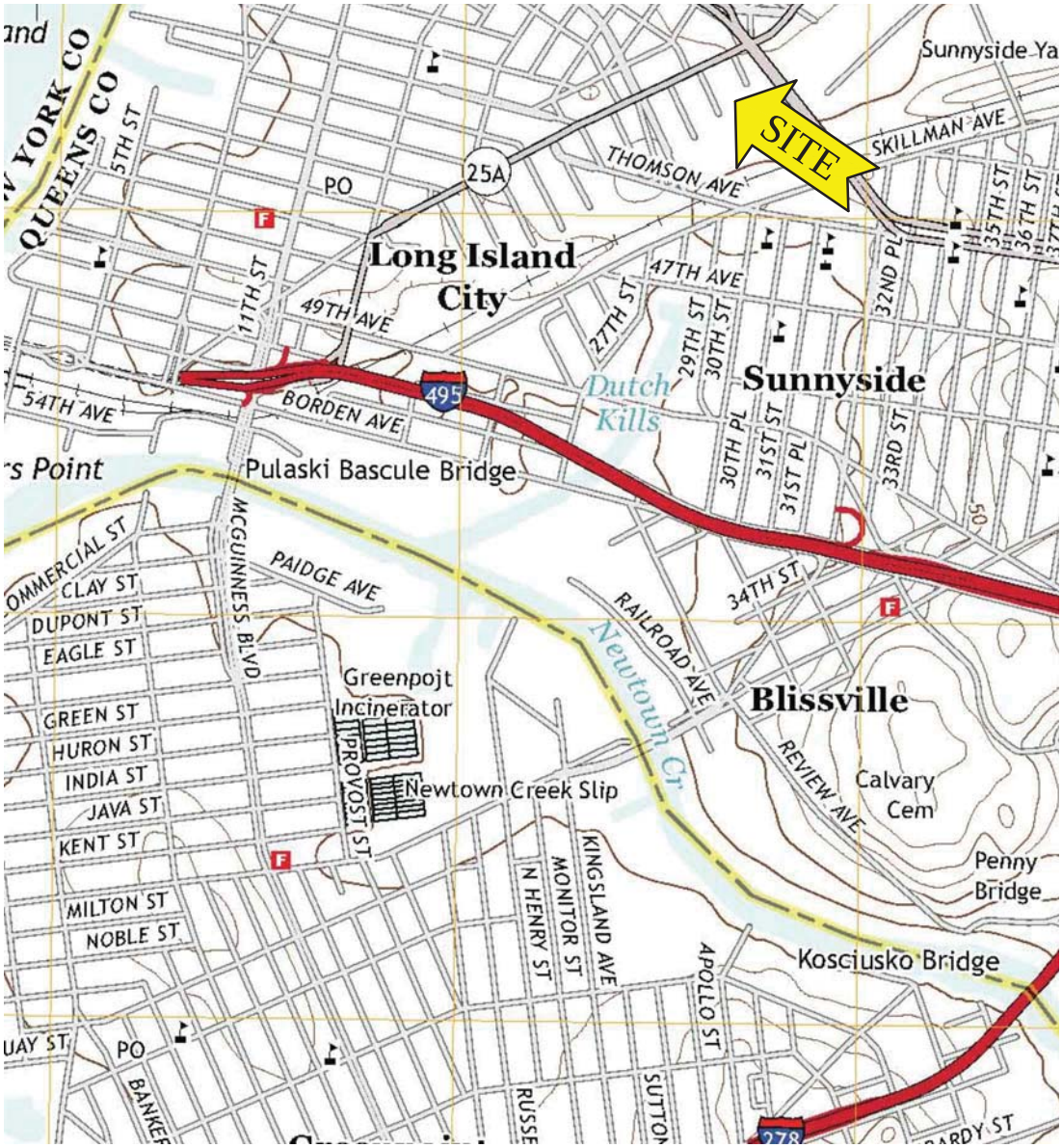
C. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

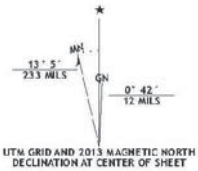
- procedures for operating and maintaining the remedy;
- maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

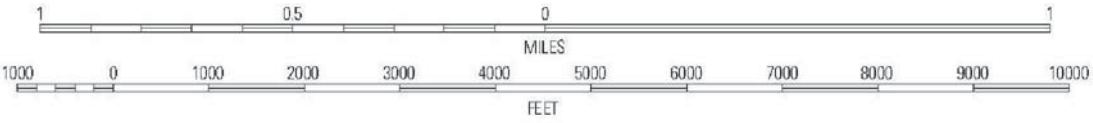
Contingent Remedial Element:

The Support of Excavation (SOE) installed at the site may limit the ability to excavate all contamination and meet the PGWSCOs. If contamination in the overburden remains, a groundwater extraction and treatment system will be implemented to treat contaminants in groundwater and to ensure contaminated groundwater does not migrate off-site. The groundwater extraction system will be designed and installed so that the capture zone is sufficient to intercept the groundwater contaminant plume to stop further migration. The extraction system will create a depression of the water table so that contaminated groundwater is directed toward the extraction wells within the site. Groundwater will be extracted from the subsurface along the down-gradient edges (the western and southern site boundaries) of the groundwater contaminant plume. If

required, further details of the extraction system will be determined during the remedial design and any O&M requirements will be incorporated into the SMP described in paragraph 6 above.







CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

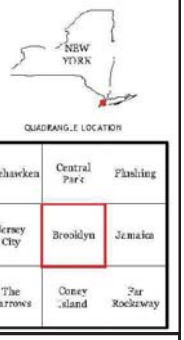


FIGURE 1: SITE LOCATION MAP

SITE: Queens Plaza Residential Development - Site B
Long Island City, NY

CLIENT: LIC Development, Owner LP

Fleming Lee Shue
Environmental Management & Consulting
158 West 29th Street, 9th Fl.
New York, NY 10001

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Environmental Consulting & Management

FILE: P:\Project Files\99999 - Tishman\Figures\Site B - RIR\FIG 13 - Environmental Dig Depth.dwg DATE: 1/15/2015

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Environmental Consulting & Management

Queens Plaza Residential Development
BCP No. C241151

FIGURE 2

ENVIRONMENTAL DIG DEPTH BASED ON REMEDIAL INVESTIGATION ANALYTICAL DATA

Date
January 2014

Project Number
10112-005

LEGEND

- TRACK 2 AREA
- TRACK 4 AREA
- 12 — LOCALIZED ENVIRONMENTAL DIG – MAXIMUM DEPTH (FT.) BELOW GROUND SURFACE AT WHICH A COMPOUND WAS FOUND ABOVE RRSCOs OR PROTECTION OF GROUNDWATER SCOs (DATA OBTAINED DURING THE REMEDIAL INVESTIGATION)
- (16) — PROPOSED ENVIRONMENTAL DIG – MAXIMUM ENVIRONMENTAL DEPTH (FT.) BELOW GROUND SURFACE REQUIRED FOR SPECIFIED AREA (EXCLUDING LOCALIZED HOT SPOTS DESCRIBED BELOW)
- LOCALIZED HOT SPOTS – LOCATIONS WHERE THE ENVIRONMENTAL DIG IS GREATER THAN THE PROPOSED DEVELOPMENT DIG; A 20 FT. X 20 FT. EXCAVATION WILL BE EXTENDED BEYOND THE PROPOSED ENVIRONMENTAL DIG TO THE MAXIMUM DEPTH AT WHICH A COMPOUND WAS FOUND ABOVE RRSCOs OR PROTECTION OF GROUNDWATER SCOs
- CONTOUR OF ELEVATION OF TOP OF ROCK (NAVD88)
- SB-10 — LOCATION OF ENVIRONMENTAL SOIL BORING

NOTE: EXACT NUMBER OF END POINT SAMPLES TO BE COLLECTED PER THE SITE B IRM WORK PLAN