DECISION DOCUMENT

Broadway Square LLC
Brownfield Cleanup Program
Queens, Queens County
Site No. C241261
July 2025

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

DECLARATION STATEMENT - DECISION DOCUMENT

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Statement of Purpose and Basis

This document presents the remedy for the Broadway Square LLC 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 (NYSDEC) for the Broadway Square LLC site and the public's input to the proposed remedy presented by 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^{TM} (available in the Sustainable Remediation Forum [SURF] library) or similar NYSDEC 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

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

Excavation and off-site disposal of all on-site soils which exceed restricted residential SCOs, as defined in 6 NYCRR Part 375-6.8 to a depth of two feet below grade in the northern half of the site, and to a depth of four feet in the southern half of the site subject to the in-situ solidification (ISS) treatment described in remedy element 3. Approximately 5,070 cubic yards of soil will be excavated. Collection and analysis of documentation samples at the northern half of the site will be used to verify 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.

Excavation and removal of any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination encountered during excavation.

3. In-situ Solidification

In-situ solidification (ISS) will be implemented in the southern portion of the site. The treatment zone will extend from approximately 4 feet below grade to approximately 12 feet below grade in areas where elevated metals are present below the water table. The bottom depth of the treatment zone will be determined during a Pre-Design Investigation as part of the Remedial Design. An approximately 4-foot soil cut will need to be excavated in this area to contain the ISS spoils and increased soil volume created by the soil mixing. 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 reagents or other binding reagents using an excavator or augers. Often Portland cement is used as the primary binder, although less carbon-intensive amendments will be considered. The soil and binding reagents are mixed to produce a solidified mass resulting in a low permeability monolith. Prior to the full implementation of this technology, bench-scale laboratory testing and on-site pilot scale studies will be conducted to more clearly define design parameters, amendment types and dosages. Bench tests will consist of collecting soil from the source area and mixing with a variety of amendments and doses in a controlled atmosphere followed by testing resulting hydraulic conductivity and unconfined-compressive strength. Pilot tests will then be conducted using successful amendment mixes from the bench test prior to full scale design.

Typical design requirements are that solidified mass would produce a hydraulic conductivity (K) of 1.0 X 10-6 cm/sec or less and would also result in an unconfined compressive strength of 50 psi, or higher pending future uses that may include construction above the solidified mass. The solidified mass will then be covered with a cover system as described in element 5 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.

Groundwater monitoring will be required down-gradient of the ISS treatment area. Monitoring will be conducted for contaminants of concern.

4. Backfill

Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and/or complete the backfilling of the excavation and establish the designed grades at the site. On-site soil, including pre-excavation soil, which does not exceed the restricted residential or protection of groundwater soil cleanup objectives SCOs for any constituent may be used to backfill the excavation or to establish the designed grades at the site below the cover system described in remedy element 5.

5. 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 to ensure the underlying monolith remains below the frost line and protected from the freeze-thaw cycle. A building and its foundation are considered suitable cover to protect the ISS monolith. Where a building and its foundation is considered part of the site cover, the ISS design should include considerations for drainage between the ISS and building foundation and the potential need to design the ISS for a higher strength. If the ISS monolith extends beyond the building footprint, the design shall include a soil cover consisting of a minimum of four feet of soil for that portion. Consistent with the remainder of the site cover, the upper two feet will meet the SCOs for restricted residential use outside the ISS monolith area. For areas where solidified material underlies the cover, the solidified material itself will serve as the demarcation layer due to the nature of the material.

6. 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 the subsurface.

7. Institutional Control

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. The environmental easement for the controlled property 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, commercial or industrial uses 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.

8. 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 remedy element 7 above.

- Engineering Controls: The ISS monolith and groundwater monitoring described in remedy element 3, the Cover System discussed in remedy element 5, and the Vapor Mitigation system in remedy element 6, 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 remedy element 5 above will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
- 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) A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

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

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 systems, if any. 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 NYSDEC guidance, as appropriate.

The remedy is protective of public health and the environment.

July 16, 2025

Date

Scott Deyette, Director
Remedial Bureau B

DECISION DOCUMENT

Broadway Square LLC
Queens, Queens County
Site No. C241261
July 2025

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (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.

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

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 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=C241261

Queens Public Library
37-44 21st Street
Long Island City, NY 11101
Phone: (718) 752-3700

Queens Community Board 1

Attn: Florence Koulouris
45-02 Ditmas Blvd. Suite 1025
Astoria, NY 11106
Phone: (718) 626-1021

Receive Site Citizen Participation Information By Email

Please note that 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 comprised of two tax parcels as identified on the New York City Tax Map. The parcels comprising the site are located at 11-06 Broadway (Block 316, Lot 13) and 11-01 33rd Avenue (Block 316, Lot 1) in Queens, NY. The site is bounded by Broadway to the north, 12th Street to the east, 33rd Avenue to the south, and 11th Street to the west.

Site Features:
The site is 49,375 square feet (1.33 acres) in size. Lot 13 contains a one-story brick and mortar building, a two-story steel framed warehouse, and an undeveloped portion used for parking and storage. Lot 1 is undeveloped and currently utilized for temporary material storage by a bridge repair company. The buildings on the site are vacant.

Current Zoning and Land Use:
The site is zoned R5, low density residential. The site has also been grandfathered in to have the ability to maintain its current industrial, factory and office usages. The site will go through a zoning change to R7A and MxM1-4 for the planned development. The surrounding parcels are currently used for a combination of commercial and residential purposes, a public school, and a park.

Past Uses of the Site:
According to the Sanborn Fire Insurance Maps the past usage of the site included an iron warehouse and a machine shop from 1928 to 1967. From 1967 to 1992 the site was occupied by Nelson Galvanizing, Inc. and from 1967 to 1977 a portion of the site was occupied by a motor part station. From 1996 - 2006 the Broadway side of the site was occupied by an auto repair facility and parking and the 33rd Avenue side of the site remained occupied by Nelson Galvanizing, Inc.

Site Geology and Hydrogeology:

The stratigraphy of the site from the surface grade consists of up to 10 feet of urban fill consisting of brown fine to coarse sand and silt, gravel, brick, cobbles, underlain by native soil consisting of dark gray silty clay, with some organics, to at least 15 feet below ground surface (bgs). Groundwater depth beneath the site ranges from 7 feet bgs to 11 feet bgs. The site is tidally influenced, and groundwater flow fluctuates between northeast and northwest. The site is located 0.15-mile west of the East River.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

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 that restricts 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, NYSDEC has determined that this site does not pose a significant threat to public health or the environment; accordingly, no enforcement actions are necessary.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

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

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

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

in the RI influence the development of remedial alternatives. The RI report is available for review in the site document repository and the results are summarized in section 6.3.

The analytical data collected on this site includes data for:

- groundwater
- soil
- soil vapor
- indoor air
- sub-slab 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. 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:

benzo(a)anthracene
benzo(a)pyrene
benzo(b)fluoranthene
benzo(k)fluoranthene
chrysene
dibenz[a,h]anthracene
indeno(1,2,3-cd)pyrene
lead
zinc
perfluorooctane sulfonic acid
perfluorooctanoic acid
benzene
isopropylbenzene
naphthalene
tetrachloroethene (PCE)
methylene chloride
carbon tetrachloride
mercury
cadmium

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.

Soil and groundwater samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), per- and polyfluoroalkyl substances (PFAS), 1,4-dioxane and pesticides. Soil vapor samples were analyzed for VOCs. Based upon investigations conducted to date, the primary contaminants of concern for the site include SVOCs and metals in soil, and VOCs in soil vapor.

Soil: Analytical results from soil samples revealed several metals and SVOCs above applicable SCOs. SVOCs and metals contamination in soils are likely related to the presence of urban fill or historical operations at the site. Elevated zinc impacts are attributed to historical operations at the site. Maximum detections in comparison to applicable protection of groundwater or restricted residential use soil cleanup objectives (PGSCOs/RRSCOs) are as follows: benzo(a)anthracene at 6.35 ppm (RRSCO of 1.0 ppm), benzo(a)pyrene at 1.93 ppm (RRSCO of 1.0 ppm), benzo(b)fluoranthene at 5.32 ppm (RRSCO of 1.0 ppm), benzo(k)fluoranthene at 3.93 ppm (RRSCO of 3.9 ppm), chrysene at 6.8 ppm RRSCO of 3.9 ppm), dibenz(a,h)anthracene at 1.66 ppm (RRSCO of 0.33 ppm), indeno(1,2,3-cd)pyrene at 2.7 ppm (RRSCO of 0.5 ppm), lead at 2,080 ppm (PGSCO of 450 ppm, RRSCO of 400 ppm), and zinc at 136,000 ppm (PGSCO of 2,480 ppm, RRSCO of 10,000 ppm).

VOCs, PCBs and pesticides were not detected in site soils above applicable SCOs. PFAS were detected in four of thirty soil samples. Perfluorooctane sulfonic acid (PFOS) was detected at a maximum concentration of 2.23 parts per billion (ppb), which is below the restricted residential use guidance value of 44 ppb and the protection of groundwater guidance value of 3.7 ppb.

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

Groundwater: Groundwater sampling found VOCs, SVOCs and metals contamination above Ambient Water Quality Standards and Guidance Values (AWQSGVs). Maximum detections are as follows: benzene at 1.58 ppb (AWQSGVs is 1 ppb), isopropylbenzene at 8.10 ppb

(AWQSGVs is 5 ppb), p-isopropyltoluene at 9.96 ppb (AWQSGVs is 5 ppb), naphthalene at 22.4 ppb (AWQSGVs is 10 ppb), benzo(a)anthracene at 0.0889 ppb (AWQSGVs is 0.002 ppb), chrysene at 0.0757 ppb (AWQSGVs is 0.002 ppb), lead at 147 ppb [total] (AWQSGVs is 25 ppb), and zinc at 2,490 ppb [total] / 369,000 ppb [dissolved] (AWQSGVs is 2,000 ppb). The presence of SVOCs in groundwater is likely due to the presence of entrained sediments in groundwater samples and not site soils. Zinc (up to 5,640 ppb [total] / 4,470 ppb [dissolved]) was detected in off-site side-gradient groundwater.

There were no exceedances of AWQSGVs for pesticides or PCBs.

The highest detection of perfluorooctanoic acid (PFOA) in groundwater was 75.5 parts per trillion (ppt) which exceeds the AWQSGV of 6.7 ppt, and the highest detection of PFOS was 67.1 ppt which exceeds the AWQSGV of 2.7 ppt. Based on the soil data, there is no apparent on-site source for PFAS in site groundwater and similar concentrations of PFAS were present in upgradient off-site groundwater samples. There were no detections of 1,4-dioxane in groundwater samples.

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

Soil Vapor: Ten soil vapor samples and three indoor samples were collected during the RI. The maximum concentrations of tetrachloroethene (PCE), methylene chloride, and carbon tetrachloride were detected in soil vapor below the slab at 1,900 micrograms per cubic meter (ug/m3), 72 ug/m3, and 11 ug/m3, respectively. The maximum concentrations of PCE, methylene chloride, and carbon tetrachloride were detected in indoor air at 11 ug/m3, 1.8 ug/m3, and 0.36 ug/m3, respectively.

Data does 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.*

The site is completely 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 the site is vacant, the inhalation of site-related contaminants due to soil vapor intrusion does not represent a current concern. People may inhale site contaminants due to soil vapor intrusion if buildings are developed at the site in the future. Environmental sampling indicates soil vapor intrusion is not a concern for off-site buildings.

6.5: Summary of the Remediation Objectives

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

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- 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 Residential use with site-specific soil cleanup objectives remedy.

The selected remedy is referred to as the Excavation, Site Cover, Vapor Mitigation, and In-situ Solidification 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;
- 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 NYSDEC 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

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

Excavation and off-site disposal of all on-site soils which exceed restricted residential SCOs, as defined in 6 NYCRR Part 375-6.8 to a depth of two feet below grade in the northern half of the site, and to a depth of four feet in the southern half of the site subject to the in-situ solidification (ISS) treatment described in remedy element 3. Approximately 5,070 cubic yards of soil will be excavated. Collection and analysis of documentation samples at the northern half of the site will be used to verify 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.

Excavation and removal of any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination encountered during excavation.

3. In-situ Solidification

In-situ solidification (ISS) will be implemented in the southern portion of the site. The treatment zone will extend from approximately 4 feet below grade to approximately 12 feet below grade in areas where elevated metals are present below the water table. The bottom depth of the treatment zone will be determined during a Pre-Design Investigation as part of the Remedial Design. An approximately 4-foot soil cut will need to be excavated in this area to contain the ISS spoils and increased soil volume created by the soil mixing. 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 reagents or other binding reagents using an excavator or augers. Often Portland cement is used as the primary binder, although less carbon-intensive amendments will be considered. The soil and binding reagents are mixed to produce a solidified mass resulting in a low permeability monolith. Prior to the full implementation of this technology, bench-scale laboratory testing and on-site pilot scale studies will be conducted to more clearly define design parameters, amendment types and dosages. Bench tests will consist of collecting soil from the source area and mixing with a variety of amendments and doses in a controlled atmosphere followed by testing resulting hydraulic conductivity and unconfined-compressive strength. Pilot tests will then be conducted using successful amendment mixes from the bench test prior to full scale design.

Typical design requirements are that solidified mass would produce a hydraulic conductivity (K) of 1.0 X 10-6 cm/sec or less and would also result in an unconfined compressive strength of 50 psi, or higher pending future uses that may include construction above the solidified mass. The solidified mass will then be covered with a cover system as described in element 5 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.

Groundwater monitoring will be required down-gradient of the ISS treatment area. Monitoring will be conducted for contaminants of concern.

4. Backfill

Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and/or complete the backfilling of the excavation and establish the designed grades at the site. On-site soil, including pre-excavation soil, which does not exceed the restricted residential or protection of groundwater soil cleanup objectives SCOs for any constituent may be used to backfill the excavation or to establish the designed grades at the site below the cover system described in remedy element 5.

5. 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 to ensure the underlying monolith remains below the frost line and protected from the freeze-thaw cycle. A building and its foundation are considered suitable cover to protect the ISS monolith. Where a building and its foundation is considered part of the site cover, the ISS design should include considerations for drainage between the ISS and building foundation and the potential need to design the ISS for a higher strength. If the ISS monolith extends beyond the building footprint, the design shall include a soil cover consisting of a minimum of four feet of soil for that portion. Consistent with the remainder of the site cover, the upper two feet will meet the SCOs for restricted residential use outside the ISS monolith area. For areas where solidified material underlies the cover, the solidified material itself will serve as the demarcation layer due to the nature of the material.

6. 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 the subsurface.

7. Institutional Control

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. The environmental easement for the controlled property 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, commercial or industrial uses 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.

8. 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 remedy element 7 above.

- Engineering Controls: The ISS monolith and groundwater monitoring described in remedy element 3, the Cover System discussed in remedy element 5, and the Vapor Mitigation system in remedy element 6, 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 remedy element 5 above will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
- 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) A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

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

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 systems, if any. 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.