PROPOSED REMEDIAL ACTION PLAN

Former Klink Cosmo Cleaners
State Superfund Project
Brooklyn, Kings County
Site No. 224130
January 2019

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

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy proposed by this Proposed Remedial Action Plan (PRAP). The disposal of hazardous wastes at this site, as more fully described in Section 6 of this document, has contaminated various environmental media. The proposed remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

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 in the document repositories identified below.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all PRAPs. This is an opportunity for public participation in the remedy selection process. The public is encouraged to review the reports and documents, which are available at the following repositories:

Brooklyn Community Board #1
435 Graham Avenue
Brooklyn, NY 11222
Phone: (718) 389-0009

Brooklyn Public Library - Leonard Branch
Attn: David Camara

81 Devoe Street
Brooklyn, NY 11211
Phone: (718) 486-6006

A public comment period has been set from:

January 18, 2019 – February 17, 2018

A public meeting is scheduled for the following date:

February 7, 2019 at 7:00 PM

Public meeting location:

Cooper Park Community Center
76 Kinglsand Avenue
Brooklyn, NY 11211

At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP.

Written comments may also be sent to:

Michael Haggerty, QEP
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
michael.haggerty@dec.ny.gov

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP based on new information or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

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 1.08-acre site is located in the Greenpoint/East Williamsburg industrial section of Brooklyn, NY. The site is located on the southwest corner of the intersection of Vandervoort Avenue and Richardson Street. Please refer to Figures 1 – 2.

Site Features

The site is completely covered by a one-story brick building. Numerous other commercial and industrial properties are located to the north, south, and west of the site. The Greenpoint Little League fields and a National Grid energy facility are east of the site across Vandervoort Avenue. A small residential area is located 1-2 blocks north of the site. An eastbound on-ramp to the Brooklyn-Queens Expressway (I-278) is located 4 blocks to the north.

Current Zoning and Land Use

The site is zoned for (M1) manufacturing. Per NYC Planning, M1 districts typically include light industrial uses, such as woodworking shops, repair shops, and wholesale service and storage facilities. The site is currently used for sheet metal fabrication and offices.

Past Use of the Site

The Department began a Site Characterization in this area in2007 as part of a plume trackdown investigation (Meeker Avenue Plume Trackdown, Site ID No. 224121). This property was identified as a potential source of contamination based on its past use. Klink Cosmo Cleaners operated as a commercial dry cleaner from the 1950's to the mid 1990's. During that time, hazardous waste (spent halogenated solvents) was generated under EPA ID no. NYD000824334.

Site Geology and Hydrogeology

The site is underlain by an urban fill unit (0.5-8 feet thick), a sand unit (approximately 100 feet thick) with varying textural features, and the Raritan (clay) Formation approximately 110 feet below ground surface (bgs). Groundwater is present approximately 35 feet bgs and flows north to northeast toward Newtown Creek.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives that restrict the use of the site to commercial use (which allows for industrial use), as described in Part 375-1.8(g), are being evaluated.

A comparison of the results of the investigation to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

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

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

Pavlovich & Company, LLC

The PRPs for the site declined to implement a remedial program when requested by the Department. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

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

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. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste 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 in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified at this site is/are:

tetrachloroethene (PCE)
trichloroethene (TCE)
lead
arsenic

As illustrated in Exhibit A, 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 Record of Decision.

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

Soil Vapor Intrusion Mitigation

Sub-slab depressurization (SSD) systems were installed at twelve off-site residential properties to eliminate exposures associated with soil vapor intrusion. SSD systems create a pressure gradient below the building slab to prevent contaminated soil vapor from entering the building. The pressure gradient is accomplished by applying vacuum beneath the slab. The extracted soil vapor is then vented to the atmosphere above the building.

The first off-site SSD systems were installed beginning in 2008 and documented in a Remedial Construction Report dated October 31, 2009. SSD systems are still offered to impacted properties based on the structure's soil vapor intrusion evaluation.

Soil Vapor Extraction/Air Sparge System

A Soil Vapor Extraction/Air Sparge (SVE/AS) system is currently being installed and will be operated to address the source of contamination located in the northeast corner of the site. SVE/AS technology recovers contaminant mass from the subsurface in the form of vapor. The vapors are then captured before the extracted air is discharged to the atmosphere.

Soil vapor extraction removes volatile organic compounds (VOCs) from the subsurface by applying vacuum to wells installed into the unsaturated (vadose) zone. Vacuum draws air through the soil matrix which carries the VOCs from the soil to the SVE well.

Air sparging is implemented to address VOC contamination in the saturated zone. VOCs are physically removed from the groundwater and soil below the water table by injecting air into the aquifer. The injected air rises through the groundwater to volatilize and transfer VOCs from the groundwater and/or soil into the injected air. The VOCs are carried with the injected air into the unsaturated zone where the soil vapor extraction component of the system collects the injected air.

Six SVE wells were installed in the unsaturated zone and screened from 12 feet below the ground surface to a depth of 27 feet. Eight air sparge wells were installed in the saturated zone at depths of 50 feet and 85 feet to target both shallow and deep intervals. Well installation was completed in November 2018; the SVE/AS system is under construction with startup anticipated in Spring 2019. The air containing VOCs extracted from the SVE wells will be treated with activated carbon to remove VOCs prior to it being discharged to the atmosphere.

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.

Soil and groundwater were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), and pesticides. Based upon investigations conducted to date, the primary contaminants of concern include VOCs and metals.

Nature and Extent of Contamination:

Soil

The VOC source area was identified in the northeast corner of the current building at depths from 1 - 35 feet below ground surface (bgs). Tetrachloroethylene (PCE) was detected in soils on-site at concentrations up to 273 parts per million or ppm, exceeding the soil cleanup objective (SCO) for commercial use (150 ppm) and for the protection of groundwater (1.3 ppm). Trichloroethene (TCE) was detected in two on-site samples which slightly exceed the protection of groundwater SCO (0.47 ppm). PCE contaminated soil exceeding the protection of groundwater SCO extends off-site approximately ten feet to the north and east below the adjacent sidewalks of Vandervoort Avenue and Richardson Street.

Metals contamination associated with urban fill was detected in shallow soil on-site. For example, lead was detected up to 2,680 ppm (exceeding the commercial SCO of 1,000 ppm) and arsenic up to 38.7 ppm (exceeding the commercial SCO of 16 ppm). The data does not indicate any off-site metal impacts in soil related to this site.

Groundwater

Based on the investigations conducted to date, the primary contaminants of concern detected in groundwater include PCE and trichloroethene (TCE). PCE has been found in shallow groundwater at concentrations up to 46,000 parts per billion or ppb (exceeding the groundwater standard of 5 ppb). PCE has also been found in deep groundwater (atop the Raritan clay) up to 4,500 ppb. TCE, a daughter product of PCE, was detected up to 2,100 ppb (exceeding the groundwater standard of 5 ppb). The groundwater plume extends north and east from the site to at least Lombardy street where it becomes co-mingled with contamination originating from other sites.

Soil Vapor

PCE has been found in soil vapor beneath the site at concentrations up to 2,090,000 micrograms per cubic meter, or ug/m^3. TCE has been found at concentrations up to 7,380 ug/m^3. Soil vapor intrusion sampling has been completed at twenty off-site structures. Actions described in Section 6.2 were needed to address potential exposure at twelve structures.

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*.

Direct contact with contaminants in the soil is unlikely because the site is covered by a building. Contaminated groundwater at the site is not used for drinking or other purposes and the site is served by a public water supply that obtains water from a different source not affected by this contamination. Volatile organic compounds in 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. Sub-slab depressurization systems (SSDSs) have been installed in twelve off-site residential buildings to prevent the indoor air quality from being affected by the contamination in soil vapor in the area. SSDSs remain available to homeowners in the vicinity of the site who previously rejected the State's offer for a system. The on-site building does not have an SSDS; however, the potential for soil vapor intrusion is being addressed by the soil vapor extraction/air sparge system which is being constructed and will be operated on-site.

6.5: Summary of the Remediation Objectives

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

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

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: SUMMARY OF THE PROPOSED REMEDY

To be selected, the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the FS report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The basis for the Department's proposed remedy is set forth at Exhibit D.

The proposed remedy is referred to as the SVE/AS, ISCO, Soil Cover, Vapor Mitigation and Institutional Controls with Site Management remedy.

The estimated present worth cost to implement the remedy is $4,512,000. The cost to construct the remedy is estimated to be $2,143,000 and the estimated average annual cost is $40,000.

The elements of the proposed 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. Soil Vapor Extraction (SVE) with Air Sparge (AS)

The SVE/AS system installed as part of the IRM (described in Section 6.2) will continue to operate; the operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

3. Floor Drain Sediment Removal

A series of floor drains within the building were identified during the remedial investigation as a potential source of contamination. Sediment material within the floor drain structures will be removed to the extent practicable.

4. In-Situ Chemical Oxidation

In-situ chemical oxidation (ISCO) will be implemented to treat dissolved volatile organic compound (VOCs). After the source of contamination is addressed, a chemical oxidant will be injected into the saturated zone to destroy contaminants in groundwater. The treatment area covers approximately 65,000 square feet with an average plume thickness of 50 feet. Conceptually, the oxidant, sodium permanganate, will be delivered to the aquifer via 26 shallow and 14 deep injection points over four separate events. The specific method, volume, frequency and depth of injection will be determined during the remedial design.

5. Vapor Mitigation

For on-site buildings impacted by site-related contaminants, a sub-slab depressurization system, or other acceptable measures, will be installed as necessary to mitigate the migration of vapors into the building from soil and/or groundwater. It is anticipated that the SVE/AS system discussed in remedial element 2 will serve to mitigate vapor intrusion until such time that its operation is discontinued, the remedy is completed and/or vapor mitigation is no longer required. Provisions for off-site structures are outlined in the Site Management Plan.

6. Cover System

A site cover consisting of buildings with concrete slabs currently exists at the site and will be maintained to allow for commercial use of the site. Any site redevelopment will maintain the existing site cover. The site cover may include paved surface parking areas, sidewalks or soil where the upper one foot of exposed surface soil meets the applicable soil cleanup objectives (SCOs) for commercial use. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6NYCRR part 375-6.7(d).

7. Institutional Controls

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

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

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 above.

   Engineering Controls: The soil cover and vapor mitigation discussed 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 for evaluation of the potential for soil vapor intrusion for any occupied off-site buildings impacted by the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
   - a provision that should a building foundation or building slab be removed in the future, a cover system consistent with that described above will be placed in any areas where the upper one foot of exposed surface soil exceeds the applicable soil cleanup objectives (SCOs)
   - 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 soil vapor intrusion 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 buildings 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, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
    - procedures for operating and maintaining the remedy;
    - compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
    - maintaining site access controls and Department notification; and
    - providing the Department access to the site and O&M records.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants are arranged into volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/ polychlorinated biphenyls (PCBs), and inorganics (metals and cyanide). For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, the Restricted Use SCGs (*i.e.* commercial) identified in Section 4 and Section 6.1.1 are also presented.

Waste/Source Areas

As described in the RI report, waste/source materials were identified at the site and are impacting soil, groundwater and soil vapor.

Wastes are defined in 6 NYCRR Part 375-1.2 (aw) and include solid, industrial and/or hazardous wastes. Source Areas are defined in 6 NYCRR Part 375 (au). Source areas are areas of concern at a site where substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium. Soil samples collected in the northeast corner of the site identified an area of unsaturated soil contamination as the primary source area. Supporting evidence identifies this area as a likely position of dry cleaning machines and/or solvent storage tanks. The current property owner indicated that air vents leading to the roof were present of this area when the property was acquired and a visual inspection revealed the presence of steel anchor points in the concrete floor confirming the former location of the large equipment. A series of floor drains in this location was also identified during the inspection as a potential source of contamination.

Soil

Soil samples were collected at various depths during the RI from on-site and off-site locations. All soil samples were compared 6 NYCRR Part 375 Soil Cleanup Objectives for unrestricted use and commercial use. Site-specific contaminants of concern were also compared to Protection of Groundwater Soil Cleanup Objectives. Refer to Table 1 and Figure 3.

The on-site investigation focused in the northeast corner of the property to define the PCE source area. 35 soil samples were collected to a depth of 40 feet bgs (5-10 feet into groundwater) and analyzed for VOCs. Seven samples were also analyzed for SVOCs, PCBs, pesticides and metals to evaluate shallow non-native urban fill material. Sample results demonstrate exceedance of unrestricted, commercial and protection of groundwater SCGs for PCE in the source area. Analysis of shallow urban fill detected SVOCs and metals over unrestricted and commercial use SCGs. Off-site soil data was collected while installing monitoring wells on neighboring sidewalks; only samples collected directly adjacent to the source area revealed exceedance of unrestricted and protection of groundwater SCGs for PCE.

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of soil. The primary soil contaminant, PCE, is associated with the property's former operation as a dry cleaner. PCE and its related daughter products will be addressed by the remedy selection process. The presence of historic fill material on-site has resulted in SVOCs and metals contamination above the current and anticipated future use of the property (*i.e.* commercial). Landfilling was a common practice in this area of Brooklyn historically and varying amounts of urban fill material was present in all on-site and off-site borings; however, SVOC and metals contamination in soil will be addressed by the remedy selection process.

Table 1 - Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted Use SCG[b] (ppm)	Frequency Exceeding Unrestricted Use SCG	Protection of Groundwater SCG[c] (ppm)	Frequency Exceeding Protection of Groundwater SCG	Restricted Use SCG[d] (ppm)	Frequency Exceeding Restricted Use SCG
Metals							
Arsenic	0-38.7	13	1/13	N/A	N/A	16	1/13
Barium	10.5-1,280	350	1/13	N/A	N/A	400	1/13
Cadmium	0-4.00	2.5	1/13	N/A	N/A	9.3	0/13
Chromium, Total	3.90-44.2	30	2/13	N/A	N/A	400	0/13
Copper	6.40-290	50	3/13	N/A	N/A	270	1/13
Lead	1.40-2,680	63	4/13	N/A	N/A	1000	1/13
Mercury	0-1.90	0.18	4/13	N/A	N/A	2.8	0/13
Nickel	4.40-39.1	30	1/13	N/A	N/A	310	0/13
Zinc	9.40-1,670	109	3/13	N/A	N/A	10000	0/13
Pesticides/PCBs							
Aldrin	0-0.0130	0.005	1/13	N/A	N/A	0.68	0/13
Dieldrin	0-0.00520	0.005	1/12	N/A	N/A	1.4	0/12
P,P'-DDD	0-0.0260	0.0033	2/13	N/A	N/A	92	0/13
SVOCs							
Benzo(A)Anthracene	0-6.60	1	2/13	N/A	N/A	5.6	1/13
Benzo(A)Pyrene	0-5.40	1	2/13	N/A	N/A	1	2/13
Benzo(B)Fluoranthene	0-7.80	1	2/13	N/A	N/A	5.6	1/13
Benzo(K)Fluoranthene	0-2.50	0.8	2/13	N/A	N/A	56	0/13
Chrysene	0-6.40	1	2/13	N/A	N/A	56	0/13
Dibenz(A,H) Anthracene	0-0.960	0.33	3/13	N/A	N/A	0.56	1/13
Indeno(1,2,3-C,D)Pyrene	0-3.70	0.5	3/13	N/A	N/A	5.6	0/13
VOCs							
Tetrachloroethylene (PCE)	0-273	1.3	15/114	1.3	15/114	150	4/114
Trichloroethylene (TCE)	0-1.14	0.47	2/114	0.47	2/114	200	0/114

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives;
c - SCG: Part 375-6.8(a), Protection of Groundwater Soil Cleanup Objectives;
d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.

Groundwater

Groundwater samples were collected at 86 groundwater monitoring wells to assess overburden groundwater conditions on-site and off-site during the RI. 47 shallow, 35 deep and 4 top of clay (confining layer) monitoring wells were installed to define the contaminant plume three-dimensionally. The upper glacial aquifer in this section of Brooklyn is +/- 100 feet thick. All samples were analyzed for VOCs and select monitoring wells were analyzed for SVOCs, PCBs, pesticides, metals and per/polyfluoroalkyl substances (PFAS). The results indicate that contamination in groundwater at the site exceeds SCGs for VOCs, metals, pesticides and PFAS. Refer to Table 2 and Figure 4.

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of groundwater. The primary groundwater contaminant of concern, PCE, and its related daughter products, are associated with the site's former operation as a dry cleaner and will be addressed by the remedy selection process.

The low concentrations of unrelated VOCs detected in groundwater are considered background contamination in this section of Brooklyn. Greenpoint/ East Williamsburg has a history of light and heavy industry where the use of petroleum products and solvents was commonplace. These isolated exceedances are not site-related contaminants and will not be addressed by the remedy selection process. Similarly, PFAS compounds were detected in groundwater above SCGs but PFAS are not site-specific contaminants. The groundwater results demonstrate PFAS compounds exceed SCG both up-gradient and downgradient of the site. The exceedance of pesticides and metals in groundwater are presumed to be artifacts of high turbidity and will not be addressed by the remedy selection process. For example, samples exceeding groundwater SCGs for metals were collected from un-developed temporary wells. Since these samples were unfiltered, the metals detected were more likely adsorbed to colloidal particles than dissolved-phase metals. Samples from properly developed wells revealed no or very minor dissolved metal and pesticides exceedance of SCGs.

Table 2 – Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
Metals			
Arsenic	0-60.5	25	3/12
Barium	0-5,390	1000	4/12
Beryllium	0-27.4	3	4/12
Cadmium	0-17.1	5	3/14
Chromium, Total	0-783	50	4/12
Copper	0-1,480	200	4/14
Lead	0-287	25	4/14
Nickel	0-1,090	100	4/14
Thallium	0-47.1	0.5	2/12
Pesticides/PCBs			
Dieldrin	0-0.0500	0.004	1/12
Gamma Bhc (Lindane)	0-0.0510	0.05	1/12

VOC			
1,1,1,2-Tetrachloroethane	0-9.50	5	1/159
1,1,1-Trichloroethane	0-22.0	5	17/406
1,1-Dichloroethane	0-46.0	5	36/406
1,1-Dichloroethene	0-120	5	59/406
1,2,4-Trichlorobenzene	0-5.50	5	1/399
1,2-Dichloroethane	0-3,700	0.6	98/406
1,2-Dichloropropane	0-2.20	1	4/406
1,4-Dichlorobenzene	0-4.30	3	1/408
Benzene	0-1.30	1	1/406
Chloroform	0-14.0	7	5/406
Cis-1,2-Dichloroethylene	0-290	5	169/406
Tert-Butyl Methyl Ether	0-36.0	10	4/406
Tetrachloroethylene (PCE)	0-46,000	5	323/406
Toluene	0-7.80	5	1/406
Trans-1,2-Dichloroethene	0-67.0	5	15/406
Trichloroethylene (TCE)	0-2,100	5	235/406
Trichlorofluoromethane	0-26.0	5	8/406
Vinyl Chloride	0-54.0	2	24/406

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703.

Soil Vapor

The potential for soil vapor intrusion resulting from site-related soil or groundwater contamination was evaluated during the RI. This evaluation included the current on-site building and multiple downgradient residential buildings. Soil gas, sub-slab soil vapor (below structures) and indoor air (inside structures) samples were collected to determine whether actions are needed to address exposures to site-related contaminants. The results confirmed concentrations of site-related contaminants PCE and TCE exceed SCGs both on-site and off-site. On-site sub-slab concentrations of PCE were detected up to 2,090,000 ug/m^3 and TCE was detected up to 7,380ug/m^3. Off-site, sub-slab concentrations of PCE were detected up to 11,000 ug/m^3 and TCE was detected up to 300 ug/m^3.

Based on the PCE concentrations detected in the on-site building, the disposal of hazardous waste has resulted in the contamination of soil vapor. PCE and its associated daughter products are considered to be primary contaminants of concern and soil vapor will be addressed by the remedy selection process. Regarding the off-site property, 20 downgradient buildings were evaluated for soil vapor intrusion. To date, 12 residences have been mitigated. Refer to Figure 5.

Exhibit B

<u>Description of Remedial Alternatives</u>

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A. A remedy to achieve pre-release conditions was screened out as a potential alternative due to its technical and logistical infeasibility. To achieve pre-release conditions, excavation and off-site disposal of all soil exceeding 6 NYCRR Part 375 Soil Cleanup Objectives for unrestricted use would be required. It would be necessary to shut down and/or relocate the commercial business operating at the property to allow for demolition of the on-site buildings and excavation of the source area, including the adjacent sidewalks on Vandervoort Avenue and Richardson Street. The pre-release alternative would also require excavation of soil to a minimum depth of 40 feet.

Alternative 1: No Action, Institutional Controls with Site Management

The Site Management Alternative requires only institutional controls for the site. This alternative includes institutional controls, in the form of an environmental easement and a site management plan, necessary to protect public health and the environment from any contamination identified at the site.

Present Worth: *$557,000*
Capital Cost: *$65,000*
Annual Costs: *$30,000*

Alternative 2: IRM SVE/AS, Site Cover, Vapor Mitigation and Institutional Controls with Site Management

An SVE/AS system is currently being implemented as an IRM to address the source area. A description of the technology is provided in Section 6.2. This alternative includes two engineering controls, a site cover and vapor mitigation, along with institutional controls to manage residual contamination and prevent exposures in the future. An acceptable site cover, in the form on a concrete slab, is currently present on-site. The concrete slab would be maintained or replaced as part of site management. Vapor mitigation, as a sub-slab depressurization system or another acceptable measure, will be implemented on-site and off-site as necessary. No remedial design is required for this alternative. The SVE/AS system is targeted for a minimum of 24 months of operation.

Institutional controls, in the form of an environmental easement, would be necessary to protect public health and the environment. The environmental easement will restrict the use of the property, prohibit groundwater use and enforce a site management plan.

Present Worth: *$2,063,000*
Capital Cost: *$683,000*
Annual Costs: *$40,000*

Alternative 3: IRM SVE/AS, In-Situ Chemical Oxidation (ISCO), Site Cover, Vapor Mitigation and Institutional Controls with Site Management

An SVE/AS system is currently being implemented as an IRM to address the source area. A description of the technology is provided in Section 6.2. This alternative includes ISCO to treat residual contamination in groundwater after the source has been addressed. An oxidant, sodium permanganate, will be injected into the subsurface to destroy dissolved contaminants. The treatment area covers approximately 65,000 square feet with an average plume thickness of 50 feet. Given the current plume characteristics, sodium permanganate will be delivered to the aquifer *via* 26 shallow and 14 deep injection points over four separate events; however, the volume of oxidant and frequency of injection will likely be reduced after the source of contamination is addressed. The contaminant plume is expected to shrink significantly over time through operation of the SVE/AS system. The specific method, volume, frequency and depth of injection will be determined during the remedial design. Remedial design would require approximately 6 – 12 months and implementation of the remedy would require an additional 36 - 48 months.

This alternative includes two engineering controls, a site cover and vapor mitigation, along with institutional controls to manage residual contamination and prevent exposures in the future. An acceptable site cover, in the form on a concrete slab, is currently present on-site. The concrete slab would be maintained or replaced as part of site management. Vapor mitigation, as a sub-slab depressurization system or another acceptable measure, will be implemented on-site and off-site as necessary.

Institutional controls, in the form of an environmental easement, would be necessary to protect public health and the environment. The environmental easement will restrict the use of the property, prohibit groundwater use and enforce a site management plan.

Present Worth: *$4,512,000*
Capital Cost: *$2,143,000*
Annual Costs: *$40,000*

Alternative 4: IRM SVE/AS, In-Situ Chemical Reduction (ISCR), Site Cover, Vapor Mitigation and Institutional Controls with Site Management

A SVE/AS system is currently being implemented as an IRM to address the source area. A description of the technology is provided in Section 6.2. This alternative includes ISCR to treat residual contamination in groundwater after the source has been addressed. A reducing agent, EHC, will be injected into the subsurface to degrade dissolved contaminants into non-hazardous constituents. The treatment area covers approximately 65,000 square feet with an average plume thickness of 50 feet. Given the current plume characteristics, EHC will be delivered to the aquifer *via* 26 shallow and 14 deep injection points over four separate events; however, the volume of reagent and frequency of injection will likely be reduced after the source of contamination is addressed. The contaminant plume is expected to shrink significantly over time through operation of the SVE/AS system. The specific method, volume, frequency and depth of injection will be determined during the remedial design. Remedial design would require approximately 6 – 12 months and implementation of the remedy would require an additional 36 - 48 months.

This alternative includes two engineering controls, a site cover and vapor mitigation, along with institutional controls to manage residual contamination and prevent exposures in the future. An acceptable site cover, in the form on a concrete slab, is currently present on-site. The concrete slab would be maintained or replaced as part of site management. Vapor mitigation, as a sub-slab depressurization system or another acceptable measure, will be implemented on-site and off-site as necessary.

Institutional controls, in the form of an environmental easement, would be necessary to protect public health and the environment. The environmental easement will restrict the use of the property, prohibit groundwater use and enforce a site management plan.

Present Worth: *$4,634,000*
Capital Cost: *$2,216,000*
Annual Costs: *$40,000*

Alternative 5 – IRM SVE/AS, ISCO, Hydraulic Containment, Site Cover, Vapor Mitigation and Institutional Controls with Site Management

A SVE/AS system is currently being implemented as an IRM to address the source area. A description of the technology is provided in Section 6.2. This alternative includes ISCO to treat residual contamination in groundwater after the source has been addressed. An oxidant, sodium permanganate, will be injected into the subsurface to destroy dissolved contaminants. The treatment area covers approximately 65,000 square feet with an average plume thickness of 50 feet. Given the current plume characteristics, sodium permanganate will be delivered to the aquifer *via* 26 shallow and 14 deep injection points over four separate events; however, the volume of oxidant and frequency of injection will likely be reduced after the source of contamination is addressed. The contaminant plume is expected to shrink significantly over time through operation of the SVE/AS system. The specific method, volume, frequency and depth of injection will be determined during the remedial design.

This alternative also includes hydraulic containment to prevent plume migration. Groundwater extraction wells will be installed and operated to counteract natural hydraulic gradients. Conceptually, hydraulic containment will be achieved by operating three extraction wells with a total pumping rate of 30 gallons per minute; however, the final process specifications to achieve hydraulic containment and meet discharge requirements will be determined during the design phase. Hydraulic containment will continue until groundwater meets ambient water quality standards for all contaminants of concern. Remedial design would require approximately 12 – 18 months and the remedy will be implemented for approximately 30 years.

This alternative includes two engineering controls, a site cover and vapor mitigation, along with institutional controls to manage residual contamination and prevent exposures in the future. An acceptable site cover, in the form on a concrete slab, is currently present on-site. The concrete slab would be maintained and replaced as part of site management. Vapor mitigation, as a sub-slab depressurization system or another acceptable measure, will be implemented on-site and off-site as necessary.

Institutional controls, in the form of an environmental easement, would be necessary to protect public health and the environment. The environmental easement will restrict the use of the property, prohibit groundwater use and enforce a site management plan.

Present Worth: *$8,781,000*
Capital Cost: *$4,123,000*
Annual Costs: *$102,000*

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
Alternative 1: No Action, Institutional Controls with Site Management	$65,000	$30,000	$557,000
Alternative 2: IRM SVE/AS, Site Cover, Vapor Mitigation and Institutional Controls with Site Management	$683,000	$40,000	$2,063,000
Alternative 3: IRM SVE/AS, ISCO, Site Cover, Vapor Mitigation and Institutional Controls with Site Management	$2,143,000	$40,000	$4,512,000
Alternative 4: IRM SVE/AS, ISCR, Site Cover, Vapor Mitigation and Institutional Controls with Site Management	$2,216,000	$40,000	$4,634,000
Alternative 5 – IRM SVE/AS, ISCO, Hydraulic Containment, Site Cover, Vapor Mitigation and Institutional Controls with Site Management	$4,123,000	$102,000	$8,781,000

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 3, SVE/AS, ISCO, Site Cover, Vapor Mitigation and Institutional Controls with Site Management, as the remedy for this site. Alternative 3 would achieve the remediation goals for the site by addressing the source material with SVE/AS and treating residual dissolved-phase contamination with In-Situ Chemical Oxidation (ISCO). A Site Cover, Vapor Mitigation and Institutional Controls with Site Management will be necessary to prevent potential exposures. The elements of this remedy are described in Section 7. The proposed remedy is depicted in Figure 6.

Basis for Selection

The proposed remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. <u>Protection of Human Health and the Environment.</u> This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

Alternative 1 would protect human health from contaminated groundwater through the implementation of institutional controls; however, potential exposure to contaminated soil and soil vapor would not be addressed. In addition, Alternative 1 does not protect the environment and therefore will not be evaluated further.

The proposed remedy, Alternative 3, satisfies this criterion by addressing the source of contamination with SVE/AS and treating residual dissolved-phase contamination *via* ISCO with sodium permanganate. Potential exposures will be eliminated through the implementation of engineering controls (*i.e.* site cover and vapor mitigation) and institutional controls.

Alternatives 2 – 5 satisfy this criterion by addressing all contaminated media and preventing exposures through institutional and engineering controls. Alternative 2 does not include groundwater treatment; consequently, the protection to public health and the environment is to a lesser degree. Alternative 5 provides the greatest degree of public health and environmental protection through groundwater treatment and hydraulic containment.

2. <u>Compliance with New York State Standards, Criteria, and Guidance (SCGs).</u> Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

The proposed remedy, Alternative 3, complies with SCGs to the extent practicable. It addresses the source of contamination and complies with the restricted use soil cleanup objectives at the surface through a cover system. After the source is addressed, groundwater treatment will accelerate restoration of the aquifer to the extent practicable. SCGs for SVI will be achieved through vapor mitigation both on-site and off-site as required.

Alternative 3 and 4 provide comparable remedial elements (ISCO vs. ISCR) so Alternative 4 meets this criterion.

Alternative 2 meets this criterion but to a lesser degree or with lower certainty because groundwater treatment is not included. Alternative 5 will achieve groundwater SCGs in the shortest timeframe through the addition of hydraulic containment therefore meeting this criterion to the greatest extent. Because Alternatives 2, 3, 4, and 5 satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final remedy for the site.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Long-term effectiveness and permanence is directly related to the quantity of contamination remaining on-site after remediation. Alternatives 2 - 5 include a SVE/AS system to address the source area and remove contaminant mass with engineering and institutional controls to eliminate exposures. Each alternative will require an environmental easement to restrict the use of the property, prohibit groundwater use and enforce a site management plan with long-term monitoring. Alternative 2 will address the on-site source and reduce the amount of contamination migrating off-site but would not treat residual contamination after the SVE/AS system is shutdown. Alternatives 3 and 4 include groundwater treatment after the source has been addressed to restore the aquifer to ambient water quality standards. They provide comparable long-term effectiveness for groundwater and soil vapor both on-site and off-site. Alternative 5 provides comparable long-term effectiveness to Alternatives 3 and 4 on-site with the addition of hydraulic containment; however, it provides improved long-term effectiveness for groundwater and soil vapor down-gradient (off-site).

4. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

The SVE/AS system included as part of Alternatives 2 - 5 permanently and significantly reduce toxicity, mobility and volume by removing VOC contaminant mass from the subsurface in the form of vapor. The vapors are then captured and ultimately destroyed. Alternatives 3 - 5 include groundwater treatment after the source has been addressed. ISCO and ISCR will destroy or degrade residual contaminants in groundwater, further reducing the toxicity, mobility and volume of contamination. Alternative 5 provides the greatest reduction of toxicity, mobility and volume with the addition of hydraulic containment. Alternative 5 would prevent remaining dissolved contamination from migrating downgradient; any water generated will be treated and discharged/disposed, thereby reducing the volume and mobility of contamination.

5. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternatives 2 - 5 all have short-term impacts which could be controlled. Alternative 2 will have the smallest impact because no additional construction or operation would be necessary post-IRM. Alternatives 3 - 5 require the installation of wells on the sidewalk and the handling of an oxidant or reagent. These activities will cause greater short-term impact to the community and workers compared to Alternative 2, but not significantly with proper implementation. Alternative 5 would have the greatest short-term impact with the addition of hydraulic containment. Construction of the treatment system and connection to its associated extraction wells will cause considerable impact to the community. For all alternatives, the potential impacts to the community will be minimized through coordination with the NYC and the surrounding residents/owners. A community air monitoring plan (CAMP) and health and safety plan (HASP) would also be necessary to safely implement all alternatives.

Alternative 2 will require the greatest amount of time to achieve remedial objectives because groundwater treatment is not included. Without groundwater treatment, dissolved-phase contamination is expected to reduce gradually over time by natural processes; however, the time required to achieve ambient water quality standards is difficult to approximate. Alternative 5 will meet remedial objectives in the shortest timeframe. After the groundwater treatment system is operational and hydraulic containment is confirmed, groundwater SCGs will be effectively achieved.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Since the SVE/AS system, site cover and vapor mitigation are common to each alternative, implementability of these elements are equal for those alternatives. The in-situ groundwater treatment technologies proposed in Alternatives 3 - 5 (ISCO and ISCR) are regularly employed to remediate groundwater at VOC contaminated sites. Permits to close sections of sidewalk would be required to protect the community during injection but no significant administrative issues were identified during the feasibility study process to implement ISCO or ISCR. While the groundwater chemistry of the upper glacial aquifer is conducive to both technologies, ISCO with sodium permanganate proposed in Alternative 3 and Alternative 5 will be technically easier to implement compared to ISCR with EHC. Sodium permanganate is miscible in water; consequently, distribution of the oxidant in the aquifer will be more uniform over the large treatment area. Proper distribution of the oxidant or reagent is critical to achieving SCGs in groundwater.

The hydraulic containment component of Alternative 5, while a common remedial technology, presents substantial administrative and logistical challenges in an urban setting such as NYC. Space requirements of the groundwater treatment system would necessitate the long-term rental or the purchase of property to house equipment. Hydraulic containment will require trenching across NYC streets to convey groundwater to the treatment system and connection to the sanitary sewer. NYC Department of Buildings, NYC Department of Transportation and NYC Department of Environmental Protection permits will be necessary to construct and operate the system. Hydraulic containment would also require significant long-term operation, maintenance and monitoring.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

Alternative 2 presents the lowest cost of the alternatives evaluated but the longest timeframe is required to achieve SCGs. Alternatives 3 and 4, with the addition of groundwater treatment, are twice the cost of Alternative 2 but groundwater treatment will accelerate the restoration of the aquifer to ambient water quality standards. In addition, the cost estimates to treat residual groundwater contamination is based on the current groundwater conditions pre-

IRM. By addressing the source of contamination, the IRM SVE/AS system will substantially reduce the dissolved-phase concentrations prior to implementing groundwater treatment. The scope of the injection program will likely be scaled back resulting in considerable cost savings. Alternative 5 is twice the cost of Alternatives 3 and 4 with significantly higher annual costs yet achieves SCGs fastest.

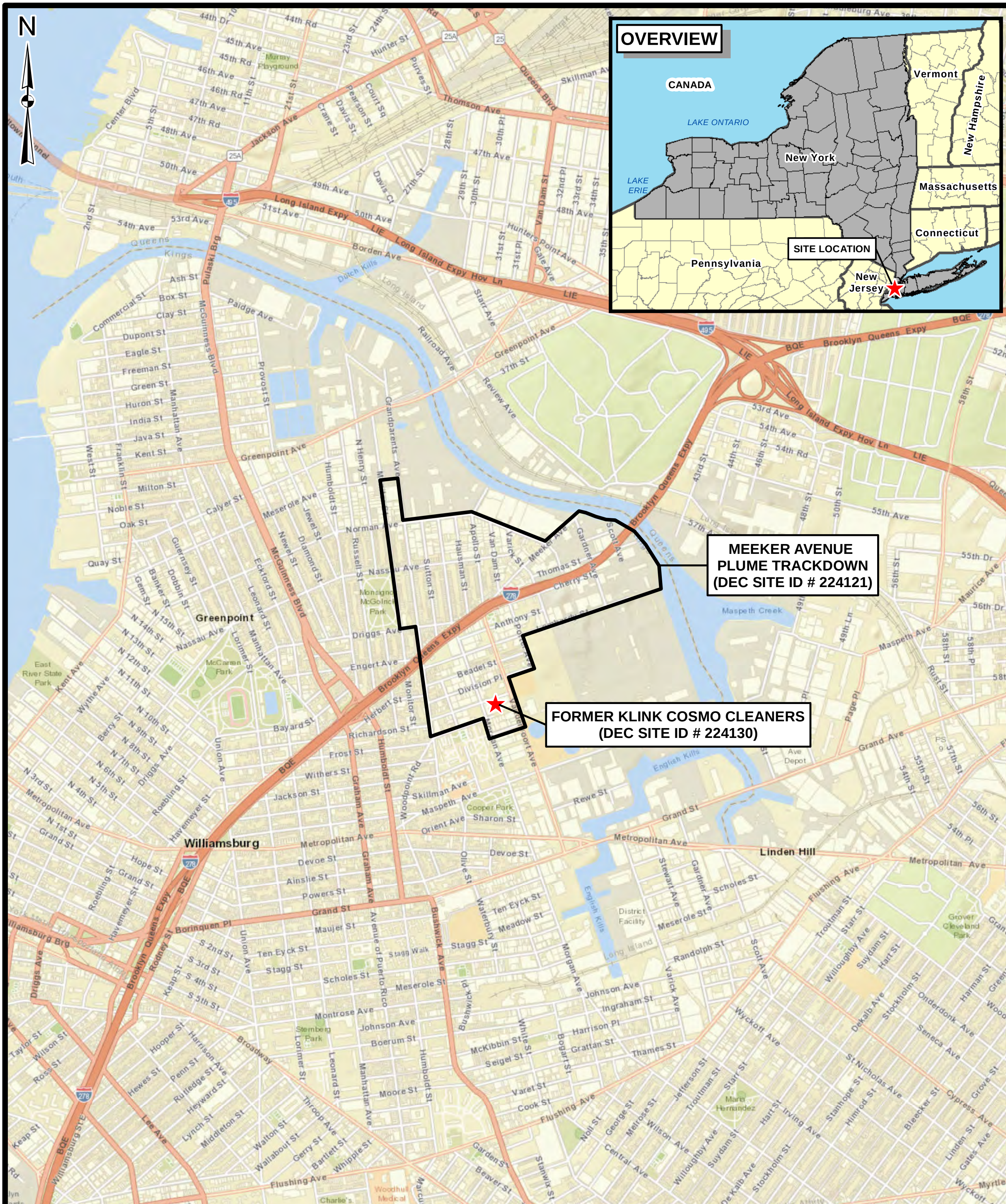
8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

Since the anticipated use of the site is commercial and or industrial, the commercial cleanup proposed in Alternatives 2 - 5 all satisfy this criterion. Excavation to meet soil cleanup objectives was not possible at the property and, therefore, was not evaluated in the FS. For each alternative, engineering controls are required to prevent exposures and institutional controls are required to restrict the use of the property, prohibit groundwater use and enforce a site management plan.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

Alternative 3 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.



Source: ESRI World Street Map

2,000 0 2,000 Feet

URS

FORMER KLINK COSMO CLEANERS SITE
SITE LOCATION

FIGURE 1

J:\Projects\11174989.00000\DB\GIS\KlinkCosmo-ReportLetter Report\01 Site Location.mxd 9/28/2017 MDL

Source: ESRI World Imagery

200 0 200 Feet

FORMER KLINK COSMO CLEANERS SITE

URS

FIGURE 2

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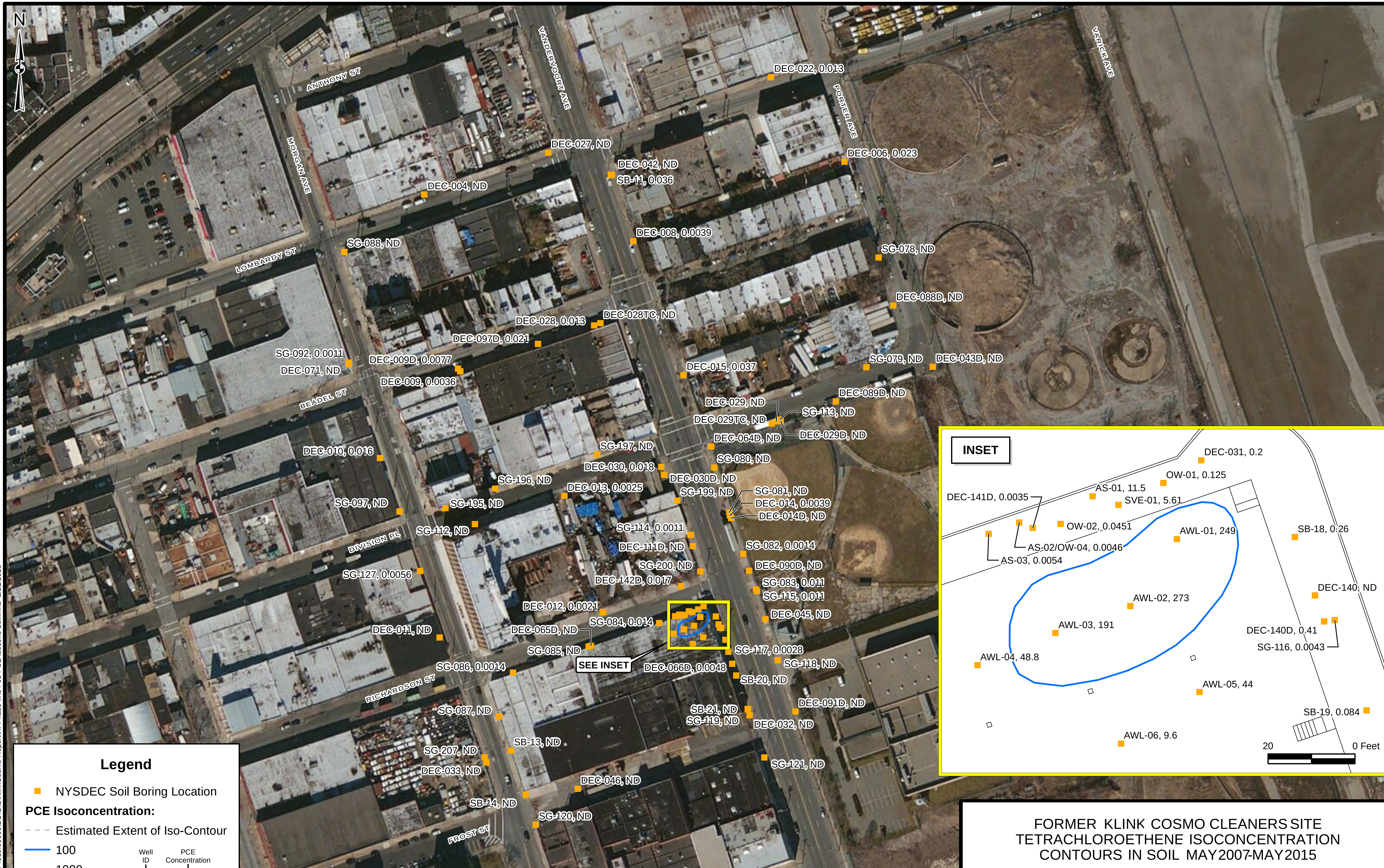

Note: Units are in mg/kg. Results shown are maximum values at soil boring location.

Source: ESRI World Imagery

FORMER KLINK COSMO CLEANERS SITE
TETRACHLOROETHENE ISOCONCENTRATION
CONTOURS IN SOIL MAY 2007-MAY 2015

URS

FIGURE 3

J:\Projects\11174989.00000\DB\GIS\KlinkCosmo-ReportRI Phase III04-05 PCE Isocone Soil.mxd 1/21/2016

Legend

NYSDEC Monitoring Well

PCE Isoconcentration:

- Estimated Extent of Iso-Contour
- 100
- 1000
- 10000

Well ID | PCE Concentration

DEC-029, 17000

ND = Not Detected

Note: Units are in µg/L

Source: ESRI World Imagery

150 0 150 Feet

FORMER KLINK COSMO CLEANERS SITE
FEASIBILITY STUDY
TETRACHLOROETHENE ISOCONCENTRATION CONTOURS
IN SHALLOW GROUNDWATER
MAXIMUM CONCENTRATIONS THROUGH FEBRUARY 2017

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FIGURE 4

J:\Projects\11174989.00000\DB\GIS\KlinkCosmo-Report\Feasibility Study\02-16 PCE Isoconc Shallow GW MAX CONC.mxd 8/16/2017

Legend

▲ Sub-Slab Sample Location

Note: Units in µg/m^3

Source: ESRI World Imagery

100 0 100 Feet

FORMER KLINK COSMO CLEANERS SITE
ON-SITE SOIL VAPOR ANALYTICAL RESULTS

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FIGURE 5

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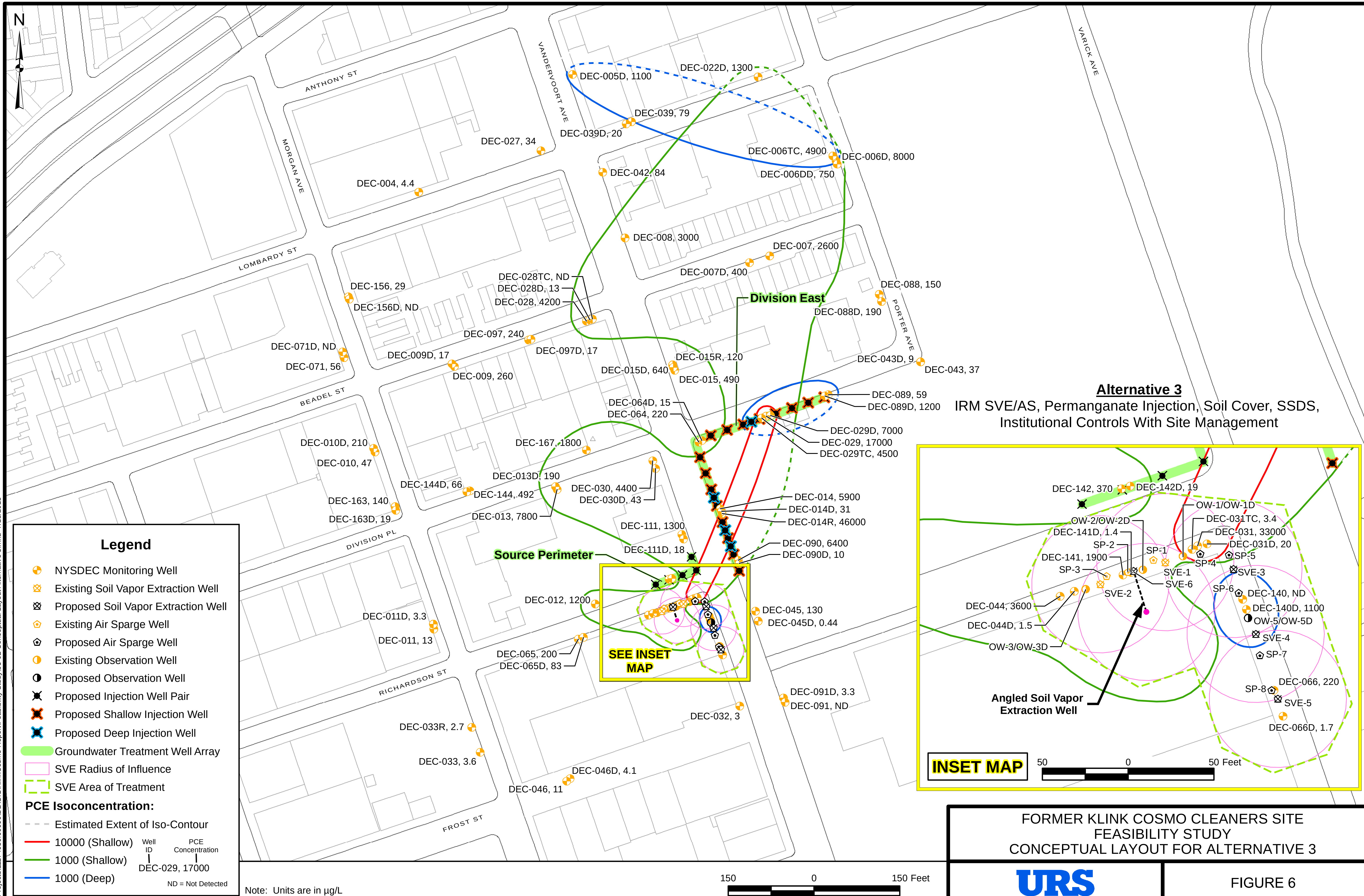

FORMER KLINK COSMO CLEANERS SITE
FEASIBILITY STUDY
CONCEPTUAL LAYOUT FOR ALTERNATIVE 3

FIGURE 6