Remedial Action Work Plan

NYSDEC Site No. C241241

27-09 40th Avenue
Long Island City, Queens, New York

May 2021

Chazen Project No.
42038.00

THE Chazen COMPANIES®
Engineers
Environmental Professionals
Land Surveyors
Landscape Architects
Planners

Prepared for:

40th Ave Dutch Kills Realty, LLC
36-08 30th Avenue, 2nd Floor
Astoria, NY 11103

New York State Department of Environmental Conservation – Division of Environmental Remediation
625 Broadway
Albany, New York 12233

Prepared by:

The Chazen Companies
21 Fox Street
Poughkeepsie, New York 12601

CERTIFICATIONS

I, Christopher Lapine, certify that I am currently a NYS registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

079470	5/20/21	Christopher Lapine
NYS Professional Engineer #	Date	Signature

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

REMEDIAL ACTION WORK PLAN
27-09 40TH AVENUE
QUEENS, NEW YORK

TABLE OF CONTENTS **PAGE**

FIGURES

TABLES

APPENDICES

ACRONYMS

AGV	Air Guidance Value
AHA	Activity Hazard Analysis
AOC	Area of Concern
ASP	Analytical Services Protocol
AST	Aboveground Storage Tank
BCA	Brownfield Clean-up Agreement
BCP	Brownfield Cleanup Program
bgs	Below Ground Surface
CAH	Chlorinated Aliphatic Hydrocarbon
CAMP	Community Air Monitoring Plan
CBS	Chemical Bulk Storage
CFR	Code of Federal Regulations
CHFM	Contaminated Historic Fill Material
COC	Chain-of-Custody
COPC	Constituents of Potential Concern
CP	Commissioner Policy
CSM	Conceptual Site Model
CTC	Cardinal Tank Corporation
CUSCO	Commercial Use Soil Cleanup Objective
DCE	cis-1,2-dichloroethene
4,4'-DDD	Dichlorodiphenyldichloroethane
DER	Division of Environmental Remediation
DER-10	Technical Guidance for Site Investigation and Remediation
DNAPL	Dense Non-Aqueous Phase Liquid
DOC	Dissolved Organic Carbon
DTW	Depth to Water
DUSR	Data Usability Summary Report
EDD	Electronic Data Deliverable
EIMS	Environmental Information Management System
ELAP	Environmental Laboratory Approval Program
EM	Electromagnetic

ESA	Environmental Site Assessment
ESI	Environmental Site Investigation
FDNY	Fire Department of New York
ft	Feet
GPR	Ground Penetrating Radar
GQS	Groundwater Quality Standard
GV	Guidance Value
GWE	Groundwater Elevation
HASP	Health & Safety Plan
HFM	Historic Fill Material
HSM	Health & Safety Manager
IBZ	Industrial Business Zone
IDW	Investigative Derived Waste
IH	Industrial Hygiene
IRM	Interim Remedial Measure
LNAPL	Light Non-Aqueous Phase Liquid
MDL	Method Detection Limit
MHz	Megahertz
MTA	Metropolitan Transit Authority
MTBE	Methyl tert-butyl ether
NAVD88	North American Vertical Datum of 1988
NYCDEP	New York City Department of Environmental Protection
NYCDOB	New York City Department of Buildings
NYCRR	New York Codes, Rules, & Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOH Guidance	Guidance for Evaluating Soil Vapor Intrusion in New York State, October 2006
ORP	Oxygen Reduction Potential
PBS	Petroleum Bulk Storage

PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PG	Professional Geologist
PID	Photo-ionization Detector
PPE	Personal Protective Equipment
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
REC	Recognized Environmental Condition
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
SCG	Standards, Criteria, & Guidance
SCO	Soil Cleanup Objective
SDG	Sample Delivery Group
SI	Subsurface Investigation
SOP	Standard Operating Procedures
SQG	Small Quantity Generator
SSI	Supplemental Subsurface Investigation
SVOC	Semi-Volatile Organic Compound
TAGM	Technical and Administrative Guidance Memorandum
TAL	Target Analyte List
TCE	Trichloroethene
TOC	Total Organic Carbon
USCS	Unified Soil Classification System
USGS	United States Geological Survey
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
UUSCO	Unrestricted Use Soil Cleanup Objective
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

Site Description/Physical Setting/Site History

The NYSDEC entered into a Brownfield Cleanup Agreement BCA Index No. C2412421-03-20 with 40th Ave Dutch Kills Realty, LLC (Dutch Kills) the Site owner, which is performing the remediation as a Volunteer (Volunteer,) for the property located at 27-09 40th Avenue, Long Island City, Queens, New York (the Site) on April 14, 2020. The site is 0.40 acres and the site number is C241241. The Site is being redeveloped into a mixed-use building consisting of commercial and residential space. The planned goal of the remediation is to reach a Track 1 cleanup within 5 years. This RAWP includes an analysis of the remedial alternatives available, based upon the remedial investigations that have been performed to date, to remediate the contamination and then selects a preferred remedy.

The Site consists of three (3) adjoining lots identified as Block 397 and Lots 33, 35, and 39 on the New York City Tax Map. The Site is approximately 17,500 square feet (0.40 acres) and is bounded by 40th Avenue to the south, 28th Street to the east, a three-story residential building with automobile garage to the north, and a three-story residential building to the west. The Site is currently undeveloped, but past operations have included a dry-cleaner, automotive repair and machine shop businesses, a glass factory, a woodworking, and photo-engraving shop. The buildings have been demolished.

Summary of the Remedial Investigation

The Remedial Investigation indicates the localized presence of PCE source material in at least three areas on site, at depths varying from 20 to 27 feet, and the presence of chlorinated aliphatic hydrocarbon related-constituents in soil vapor and groundwater throughout the property. Metals, SVOCs and a pesticide were also identified in soil at the site. The available information indicates that at least one potentially upgradient source, the Bridge Cleaners Site, may be contributing to the presence of PCE in groundwater at and around the Site.

In general, contaminated historic fill material is underlain by layers of fine to medium silty sands and silt which overlie thick, competent, plastic clay at approximately 31 to 36 ft bgs. The high plasticity clay layer dips significantly towards the west and may be approximately 10 to 15 ft thick. The high plasticity clay acts as a hydraulic boundary layer.

As part of the Supplemental Remedial Investigation (SRI) a total of fifty-five (55) soil samples were collected and analyzed throughout the Site. In addition, ten (10) groundwater monitoring wells were

installed on-Site and off-Site as part of the SRI, and sampled and analyzed, to address data gaps in groundwater quality and to confirm localized groundwater flow direction. Four (4) off-Site permanent groundwater monitoring wells were installed in sidewalks and driveways adjoining the Site (MW-101, MW-102, MW-103, and MW-104.) A total of eight soil vapor samples (four on-site and four off-site) were collected and analyzed.

AOC 1 – Former Dry Cleaning Operation

A localized PCE hotspot extends to a depth of approximately 5 ft bgs at SB-101B. PCE was present in soil vapor samples collected at 25 ft bgs including a concentration of 270,000 µg/m^3 PCE at SV-107 and a concentration of 1,600,00 at SV-4 d µg/m^3 PCE during the 2019 RI. Soil in the vicinity of AOC 1 will be excavated to approximately 27 ft bgs, and deeper as necessary, to remove PCE source material and achieve Track 1 UUSCOs.

AOC 2 – Former Photo Engraving Operations, Machine Shop, and Subsurface Piping

A localized PCE hotspot extends to a depth of at least 27 ft bgs at historic boring B-A. This hot spot is approximately 10 ft wide, approximately 25 ft long, and extending to depths of between 17 and 27 ft bgs, and potentially deeper, in the vicinity of historic boring B-A. The top of the extensive, thick, competent, plastic clay layer that is present throughout the Site is present at depths of approximately 33 to 35 ft bgs in the vicinity of this hotspot. Soil in the vicinity of AOC 2 will be excavated to approximately 27 ft bgs, and deeper as necessary, potentially up to approximately 36 ft bgs, which is approximately 1 feet into the top of the clay, to remove PCE source material and achieve Track 1 UUSCOs. Reactive amendments consisting of zero valent iron (ZVI) will be mixed into the backfill material that is placed back into the hole in order to treat residual PCE in groundwater in the vicinity of AOC 2 and downgradient.

AOC 3 – Vicinity of B-1

PCE was detected above NYSDEC UUSCO in the 1 to 4-foot interval at this location. A PID response of 26 ppm was recorded in the elastic silt at 16 to 20 ft bgs at SB-103 which indicates the likely presence of PCE at concentrations that exceed applicable UUSCOs. Soil in the vicinity of AOC 3 will be excavated to a depth of at least 20 ft bgs to remove PCE source material and achieve Track 1 UUSCOs.

AOC 4 – Contaminated Historic Fill Material (CHFM)

Visual observations indicate the presence of CHFM to depths of approximately 4 ft bgs throughout the Site. The non-native CHFM generally appears to consist of brown silty sands, concrete, brick, coal ash, and

other construction debris. Historical results indicate PAHs and metals exceed UUSCOs in the CHFM. Soil throughout the Site will be excavated to a depth of approximately 4 ft bgs to remove CHFM material and achieve Track 1 UUSCOs. Soil in the vicinity of SB-105 will be excavated to a depth of 15 ft bgs to remove soil containing pesticides above the UUSCO and achieve Track 1 UUSCOs over an area approximately 15 wide and 15 ft deep.

AOC 5 – Groundwater

PCE was detected in all on-site groundwater samples at concentrations exceeding the NYSDEC Class GA Groundwater standard of 5 µg/L. The highest concentration of PCE in groundwater was at MW-108, along the western Site boundary, which contained 400 µg/L. The concentration of PCE in groundwater was 170 µg/L at MW-105 (AOC 1) and 250 µg/L at MW-106 (AOC 2) in the central and eastern portions of the Site, respectively. The concentration of PCE in groundwater along the northern boundary of the Site was 46 µg/L at MW-109 and 340 µg/L at MW-110.

An off-site source may potentially be contributing to the presence of dissolved-phase chlorinated solvents in groundwater e. Dissolved-phase PCE was detected in groundwater above its NYSDEC Class GA Groundwater standard (5 µg/L) at a concentration of 49 µg /L at MW-101 and 64 µg/L at MW-102, which are located hydraulically upgradient of the Site.

The remedy for groundwater includes the removal of PCE-containing source material and groundwater treatment consisting of application of reactive amendments at the groundwater interface in source areas, in-situ injection of chemical oxidant along transects located downgradient of source areas, and a downgradient permeable reactive barrier in the western portion of the Site to reduce PCE concentrations in groundwater on-Site and mitigate the potential for off-Site migration of PCE in groundwater.

AOC 6 – Soil Vapor

Even after the on-Site soil source material is removed, the presence of dissolved-phase constituents remaining in groundwater may represent a source of vapor intrusion.

To mitigate the potential soil vapor intrusion risk at the Site, a sub-slab depressurization system (SSDS) will be designed and installed. To mitigate the potential for off-site migration of soil vapor, a soil vapor extraction (SVE) system will be designed and installed.

AOC 7 – Former Vent Pipes

No compounds were detected at or above the NYSDEC UUSCO from soil samples in this area. No further action is warranted at AOC 7.

AOC 8 – Floor Drain

A floor drain was located within the former 27-03 40th Avenue building, towards the northern property boundary. No evidence of staining was noted in or on the concrete slab surrounding the floor drain. No further action is warranted at AOC 8.

Qualitative Human Health Exposure Assessment

The available information indicates that the PCE in soil vapor may represent a potential threat to human health and the environment under future conditions unless the exposure pathway is eliminated through remedial action. Even after the on-Site soil source material is removed as part of the proposed remediation, the presence of dissolved-phase constituents in groundwater will continue to represent a source of vapor intrusion that will require mitigation for some time. The proposed remedy includes excavation to remove potential source material that may remain on Site as part of an overall remedy that will be protective of human health and the environment. The proposed remedy includes an SSDS to mitigate the potential exposure from soil vapor intrusion from soil as well as contaminated groundwater from on or off-site sources. The remedy also includes an SVE system to mitigate the potential for off-Site migration of soil vapor and a PRB to reduce concentrations of PCE in groundwater.

Summary of the Remedy

The proposed remedial action will consist of the following:

- Implementation of a Community Air Monitoring Plan (CAMP) for particulates and volatile organic carbon compounds during intrusive activities,
- Removal and proper off-site disposal of remaining concrete foundation,
- Excavation of soil / fill that exceed UUSCOs,
- Design and construction of SOE,
- Screening of excavated soil / fill during intrusive activities for indications of contamination by visual means, odor, and monitoring with a PID,
- Collection and laboratory analysis of confirmation soil samples to confirm the performance of

the remedy with respect to attainment of UUSCOs,

- Collection of post-excavation soil, groundwater, and / or soil vapor data to support the completion final remedial system design documents,
- Appropriate off-Site disposal of material removed from the Site in accordance with Federal, State, and local rules and regulations for handling, transport, and disposal,
- Design, construction, and maintenance of a sub-slab depressurization system to mitigate the potential for vapor intrusion,
- Design, construction, and maintenance of a soil vapor extraction system to mitigate the potential for off-site migration of soil vapor,
- Design and installation of an in-situ groundwater treatment system to prevent the off-site migration of contaminated groundwater,
- Prohibition on the use of groundwater beneath the Site without treatment rendering it safe for its intended use,
- Recording of an Environmental Easement, including ICs, to prevent future exposure to residual contamination remaining at the Site. A copy of the Environmental Easement will be provided as an appendix to the Final Engineering Report,
- Publication of an SMP as required by the Environmental Easement, including plans for: (1) ICs and ECs, (2) monitoring, (3) operation and maintenance, and (4) reporting. The ECs are intended to be used for up to five years for a Conditional Track 1 remedy, and
- If Track 1 or Track 2 objectives are not met, the site will be considered a Track 4 with restrictions on the use of the property as detailed in the Environmental Easement.

1.0 INTRODUCTION

The NYSDEC entered into a Brownfield Cleanup Agreement BCA Index No. C2412421-03-20 with 40th Ave Dutch Kills Realty, LLC (Dutch Kills) the Site owner, which is performing the remediation as a Volunteer (Volunteer,) for the property located at 27-09 40th Avenue, Long Island City, Queens, New York (the Site) on April 14, 2020. The site is 0.40 acres and the site number is C241241. The Chazen Companies (Chazen) have prepared this Remedial Action Work Plan (RAWP) for the remediation of the Site on behalf of the Volunteer. This RAWP includes an analysis of the remedial alternatives available, based upon the remedial investigations that have been performed to date, to remediate the contamination and then selects a preferred remedy.

The SRI was completed in accordance with the NYSDEC DER-10 and a NYSDEC-approved RIWP dated June 2020, to provide a systematic assessment of environmental conditions on the Site. The SRI defines the nature and extent of contamination on-site, identifying contaminant source areas, and producing data of sufficient quantity and quality to complete an on-site exposure assessment and a qualitative off-site exposure assessment for purposes of designing the remedial action for the Site.

The Site is being redeveloped into a mixed-use building consisting of commercial and residential space. The planned goal of the remediation is to reach a Track 1 cleanup within 5 years. A Site Location Map is included as **Figure 1**.

2.0 SITE DESCRIPTION AND HISTORY

2.1. Site Description

The Site consists of three (3) adjoining lots identified as Block 397 and Lots 33, 35, and 39 on the New York City Tax Map. The Site is approximately 17,500 square feet (0.40 acres) and is bounded by 40th Avenue to the south, 28th Street to the east, a three-story residential building with automobile garage to the north, and a three-story residential building to the west. The Site is currently undeveloped, but past operations have included a dry-cleaner, automotive repair and machine shop businesses, a glass factory, a woodworking, and photo-engraving shop. Previously, it was developed with three (3) vacant one-story commercial structures with one (1) structure per lot. There is an exterior alleyway that provides access to the rear of the buildings. The buildings were constructed circa 1947 (39-44 28th Street), 1950 (27-09/11 40th Avenue), and 1970 (27-03 40th Avenue) and are constructed with concrete slabs-on-grade. The building at 39-44 28th Street had a partial basement present at the northern end of the structure which is still present at the Site. The buildings have been demolished. **Figure 2** presents a Site Plan indicating the location of historical operations.

2.2 Current and Future Site Use

The Site is currently vacant. The proposed development will consist of a mixed-use building consisting of commercial and residential space.

2.3 Contemplated Redevelopment Plan

The remedial action to be performed pursuant to this Remedial Action Work Plan (RAWP) is intended to make the Site protective of human health and the environment consistent with the contemplated end use. The proposed future redevelopment of the Site will involve the construction of a single, new 5-story mixed- use building, which will include commercial use of the ground floor, market-rate apartments on the second through fifth floors, and two sub-grade ventilated parking levels. The footprint of the new building, including the basement, will cover the entirety of the Site area. The redevelopment plan includes removal of remaining foundation structures and soil to a depth of approximately 25 feet to accommodate a 2-level parking garage below the building. As part of the redevelopment, the referenced lots are expected to be merged into a single Lot. Proposed redevelopment plans are attached as **Appendix A**. The current zoning designation is M1-2R5D, allowing for mixed residential, community facilities, commercial, and light industrial uses. The proposed use is consistent with the existing zoning of the property.

2.4 Surrounding Properties

The Bridge Cleaners Site, located at 39-26 30th Street, is approximately 514 feet east of the Site. The Bridge Cleaners Site was occupied by a commercial laundry and dry cleaner until 2011. Records indicate at least 10 years of use as a commercial drycleaner. The Bridge Cleaners Site has been listed as a small quantity generator of chromium, as well as a small quantity generator of PCE, TCE, and spent halogenated solvents associated with dry cleaning operations. There have been several violations associated with the property, including several compliance violations. The Bridge Cleaners Site entered the Brownfield database in 2012 as Bridge Cleaners Site (C241127) and remained in the program until December 2016. A 2015 IRM Work Plan indicates that residual chlorinated hydrocarbon source material in the northern portion of the Site was the source of impacts to groundwater. An April 2016 NYSDEC Fact Sheet indicates that an Interim Remedial Measure involving air sparging and soil vapor extraction was open for public comment.

PCE has been detected at concentrations of up to 1,470 µg/L in groundwater, up to 668,000 µg/m^3 in soil vapor, and up to 9.6 milligrams per kilogram (mg/kg) in soil at the Bridge Cleaners Site. A Remedial Investigation Report prepared by TRC in 2017 for the Bridge Cleaners Off-Site concluded that the chlorinated contamination at the Site likely originates from the southwest corner of the Bridge Cleaners building. Boring logs indicate the presence of clay at approximately 32-38 feet bgs in at least one (1) boring, which is consistent with observations at 27-09 40th Avenue. The available information and the complexity of the geology indicates that the true nature of groundwater flow direction at and between these sites is subject to uncertainty but generally flows from east to west. The 2017 TRC Report states that "The inferred predominant groundwater flow direction in shallow overburden was towards the west-southwest in the northern part of the Investigation Area" and that the site exhibited a "component of radial groundwater flow." These lines of evidence indicate that the Bridge Cleaners Site may be contributing to the PCE-contaminated groundwater that is migrating onto the 27-09 40th Ave. Site from upgradient off-site sources.

3.0 REMEDIAL INVESTIGATION FINDINGS

3.1 Previous Investigations

Previous investigations indicate the presence of Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), and metals in subsurface media including soil, groundwater, and soil vapor as well as the presence of contaminated historic fill material throughout the Site.

The following investigations have been previously performed at the Site:

- Phase I Environmental Site Assessment – June 2008 – prepared by AEI Environmental & Engineering Services (AEI)
- Phase II Subsurface Investigation – August 2008 – prepared by AEI
- Focused Sub-surface Site Investigation – January 2017 – prepared by Merritt Environmental Consulting Corp. (Merritt)
- Remedial Investigation Report – August 2019 – prepared by Athenica Environmental Services Inc. (Athenica)
- Supplemental Remedial Investigation Report – November 2020 – prepared by Laurel Environmental Geosciences DPC (Laurel)

Figures 3, 4, and 5 present historic soil, groundwater, and soil vapor analytical results, respectively, from previous investigations.

The results of these investigations indicated the localized presence of chlorinated aliphatic hydrocarbon related-constituents in soil and the presence of chlorinated aliphatic hydrocarbon related-constituents in soil vapor and groundwater throughout the property. The data indicate the potential of presence of PCE source material to a depth of approximately 27 ft bgs at a hot spot at AOC 1 in the central portion of the Site, to a depth of potentially 35 ft bgs at a hot spot at AOC 2 in the eastern portion of the Site, and to a depth of approximately 20 ft bgs at a hot spot at AOC 3. The available information indicates that at least one potentially upgradient source, the Bridge Cleaners Site, may be contributing to the presence of chlorinated aliphatic hydrocarbon related-constituents, including PCE, in groundwater at and around the Site.

3.2 Supplemental Remedial Investigation

3.2.1 Supplemental Remedial Investigation – Summary of Work Performed

The RI has delineated the vertical and horizontal extent of constituents of potential concern (COPCs), to the Site boundary, that exceed UUSCOs in connection with 7 AOCs with the exceptions noted herein. The building has been demolished and the Site is vacant. NYSDEC has determined that the Site is a significant threat with respect to the potential for the off-site migration of groundwater and / or soil vapor. **Figure 6** presents pre-approved SRI sampling locations along with the location of AOCs. **Table 1** presents select sample location coordinates.

As part of the Supplemental Remedial Investigation (SRI) a total of fifty-five (55) soil samples were collected and analyzed throughout the Site, including:

- Eleven (11) samples at AOC 1 from 5 boring locations (SB-101 through SB-101D,)
- Twenty-three (23) samples at AOC 2 from 8 boring locations (SB-102 through SB-102I,)
- Two (2) samples at AOC 3 from boring SB-103,
- Seventeen (17) samples from eight (8) boring locations (SB104 through SB-111,) and
- Two (2) samples at AOC 7 from boring SB-112.

These samples are generally biased towards areas of highest contamination consistent with DER-10.

A total of ten (10) groundwater monitoring wells were installed on-Site and off-Site as part of the SRI to address data gaps in groundwater quality and to confirm localized groundwater flow direction at the Site. Four (4) off-Site permanent groundwater monitoring wells were installed in sidewalks and driveways adjoining the Site (MW-101, MW-102, MW-103, and MW-104). Two (2) permanent on-Site groundwater monitoring wells, MW-105 and MW-106, were installed within 10 feet of locations hydraulically downgradient of the suspected source areas (e.g. at SV-1 and SV-4) and analyzed for VOCs, SVOCs, PFAs, 1,4-dioxane, and TAL metals. On-Site groundwater monitoring wells were installed in the southern (MW-107) and southwest (MW-108) corners of the Site and along the northern Site boundary (MW-109 and MW-110). The groundwater at MW-101, MW-102, MW-103, and MW-104 was analyzed for VOCs, PFAs, and 1,4-dioxane. The groundwater at MW-105, MW-106, and MW-108 was analyzed for VOCs, SVOCs, PFAs, 1,4-dioxane, and TAL Metals (total and dissolved). Groundwater at MW-109 and MW-110 was analyzed for VOCs only. Monitoring well MW-107 was not sampled but was used in determining Site-specific groundwater flow direction.

A total of eight soil vapor samples (four on-site and four off-site) were collected. As per the BCA, off-Site

contamination is not the responsibility of the Volunteer.

3.2.2 Geophysical Survey

A geophysical survey identified three (3) geophysical anomalies as presented in **Figure 7.** A test pit (TP) was performed at the location of each geophysical anomaly. Buried construction debris (e.g. old roofing material and bricks) were encountered at test pit locations TP-1 and TP-3. The geophysical anomaly at TP-2 was identified as an apparent sewer connection likely servicing the former 27-09 40th Avenue and 39-44 28th Street buildings. A 4-foot section of cast iron pipe was found to be rusting and cracked. Discolored white soil with a strong chemical odor was noted in proximity to the cast iron piping. The discolored soil was encountered approximately 15 feet southeast of the proposed soil boring location designation SB-102. In addition, a floor drain was located within the former 27-03 40th Avenue building, towards the northern property boundary. The floor drain was traced southwest towards 40th Avenue, where it likely discharges into public sewer. No evidence of staining was noted in or on the concrete slab surrounding the floor drain.

In order to confirm that Track 1 clean-up requirements have been achieved post-excavation, additional post-excavation soil samples will be collected as indicated below. The following presents a summary of the RI findings, conclusions, and recommendations for each AOC.

3.2.3 Supplemental Remedial Investigation - Results by Area of Concern

3.2.3.1 AOC 1 – Former Dry Cleaning Operation

A total of eleven (11) soil samples collected from 5 borings locations in AOC 1 were submitted for laboratory analysis of VOCs, PFAs, and 1-4 dioxane. PCE was detected above NYSDEC UUSCO in 1 of the 5 soil borings. A localized PCE hotspot extends to a depth of approximately 5 ft bgs at SB-101B. The vertical delineation of VOCs to the NYSDEC UUSCO is complete in this AOC.

No other compounds were detected at or above the NYSDEC UUSCO from soil samples in this area during the SRI. Historical results indicate the presence of PAHs and metals associated with contaminated historic fill material (CHFM) in shallow soil up to at least 4 ft bgs.

Groundwater samples collected from monitoring well MW-105 in AOC 1 contained 170 µg/l PCE. In addition, PCE was present in soil vapor samples collected in AOC -1 including a concentration of 270,000 µg/m^3 PCE at SV-107 during the 2020 SRI and a concentration of 1,600,00 at SV-4 d µg/m^3 PCE during the 2019 RI. Both of these soil vapor samples were collected at 25 feet bgs indicating the potential presence

of residual PCE in soil at depth in this AOC, perhaps bound in silt-clay horizons, and thus present in soil vapor samples but not significantly detected in groundwater. **Figure 8** presents a geologic cross-section. **Figures 9** and **10** present SRI soil exceedances for all AOCs. **Table 2** presents soil analytical results for AOC 1.

The following conclusions and recommendations are presented in connection with AOC 1:

- Soil in the vicinity of AOC 1 will be excavated to approximately 27 ft bgs, and deeper as necessary, to remove PCE source material and achieve Track 1 UUSCOs.
- Soil, structures, and related piping will be properly removed and disposed.
- Post-excavation soil samples will be collected in the vicinity of the historic SV-4 sample as well as SRI sampling locations SB-101B and SV-107 to confirm that Track 1 UUSCOs have been achieved.
- There are no public drinking water wells in the vicinity of the Site that will complete a route of exposure.

3.2.3.2 AOC 2 – Former Photo Engraving Operations, Machine Shop, and Subsurface Piping

A total of twenty-three (23) soil samples collected from 8 boring locations in AOC 2 were submitted for laboratory analysis of VOCs, PFAs, and 1-4 dioxane. PCE was detected above NYSDEC UUSCO in 2 of the 8 soil borings performed as part of the SRI including:

- SB-102C, which contained PCE at a concentration of 30 mg/kg at a depth of 0 to 2 ft bgs and 17 mg/kg at 15 to 17 ft bgs. The PCE concentration was 0.02 mg/kg at a depth of 36 to 38 ft bgs at SB-102C, which is below the UUSCO.
- SB-102G, which contained PCE at a concentration of 17 mg/kg at a depth of 0 to 2 ft bgs and 0.021 mg/kg at 25 to 27 ft bgs.

In addition, historic boring B-A contained PCE at a concentration of 2.5 mg/kg at a depth of 0 to 2 ft bgs and 11 mg/kg at 25 to 27 ft bgs.

These results indicate that a PCE hotspot centered around historic boring B-A and SB-102C is approximately 10 ft wide and approximately 25 ft long. Consistent with expectations regarding the fate and transport of PCE in soil containing silts and clays, PCE concentrations within the hotspot do not appear to exhibit predictable concentration gradients throughout. The available information indicates that PCE is expected to be present in soil at this hotspot to depths of between 17 and 27 ft bgs, and potentially deeper in the vicinity of historic boring B-A. The top of the extensive, thick, competent, plastic clay layer

that is present throughout the Site is present at depths of approximately 33 to 35 ft bgs in the vicinity of this hotspot. Depth-to-water in the vicinity of this hotspot at MW-106 was 35.1 ft bgs during the SRI.

No other compounds were detected at or above the NYSDEC U SCO from soil samples in this area during the SRI.

Table 3 presents soil analytical results for AOC 2.

The following conclusions and recommendations are presented in connection with AOC 2:

- Soil in the vicinity of AOC 2 will be excavated to approximately 27 ft bgs, and deeper as necessary, potentially up to approximately 36 ft bgs, which is approximately 1 feet into the top of the clay, to remove PCE source material and achieve Track 1 UUSCOs.
- Soil, structures, and related piping will be properly removed and disposed.
- Post-excavation soil samples will be collected in the vicinity of the historic B-A sample as well as SRI sampling locations SB-102C and SB-102H to confirm that Track 1 UUSCOs have been achieved.

3.2.3.3 AOC 3 – Vicinity of B-1

A total of two (2) samples collected from one (1) boring location in AOC 3 were submitted for laboratory analysis of VOCs, PFAs, and 1-4 dioxane. PCE was detected above NYSDEC UUSCO in the 1 to 4-foot interval at this location. PCE was detected above NYSDEC UUSCO in the 1 to 4-foot interval at this location. A PID response of 26 ppm was recorded in the elastic silt at 16 to 20 ft bgs at SB-103 which indicates the likely presence of PCE at concentrations that exceed applicable UUSCOs.

No other compounds were detected at or above the NYSDEC UUSCO from soil samples in this area during the SRI.

Table 4 presents soil analytical results for AOC 3.

The following conclusions and recommendations are presented in connection with AOC 3:

- Soil in the vicinity of AOC 3 will be excavated to a depth of at least 20 ft bgs, to remove PCE source material and achieve Track 1 UUSCOs.
- Soil, structures, and related piping will be properly removed and disposed.
- Post-excavation soil samples will be collected in the vicinity of SB-103 to confirm that Track 1 UUSCOs have been achieved.

3.2.3.4 AOC 4 – Contaminated Historic Fill Material

A total of seventeen (17) samples were submitted from eight (8) boring locations in this AOC for laboratory analysis of VOCs, SVOCs, TAL Metals, PCBs, Pesticides, PFAs, and 1-4 dioxane. One (1) sample was submitted for analysis of VOCs only (SB-107 0 to 2 ft bgs).

Visual observations indicate the presence of CHFM to depths of approximately 4 ft bgs throughout the Site. The non-native HFM generally appears to consist of brown silty sands, concrete, brick, coal ash, and other construction debris. PCE was detected above NYSDEC UUSCO in 1 of the 11 soil borings (SB-107 from 0 to 2 ft bgs). PCE was not detected in any other soil samples at concentrations exceeding the UUSCOs.

The SVOCs benzo(a)anthracene (1.19mg/kg), chrysene (1.06mg/kg), and indeno(1,2,3-cd)pyrene (0.503 mg/kg) were detected at SB-106 in the 5 to 7-foot interval, at concentrations exceeding their respective UUSCOs of 1 mg/kg, 1 mg/kg, and 0.5 mg/kg. No other SVOCs were detected at concentrations exceeding the UUSCOs.

The pesticide dieldrin was detected in SB-105 at the 13 to 15-foot interval at a concentration of 0.00578 mg/kg, which exceeds the UUSCOs of 0.005 mg/kg. No other pesticides were detected at concentrations exceeding the UUSCOs.

No other compounds were detected at or above the UUSCOs in any samples from this area during the SRI. Historical results indicate the presence of PAHs and metals associated with CHFM in shallow soil up to at least 4 ft bgs.

Table 5 presents soil analytical results for AOC 4.

The following conclusions and recommendations are presented in connection with AOC 4:

- Contaminated historic fill consists of concrete, brick, coal ash, and other construction debris and contains VOCs, SVOCs, and metals.
- Soil throughout the Site will be excavated to a depth of approximately 4 ft bgs to remove CHFM material and achieve Track 1 UUSCOs.
- Soil in the vicinity of SB-105 will be excavated to a depth of 15 ft bgs to remove soil containing pesticides above the UUSCO and achieve Track 1 UUSCOs over an area approximately 15 wide and 15 ft deep.

- Post-excavation confirmation soil samples will be collected throughout the Site to confirm that Track 1 UUSCOs are achieved.

3.2.3.5 AOC 5 – Groundwater

Groundwater quality at the Site is consistent with the ubiquitous presence of chlorinated aliphatic hydrocarbons in groundwater throughout highly industrialized and densely populated urban areas such as Long Island City in the Borough of Queens in New York City. The findings of the SRI indicate that chlorinated aliphatic hydrocarbons (CAHs,) including PCE, were detected in groundwater on-Site and are migrating onto the Site from upgradient sources. On-site sources may also be contributing to concentrations of dissolved-phase PCE in groundwater at monitoring wells MW-105, MW-106, MW-108, and MW-110 at concentrations that are above background concentrations migrating onto the Site.

The results of the SRI are summarized below:

- PCE was detected in all on-site groundwater samples at concentrations exceeding the NYSDEC Class GA Groundwater standard of 5 µg/L. The highest concentration of PCE in groundwater was at MW-108, along the western Site boundary, which contained 400 µg/L. The concentration of PCE in groundwater was 170 µg/L at MW-105 (AOC 1) and 250 µg/L at MW-106 (AOC 2) in the central and eastern portions of the Site, respectively. The concentration of PCE in groundwater along the northern boundary of the Site was 46 µg/L at MW-109 and 340 µg/L at MW-110.
- Dissolved-phase PCE was detected in groundwater above its NYSDEC Class GA Groundwater standard (5 µg/L) at a concentration of 49 µg /L at MW-101 and 64 µg/L at MW-102, which are plausibly located hydraulically upgradient of the Site and representative of groundwater potentially migrating onto the Site.
- The VOC chloroform was found in MW-108 at a concentration of 8.5 µg/L, which exceeds the NYSDEC Class GA Groundwater standard of 7 µg/L. Chloroform was not detected in on-Site soil and is not considered Site-related.
- No other VOCs were found to exceed their respective NYSDEC Class GA Groundwater standards.
- No SVOCs were found in any on-site groundwater samples at concentrations exceeding their respective NYSDEC Class GA Groundwater standards.

- The heavy metals barium, chromium, copper, lead, magnesium, manganese, nickel, selenium, and sodium were found undissolved in groundwater at concentrations exceeding their respective NYSDEC Class GA Groundwater standards.
- The heavy metals magnesium, manganese, selenium, and sodium were found dissolved in groundwater at concentrations exceeding their respective NYSDEC Class GA Groundwater standards. The presence of these metals in groundwater appears to be attributable to naturally occurring conditions related to the brackish nature of groundwater in this part of the city.
- Concentrations of PFOA were found to exceed the NYSDEC interim guidance values for emerging contaminants in the sample collected from MW-106. The concentration of PFOA at 0.0108 µg/L is above the NYSDEC interim guidance value of 0.01 µg/L. PFOA was not detected in any other on-site groundwater samples at concentrations exceeding the NYSDEC interim guidance values. Given that PFOA was not detected in soil samples at concentrations that exceed 1 ppb, PFOA in groundwater at the Site is not considered Site-related.
- Concentrations of PFOS in on-site groundwater were not found to exceed the NYSDEC interim guidance values for emerging contaminants of 0.01 µg/L. The compound 1-4 dioxane was detected in MW-108 at a concentration of 0.5 µg/L, which is below the NYSDEC interim guidance value of 1 µg/L. 1-4 dioxane was not detected in any other on-site groundwater samples.

At the Former Bridge Cleaners Site, 514 feet east of the Site, PCE has been detected at concentrations of up to 1,470 µg/L in groundwater, up to 668,000 µg/m^3 in soil vapor, and up to 9.6 mg/kg in soil at the Site. The proximity of the Bridge Cleaners Site to the Site, as well as its potentially hydraulically upgradient location and the presence of an extensive, thick, competent, plastic clay layer across the Site appears to indicate that the Bridge Cleaners Site may be contributing to PCE present in groundwater at and around the Site. In addition, it is generally understood that the presence of dissolved-phase PCE at these concentrations is ubiquitous in the upper glacial aquifer throughout most of New York City. Dissolved-phase PCE was detected in groundwater at a concentration of 49 µg /L at MW-101 and 64 µg/L at MW-102, which are plausibly located hydraulically upgradient of the Site and representative of groundwater potentially migrating onto the Site. These lines of evidence indicate that the presence of dissolved-phase chlorinated solvents in groundwater may potentially be attributed to migration onto the Site from an off-property source. Furthermore, local groundwater is not for used for potable purposes.

Although the Volunteer is not responsible for the remediation of these dissolved-phase constituents from

upgradient sources, these constituents are present in groundwater at the Site. Further, future releases and / or migration of dissolved-phase constituents from these upgradient sources onto the Site may continue to contribute to groundwater contamination at the Site. Therefore, it is important to understand the fate and transport mechanisms that may help to reduce the concentrations of these constituents in groundwater.

Geochemical field and laboratory results, including ORP results ranging between 80 and 149 milliVolts (mV,) dissolved oxygen content ranging between 1.6 and 11.7 mg/L, and sulfate concentrations ranging between 106 and 117 mg/L, indicate that aerobic conditions prevail in groundwater at the Site. The lack of significant concentrations of PCE daughter products (TCE) as well as chromium concentrations further support this conclusion. The presence of metals in groundwater appears to be attributable to naturally occurring conditions related to the brackish nature of groundwater in this part of the city.

Table 6 presents groundwater measurements. **Table 7** presents off-Site groundwater analytical results. **Table 8** presents on-Site groundwater analytical results. **Figure 11** presents SRI groundwater exceedances. **Figure 12** presents groundwater contours.

The following conclusions are presented in connection with AOC 5:

- Dissolved-phase chlorinated solvents in groundwater may potentially be attributed to migration onto the Site from an off-property source.
- On-site concentrations of PCE in groundwater at the Site exceed the concentration of PCE that is migrating onto the Site by a factor of approximately 2 to 8 times indicating a potential on-site source.
- The concentration of PCE observed in groundwater is less than 0.1% of the aqueous solubility of PCE which indicates that DNAPL is not present at the Site.
- Dissolved-phase chlorinated aliphatic hydrocarbons such as PCE have the potential to represent a source of vapor intrusion at the Site.
- Aerobic processes presently dominate in groundwater.
- There are no public drinking water wells in the vicinity of the Site that will complete a route of exposure.

- The presence of metals in groundwater appears to be attributable to naturally occurring conditions related to the brackish nature of groundwater in this part of the city.
- PFOA, PFOS, and 1,4-dioxane are not considered Site-related and are not relevant to the remedy for this Site.

The following recommendations are presented for AOC 5:

- Remove PCE source material that could impact groundwater as described above for AOCs 1 through 4, and elsewhere, as necessary, based on field observations and post-excavation sampling.
- To mitigate the potential soil vapor intrusion risk at the Site, a sub-slab depressurization system (SSDS) will be designed and installed.
- To mitigate the potential for off-site migration of soil vapor, a soil vapor extraction (SVE) system will be designed and installed.
- To prevent the off-site migration of contaminated groundwater, groundwater treatment consisting of soil amendments, passive reactive barrier, and in-situ chemical oxidation will be designed and installed.

3.2.3.6 AOC 6 – Soil Vapor

The findings of the SRI indicate the presence of PCE concentrations in soil vapor at the Site that may require action under future conditions following redevelopment according to the New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH Guidance). The available information indicates that the PCE in soil vapor may represent a potential threat to human health and the environment under future conditions unless the exposure pathway is eliminated through remedial action. Even after the on-Site soil source material is removed as part of the proposed remediation, the presence of dissolved-phase constituents in groundwater will continue to represent a source of vapor intrusion that will require mitigation for some time.

Table 7 presents off-Site soil vapor analytical results. **Table 8** presents on-Site soil vapor analytical results **Figure 13** presents SRI soil vapor sampling results.

The following conclusions and recommendations are presented in connection with AOC 6:

- Even after the on-Site soil source material is removed, the presence of dissolved-phase

constituents remaining in groundwater may represent a source of vapor intrusion.

- To mitigate the potential soil vapor intrusion risk at the Site, a sub-slab depressurization system (SSDS) will be designed and installed.
- To mitigate the potential for off-site migration of soil vapor, a soil vapor extraction (SVE) system will be designed and installed.

3.2.3.7 AOC 7 – Former Vent Pipes

A total of two (2) samples collected from 1 boring location in AOC 7 were submitted for laboratory analysis of VOCs, PFAs, and 1-4 dioxane. No compounds were detected at or above the NYSDEC UUSCO from soil samples in this area. The vertical delineation of VOCs to the NYSDEC UUSCO is complete in this AOC.

The following conclusions and recommendations are presented in connection with AOC 7:

- No further action is warranted.

3.2.3.8 AOC 8 – Floor Drain

One (1) floor drain was identified at the Site during the geophysical survey. The floor drain was located within the former 27-03 40th Avenue building, towards the northern property boundary. The floor drain was traced southwest towards 40th Avenue, where it likely discharges into public sewer. No evidence of staining was noted in or on the concrete slab surrounding the floor drain. The floor drain is a potential pathway for subsurface contamination through leaks or cracks in the piping. The floor drain was established and investigated as AOC 8.

Soil samples locations SB-104 and SB-105 were placed in proximity to the former floor drain within the former 27-03 40th Avenue building at the Site. Soil samples SB-104 (5-7’ and 13-15’) and SB-105 (5-7’ and 13-15’) were collected from in proximity to the floor drain. The only exceedance of UUSCOs found in either of these two soil boring locations, was the pesticide dieldrin in SB-105 at the 13 to 15-foot interval. The laboratory analytical results indicate that the floor drain has not impacted subsurface soils. Furthermore, no tenants of the former 27-03 40th Avenue building are known to have utilized PCE or other halogenated solvents, which is the primary contaminant of concern at the Site.

The following conclusions and recommendations are presented in connection with AOC 8:

- No further action is warranted.

3.3 Conceptual Site Model

Pursuant to DER-10, a conceptual site model (CSM) has been prepared to develop a general understanding of the Site and evaluate potential human exposure pathways and impacts to the environment. This CSM considers Site history and context, including the factors that influence distribution, and fate and transport of remedy-relevant constituents, as well as potential receptors and pathways for exposure. These factors include potential sources and release mechanisms, the physical-chemical mechanisms that control constituent fate and transport, and the likely exposure pathways that govern the potential for adverse effects to human and ecological receptors. The CSM will be used to identify remedy relevant data gaps that will be addressed as part of the remedial action. The CSM reflects data collected through November 2020 as part of the SRI.

3.3.1 Potential Sources

Dissolved-phase chlorinated aliphatic hydrocarbon (CAH) - related constituents, including PCE, have been detected in soil, groundwater, and soil vapor at the Site and may be attributed to releases associated with historical operations including former dry cleaning, glass manufacturing, photo engraving, motor manufacturing, and parts washing operations from the former machine shop.

According to historical sources, the 27-09 40th Avenue building was occupied as a dry cleaning facility from 2000 to 2017. The facility was equipped with a Turbo Dry 1131 closed loop dry cleaning system, with steel secondary containment within an enclosed and ventilated room. This system utilized PCE, which, even when properly stored and disposed of, may be released from dry cleaning facilities in small, frequent releases through floor drains, cracked concrete, and sewer systems. Chlorinated solvents are highly mobile chemicals that can easily accumulate in soil. PCE was reportedly not stored on-site and was only present within the closed loop dry cleaning system.

The 27-09 and 27-11 40th Avenue buildings were occupied by a glass manufacturer, Scientific Glass and Modern Glass Works, from 1950 until 1992. No information as to specific on-site operations is available. The geophysical survey and associated test pitting, conducted as part of the SRI, identified a cracked pipe at approximately 2 ft bgs in the vicinity of AOC 2. This pipe which appears to have provided sanitary service to the former buildings at the Site. Discolored soil with a chemical odor was identified in proximity to the cracked pipe. It is possible that this leaking pipe may be a source of release of fluids containing PCE and / or other chemicals into the subsurface.

Visual observations and laboratory analytical results for subsurface soils collected during the SRI indicate that poor housekeeping practices, the presence of contaminated historic fill, and use of pesticides may be responsible for the presence of VOCs, including PCE, as well as SVOCs, pesticides, and metals in soils.

High VOC concentrations in soil vapor were also detected throughout the Site. At AOC 1, the concentration of PCE in soil vapor (SV-107 at 270,000 µg/m^3) during the SRI, and historical 2019 results (SV-4 at 1,600,000 PCE µg/m^3), both sampled from 25 ft bgs, indicate the potential presence of PCE in soil at depth at or near this AOC.

No underground storage tanks have been identified in historical records or in the geophysical survey conducted as part of the SRI.

3.3.2 ENVIRONMENTAL FATE AND TRANSPORT

Chemicals are transported or transformed in the environment through physical and kinetic processes. Physical processes including dissolution, vaporization, and adsorption result in the transfer the substances across media and phases. Kinetic processes, which include biotic and abiotic chemical transformations, decrease the concentration of a chemical by degrading it into other products. The current understanding of the fate and transport of petroleum hydrocarbon-related constituents is summarized below for each of the environmental media of interest at the Site.

3.3.2.1 Soil

Pure TCE and PCE are considered dense non-aqueous phase liquids (DNAPL) because they are heavier than, and therefore sink in, water. This contrasts with light non-aqueous phase liquids (LNAPL), which are lighter than, and therefore float on, water. The physical and chemical properties of subsurface DNAPLs can vary considerably from that of pure DNAPL compounds due to the presence of complex chemical mixtures, the effects of in-situ weathering, and the fact that much DNAPL waste consists of off-specification materials, production process residues, and spent materials. No free-phase DNAPL has been found on-Site, and DNAPL concentrations in soil samples collected above the water table are uniformly low.

When released as free-phase DNAPL, PCE can migrate in the subsurface as volatiles in soil gas, dissolved in groundwater, and as a mobile, separate phase liquid, until ceasing to move due to adsorption or fully dissolving. The migration of free-phase DNAPL is governed by transport principles and the following chemical and media specific properties: saturation, interfacial tension, wettability, capillary pressure,

residual saturation, relative permeability, solubility vapor pressure, volatilization, density, and viscosity. Like LNAPL, subsurface DNAPL is acted upon by three distinct forces due to: (1) gravity, (2) capillary pressure, and (3) hydrodynamic pressure.

Gravity promotes the downward migration of DNAPL. The fluid pressure exerted at the base of a DNAPL body due to gravity is proportional to the DNAPL body height, the density difference between DNAPL and water in the saturated zone, and the absolute DNAPL density in the vadose zone. Capillary pressure resists the migration of non-wetting DNAPL from larger to smaller openings in water-saturated porous media. Fine-grained layers with small pore radii may as capillary barriers to DNAPL migration. Alternatively, fractures, root holes, and coarse-grained strata with relatively large openings may provide preferential pathways for non-wetting DNAPL migration. Capillary pressure effects cause lateral spreading of DNAPL above capillary barriers and also act to immobilize DNAPL at residual saturation and in stratigraphic traps. Trapped DNAPL, whether as isolated blebs or larger volumes, are a long-term source of groundwater contamination.

The hydrodynamic force due to hydraulic gradient can promote or resist DNAPL migration and is usually minor compared to gravity and capillary pressures. The control on DNAPL movement exerted by the hydrodynamic force increases with (1) decreasing gravitational pressure due to reduced DNAPL density and thickness (2) decreasing capillary pressure due to the presence of coarse media, low interfacial tension, and a relatively high contact angle, and (3) increasing hydraulic gradient. Mobile DNAPL can migrate along capillary barriers (such as bedding planes) in a direction opposite to the hydraulic gradient.

Previous investigations at this Site have indicated the presence of PCE in shallow subsurface soil samples throughout the Site at concentrations that exceed UUSCOs, with localized deep hotspots identified in the vicinity of the former dry cleaning operations and well as the former photo engraving and parts washing operations at depths of at least 27 ft bgs. Contaminated historic fill material is underlain by a shallow clay horizon also then covering layers of fine to medium silty sands and silt which overlie an extensive layer of thick, competent, plastic clay. Low plasticity elastic silt layers are present throughout the Site which limits the horizontal migration of contamination and an extensive, competent, plastic clay layer is present beneath the Site. The available boring logs indicate that the top of an extensive, competent, thick plastic clay layer exists at approximately from 31 to 36 ft bgs across the Site with top of clay shallower on the eastern side and trending deeper to the western margin of the Site. None of the borings performed as part of the SRI penetrated the full thickness of the clay, but the available information, including

geotechnical boring logs, indicates that the lay may be approximately 10 to 15 ft thick. The high plasticity clay acts as a hydraulic boundary layer expected to remain saturated at all times because it is approximately coincident with mean sea level, but which is also likely to delay natural recession of groundwater mounding following recharge events. The clay layer is likely to significantly limit the vertical migration of fluids into groundwater.

The proposed remedy includes the removal of contaminated soil present at source material varying depths across the site at concentrations that exceed their respective UUSCO and confirmation that Track 1 SCOs are achieved with the collection of additional post-excavation confirmation soil samples.

3.3.2.2 Groundwater

On-site concentrations of PCE in groundwater range from 170 ug/L (MW-105) and 250 ug/L (MW-106) in the eastern portion of the Site and are 400 ug/L at MW-108 in the far western, downgradient portion of the Site. The concentrations of PCE observed in groundwater at the Site is less than 0.1% of the aqueous solubility of PCE (200,000 µg/l) which indicates that DNAPL is not present at the Site. In addition, upgradient sources are contributing to the presence of PCE in groundwater at the Site at concentrations of approximately 49 ug/L (MW101) and 64 ug/L (MW-102.)

Depth to groundwater varies from approximately 33 to 38 feet bgs on Site. Groundwater resides in the deep clay horizon. As indicated in the geologic cross section presented in **Figure 8**, depth-to-water appears to be 1.5 to 5.5 feet below the top of clay at on-Site monitoring wells, with an overlying silty clay horizon. The extensive, competent, thick (10 to 15 ft) plastic clay layer is present beneath the Site at approximately 31 to 36 ft bgs with top of clay shallower on the eastern side and trending deeper to the western margin of the Site. The clay layer limits the vertical migration of fluids and any potential PCE-related impacts to soil may be limited to the top foot of the clay.

The Site lies mid-way between the East River and the Newtown Creek and groundwater elevations are within 10 feet of sea level, and as such hydraulic gradients are presumed to be extremely low. The varying groundwater elevations measured in monitoring wells installed as part of the SRI are interpreted to be more representative of localized potentiometric pressure in the semi-confining silt-clay and clay horizons and local-influenced gradients reflecting small permeability variations rather than significant indications of regional groundwater flow.

It is possible flow may take place in the overlying silty-clay horizon seasonally, however, the data do not indicate any significant variations in water levels in monitoring wells at the Site over time. Rates of

groundwater migration at the Site appear to be extremely slow on the basis of low geologic permeability and regional hydraulic gradients. The hydraulic gradient was calculated to be approximately 0.015 ft/ft along the groundwater flow path, which appears to be unusually high and may not accurately reflect actual conditions. Conservatively assuming a hydraulic conductivity of 10^{-4} cm/sec for silt and a porosity of 0.22, a groundwater seepage velocity of approximately 7 ft / year for the Site is assumed. Groundwater contour maps indicate that groundwater generally flows to the west-southwest.

The available information and the complexity of the geology indicates that the true nature of groundwater flow direction at the Site is subject to uncertainty. It is possible that CAHs may both be explained by on-Site residual sources, as well as by contributing off-site sources which may include the Bridge Cleaners Site, all of which may have the potential to contaminate groundwater at the Site and represent a potential source vapor intrusion. A 2017 report prepared in connection with the Bridge Cleaners Site, located approximately 500 feet to the east, states that "the inferred predominant groundwater flow direction in shallow overburden was towards the west-southwest in the northern part of the Investigation Area" and that the site exhibited a "component of radial groundwater flow." A review of historical hydrogeological maps indicates that the clay may have been formed in estuarine deposits associated with vestiges of Newtown Creek.

The fate and transport mechanisms that affect groundwater include advection, dispersion, dissolution, and natural degradation, which may work to reduce the concentration of any dissolved-phase constituents in groundwater. Multiple lines of evidence including dissolved oxygen, ORP, and sulfate concentrations, the lack of significant concentrations of PCE daughter products (TCE), as well as chromium concentrations indicate that aerobic conditions prevail in groundwater at the Site. The presence of metals in groundwater appear to be attributable to naturally occurring conditions related to the brackish nature of groundwater in this part of the City.

To prevent the off-site migration of contaminated groundwater, a groundwater treatment system will be designed and installed. To mitigate the potential soil vapor intrusion risk at the Site, a sub-slab depressurization system (SSDS) will be designed and installed. To mitigate the potential for off-site migration of soil vapor, a soil vapor extraction (SVE) system will be designed and installed.

3.3.2.3 Soil Vapor

CAH-related constituents in soil and groundwater have the potential to volatilize and enter buildings through cracks and joints in foundation walls, or porous concrete at the Site. The results of soil vapor

sampling performed to date indicate the presence of CAH-related constituents in soil vapor at concentrations that are orders of magnitude above their respective guidance values. The greatest concentrations are in the vicinity of AOC 1, with lesser concentrations at AOC 2. At AOC 1, the concentration of PCE in soil vapor samples collected from 25 ft bgs during the 2020 SRI (SV-107 at 270,000 µg/m^3) and the 2019 RI (SV-4 at 1,600,000 PCE µg/m^3) indicate the potential presence of PCE in soil at depth at or near this AOC. Concentrations of PCE in soil at AOC 2 indicate the presence of a hotspot centered around historic boring B-A and SB-102C.

The proposed remedy involves excavation to remove potential source material that may remain on the Site. Site sources, as well as any dissolved-phase chlorinated aliphatic hydrocarbons in groundwater may also represent a potential source of vapor intrusion. Therefore, the proposed remedy includes an SSDS to mitigate the potential exposure from soil vapor intrusion on-site. The remedy also includes an SVE system to mitigate the potential for off-Site migration of soil vapor.

3.3.3 Potential Sensitive Receptors and Exposure Pathways

A complete exposure pathway is needed for a potential human or ecological health risk to be present. Potential receptors at the Site include construction/utility workers, groundwater, and future building occupants. Based on the peer-reviewed principles of environmental risk assessment, there is no risk to a receptor when either (1) no receptor is present or (2) there is no complete exposure pathway for that receptor.

The Site is presently vacant, and therefore, there are no current sensitive receptors at the Site either to vapor or groundwater. Groundwater is also not expected to be used for any purposes in the foreseeable future.

The proposed remedy includes excavation to remove potential source material that may remain on Site as part of an overall remedy that will be protective of human health and the environment. The proposed remedy includes an SSDS to mitigate the potential exposure from soil vapor intrusion from soil as well as contaminated groundwater from on or off-site sources. The remedy also includes an SVE system to mitigate the potential for off-Site migration of soil vapor and a PRB to reduce PCE concentrations in groundwater.

3.4 Qualitative Human Exposure Assessment

The overall purpose of the Qualitative Human Exposure Assessment is to evaluate and document how

people might be exposed to site-related contaminants and to identify and characterize the potentially exposed population(s) now and under reasonably anticipated future use of the Site. To evaluate if an exposure pathway exists, the exposure assessment assesses the quality, representativeness, and adequacy of the available data. In addition, the qualitative exposure assessment considers the nature of populations currently exposed or that has the potential to be exposed to Site related contaminants both on-Site and off-Site and describe the reasonably anticipated future land use of the Site and affected off-Site areas.

3.4.1 CONTAMINANT SOURCE

The Site is located at 27-09 40th Ave. in Queens, New York and is presently vacant. The property is bordered by 40th Avenue to the south, 28th Street to the east, a three-story residential building with automobile garage to the north, and a three-story residential building to the west.

Historic uses at the Site include an auto body shop (1977-~2006) at 27-03 40th Avenue; a dry cleaning facility (~2000-~2017), auto sales (1991-2005), a woodworking shop (2005-~2017), and a scientific glass factory (1950-1991) at 27-09/27-11 40th Avenue; and a photo-engraving shop (1947-2006), a machine shop (2014-2019), and an auto repair facility (2000-2005) at 39-44 28th Street. Historic fire insurance maps indicate that the Site maintained residential buildings prior to 1936.

The equipment and machinery utilized at the site included dry cleaning machines parts washing stations. Chlorinated solvents were used in connection with former dry cleaning operations, photo engraving, and parts washing operations. Glass manufacturing and photo engraving processes may also have resulted in the release of metals into the subsurface. Contaminated historic fill appears to contain VOCs, SVOCs, and metals. Pesticides are also present in subsurface soils.

There is no evidence of the presence of ASTs or USTs or the release of petroleum hydrocarbons at the Site.

3.4.2 CONTAMINANT RELEASE AND TRANSPORT

Visual observations and laboratory analytical results for subsurface soils collected during the SRI indicate that poor housekeeping practices, the presence of contaminated historic fill, and use of heavy metals is collectively responsible for the presence of VOCs, particularly PCE, as well as SVOCs, pesticides and metals in soils. PCE soil vapor contamination is present throughout the Site, including several hotspots located at AOC 1 and AOC 2, as well as groundwater throughout the Site. In the vicinity of the former photo

engraving operations and machine shop, the available information indicates that these operations and/or related piping may be a source of a release of the PCE in this area. An extensive, competent, thick plastic clay layer exists at approximately from 31 to 36 ft bgs across the Site with top of clay shallower on the eastern side and trending deeper to the western margin of the Site. The clay is approximately 10 to 15 ft thick. This clay layer is likely to significantly limit the vertical migration of fluids into groundwater.

3.4.3 POINTS AND ROUTES OF EXPOSURE

The VOCs, SVOCs, metals, and pesticides detected at the Site above UUSCOs may have adverse effects on human health and may be absorbed after ingestion, inhalation, or dermal exposure. Acute exposure symptoms may include headache, dizziness, unconsciousness, abdominal pain, nausea, diarrhea, and skin and eye irritation among other effects. Chronic exposure may cause harm to the central nervous system, liver, kidneys, and dermatitis among other effects. Many of the compounds are known or probable human carcinogens.

3.4.4 Characterization of Potential Receptor Populations

The Site is located at 27-09 40th Ave. in Queens, New York and is currently vacant. The Site is approximately 17,500 square feet and is bounded by 40th Avenue to the south, 28th Street to the east, a three-story residential building with automobile garage to the north, and a three-story residential building to the west. The Site is currently undeveloped. The neighboring area consists primarily of residential and commercial properties.

The following table provides a summary of the routes of exposure.

Qualitative Human Health Exposure Assessment Summary Table

Environmental Media & Exposure Route	Human Assessment
Direct contact with surface soils	• Public access will be restricted by fencing. • Trespassers may come into contact. • The majority of source area soils will be removed during redevelopment. • Construction workers and may come into contact when development begins but exposure will be prevented through CAMP and HASP implementation. • Future contact will be prevented by engineering controls such as a composite cap system.

Direct contact with subsurface soils	• Workers may come into contact if they complete ground intrusive work at the Site but exposure will be prevented through CAMP and HASP implementation.
Direct contact with groundwater	• Groundwater is at ~33-38 ft bgs. Workers may come into contact but exposure will be prevented through HASP implementation.
Ingestion of groundwater	• Groundwater is not utilized for drinking water. New York City public drinking water is supplied from reservoirs outside of the New York City area. • There are no known domestic water supply wells in the area.
Inhalation of air	• Source area soils will be removed during redevelopment in soil although VOCs will remain in groundwater. • Workers may come into contact if they complete ground intrusive work at the site. • An SSDS will be installed to mitigate the potential for soil vapor intrusion into the building from on- and off-Site sources of PCE in groundwater. • In conjunction with the SVE and SSDS, the exposure pathway will also be mitigated by a mechanical ventilation system in the parking garage encompassing the entire lower level of the property, however, this system alone is insufficient to prevent vapor intrusion from occurring.
Direct contact with surface waters	• Groundwater discharges to surface waters are not anticipated based upon on-Site groundwater concentrations and the distance to the nearest surface water body.

3.5 Geological Conditions

In general, contaminated historic fill material is underlain by layers of fine to medium silty sands and silt which overlie thick, competent, plastic clay. The continuous soil borings performed as part of the SRI indicated the presence of between 2 and 5 feet of clay at grade or under de-minimis urban fill across most of the site. This horizon overlies approximately 3 to 8 feet of black coarse sands transitioning to silt and silty clay. The sands from 8 to 37 ft bgs are consistent with distal glacial deposits in a low velocity shallow marine environment; the sands were characterized as alternating deposits of fine silty to coarse sands with varying degrees of clay content.

A coherent high plasticity brown clay layer was encountered at approximately 31 to 36 ft bgs in all soil borings conducted on and off-site as part of the SRI. The high plasticity clay layer dips significantly towards

the west, with a variation of up to 7 feet noted between the eastern and westernmost soil borings. The available boring logs indicate that the top of an extensive, competent, thick plastic clay layer exists at approximately from 31 to 36 ft bgs across the Site with top of clay shallower on the eastern side and trending deeper to the western margin of the Site. None of the borings performed as part of the SRI penetrated the full thickness of the clay but the available information, including geotechnical boring logs, indicates that the lay may be approximately 10 to 15 ft thick. The high plasticity clay acts as a hydraulic boundary layer expected to remain saturated at all times because it is approximately coincident with mean sea level, but which is also likely to delay natural recession of groundwater mounding following recharge events.

During this study period, potentiometric levels in monitoring wells were frequently noted to lie within the uppermost boundary of this clay horizon. Data collected during the SRI indicates that groundwater flows toward the west-southwest at the Site. Depth to groundwater varies from approximately 33 to 38 ft bgs on Site. The Site lies mid-way between the East River and the Newtown Creek and groundwater elevations are within 10 feet of sea level, and as such hydraulic gradients are presumed to be extremely low. The varying groundwater elevations measured in monitoring wells installed as part of the SRI are interpreted to be more representative of localized potentiometric pressure in the semi-confining silt-clay and clay horizons and local-influenced gradients reflecting small permeability variations rather than significant indications of regional groundwater flow.

A 2002 USGS map included in the History and Hydrologic Effects of Groundwater Use in Kings, Queens, and Western Nassau Counties, Long Island, New York, 1800's through 1997 (USGS Water-Resources Investigations Report 01-4096) indicates that the thick, competent, plastic clay layer observed in soil brings may be associated with estuarine deposits associated with vestiges of Newtown Creek. Depth-to-water measurements at the Bridge Cleaners site appeared vary significantly from as shallow as approximately 10 ft bgs in places to as deep as approximately 30 ft bgs in others indicating the potential for a locally perched water tables, at times. The 2002 USGS map also indicates that the Bridge Cleaners Site and the 27-09 40th Avenue Site are located close to a groundwater divide. The available information and the complexity of the geology indicates that the true nature of groundwater flow surrounding the Site is subject to uncertainty.

A geologic cross section is presented in **Figure 8.**

3.6 Applicable Standards, Criteria, And Guidance

- DER-10 / Technical Guidance for Site Investigation and Remediation
- DER-13 / Strategy for Evaluating Soil Vapor Intrusion at Remedial Sites in New York New York State Department of Environmental Conservation
- NYCRR Part 257 - Air Quality Standards
- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
- TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations
- Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (October 1994)
- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (Final October 2006)
- DER Interim Strategy for Groundwater Remediation at Contaminated Sites in New York State
- NYCRR Part 375 - Regulations Subparts 1, 3 and 6 applicable to the Brownfield Cleanup Program
- Citizen Participation in New York's Hazardous Waste Site Remediation Program: A Guidebook (June 1998)
- USEPA Office of Solid Waste and Emergency Response Directive 9355.047FS Presumptive Remedies: Policy and Procedures (September 1993)
- USEPA Office of Solid Waste and Emergency Response Directive 9355.048FS Presumptive Remedies
- Site Characterization and Technology Selection for CERCLA sites with Volatile Organic Compounds in Soils (September 1993)
- NYCRR Part 612 - Registration of Petroleum Storage Facilities (February 1992) 6 NYCRR Part 613 - Handling and Storage of Petroleum (February 1992)
- NYCRR Part 614 - Standards for New and Substantially Modified Petroleum Storage Tanks (February 1992)
- NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)

- NYCRR Subpart 374-2 - Standards for the Management of Used Oil (November 1998)
- NYCRR 375 Table 375-6.8(a) and Table 375-6.8(b)
- NYCRR Parts 700-706 - Water Quality Standards (June 1998)
- 40 CFR Part 280 - Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks
- STARS #1 - Petroleum-Contaminated Soil Guidance Policy
- STARS #2 - Biocell and Biopile Designs for Small-Scale Petroleum-Contaminated Soil Projects
- SPOTS #14 - Site Assessments at Bulk Storage Facilities (August 1994) Spill Response Guidance Manual
- Permanent Closure of Petroleum Storage Tanks (July 1988)
- NYSDOH Environmental Health Manual CSFP-530 – Individual Water Supplies Activated Carbon Treatment Systems
- 40 CFR Part 144- Underground Injection Control Program
- 6 NYCRR Part 67 Lead
- 6 NYCRR Part 56 - Industrial Code Rule 56 (Asbestos)
- 6 NYCRR Part 175 - Special Licenses and Permits--Definitions and Uniform Procedures
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)
- 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
- 6 NYCRR Subpart 374-1 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)
- 6 NYCRR Subpart 374-3 - Standards for Universal Waste (November 1998) 6 NYCRR Part 608 - Use and Protection of Waters
- TAGM 4013 - Emergency Hazardous Waste Drum Removal/ Surficial Cleanup Procedures (March 1996)

- TAGM 4059 - Making Changes to Selected Remedies (May 1998) Groundwater Effluent Limitations
- TOGS 1.3.8 - New Discharges to Publicly Owned Treatment Works
- TOGS 2.1.2 - Underground Injection/Recirculation (UIR) at Groundwater Remediation Sites
- OSWER Directive 9200.4-17 - Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (November 1997)
- Groundwater Monitoring Well Decommissioning Procedures (May 1995)

3.7 Remedial Action Objectives

As per Part 375-3.8, the chosen remedy shall be fully protective of public health and the environment including but not limited to, groundwater, drinking water, surface water, and air (including indoor air). Generic RAO for the protection of public health and the environment are presented below. The BCP program allows for various specific RAOs based upon the proposed clean-up Track.

3.7.1 Soil

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of, or exposure to, contaminants volatilizing from contaminated soil.
- Prevent migration of contaminants that will result in groundwater or surface water contamination.

3.7.2 Groundwater

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.
- Remove the source of ground or surface water contamination.
- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.

3.7.3 Soil Vapor

- Mitigate potential impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings.

4.0 REMEDIAL ACTION PLAN

4.1 Evaluation of Remedial Alternatives

Based upon the findings of previous environmental investigations and the SRI, the site lithology, proposed re- development plan for the site, and the RAOs for the site, the remediation may be performed to achieve either a Track 1, 2, or 4 cleanup objectives at the Site. For the purposes of this RAWP, we have evaluated all three cleanup alternatives which are protective of human health and the environment and conform to officially promulgated standards, criteria, and guidance (SCGs).

4.1.1 Track 1

A Track 1 remedy results in a cleanup level that will allow unrestricted use of the site. A remedy pursuant to this track must achieve compliance with the USCOs set forth in 6 NYCRR Table 375-6.8(a) for soils above bedrock, and may include use of short-term institutional or engineering controls to address other contaminated media, provided the engineering controls operate for no longer than 5 years to meet remedial goals .

A Track 1 cleanup will remove on-site soils with contaminant concentrations in excess of the applicable UUSCOs. The contaminated soil exceeding UUSCOs extends from the surface to approximately 4 ft bgs across the entire site. Hot spot source areas were identified across the site, at varying depths, to a depth of 27 ft bgs, and potentially up to 36 ft bgs, in the northeast portion of the Site, in the vicinity of the hot spot at AOC 2. A feasible remedial technology that may be used to implement this alternative involves the excavation of the contaminated soil and transportation to an approved off-site facility for disposal and related support-of-excavation (SOE) technologies to allow for the excavation to proceed safely and in accordance with applicable code requirements.

The Track 1 remedy will be “conditional” since an SSDS is required to mitigate the potential for vapor intrusion into buildings at the Site, an SVE system is needed to mitigate the potential for soil vapor to migrate off-site, and groundwater treatment is required to reduce concentrations of PCE in groundwater and to prevent the off-site migration of dissolved-phase PCE in groundwater. In a conditional Track 1 remedy, institutional and engineering controls are allowed only for periods of less than five years except in the limited instance where a Volunteer has conducted remedial activities resulting in a bulk reduction in groundwater contamination to asymptotic levels. To achieve a Track 1 remedy, engineering controls must achieve cleanup within 5 years. If cleanup goals for site-related groundwater contamination are not satisfied within 5 years for soil vapor and groundwater, which shall require groundwater treatment until

at least eight quarters indicate a downward trend or asymptotic conditions, and sub-slab and indoor air data do not achieve no further action, a Track 4 remedy will have been achieved.

The conditional Track 1 remedy includes:

- Excavation to remove source material and soils that exceed UUSCOs,
- Sub-slab depressurization system to mitigate the risk associated with potential for soil vapor intrusion into buildings on-Site,
- Soil vapor extraction system to mitigate the potential for off-Site migration of Site-related soil vapor,
- Groundwater treatment consisting of application of reactive amendments at the groundwater interface in source areas, in-situ injection of chemical oxidant along transects located downgradient of source areas, and a downgradient permeable reactive barrier in the western portion of the Site to reduce PCE concentrations in groundwater on-Site and mitigate the potential for off-Site migration of PCE in groundwater, and
- Implementation of appropriate on-site soil management, dust suppression, truck wash and other engineering controls to ensure protection to public health and the environment while the final remedy is being implemented.
- Development of an SMP and EE for the site to ensure appropriate operation, maintenance, and monitoring of the Engineering Controls (Groundwater treatment, SVE and SSDS), and appropriate use of the site. In a conditional Track 1 remedy, a Site Management Plan and Environmental Easement are required during the time period (up to five years) while the engineering controls are operating.

It is important to note that while a Track 1 cleanup typically does not include engineering controls, since groundwater may still be contaminated after the implementation of the Track 1 soil removal remedy, ECL 27-1415(4) allows for the employment of institutional or engineering controls, such as an SVE system and SSDS, for up to five years until asymptotic concentrations have been achieved. The elements of the conditional Track 1 remedy are described in further detail below:

Excavation

Excavation is required to remove source material to varying depths across the site. Soil will be excavated to a depth of approximately 4 ft bgs across the entire site to remove contaminated historic fill material which consists of concrete, brick, coal ash, and other construction debris and contains VOCs, SVOCs, and metals.

Soil will be excavated to a depth of approximately 15 ft bgs in the vicinity of SB-105 in the southwestern portion of the Site across an area approximately 15 ft by 15 ft to remove soil containing pesticides and to a depth of approximately 7 ft bgs in the vicinity of SB-106 in the northwestern portion of the Site across an area approximately 15 ft by 15 ft too remove soil containing SVOCs.

In the central portion of the Site, in the vicinity of the hot spot at AOC 1, excavation is required to a depth of approximately 27 ft bgs, and potentially deeper, as necessary, to remove soil containing PCE above UUSCOs in the vicinity of the 2020 SRI soil vapor sampling location SV-107, which contained 270,000 µg/m^3 PCE and the 2019 RI soil vapor sampling location SV-4 which contained 1,600,000 µg/m^3 PCE at 25 ft bgs across an area approximately 15 ft by 15 ft.

In the eastern portion of the Site, in the vicinity of the hot spot at AOC 2, excavation is required to a depth of approximately 27 ft bgs, and potentially deeper, up to approximately 36 ft bgs to remove soil containing PCE above UUSCOs. Excavation will continue until soil containing constituents above UUSCOs have been removed throughout AOC 2.

In addition, in the vicinity of AOC 3, excavation is required to a depth of approximately 20 ft bgs across an area approximately 15 ft by 15 ft to remove soil containing PCE above UUSCOs.

Soils will be removed at additional hot spots, if any, until the full extent of source material containing PCE concentrations that exceed UUSCOs is removed. A total quantity of approximately 4450 cy is expected to be removed for remedial purposes.

Excavated soil will be characterized and disposed of at permitted and approved disposal facilities consistent with applicable local, state, and federal laws and regulations. Hot spots of PCE-containing soil will be excavated, segregated, and characterized, as necessary, for proper disposal as potentially hazardous waste. Post-excavation bottom samples will be collected to confirm that the remaining soil is below the UUSCOs.

Sub-Slab Depressurization System

An active SSDS will be installed as an engineering control to mitigate the risk of soil vapor intrusion in the building on-Site. The system will be installed beneath the slab from approximately 23 to 25 ft bgs. The potential for vapor intrusion will be monitored for up to five years. The vapor intrusion monitoring will include the collection of samples from the sub-slab of the proposed building and the indoor air in accordance with the NYSDOH Guidance or Evaluating Soil Vapor in the State of New York (October 2006) and the May 2017: Updates to Soil Vapor / Indoor Air Decision Matrices. If within the 5 years the soil vapor and indoor air levels are below the "no further action" concentrations, then the SSDS will not be considered an EC anymore and the condition on the Track 1 remedy will be removed. The monitoring will be described in a Site Management Plan (SMP.) If, approaching the 5 year milestone, soil vapors continue to exceed the matrix values that require mitigation or monitoring, then the SSDS will become a permanent EC and the remedy will be considered a Track 4 as described below.

Soil Vapor Extraction System

An SVE system will be designed and installed to reduce concentrations of soil vapor on-Site and mitigate the potential for off-site migration of soil vapor that may result from the presence of PCE in groundwater. A blower will be attached to the SVE wells to create a negative pressure gradient facilitating the removal of vapors from the soil, through the extraction wells, through a granulated activated carbon (GAC) unit, if necessary, and finally, piped through an effluent stack where the resulting air is discharged to the atmosphere. The SVE wells will be piped to the same chase as the SSDS. The SVE system design will be in accordance with EPA 510-B-17-003, October 2017. The SVE system may consist of 2-inch diameter schedule 40 PVC extraction wells installed to the top of clay with approximately 5 feet of slotted screen along the northern, southern, and western property boundaries. A soil vapor extraction pilot study will be performed prior to mobilization for remediation. This data will be used to prepare a Soil Vapor Extraction system design document to be submitted to NYSDEC for approval and included as an Addendum to the RAWP.

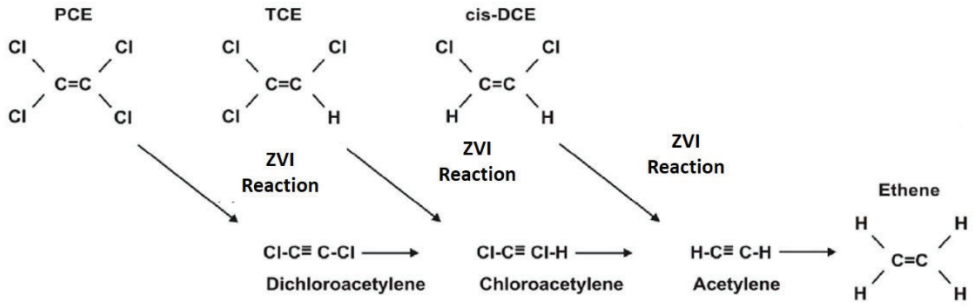
The SVE system may be used for up to five years as part of a Conditional Track 1 remedy.

Figure 14 presents a conceptual SVE system layout.

Conceptual Groundwater Treatment Plan

A groundwater treatment system will be installed to reduce concentrations of PCE in groundwater and mitigate the potential for off-site migration of contaminated groundwater. Once the excavation has reached approximately 27 ft bgs in the eastern portion of the Site, it will be safe and feasible to perform

additional excavation of the anticipated hot spot at AOC 2. It is expected that this hot spot may require excavation to a depth of up to 36 ft bgs, which is up to 1 ft into the top of the clay layer, based on the available information. After the contaminated soil has been removed, it will be replaced by clean backfill from the western portion of the Site from depths of approximately 15 to 25 ft bgs as indicated on **Figure 16.** At this time, reactive amendments will be mixed into the backfill material that is placed back into the hole in order to treat residual PCE in groundwater in the vicinity of AOC 2 and downgradient. The proposed reactive amendment will be zero valent iron (ZVI.) ZVI acts to directly destroy chlorinated VOCs through chemical reaction without bacteria involvement and without generation of daughter products.



Given the extremely slow rates of groundwater movement typical in silt and clay, these remedial investments will be designed to be highly effective in the short term (less than 5 years) and will have ample contact time to address groundwater that may have been impacted by an on-site source with the added benefit of also being persistent with the potential for having longer lasting effects (greater than 5 years.) This approach may be replicated for any other identified hot spots where excavation and off-site disposal is performed for impacted saturated soils such as AOC 1, and other hotspots, if necessary.

In-situ chemical oxidation will be performed via transects of injection points to treat PCE in the groundwater present above the clay in silt and sand soils in the northern portion of the Site. Sodium permanganate will be the injected oxidant. Permanganate is a more stable oxidant that preferentially oxidizes VOCs containing double bonds and is demonstrated to be effective for treatment of PCE. Permanganate can remain active for more than one year and has been observed to persist for more than 8 years at some projects. The relatively low PCE concentrations and slow groundwater flow rates will contribute to longer active lifetime of the oxidant, and a conservative oxidant dosage (5 to 10+ percent) would be utilized to extend the lifetime. Therefore, higher permanganate dosages can be created and injected. The higher dosages will allow longer persistence after injection and further migration.

Groundwater seepage velocity is estimated to range between 5 and 10 feet per year (using site calculated hydraulic gradient with porosity and hydraulic conductivity values assumed for observed site soils). The transections of injection points will be placed such that permanganate and/or remediated groundwater would be expected to travel across the site in a period of five years. Transects would be included downgradient of AOC 2 for treatment of downgradient groundwater containing PCE in the northern portion of the Site.

In the western, downgradient portion of the Site, a permeable reactive barrier (PRB) will be installed to prevent the off-site migration of contaminated groundwater. The PRB will be constructed using injection points oriented roughly north to south, perpendicular to groundwater flow near the downgradient property boundary for treatment of residual PCE in groundwater. The treatment interval will focus on the zone immediately above the clay and / or into the top 1 to 2 feet of the clay layer. The PRB will be approximately 10 to 15 feet wide in the direction of groundwater flow along the east-west axis and approximately 70 feet long along the north-south axis. The reactive amendment for the PRB will consist of injectable activated carbon with reactive iron impregnated on the surface of the activated carbon. The BOS 100 product consists of activated carbon that is impregnated with non-sulfidated metallic iron formed under reducing conditions at a temperature of 850 degrees C. The iron partially dissolves into the carbon forming a unique material with properties of both the carbon and iron but with capabilities exceeding ZVI in terms of rates of destruction. PCE in groundwater will sorb to the activated carbon and subsequently be degraded by the reactive iron by the abiotic dechlorination reaction shown above. This approach offers several advantages over other reactive amendments including a long active life time as well as that the amendment is not sensitive to groundwater conditions (pH, oxidation-reduction potential, dissolved oxygen.) Its use at this site will be designed to be highly effective in the short term (less than 5 years) while having longer lasting effects (greater than 5 years.)

Additional synoptic groundwater gauging and sampling will be collected to help further evaluate depth to groundwater, direction of groundwater flow, hydraulic gradient, and confirm groundwater quality and geochemical conditions. Additional vertical soil characterization sampling will be performed in the areas targeted for PRB installation, ISCO transects, and / or source area to further refine the vertical interval for treatment and prior to mobilization for remediation. Soil oxidant demand (SOD) bench testing will also be performed estimate mass of oxidant per mass of soil. This data will be used to prepare a Groundwater Treatment System design document to be submitted to NYSDEC for approval and included as an Addendum to the RAWP.

In-situ groundwater treatment will be regarded as an engineering control and will be monitored to confirm that groundwater concentrations are reduced until concentrations of PCE in groundwater achieve asymptotic conditions. The groundwater treatment system may be used for up to five years for a Conditional Track 1 remedy. If asymptotic conditions in groundwater concentrations are not achieved within five years, as demonstrated by 8 quarters of groundwater data, groundwater monitoring will continue and the conditional Track 1 will fall back to a Track 4 remedy.

Figure 15 presents the conceptual groundwater treatment system.

Site Management Plan and Environmental Easement

Under a conditional Track 1 cleanup scenario, the Site will utilize institutional controls (ICs) including an environmental easement (EE,) and engineering controls including an SSDS, SVE, and groundwater treatment for up to five years following completion of the remedy. Operation, maintenance, and reporting associated with the ECs will be documented in an SMP and enforced through the use restrictions contained in the EE, thereby ensuring that the public health and environmental protections remain in perpetuity. If the engineering controls meet the requirements for a Track 1 clean-up within 5 years, the SMP will no longer be required and the applicant may request removal of the environmental easement.

4.1.2 Track 2

The Site remediation is planned to achieve a Track 1 cleanup. However, if that is not possible the site may be remediated to a Track 2 restricted use with generic soil cleanup objectives (SCOs) based on the intended use of the property which will be restricted-residential.

Track 2 consists of restricted use with generic soil cleanup objectives. This track requires the Volunteer implement a cleanup that achieves an SCO that is consistent with the intended Site use, the lowest of restricted-residential (RRSCOs) or protection of groundwater (PG-SCOs) from tables in 6 NYCRR 375-6.7(b) for the top 15 feet of soil (or bedrock if less than 15 feet). Source material in soils (soils that exceed PG-SCOs) below 15 feet must be removed. Under a Track 2 remedy, the remedial program may include the use of long-term IC / ECs to address contamination related to groundwater and soil vapor. The Site remediation pursuant to Track 2 would involve excavation and disposal of contaminated soils to achieve the UUSCOs as presented above for the Track 1 cleanup scenario. The Track 2 remedy would use the same engineering controls (SSDS, SVE and groundwater treatment) and institutional controls (SMP and environmental easement) described for a conditional Track 1 remedy. The long term management of any

ICs / ECs will be documented in an SMP and enforced through the use restrictions and engineering control requirements contained in the applicable EE, thereby ensuring that the public health and environmental protections remain in perpetuity or until asymptotic conditions in groundwater concentrations are achieved.

The Track 2 remedy includes:

- Excavation to remove soil containing PCE at concentrations that exceed UUSCOS and removal of other contaminants in the top 15 feet of soil to RRSCOs,
- Sub-slab depressurization system to mitigate the risk associated with potential for soil vapor intrusion into buildings on-Site,
- Soil vapor extraction system to mitigate the potential for off-Site migration of Site-related soil vapor,
- Groundwater treatment consisting of application of reactive amendments at the groundwater interface in source areas, in-situ injection of chemical oxidant along transects located downgradient of source areas, and a downgradient permeable reactive barrier in the western portion of the Site to reduce PCE concentrations in groundwater on-Site and mitigate the potential for off-Site migration of PCE in groundwater,
- Implementation of appropriate on-Site soil management, dust suppression, truck wash and other engineering controls to ensure protection to public health and the environment while the final remedy is being implemented, and
- Development of an SMP and EE for the site to ensure appropriate operation, maintenance, and monitoring of the Engineering Controls (GW treatment, SVE and SSDS), and appropriate long term use of the site.

The EE and SMP for the site will include:

- Inspecting and certifying that the SSDS, and SVE system are still functioning properly and there are no cracks in the foundation,
- Soil Management Plan to address any residual contaminated soil left in place,
- Groundwater monitoring to confirm the effectiveness of groundwater treatment,
- Amending the Environmental Easement in the event of modifications to the ECs, and

- Compliance with the Environmental Easement by the Grantor and the Grantor's successors.

If the soil vapor concentrations do not reach the "no further action" concentrations as described in the matrices, then the SSDS and SVE, as described above, will continue to act as an EC.

Institutional Controls (ICs) are non-physical means of enforcing a restriction on the use of real property that limits human or environmental exposure, restricts the use of groundwater, provides notice to potential owners, operators, or members of the public, or prevents actions that will interfere with the effectiveness of a remedial program or with the effectiveness and / or integrity of operation, maintenance, or monitoring activities at or pertaining to a remedial site.

Engineering Controls (ECs) are physical barriers or methods employed to actively or passively contain, stabilize, or monitor contamination, restrict the movement of contamination to ensure the long-term effectiveness of a remedial program, or eliminate potential exposure pathways to contamination. Engineering controls may include, but are not limited to, pavement, caps, covers, subsurface barriers, sub-slab depressurization systems, vapor barriers, slurry walls, building ventilation systems, fences, access controls, and provision of alternative water supplies via connection to an existing public water supply, adding treatment technologies to such water supplies, and installing filtration devices on private water supplies.

4.1.3 Track 3

The Track 3 cleanup is not applicable to this site because the contaminants on this Site are common and all listed in the SCOs in NYCRR 375-6.8(b) tables.

4.1.4 Track 4

A Track 4 remedy for a restricted-residential use does not need to meet specific soil cleanup objectives but requires source removal and typically a Site-wide cover system where, as here, there is Site-wide surficial contamination. The Track 4 cleanup does not have specific soil cleanup objectives, but rather the Applicant may solely or in combination use the SCOs in subpart 375-6, develop or modify site specific SCOs in section 375-6.9, or propose site specific SCOs which are protective of public health and the environment. Short and long-term institutional and engineering controls are allowed to achieve protection of public health and the environment. In the event a remedy under Track 4 were to be implemented for this Site, it must provide a cover system over exposed residual soil contamination.

A Track 4 remedy for restricted-residential use requires that the top two feet of all exposed surface soils,

which exceed the site background values for contaminants of concern and are not otherwise covered by the components of the development of the site (e.g. buildings, pavement), shall not exceed the applicable contaminant-specific soil cleanup objectives per 6 NYCRR Part375-3.8€(4)(iii)(a)(1). The applicable contaminant specific soil cleanup objectives are included in **Appendix B.**

Track 4 also includes an SMP as an institutional control to ensure that any institutional and engineering controls are maintained, and material removed from the site (post remedial action) is managed properly. The SMP will include periodic (annual) monitoring and reporting of the cover system to ensure continued protection of the human health and the environment. A Track 4 remedy would be used in the event that criteria for a Track 1or Track 2 remedy are not achieved. If that occurred, then a site-wide cover system, consisting of two feet of clean soil cover placed over a demarcation layer, or consisting of components, such as pavement, sidewalks, or building foundations or slabs placed as part of site redevelopment, would become an additional engineering control for the site.

4.1.5 No Action Alternative

The no action alternative will leave existing sources of contamination in soil and groundwater and soil vapor. The no action alternative is thus unacceptable and has not been compared to the factors below.

4.1.6 Alternatives Analysis

Protection of Human Health and the Environment

Although all tracks will provide adequate protection of human health and the environment, Track 1 will be more protective than the other cleanup tracks because it will remove all soil contamination, which also act as on-Site sources of groundwater contamination. This conditional Track 1 remedy requires a short term (less than 5 years) institutional and engineering controls to manage the groundwater and vapor contamination to effectively protect human health and the environment. A Track 2 remedy also requires removal of soil source material, and includes the long term use (over 5 years) of institutional and engineering controls to address groundwater and soil vapor. A Track 4 remedy is also protective of human health and the environment, as it requires a cover system over any remaining soil contamination and long-term engineering and institutional controls to address groundwater and soil vapor contamination. .

Compliance with Standards, Criteria, and Guidelines (SCGs)

All cleanup tracks will achieve applicable cleanup standards. However, a Track 1 cleanup achieves a more

stringent set of soil clean-up standards than a Track 2 or 4 cleanup. Groundwater and soil vapor criteria are the same for Track 1, 2 and 4. Under a Track 1 remedy, these criteria must be achieved within 5 years; under a track 2 or 4 remedy, additional time is allowed to achieve groundwater and soil vapor criteria.

Short-term Effectiveness and Impacts

Generally, Track 1 provides the best short term effectiveness because it promptly removes the most contaminant mass from the Site. Track 2 and 4 also accomplishes this, but to a lesser extent, because of the longer duration needed. Tracks 1 and 2 are less favorable in terms of short-term impacts because the greater mass removal of the contaminated soils generates more truck trips than a Track 4 limited removal remedy. A Track 4 approach also reduces the risk of construction worker exposure by reducing the volume of contaminated soil being managed, and has less potential to cause dust and traffic issues. Impacts associated with excavation for track 1, 2 and 4 remedies will be reduced by implementation of standard practices, such as community air monitoring program, erosion and sediment controls, and soils management plan described in Section 6.

Long-term Effectiveness and Performance

Because Tracks 1 and 2 will involve removal of the greatest amount of contaminated soil, they will provide the most long-term effectiveness. A Track 1 cleanup will allow the Site to ultimately be used without reliance on the long-term employment of ICs or ECs. Both a Track 2 and Track 4 clean-up require long term engineering controls. Engineering controls require on-going operation, maintenance and monitoring to remain effective over the long-term. An SMP and Environmental Easement are needed for a conditional Track 1 remedy for up to 5 years. For a Track 2 or Track 4 remedy, the SMP and EE will be needed for a longer time period.

Under a Track 4 remedy, a properly maintained cover system is required to prevent exposures to contaminated soils remaining on-site.

Reduction of Toxicity, Mobility, or Volume of Contaminated Material

Tracks 1 through 4 will reduce of toxicity and mobility. A Track 1 or 2 will result in more reduction in the volume of contaminated soils than in a Track 4 clean-up. While Track 4 provides a relatively smaller reduction in volume than the other tracks, it relies primarily on the decrease of contaminant mobility.

Implementability

Tracks 1, 2 and 4 are all implementable given the location and the planned use for the Site.

While there are short term potential impacts from a Track 1 or 2 or 4 remedy, the Site is located in the middle of an urban area, therefore disposal of the contaminated soils and truck access will not be a problem. Moreover, these short-term impacts will be avoided through implementation of the CAMP and HASP, which will employ truck washing and odor and dust control measures. Therefore, Track 1 ,2 or 4 are implementable remedies for this Site.

Cost Effectiveness

Removal of the soil exceeding UUSCOs to achieve Track 1 or 2 Site wide will be costly. However, this mass removal results in long term savings by eliminating (or, in Track 2, significantly reducing) the need for indefinite cap monitoring and maintenance. Therefore, a Track 1 or 2 remedy for the Site is cost effective.

A Track 1 remedy also initially costs more and is less implementable than Track 2 and 4 remedies. However, if Track 1 can be implemented through the complete removal of all the contaminated soil, then groundwater contamination is expected to be treated more rapidly than from the other remedies. Moreover, because a Track 1 remedy requires no long term institutional or engineering controls, it is potentially less costly and more implementable in the long run than Track 2 or 4 remedies that rely on such controls for long-term effectiveness.

Community Acceptance

Community participation will be incorporated into all remedial alternatives, in the form of fact-sheets, per NYSDEC Brownfield Program law and regulations. The Site development will include affordable housing and is part of an area wide redevelopment that includes a mix of modern residences and retail stores.

Land use

All cleanup tracks will achieve remediation for the planned restricted residential use of the Site, which is consistent with proposed plans for the area. Developing the property will create short term construction impacts, but the creation of a new affordable housing project will provide significant community benefits.

Zoning: All of the proposed remedies under each track will facilitate the Site to be utilized for a proposed mixed commercial-residential development, which is consistent with applicable zoning laws and anticipated future use of the site.

Applicable comprehensive community master plans or land use plans: Implementation of all Tracks (with institutional controls) cleanup will facilitate the proposed commercial-residential development, which is consistent with current local land use plan.

Surrounding property uses: Any cleanup approach is not expected to significantly impact land use of the surrounding properties as the truck traffic and access will be on public roads. There will be short term impacts from the remediation and construction project but these will result in long-term benefits of converting defunct, abandoned, and contaminated property into new affordable housing and commercial uses.

Citizen Participation: Citizen Participation during implementation of a remedial program will proceed in accordance with the Citizen Participation Plan included as **Appendix C** of this RAWP and as noted above will have minimal community impact. Any short term impacts will be addressed by the CAMP and HASP. In accordance with DER-23, a 45-day comment period will be open to the community following submission of this RAWP to the NYSDEC.

Environmental justice concerns:

There is sizable Hispanic-American population in the area and factsheets are made available in Spanish.

Land use designations: A Track 1 remedy will not restrict any current or future land use designations. A restricted residential Track 4 will have very minimal restrictions on the future land use of the property. A Track 4 will have restrictions that will be managed in the SMP.

Population growth patterns: Any of the proposed remedies will not impact reasonably anticipated population growth patterns in the area other than to better accommodate growth by providing for new housing.

Accessibility to existing infrastructure: Existing infrastructure is present in the surrounding area but the on-site infrastructure had to be demolished and removed as part of the building demolitions and more infrastructure will be removed during the remedy. However, new infrastructure will be installed as part of remediation/redevelopment.

Proximity to natural resources: The closest surface water body, a tributary of Newton Creek, is located approximately 0.7 miles southeast of the Site.

Off-Site groundwater impacts: There are no known downgradient groundwater receptors.

Geography and geology of the Site: See Section 2.0 and 3.6 above.

Current Institutional Controls: There are no current institutional controls associated with the Site. An institutional control will be required to address contamination remaining at the Site following remediation.

4.2 Selection of the Preferred Remedy

The objective of the remedy is to achieve a cleanup that is the most protective of the human health and the environment and that does not rely on Engineering or Institutional Controls (ECs or ICs). This objective will most likely be accomplished under a Track 1 by achieving the USCOs.

A Track 1 (conditional) remedy, Alternative 1, is the preferred remedy for the Site.

This alternative will achieve a Track 1 cleanup to UUSCOs. It involves the use of proven technology to ensure long term effectiveness and permanence, reduces the toxicity, mobility, and volume of the contamination, has minimal short term impacts, is readily implementable and compatible with the size of the Site, and is cost effective. Based upon the strengths of this alternative, the protection of public health and environmental aspects, and the minimal visual impact created by this alternative, community acceptance of this alternative should be strong.

This alternative will achieve RAOs by:

- To achieve a Track 1 cleanup, excavation is required to remove source material to varying depths across the site. Soil will be excavated to a depth of approximately 4 ft bgs across the entire site, to a depth of approximately 15 ft bgs in the vicinity of SB-105 in the southwestern portion of the Site across an area approximately 15 ft by 15 ft, and to a depth of approximately 7 ft bgs in the vicinity of SB-106 in the northwestern portion of the Site across an area approximately 15 ft by 15 ft .

  In the central portion of the Site, in the vicinity of the hot spot at AOC 1, excavation is required to a depth of approximately 27 ft bgs, and potentially deeper, as necessary, to remove source material in the vicinity of the 2020 SRI soil vapor sampling location SV-107, which contained 270,000 µg/m^3 PCE and the 2019 RI soil vapor sampling location SV-4 which contained 1,600,000 µg/m^3 PCE at 25 ft bgs across an area approximately 28 ft by 28 ft.

  In the eastern portion of the Site, in the vicinity of the hot spot at AOC 2, excavation is required to a depth of approximately 27 ft bgs, and potentially deeper, as necessary, potentially as deep as approximately 36 ft bgs. In the area identified as AOC 2a, excavation is required to a depth of approximately 27 ft bgs across an area approximately 25 ft by 15 ft. In the area identified as AOC 2b, excavation is required to a depth of approximately 33 ft bgs across an area approximately 22 ft by 15 ft. In the area identified as AOC 2c excavation is required to a depth of approximately 36

ft bgs across an area approximately 15 ft by 15 ft.

In addition, in the vicinity of AOC 3, excavation is required to a depth of approximately 20 ft bgs across an area approximately 15 ft by 15 ft.

Soils will be removed at additional hot spots, if any, until the full extent of source material containing PCE concentrations that exceed UUSCOs is removed.

A total of approximately 4450 cy of soil is expected to be removed from the site for remedial purposes.

Achievement of the Track 1 UUSCOs for soil will be confirmed through the collection and analysis of post-excavation confirmation soil samples. Excavated soil will be characterized and disposed of at permitted and approved disposal facilities consistent with applicable local, state, and federal laws and regulations. Hot spots of PCE-containing soil will be excavated, segregated, and characterized, as necessary, for proper disposal as potentially hazardous waste. Post-excavation bottom samples will be collected to confirm that the concentration of PCE in remaining soil is below the UUSCOs.

- Utilizing an SSDS to mitigate potential vapor intrusion into on-site buildings.
- Utilizing an SVE system to mitigate the potential off-site migration of soil vapor that may result from the presence of PCE in groundwater.
- Performing groundwater treatment consisting of application of reactive amendments at the groundwater interface in source areas, in-situ injection of chemical oxidant along transects located downgradient of source areas, and a downgradient permeable reactive barrier in the western portion of the Site to reduce PCE concentrations in groundwater on-Site and mitigate the potential for off-Site migration of PCE in groundwater,
- Development of a site management plan and environmental easement to operate, maintain and monitor the engineering controls and limit use of the property as short-term IC/ECs for up to five years.
- Implementing appropriate on-Site soil management, dust suppression, truck wash and other engineering controls to ensure protection to public health and the environment while the final remedy is being implemented-implementation of the Track 1 remedy, ECL 27-1415(4) allows for

the employment of institutional or engineering controls for groundwater and soil vapor until asymptotic concentrations have been achieved within five years.

4.3 Summary of the Remedial Action

The proposed remedy achieves the remedial action objectives established for the redevelopment project. The remedial action is protective of the public health and environment, is compliant with remedial goals, SCGs, and RAOs, demonstrates short-term and long-term effectiveness, will result in the reduction of toxicity, mobility, and volume of contaminants through treatment, is implementable, cost effective, compatible with land use, and will generally be acceptable to the surrounding community.

The proposed remedial action will consist of the following:

- Implementation of a Community Air Monitoring Plan (CAMP) for particulates and volatile organic carbon compounds during intrusive activities,
- Removal and proper off-site disposal of remaining concrete foundation,
- Excavation of soil / fill that exceed UUSCOs,
- Design and construction of SOE,
- Screening of excavated soil / fill during intrusive activities for indications of contamination by visual means, odor, and monitoring with a PID,
- Collection and laboratory analysis of confirmation soil samples to confirm the performance of the remedy with respect to attainment of UUSCOs,
- Collection of post-excavation soil, groundwater, and / or soil vapor data to support the completion final remedial system design documents,
- Appropriate off-Site disposal of material removed from the Site in accordance with Federal, State, and local rules and regulations for handling, transport, and disposal,
- Design, construction, and maintenance of a sub-slab depressurization system to mitigate the potential for vapor intrusion,
- Design, construction, and maintenance of a soil vapor extraction system to mitigate the potential for off-site migration of soil vapor,
- Design and installation of an in-situ groundwater treatment system to prevent the off-site

migration of contaminated groundwater,

- Prohibition on the use of groundwater beneath the Site without treatment rendering it safe for its intended use,
- Recording of an Environmental Easement, including ICs, to prevent future exposure to residual contamination remaining at the Site. A copy of the Environmental Easement will be provided as an appendix to the Final Engineering Report,
- Publication of an SMP as required by the Environmental Easement, including plans for: (1) ICs and ECs, (2) monitoring, (3) operation and maintenance, and (4) reporting, and
- If Track 1 or Track 2 objectives are not met, the site will be considered a Track 4 with restrictions on the use of the property as detailed in the Environmental Easement.

Structural fill will be needed beneath foundation and parking garages and will require importation from off-Site. The import of materials will be performed in compliance with DER-10, Section 5.4, applicable chemical limits, and other specifications, as well as Federal, State, and local rules and regulations for handling and transport of material. Native material has been sampled in accordance with DER-10, Section 5.4(e) and such material that meets the UUSCOs may be used as backfill on-site, if necessary. In accordance with DER-10, documentation of the source of off-Site fill being brought to the Site must be provided to DER for approval at least one week prior to its arrival and use on site.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP. All deviations from the RAWP will be promptly reported to NYSDEC for approval and fully explained in the Final Engineering Report (FER.)

5.0 REMEDIAL ACTION PROGRAM

5.1 Governing Documents

5.1.1 Site Specific Health & Safety Plan (HASP)

The HASP has been included as **Appendix D**. The HASP outlines the requirements for training, medical surveillance, daily tailgate meetings, emergency response, and accident and injury reporting.

The Chazen Field Team Leader will be responsible for implementing the HASP, completing the daily tailgate safety meetings, and performing necessary Industrial Hygiene monitoring as specified in the HASP.

Subcontractors to Chazen and/or Volunteer will have the option of adopting this HASP or developing their own Site-specific document. If a subcontractor chooses to prepare their own HASP, it must meet the minimum requirements as detailed in the Site HASP prepared by Chazen, and must be made available to Chazen and NYSDEC.

Remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA and the Chazen Corporate Environmental Health and Safety policy. Modifications to the HASP may be made with the approval of the Chazen Health and Safety Manager and/or Project Manager.

The Volunteer and associated parties preparing the remedial documents submitted to the State and those performing the construction work, are completely responsible for the preparation of an appropriate Health and Safety Plan, and for the appropriate performance of work according to that plan and applicable laws.

The Health and Safety Plan (HASP) and requirements defined in this Remedial Action Work Plan pertain to remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

Confined space entry will comply with applicable OSHA requirements to address the potential risk posed by combustible and toxic gasses.

5.1.2 Quality Assurance Project Plan

The quality assurance project plan (QAPP), included as **Appendix E**, presents the objectives, functional activities, methods, and quality assurance / quality control (QA/QC) requirements associated with sample collection and laboratory analysis for remedial activities. The QAPP follows requirements detailed in DER-10, Section 2.

The components of the QAPP include:

- Project Organization,
- Sampling requirements, including methodology, identification, quantity, volumes, locations, frequency, chain of custody procedures, and sample packaging,
- Field/Laboratory data control requirements,
- Equipment decontamination, and
- Field documentation.

5.1.3 Soil / Materials Management Plan

A Soil / Materials Management Plan, further detailed in Section 6.4 of this RAWP, includes detailed plans for managing soils/materials that are disturbed as the Site, including excavation, handling, storage, transport, and disposal. The Soil / Materials Management Plan will also include the controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with all applicable federal, state, and local laws and regulations.

5.1.4 Storm-Water Pollution Prevention Plan

Applicable laws and regulations pertaining to storm-water pollution prevention will be addressed during remedial activities. Erosion and sediment controls will be in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control.

5.1.5 Community Air Monitoring Plan

A Site-specific Community Air Monitoring Plan (CAMP) has been prepared and included as **Appendix F** to provide measures for protection for on-Site workers and the downwind community (i.e., off-Site receptors including residences, businesses, and on-Site workers not directly involved in the remedial work) from potential airborne contaminants as a direct result of the remedial activities. The primary concerns for this Site are VOCs and dust particulates.

The CAMP will be implemented and executed in accordance with 29 CFR 1910.120(h), the NYSDOH Generic CAMP, and the NYSDEC TAGM #4031.

5.1.6 Contractors Site Operations Plan

The Remedial Engineer has reviewed plans and submittals for this remedial project (including those listed

above and contractor and sub-contractor document submittals) and confirms that they are in compliance with this RAWP. The Remedial Engineer is responsible to ensure that document submittals for this remedial project, including contractor and sub-contractor document submittals are in compliance with this RAWP. Remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

5.1.7 Citizen Participation Plan

A certification of mailing will be sent by the Volunteer to the NYSDEC project manager following the distribution of Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed, (2) the date they were mailed; (3) a copy of the Fact Sheet, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected on (specific date) and that it contained applicable project documents.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

The approved Citizen Participation Plan for this project is attached in **Appendix C.**

Document repositories have been established at the following location which contains applicable project documents:

Queens Library at Long Island City
37-44 21st Street
Long Island City, NY 11101

Queens Board 1
45-02 Ditmars Boulevard, LL Suite 1025
Astoria, NY 11105

5.2 General Remedial Construction Information

5.2.1 Project Organization

40th Ave Dutch Kills Realty, LLC (Dutch Kills) is the BCP Volunteer and redeveloper of the Site. Laurel Environmental Geosciences DPC (Laurel) is the environmental consultant. A table summarizing the various personnel associated with the project is included as **Table 11** below.

Table 1 - Project Personnel

Name	Company	Project Position	Address	Phone Number
Tony Raouf	40th Ave Dutch Kills Realty, LLC	Volunteer	36-08 36th Ave, Astoria, NY 11106	917-907-4037
Jamie Burgher	Laurel Environmental Geosciences, DPC	Environmental Consultant's Project Manager	53 West Hills Rd., Suite 1 Huntington, Station, NY 11746	631-673-0612
Christopher Lapine / Richard Kampf	The Chazen Companies	Remedial Engineer	21 Fox Street, Poughkeepsie, NY 12601	845-486-1478 917-280-6364
Ruth Curley	NYSDEC	Project Manager	625 Broadway, Albany, NY 11223	518-402-9480

5.2.2 Remedial Engineer

The Remedial Engineer for this project will be Christopher Lapine, PE of the Chazen Companies (Chazen.) The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer or qualified environmental professionals working under his supervision (referred to as Remedial Engineer Team) will have primary direct responsibility for implementation of the remedial program for the Site (NYSDEC BCA Site No. C241241.) The Remedial Engineer will certify in the Final Engineering Report that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer Team will coordinate the work of other contractors and subcontractors involved in remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal. The Remedial Engineer Team will be responsible for appropriate communication with NYSDEC and NYSDOH.

The Remedial Engineer Team will review pre-remedial plans submitted by contractors for compliance with this Remedial Action Work Plan and will certify compliance in the Final Engineering Report.

The Remedial Engineer will provide the certifications listed in Section 9.0 in the Final Engineering Report.

5.2.3 Remedial Action Construction Schedule

The estimated duration to complete the remedy is approximately three months following NYSDEC approval of the RAWP. A generalized timeline has been prepared to illustrate the proposed schedule starting with the approval of this RAWP and is included as **Table 12**. Following approval of this RAWP by the NYSDEC, a revised timeline with actual dates will be submitted.

5.2.4 Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings construction code requirements or according to specific variances issued by that agency. DEC will be notified by the Volunteer of variances issued by the Department of Buildings.

5.2.5 Site Security

Site security will be maintained by utilizing and maintaining the existing eight-foot-high plywood construction fence surrounding the property. The fence will be maintained throughout the project and access gates will be maintained during daily operations and closed and locked at other times.

5.2.6 Traffic Control

Drivers of trucks leaving the Site with soil/fill will be instructed to proceed without stopping in the vicinity of the Site to prevent neighborhood impacts.

5.2.7 Worker Training and Monitoring

Remedial site workers will be required, at a minimum, to have completed 29 CFR 1910.120 HAZWOPER, Site safety training, and medical monitoring for Site workers. Workers must also meet the requirement of Local Law 196. HAZWOPER training completion certificates will be submitted to the Remediation Engineer before commencement of Site work. Once the concrete slab is in place, HAZWOPER training will not be required of site construction workers.

5.2.8 Agency Approvals

Necessary permits and government approvals required for remedial construction have been, or will be, obtained prior to the start of remedial construction.

The planned end use for the Site is in conformance with the current zoning for the property as determined by New York City Department of Planning.

A list of local, regional, and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work is attached in **Table 13**. This list

includes a citation of the law, statute, or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list will be updated in the Final Engineering Report.

5.2.9 Pre-Construction Meeting with NYSDEC

A pre-construction meeting will take place with the NYSDEC, the Volunteer, Chazen, and the contractor prior to the start of site mobilization.

5.2.10 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in **Table 14**. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

5.3 Site Preparation

5.3.1 Mobilization

Mobilization will include the delivery of construction equipment and materials to the Site. Site workers will receive Site orientation and training in accordance with the Site-specific HASP, CAMP, and established policies and procedures to be followed during the implementation of remedial activities. The remediation contractor and associated subcontractors will each receive a copy of the RAWP, HASP, and CAMP and will be briefed on their contents.

5.3.2 Monitoring Well / Vapor Point Decommissioning

Existing groundwater monitoring wells will either be protected during remediation and development for use in post-remedial monitoring, or will be properly decommissioned in accordance with NYSDEC policy CP-43. The only exception to this is if the full length of the well is to be excavated during remediation and development.

Similarly, existing soil vapor probes will be properly decommissioned unless they are to be fully removed during remediation/development or used for post-remedial monitoring.

5.3.3 Erosion and Sedimentation Controls

Erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff will be placed to protect the excavation work and adjacent areas during excavation activities. Storm water control measures, such as straw hay bales or silt fence, may be utilized during excavation activities

to prevent storm water runoff from impacting excavation areas and neighboring sites.

5.3.4 Stabilized Construction Entrance(s)

During Site remediation, continuity will be achieved between the truck wash and the stone-based egress path by placing the truck wash system right before the egress path of the Site. Egress points for truck and equipment transport will be kept clean of dirt and other materials during Site remediation and development, so that trucks will be decontaminated prior to departure from the Site.

5.3.5 Utility Marker and Easements Layout

The Volunteer and its contractors are solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of required, appropriate, or necessary health and safety measures during performance of work under this RAWP. The Volunteer and its contractors are solely responsible for safe execution of invasive and other work performed under this RAWP. The Volunteer and its contractors must obtain local, State, or Federal permits or approvals pertinent to such work that may be required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

5.3.6 Sheeting and Shoring

Appropriate management of structural stability of on-Site or off-Site structures during on-Site activities include excavation is the sole responsibility of the Volunteer and its contractors. The Volunteer and its contractors are solely responsible for safe execution of invasive and other work performed under this Plan. The Volunteer and its contractors must obtain local, State, or Federal permits or approvals that may be required to perform work under this Plan. Further, the Volunteer and its contractors are solely responsible for the implementation of required, appropriate, or necessary health and safety measures during performance of work under the approved Plan.

5.3.7 Equipment and Material Staging

Equipment and materials staging areas will be designated during the remediation activities, in coordination with the Construction Manager to facilitate remediation work and prevent cross-contamination.

5.3.8 Decontamination Area

A temporary decontamination area lined with polyethylene sheeting will be constructed for steam-cleaning or washing excavation and drilling equipment, when appropriate. The location of the decontamination area will be coordinated with the Construction Manager. At a minimum, the decontamination pad will have a 30 mil low-permeability liner and be bermed and sloped to a collection sump to contain and collect fluids, and have side walls to mitigate, to the extent practicable, errant overspray, especially when decontaminating large equipment.

5.3.9 Site Fencing

Site security will be maintained by utilizing and maintaining the existing eight-foot-high plywood construction fence surrounding the property. The fence will be maintained throughout the project and the vehicle access gate will be kept closed during daily operations and closed and locked at other times.

5.3.10 Demobilization

Following the completion of remedial activities at the Site, equipment and remedial structures will be decontaminated and dismantled and removed from the Site. Sediment and erosion control measures and solid wastes generated during remedial activities (i.e., polyethylene sheeting) will be properly disposed.

5.4 Reporting

Daily and monthly Reports will be included in the Final Engineering Report.

5.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers via email by the end of each day and will include:

- An update of progress made during the reporting day;
- Locations of work and quantities of material imported and exported from the Site;
- References to alpha-numeric map for Site activities;
- A summary of complaints with relevant details (names, phone numbers);
- A summary of CAMP finding, including excursions;
- Upcoming (planned) activities for the next workday;
- An explanation of notable Site conditions; and

- Photographs will be taken of remedial activities and submitted to NYSDEC in digital format. Representative photos will be provided of each contaminant source, source area and Site structures before, during, and after remediation. A photo log keyed to photo file ID numbers will be prepared to provide explanation for all representative photos.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to NYSDEC Project Manager via personal communication.

Daily Reports will include a description of daily activities keyed to an alpha-numeric map for the Site that identifies work areas. These reports will include a summary of air sampling results, odor and dust problems and corrective actions, and complaints received from the public.

The NYSDEC assigned project number will appear on reports.

5.4.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers by the tenth day of the following month and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e. tons of material exported and imported, etc.),
- Description of approved activity modifications, including changes of work scope and/or schedule,
- Sampling results, labeled as draft and provided to NYSDEC upon receipt, and
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

Remedial activities will be appropriately documented in a log book maintained on-Site during the project duration and available for inspection by NYSDEC and NYSDOH staff.

5.4.3 Complaint Management Plan

Complaints from the public regarding nuisance or other Site conditions will be reported directly to the

NYSDEC project manager and included in the daily reports.

5.4.4 Deviations from the Remedial Action Work Plan

In the event that remedial activities require deviation from the RAWP due to unforeseen Site conditions, a detailed description of the conditions and required deviations from the RAWP will be submitted to the NYSDEC project manager. The description will include the reasons that dictate deviation from the RAWP, changes/editions to the RAWP, and how the proposed remedy is affected.

6.0 REMEDIAL ACTION – SOIL REMOVAL

Site preparation and remediation of the Site includes the proper removal and off-site disposal of remaining concrete foundation structures (approximately 75 cy), a floor drain and approximately 150 linear feet of subsurface piping, and approximately 4450 cy of contaminated soil.

As described in 6.4, during excavation, soil will be screened using a PID to ensure identification of potentially unknown contaminant sources.

To achieve a Track 1 cleanup, excavation is required to remove source material to varying depths across the site. Soil will be excavated to a depth of approximately 4 ft bgs across the entire site, to a depth of approximately 15 ft bgs in the vicinity of SB-105 in the southwestern portion of the Site across an area approximately 15 ft by 15 ft, and to a depth of approximately 7 ft bgs in the vicinity of SB-106 in the northwestern portion of the Site across an area approximately 15 ft by 15 ft .

In the central portion of the Site, in the vicinity of the hot spot at AOC 1, excavation is required to a depth of approximately 27 ft bgs, and potentially deeper, as necessary, to remove source material in the vicinity of the 2020 SRI soil vapor sampling location SV-107, which contained 270,000 µg/m^3 PCE and the 2019 RI soil vapor sampling location SV-4 which contained 1,600,000 µg/m^3 PCE at 25 ft bgs across an area approximately 15 ft by 15 ft.

In the eastern portion of the Site, in the vicinity of the hot spot at AOC 2, excavation is required to a depth of approximately 27 ft bgs, and potentially deeper, as necessary, potentially as deep as approximately 36 ft bgs. In the area identified as AOC 2a, excavation is required to a depth of approximately 27 ft bgs across an area approximately 25 ft by 15 ft. In the area identified as AOC 2b, excavation is required to a depth of approximately 33 ft bgs across an area approximately 22 ft by 15 ft. In the area identified as AOC 2c excavation is required to a depth of approximately 36 ft bgs across an area approximately 15 ft by 15 ft.

In addition, in the vicinity of AOC 3, excavation is required to a depth of approximately 20 ft bgs across an area approximately 15 ft by 15 ft.

Soils will be removed at additional hot spots, if any, until the full extent of source material containing PCE concentrations that exceed UUSCOs is removed.

In order to safely access source material soil that must be removed in the central portion of the Site at depths of approximately 20 ft bgs at AOC 3 and 27 ft bgs in the vicinity AOC 1, soil must be removed at increasing depths as the excavation progresses from west to east across the Site. The remaining eastern

portion of the Site must be excavated to a depth of approximately 27 ft bgs to allow access of staging for the removal of soil to a depth of up approximately 36 ft bgs at the hot spot located at AOC 2.

A conceptual benching strategy has been developed to safely access soil that requires removal. In order to safely access soil that requires removal, portions of the Site containing potentially clean soil must be removed and either properly disposed or re-used on Site. The actual benching used may be modified as necessary to accommodate site access, construction safety, material handling, and construction phasing determined by site engineering requirements and construction practicability. SOE will be designed and installed to allow for the safe excavation of soil that requires removal in accordance with engineering practices and applicable code requirements.

Achievement of the Track 1 UUSCOs for soil will be confirmed through the collection and analysis of post-excavation confirmation soil samples. Excavated soil will be characterized and disposed of at permitted and approved disposal facilities consistent with applicable local, state, and federal laws and regulations. Hot spots of PCE-containing soil will be excavated, segregated, and stockpiled as per Section 6.4.2, and characterized, as necessary, for proper disposal as potentially hazardous waste. Post-excavation bottom samples will be collected to confirm that concentrations in remaining soil is below the UUSCOs. In accordance with DER -10 5.4(b)5, each hot spot will be handled as a separate excavation and will comply with the confirmation sampling requirements for bottom and sidewall. The larger AOCs will require sidewall samples to ensure the hotspot soils are segregated from the clean soils .

Known or unknown USTs or other structures (such as drain lines) located during remediation will be disposed of in accordance with federal, state, and local regulations. The NYSDEC project manager will be contacted following the uncovering of such structures.

With the exception of development and purge water from the monitoring wells, no additional water is expected to be removed from the Site. Given the depth of the water table (~33 to 38 ft bgs) dewatering is not expected to be necessary.

6.1 Soil Cleanup Objectives

The Soil Cleanup Objectives for this Site are the NYSDEC UUSCOs. Soil and materials management on-Site and off-Site will be conducted in accordance with the Soil Management Plan as described below. UST closures will, at a minimum, conform to criteria defined in DER-10.

6.2 Post Excavation Confirmation Soil Sampling

Post-excavation confirmation samples will be collected to confirm that the remedial objectives have been achieved. The dimensions of the Site are 100 feet by 175 feet for a total of 17,500 square feet. Post-excavation confirmation soil samples will be collected in accordance with the QAPP. Post-excavation bottom soil samples will be collected at frequency of one sample every 900 sq. ft. as per DER-10, and sidewall samples on each side for every 30 feet of sidewall. Confirmation sampling locations will be biased toward the AOCs that have been identified herein and are likely to be more tightly spaced to ensure complete removal of soil exceeding UUSCO**.**

6.2.1 Post Excavation Soil Sampling Contingencies

UST / Spill Closure Contingency: During UST / spill closure activities, confirmatory samples will be collected in accordance with the procedures set forth in Section 5.5 of DER-10.

Hotspots: As hotspots are encountered during excavation, the following end-point sampling protocol will be followed:

- Hot-spot excavations will have a minimum of one bottom sample and, a sidewall sample collected for every 30 linear feet of sidewall from along applicable excavation boundaries.
- For sampling of volatile organics, bottom samples will be taken within 24 hours of excavation, and will be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours will be taken at six to twelve inches.
- For contaminated soil removal, post-remediation soil samples for laboratory analysis will be collected immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples may be required.

Post-remediation sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. Post-excavation confirmation samples will be biased toward locations and depths of the highest expected contamination.

New York State Department of Health (NYSDOH) environmental laboratory approval program (ELAP) certified labs will be used for confirmation soil sample analyses. Lab results for confirmation soil sample analyses will be reported in the FER. The FER will provide a tabular and map summary of confirmation soil sample results. Confirmation soil samples will be analyzed for analytes utilizing the following

methodology:

- VOCs by United States Environmental Protection Agency (USEPA) Method 8260,
- SVOCs by USEPA Method 8270,
- Pesticides/PCBs by USEPA Method 8081/8082,
- Target Analyte List metals by USEPA Method 6010/7471, and
- PFAs by USEPA method 537.1 & 1,4 dioxane by Method 8270 modified SIM.

If either light non-aqueous phase liquid (LNAPL) and/or dense non-aqueous phase liquid (DNAPL) are detected, appropriate samples will be collected for characterization and fingerprint analysis and required regulatory reporting (i.e. spills hotline) will be performed.

6.2.2 Confirmation Soil Sampling Methodology

Post-excavation confirmation soil samples will be collected at the identified locations when the limits of the remediation excavation have been reached. Confirmation soil samples will be collected from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours will be taken at six to twelve inches. Samples will be collected utilizing a properly decontaminated stainless steel hand auger, trowel, or equivalent. Samples collected for VOC analysis will be conducted by collecting a grab sample of soil within 24 hours of excavation exposure and placing it into laboratory supplied glassware. Confirmation soil samples will be submitted for laboratory analyses under standard chain of custody protocol to an NYSDOH ELAP accredited laboratory to be determined. Samples will be analyzed according to the Full Part 375 list of VOCs, SVOCs, metals, PCBs, pesticides, and herbicides. Emerging contaminants (PFAs & 1,4 dioxane) shall be analyzed in 25% of confirmation samples, with the 25% being in the source areas.

6.2.3 Reporting of Results

Data collected during the field investigation will be tabulated and reviewed. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain items specified in the USEPA SW-846 appropriate for the analyses to be performed, and be reported in standard format. Data will also be submitted to NYSDEC's Environmental Information Management System in the standardized electronic data deliverable format. The FER will provide a tabular and map summary of post-excavation confirmation soil sampling results and exceedances of UUSCOs.

6.2.4 QA/QC

Each set of samples will be analyzed concurrently with calibration standards, method blanks, matrix spikes (MS), matrix spike duplicates (MSD) or laboratory duplicates, and QC check samples (if required by the protocol). MS/MSD samples, as applicable, will be designated by the field personnel. QA/QC protocols are further detailed in the QAPP included as **Appendix E**.

6.2.5 Data Usability Summary Report

Data usability and validation are performed on analytical data sets, primarily to confirm that sampling and chain-of- custody documentation are complete, sample IDs can be tied to specific sampling locations, samples were analyzed within the required holding times, and analyses are reported in conformance to NYSDEC ASP, Category B data deliverable requirements as applicable to the method utilized.

Independent third party data validation will be performed on all sample results. Data validation will be performed by a qualified subcontractor independent of the project and a Data Usability Summary Report will be included in the FER.

6.3 Estimated Material Removal Quantities

Soils in exceedance of UUSCOs will be removed from the Site to achieve a Track 1 cleanup.

Approximately 4,450 cy of contaminated soil / fill will be removed and properly disposed off-site in order to achieve the remedial action objectives. Approximately 13,100 cy of clean excavated material that meets the UUSCOs may be re-used on-site for backfill beneath the foundation and between foundation footings as well as to backfill hot spot excavations and / or removed and properly disposed off-site.

Soil being re-used on site must meet unrestricted soil SCGs for a conditional Track 1 remedy. Sampling in accordance with DER-10 section 5.4 and Table 5.4(e)10 is required prior to reuse of material on-site.

Table 5.4(e)10
Recommended Number of Soil Samples for Soil Imported To or Exported From a Site

Contaminant	VOCs	SVOCs, Inorganics & PCBs/Pesticides	
Soil Quantity (cubic yards)	Discrete Samples	Composite	Discrete Samples/Composite
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
➢ 1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

One VOC sample will be collected and analyzed per 50 cy and one 3-point composite sample will be collected and analyzed for SVOCs, Metals, PCBS / Pesticides, and PFAs .

Figure 16 presents the estimated depth of excavation required to achieve UUSCOs and includes the on-site area from where clean excavated material is expected to come from (from approximately 15 to 25 ft bgs.)

6.4 Soil/Materials Management Plan

This section presents the approach to managing, disposing, and reusing soil, fill, and debris excavated from the Site. This plan is based on the current knowledge of Site conditions, and will be augmented with the additional data collected during remediation. The Remediation Engineer Team will monitor and document the handling and transporting of material removed from the Site to a proper disposal facility as a regulated waste or as an unregulated waste, as applicable. The Remediation Engineer Team will assist the remedial contractor in identifying impacted materials during excavation, determining materials suitable for direct load out versus temporary on-Site stockpiling, selection of samples for waste characterization, and determining the proper off-Site disposal facility.

6.4.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional under direction of the Remedial Engineer during remedial and development excavations into known or potentially contaminated material. Soil screening will be performed regardless of when the invasive work is done and will include excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

Primary contaminant sources (including, but not limited, to hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. This information will be provided on maps in the Final Engineering Report.

Screening will be performed by qualified environmental professionals. Resumes of key personnel are provided in **Appendix G** provided for personnel responsible for field screening of invasive work for unknown contaminant sources during remediation and development work.

6.4.2 Stockpile Methods

Soil excavated from hotspots may be stockpiled prior to disposal. Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.

Stockpiles will be placed on top of a tarp and be kept covered with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Soil stockpiles will be continuously encircled with silt fences. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Water must be available on site at suitable supply and pressure for use in dust control, such as a dedicated water truck equipped with a water cannon.

6.4.3 Materials Excavation and Load Out

The Remedial Engineer or a qualified environmental professional under his/her supervision will oversee invasive work and the excavation and load-out of excavated material.

The Volunteer and its contractors are solely responsible for safe execution of invasive and other work performed under this Plan.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer Team. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and other applicable transportation requirements).

A truck wash will be operated on-Site,. The Remedial Engineer will be responsible for ensuring that outbound trucks wheels will be washed at the truck wash before leaving the Site until the remedial construction is complete.

Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site sediment tracking.

The Remedial Engineer Team will be responsible for ensuring that egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site

remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

The Volunteer and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of invasive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations and bridge footings).

The Remedial Engineer Team will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this Remedial Action Work Plan.

Each hotspot and structure to be remediated (USTs, vaults and associated piping, transformers, etc.) will be removed and end-point remedial performance sampling completed before excavations related to Site development commence proximal to the hotspot or structure.

Development-related grading cuts and fills will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan. Fills will not be performed with NYSDEC approval of fill material.

Mechanical processing of historical fill and contaminated soil on-Site is prohibited.

Primary contaminant sources (including, but not limited to, hotspots) identified during the Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. The survey information will be shown on maps to be reported in the Final Engineering Report.

6.4.4 Materials Transport Off-Site

Transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Proposed in-bound and out-bound truck routes to the Site are shown in **Figure 17.** All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off- Site queuing of trucks entering the facility; (d) limiting total distance to major highway(e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes. Truck operators are responsible for obeying traffic signs and detours.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development.

Queuing of trucks will be performed adjacent to the Site.

Material transported by trucks exiting the Site will be secured with tight fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-Site in an appropriate manner.

6.4.5 Materials Disposal Off-Site

The total quantity of material expected to be disposed off-Site is approximately 17,500 cubic yards.

The tentative soil disposal locations are as follows:

- Clean sandy soil re-sued on site or to the NYCOER Clean Soil Bank (either stockpile or OER approved fill receiving site)
- Clean silty soil to IRRC facility, Palmerton, PA
- Historic fill to Kingsland, Lyndhurst, NJ
- Non-hazardous PCE contaminated soil to ACUA, Atlantic City (with “contained in” determination)

Soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed in accordance with local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to NYSDEC’s Project Manager. Unregulated off-Site management of materials from this Site is prohibited without formal NYSDEC approval.

Material that does not meet Track 1 UUSCOs is prohibited from being taken to a New York State recycling

facility (6NYCRR Part 360-15 Registration Facility).

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to demonstrate that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or BCP Volunteer to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State, and provide the Site ID number and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

Non-hazardous contaminated soils, including contaminated historic fill, taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-2.

Historic fill and contaminated soils from the Site are prohibited from being disposed at Part 360-15 Registration Facilities (also known as Soil Recycling Facilities).

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the Division of Materials Management s (DMM in NYSDEC to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC Region 2 DSHM. This material is prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, as dictated by DSHM, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it must not be redirected to on-Site or off-Site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of chemical data for the material being transported.

Pursuant to discussions with, Division of Materials Management, prior to the start of excavation, additional sampling and characteristic analysis of soil will be performed to confirm the extent of material that will require disposal as hazardous and / or non-hazardous in accordance with a Non-Hazardous Waste Contained-In Determination.

The Final Engineering Report will include an accounting of the destination of material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, including contaminated historic fill, solid waste, and hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of material must also include records and approvals for receipt of the material. This information will also be presented in a tabular form in the FER.

Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in the FER.

Hazardous wastes derived from on-Site will be stored, transported, and disposed of in full compliance with applicable local, State, and Federal regulations. Manifests will be provided in the FER.

Appropriately licensed haulers will be used for material removed from this Site and will be in full compliance with applicable local, State and Federal regulations.

Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the FER. Data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

If using the services of a soil broker, the soil broker is required to hold a Business Integrity Commission (BIC) license. The BIC license number shall be provided in the FER.

6.4.6 Materials Reuse On-Site

Chemical criteria for on-site reuse of material have been established by NYSDEC. Materials planned for reuse (if any) will be segregated and stockpiled from materials slatedfor off-site disposal. Stockpiles will be placed on and covered with polyethylene sheeting.The stockpiled material will be sampled and analyzed in accordance with Table 5.4(e)10 on page 161 of DER-10 Technical Guidance for Investigation and Remediation. The analytical results will be submitted to NYSDEC via a *Request to Import/Reuse Soil or Fill* form for review and approval prior to placement on-site. All of the materials to be reusedon the Site will comply with UUSCOs. The RE will ensurethat procedures defined for materials reuse in this RAWP are followed and that unacceptable material will not remain on-site.

Clean soil stockpiles for reuse will be stored on the western position of the site. Approximately 60 cy of soil is expected to be re-used to backfill the AOC 2 excavation. Approximately 20 cy of soil may be re-used

to backfill at foundation footing excavations. Soil stockpile for re-use may range in size up to approximately 80 cy.

Concrete crushing or processing on-site is prohibited. Organic matter (wood, roots, stumps,etc.) or other solid waste derived from clearing and grubbing of the Site is prohibited for reuse on-site.

Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. This will be expressed in the final Site Management Plan.

6.4.7 Fluids Management

Liquids to be removed from the Site, including dewatering fluids, will be handled, transported, and disposed in accordance with applicable local, State, and Federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP, to be obtained by the contractor.

Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. Dewatering fluids will be managed off-Site.

Discharge of water generated during remedial construction to surface waters (i.e. a local pond, stream, or river) is prohibited without a SPDES permit.

6.4.8 Demarcation

If necessary, after the completion of soil removal and other invasive remedial activities and prior to backfilling, if the soil excavation activities were unsuccessful at achieving unrestricted SCOS, and there is remaining contamination, a land survey will be performed by a New York State licensed surveyor to define the top elevation of residual contaminated soils. A physical demarcation layer, consisting of orange snow fencing material or equivalent material will be placed on this surface to provide a visual reference. This demarcation layer will constitute the top of the 'Residuals Management Zone', the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in the Site Management Plan. The survey will measure the grade covered by the demarcation layer before the placement of cover soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the 'Residuals Management Zone' in the Site Management Plan. A map showing the survey results will be included in the Final Engineering Report and the Site Management Plan.

6.4.9 Backfill from Off-Site Sources

Structural fill will be needed beneath foundation and parking garages and will require importation from off-Site. Materials proposed for import onto the Site will be approved by the Remedial Engineer Team and will be in compliance with provisions in this RAWP prior to receipt at the Site.

If sampling of material imported to the Site is required, sampling will be conducted in accordance with DER-10 Section 5.4. The NYSDEC will be consulted prior to importation of fill material. In accordance with DER-10, documentation of the source of off-Site fill being brought to the Site must be provided to DER for approval at least one week prior to its arrival and use on site. Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The Final Engineering Report will include the following certification by the Remedial Engineer: "I certify that import of soils from off-Site, including source evaluation, approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan." A map detailing the locations of backfilled material will also be included in the Final Engineering Report.

Imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. These NYSDEC approved backfill or cover soil quality objectives are the lower of the protection of groundwater or the protection of public health soil cleanup objectives for restricted residential as set forth in Table 375-6.8(b) of 6 NYCRR Part 375 and included as **Appendix B.** Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved Remedial Action Work Plan or its approval by NYSDEC should be construed as an approval for this purpose.

Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Nothing in this Remedial Action Work Plan should be construed as an approval for this purpose.

Solid waste will not be imported onto the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers.

6.4.10 Contingency Plan

If underground tanks or other previously unidentified contaminant sources are found during on-Site remedial excavation or development related construction, sampling will be performed on product,

sediment, and surrounding soils, etc. Chemical analytical work will be for full scan parameters (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs). These analyses will not be limited to STARS parameters where tanks are identified without prior approval by NYSDEC. Analyses will not be otherwise limited without NYSDEC approval.

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone to NYSDEC's Project Manager. These findings will be also included in daily and periodic electronic media reports.

6.4.11 Community Air Monitoring Plan

The CAMP provides measures for protection for on-Site workers and the downwind community (i.e., off-Site receptors including residences, businesses, and on-Site workers not directly involved in the remedial investigation) from potential airborne contaminant releases resulting from remedial activities at the Site.

Continuous monitoring will be conducted within the work area and along the upwind and downwind perimeter during intrusive activities such as excavation, product recovery, manipulation of soil piles, extraction of sheet piling, etc. Air monitoring will consist of monitoring for VOCs and dust particulates including particulate matter less than 10 micrometers in size (PM-10) during intrusive activities using a MiniRAE 2000 PID and a PDR-1000 dust monitor, respectively, calculated over a 15-minute running average. Before work begins, background concentrations will be measured. During intrusive activities, if concentrations are greater than the background concentrations plus the action levels detailed in the in-line table below, appropriate actions will be taken as described in the following table.

MONITORING INSTRUMENT	MONITORING LOCATION	ACTION LEVEL (15-minute avg)	SITE ACTION	REASON
PID	Work Zone	0-5 ppm	None	Exposure below established exposure limits
PID	Work Zone	5-25 ppm	Identify source of VOCs and abate emissions	Based on potential exposure to VOCs

PID	Work Zone	>25 ppm	Suspend work and notify HSM	Increased exposure to Site contaminants, potential for vapor release to public areas.
PID	Downwind Perimeter	0-5 ppm	None	Exposure below established exposure limits
PID	Downwind Perimeter	5-25 ppm	Identify source of VOCs and abate emissions	Based on potential exposure to VOCs
PID	Downwind Perimeter	>25 ppm	Suspend work and notify HSM	Increased exposure to Site contaminants, potential for vapor release to public areas.
PID	Potentially Exposed Individuals or Structures	0-1 ppm	None	Exposure below established exposure limits
PID	Potentially Exposed Individuals or Structures	>1 ppm	Suspend work and implement appropriate engineering controls	Increased exposure to Site contaminants
Aerosol Monitor	Work Zone	Fugitive Dust	Wet soils to limit dust migration	Potential exposure to Site contaminants
Aerosol Monitor	Downwind Perimeter	< 150 µg/m^3 over background	None	Below acceptable particulate levels
Aerosol Monitor	Downwind Perimeter	>150 µg/m^3 over background	Institute dust suppression measures	Work to continue with dust suppression measures. Work must stop if suppression measures are not successful.
Aerosol Monitor	Potentially Exposed Individuals or Structures	< 150 µg/m^3 over background	None	Below acceptable particulate levels

Aerosol Monitor	Potentially Exposed Individuals or Structures	>150 µg/m^3 over background	Suspend work and implement appropriate engineering controls	Potential exposure to Site contaminants

The CAMP, in its entirety, is included as **Appendix F.**

All CAMP readings will be submitted for State (NYSDEC and NYSDOH) personnel to review on a weekly basis or as soon as possible if/when exceedance occurs.

6.4.12 Odor, Dust and Nuisance Control Plan

The Final Engineering Report will include the following certification by the Remedial Engineer: "I certify that invasive work during the remediation and invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan."

6.4.12.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site. Specific odor control methods to be used on a routine basis will include wetting soils to prevent off-Site migration, application of a foam suppressant on the source area, and/or covering the source area with a tarp. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until nuisance odors have been abated. NYSDEC and NYSDOH will be notified of odor events and of other complaints about the project. Implementation of odor controls, including the halt of work, will be the responsibility of the Volunteer's Remedial Engineer, who is responsible for certifying the Final Engineering Report.

Necessary means will be employed to prevent on- and off-Site nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

6.4.12.2 Dust Control Plan

A dust suppression plan that addresses dust management during invasive on-Site work, will include, at a minimum, the items listed below:

- Dust suppression will be achieved using a dedicated on-Site water truck. The truck will be equipped with water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles,
- Gravel will be used on access roads to provide a clean and dust-free road surface, and
- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

6.4.12.3 Other Nuisances

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during remedial work.

A plan will be developed and utilized by the contractor for remedial work and will conform, at a minimum, to NYCDEP noise control standards.

7.0 REMEDIAL ACTION – ENGINEERING AND INSTITUTIONAL CONTROLS

The remedial action for the Site consists of excavation of contaminated material above the applicable UUSCOs to achieve the Track 1 cleanup objectives. The majority of the eastern portion of the Site will be excavated to a depth of approximately 27 ft bgs to achieve the remedial action objectives. The remediation will be deeper in the vicinity of hot spots as necessary, depending on the results of post-excavation confirmation sampling. Soils will be removed at additional hot spots, if any, until the full extent of source material containing PCE concentrations that exceed UUSCOs is removed. Achievement of UUSCOs will be confirmed through the collection and analysis of post-excavation confirmation soil samples.

The Track 1 remedy will be "conditional" since an SSDS is required to mitigate the potential for vapor intrusion into buildings at the Site, an SVE system is needed to mitigate the potential for soil vapor to migrate off-site, and groundwater treatment to reduce concentrations of PCE in groundwater and to prevent the off-site migration of Site-Related PCE in groundwater. In a conditional Track 1 remedy, institutional and engineering controls are allowed only for periods of less than five years except in the limited instance where a Volunteer has conducted remedial activities resulting in a bulk reduction in groundwater contamination to asymptotic levels. To achieve a Track 1 remedy, ongoing remedial actions and / or engineering controls must achieve cleanup within 5 years. If cleanup goals are not satisfied within 5 years for soil vapor and groundwater, a Track 4 restricted residential remedy will have been achieved. The conditional Track 1 remedy includes:

- Installation of SOE to approximately 32 ft bgs across the majority of the Site and approximately 36 ft bgs in the northwest portion of the Site in order to perform excavation to remove soil containing PCE at concentrations that exceed UUSCOs,
- Excavation and removal of approximately 4450 y of soil exceeding UUSCOs sitewide,
- Sub-slab depressurization system to mitigate the risk associated with potential for soil vapor intrusion into buildings on-Site,
- Soil vapor extraction system to mitigate the potential for off-Site migration of Site-related soil vapor,
- Groundwater treatment consisting of 1) application of reactive amendments at the groundwater interface in source areas, 2) in-situ injection of chemical oxidant along transects located

downgradient of source areas, and 3) a downgradient permeable reactive barrier on the western portion of the Site, to reduce PCE concentrations in groundwater on-Site and mitigate the potential for off-Site migration of PCE in groundwater, and

- Implementation of appropriate on-Site soil management, dust suppression, truck wash and other engineering controls to ensure protection to public health and the environment while the final remedy is being implemented,
- Development of a SMP and EE for the engineering controls at the site.

Management of EC/ICs will be executed under a Site-specific SMP and Environmental easement (EE) that will be developed and approved by NYSDEC prior to the FER and attached as appendices to the FER.

The FER will report residual contamination on the Site in tabular and map form. This will include presentation of exceedances of both unrestricted and restricted residential SCOs, if any.

7.1 Engineering Controls

As part of the remedy, source material, that exceed UUSCOs, will be removed from the Site. However, in order to ensure the protection of public health and the environment, engineering controls (ECs) will be utilized to eliminate potential exposure pathways in connection with the migration of contaminated groundwater and soil vapor off-site or into the occupied above-grade spaces of the building. The ECs include the installation of an active SSDS, an SVE system, and groundwater treatment.

7.1.1 Sub-Slab Depressurization System

An active SSDS will be installed as an engineering control to mitigate the risk of soil vapor intrusion into the building on-Site. A schematic SSDS design is attached as **Appendix H**. The system will be installed from approximately 25 to 27 ft bgs. The SSDS may be used for up to five years for a Conditional Track 1 remedy..

As part of the development plan, a two-level sub-grade parking garage will be constructed in the building cellar and ventilated in accordance with the New York City building code. The operation of this sub-grade ventilation system will further prevent the accumulation of potential soil vapor in the parking garages thereby preventing the migration of soil vapor into the occupied above-grade spaces of the building. The air exchange system for sub-grade parking areas is not designed to address vapor intrusion and is not a remedial measure.

7.1.2 Soil Vapor Extraction System

An SVE system will be designed and installed to reduce concentrations of soil vapor on-Site and mitigate the potential for off-site migration of soil vapor that may result from the presence of PCE in groundwater. The SVE system will consist of extraction wells installed to the top of clay with approximately 5 feet of slotted screen along the northern, southern, and western property boundaries. The SVE system may be used for up to five years for a Conditional Track 1 remedy. A conceptual soil vapor extraction system layout is presented in **Figure 14.** A detailed Soil Vapor Extraction System design will be submitted to NYSDEC for approval as an addendum to the RAWP.

7.1.3 Groundwater Treatment

A comprehensive In-Situ Groundwater Treatment Plan will be initiated during the process of excavation to reduce concentrations of PCE in groundwater and mitigate the potential for off-site migration of Site-related PCE in groundwater. Groundwater treatment will include application of reactive amendments at the groundwater interface in source areas, in-situ injection of chemical oxidant along transects located downgradient of source areas, and installation of a downgradient permeable reactive barrier on the southwestern portion of the Site, to reduce PCE concentrations in groundwater on-Site and mitigate the potential for off-Site migration of Site-Related PCE in groundwater. Groundwater treatment may be used for up to five years for a Conditional Track 1 remedy. A detailed Groundwater Treatment System Design, including monitoring locations, will be submitted to NYSDEC for approval as an addendum to the RAWP.

A conceptual groundwater treatment system is presented in **Figure 15.**

7.2. Criteria for Completion of Remediation / Termination of Remedial Systems

7.2.1 Sub-Slab Depressurization System

The vapor intrusion risk will continue to be monitored for up to five years. The vapor intrusion monitoring will include the collection of samples from the sub-slab of the proposed building and the indoor air in accordance with the NYSDOH Guidance or Evaluating Soil Vapor in the State of New York (October 2006) and the May 2017: Updates to Soil Vapor / Indoor Air Decision Matrices. If within the 5 years the soil vapor levels have dropped to below the “no further action” sub-slab vapor concentrations, then the SSDS will not be considered an EC anymore and the condition on the Track 1 remedy will be removed. The monitoring will be described in an SMP.

The active SSD system will not be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue the active SSD system may be submitted by the property owner based on

confirmatory data that justifies such request. Systems will remain in place and operational until permission to discontinue use is granted in writing by NYSDEC and NYSDOH.

7.2.2 Soil Vapor Extraction System

The SVE will be monitored for up to five years and may be terminated upon demonstration that soil vapor concentrations have achieved asymptotic concentrations. The monitoring will be described in an SMP.

The SVE system will not be discontinued without written approval by NYSDEC and NYSDOH. Systems will remain in place and operational until permission to discontinue their use is granted in writing by NYSDEC and NYSDOH. These sampling/monitoring activities will adhere to stipulations outlined in the Monitoring Plan section of the SMP.

7.2.3 Groundwater Treatment

Groundwater monitoring activities to assess the performance of the remedy, or natural attenuation following the removal of contaminant sources, will continue, as determined by NYSDOH and NYSDEC, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period. Monitoring will continue until permission to discontinue is granted in writing by NYSDEC and NYSDOH. Monitoring activities will be outlined in the Monitoring Plan of the SMP. It is anticipated that, following remediation, a minimum of eight quarterly monitoring events will be performed.

7.3 Institutional Controls

An Environmental Easement and a Site Management Plan will be required under a conditional Track 1 remedy to establish operation, monitoring and maintenance requirements for engineering controls at the site. An environmental easement is required to ensure compliance with the SMP and restrict use of the property to restricted residential uses. In the event that a conditional Track 1 remedy is satisfied within five years, the SMP and EE will no longer be required and the applicant may request termination of the EE.

A site-specific Environmental Easement will be recorded with Queens County to provide an enforceable means of ensuring the continual and proper management of residual contamination, and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved remedy. ICs

provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for ECs and ICs.

An SMP will describe appropriate methods and procedures to ensure compliance with ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

7.4 Environmental Easement

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. the Site will have residual contamination after completion of Remedial Actions, and an Environmental Easement approved by NYSDEC will be filed and recorded with the Queens County Clerk and submitted as part of the Final Engineering Report.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the Queens County Clerk before the Certificate of Completion can be issued by NYSDEC. A series of Institutional Controls are required under such a remedy to implement, maintain, and monitor the applicable Engineering Control systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of the Site, as appropriate. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the Site Management Plan, which provides the methods and procedures to be followed to comply with this remedy.

The Institutional Controls that support Engineering Controls are:

- Compliance with the Environmental Easement by the Grantee and the Grantee's successors and adherence of elements of the SMP is required,
- Operation and maintenance of Engineering Controls as specified in the SMP,
- Installation, maintenance, inspection, and certification of Engineering Controls as specified in the SMP, and

- Monitoring of environmental media, maintenance of environmental monitoring devices, and reporting of data and information as specified in the SMP.

Engineering Controls may not be discontinued without an amendment or extinguishment of the Environmental Easement.

Adherence to these Institutional Controls for the Site is mandated by the Environmental Easement and will be implemented under the Site Management Plan (discussed in the next section). The Controlled Property (Site) will also have a series of Institutional Controls in the form of Site restrictions and requirements. The Site restrictions that apply to the Controlled Property are:

- Vegetable gardens and farming on the Controlled Property are prohibited,
- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose,
- Future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in the Site Management Plan,
- The Controlled Property may be used for restricted residential, commercial, or industrial use only, provided the long-term Engineering and Institutional Controls included in the Site Management Plan are employed,
- The Controlled Property may not be used for a higher level of use, such as unrestricted use without an amendment or extinguishment of this Environmental Easement, and
- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property in order to evaluate the continued maintenance of controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable.

7.5 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the Final Engineering

Report and issuance of the Certificate of Completion for the Remedial Action. The Site Management Plan is submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that Site Management responsibilities defined in the Environmental Easement and the Site Management Plan are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action, if any, in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually.

The Site Management Plan in the Final Engineering Report will include a monitoring plan for groundwater at the down-gradient Site perimeter to evaluate Site -wide performance of the remedy. Appropriately placed groundwater monitoring wells will also be installed immediately down-gradient of all VOC remediation areas for the purpose of evaluation of the effectiveness of the remedy that is implemented. No exclusions for handling of residual contaminated soils will be provided in the SMP. Handling of residual contaminated material will be subject to provisions contained in the SMP.

8.0 FINAL ENGINEERING REPORT

A Final Engineering Report (FER) and Certificate of Completion (COC) will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER provides the documentation that the remedial work required under this RAWP has been completed, and will specify which cleanup Track has been performed and achieved in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed map(s) of sources. The Final Engineering Report will include as-built drawings constructed elements, calculation and manufacturer documentation for treatment systems, certifications, manifests, bills of lading as well as the complete Site Management Plan . The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of performance evaluation sampling results and material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10.

Where determined to be necessary by NYSDEC, a Financial Assurance Plan will be required to ensure the sufficiency of revenue to perform long-term operations, maintenance and monitoring tasks defined in the Site Management Plan and Environmental Easement. This determination will be made by NYSDEC in the context of the Final Engineering Report review.

The Final Engineering Report will include written and photographic documentation of remedial work performed under this remedy.

The FER will include an itemized tabular description of actual costs incurred during the Remedial Action.

The FER will provide a thorough summary of residual contamination left on the Site after the remedy is complete. Residual contamination includes contamination that exceeds the Track 1 Unrestricted Use SCO in 6NYCRR Part 375-8. A table that shows exceedances from Track 1 Unrestricted SCOs of soil/fill remaining at the Site after the Remedial Action and a map that shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for soil/fill remaining at the Site after the Remedial Action will be included in the FER.

The FER will provide a thorough summary of residual contamination that exceeds the SCOs defined for the Site in the RAWP and must provide an explanation for why the material was not removed as part of the Remedial Action. A table that shows residual contamination in excess of Site SCOs and a map that

shows residual contamination in excess of Site SCOs will be included in the FER.

The Final Engineering Report will include an accounting of the destination of material removed from the Site, including excavated contaminated soil, including contaminated historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of material imported onto the Site. Before approval of a FER and issuance of a Certificate of Completion, project reports must be submitted in digital form on electronic media (PDF).

9.0 CERTIFICATIONS

The following certification will appear in front of the Executive Summary of the Final Engineering Report. The certification will be signed by the Remedial Engineer [name] who is a Professional Engineer registered in New York State This certification will be appropriately signed and stamped. The certification will include the following statements:

I, Christopher Lapine, am currently a registered professional engineer licensed by the State of New York, I had primary direct responsibility for implementation of the remedial program activities, and I certify that the Remedial Action Work Plan was implemented and that all construction activities were completed in substantial conformance with the Department-approved Remedial Action Work Plan dated [Month/day/yr]

I certify that the data submitted to the Department with this Final Engineering Report demonstrates that the remediation requirements set forth in the [Remedial Action Work Plan or Remedial Design] and in all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established for the remedy.

I certify that the remedial activities were observed by qualified environmental professionals under my supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved.

I certify that all use restrictions, Institutional Controls, Engineering Controls, and/or any operation and maintenance requirements applicable to the Site are contained in an environmental easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

I certify that a Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by Department.

If financial assurance is required, also include the following sentence:

I certify that any financial assurance mechanisms required by the Department pursuant to Environmental Conservation Law have been executed.

I certify that the export of all contaminated soil, fill, water, or other material from the property was performed in accordance with the Remedial Action Work Plan, and were taken to facilities licensed to accept this material in full compliance with all Federal, State, and local laws.

I certify that all import of soils from off-Site, including source approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan.

I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology and soil screening methodology defined in the Remedial Action Work Plan.

I certify that all documents generated in support of this report have been submitted in accordance with the DER's electronic submission protocols and have been accepted by the Department.

I certify that all data generated in support of this report have been submitted in accordance with the Department's electronic data deliverable and have been accepted by the Department.

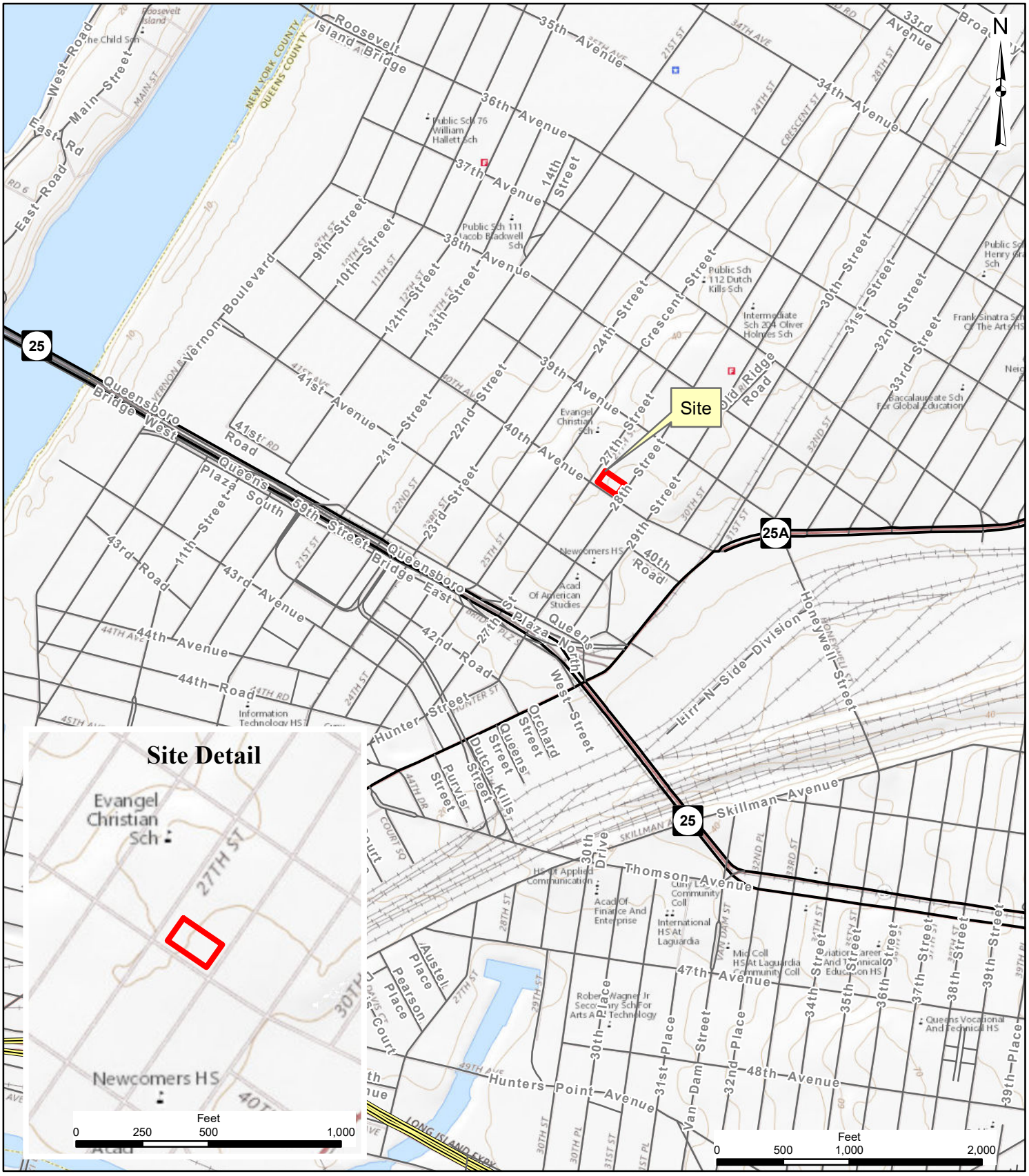
I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law.

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

10.0 SCHEDULE

A schedule of remedial actions, including estimated dates for performance of work and deliverables, has been included as **Table 12**.

Figures



THE Chazen COMPANIES®
Proud to Be Employee Owned
Engineers
Land Surveyors
Planners
Environmental & Safety Professionals
Landscape Architects

Hudson Valley Office:
21 Fox Street, Poughkeepsie, NY 12601

Capital District Office:
547 River Street, Troy, NY 12180

North Country Office:
20 Elm Street, Suite 110, Glens Falls, NY 12801

Westchester County Office:
1 North Broadway, Suite 803, White Plains, NY 10601

www.chazencompanies.com Phone: (888) 539-9073

27-09 40th Ave Dutch Kills Realty LLC

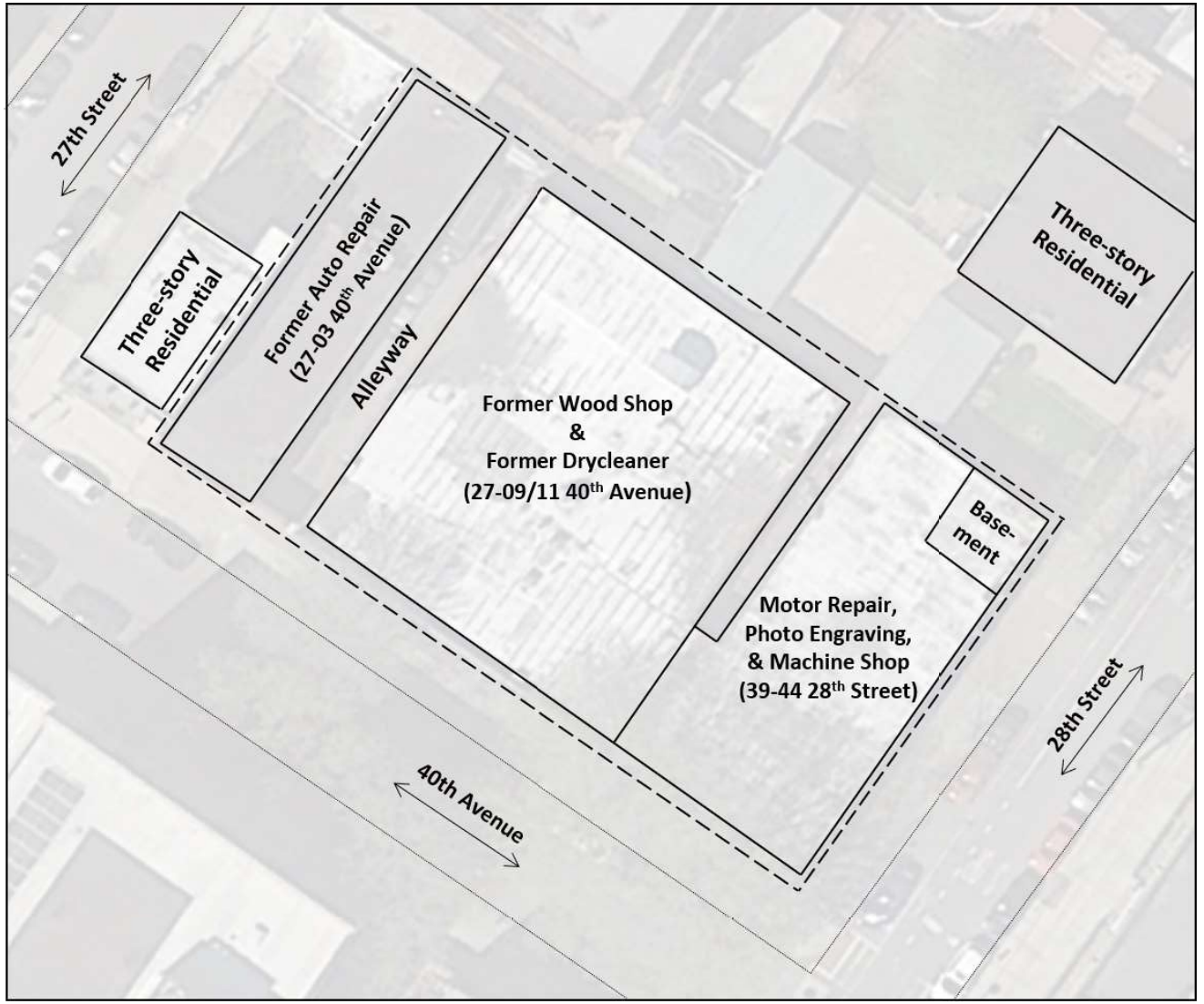
Figure 1: Site Location Map

27-09 40th Avenue
Long Island City, New York

Source: NYS ITS GIS Orthos, New York City 2018 aerial photograph;
NYS Department of Transportation 2008 Roads Dataset

Drawn:	MO
Date:	8/13/2020
Scale:	As noted above
Project:	42038.00
Figure:	1

Document Path: Z:\projects\42000-42099\42038.00_27-09 40th Ave_BCP Consulting & PE Services\GIS\Maps\Figure1SiteLocation.mxd



Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 2.0:
Historic Site Uses

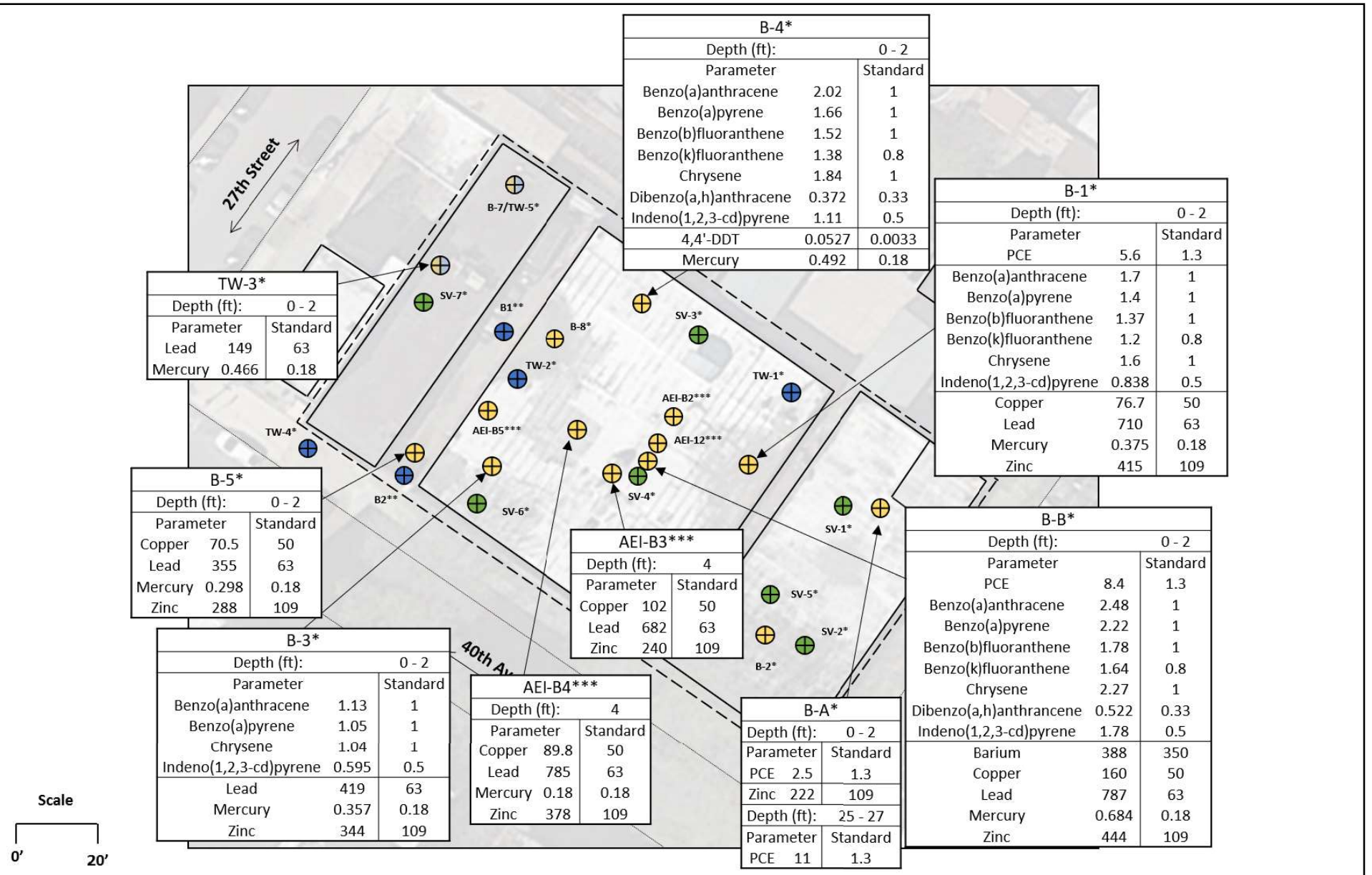
27-09 40th Avenue, Long Island City, New York

PROJECT #: 19-410
DRAWING DATE: 4-20-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY

– — Site boundary

Scale
0' 20'



B-4*		
Depth (ft):		0 - 2
Parameter		Standard
Benzo(a)anthracene	2.02	1
Benzo(a)pyrene	1.66	1
Benzo(b)fluoranthene	1.52	1
Benzo(k)fluoranthene	1.38	0.8
Chrysene	1.84	1
Dibenzo(a,h)anthracene	0.372	0.33
Indeno(1,2,3-cd)pyrene	1.11	0.5
4,4'-DDT	0.0527	0.0033
Mercury	0.492	0.18

B-1*		
Depth (ft):		0 - 2
Parameter		Standard
PCE	5.6	1.3
Benzo(a)anthracene	1.7	1
Benzo(a)pyrene	1.4	1
Benzo(b)fluoranthene	1.37	1
Benzo(k)fluoranthene	1.2	0.8
Chrysene	1.6	1
Indeno(1,2,3-cd)pyrene	0.838	0.5
Copper	76.7	50
Lead	710	63
Mercury	0.375	0.18
Zinc	415	109

TW-3*		
Depth (ft):		0 - 2
Parameter		Standard
Lead	149	63
Mercury	0.466	0.18

B-5*		
Depth (ft):		0 - 2
Parameter		Standard
Copper	70.5	50
Lead	355	63
Mercury	0.298	0.18
Zinc	288	109

AEI-B3***		
Depth (ft):		4
Parameter		Standard
Copper	102	50
Lead	682	63
Zinc	240	109

B-B*		
Depth (ft):		0 - 2
Parameter		Standard
PCE	8.4	1.3
Benzo(a)anthracene	2.48	1
Benzo(a)pyrene	2.22	1
Benzo(b)fluoranthene	1.78	1
Benzo(k)fluoranthene	1.64	0.8
Chrysene	2.27	1
Dibenzo(a,h)anthrancene	0.522	0.33
Indeno(1,2,3-cd)pyrene	1.78	0.5
Barium	388	350
Copper	160	50
Lead	787	63
Mercury	0.684	0.18
Zinc	444	109

B-3*		
Depth (ft):		0 - 2
Parameter		Standard
Benzo(a)anthracene	1.13	1
Benzo(a)pyrene	1.05	1
Chrysene	1.04	1
Indeno(1,2,3-cd)pyrene	0.595	0.5
Lead	419	63
Mercury	0.357	0.18
Zinc	344	109

AEI-B4***		
Depth (ft):		4
Parameter		Standard
Copper	89.8	50
Lead	785	63
Mercury	0.18	0.18
Zinc	378	109

B-A*		
Depth (ft):		0 - 2
Parameter		Standard
PCE	2.5	1.3
Zinc	222	109
Depth (ft):		25 - 27
Parameter		Standard
PCE	11	1.3

All units are in milligrams per kilogram (mg/kg)

Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 3.0:
Historic Analytical Results Sampled by Others (Soil Exceedances Only)

27-09 40th Avenue, Long Island City, New York

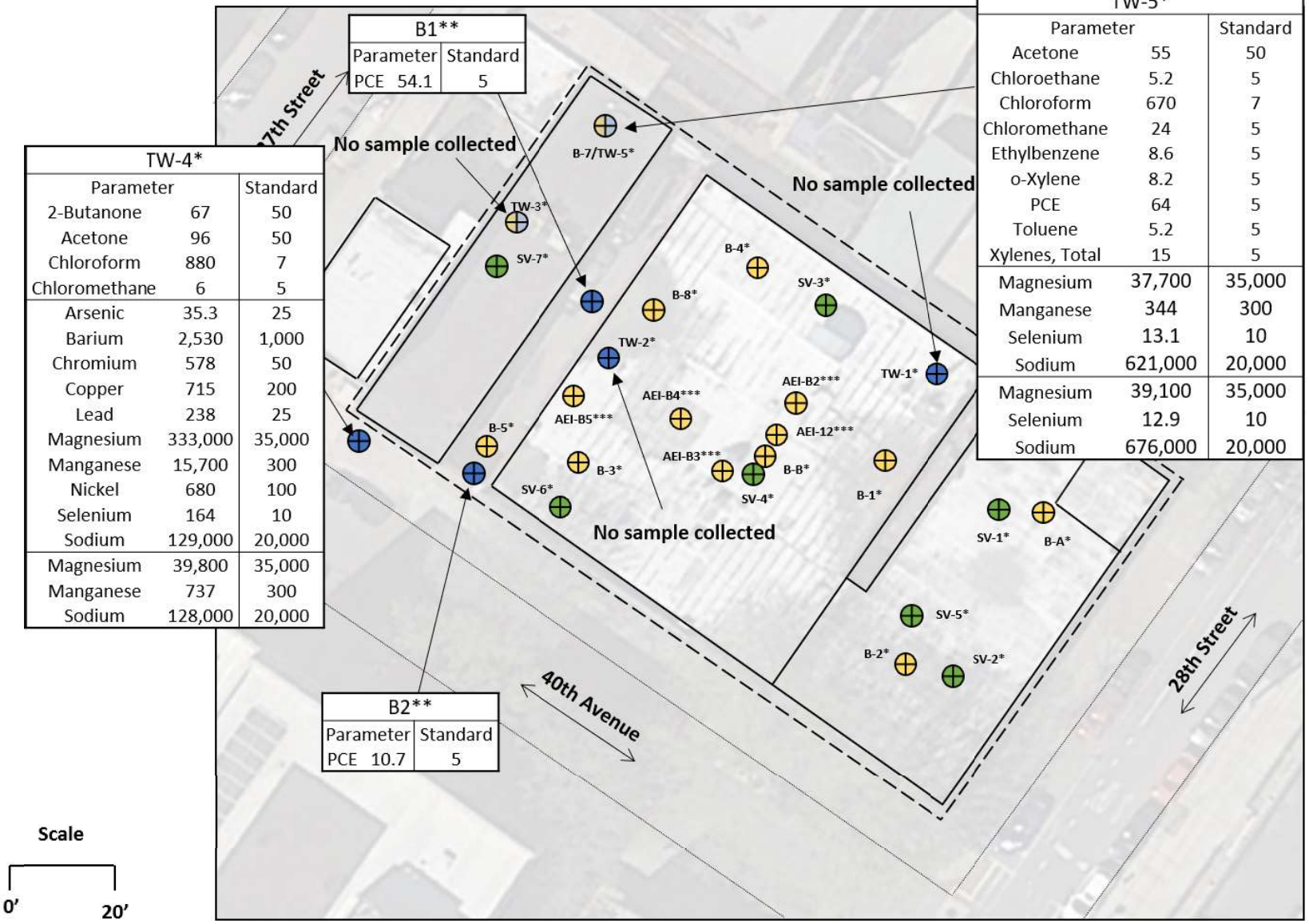
PROJECT #: 19-410
DRAWING DATE: 4-22-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY

- Soil boring location
- Groundwater sample location
- Soil and groundwater sample location
- Soil vapor sample location
- — — Site boundary

*** = sample collected in 2019**
**** = sample collected in 2017**
***** = sample collected in 2008**

N W E S



All units are in micrograms per liter (µg/L)

Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 4.0:
Historic Analytical Results Sampled by Others (Groundwater Exceedances Only)

27-09 40th Avenue, Long Island City, New York

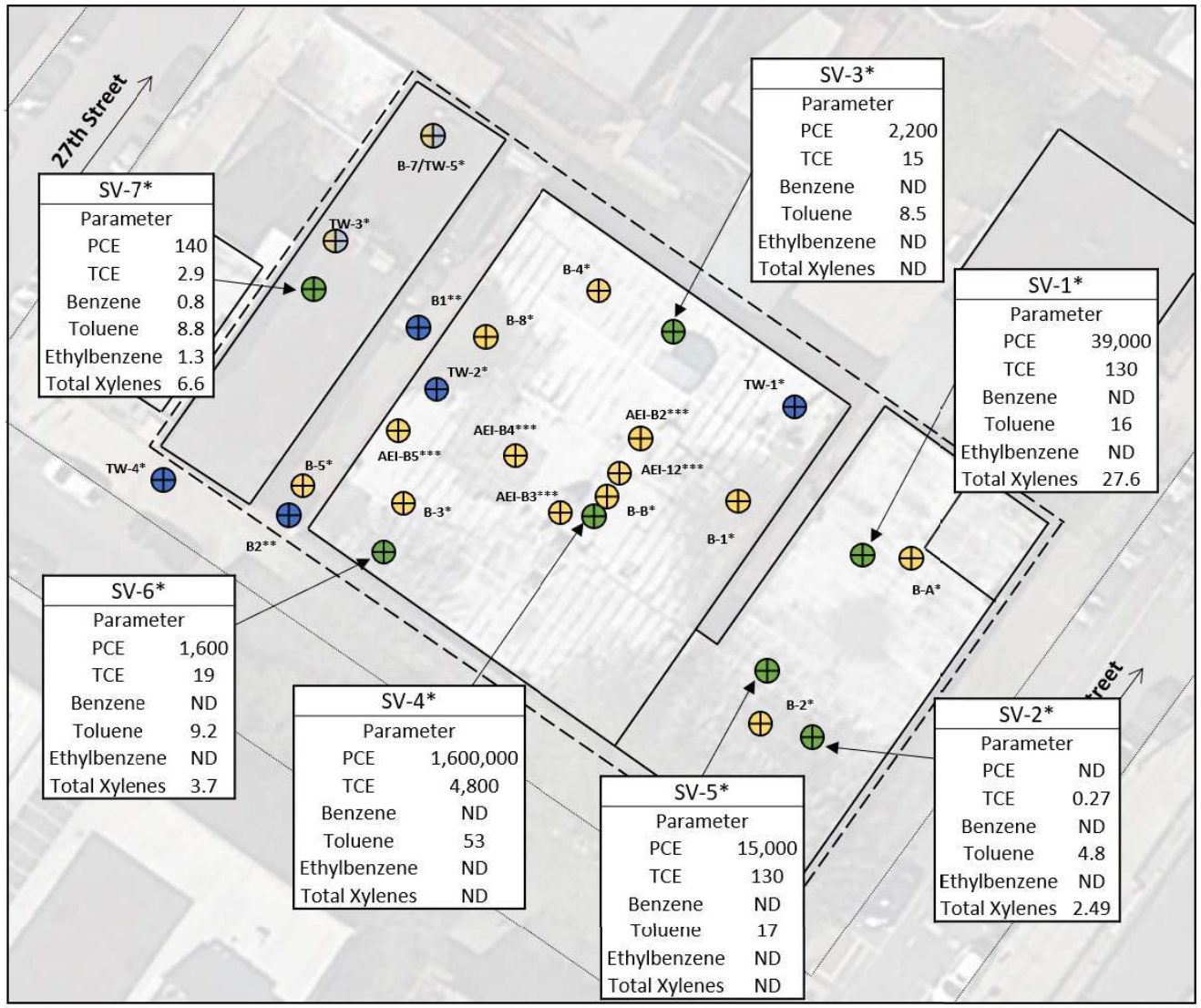
PROJECT #: 19-410
DRAWING DATE: 4-22-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY

- Soil boring location
- Groundwater sample location
- Soil and groundwater sample location
- Soil vapor sample location
- Site boundary

*** = sample collected in 2019**
**** = sample collected in 2017**
***** = sample collected in 2008**
PCE = Tetrachloroethylene

N W E S



Scale

0' 20'

All units are in micrograms per cubic meter (µg/m³)

Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 5.0:
Historic Analytical Results Sampled by Others (Soil Vapor Only)

27-09 40th Avenue, Long Island City, New York

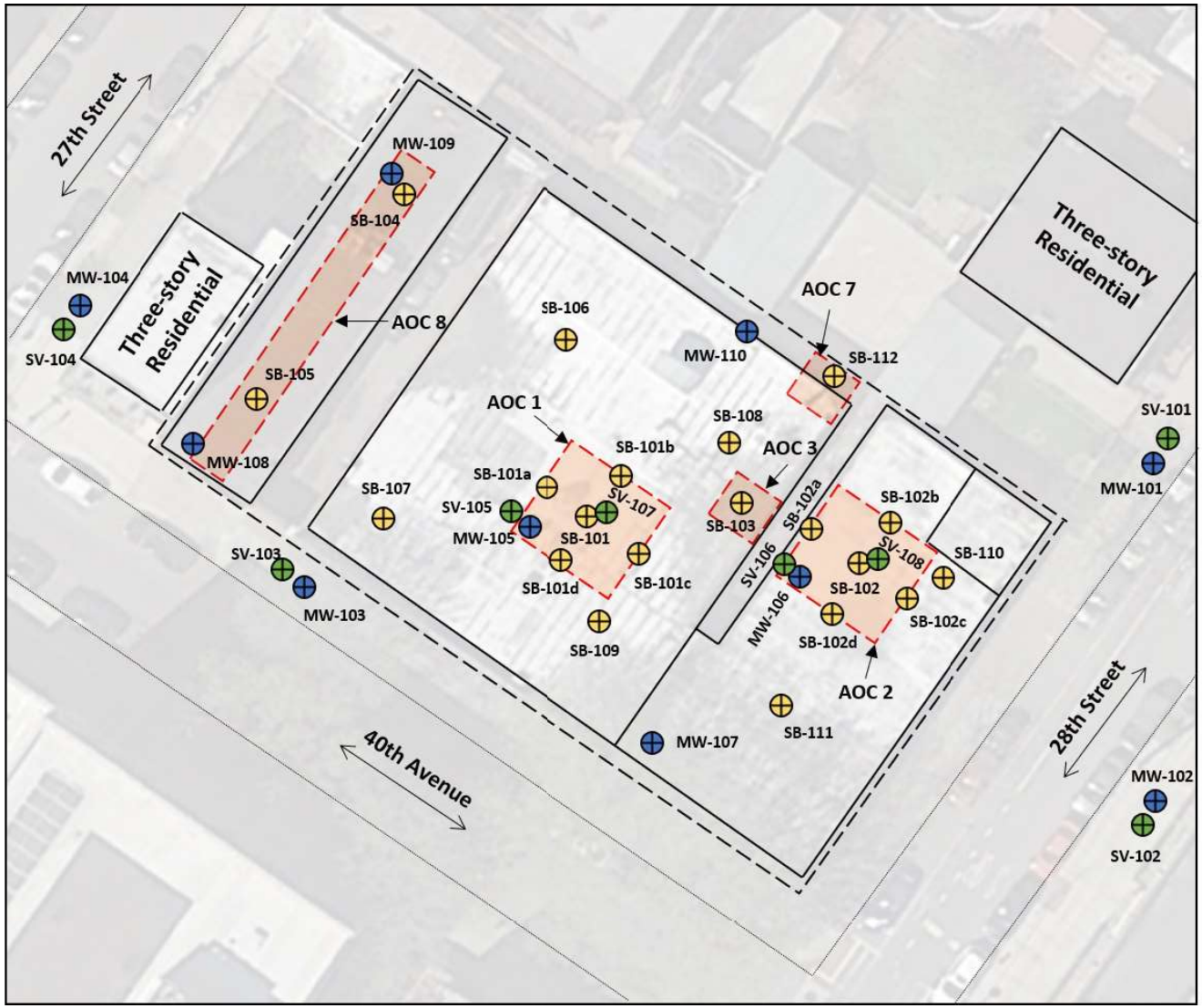
PROJECT #: 19-410
DRAWING DATE: 4-22-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY

- Soil boring location
- Groundwater sample location
- Soil and groundwater sample location
- Soil vapor sample location
- – – Site boundary

* = sample collected in 2019
** = sample collected in 2017
*** = sample collected in 2008
PCE = Tetrachloroethylene
TCE = Trichloroethylene

N W E S



Note: AOCs 4, 5, and 6 are site-wide

Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 6.0:
SRI Pre-Approved Sampling Locations with AOCs

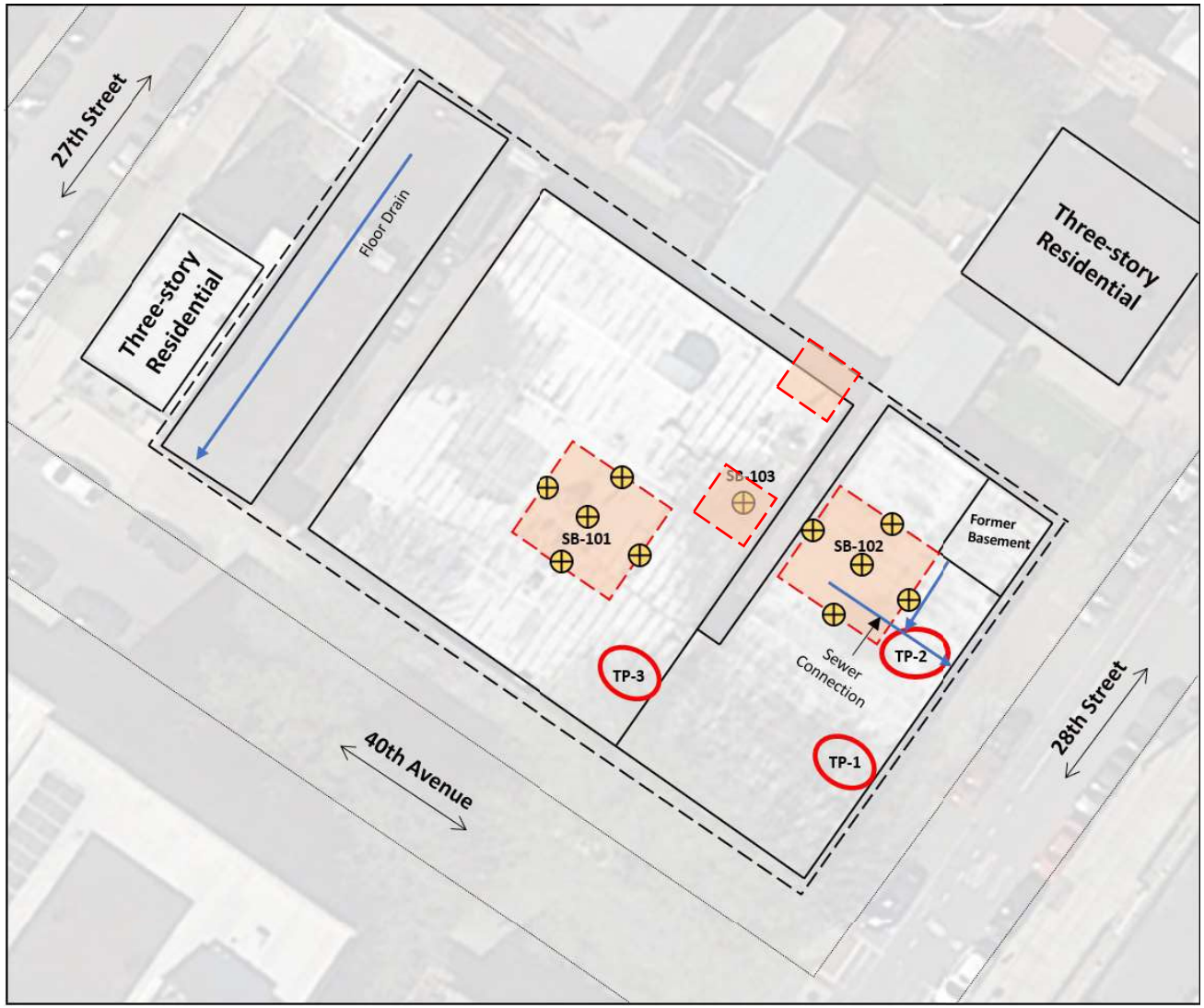
27-09 40th Avenue, Long Island City, New York

PROJECT #: 19-410
DRAWING DATE: 7-24-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY
- Soil sample location
- Groundwater sample location
- Soil vapor sample location
- Area of concern
- Site boundary

Scale
0' 20'

N W E S



Laurel
ENVIRONMENTAL
GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

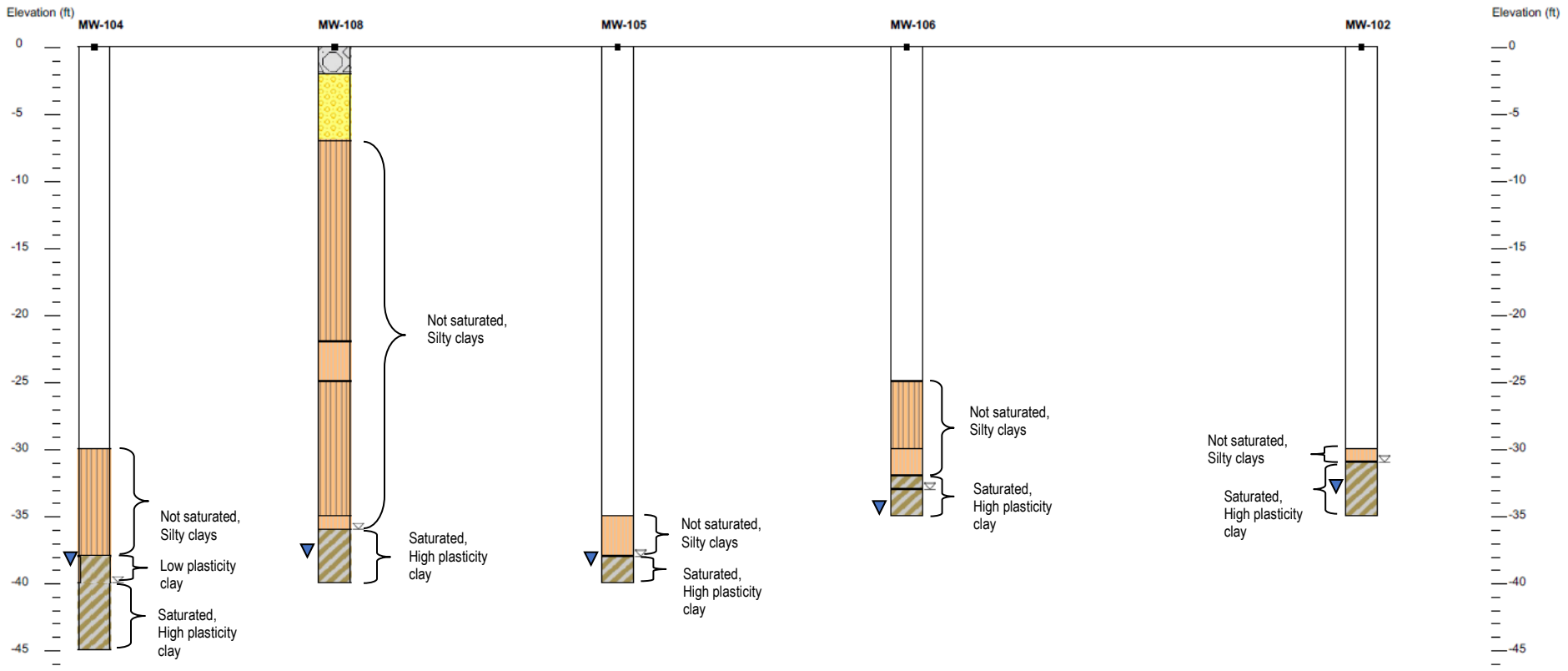
FIGURE 7.0:
Geophysical Survey and Test Pitting Locations

27-09 40th Avenue, Long Island City, New York

PROJECT #: 19-401
DRAWING DATE: 6-29-20
DRAWN BY: MO
CHECKED BY: JB
REVISIONS: NA

KEY

- Test pit location
- Soil sample location
- Area of concern
- Site boundary



Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 8.0:
Geologic Cross Section

27-09 40th Avenue, Long Island City, New York

PROJECT #: 19-410

DRAWING DATE: 8-19-20

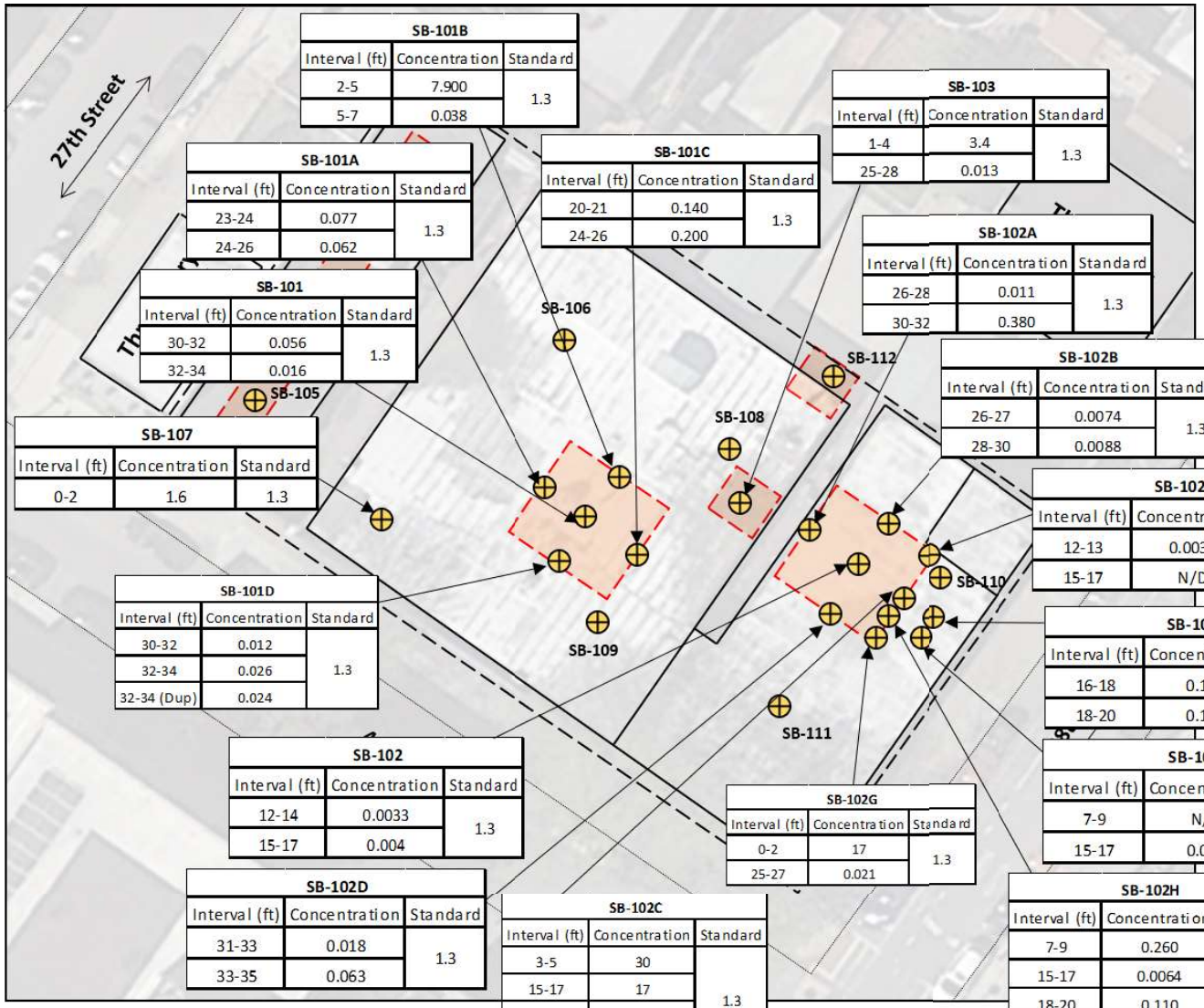
DRAWN BY: JB

CHECKED BY: SY

REVISIONS: NA

Legend

- Elastic SILT (MH)
- Fat CLAY (CH)
- FILL
- Well-graded SAND
- SILT (ML)
- Water Level During Drilling
- Water Level at End of Drilling
- Water Level During Sampling
- Cap
- Screen
- Annular Seal
- Sanitary Seal
- Filter Pack
- Backfill



Standard is NYSDEC Part 375 Unrestricted Use

Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 9.0:
SRI Delineation Results (Tetrachloroethylene Only)

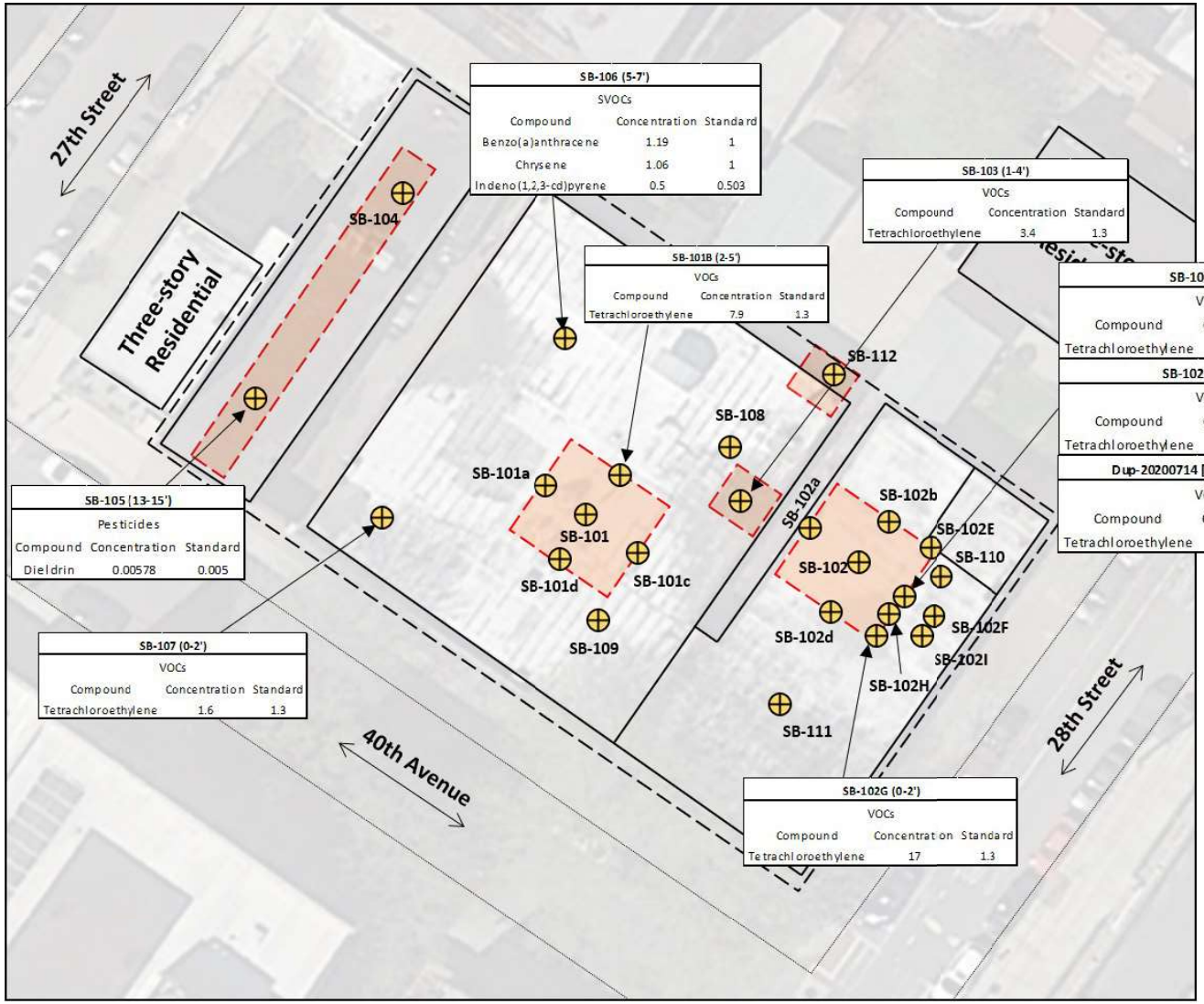
27-09 40th Avenue, Long Island City, New York

PROJECT #: 19-410
DRAWING DATE: 7-29-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY
All units in mg/Kg
N/D = Not detected
Soil boring location
Area of concern
Site boundary

Scale
0' 20'

N W E S



Standard is NYSDEC Part 375 Unrestricted Use

Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 10.0:
SRI Analytical Results (Soil Exceedances of Unrestricted Use Standards Only)

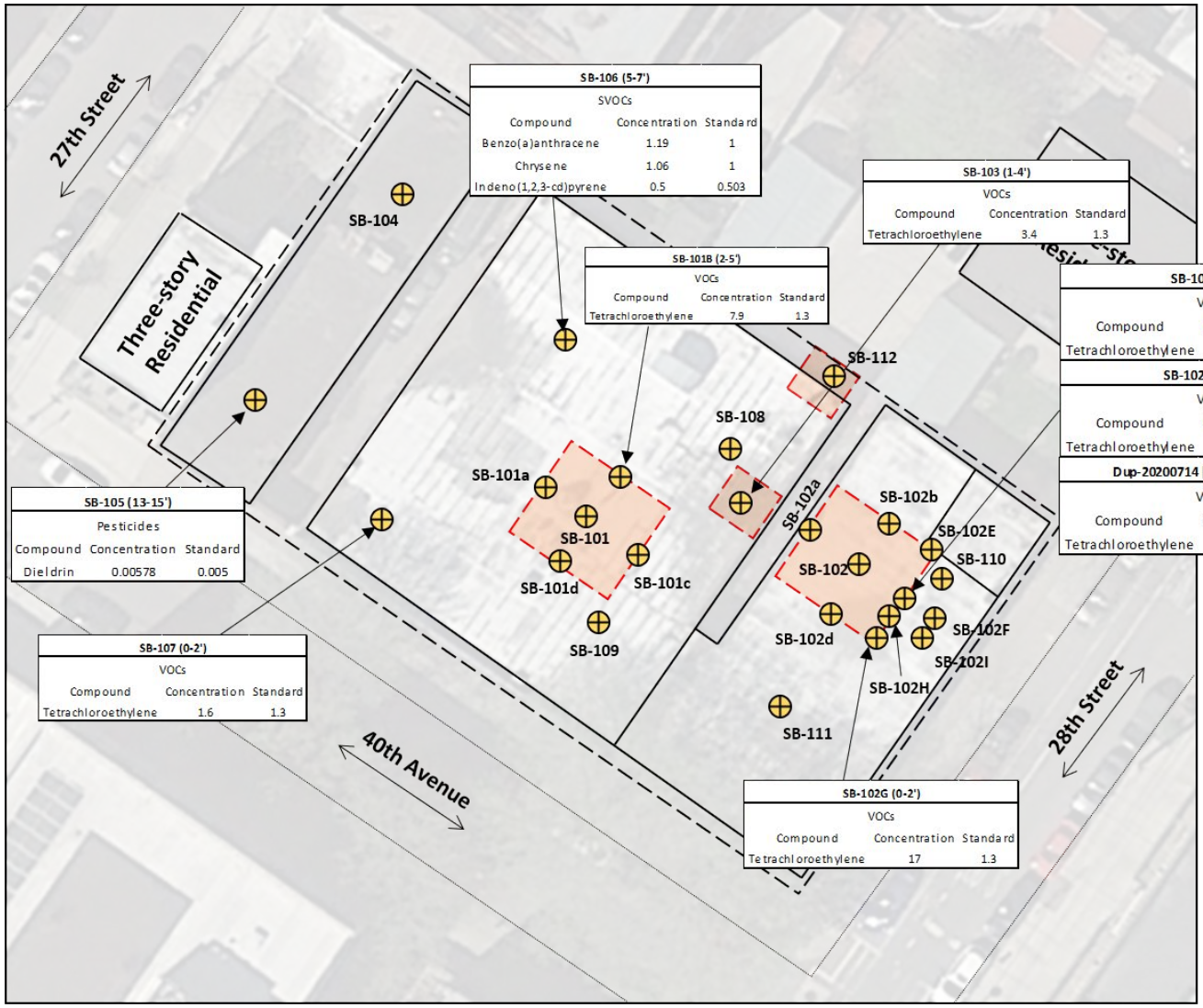
27-09 40th Avenue, Long Island City, New York

PROJECT #: 19-410
DRAWING DATE: 7-29-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY
All units in mg/Kg
Soil boring location
Area of concern
Site boundary

Scale
0' 20'

N W E S



Standard is NYSDEC Part 375 Unrestricted Use

Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 10.0:
SRI Analytical Results (Soil Exceedances of Unrestricted Use Standards Only)

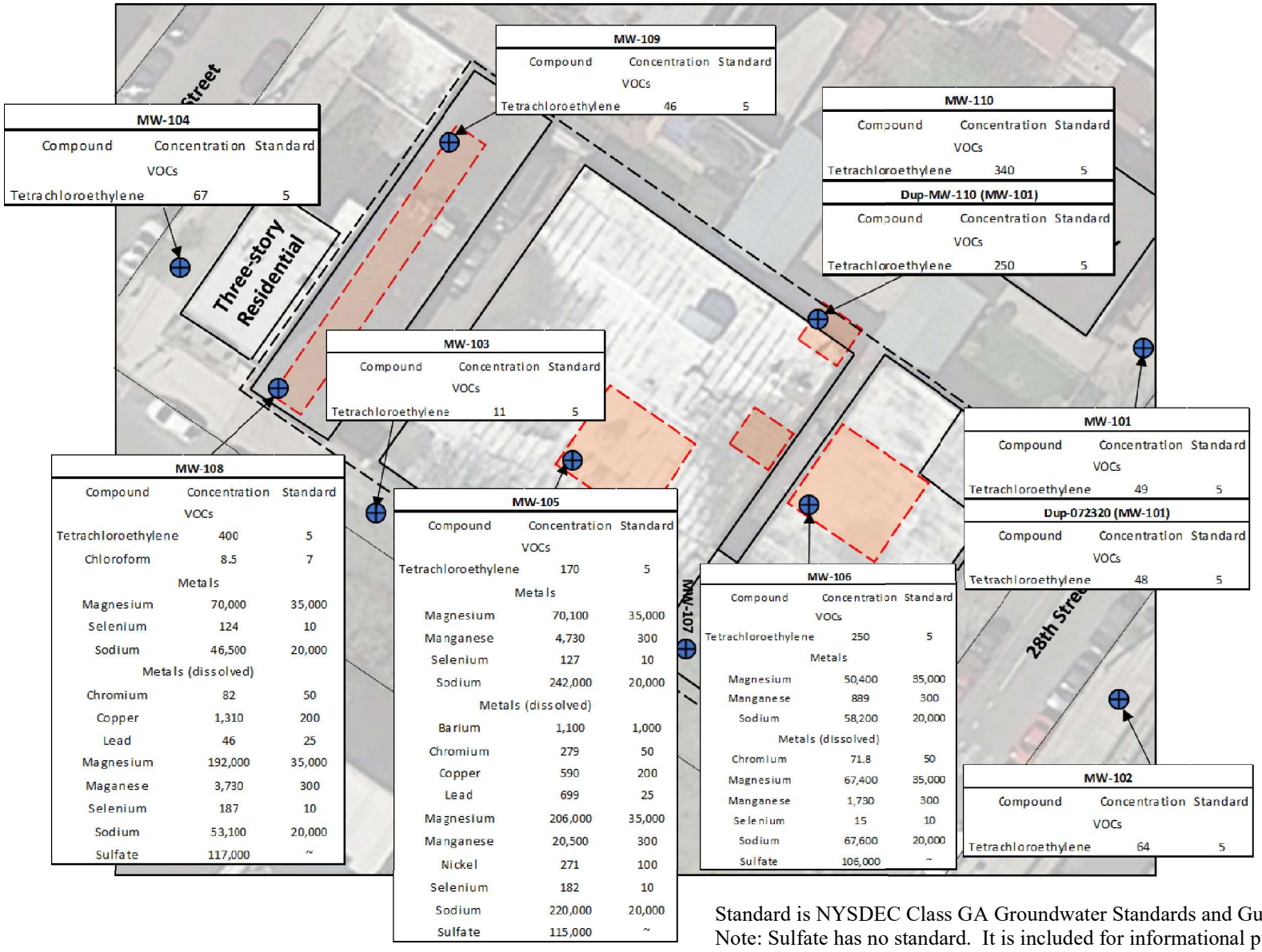
27-09 40th Avenue, Long Island City, New York

PROJECT #: 19-410
DRAWING DATE: 7-29-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY All units in mg/Kg
- Soil boring location
- Area of concern
- Site boundary

Scale
0' 20'

N W E S



Standard is NYSDEC Class GA Groundwater Standards and Guidance Values
Note: Sulfate has no standard. It is included for informational purposes only.

Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 11.0:
SRI Analytical Results (Groundwater Exceedances Only)

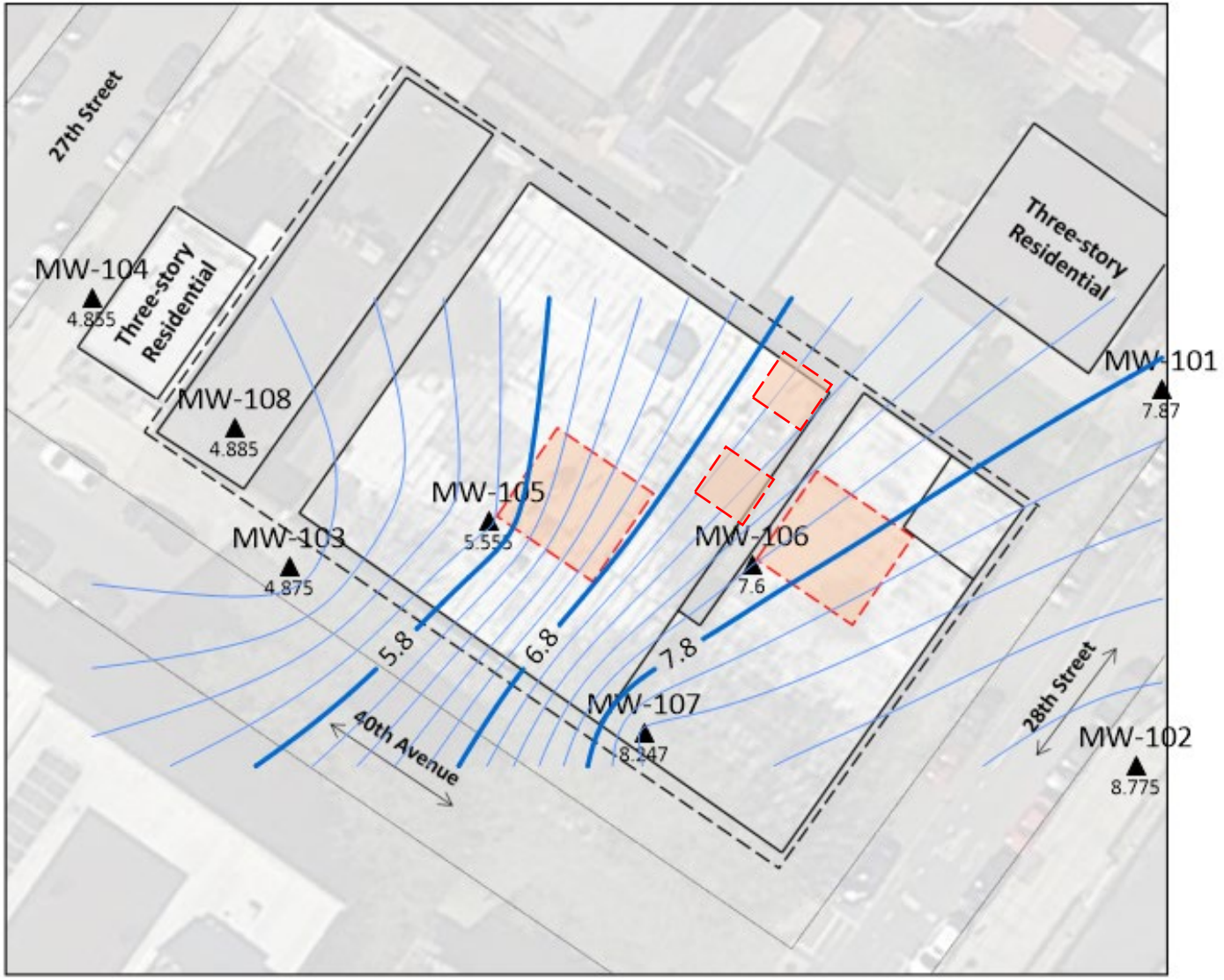
27-09 40th Avenue, Long Island City, New York

PROJECT #: 19-410
DRAWING DATE: 8-4-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY
All units in µg/L
Monitoring well location
Area of concern
Site boundary

Scale
0' 20'

N W E S



Available USGS maps indicate that the Site is located close to a groundwater divide. The available information and the complexity of the geology indicates that the true nature of groundwater flow surrounding the Site is subject to significant uncertainty.

Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 12.0:
Groundwater Elevation Contour Map – 7/18/2020

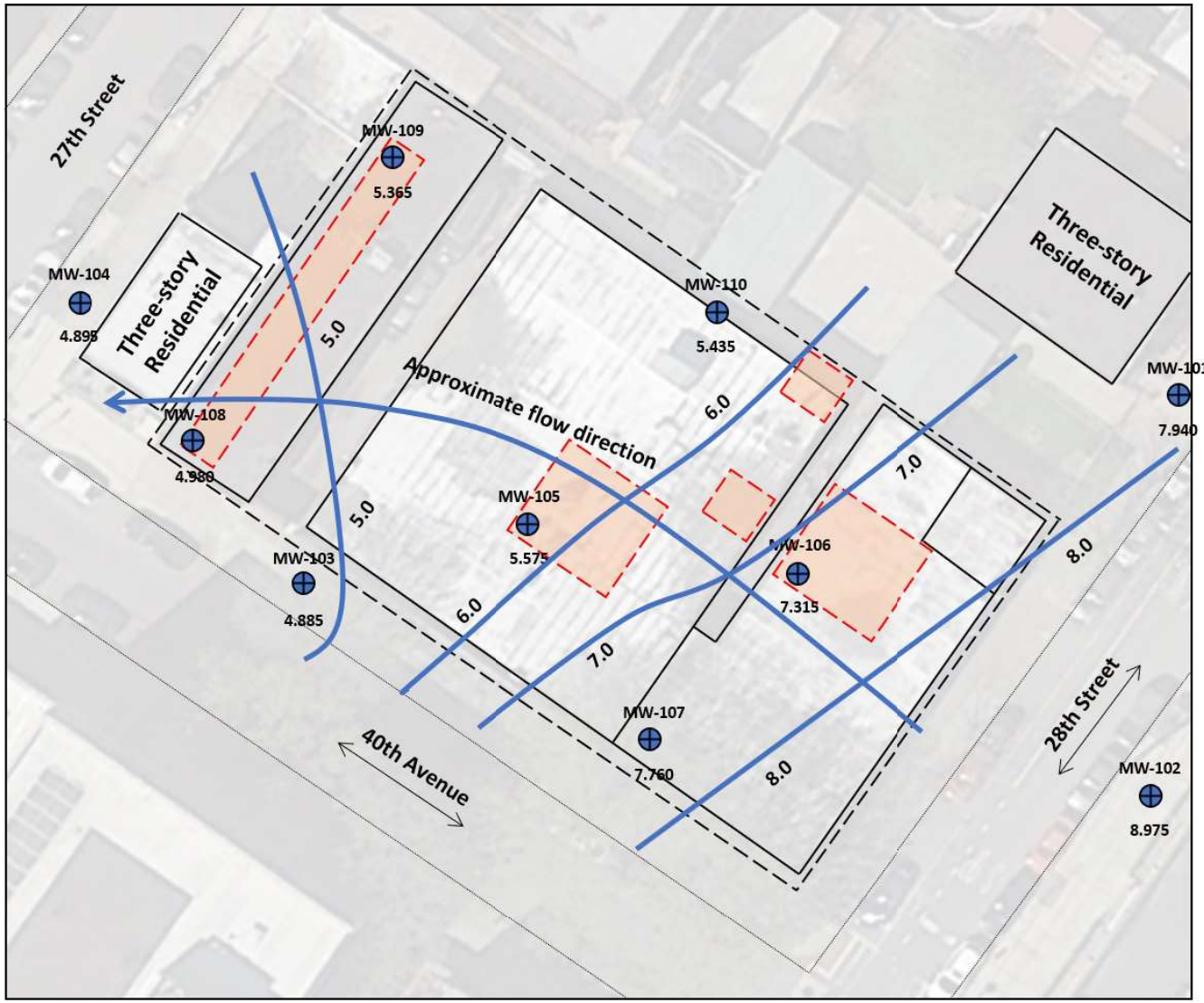
27-09 40th Avenue, Long Island City, New York

PROJECT #: 19-410
DRAWING DATE: 8-18-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY All units are in feet
- Monitoring well location
- Groundwater Elevation Contour
- Area of Concern
- Site boundary

Scale
0' 20'

N W E S



Available USGS maps indicate that the Site is located close to a groundwater divide. The available information and the complexity of the geology indicates that the true nature of groundwater flow surrounding the Site is subject to significant uncertainty.

Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 12.0:
Groundwater Elevation Contour Map – 11/04/20

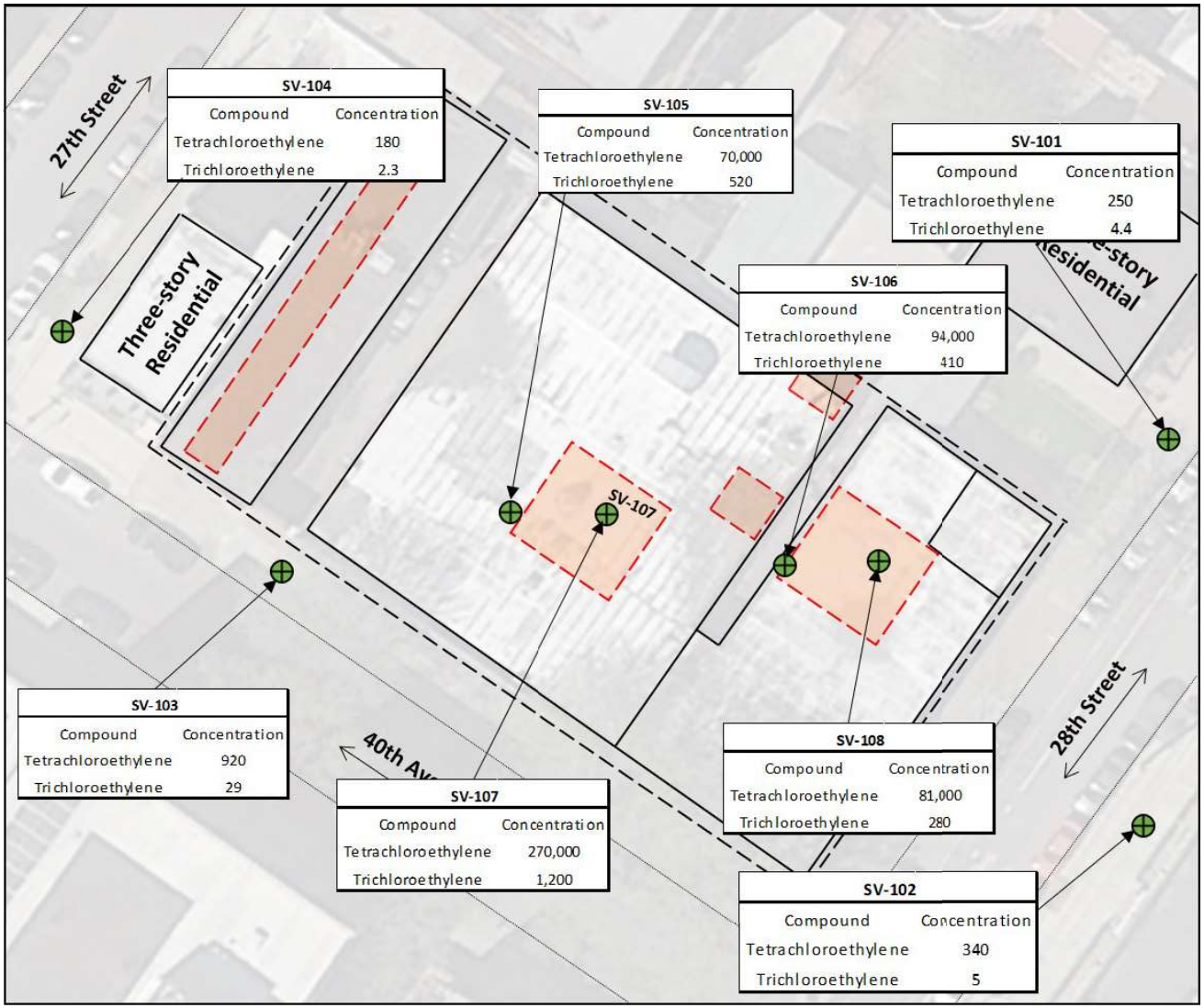
27-09 40th Avenue, Long Island City, New York

PROJECT #: 19-410
DRAWING DATE: 11-4-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY
All units are in feet
Monitoring well location
Groundwater Elevation Contour
Area of Concern
Site boundary

Scale
0' 20'

N W E S



Laurel ENVIRONMENTAL GEOSCIENCES DPC

53 West Hills Road
Huntington Station, NY 11746

PHONE: 631-673-0612
FAX: 631-427-5323

WWW.LAURELENV.COM

FIGURE 13.0:
SRI Analytical Results (Soil Vapor PCE & TCE Only)

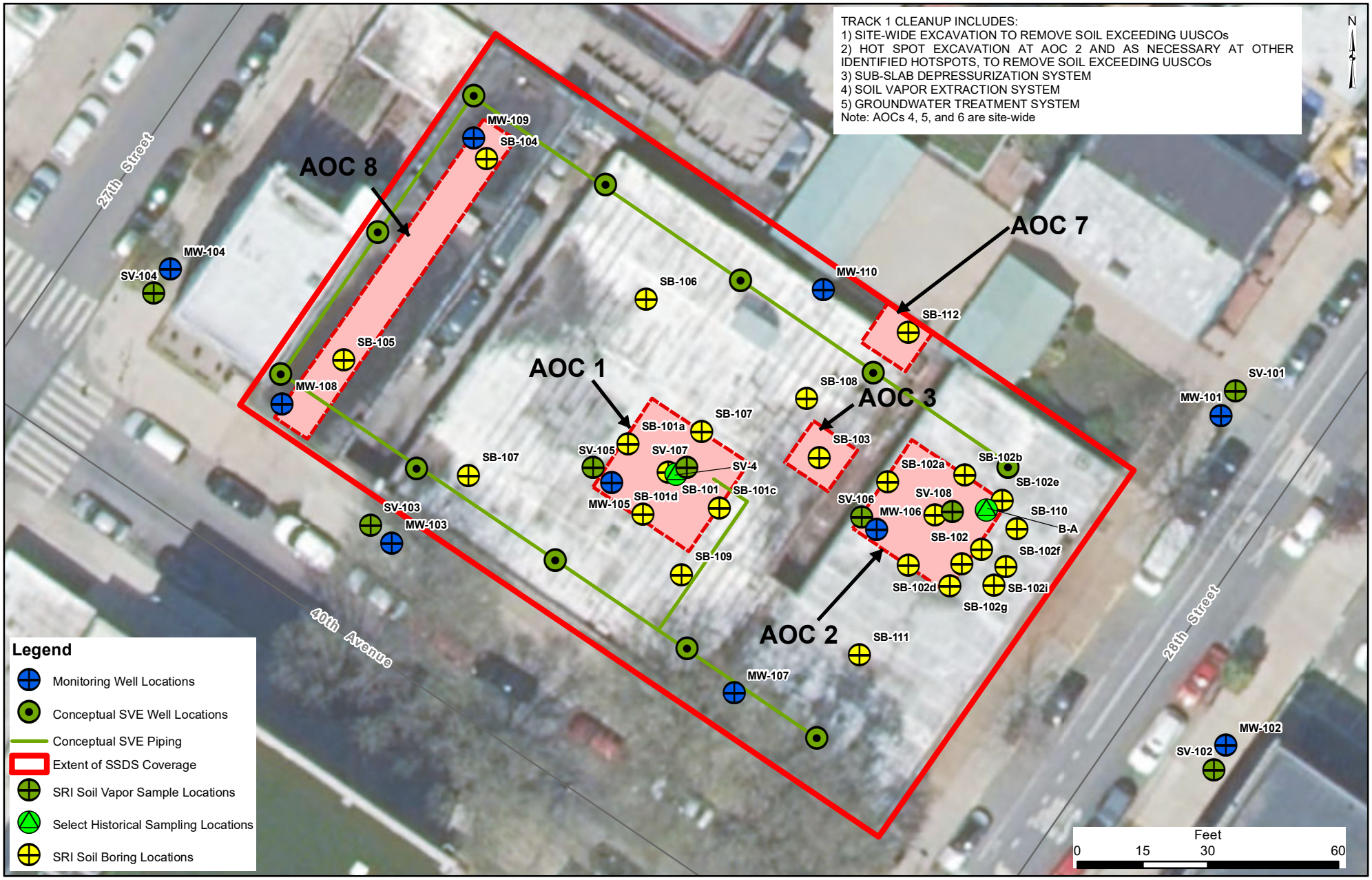
27-09 40th Avenue, Long Island City, New York

PROJECT #: 19-410
DRAWING DATE: 8-10-20
DRAWN BY: JB
CHECKED BY: SY
REVISIONS: NA

KEY Units are µg/m³
- Soil vapor location
- Area of concern
- Site boundary

Scale
0' 20'

N W E S



THE Chazen COMPANIES®
Proud to Be Employee Owned
Engineers
Land Surveyors
Planners
Environmental & Safety Professionals
Landscape Architects

CHAZEN ENGINEERING, LAND SURVEYING, LANDSCAPE ARCHITECTURE & GEOLOGY CO., D.P.C.

Office Locations:

Hudson Valley Office:
21 Fox Street
Poughkeepsie, NY. 12601
Phone: (845) 454-3980

Capital District Office:
547 River Street
Troy, NY. 12180
Phone: (518) 273-0055

North Country Office:
20 Elm Street, Suite 110
Glens Falls, NY. 12801
Phone: (518) 812-0513

Westchester County Office:
1 North Broadway, Suite 803
White Plains, NY. 10601
Phone: (914) 997-8510

27-09 40th Ave Dutch Kills Realty LLC

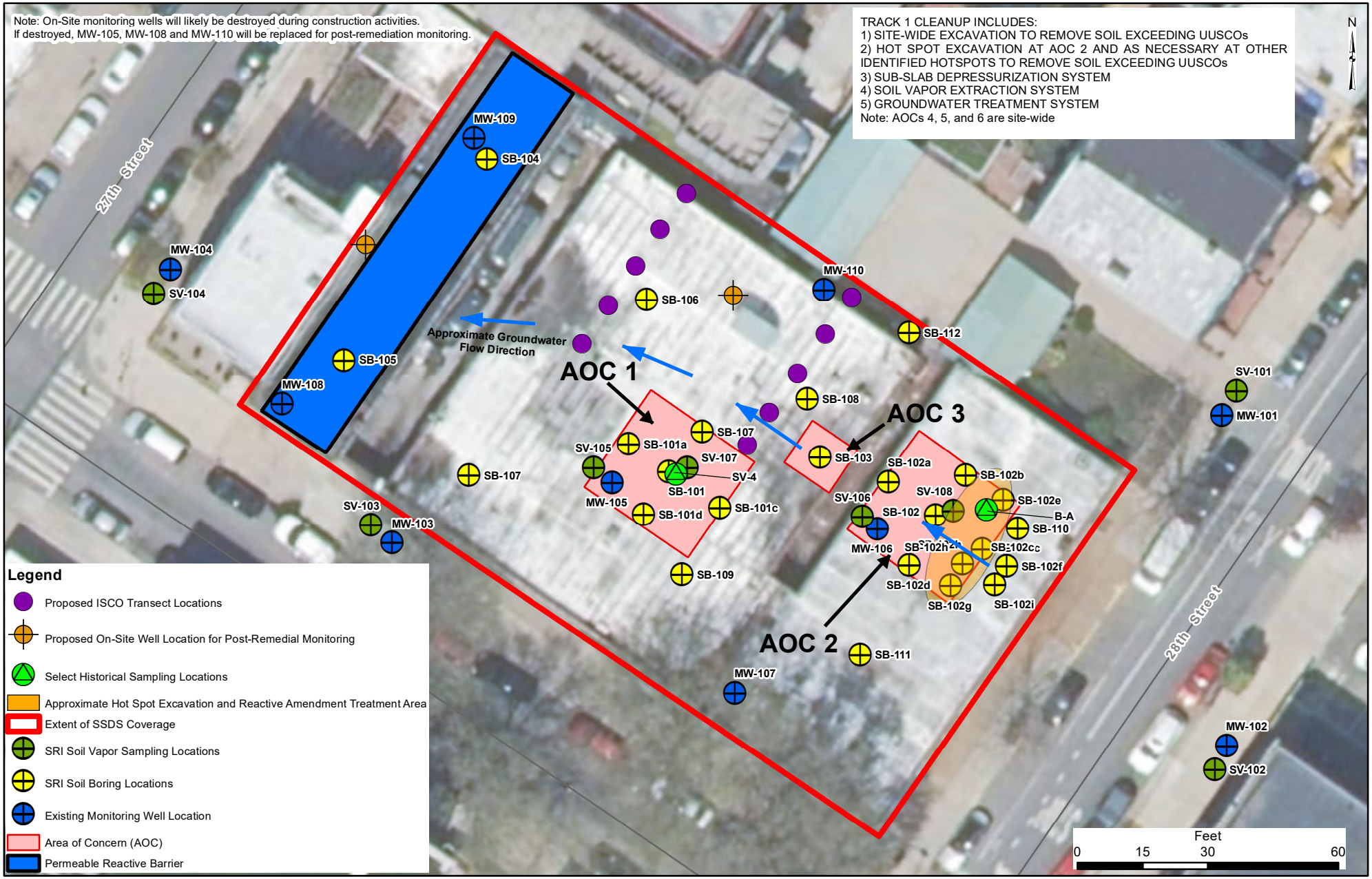
Figure 14 - Conceptual Soil Vapor Extraction System Layout

27-09 40th Avenue
Long Island City, New York

Source: NYS ITS GIS Orthos, New York City 2018 aerial photograph;
NYS Department of Transportation 2008 Roads Dataset

Drawn:	MO/CJL
Date:	11/30/2020
Scale:	1 inch equals 30 feet
Project:	42038.00
Figure:	14

Document Path: Z:\projects\42000-42099\42038.00_27-09 40th Ave_BCP Consulting PE Services\GIS\Maps\Fig14SVE SystemLayout.mxd



THE Chazen COMPANIES®
Proud to Be Employee Owned
Engineers
Land Surveyors
Planners
Environmental & Safety Professionals
Landscape Architects

CHAZEN ENGINEERING, LAND SURVEYING, LANDSCAPE ARCHITECTURE & GEOLOGY CO., D.P.C.

Office Locations:

Hudson Valley Office:
21 Fox Street
Poughkeepsie, NY. 12601
Phone: (845) 454-3980

Capital District Office:
547 River Street
Troy, NY. 12180
Phone: (518) 273-0055

North Country Office:
20 Elm Street, Suite 110
Glens Falls, NY. 12801
Phone: (518) 812-0513

Westchester County Office:
1 North Broadway, Suite 803
White Plains, NY. 10601
Phone: (914) 997-8510

27-09 40th Ave Dutch Kills Realty LLC

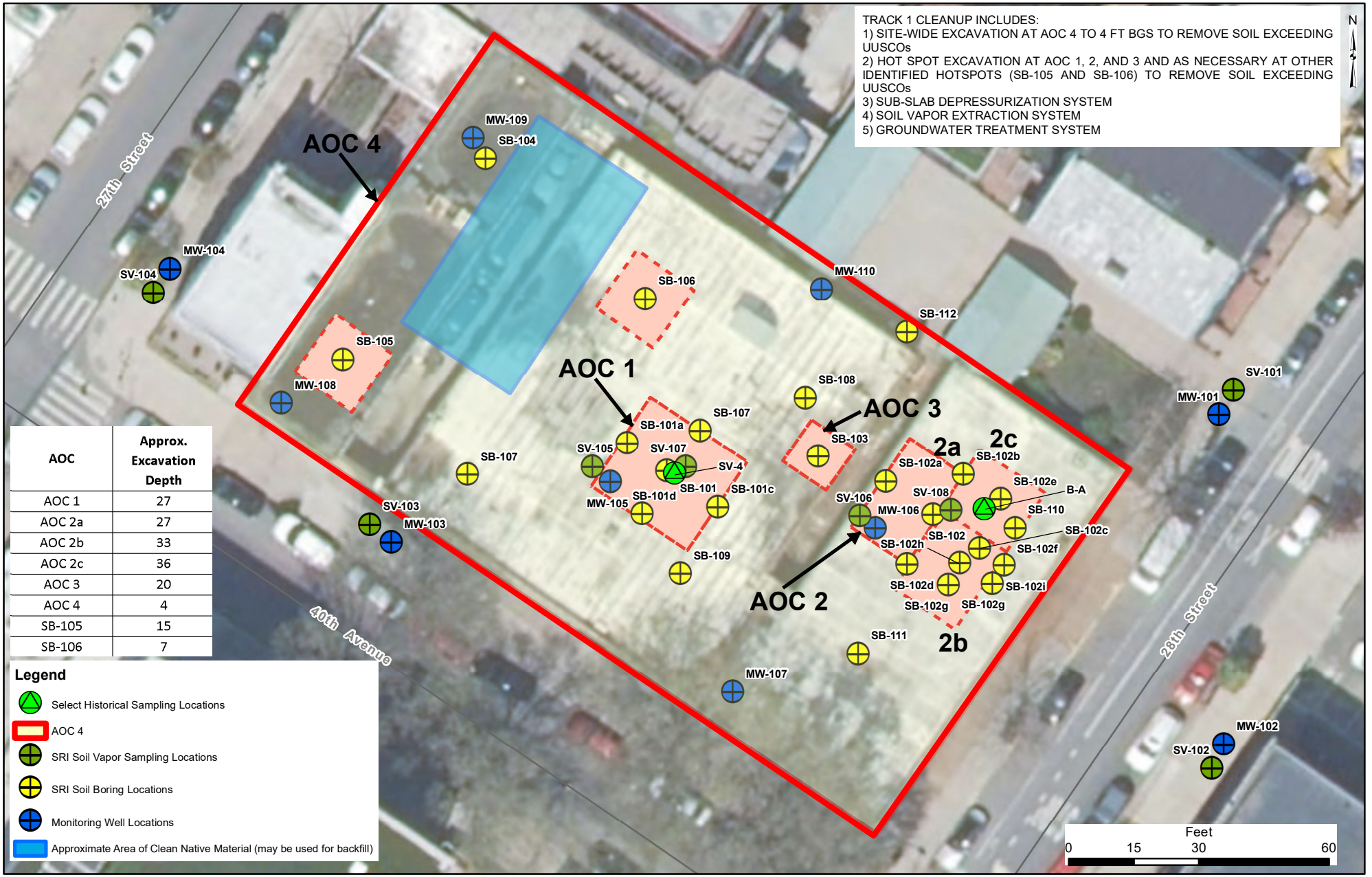
Figure 15 - Conceptual Groundwater Treatment Plan

27-09 40th Avenue
Long Island City, New York

Source: NYS ITS GIS Orthos, New York City 2018 aerial photograph;
NYS Department of Transportation 2008 Roads Dataset

Drawn:	BWF
Date:	5/7/2021
Scale:	1 inch equals 30 feet
Project:	42038.00
Figure:	15

Document Path: Z:\projects\42000-42099\42038.00_27-09 40th Ave_BCP Consulting PE Services\GIS\Maps\Fig15 GW Treatment Plan.mxd



AOC	Approx. Excavation Depth
AOC 1	27
AOC 2a	27
AOC 2b	33
AOC 2c	36
AOC 3	20
AOC 4	4
SB-105	15
SB-106	7

Legend

- Select Historical Sampling Locations
- AOC 4
- SRI Soil Vapor Sampling Locations
- SRI Soil Boring Locations
- Monitoring Well Locations
- Approximate Area of Clean Native Material (may be used for backfill)

THE Chazen COMPANIES
Proud to Be Employee Owned
Engineers
Land Surveyors
Planners
Environmental & Safety Professionals
Landscape Architects

CHAZEN ENGINEERING, LAND SURVEYING, LANDSCAPE ARCHITECTURE & GEOLOGY CO., D.P.C.

Office Locations:

Hudson Valley Office:
21 Fox Street
Poughkeepsie, NY. 12601
Phone: (845) 454-3980

Capital District Office:
547 River Street
Troy, NY. 12180
Phone: (518) 273-0055

North Country Office:
20 Elm Street, Suite 110
Glens Falls, NY. 12801
Phone: (518) 812-0513

Westchester County Office:
1 North Broadway, Suite 803
White Plains, NY. 10601
Phone: (914) 997-8510

27-09 40th Ave Dutch Kills Realty LLC

Figure 16 - Approximate Depth of Excavation to Achieve Remedial Objectives

27-09 40th Avenue
Long Island City, New York

Source: NYS ITS GIS Orthos, New York City 2018 aerial photograph;
NYS Department of Transportation 2008 Roads Dataset

Drawn:	MO/CJL/BWF
Date:	1/12/2021
Scale:	1 inch equals 30 feet
Project:	42038.00
Figure:	16

Document Path: Z:\projects\42000-42099\42038.00_27-09 40th Ave_BCP Consulting PE Services\GIS\Maps\Fig16DepthofExcavation.mxd

THE Chazen COMPANIES®
Proud to Be Employee Owned
Engineers
Land Surveyors
Planners
Environmental & Safety Professionals
Landscape Architects

Hudson Valley Office:
21 Fox Street, Poughkeepsie, NY 12601

Capital District Office:
547 River Street, Troy, NY 12180

North Country Office:
20 Elm Street, Suite 110, Glens Falls, NY 12801

Westchester County Office:
1 North Broadway, Suite 803, White Plains, NY 10601

www.chazencompanies.com Phone: (888) 539-9073

27-09 40th Ave Dutch Kills Realty LLC

Figure 17: Truck Route(s) Map

27-09 40th Avenue
Long Island City, New York

Source: NYS ITS GIS Orthos, New York City 2018 aerial photograph;
NYS Department of Transportation 2008 Roads Dataset

Drawn:	BWF
Date:	04/22/2021
Scale:	As noted above
Project:	42038.00
Figure:	17

Document Path: Z:\projects\42000-42099\42038.00_27-09 40th Ave_BCP Consulting PE Services\GIS\Maps\Figure17_TruckRouteMap.mxd

Tables

Table I
Select Sample Location Coordinates

Point Name	***Latitude***	***Longitude***	***Elevation (ft)***	***Format***	Collected By
SB-101	40° 45' 11.053"	-73° 56' 11.870"	N/A	NAD83	Laurel
SB-102	40° 45' 10.784"	-73° 56' 11.104"	N/A	NAD83	Laurel
SB-102A	40° 45' 10.929"	-73° 56' 11.107"	N/A	NAD83	Laurel
SB-102C	40° 45' 10.835"	-73° 56' 10.863"	N/A	NAD83	Laurel
SB-102E	40° 45' 10.834"	-73° 56' 10.913"	N/A	NAD83	Laurel
SB-102F	40° 45' 10.576"	-73° 56' 10.913"	N/A	NAD83	Laurel
SB-102G	40° 45' 10.631"	-73° 56' 10.996"	N/A	NAD83	Laurel
SB-102H	40° 45' 10.729"	-73° 56' 11.008"	N/A	NAD83	Laurel
SB-102I	40° 45' 10.660"	-73° 56' 10.956"	N/A	NAD83	Laurel
SB-103	40° 45' 10.938"	-73° 56' 11.357"	N/A	NAD83	Laurel
SB-104	40° 45' 11.547"	-73° 56' 12.097"	N/A	NAD83	Laurel
SB-105	40° 45' 11.116"	-73° 56' 12.484"	N/A	NAD83	Laurel
SB-106	40° 45' 11.127"	-73° 56' 12.022"	N/A	NAD83	Laurel
SB-107	40° 45' 10.886"	-73° 56' 12.311"	N/A	NAD83	Laurel
SB-108	40° 45' 11.062"	-73° 56' 11.333"	N/A	NAD83	Laurel
SB-109	40° 45' 10.780"	-73° 56'11.680"	N/A	NAD83	Laurel
SB-110	40° 45' 10.776"	-73° 56' 11.040"	N/A	NAD83	Laurel
SB-111	40° 45' 10.452"	-73° 56' 11.259"	N/A	NAD83	Laurel
SB-112	40° 45' 11.150"	-73° 56' 11.120"	N/A	NAD83	Laurel

N/A = data not collected

Table I
Select Sample Location Coordinates (continued)

Point Name	***Latitude***	***Longitude***	***Elevation (ft)***	***Format***	Collected By
MW-101	40° 45' 11.18324"	-73° 56' 09.94581"	42.5	NAD83	GeoMar
MW-102	40° 45' 10.22584"	-73° 56' 10.11700"	42.2	NAD83	GeoMar
MW-103	40° 45' 10.67509"	-73° 56' 12.64465"	42.6	NAD83	GeoMar
MW-104	40° 45' 11.38683"	-73° 56' 13.15943"	43.6	NAD83	GeoMar
MW-105	40° 45' 10.81981"	-73° 56' 12.03072"	43.9	NAD83	GeoMar
MW-106	40° 45' 10.77991"	-73° 56' 11.28742"	42.7	NAD83	GeoMar
MW-107	40° 45' 10.30820"	-73° 56' 11.53106"	42.0	NAD83	GeoMar
MW-108	40° 45' 11.07638"	-73° 56' 12.76986"	42.6	NAD83	GeoMar
MW-109	40° 45' 11.63946"	-73° 56' 12.39435"	43.8	NAD83	Laurel
MW-110	40° 45' 11.31802"	-73° 56' 11.45624"	44.0	NAD83	Laurel
SV-101	40° 45' 11.17237"	-73° 56' 09.95892"	42.5	NAD83	GeoMar
SV-102	40° 45' 10.21017"	-73° 56' 10.13128"	42.1	NAD83	GeoMar
SV-103	40° 45' 10.68581"	-73° 56' 12.63427"	42.7	NAD83	GeoMar
SV-104	40° 45' 11.37466"	-73° 56' 13.17230"	43.6	NAD83	GeoMar
SV-105	40° 45' 10.80562"	-73° 56' 12.06181"	44.1	NAD83	GeoMar
SV-106	40° 45' 10.75855"	-73° 56' 11.27055"	42.7	NAD83	GeoMar
SV-107	40° 45' 10.83162"	-73° 56' 11.85678"	43.7	NAD83	GeoMar
SV-108	40° 45' 10.80284"	-73° 56' 11.06351"	42.2	NAD83	GeoMar

Horizontal NAD83 (2011) (EPOCH:2010.0000)
Vertical NAVD88 (GEOID18)

Table II
Analytes Detected in AOC 1 (Former Dry Cleaning Unit)

Sample ID	UU SCOs	RR SCOs	SB-101 30-32'		SB-101 32-34'		SB-101A 23-24'		SB-101A 24-26'		SB-101B 2-5'		SB-101B 5-7'	
Sampling Date			7/10/2020		7/10/2020		7/10/2020		7/10/2020		7/10/2020		7/10/2020	
Client Matrix			Soil		Soil		Soil		Soil		Soil		Soil	
Compound			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			1		1		1		1		200		1	
Acetone	0.05	100	0.00580	J	0.00530	U	0.00560	U	0.00830	J	0.00480	U	0.00590	U
Tetrachloroethylene	1.3	19	0.0560	J	0.0160	J	0.0770	J	0.0620	J	**7.9**	DJ	0.0380	J
Trichloroethylene	0.47	21	0.00280	U	0.00260	U	0.00280	U	0.00360	U	0.00260	J	0.00300	U

Sample ID	UU SCOs	RR SCOs	SB-101C 20-21'		SB-101C 24-26'		DUP-20200710		SB-101D 18-20'		SB-101D 21-23'	
Sampling Date			7/10/2020		7/10/2020		7/10/2020		7/10/2020		7/10/2020	
Client Matrix			Soil		Soil		Soil		Soil		Soil	
Compound			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			1		1		1		1		1	
Acetone	0.05	100	0.0170		0.00410	U	0.00480	U	0.00560	U	0.00560	U
Tetrachloroethylene	1.3	19	0.140	J	0.200	EJ	0.0240	J	0.0120	J	0.0260	J
Trichlorofluoromethane	~	~	0.00300	U	0.00210	U	0.00240	U	0.00370	J	0.00280	U

Note:
mg/kg=milligrams per kilogram
Yellow=exceeds the NYSDEC Part 375 Unrestricted Use SCOs
Q is the qualifier column, where:
D=result is from an analysis that required a dilution
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table II
Analytes Detected in AOC 1 (Former Dry Cleaning Unit) [continued]

Sample ID	NYSDEC Interim Guidance Values	SB-101 30-32'		SB-101 32-34'		SB-101A 23-24'		SB-101A 24-26'		SB-101B 2-5'		SB-101B 5-7'	
Sampling Date		7/10/2020		7/10/2020		7/10/2020		7/10/2020		7/10/2020		7/10/2020	
Client Matrix		Soil		Soil		Soil		Soil		Soil		Soil	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, NYSDEC Target List	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
Dilution Factor		1		1		1		1		1		1	
Perfluoroheptanoic acid (PFHpA)		0.04	U	0.05	U	0.05	U	0.05	U	0.12	J	0.05	U
Perfluorohexanoic acid (PFHxA)		0.06	U	0.07	U	0.08	U	0.07	U	0.10	J	0.07	U
Perfluoro-n-butanoic acid (PFBA)		0.19	J	0.19	U	0.26	J	0.21	J	0.25	J	0.21	J
Perfluorooctanesulfonic acid (PFOS)	1	0.05	J	0.05	U	0.05	U	0.05	U	0.05	U	0.04	U
Perfluorooctanoic acid (PFOA)	1	0.07	U	0.08	U	0.17	J	0.22	J	0.35	J	0.08	U
Perfluoropentanoic acid (PFPeA)		0.09	U	0.09	U	0.11	U	0.10	U	0.14	J	0.10	J
SVOCs, 1,4,-Dioxane 8270 SIM-Soil	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
1,4-Dioxane		0.09	U	0.09	U	0.11	U	0.10	U	0.05	U	0.08	U

Sample ID	NYSDEC Interim Guidance Values	SB-101C 20-21'		SB-101C 24-26'		DUP-20200710		SB-101D 18-20'		SB-101D 21-23'	
Sampling Date		7/10/2020		7/10/2020		7/10/2020		7/10/2020		7/10/2020	
Client Matrix		Soil		Soil		Soil		Soil		Soil	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, NYSDEC Target List	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
Dilution Factor		1		1		1		1		1	
Perfluoroheptanoic acid (PFHpA)		0.05	U	0.05	U	0.04	U	0.05	U	0.05	U
Perfluorohexanoic acid (PFHxA)		0.07	U	0.07	U	0.06	U	0.07	U	0.07	U
Perfluoro-n-butanoic acid (PFBA)		0.22	J	0.24	J	0.22	J	0.20	J	0.20	J
Perfluorooctanesulfonic acid (PFOS)	1	0.04	U	0.05	U	0.10	J	0.04	U	0.05	U
Perfluorooctanoic acid (PFOA)	1	0.08	U	0.09	U	0.09	J	0.12	J	0.08	U
Perfluoropentanoic acid (PFPeA)		0.11	J	0.10	U	0.09	J	0.09	U	0.10	U
SVOCs, 1,4,-Dioxane 8270 SIM-Soil	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
1,4-Dioxane		0.08	U	0.09	U	0.06	U	0.09	U	0.10	U

Note:
µg/kg=micrograms per kilogram
Q is the qualifier column, where:
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table III
Analytes Detected in AOC 2 (Sewer Piping, Vicinity of SV-1)

Sample ID	UU SCOs	RR SCOs	SB-102 12-14		SB-102 15-17		SB-102A 26-28		SB-102A 30-32		SB-102B 26-27		SB-102B 28-30	
Sampling Date			7/13/2020		7/13/2020		7/13/2020		7/13/2020		7/13/2020		7/13/2020	
Client Matrix			Soil		Soil		Soil		Soil		Soil		Soil	
Compound			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			1		1		1		1		1		1	
Acetone	0.05	100	0.00600	U	0.00560	U	0.00580	U	0.00530	U	0.00660	U	0.0220	
Bromomethane	~	~	0.0100		0.00980		0.00900		0.00270	U	0.00330	U	0.00890	
Iodomethane	~	~	0.0120		0.0110		0.0100		0.00270	U	0.00330	U	0.0100	
Tetrachloroethylene	1.3	19	0.00330	J	0.00400	J	0.0110		0.380	E	0.00740		0.00880	

Note:
mg/kg=milligrams per kilogram
Q is the qualifier column, where:
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table III
Analytes Detected in AOC 2 (Sewer Piping, Vicinity of SV-1) [continued]

Sample ID	UU SCOs	RR SCOs	SB-102C 3-5		SB-102C 15-17		Dup-20200714 (SB-102C 15-17)		SB-102C 36-38		SB-102D 31-33		SB-102D 33-35	
Sampling Date			7/13/2020		7/14/2020		7/14/2020		7/13/2020		7/13/2020		7/13/2020	
Client Matrix			Soil		Soil		Soil		Soil		Soil		Soil	
Compound			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			1000		100		100		1		1		1	
1,2,4,5-Tetramethylbenzene	~	~	0.0940		0.0180		0.0220		0.00400	U	0.00270	U	0.00510	U
2-Butanone	0.12	100	0.00510	J	0.00220	U	0.00260	U	0.00400	U	0.00270	U	0.00510	U
Acetone	0.05	100	0.0150		0.00440	U	0.00530	U	0.00790	U	0.00540	U	0.0100	U
Bromomethane	~	~	0.00610		0.00220	U	0.00260	U	0.00400	U	0.00270	U	0.00510	U
Iodomethane	~	~	0.00750		0.00220	U	0.00260	U	0.00400	U	0.00270	U	0.00510	U
Naphthalene	12	100	0.00270	U	0.0490		0.0460		0.00400	U	0.00270	U	0.00510	U
n-Butylbenzene	12	100	0.0110		0.00220	U	0.00260	U	0.00400	U	0.00270	U	0.00510	U
p-Diethylbenzene	~	~	0.0470		0.0140		0.00260	U	0.00400	U	0.00270	U	0.00510	U
p-Isopropyltoluene	~	~	0.00450	J	0.00220	U	0.00260	U	0.00400	U	0.00270	U	0.00510	U
tert-Butyl alcohol (TBA)	~	~	0.0200		0.00790	J	0.00260	U	0.00400	U	0.00270	U	0.00510	U
Tetrachloroethylene	1.3	19	**30**	D	**17**	D	**5.7**	D	0.0210		0.0180		0.0630	

Note:
mg/kg=milligrams per kilogram
Yellow=exceeds the NYSDEC Part 375 Unrestricted Use SCOs
Red=exceeds the NYSDEC Part 375 Restricted Use – Restricted Residential SCOs
Q is the qualifier column, where:
D=result is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table III
Analytes Detected in AOC 2 (Sewer Piping, Vicinity of SV-1) [continued]

Sample ID Sampling Date Client Matrix	UU SCOs	RR SCOs	SB-102E 12-13 7/13/2020 Soil		SB-102E 15-17 7/13/2020 Soil		SB-102F 16-18 7/13/2020 Soil		SB-102F 18-20 7/13/2020 Soil		SB-102G 0-2 7/14/2020 Soil		SB-102G 25-27 7/14/2020 Soil	
Compound			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			1		1		1		1		100		1	
Acetone	0.05	100	0.00590	U	0.0320		0.00450	U	0.00630	U	0.00400	U	0.00450	U
tert-Butyl alcohol (TBA)	~	~	0.00290	U	0.00290	U	0.0150		0.00310	U	0.00200	U	0.00220	U
Tetrachloroethylene	1.3	19	0.00320	J	0.00290	U	0.110		0.110		**17**	D	0.0210	

Note:
mg/kg=milligrams per kilogram
Yellow=exceeds the NYSDEC Interim Guidance Values for Emerging Contaminants
Q is the qualifier column, where:
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table III
Analytes Detected in AOC 2 (Sewer Piping, Vicinity of SV-1) [continued]

Sample ID Sampling Date Client Matrix	UU SCOs	RR SCOs	SB-102H 7-9 7/14/2020 Soil		SB-102H 15-17 7/14/2020 Soil		SB-102H 18-20 7/14/2020 Soil		SB-102I 7-9 7/14/2020 Soil		SB-102I 15-17 7/14/2020 Soil	
Compound			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			1		1		1		1		1	
1,2,4,5-Tetramethylbenzene	~	~	0.230		0.00600		0.00250	U	0.00260	U	0.00280	U
2-Butanone	0.12	100	0.00610		0.00140	U	0.00250	U	0.00260	U	0.00280	U
Acetone	0.05	100	0.0110		0.00480	J	0.00500	U	0.00530	U	0.00570	U
Carbon disulfide	~	~	0.00560	B	0.00140	U	0.00250	U	0.00260	U	0.00280	U
Naphthalene	12	100	0.00240	U	0.00180	J	0.00250	U	0.00260	U	0.00280	U
n-Butylbenzene	12	100	0.00560		0.00140	U	0.00250	U	0.00260	U	0.00280	U
p-Diethylbenzene	~	~	0.0480		0.00140	U	0.00250	U	0.00260	U	0.00280	U
p-Isopropyltoluene	~	~	0.00790		0.00140	U	0.00250	U	0.00260	U	0.00280	U
Tetrachloroethylene	1.3	19	0.260	E	0.00640		0.110		0.00260	U	0.00300	J

Note:
mg/kg=milligrams per kilogram
Yellow=exceeds the NYSDEC Part 375 Unrestricted Use SCOs
Q is the qualifier column, where:
B=analyte found in the analysis batch blank
E=result is estimated and cannot be accurately reported due to levels encountered or interferences
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table III
Analytes Detected in AOC 2 (Sewer Piping, Vicinity of SV-1) [continued]

Sample ID	NYSDEC Interim Guidance Values	SB-106 5-7		SB-106 13-15		SB-102 12-14		SB-102 15-17		SB-102A 26-28		SB-102A 30-32		SB-102B 26-27	
Sampling Date		7/9/2020		7/9/2020		7/13/2020		7/13/2020		7/13/2020		7/13/2020		7/13/2020	
Client Matrix		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, NYSDEC Target List	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
Dilution Factor		1		1		1		1		1		1		1	
N-MeFOSAA	~	0.10	U	0.12	U	0.10	U	0.10	U	0.10	J	0.10	U	0.12	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	0.05	U	0.06	U	0.05	U	0.05	U	0.09	J	0.05	U	0.06	U
Perfluoro-1-octanesulfonamide (FOSA)	~	0.04	U	0.05	U	0.05	U	0.05	U	0.14	J	0.05	U	0.05	U
Perfluorodecanoic acid (PFDA)	~	0.05	U	0.06	U	0.05	U	0.05	U	0.16	J	0.05	U	0.06	U
Perfluoroheptanoic acid (PFHpA)	~	0.04	U	0.05	U	0.05	U	0.04	U	0.04	U	0.04	U	0.05	U
Perfluorohexanesulfonic acid (PFHxS)	~	0.03	U	0.04	U	0.06	J	0.08	J	0.03	U	0.03	U	0.04	U
Perfluoro-n-butanoic acid (PFBA)	~	0.22	J	0.27	J	0.44	J	0.35	J	0.25	J	0.24	J	0.25	J
Perfluorooctanesulfonic acid (PFOS)	1	0.04	U	0.05	U	0.04	U	0.04	U	0.13	J	0.04	U	0.05	U
Perfluorooctanoic acid (PFOA)	1	0.07	U	0.09	U	0.08	U	0.08	J	0.07	U	0.08	U	0.09	U
Perfluoropentanoic acid (PFPeA)	~	0.09	U	0.10	U	0.19	J	0.12	J	0.10	J	0.09	U	0.11	U
SVOCs, 1,4,-Dioxane 8270 SIM-Soil	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
1,4-Dioxane	~	0.09	U	0.10	U	0.08	U	0.04	U	0.04	U	0.09	U	0.09	U

Sample ID	NYSDEC Interim Guidance Values	SB-102B 28-30		SB-102C 3-5		SB-102C 36-38		SB-102D 31-33		SB-102D 33-35		SB-102E 12-13		SB-102E 15-17	
Sampling Date		7/13/2020		7/13/2020		7/13/2020		7/13/2020		7/13/2020		7/13/2020		7/13/2020	
Client Matrix		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, NYSDEC Target List	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
Dilution Factor		1		2		1		1		1		1		1	
Perfluorohexanesulfonic acid (PFHxS)	~	0.03	U	0.15	JD	0.04	U	0.03	U	0.04	U	0.03	U	0.05	J
Perfluoro-n-butanoic acid (PFBA)	~	0.24	J	9.76	D	0.31	J	0.22	J	0.27	J	0.25	J	0.34	J
Perfluorooctanesulfonic acid (PFOS)	1	0.04	U	0.14	JD	0.05	U	0.04	U	0.05	U	0.05	U	0.05	U
Perfluorooctanoic acid (PFOA)	1	0.08	U	0.15	U	0.09	U	0.08	U	0.09	U	0.08	U	0.08	U
Perfluoropentanoic acid (PFPeA)	~	0.09	U	4.28	D	0.16	J	0.09	U	0.11	U	0.10	J	0.10	U
SVOCs, 1,4,-Dioxane 8270 SIM-Soil	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
1,4-Dioxane	~	0.09	U	0.15	U	0.04	U	0.09	U	0.11	U	0.08	U	0.10	U

Note:
mg/kg=milligrams per kilogram
µg/kg=micrograms per kilogram

Q is the qualifier column, where:
D=result is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table III
Analytes Detected in AOC 2 (Sewer Piping, Vicinity of SV-1) [continued]

Sample ID	NYSDEC Interim Guidance Values	SB-102F 16-18		SB-102F 18-20		SB-102G 0-2		SB-102G 25-27		SB-108 5-7		SB-108 13-15		SB-102C 15-17	
Sampling Date		7/13/2020		7/13/2020		7/14/2020		7/14/2020		7/14/2020		7/14/2020		7/14/2020	
Client Matrix		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, NYSDEC Target List	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
Dilution Factor		1		1		1		1		1		1		2	
Perfluorohexanesulfonic acid (PFHxS)	~	0.04	J	0.05	J	0.03	U	0.03	U	0.03	U	0.03	U	0.14	JD
Perfluoro-n-butanoic acid (PFBA)	~	0.24	J	0.27	J	0.26	J	0.26	J	0.21	J	0.21	J	3.60	D
Perfluorooctanesulfonic acid (PFOS)	1	0.05	U	0.05	U	0.06	J	0.05	U	0.04	U	0.04	U	0.12	JD
Perfluoropentanoic acid (PFPeA)	~	0.09	U	0.10	U	0.10	U	0.11	J	0.09	J	0.09	U	0.88	JD
SVOCs, 1,4,-Dioxane 8270 SIM-Soil	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
1,4-Dioxane	~	0.05	U	0.05	U	0.10	U	0.05	U	0.04	U	0.04	U	0.10	U

Sample ID	NYSDEC Interim Guidance Values	Dup-20200714 (SB-102C 15-17)		SB-102H 7-9		SB-102H 15-17		SB-102H 18-20		SB-102I 7-9		SB-102I 15-17	
Sampling Date		7/14/2020		7/14/2020		7/14/2020		7/14/2020		7/14/2020		7/14/2020	
Client Matrix		Soil		Soil		Soil		Soil		Soil		Soil	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, NYSDEC Target List	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
Dilution Factor		2		2		1		1		1		1	
Perfluoroheptanoic acid (PFHpA)	~	0.09	U	0.26	JD	0.04	J	0.05	U	0.05	U	0.05	U
Perfluorohexanesulfonic acid (PFHxS)	~	0.13	JD	0.06	U	0.03	U	0.05	J	0.05	J	0.11	J
Perfluorohexanoic acid (PFHxA)	~	0.13	U	0.23	JD	0.06	U	0.07	U	0.07	U	0.07	U
Perfluoro-n-butanoic acid (PFBA)	~	6.29	D	9.15	D	2.35		0.25	J	0.27	J	0.22	J
Perfluoropentanoic acid (PFPeA)	~	1.30	D	2.04	D	2.80		0.11	J	0.11	J	0.10	U
SVOCs, 1,4,-Dioxane 8270 SIM-Soil		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
1,4-Dioxane	~	0.13	U	0.06	U	0.03	U	0.05	U	0.05	U	0.05	U

Note:
µg/kg=micrograms per kilogram
Q is the qualifier column, where:
D=result is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table IV
Analytes Detected in AOC 3 (Vicinity of B-1)

Sample ID	UU SCOs	RR SCOs	SB-103 1-4		SB-103 25-28	
Sampling Date			7/14/2020		7/14/2020	
Client Matrix			Soil		Soil	
Compound			Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg	mg/Kg		mg/Kg	
Dilution Factor			100		1	
Carbon disulfide	~	~	0.00430	B	0.00490	B
Tetrachloroethylene	1.3	19	**3.4**	D	0.0130	

Sample ID	NYSDEC Interim Guidance Values	SB-103 1-4		SB-103 25-28	
Sampling Date		7/14/2020		7/14/2020	
Client Matrix		Soil		Soil	
Compound		Result	Q	Result	Q
PFAS, NYSDEC Target List	µg/kg	µg/kg		µg/kg	
Dilution Factor		1		1	
Perfluorohexanoic acid (PFHxA)	~	0.07	J	0.06	U
Perfluoro-n-butanoic acid (PFBA)	~	0.62		0.22	J
Perfluorooctanesulfonic acid (PFOS)	1	0.22	J	0.04	U
Perfluorooctanoic acid (PFOA)	1	0.37	J	0.07	U
Perfluoropentanoic acid (PFPeA)	~	0.22	J	0.09	U
SVOCs, 1,4,-Dioxane 8270 SIM-Soil	µg/kg	µg/kg		µg/kg	
1,4-Dioxane	~	0.09	U	0.09	U

Note:
mg/kg=milligrams per kilogram
µg/kg=micrograms per kilogram
Yellow=exceeds the NYSDEC Part 375 Unrestricted Use SCOs
Q is the qualifier column, where:
B=analyte found in the analysis batch blank
D=result is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table V
Analytes Detected in AOC 7 (Former Vent Pipes)

Sample ID	UU SCOs	RR SCOs	SB-112 1-3		SB-112 15-17	
Sampling Date			7/14/2020		7/14/2020	
Client Matrix			Soil		Soil	
Compound			Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg	mg/Kg		mg/Kg	
Dilution Factor			1		1	
Carbon disulfide	~	~	0.00470	B	0.00430	B
Tetrachloroethylene	1.3	19	0.00910		0.00690	

Sample ID	NYSDEC Interim Guidance Values	SB-112 1-3		SB-112 15-17	
Sampling Date		7/14/2020		7/14/2020	
Client Matrix		Soil		Soil	
Compound		Result	Q	Result	Q
PFAS, NYSDEC Target List	µg/kg	µg/kg		µg/kg	
Dilution Factor		1		1	
Perfluorodecanoic acid (PFDA)	~	0.99		0.05	U
Perfluorododecanoic acid (PFDoA)	~	0.10	J	0.08	U
Perfluoroheptanoic acid (PFHpA)	~	0.07	J	0.05	U
Perfluorohexanoic acid (PFHxA)	~	0.18	J	0.07	U
Perfluoro-n-butanoic acid (PFBA)	~	0.65		0.25	J
Perfluorononanoic acid (PFNA)	~	0.17	J	0.06	U
Perfluorooctanesulfonic acid (PFOS)	1	0.74		0.06	J
Perfluorooctanoic acid (PFOA)	1	0.51	J	0.08	U
Perfluoropentanoic acid (PFPeA)	~	0.24	J	0.10	U
Perfluoroundecanoic acid (PFUnA)	~	0.22	J	0.12	U
SVOCs, 1,4,-Dioxane 8270 SIM-Soil	µg/kg	µg/kg		µg/kg	
1,4-Dioxane	~	0.09	U	0.10	U

Note:
mg/kg=milligrams per kilogram
µg/kg=micrograms per kilogram
Q is the qualifier column, where:
B=analyte found in the analysis batch blank
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table VI
Analytes Detected in AOC 4 (Contaminated Historic Fill Material)

Sample ID	UU SCOs	RR SCOs	SB-104 5-7		SB-104 13-15		SB-105 5-7		SB-105 13-15		SB-106 5-7		SB-106 13-15		SB-108 5-7	
Sampling Date			7/14/2020		7/14/2020		7/14/2020		7/14/2020		7/9/2020		7/9/2020		7/14/2020	
Client Matrix			Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			1		1		1		1		1		1		1	
Acetone	0.05	100	0.00890	J	0.00550	U	0.00570	U	0.00530	U	0.00600	U	0.00610	U	0.00520	U
Carbon disulfide	~	~	0.00490	B	0.00570	B	0.00590	B	0.00620	B	0.00300	U	0.00310	U	0.00260	U
Tetrachloroethylene	1.3	19	0.00230	U	0.00610		0.00280	U	0.00270	U	0.170		0.0510		0.00950	

Sample ID	UU SCOs	RR SCOs	SB-108 13-15		SB-109 5-7		SB-109 13-15		SB-110 5-7		SB-110 13-15		SB-111 5-7		SB-111 13-15	
Sampling Date			7/14/2020		7/14/2020		7/14/2020		7/14/2020		7/14/2020		7/14/2020		7/14/2020	
Client Matrix			Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			1		1		1		1		1		1		1	
Acetone	0.05	100	0.00500	U	0.00660	J	0.00530	J	0.00560	U	0.00660	U	0.00520	U	0.00490	U
Carbon disulfide	~	~	0.00250	U	0.00530	B	0.00500	B	0.00280	U	0.00330	U	0.00260	U	0.00250	U
Tetrachloroethylene	1.3	19	0.0250		0.0270		0.0110		0.00500	J	0.00420	J	0.00260	U	0.00500	

Note:
mg/kg=milligrams per kilogram
Q is the qualifier column, where:
B=analyte found in the analysis batch blank
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table VI
Analytes Detected in AOC 4 (Contaminated Historic Fill Material) [continued]

Sample ID Sampling Date Client Matrix	UU SCOs	RR SCOs	SB-106 5-7 7/9/2020 Soil		SB-106 13-15 7/9/2020 Soil		SB-109 5-7 7/14/2020 Soil		SB-109 13-15 7/14/2020 Soil	
Compound			Result	Q	Result	Q	Result	Q	Result	Q
SVOCs, 8270	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			2		2		2		2	
1,1-Biphenyl	~	~	0.0445	JD	0.0509	U	0.0425	U	0.0448	U
2-Methylnaphthalene	~	~	0.173	D	0.0509	U	0.0425	U	0.0448	U
Acenaphthene	20	100	0.326	D	0.0509	U	0.0425	U	0.0448	U
Acenaphthylene	100	100	0.0674	JD	0.0509	U	0.0425	U	0.0448	U
Anthracene	100	100	0.766	D	0.0509	U	0.0425	U	0.0448	U
Benzo(a)anthracene	1	1	**1.19**	D	0.0509	U	0.0806	JD	0.0448	U
Benzo(a)pyrene	1	1	0.965	D	0.0509	U	0.0684	JD	0.0448	U
Benzo(b)fluoranthene	1	1	0.897	D	0.0509	U	0.0569	JD	0.0448	U
Benzo(g,h,i)perylene	100	100	0.568	D	0.0509	U	0.0425	U	0.0448	U
Benzo(k)fluoranthene	0.8	3.9	0.751	D	0.0509	U	0.0555	JD	0.0448	U
Carbazole	~	~	0.294	D	0.0509	U	0.0425	U	0.0448	U
Chrysene	1	3.9	**1.06**	D	0.0509	U	0.0738	JD	0.0448	U
Dibenzo(a,h)anthracene	0.33	0.33	0.213	D	0.0509	U	0.0425	U	0.0448	U
Dibenzofuran	7	59	0.273	D	0.0509	U	0.0425	U	0.0448	U
Fluoranthene	100	100	2.370	D	0.0509	U	0.139	D	0.0448	U
Fluorene	30	100	0.387	D	0.0509	U	0.0425	U	0.0448	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	**0.503**	D	0.0509	U	0.0425	U	0.0448	U
Naphthalene	12	100	0.350	D	0.0509	U	0.0425	U	0.0448	U
Phenanthrene	100	100	2.500	D	0.0509	U	0.118	D	0.0448	U
Pyrene	100	100	2.040	D	0.0509	U	0.130	D	0.0448	U

Note:
mg/kg=milligrams per kilogram
Yellow=exceeds the NYSDEC Part 375 Unrestricted Use SCOs
Red=exceeds the NYSDEC Part 375 Restricted Use – Restricted Residential SCOs

Q is the qualifier column, where:
D=result is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table VI
Analytes Detected in AOC 4 (Contaminated Historic Fill Material) [continued]

Sample ID Sampling Date Client Matrix	UU SCOs	RR SCOs	SB-104 5-7 7/14/2020 Soil		SB-104 13-15 7/14/2020 Soil		SB-105 5-7 7/14/2020 Soil		SB-105 13-15 7/14/2020 Soil		SB-106 5-7 7/9/2020 Soil		SB-106 13-15 7/9/2020 Soil	
Compound			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			5		5		5		5		5		5	
Dieldrin	0.005	0.2	0.00171	U	0.00175	U	0.00346	D	**0.00578**	D	0.00423	D	0.00201	U
Metals, TAL	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			1		1		1		1		1		1	
Aluminum	~	~	5,390		5,890		6,170		6,430		4,690		5,800	
Arsenic	13	16	2	U	2	U	2		2	U	2	U	2	U
Barium	350	400	31		31		34		27		39		40	
Calcium	~	~	1,110		1,360		12,900		1,710		741		1,370	
Chromium	~	~	12		13		16		15		11		16	
Cobalt	~	~	4		6		4		6		4		7	
Copper	50	270	12		10		14		11		13		11	
Iron	~	~	8,490		10,600		9,410		11,200		7,570		12,700	
Lead	63	400	3	B	3	B	16	B	3	B	25		4	
Magnesium	~	~	2,020		2,500		2,960		3,610		1,680		2,460	
Manganese	1600	2000	253		352		217		319		283		429	
Nickel	30	310	10		12		11		12		8		14	
Potassium	~	~	687		990		670		937		494		908	
Sodium	~	~	59		89		150		102		57		79	
Vanadium	~	~	13		18		14		20		12		23	
Zinc	109	10000	18		21		29		26		30		19	

Note:
mg/kg=milligrams per kilogram
Yellow=exceeds the NYSDEC Part 375 Unrestricted Use SCOs
Q is the qualifier column, where:
B=analyte found in the analysis batch blank
D=result is from an analysis that required a dilution
U=analyte not detected at or above the level indicated

Table VI
Analytes Detected in AOC 4 (Contaminated Historic Fill Material) [continued]

Sample ID Sampling Date Client Matrix	UU SCOs	RR SCOs	SB-104 5-7 7/14/2020 Soil		SB-104 13-15 7/14/2020 Soil		SB-105 5-7 7/14/2020 Soil		SB-105 13-15 7/14/2020 Soil	
Compound			Result	Q	Result	Q	Result	Q	Result	Q
Mercury by 7473	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			1		1		1		1	
Mercury	0.18	0.81	0.0312	U	0.0323	U	0.0860		0.0319	U
Polychlorinated Biphenyls (PCBs)	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			1		1		1		1	
Aroclor 1260	~	~	0.0988		0.0176	U	0.0166	U	0.0172	U
Total PCBs	0.1	1	0.0988		0.0176	U	0.0166	U	0.0172	U

Note:
mg/kg=milligrams per kilogram
Q is the qualifier column, where:
U=analyte not detected at or above the level indicated

Table VI
Analytes Detected in AOC 4 (Contaminated Historic Fill Material) [continued]

Sample ID Sampling Date Client Matrix	UU SCOs	RR SCOs	SB-107 0-2' 7/8/2020 Soil		SB-107 5-7' 7/8/2020 Soil		SB-107 13-15' 7/8/2020 Soil	
Compound			Result	Q	Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg	
Dilution Factor			100		1		1	
Tetrachloroethylene	1.3	19	**1.6**	DJ	0.00960	J	0.0250	J
Metals, TAL	mg/Kg	mg/Kg			mg/Kg		mg/Kg	
Dilution Factor					1		1	
Aluminum	~	~	NT		4,950		5,180	
Barium	350	400	NT		23		21.500	
Calcium	~	~	NT		625		1,160	
Chromium	~	~	NT		8		13	
Cobalt	~	~	NT		4		6	
Copper	50	270	NT		10		10	
Iron	~	~	NT		7,920		9,740	
Lead	63	400	NT		3		4	
Magnesium	~	~	NT		2,230		2,790	
Manganese	1600	2000	NT		203		341	
Nickel	30	310	NT		9		13	
Potassium	~	~	NT		521		633	
Sodium	~	~	NT		54		71	
Vanadium	~	~	NT		11		16	
Zinc	109	10000	NT		19		23	
PFAS, NYSDEC Target List	µg/kg				mg/kg		mg/kg	
Dilution Factor					1		1	
Perfluoro-n-butanoic acid (PFBA)			NT		0.48	J	0.51	J
SVOCs, 1,4,-Dioxane 8270 SIM-Soil	µg/kg							
1,4-Dioxane			NT		0.10	U	0.10	U

Note:
mg/kg=milligrams per kilogram
µg/kg=micrograms per kilogram
Yellow=exceeds the NYSDEC Part 375 Unrestricted Use SCOs

Q is the qualifier column, where:
D=result is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
NT=this indicates the analyte was not a target for this sample

Table VI
Analytes Detected in AOC 4 (Contaminated Historic Fill Material) [continued]

Sample ID	NYSDEC Interim Guidance Values	SB-104 5-7		SB-104 13-15		SB-105 5-7		SB-105 13-15		SB-106 5-7		SB-106 13-15		SB-108 5-7	
Sampling Date		7/14/2020		7/14/2020		7/14/2020		7/14/2020		7/9/2020		7/9/2020		7/14/2020	
Client Matrix		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, NYSDEC Target List	mg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
Dilution Factor		1		1		1		1		1		1		1	
Perfluoro-n-butanoic acid (PFBA)	~	0.25	J	0.24	J	0.29	J	0.21	J	0.22	J	0.27	J	0.21	J
Perfluorooctanesulfonic acid (PFOS)	1	0.04	J	0.04	U	0.04	U	0.04	U	0.04	U	0.05	U	0.04	U
Perfluoropentanoic acid (PFPeA)	~	0.10	J	0.09	J	0.09	U	0.09	U	0.09	U	0.10	U	0.09	J

Sample ID	NYSDEC Interim Guidance Values	SB-108 13-15		SB-109 5-7		SB-109 13-15		SB-110 5-7		SB-110 13-15		SB-111 5-7		SB-111 13-15	
Sampling Date		7/14/2020		7/14/2020		7/14/2020		7/14/2020		7/14/2020		7/14/2020		7/14/2020	
Client Matrix		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, NYSDEC Target List	µg/kg	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
Dilution Factor		1		1		1		1		1		1		1	
Perfluorohexanesulfonic acid (PFHxS)	~	0.03	U	0.03	U	0.03	U	0.03	J	0.03	U	0.03	U	0.03	U
Perfluoro-n-butanoic acid (PFBA)	~	0.21	J	0.22	J	0.23	J	0.20	J	0.28	J	0.25	J	0.26	J
Perfluorooctanoic acid (PFOA)	1	0.07	U	0.11	J	0.08	U	0.07	U	0.08	U	0.08	U	0.08	U
Perfluoropentanoic acid (PFPeA)	~	0.09	U	0.12	J	0.10	U	0.09	U	0.09	U	0.09	U	0.09	U

Note:
mg/kg=milligrams per kilogram
Q is the qualifier column, where:
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated U=analyte not detected at or above the level indicated
U=analyte not detected at or above the level indicated

Table VII
Groundwater Quality Readings (July 23, 2020)

Monitoring Well #	***MW-101***	***MW-102***	***MW-103***	***MW-104***	***MW-105***	***MW-106***	***MW-107***	***MW-108***
Depth To Water (ft)	34.630	33.425	37.725	38.745	38.345	35.100	33.735	37.715
Depth To Bottom (ft)	38.750	36.490	40.020	41.985	39.950	39.620	38.900	41.045
Total Water (ft)	**4.120**	**3.065**	**2.295**	**3.24**	**1.605**	**4.520**	**5.165**	**3.330**
Conductivity (µS/cm)	1612	1407	524	541	2.37 mS/cm	1315 µS/cm		1678 µS/cm
Temperature (°F)	80.02	90.10	79.20	80.20	85.50	81.90		85.60
Salinity (ppt)	0.88	0.70	0.26	0.27	1.17 ppt	0.70 ppt		0.83 ppt
pH (pH)	8.88	7.77	7.89	8.58	7.40	7.50		7.31
TDS (ppt) / (ppm)	1.18 ppt	1.00 ppt	376 ppm	388 ppm	1.56 ppt	450 ppm		1.17 ppt
Turbidity (NTU)	96.50	230	739	633	744	61.1		769

Table VII
Groundwater Quality Readings [continued] (August 20, 2020)

Monitoring Well #	***MW-101***	***MW-102***	***MW-103***	***MW-104***	***MW-105***	***MW-106***	***MW-107***	***MW-108***
Depth To Water (ft)	34.570	33.17	37.665	38.62	38.245	35.005	33.815	37.575
Depth To Bottom (ft)	38.750	36.490	40.020	41.985	39.950	39.620	38.900	41.045
Total Water (ft)	**4.180**	**3.32**	**2.355**	**3.365**	**1.705**	**4.615**	**5.085**	**3.470**
Conductivity (mS/cm)	1.000	1.393	0.915	0.462	1.448	1.214	2.265	1.54
Temperature (°C)	17.47	17.69	17.80	15.86	28.31	17.09	17.38	15.11
Oxidation-Reducing Potential	121.60	135.00	80.2	81.7	149.2	125.90	122.60	109.6
pH (pH)	7.74	7.7	7.77	8.06	7.60	7.55	7.66	8.13
Dissolved Oxygen (%)	18.7	52	81.1	120	120	38.9	72.7	116.7
Dissolved Oxygen (mg/L)	1.60	4.42	7.68	11.7	9.32	3.36	6.91	11.14

Table VII
Groundwater Quality Readings (November 4, 2020)

Monitoring Well #	***MW-101***	***MW-102***	***MW-103***	***MW-104***	***MW-105***	***MW-106***	***MW-107***	***MW-108***	***MW-109***	***MW-110***
Elevation (ft)	**42.5**	**42.2**	**42.6**	**43.6**	**43.9**	**42.7**	**42.44**	**42.6**	**43.81**	**44.02**
Depth To Water (ft)	34.560	33.225	37.715	38.705	38.325	35.385	34.680	37.620	38.445	38.585
Groundwater Elevation (ft)	7.940	8.975	4.885	4.895	5.575	7.315	7.760	4.980	5.365	5.435
Depth To Bottom (ft)	38.855	35.435	38.860	41.915	39.250	42.765	37.310	41.305	39.935	40.645
Total Water (ft)	**4.295**	**2.210**	**1.1450**	**3.210**	**0.9250**	**7.380**	**2.630**	**3.685**	**1.490**	**2.060**

Table VIII
Analytes Detected in AOC 5 (Groundwater)

Sample ID	NYSDEC Class GA	MW-101		Dup-072320 (MW-101)		MW-102		MW-103		MW-104	
Sampling Date		7/23/2020		7/23/2020		7/23/2020		7/23/2020		7/23/2020	
Client Matrix		Water		Water		Water		Water		Water	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L	
Dilution Factor		1		1		1		1		1	
1,1-Dichloroethylene	5	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
2-Butanone	50	0.200	U	0.200	U	0.440	J	1.800		1.400	
2-Hexanone	50	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
4-Methyl-2-pentanone	~	0.200	U	0.200	U	0.200	U	0.200	J	0.200	U
Acetone	50	3.200	B	2.500	B	5.100	B	13	B	8.200	B
Bromoform	50	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Chloroform	7	0.950		0.910		1.700		0.300	J	0.880	
Chloromethane	5	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
cis-1,2-Dichloroethylene	5	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Methyl tert-butyl ether (MTBE)	10	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Tetrachloroethylene	5	**49**		**48**		**64**		**11**		**67**	
Trichloroethylene	5	0.470	J	0.400	J	0.650		0.310	J	0.590	
Trichlorofluoromethane	5	0.450	J	0.410	J	0.330	J	0.200	U	0.200	U

Note:
µg/L=micrograms per liter
Yellow=exceeds the NYSDEC Class GA Groundwater Standards
Q is the qualifier column, where:
B=analyte found in the batch analysis blank
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table VIII
Analytes Detected in AOC 5 (Groundwater) [continued]

Sample ID	NYSDEC Class GA	MW-109		MW-110		DUP-MW-110 (MW-110)	
Sampling Date		10/30/2020		10/30/2020		10/30/2020	
Client Matrix		Water		Water		Water	
Compound		Result	Q	Result	Q	Result	Q
VOCs, 8260	µg/L	µg/L		µg/L		µg/L	
Dilution Factor		1		10		10	
1,2,4-Trimethylbenzene	5	0.640		0.200	U	0.200	U
1,4-Dioxane	~	96	J	40	UJ	40	UJ
2-Butanone	50	3.200	J	0.910	J	2.300	J
4-Methyl-2-pentanone	~	0.810		0.200	U	0.200	U
Acetone	50	24		16		15	
Carbon disulfide	~	0.200	U	0.200	U	0.200	U
Chloroform	7	0.650		2.900		2.800	
cis-1,2-Dichloroethylene	5	0.200	U	1.200		1.200	
o-Xylene	5	0.460	J	0.200	U	0.200	U
p- & m- Xylenes	5	0.580	J	0.500	U	0.500	U
Tetrachloroethylene	5	**46**		**340**	D	**250**	D
Toluene	5	0.270	J	0.200	U	0.200	U
Trichloroethylene	5	0.310	J	2.500		2.300	
Trichlorofluoromethane	5	0.200	UJ	0.410	J	0.400	J
Xylenes, Total	5	1	J	0.600	U	0.600	U

Note:
µg/L=micrograms per liter
Yellow=exceeds the NYSDEC Class GA Groundwater Standards
Q is the qualifier column, where:
D=results is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table VIII
Analytes Detected in AOC 5 (Groundwater) [continued]

Sample ID Sampling Date Client Matrix	NYSDEC Interim Guidance Values	MW-101 7/23/2020 Water		MW-102 7/23/2020 Water		MW-103 7/23/2020 Water		MW-104 7/23/2020 Water	
Compound		Result	Q	Result	Q	Result	Q	Result	Q
SVOCs, 8270 SIM-Aqueous	µg/L	µg/L		µg/L		µg/L		µg/L	
Dilution Factor		1		1		1		1	
1,4-Dioxane	1	0.400	U	0.400	U	0.400	U	0.400	U
PFAS, NYSDEC Target List	ng/L	ng/L		ng/L		ng/L		ng/L	
Dilution Factor		1		1		1		1	
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	100	0.49	U	0.49	U	0.49	U	0.53	J
Perfluoro-1-octanesulfonamide (FOSA)	100	0.30	U	0.30	U	0.45	J	0.77	J
Perfluorobutanesulfonic acid (PFBS)	100	3.49		3.24		1.62	J	4.12	
Perfluorodecanoic acid (PFDA)	100	0.52	U	0.52	U	0.63	J	2.32	
Perfluoroheptanoic acid (PFHpA)	100	7.08		8.06		1.56	J	12.00	
Perfluorohexanesulfonic acid (PFHxS)	100	2.62		2.82		1.18	J	3.41	
Perfluorohexanoic acid (PFHxA)	100	1.07		13.10		4.06		12.70	
Perfluoro-n-butanoic acid (PFBA)	100	11.60	B	11.80	B	11.90	B	25.30	B
Perfluorononanoic acid (PFNA)	100	0.57	U	0.57	U	0.57	U	4.49	
Perfluorooctanesulfonic acid (PFOS)	10	0.99	J	1.52	J	4.05		3.83	
Perfluorooctanoic acid (PFOA)	10	6.70		8.61		5.27		**50.90**	
Perfluoropentanoic acid (PFPeA)	100	17.20		17.70		4.32		11	
Perfluorotetradecanoic acid (PFTA)	100	0.53	U	0.53	U	0.53	U	0.53	U
Perfluoroundecanoic acid (PFUnA)	100	0.66	U	0.66	U	0.66	U	1.70	J
TOTAL PFAS	~	54.82		69.92		37.29		133.60	

Note:
µg/L=micrograms per liter
ng/L=nanograms per liter
Yellow=exceeds the NYSDEC Interim Guidance Values for Emerging Contaminants
Q is the qualifier column, where:
B=analyte found in the batch analysis blank
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table IX
Analytes Detected in AOC 5 (Groundwater) [continued]

Sample ID	NYSDEC Class GA	MW-105		MW-106		MW-108	
Sampling Date		7/23/2020		7/22/2020		7/23/2020	
Client Matrix		Water		Water		Water	
Compound		Result	Q	Result	Q	Result	Q
VOCs, 8260	µg/L	µg/L		µg/L		µg/L	
Dilution Factor		10		10		10	
1,1-Dichloroethylene	5	0.200	U	0.380	J	0.200	U
2-Butanone	50	0.200	U	0.860		0.200	U
2-Hexanone	50	0.200	U	0.200	U	0.200	U
4-Methyl-2-pentanone	~	0.200	U	0.200	U	0.200	U
Acetone	50	2.800	B	11	B	5.300	B
Bromoform	50	0.200	U	0.200	U	0.200	U
Chloroform	7	0.790		2		**8.5**	
Chloromethane	5	0.550	B	0.480	JB	0.240	JB
cis-1,2-Dichloroethylene	5	1.900		1.100		0.710	
Methyl tert-butyl ether (MTBE)	10	0.200	U	0.200	U	0.270	J
Tetrachloroethylene	5	**170**	D	**250**	D	**400**	D
Trichloroethylene	5	3		2.600		3.400	
Trichlorofluoromethane	5	1.100		1.900		0.200	U
SVOCs, 8270	µg/L	µg/L		µg/L		µg/L	
Dilution Factor		1		1		1	
Benzo(a)anthracene	0.002	0.0588	U	0.0526		0.0556	U
Fluoranthene	50	0.0706		0.0947		0.0556	U
Fluorene	50	0.0588	U	0.0526	U	0.200	
Phenanthrene	50	0.0824		0.0526		0.0556	U
Pyrene	50	0.0588		0.0737		0.0556	U

Note:
µg/L=micrograms per liter
Yellow=exceeds the NYSDEC Class GA Groundwater Standards
Q is the qualifier column, where:
B=analyte found in the batch analysis blank
D=results is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table IX
Analytes Detected in AOC 5 (Groundwater) [continued]

Sample ID Sampling Date Client Matrix	NYSDEC Interim Guidance Values	MW-105 7/23/2020 Water		MW-106 7/22/2020 Water		MW-108 7/23/2020 Water	
Compound		Result	Q	Result	Q	Result	Q
SVOCs, 8270 SIM-Aqueous	µg/L	µg/L		µg/L		µg/L	
Dilution Factor		1		1		1	
1,4-Dioxane	1	0.400	U	0.400	U	0.500	
PFAS, NYSDEC Target List	ng/L	ng/L		ng/L		ng/L	
Dilution Factor		1		2		1	
Perfluoro-1-octanesulfonamide (FOSA)	100	0.30	U	0.76	JD	0.30	U
Perfluorobutanesulfonic acid (PFBS)	100	2.42		2.90	JD	4.47	
Perfluoroheptanoic acid (PFHpA)	100	3.14		4.96	D	3.62	
Perfluorohexanesulfonic acid (PFHxS)	100	1.69	J	2.66	JD	0.79	J
Perfluorohexanoic acid (PFHxA)	100	6.81		8.64	D	10.7	
Perfluoro-n-butanoic acid (PFBA)	100	12.30	B	18.5	BD	19.80	B
Perfluorooctanesulfonic acid (PFOS)	10	1.06	J	2.64	JD	1.35	J
Perfluorooctanoic acid (PFOA)	10	3.87		**10.80**	D	3.61	
Perfluoropentanoic acid (PFPeA)	100	7.67		6.94	D	18.2	
Perfluorotetradecanoic acid (PFTA)	100	0.53	U	1.06	U	0.53	U
TOTAL PFAS		40.79		59.86		63.37	

Note:
µg/L=micrograms per liter
ng/L=nanograms per liter
Yellow=exceeds the NYSDEC Interim Guidance Values for Emerging Contaminants
Q is the qualifier column, where:
B=analyte found in the batch analysis blank
D=results is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table IX
Analytes Detected in AOC 5 (Groundwater) [continued]

Sample ID	NYSDEC Class GA	MW-101		MW-102		MW-105		MW-106		MW-108	
Sampling Date		7/23/2020		7/23/2020		7/23/2020		7/22/2020		7/23/2020	
Client Matrix		Water		Water		Water		Water		Water	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
TAL Metals, Dissolved	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L	
Dilution Factor						1		1		1	
Aluminum	~	11	U	6	U	85		75		78	
Barium	1000	47	J	118	J	163	J	121	J	173	J
Calcium	~	45,900	BJ	162,000	BJ	161,000	J	120,000	J	178,000	J
Chromium	50	11	U	6	U	6	U	6	U	45	
Cobalt	~	11	UJ	6	UJ	6	UJ	6	UJ	4	UJ
Copper	200	22	UJ	64	J	63	J	69	J	64	J
Magnesium	35000	20,600	J	**71,400**	J	**70,100**	J	**50,400**	J	**70,000**	J
Manganese	300	86	J	**610**	J	**4,730**	J	**889**	J	126	J
Potassium	~	3,510	J	13,100	J	11,200	J	12,400	J	12,600	J
Selenium	10	**30**	J	**135**	J	**127**	J	5	J	**124**	J
Sodium	20000	**21,100**		**29,900**		**242,000**		**58,200**		**46,500**	
Zinc	2000	11	UJ	6	UJ	6	UJ	177	J	4	UJ

Note:
µg/L=micrograms per liter
Yellow=exceeds the NYSDEC Class GA Groundwater Standards
Q is the qualifier column, where:
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table IX
Analytes Detected in AOC 5 (Groundwater) [continued]

Sample ID Sampling Date Client Matrix	NYSDEC Class GA	MW-101 7/23/2020 Water		MW-102 7/23/2020 Water		MW-105 7/23/2020 Water		MW-106 7/22/2020 Water		MW-108 7/23/2020 Water	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
TAL Metals	µg/L					µg/L		µg/L		µg/L	
Dilution Factor						1		1		1	
Aluminum	~	7,400	B	8,330	B	36,400		14,300		22,800	
Arsenic	25	11	U	6	U	17	U	3.87		19	
Barium	1000	222		204		**1,110**		271		487	
Calcium	~	138,000		158,000		520,000		155,000		533,000	
Chromium	50	36		47		**279**		**71.8**		**82**	
Cobalt	~	18		8		185		17.600		47	
Copper	200	61		**321**		**590**		108		**1,310**	
Iron	~	14,200		12,400		54,000		23,000		28,500	
Lead	25	25		6	U	**699**		11.200		**46**	
Magnesium	35000	**64,000**		**76,200**		**206,000**		**67,400**		**192,000**	
Manganese	300	**1,040**		**827**		**20,500**		**1,730**		**3,730**	
Nickel	100	32		22		**271**		20.700		28	
Potassium	~	10,700		16,500		19,800		18,600		17,500	
Selenium	10	**93**		**124**		**182**		**14.8**		**187**	
Sodium	20000	**37,700**		**29,500**		**220,000**		**67,600**		**53,100**	
Vanadium	~	20		19		59		24		46	
Zinc	2000	103	J	131	J	1,380	J	400	J	205	J
Sulfate as SO4	µg/L					µg/L		µg/L		µg/L	
Dilution Factor						10		10		10	
Sulfate	~	NT		NT		115,000	D	106,000	D	117,000	D

Note:
µg/L=micrograms per liter
Yellow=exceeds the NYSDEC Class GA Groundwater Standards
Q is the qualifier column, where:
D=results is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated
NT=analyte was not a target of this analysis

Table X
Analytes Detected in AOC 6 (Off-Site Soil Vapor)

Sample ID	SV-101		SV-102		SV-103		SV-104	
Sampling Date	7/23/2020		7/23/2020		7/15/2020		7/15/2020	
Client Matrix	Soil Vapor		Soil Vapor		Soil Vapor		Soil Vapor	
Compound	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, TO-15	µg/m^3		µg/m^3		µg/m^3		µg/m^3	
Dilution Factor	7.445		6.208		17.34		34.5	
1,2,4-Trimethylbenzene	53	D	7.600	D	27	D	25	D
1,3,5-Trimethylbenzene	25	D	3.100	J	10	D	9.300	D
2-Butanone	39	D	50	D	140	D	150	D
2-Hexanone	6.100	J	5.100	J	14	U	14	U
4-Methyl-2-pentanone	6.100	D	2.500	U	7.100	UJ	7.100	UJ
Acetone	370	D	660	D	1,300	DJ	2,000	DJ
Benzene	13	D	17	D	33	D	31	D
Carbon disulfide	18	D	7.500	D	5.400	U	5.400	U
Chloroform	92	D	3	D	16	D	8.400	U
Chloromethane	1.500	J	1.300	U	3.600	U	3.600	U
Cyclohexane	23	D	13	D	20	D	11	D
Ethyl acetate	29	D	33	D	12	U	12	U
Ethyl Benzene	11	D	7.800	D	32	D	33	D
Isopropanol	170	D	110	D	8.500	UJ	8.500	UJ
Methyl Methacrylate	3	U	2.500	J	7.100	U	7.100	U
Methylene chloride	6.700	D	9.500	D	12	U	12	U
n-Heptane	54	D	24	D	43	D	34	D
n-Hexane	51	D	40	D	72	D	38	D
o-Xylene	36	D	8.600	D	41	D	41	D
p- & m- Xylenes	99	D	25	D	120	D	120	D
p-Ethyltoluene	60	D	7.600	D	26	D	23	D
Propylene	17	D	1.100	U	55	D	24	D
Styrene	3.200	J	2.600	U	7.400	U	7.300	U
Tetrachloroethylene	250	D	340	D	920	D	180	D
Tetrahydrofuran	10	D	16	D	240	D	260	D
Toluene	70	D	49	D	140	D	150	D
Trichloroethylene	4.400	D	5	D	29	D	2.300	U
Trichlorofluoromethane (Freon 11)	4.200	D	5.600	D	9.700	U	9.700	U

Note:
µg/m^3=micrograms per cubic meter

Q is the qualifier column, where:
D=results is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table XI
Analytes Detected in AOC 6 (On-Site Soil Vapor) [continued]

Sample ID	SV-105		SV-106		SV-107		SV-108	
Sampling Date	7/15/2020		7/15/2020		7/15/2020		7/15/2020	
Client Matrix	Soil Vapor		Soil Vapor		Soil Vapor		Soil Vapor	
Compound	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, TO-15	µg/m^3		µg/m^3		µg/m^3		µg/m^3	
Dilution Factor	244.1		518.2		1496.6		514.2	
1,1-Dichloroethylene	1.700	U	2.200	D	2.500	D	1.800	U
1,2,4-Trimethylbenzene	34	D	31	D	24	D	34	D
1,3,5-Trimethylbenzene	9.200	D	9.800	D	7.700	J	8.800	D
1,3-Butadiene	11	U	12	J	10	U	12	U
2-Butanone	680	D	760	D	410	D	760	D
2-Hexanone	96	D	82	D	100	D	110	D
Acetone	15,000	DJ	17,000	DJ	18,000	DJ	11,000	DJ
Benzene	20	D	21	D	7	D	14	D
Carbon disulfide	6.900	D	18	D	5.400	D	17	D
Chloroform	35	D	41	D	53	D	60	D
Chloromethane	3.500	J	3.700	U	3.200	U	3.700	U
cis-1,2-Dichloroethylene	4.700	D	11	D	22	D	14	D
Cyclohexane	16	D	14	D	5.900	D	9.900	D
Ethyl Benzene	31	D	31	D	18	D	30	D
Isopropanol	280	DJ	210	DJ	57	DJ	78	DJ
Methylene chloride	12	J	13	U	11	U	12	U
n-Heptane	77	D	70	D	31	D	66	D
n-Hexane	54	D	45	D	17	D	30	D
o-Xylene	43	D	42	D	23	D	42	D
p- & m- Xylenes	110	D	120	D	64	D	110	D
p-Ethyltoluene	33	D	31	D	21	D	33	D
Propylene	240	D	240	D	150	D	200	D
Tetrachloroethylene	70,000	D	94,000	D	270,000	D	81,000	D
Tetrahydrofuran	69	D	81	D	30	D	88	D
Toluene	100	D	95	D	54	D	85	D
trans-1,2-Dichloroethylene	6.800	U	7.200	U	8.100	D	7.100	U
Trichloroethylene	520	D	410	D	1,200	D	280	D
Trichlorofluoromethane (Freon 11)	22	D	31	D	31	D	29	D

Note:
µg/m^3=micrograms per cubic meter
Q is the qualifier column, where:
Q is the qualifier column, where:
D=results is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated
U=analyte not detected at or above the level indicated

Table 12

Proposed Remedial Action and Reporting Schedule

Activity	Planned Start Date	Planned Completion Date	Deliverable(s)	Deliverable Due Date
NYSDEC Notice for Public Comment on RAWP	January 20, 2021	January 20, 2021	Notice for Public Comment	January 2021
NYSDEC 45 Day RAWP Review Period	January 20, 2021	March 25, 2021	RAWP Comments	March 2021
RAWP Revisions	March 25, 2021	April 28, 2021	Revised RAWP Submitted	April 2021
NYSDEC Review and Approval	April 29, 2021	May 7, 2021	Revised RAWP Approved	May 2021
OER Notice to Proceed	May 10, 2021	May 11, 2021	Notice to proceed	May 2021
PRB and SVE Design	May 3, 2021	June 3, 2021	Design Submittal	June 2021
PRB and SVE Design 30 Day Review Period	June 3, 2021	July 3, 2021	Approved Design	July 2021
Mobilization	May 12, 2021	May 19, 2021	Field Notes	NA
SOE / Remedial Implementation	May 19, 2021	November 30, 2021	Field Notes/CAMP	November 2021
Demobilization	November 30, 2021	December 10, 2021	Field Notes/CAMP	NA
Draft Site Management Plan	December 1, 2021	February 15, 2022	Draft SMP Submitted to NYSDEC	February 2022
Draft Environmental Easement	December 1, 2021	February 1, 2022	Draft EE Submitted to NYSDEC	February 2022
Environmental Easement Recorded	February 1, 2022	May 1, 2022	Recorded EE	May 2022
Site Management Plan	February 15, 2022	April 15, 2022	Approved SMP	April 2022
Draft Final Engineering Report	December 1, 2020	February 15, 2022	Draft FER Submitted to NYSDEC	February 2022
Final Engineering Report	February 17, 2022	June 1, 2022	Approved FER	June 2022

Table 13

Approvals and Permits List	
Agency	**Status/Approval Date**
NYS DEC	
Storm Water Pollution Prevention Plan	
NYS DEP	
NB Site Sewer Connection	
Hydrant Use	
SSDS / SVE Construction	
SSDS / SVE Operation	
NYS DOB	
Demolition Permits	
Fence Permit	
SOE Permit	
Soil Remediation Permit	
Foundation Permit	DOB permit issuance is Pending OER approval to Proceed. OER is conditionally approved pending DEC approval to proceed
City Planning/OER	
Zoning Approval	
RAP (Noise/AQ)	
DOT	
Sidewalk Closure	
Note: This is not intended to be a complete list of required permits/approvals. All permits and approvals required for code compliant execution of work will be acquired as necessary for the complete execution of work as set forth in RAWP.	

Table 14
Emergency Contacts

Contact	Firm or Agency	Telephone Number
Police	114th Precinct - 34-16 Astoria Blvd S, Astoria, NY 11103	911 - (718) 626-9311
Fire	FDNY Engine 260, 11-15 37th Ave, Long Island City, NY	911
Hospital	Mount Sinai Hospital Queens	(718) 932-1000
Ambulance		911
Remedial Engineer	Christopher Lapine / Richard Kampf	917-280-6364
Project Manager	Jamie Burgher, Laurel	631-673-0612
NYSDEC Site Contact	Ruth Curley	518-402-9480
NYSDEC Spills Hotline		(800) 457-7362
One Call Center:		(800) 272-4480 (3-day notice required for utility markout)
Pollution Toxic Chemical Oil Spills:		(800) 424-8802
Poison Control Center		(800) 222-1222
Chemtrec		(800) 424-9300