REMEDIAL ACTION WORK PLAN

for

45 COMMERCIAL STREET
BROOKLYN, NY 11222
NYSDEC BCP Site No.: C224304

Prepared for:

GPL Development LLC
535 Madison Avenue
New York, NY 10022

Prepared by:

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, New York 10001

March 22, 2021
Langan Project No. 170229024

LANGAN

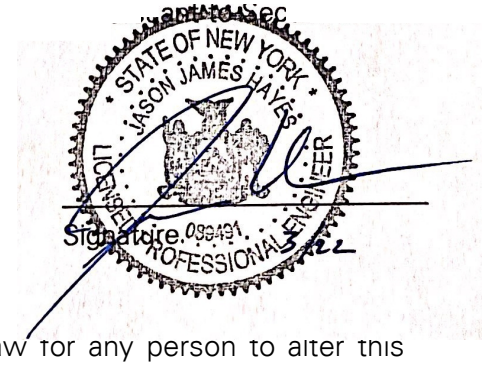
CERTIFICATION

I, Jason J. Hayes, certify that I am currently a New York State (NYS) registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with 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 a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

JASON HAYES
NYS Professional Engineer #089491

3/22/2021
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.

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	below grade surface
CAMP	Community Air Monitoring Plan
CHASP	Construction Health and Safety Plan
CFR	Code of Federal Regulations
COC	Contaminant of Concern
CQAP	Construction Quality Assurance Plan
CSM	Conceptual Site Model
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
EC	Engineering Controls
ECL	Environmental Conservation Law
EDD	Electronic Data Deliverable
el	Elevation
ELAP	Environmental Laboratory Approval Program
eV	Electron Volt
FER	Final Engineering Report
FWRIA	Fish and Wildlife Resources Impact Analysis
GPR	Ground Penetrating Radar
IC	Institutional Controls
L/min	Liters per minute
MIL	Millimeter
NYCRR	New York Codes, Rules and Regulations
NYCDEP	New York City Department of Environmental Protection
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbon
PBS	Petroleum Bulk Storage
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene/Tetrachloroethylene
PFAS	Per- and Polyfluoroalkyl Substances
PFHxA	Perfluorohexanoic Acid
PFOA	Perflourooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid

Acronym	Definition
PFPeA	Perfluoropetanoic Acid
PID	Photoionization Detector
PPE	Personal Protective Equipment
ppm	parts per million
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RE	Remediation Engineer
RI	Remedial Investigation
RIR	Remedial Investigation Report
RURR SCO	Restricted Use – Restricted Residential Soil Cleanup Objective
SCO	Soil Cleanup Objective
SGV	Standards and Guidance Values
SEQRA	State Environmental Quality Review Act
SI	Subsurface Investigation
SMDS	Sub-membrane Depressurization System
SMMP	Soil/Materials Management Plan
SMP	Site Management Plan
SOE	Support of Excavation
SPDES	State Pollutant Discharge Elimination System
SVOC	Semivolatile Organic Compound
SWPPP	Stormwater Pollution Prevention Plan
TAGM	Technical and Administrative Guidance Memorandum
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
TOGS	Technical and Operational Guidance Series
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
UU SCO	Unrestricted Use Soil Cleanup Objective
VOC	Volatile Organic Compound
$\mu g/m^3$	Micrograms per cubic meter

EXECUTIVE SUMMARY

GPL Development LLC, H Owner LLC, Greenpoint Landing Developers LLC, Greenpoint Storage Terminal LLC, and Greenpoint Landing Associates, L.L.C. are Volunteers in the New York State Brownfield Cleanup Program (BCP) and are responsible for the investigation, remediation, and redevelopment of 45 Commercial Street, Brooklyn, New York (the site). The Brownfield Cleanup Agreement (BCA) was fully executed on April 17, 2020 and BCP Site No. C224304 was assigned. The proposed redevelopment project includes removal of contaminated soil/fill and construction of a mixed-use residential and commercial building with 374 residential units (100% affordable housing for families earning under 90% of the annual median income) and ground floor retail. The building will comprise a 6-story podium (no cellar) with a 22-story tower set back from Commercial Street. The building footprint is about 32,000 square feet in area and the remainder of the tax lot (about 12,600 square feet) will be open space with a mixture of hardscape and landscaped areas.

This Remedial Action Work Plan (RAWP) identifies and evaluates remedial action alternatives, and recommends a Track 4 remedy to address semivolatile organic compounds (SVOC) and metals in historic fill, petroleum-impacted soil, and volatile organic compounds (VOC) in soil vapor. The proposed remedy was developed based on data gathered during the 2019 Subsurface Investigation (SI) and 2020 Remedial Investigation (RI) performed by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan). The remedy described in this document is consistent with the procedures defined in the New York State Department of Environmental Conservation (NYSDEC) Program Policy DER-10: Technical Guide for Site Investigation and Remediation (DER-10) and complies with applicable federal, state, and local laws, regulations, and requirements.

Site Description/Physical Setting/Site History

The site is located at 45 Commercial Street in the Greenpoint neighborhood of Brooklyn, New York, is identified as Block 2472, Lot 70 on the Borough of Brooklyn Tax Map and encompasses an area of about 44,600 square feet. The site is bound by an active construction site, 1 Bell Slip (a/k/a, Parcel H3 [Block 2472, Lots 200 and 475]) to the north; an active NYC transit authority parking lot, 65 Commercial Street (Block 2472, Lot 425) to the east; Commercial Street to the south; and Bell Slip followed by a new 37-story mixed used residential and commercial building with associated site improvements, 37 Blue Slip (a/k/a, Parcel G1 [Block 2472, Lots 80, 90, and part of Lots 45, 50 and 100]) and 21 Commercial Street (a/k/a, Parcel G2 [Block 2472, Lots 50, 60, part of Lot 100]) to the west.

The western portion of the site is currently used as a staging area for construction trailers and equipment for the redevelopment of the adjoining Parcel H3 and the eastern portion is vacant. Coal and lumber storage were the primary uses of the site for more than 100 years from the late 1800s until about 1980, when the lumber yard operations were phased out and the owner

(Lumber Exchange Terminal, Inc.) began to lease the site to tenants for heavy construction equipment, materials, and machinery storage.

Summary of the Remedial Investigation

The findings and conclusions of the 2019 SI and 2020 RI are as follows:

1. Stratigraphy: A historic fill layer was observed from surface grade to depths ranging from about 13 to 20 feet below grade surface (bgs) (deepest sample collected), and consisted of gray to black fine-grained sand with varying amounts of gravel, silt, clay, brick, concrete, glass, coal ash, slag, wood, and coal. The fill layer is underlain by native soil consisting of light- to dark-gray clay with varying amounts of silt, peat, sand, and shells. Bedrock was not encountered during the RI or previous environmental investigation conducted at the site. Bedrock was encountered during a geotechnical investigation at about 50 to 65 feet bgs.
2. Hydrogeology: Groundwater was observed at depths between 8.55 and 10.54 feet bgs with elevations[1] ranging from el. 2.82 to 3.28 feet during synoptic groundwater level measurements collected from six wells during the RI. Groundwater flows to the west towards the confluence of Newtown Creek and the East River.
3. Historic Fill Quality: Historic fill contains contaminants including SVOCs and metals above the Part 375-6.8(b) Unrestricted Use (UU) and/or NYSDEC Part 375-6.8(b) Restricted Use Restricted-Residential (RURR) Soil Cleanup Objectives (SCO), including hazardous concentrations of lead. The presence of these compounds in soil may be related to historic fill or to historical site uses as a lumber storage yard.
4. Petroleum-Impacted Soil, Groundwater and Soil Vapor:
    a. Soil - Residual petroleum contamination (as evidenced by PID readings above background, odors, staining, and/or analytical data) were observed in soil boring LB07 from 6 to 8 feet bgs, LB13 from 4 to 6 feet bgs, and in 10 soil borings (LB13, LB13S, LB16, LB17, LB20, LB21, LB22, LB24, LB25, and LB27) from 12.5 to 18 feet bgs across the site. The maximum PID reading, 501 ppm, was recorded in LB22 at 13 feet bgs. Analytical results for soil samples collected from 4 to 6 feet and 14 to 16 feet bgs in LB13 and 15.5 to 17.5 in LB20 exhibited petroleum-related VOCs at concentrations above the UU SCOs. Analytical results for the soil samples collected from LB07 from 6 to 8 feet bgs and LB13W from 15 to 17 feet bgs exhibited a petroleum-related SVOC (naphthalene) at a concentration above the UU SCOs. Based on the analytical results and field observations, subsurface, residual petroleum impacts encompass a 24,000 square foot area. A historical

[1] Elevations are based on the North American Vertical Datum of 1988 (NAVD88), which is approximately 1.1 feet above mean sea level datum at Sandy Hook, New Jersey as defined by the United States Geologic Survey (USGS NGVD 1929).

petroleum release is the likely source of the residual petroleum contamination in the lower part of the historic fill layer.

b. Groundwater - One VOC, 1,2-dichloroethane, was identified above the NYSDEC Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (6 NYCRR) Part 703.5 and the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values (SGV) for Class GA water. The presence of 1,2-dichloroethane may be an artifact of a historical on-site petroleum release since 1,2-dichloroethane was historically used as an anti-knocking additive in leaded gasoline.

c. Soil Vapor – Petroleum-related compounds were identified in soil vapor across the site.

5. VOCs in Groundwater and Soil Vapor – One VOC, 1,2-dichloroethane, was identified above the NYSDEC SGVs in groundwater and thirteen petroleum, ketone, and/or solvent-related VOCs (including 2,2,4-trimethylpentane, 2-butanone, acetone, benzene, carbon disulfide, chloromethane, cyclohexane, heptane, n-hexane, p- & m-xylene, propylene, toluene, and trichlorofluoromethane) were detected in soil vapor; however, no NYSDOH standards or guidance values exist for these compounds.

6. Emerging Contaminants in Groundwater - Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) were detected in groundwater at concentrations above the maximum contaminant level (MCL) (drinking water standard) of 10 parts per trillion. 1,4-dioxane was detected in groundwater at concentrations below its MCL in drinking water of 1 part per billion.

Sufficient analytical data were gathered during the 2019 SI and the 2020 RI to develop a remedy for the site. The remedy described and evaluated in this RAWP was prepared in accordance with New York State BCP guidelines. The remedy will address the SVOCs and metals in historic fill, petroleum-impacted soil and/or groundwater, and VOCs in soil vapor and groundwater described in the Remedial Investigation Report (RIR).

Qualitative Human Health Exposure Assessment

Based on the conceptual site model (CSM) and the review of environmental data, complete on-site and off-site exposure pathways exist, in the absence of institutional controls (IC) and engineering controls (EC), under current, construction and remediation, and future use conditions. The complete exposure pathways indicate there is a risk of exposure to humans from site contaminants via exposure to soil, groundwater and soil vapor if institutional and engineering controls are not implemented.

Complete exposure pathways have the following five elements: 1) a contaminant source; 2) a contaminant release and transport mechanism; 3) a point of exposure; 4) a route of exposure;

and 5) a receptor population. A discussion of the five elements comprising a complete pathway as they pertain to the site is provided below.

Current Conditions

Contaminant sources include 1) historic fill with varying levels of SVOCs and metals, including detections of hazardous lead concentrations; 2) petroleum contamination in soil, groundwater and soil vapor; and 3) one chlorinated VOC in groundwater and VOCs in soil vapor. Contaminant release and transport mechanisms and routes of exposure include contaminated soil transported as dust (dermal, ingestion, inhalation), contaminated groundwater flow (dermal contact), and volatilization of contaminants from the soil and groundwater matrices to the soil vapor phase (inhalation).

Under current conditions, the likelihood of soil, groundwater or soil vapor exposure to on-site and off-site human receptors is limited, as the site is capped with impervious surface cover, the site is mostly vacant except for use by construction workers, and no buildings are currently present on-site. Exposure to contaminants in soil, groundwater and soil vapor via dermal contact, ingestion or inhalation during site investigation is low, as these activities occur under a Health and Safety Plan (HASP) with Community Air Monitoring Plan (CAMP) to limit exposure to site workers and the community. In addition, groundwater is not used as potable water source, precluding any complete exposure pathway to impacted groundwater.

Construction/Remediation Activities

During construction and remediation, points of exposure will include disturbed and exposed historic fill/soil and dust and organic vapors generated during excavation. Groundwater is not expected to be encountered during remedial excavation and foundation construction because the design elevation for the foundation is above the groundwater table. Potential routes of exposure will include ingestion, dermal absorption and inhalation (dust) of historic fill/soil and inhalation of organic vapors arising from contaminated soil. The receptor population includes construction and remediation workers and, to a lesser extent, the public adjacent to the site.

The potential for a complete exposure pathway is present since all five elements exist; however, the risk will be minimized by the implementation of appropriate health and safety measures in accordance with a RAWP, which will include a Construction Health and Safety Plan (CHASP), a Soil/Materials Management Plan (SMMP), and a CAMP. These measures include conducting an air-monitoring program, donning the appropriate personal protective equipment (PPE), covering soil stockpiles, altering work sequencing, maintaining a secure construction entrance, cleaning truck undercarriages before they leave the site, proper housekeeping, and applying vapor and dust suppression measures to prevent off-site migration of contaminants during construction. These measures will be implemented to prevent completion of exposure pathways.

Proposed Future Use Conditions

Under the proposed future use condition, residual contamination will remain on-site based on the anticipated Track 4 remedy. If residual contamination exist and institutional and/or engineering controls are not implemented, points of exposure would include potential cracks in the proposed building foundation and exposure during any future soil disturbance activities (including breach of the capping system in landscaped areas. The receptor population includes building occupants and employees, visitors, and workers and, to a much lesser extent, the community surrounding the site. Complete exposure pathways can be avoided or mitigated by construction and maintenance of the site capping system (i.e., concrete or at least 2 feet of cover soil), incorporation of an sub-membrane depressurization system (SMDS) that includes a vapor barrier into foundation design, and implementation of a Site Management Plan (SMP) (required by an easement placed on the site).

The following conclusions were developed from this human health exposure assessment:

1. Under current conditions, there is a marginal risk for human exposure to site contaminants. The primary exposure pathways are for dermal contact, ingestion, and/or inhalation of soil, soil vapor, and/or groundwater by occasional construction workers and site investigation workers, and to a much lesser extent to the community in the vicinity of the site. The exposure risks can be avoided or minimized by implementing the site-specific HASP and CAMP during investigation activities.
2. In the absence of a CHASP and CAMP, there is a moderate risk of exposure during construction and remediation activities. The primary exposure pathways are:
    a. Dermal contact, ingestion, and inhalation of historic fill/soil by construction workers.
    b. Inhalation of historic fill (airborne dust and vapors) by the community in the vicinity of the site.

    These exposure risks can be avoided or minimized by implementing the site-specific CHASP and CAMP.
3. The existence of a complete exposure pathway for site contaminants to human receptors (both on- and off-site) during proposed future use conditions is unlikely, as sources of contamination will be partially removed during the construction/remediation phase and residual contamination will be managed with an engineered composite cover system, an SMDS, an easement, and Site Management Plan.
4. Regional groundwater is not used as a potable water in Kings County so there is no potential exposure to site-specific or regional groundwater contaminants

Summary of the Remedy

It is anticipated that the site will be remediated to a Restricted-Residential Track 4 cleanup. As a pre-requisite to site remediation, asphalt and concrete surface cover will be removed by the contractor and managed as construction and demolition (C&D) debris in accordance with Part 360 and 361 regulations. The proposed Track 4 remedy consists of the following actions:

1. Development and implementation of a CHASP and CAMP for the protection of on-site workers, visitors, and the environment during remediation activities.
2. Screening of soil for indications of contamination source areas, by visual, olfactory, or instrumental methods, during any intrusive site work - During removal of surface cover in contact with site soil, observation of C&D material and site soil segregation to document that site soil was not comingled with the contractor's C&D material will be completed.
3. Construction of a support of excavation (SOE) system to facilitate hotspot soil excavations, as necessary.
4. Excavation, stockpiling, off-site transport, and disposal of historic fill to achieve a Track 4 cleanup. Soil exceeding the following site-specific SCOs will be removed to achieve a Track 4 cleanup:
    a. Soil exceeding the RURR SCOs within the 0- to 2-foot bgs interval across the site (two feet of soil will be removed site-wide).
    b. Soil exceeding the 6 NYCRR Part 371 hazardous criteria for lead.
    c. Soil containing total SVOCs exceeding 500 parts per million (ppm).
    d. Soil with evidence of petroleum or chemical-like impacts (visual, olfactory, and/or PID above background) encountered during excavation of deeper foundation components (mats, pile caps, elevator pits).
5. Collection of endpoint soil samples from the base and sidewalls of hotspot excavations after soil is removed to confirm the Track 4 site-specific SCOs are met. Hotspots include areas with hazardous concentrations of lead and SVOCs exceeding 500 ppm.
6. Decommissioning and removal of any discovered underground storage tanks (UST) in accordance with NYSDEC DER-10 5.4(b)(5).
7. Appropriate off-site disposal of historic fill and soil from the site in accordance with federal, state, and local rules and regulations for handling, transport, and disposal.
8. Collection and analysis of documentation soil samples in accordance with DER-10 at the completion of the general 2-foot remedial excavation across the site to document post-remediation soil quality.
9. Demarcation of residual (existing) soil and historic fill outside of the proposed building footprint by survey or by a high-visibility demarcation barrier for visual reference.

10. Import of soil and fill materials for composite cover and backfill, where required, in compliance with: a) RURR or NYSDEC Part 375-6.8(b) Protection of Groundwater (PGW) SCOs, whichever is more stringent; b) 6 NYCRR Part 360 regulations; c) federal, state, and local rules and regulations for handling and transport of soil and fill materials; and d) NYSDEC 2021 PFAS Guidance. Imported soil and fill materials are subject to approval by the NYSDEC project manager and may require sampling as listed in DER-10 Section 5.4.
11. Construction of a composite cover system consisting of concrete pavement, manufactured paving stones or bricks, asphalt pavement or a minimum of 2 feet of soil that meets the lower of the RURR and PGW SCOs or virgin quarry stone in landscaped areas.
12. Installation and operation of an active SMDS that includes a vapor barrier membrane (20-millimeter [mil] minimum thickness), below the foundation of the proposed building to mitigate soil vapor intrusion from VOCs in the subsurface.
13. Recording of ICs in an Environmental Easement.
14. Preparation of an SMP that describes management of the ECs and ICs – Implementation of the SMP following completion of the remedy will be required by the Environmental Easement.
15. Overall performance of the remedial action, including permitting requirements, in accordance with applicable federal, state and local rules and regulations and with NYSDEC approval.

1.0 INTRODUCTION

GPL Development LLC, H Owner LLC, Greenpoint Landing Developers LLC, Greenpoint Storage Terminal LLC, and Greenpoint Landing Associates, L.L.C, collectively, are Volunteers in the New York State Brownfield Cleanup Program (BCP) and are responsible for the investigation, remediation, and redevelopment of 45 Commercial Street, Brooklyn, New York (the site). The Brownfield Cleanup Agreement (BCA) was fully executed on April 17, 2020 and BCP Site No. C224304 was assigned to the site. The proposed redevelopment project includes removal of contaminated soil/fill and construction of a mixed-use residential and commercial building with 374 residential units (100% affordable housing for families earning under 90% of the annual median income) and ground floor retail. The building will comprise a 6-story podium (no cellar) with a 22-story tower set back from Commercial Street. The building footprint is about 32,000 square feet in area and the remainder of the tax lot (about 12,600 square feet) will be open space with a mixture of hardscape and landscaped areas.

This Remedial Action Work Plan (RAWP) identifies and evaluates remedial action alternatives, and recommends a Track 4 remedy to address semivolatile organic compounds (SVOC) and metals in historic fill, petroleum-impacted soil, and volatile organic compounds (VOC) in soil vapor. The proposed remedy was developed based on data gathered during the 2019 Subsurface Investigation (SI) and 2020 Remedial Investigation (RI) performed by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan). The remedy described in this document is consistent with the procedures defined in the New York State Department of Environmental Conservation (NYSDEC) Program Policy DER-10: Technical Guide for Site Investigation and Remediation (DER-10) and complies with applicable federal, state, and local laws, regulations, and requirements.

1.1 Site Location and Description

The site is located at 45 Commercial Street in the Greenpoint neighborhood of Brooklyn, New York, is identified as Block 2472, Lot 70 on the Borough of Brooklyn Tax Map and encompasses an area of about 44,600 square feet. The site is bound by an active construction site, 1 Bell Slip (a/k/a, Parcel H3 [Block 2472, Lots 200 and 475]) to the north; an active NYC transit authority parking lot, 65 Commercial Street (Block 2472, Lot 425) to the east; Commercial Street to the south; and Bell Slip followed by a new 37-story mixed used residential and commercial building with associated site improvements, 37 Blue Slip (a/k/a, Parcel G1 [Block 2472, Lots 80, 90, and part of Lots 45, 50 and 100]) and 21 Commercial Street (a/k/a, Parcel G2 [Block 2472, Lots 50, 60, part of Lot 100]) to the west. A Site Location Map and Site Plan are provided as Figures 1 and 2, respectively.

The western portion of the site is currently used as a staging area for construction trailers and equipment for the redevelopment of the adjoining Parcel H3 and the eastern portion is vacant. Coal and lumber storage were the primary uses of the site for more than 100 years from the late 1800s until about 1980, when the lumber yard operations were phased out and the owner

(Lumber Exchange Terminal, Inc.) began to lease the site to tenants for heavy construction equipment, materials, and machinery storage.

1.2 Redevelopment Plan

The proposed remedy is intended to render the site protective of human health and the environment consistent with the contemplated end use. The proposed redevelopment plan and end use are described here to provide the basis for this assessment; however, the contemplated remedy may be implemented independent of the proposed redevelopment plan in the event that it changes.

The proposed redevelopment project includes the removal of contaminated soil/fill and construction of a mixed-use residential and commercial building with 374 residential units (100% affordable housing for families earning under 90% of the annual median income) and ground floor retail. The building will comprise a 6-story podium (no cellar) with a 22-story tower set back from Commercial Street. The building footprint is about 32,000 square feet in area and the remainder of the tax lot (about 12,600 square feet) will be open space with a mixture of hardscape and landscaped areas. Design development plans are included as Appendix A.

The site will be excavated to 2 feet below grade surface (bgs) (about elevation[2] [el.] 10 feet) across the site, and at least 1 foot below the Subsurface Investigation (SI) and RI sample collection depths in hotspot locations. Remedial excavations will extend to at least 4 feet bgs (about el. 7 feet) in the LB17 hotspot, at least 9 feet bgs (about el. 2 feet) in the LB16 hotspot, and to at least 7 feet bgs (about el. 5 feet) in the LB18 and LB22 hotspot locations for remedial purposes. Further excavation up to 5 feet bgs (about el. 7 feet) for the foundation slab with localized excavation up to 11 feet bgs (about el. 1 feet) for deep foundation components (i.e. mats, elevator pits and pile caps) will be required for redevelopment. Additional soil in these areas may require excavation and segregation in accordance with Section 4.2.7. Certain excavated areas will be backfilled with fill material (meeting the lower of NYSDEC Part 375-6.8(b) Protection of Groundwater [PGW]) and NYSDEC Part 375-6.8(b) Restricted Use Restricted-Residential [RURR] Soil Cleanup Objectives [SCO]) and the site will be capped with a composite cover system. Through these means and the elements further described herein, the intended future use will be protective of human health and the environment.

1.3 Description of Surrounding Property

According to the New York City Department of City Planning (NYCDCP) Zoning Map 12c, dated August 8, 2018, the site is currently located in an R6/R8/C2-4 mixed-use residential and commercial district. The following is a summary of surrounding property usage:

[2] Elevations are based on the North American Vertical Datum of 1988 (NAVD88), which is approximately 1.1 feet above mean sea level datum at Sandy Hook, New Jersey as defined by the United States Geologic Survey (USGS NGVD 1929).

Direction	Adjoining and Adjacent Properties			Surrounding Properties
	Block No.	Lot No.	Description	
Northwest	2472	200 & 475	Active construction site (Parcel H3)	Newtown Creek
Northeast	2472	425	NYC Transit Authority Parking Lot	Vacant lot, mixed-use residential and commercial buildings, residential buildings
Southeast	Commercial Street			Vacant lots, mixed-use residential and commercial buildings, industrial and manufacturing buildings,
Southwest	Bell Slip			Mixed-use residential and commercial buildings

Public infrastructure (storm drains, sewers, and underground utility lines) exists or is being built within Commercial Street and Bell Slip.

Land use within a half-mile radius is urban and includes multi-story residential buildings, some with ground-level retail stores and restaurants, parking lots, office buildings, small-scale industrial and manufacturing facilities, and park land owned and operated by the New York City Department of Parks and Recreation (NYCDPR). The East River and Newtown Creek are the two closest ecological receptors. The property located southwest of the site, across Commercial Street, is the former NuHart Plastics Manufacturing facility located at 280 Franklin Street, Brooklyn, NY (Lots 1, 10, and 78 of Block 2487), which is listed as an NYSDEC inactive hazardous waste disposal site. No schools or day care facilities are on the site. Sensitive receptors, as defined in DER-10, within a half mile of the site include those listed below:

Number	Name (Approximate distance from site)	Address
1	Newtown Barge Playground (approximately 0.12 miles southwest of the site)	3 Commercial Street, Brooklyn NY 11222
2	Greenpoint Playground (approximately 0.10 miles southwest of the site)	243 Franklin Street, Brooklyn NY 11222
3	Dupont Street Senior Housing (approximately 0.13 miles south of the site)	80 Dupont St, Brooklyn, NY 11222

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The RI was completed between May 6 and 20, 2020 to supplement the data set generated during the 2019 SI and further investigate potential areas of concern (AOC). The objective of the RI was to determine, to the extent practical, the nature and extent of contamination in soil, groundwater, and soil vapor. The RI included the advancement of soil borings; installation of groundwater monitoring wells and soil vapor probes; and collection of soil, groundwater, and soil vapor samples. Sample locations are presented on Figure 3.

The RI consisted of the following:

- Geophysical survey to identify subsurface anomalies consistent with utilities, subsurface structures, physical obstructions, and underground storage tanks (UST), and to pre-clear soil boring locations;
- Advancement of 17 soil borings and collection of 36 soil samples, plus quality assurance/quality control (QA/QC) samples;
- Installation of six groundwater monitoring wells and collection of six groundwater samples plus quality assurance/quality control (QA/QC) samples;
- Installation of five soil vapor points and collection of five soil vapor samples, plus QA/QC samples;
- Implementation of a Community Air Monitoring Program (CAMP); and
- Survey and synoptic groundwater gauging of newly installed monitoring wells to determine the elevation and flow of site groundwater.

The RI was conducted in accordance with Remedial Investigation Work Plan (RIWP), Title 6 of the New York Code of Rules and Regulations (6 NYCRR) Part 375-3.8, NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (May 2010), the NYSDEC Draft Brownfield Cleanup Program Guide (May 2004), and the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) with updates (SVI Guidance).

2.1 Site History

Coal and lumber storage were the primary uses of the site for more than 100 years from the late 1800s until about 1980, when the lumber yard operations were phased out and the owner (Lumber Exchange Terminal, Inc.) began to lease portions of the site to tenants for heavy construction equipment, materials, and machinery storage.

2.2 Previous Environmental Reports

Previous environmental reports were reviewed as part of this RAWP and are summarized in chronological order below. Previous environmental reports are included in Appendix B and include the following;

1. *Phase I Environmental Site Assessment Report – Greenpoint Lumber Yard, Brooklyn, New York, prepared by AKRF, Inc. dated July 2001*
2. *Supplemental Subsurface (Phase II) Investigation Report – Greenpoint Lumber Yard, Brooklyn, New York, prepared by AKRF, Inc. dated April 2004*
3. *Remedial Investigation Report – Parcels D1, D2, E3, F, G, and H, prepared by Langan, dated May 19, 2014*
4. *Subsurface Investigation – 45 Commercial Street, performed by Langan, dated September 2019*

Phase I Environmental Site Assessment Report – Greenpoint Lumber Yard, Brooklyn, New York, prepared by AKRF, Inc. (July 2001)

AKRF, Inc. was retained by Park Tower Realty Corporation to perform an Environmental Site Assessment (ESA) of a 21-acre former lumber yard (including lands underwater) in the Greenpoint neighborhood of Brooklyn, New York. The site is included in the upland acres that comprise the former lumber yard.

The Phase I ESA concluded that releases of petroleum or hazardous substances may be present on the former lumber yard (including the site) as the result of historical uses of the site and surrounding area. Several 55-gallon drums of lube oil and car maintenance activities (minor auto repairs, truck washing, and tire changes) were observed at the site during the site reconnaissance.

Supplemental Subsurface (Phase II) Investigation Report – Greenpoint Lumber Yard, Brooklyn, New York, prepared by AKRF, Inc. (April 2004)

This investigation included the completion of two soil borings and one groundwater monitoring well, and collection of four soil samples and one groundwater sample within the site boundary. Soil samples were analyzed for VOCs, SVOCs, polychlorinated biphenyls (PCB), pesticides, and target analyte list (TAL) metals. Groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and TAL metals.

- Historic fill was identified in both borings completed at the site and was composed of varying amounts of sand, silt, and gravel with brick, coal, concrete, slag, and wood. Historic fill was observed immediately below the asphalt and concrete cap to boring termination depths of about 10 to 15 feet bgs.
- No VOCs exceeded the NYSDEC Unrestricted Use (UU) or RURR SCOs.
- Seven SVOCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and ideno(1,2-c,d)pyrene) exceeded the UU and/or RURR SCOs in soil. Total SVOCs were detected at a maximum concentration of 49.55 milligrams per kilogram (mg/kg). Total PCBs exceeded the UU

SCO in a soil sample collected from the 0.5- to 2-foot interval in the northern part of the site. Two pesticides, 4,4'-DDD and 4,4'-DDE, exceeded the UU SCOs in soil samples collected from the 0.5- to 2-foot interval in the southern part of the site. Metals (including copper, lead, mercury, nickel, and/or zinc) exceeded the UU and/or RURR SCOs in all soil samples with the exception of one soil sample collected from the 8- to 9-foot interval in the northern part of the site. VOCs, SVOCs, PCBs, and pesticides were not detected in the groundwater sample collected from in the southern part of the site.

- Three metals (iron, manganese, and sodium) exceeded the NYSDEC Standards and Guidance Values (SGV) for Class GA water at total and dissolved concentrations in the southern part of the site.

The data collected from the AKRF Phase II investigation is not included in the analysis of this RIR because the data was not validated and samples were collected over 15 years ago and, thus, no longer represent site conditions.

Remedial Investigation Report – Parcels D1, D2, E3, F, G, and H, Brooklyn, NY, prepared by Langan (May 19th, 2014)

This investigation was prepared in consultation with the OER to satisfy E-Designation requirements for six parcels of the Greenpoint Landing Development Property and included the completion of one soil boring and groundwater monitoring well and one soil vapor point, and collection of three soil samples, one groundwater sample, and one soil vapor sample in the eastern part of the site. Additional data were collected on other parcels that comprise Greenpoint Landing development property. Soil samples were analyzed for VOCs, SVOCs, PCBs, pesticides, and TAL metals. Groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and TAL metals.

Historic fill identified in the soil boring was composed of varying amounts of sand, silt, gravel, and clay with ash, coal, and concrete and was observed directly below the concrete cap to a depth of about 10 feet bgs. Historic fill was underlain by native soil composed of varying amounts of sand, silt, and clay to a boring termination depth of about 15 feet bgs.

- No VOCs were detected above the UU or RURR SCOs. Eight SVOCs (3-methylphenol/4-methylphenol, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and/or ideno(1,2,3-cd)pyrene) exceeded the UU and/or RURR SCOs in one or more soil samples. Total SVOCs were detected at a maximum concentration of 219.16 mg/kg in a sample collected from the 0- to 2-foot interval. Five metals (arsenic, copper, lead, mercury, and zinc) exceeded the UU SCOs in one or more soil samples; lead also exceeded the RURR SCO in soil samples collected from the 3- to 5-foot depth interval. Pesticides and herbicides were not detected in soil samples.
- VOCs and SVOCs were not detected above the NYSDEC SGVs. PCBs, pesticides, and

herbicides were not detected in groundwater. Four metals (iron, magnesium, manganese, and sodium) exceeded the NYSDEC SGVs at total and dissolved concentrations.

- Thirteen petroleum, ketone, and/or solvent-related VOCs (including 2,2,4-trimethylpentane, 2-butanone, acetone, benzene, carbon disulfide, chloromethane, cyclohexane, heptane, n-hexane, p- & m-xylene, propylene, toluene, and trichlorofluoromethane) were detected in soil vapor; however, no NYSDOH standards or guidance values exist for these compounds.
- One soil vapor sample was evaluated using the NYSDOH Guidance for Evaluating Soil Vapor Intrusion. The NYSDOH Guidance document contains Decision Matrices that evaluate eight VOCs – carbon tetrachloride, TCE, cis-1,2-dichloroethene, 1,1-dichloroethene, tetrachloroethene (PCE), 1,1,1-trichloroethane, methylene chloride, and vinyl chloride. None of the 8 VOCs were detected. The NYSDOH Guidance also include Air Guideline Values (AGV) for three VOCs (methylene chloride, PCE, and TCE); none of these compounds were detected in the soil vapor sample.

September 2019 Subsurface Investigation – 45 Commercial Street, performed by Langan

This investigation was performed on the site only (no other Greenpoint Landing development property) for the purpose of BCP eligibility, and included the completion of 15 soil borings and collection of 32 soil samples (including QA/QC samples). Soil samples were analyzed for VOCs, SVOCs, and TAL metals. NYSDEC Analytical Services Protocol (ASP) Category B deliverables were provided by Alpha Analytical, LLC, an Environmental Laboratory Approval Program (ELAP) certified laboratory. Analytical data was validated by a Langan validator in accordance with United States Environmental Protection Agency (USEPA) and NYSDEC validation protocols

- Historic fill identified in the soil borings was composed of varying amounts of sand, silt and gravel, with ash, asphalt, coal, concrete, wood, and slag and was observed directly below the concrete and asphalt cap to a depths ranging from about 6 to 15 feet bgs (deepest soil boring termination depth). Native soil, composed of grayish brown to tan fine sand with trace silt, was encountered at depths between about 6 to 13.5 feet bgs in four of the twelve soil borings. Native soil was not encountered in eight soil borings.
- Two VOCs (acetone and total xylenes) exceeded the UU but not the RURR SCOs in one or more soil samples.
- Nine SVOCs (3- and 4-methylphenol, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene) exceeded the UU and/or RURR SCOs in one or more soil samples. With the exception of 3- and 4-methylphenol and naphthalene, all SVOCs were detected in at least one boring at concentrations exceeding the RURR SCOs.
- Seven inorganics (including arsenic, trivalent chromium, copper, lead, mercury, nickel, and

zinc) exceeded the UU and/or RURR SCOs in one or more soil samples. Of these inorganics, arsenic, copper, lead and mercury were detected at concentrations exceeding the RURR SCOs in one or more soil samples.

- A spill was reported to NYSDEC (Spill No. 1906491) based on field observations and review of analytical data that identified staining, odors and photoionization detector (PID) readings and the detection of petroleum related compounds (total xylenes and naphthalene) in soil.

2.3 Potential Areas of Concern

The potential AOCs identified for the site and investigated under the RI are listed below.

AOC 1: Prior Site Use

Historical operations at the site include coal and lumber storage for more than 100 years from the late 1800s until about 1980; heavy construction equipment, machinery, and materials storage starting in 1980; and truck/vehicle parking and scaffolding materials storage until the 2000s. Leaks or spills of solvents (including chromated copper arsenate, a preservative used to treat lumber), petroleum products, and/or other hazardous materials associated with on-site operations may have adversely affected soil, groundwater, and/or soil vapor at the site.

AOC 2: Petroleum Impacted Soil

The 2019 SI identified petroleum-impacted soil in one soil boring located in the northeastern portion of the site. Spill No. 19-06491 was reported on September 25, 2019 based on field observations and subsequent analytical data review.

AOC 3: Historic Fill

Historical maps from the mid to late 1800s show the original shoreline of Newtown Creek to be present day Commercial Street, indicating the site lies entirely on reclaimed land as the result of historical filling activities. Historic fill was identified during the 2019 SI from surface grade to depths between 13 to 20 feet bgs (boring termination depth) and is composed of gray to black fine-grained sand with varying amounts of gravel, silt, clay, brick, concrete, glass, coal ash, slag, wood, and coal. Contaminants associated with historic fill were identified in surficial soil samples, including SVOCs and metals exceeding the UU and/or RURR SCOs.

AOC 4: Historical Use of Surrounding Properties

The former NuHart Plastic Manufacturing facility, an NYSDEC inactive hazardous waste disposal site (Site #224136), is located about 100 feet south of the site. The NuHart Plastic Manufacturing facility operated from 1950 until about 2004, and was primarily used for the production, storage, and shipping of plastic and vinyl products. Previous investigations performed at the former NuHart Plastic Manufacturing facility found phthalates, paraffinic oil/mineral oil, and trichloroethylene (TCE) in soil, groundwater, and soil vapor. Historical use of surrounding

properties also includes light commercial and industrial use such as large item storage and transport areas, and cargo truck repair.

2.4 Summary of the Remedial Investigation

The following sections summarize the 2020 RI. This RI is documented in the Remedial Investigation Report (RIR), dated October 29, 2020 and prepared by Langan. Soil boring, monitoring well, and soil vapor probe locations are shown on Figure 3.

2.4.1 Geophysical Investigation

On May 6, 2020, prior to intrusive field activities, NOVA Geophysical Engineering (NOVA) of Douglaston, New York conducted a geophysical survey at the site. The survey used ground-penetrating radar (GPR) to identify potential USTs and locate buried utilities and subsurface structures in the vicinity of each boring location. Borings were relocated as necessary to avoid subsurface utilities and other subsurface impediments.

NOVA identified anomalies suspected to be foundation elements from previous site uses. Geophysical anomalies consistent with USTs were not identified.

2.4.2 Borings, Monitoring Wells and Soil Vapor Probes

Langan field personnel documented the advancement of 17 soil borings by Eastern Environmental Solutions, Inc. (Eastern) of Manorville, New York. Boring locations were selected to provide sufficient site coverage and to evaluate the AOCs. Geoprobe® 6610 and Geoprobe®7822 drilling rigs were used to advance borings to 20 feet bgs. Four borings were advanced to horizontally delineate petroleum impacts observed in soil borings.

Six select soil borings were converted into permanent groundwater monitoring wells with screens set across the groundwater interface. The wells were installed with 2-inch-diameter, threaded, flush-joint, polyvinyl chloride (PVC) casing and 0.01-inch-slot well screens set to straddle the groundwater table. The screens were set between 5 to 17 feet bgs or 5 to 20 feet bgs.

The wells were developed and the top of casing for each monitoring well was surveyed by Langan on May 18, 2020.

Langan field personnel documented installation of five soil vapor points with a Geoprobe® 6610 or Geoprobe® 7822 DT drilling rig to about 6 feet bgs within the footprint of the proposed building (about 2 feet above the groundwater table) in accordance with the NYSDOH's Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006).

2.4.3 Samples Collected

A total of 36 soil samples (plus QA/QC samples) were collected from the soil borings for laboratory analysis in general accordance with the Remedial Investigation Work Plan. Soil samples were collected based on the following:

- Historic fill was characterized by collecting 16 soil samples from above the groundwater table. Historic fill samples targeted select intervals where metals were detected above RURR SCOs in nearby 2019 SI borings.
- Petroleum-impacted soil was characterized by collecting one sample from the interval exhibiting the greatest degree of petroleum contamination, where observed (based on the presence of staining, odor, and/or PID readings above background) in 8 borings located across the site.
- The vertical extent of petroleum-impacted soil/historic fill was defined by collecting one sample from soil below the interval exhibiting the greatest degree of contamination in petroleum-impacted soil borings (based on lack of staining, odor, and/or PID readings above background) in the central and northern parts of the site.
- One soil sample was collected from native soil to define the vertical extent of historic fill at 3 locations.

Groundwater samples were collected from each newly installed well in accordance with NYSDEC DER-10, USEPA's Low Flow Purging and Sampling Procedures for the Collection of Groundwater Samples from Monitoring Wells (EQASOP-GW4 Revised Sep. 2017) and NYSDEC's January 2020 Guidelines for Sampling and Analysis of per- and poly-fluoroalkyl substances (PFAS).

Six groundwater samples were collected from each of the wells installed during the RI, plus QA/QC samples.

Six soil vapor samples (one from each of the soil vapor points installed during the RI, including one duplicate) were collected in accordance with the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006).

One outdoor ambient air sample was collected concurrently with the soil vapor samples. Soil vapor and ambient air samples were collected using laboratory-provided, batch-certified clean, 1-liter air canisters equipped with 2-hour sample interval flow controllers.

2.4.4 Chemical Analysis

The laboratory analyses performed on the soil, groundwater, and soil vapor samples collected during RI are summarized below by date and media.

Soil samples collected from all borings were analyzed using the latest USEPA methods for NYSDEC Part 375 list and USEPA Target Compound List (TCL)/Target Analyte List (TAL) parameters:

- TCL VOCs by USEPA methods 8260C
- TCL SVOCs by USEPA method 8270D
- Pesticides by USEPA method 8081B
- Herbicides by USEPA method 8151A
- PCBs by USEPA method 8082A

- TAL Part 375-list metals by USEPA methods 6010D/7471B
- Toxicity Characteristic Leaching Procedure (TCLP) Arsenic, Lead, and Mercury by USEPA method 1311
- Hexavalent/trivalent chromium by USEPA method 7196A
- Total cyanide by USEPA method 9010C
- NYSDEC PFAS (21-compound list) by USEPA method 537 Rev. 1.15
- 1,4-Dioxane by USEPA method 8270 with SIM isotope dilution

Grab samples submitted for PFAS and VOC analysis were collected directly from the acetate sleeves via laboratory-supplied sample containers and Terra Core® soil sample kits. The remaining sample volume was homogenized and placed into laboratory-supplied glassware. The sample containers were labeled, placed in a laboratory-supplied cooler, and packed with ice to attempt to maintain a temperature of 4°C). The samples were relinquished, under standard chain-of-custody protocol, to a courier for delivery to Eurofins Lancaster Laboratories Environmental, LLC (Eurofins), a NYSDOH ELAP-certified laboratory (ID No. 10670) in Lancaster, Pennsylvania.

Groundwater samples were collected into laboratory-supplied glassware and delivered via courier service to Eurofins for analysis of one or more of the following USEPA methods for NYSDEC Part 375 list and USEPA TCL/TAL:

- TCL VOCs by USEPA method 8260C
- TCL SVOCs (field-filtered) by USEPA method 8270D
- PCBs (lab-filtered in MW13N) by USEPA method 8082A
- Metals (field-filtered and unfiltered) by USEPA method 6010C/7470
- Pesticides by USEPA method 8081B
- Herbicides by USEPA method 8151A
- NYSDEC PFAS (21-compound list) by USEPA method 537 Rev. 1.15
- 1,4-Dioxane by USEPA method 8270 with SIM isotope dilution

Soil vapor samples were analyzed for VOCs via USEPA Method TO-15.

2.4.5 Summary of Remedial Investigation Findings

The findings and conclusions of the RI are as follows:

1. Stratigraphy: A historic fill layer was observed from surface grade to depths ranging from about 13 to 20 feet bgs (deepest sample collected), and consisted of gray to black fine-grained sand with varying amounts of gravel, silt, clay, brick, concrete, glass, coal ash, slag, wood, and coal. The fill layer is underlain by native soil consisting of light- to dark-gray clay with varying amounts of silt, peat, sand, and shells. Bedrock was encountered during a geotechnical investigation at about 50 to 65 feet bgs.

2. Hydrogeology: Groundwater was observed at depths between 8.55 and 10.54 feet bgs with elevations ranging from el. 2.82 to 3.28 feet during synoptic groundwater level measurements collected from six wells during the RI. Groundwater flows to the west towards the confluence of Newtown Creek and the East River.

3. Historic Fill Quality: Historic fill contains contaminants including SVOCs and metals above the UU and/or RURR SCOs, including hazardous concentrations of lead. The presence of these compounds in soil may be related to historic fill or to historical site uses as a lumber storage yard.

4. Petroleum-Impacted Soil, Groundwater and Soil Vapor:

    a. Soil - Residual petroleum contamination (as evidenced by PID readings above background, odors, staining, and/or analytical data) were observed in soil boring LB07 from 6 to 8 feet bgs, LB13 from 4 to 6 feet bgs, and in 10 soil borings (LB13, LB13S, LB16, LB17, LB20, LB21, LB22, LB24, LB25,and LB27) from 12.5 to 18 feet bgs across the site. The maximum PID reading, 501 ppm, was recorded in LB22 at 13 feet bgs. Analytical results for soil samples collected from 4 to 6 feet and 14 to 16 feet bgs in LB13 and 15.5 to 17.5 in LB20 exhibited petroleum-related VOCs at concentrations above the UU SCOs. Analytical results for the soil samples collected from LB07 from 6 to 8 feet bgs and LB13W from 15 to 17 feet bgs exhibited a petroleum-related SVOC (naphthalene) at a concentration above the UU SCOs.

    b. Groundwater - One VOC, 1,2-dichloroethane, was identified above the NYSDEC 6 NYCRR Part 703.5 and the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality SGVs for Class GA water. The presence of 1,2-dichloroethane may be an artifact of a historical on-site petroleum release since 1,2-dichloroethane was historically used as an anti-knocking additive to leaded gasoline.

    c. Soil Vapor – Petroleum-related compounds were identified in soil vapor across the site.

5. VOCs in Groundwater and Soil Vapor - One VOC, 1,2-dichloroethane, was identified above the NYSDEC SGVs in groundwater and thirteen petroleum, ketone, and/or solvent-related VOCs (including 2,2,4-trimethylpentane, 2-butanone, acetone, benzene, carbon disulfide, chloromethane, cyclohexane, heptane, n-hexane, p- & m-xylene, propylene, toluene, and trichlorofluoromethane) were detected in soil vapor; however, no NYSDOH standards or guidance values exist for these compounds.

6. Emerging Contaminants in Groundwater: Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) were detected in groundwater at concentrations above the maximum contaminant level (MCL) (drinking water standard) of 10 parts per

trillion. 1,4-dioxane was detected in groundwater at concentrations below its MCL in drinking water of 1 part per billion.

2.5 Significant Threat Determination

The RIR was submitted to the NYSDEC and NYSDOH on October 29, 2020. The NYSDEC and NYSDOH determined that the site does not pose a significant threat to public health and the environment.

2.6 Geology and Hydrogeology

2.6.1 Regional and Site Geology

According to United States Geological Survey (USGS) "Bedrock and Engineering Geology Maps of New York County, and parts of Kings and Queens Counties, New York, and parts of Bergen and Hudson Counties, New Jersey", bedrock stratigraphy in the area consists of Ravenswood Granodiorite of the Middle Ordovician to Middle Cambrian Age and Hartland Formation of the Middle Ordovician to Lower Cambrian Age. Ravenswood Granodiorite typically consists of medium- to dark-gray, sillimanite-garnet-pink microcline-plagioclase-biotite-muscovite-quartz and biotite-hornblende-orthoclase layered gneiss. The Hartland formation typically consists of gray sillimanite-garnet-microcline gneiss and fine-grained biotite-muscovite-quartz schist interlayered with quartz-plagioclase-muscovite pegmatite, hornblende amphibolite, and coarse granoblastic-textured amphibolite gneiss. Bedrock was not encountered during the RI or previous environmental investigations conducted at the site. Bedrock was encountered during a geotechnical investigation at about 50 to 65 feet bgs.

The stratigraphy immediately underlying the site consists of an about 13- to 20-foot thick layer of historic fill composed of gray to black fine-grained sand with varying amounts of gravel, silt, clay, brick, concrete, glass, coal ash, slag, wood, and coal. The historic fill is underlain by native soils consisting of light- to dark-gray clay with varying amounts of silt, peat, sand, and shells.

2.6.2 Regional and Site Hydrogeology

Groundwater flow is typically topographically influenced because shallow groundwater tends to originate in areas of topographic highs and flows toward areas of topographic lows such as rivers, stream valleys, ponds, and wetlands. A broader, interconnected hydrogeologic network often governs groundwater flow at depth or in the bedrock aquifer. Groundwater depth and flow direction are also subject to hydrogeologic and anthropogenic variables such as precipitation, evaporation, extent of vegetation cover, and coverage by impervious surfaces. Other factors influencing groundwater include depth to bedrock, the presence of fill, and variability in local geology and groundwater sources or sinks.

Groundwater was observed at depths between approximately 8.55 and 10.54 feet bgs with elevations ranging from approximately el. 2.82 to 3.28 feet during synoptic groundwater level measurements collected from six wells during the RI. Groundwater was calculated to flow to the west towards the confluence of Newtown Creek and the East River, consistent with the

inferred regional groundwater flow. A groundwater elevation contour map is presented as Figure 4.

Groundwater in this area of New York City is not used as a potable water source. Potable water provided to New York City is derived from surface impoundments in the Croton, Catskill, and Delaware watersheds.

2.7 Contamination Conditions

2.7.1 Conceptual Model of Site Contamination

A conceptual site model (CSM) was developed based on the findings of previous investigations and the RI. The purpose of the CSM is to develop a simplified framework for understanding the distribution of impacted media, potential migration pathways, and potentially complete exposure pathways, as discussed below.

Sources of Contamination

Potential sources of contamination include: historic fill, prior site use, a historical release of petroleum, and historical off-site uses.

- Historic Fill - The site-wide presence of historic fill was established as a source of SVOCs and metals in soil, including detections of hazardous lead concentrations.
- Prior Site Usage - Historical site use as a coal and lumber storage yard was established as a source of SVOCs and metals in soil, including detections of hazardous lead concentrations.
- Petroleum Release - A historical petroleum release was established as a source of VOCs and SVOCs in soil, VOCs in groundwater, and VOCs in soil vapor. Physical indicators of petroleum impacts (staining, odors, PID readings) in soil also support this conclusion.
- Historical Off-site Use - The source of VOCs in groundwater and soil vapor at the site may be related to the former NuHart Plastic Manufacturing facility.

Exposure Media

Impacted media include soil, groundwater and soil vapor. Soil contains SVOCs and metals at concentrations above regulatory standards (RURR SCOs). Emerging contaminants were identified in soil and groundwater. VOCs were detected in soil vapor and groundwater at the site.

Receptor Populations

Site access is currently limited to authorized construction personnel in the staging area and the site is otherwise vacant. Under future construction conditions, human receptors may include construction and remediation workers, authorized guests, and the public adjacent to the site. Under future use conditions, human receptors include residents, visitors, workers and customers at the residential/commercial building and the public adjacent to the site.

Description of Areas of Concern

Based on results from the RI and previous environmental investigations, the AOCs were revised from those presented in the RIWP (and in Section 2.3, above) and are described below:

AOC 1: Prior Site Use

Historical operations at the site include coal and lumber storage for more than 100 years from the late 1800s until about 1980; heavy construction equipment, machinery, and materials storage starting in 1980; and truck/vehicle parking and scaffolding materials storage until the 2000s. Leaks or spills of solvents (including chromated copper arsenate, a preservative used to treat lumber), petroleum products, and/or other hazardous substances associated with on-site operations were established as potential sources of SVOCs and metals exceeding the UU and/or RURR SCOs and hazardous concentrations of lead in soil.

AOC 2: Historic Fill

A historic fill layer was observed from surface grade to depths ranging from about 13 to 20 feet bgs, and consisted of gray to black fine-grained sand with varying amounts of gravel, silt, clay, brick, concrete, glass, coal ash, slag, wood, and coal. The site-wide presence of historic fill was established as a source of SVOCs and metals in soil, including detections of hazardous lead concentrations.

AOC 3: Petroleum Impacts

A historical petroleum release associated with Spill No. 1906491 was established as a potential source of VOCs and SVOCs in soil, one VOC in groundwater and VOCs in soil vapor at the site. Petroleum contamination (as evidenced by PID readings above background, odors, staining, and/or analytical data) was observed in soil borings across the site. Petroleum–related VOCs and SVOCs were not detected or not identified above the SGVs and are not affecting groundwater quality.

AOC 4: Historical Off-Site Uses

The NuHart Plastic Manufacturing facility may be a source of VOCs in soil vapor and groundwater.

An AOC and conceptual site model is included as Figure 3.

2.7.2 Nature and Extent of Contamination

This section evaluates the nature and extent of soil, groundwater, and soil vapor contamination.

Soil Contamination

Soil contamination is divided into the following classifications:

a) Historic fill

b) Petroleum-impacted soil

a) Historic fill

Historic fill contains several SVOCs, mainly polyaromatic hydrocarbons (PAH) and metals at concentrations above the UU and/or RURR SCOs. Hazardous concentrations of lead were in detected in three soil borings up to 6 feet bgs. Elevated total concentrations of SVOCs (above 500 ppm) were identified in one soil boring at a depth of 6 feet bgs and elevated concentrations of arsenic (above 50 ppm) was identified in one boring at a depth of 8 feet bgs. Historic fill was identified site-wide and ranges in depth from about 13 feet to 20 feet bgs based on visual observations and analytical results. SVOCs and metals above the RURR SCOs were confined to the historic fill layer and were not identified in native soil. Soil sample analytical results are shown on Figures 5A through 5C.

b) Petroleum-impacted soil

Petroleum contamination (as evidenced by PID readings above background, odors, staining, and/or analytical data) was observed above the groundwater table in soil from 6 to 8 feet bgs in the southern part of the site and from 4 to 6 feet bgs in the northern part of the site, and below the groundwater table in 10 soil borings from 12.5 to 18 feet bgs across the site. The maximum PID reading, 501 parts per million (ppm), was recorded in the central part of the site at 13 feet bgs. Analytical results for soil samples collected from 4 to 6 feet and 14 to 16 feet bgs in the northern part of the site and 15.5 to 17.5 in the southern part of the site exhibited petroleum-related VOCs at concentrations above the UU SCOs. Analytical results for the soil samples collected from the southern part of the site from 6 to 8 feet bgs and the northern part of the site from 15 to 17 feet bgs exhibited a petroleum-related SVOC (naphthalene) at a concentration above the UU SCOs. Based on the analytical results and field observations, subsurface, petroleum impacts encompasses an about 24,000-square-foot area. A historical petroleum release is the likely source of the petroleum contamination in the lower part of the historic fill layer. Petroleum–related VOCs and SVOC were not detected or not identified above NYSDEC SGVs and are not affecting groundwater quality.

Groundwater Contamination

Petroleum-related VOCs were not identified above the NYSDEC SGVs in groundwater. One chlorinated VOC, 1,2-dichloroethane, was detected above the NYSDEC SGVs in a well in the western part of the site. Groundwater analytical results are shown on Figure 6.

Dissolved manganese was detected in samples collected from four of six monitoring wells at concentrations above the NYSDEC SGVs. The presence of manganese in groundwater is attributed to naturally occurring, brackish groundwater conditions.

PFOA was detected above MCL of 10 nanograms per liter (ng/L) in groundwater samples from 6 monitoring wells. PFOS was detected above the MCL of 10 ng/L in 1 monitoring well in the southeastern part of the site. Perfluoropetanoic acid (PFPeA) was detected above the

recommended guidance of 100 ng/L in monitoring wells in the southern part of the site. Perfluorohexanoic acid (PFHxA) was detected was detected above the MCL of 100 ng/L in 1 monitoring well in the southern part of the site. Total PFAS were detected above the recommended guidance of 500 ng/L in 1 monitoring well in the southern part of the site.

1,4-dioxane was detected above the MCL of 1 ng/L at a concentration of 100 ng/L in groundwater samples from 2 monitoring wells in the central and northern parts of the site.

No source areas of PFAS and 1,4-dioxane were identified on-site. The source of PFAS and 1,4-dioxane is unknown.

Soil Vapor Contamination

VOCs were identified in soil vapor samples across the site. VOCs were not identified above the NYSDOH Air Guideline Values (AGV) or minimum concentrations for which mitigation is recommended. The source of VOCs may be an isolated on-site source or related to the former NuHart Plastic Manufacturing facility. Soil vapor sample analytical results are shown on Figure 7.

Qualitative Human Health Exposure Assessment

Human health exposure risk was evaluated for both current and future on-site and off-site conditions in accordance with NYSDEC DER-10. The assessment includes an evaluation of contaminant sources, contaminant release and transportation mechanisms, points of exposure, routes of exposure and receptor populations in an effort to determine whether complete exposure pathways exist.

In addition to the human health exposure assessment, NYSDEC DER-10 requires an on-site and off-site Fish and Wildlife Resources Impact Analysis (FWRIA) if certain criteria are met. According to the requirements stipulated in Section 3.10 and Appendix 3C of DER-10, there was no need to prepare an FWRIA for the site.

2.7.3 Site Setting

Current Conditions

The site footprint is covered by an impervious concrete and/or asphalt-paved lot. Groundwater in this area of New York City is not used as a potable water source.

Proposed Conditions (Construction/Remediation and Future Site Use)

The site will be redeveloped with one mixed-use residential and commercial building with 374 residential units and ground floor retail. The building will comprise a 6-story podium (no cellar) with a 22-story tower set back from Commercial Street. The building footprint is about 32,000 square feet in area and the remainder of the tax lot (about 12,600 square feet) will be open space with a mixture of hardscape and landscaped areas.

Summary of Environmental Conditions

AOCs include prior site use, historic fill, a petroleum release, and historical use of surrounding properties. Contaminants of concern (COC) associated with the AOCs include VOCs, SVOCs, and metals.

Historic fill contains SVOCs and metals above the UU and/or RURR SCOs and hazardous concentrations of lead.

Petroleum impacts, evidenced by odors, staining, PID readings above background levels, and/or analytical data, were identified in two soil borings LB07 and LB13 above the groundwater table (6 to 8 feet bgs and 4 to 6 feet bgs, respectively) and in 10 soil borings from below the groundwater table to a clay confining layer (about 12.5 to 18 feet bgs) in the northern part of the site. Petroleum-related VOCs and SVOCs were identified above the UU SCOs, but below the RURR SCOs in soil.

No chlorinated VOCs were identified above the NYSDEC SGVs in groundwater with the exception of a single isolated detection of 1,2-dichloroethane.

VOCs were identified in soil vapor across the site. The source of VOCs may be an isolated on-site source or related to the former NuHart Plastic Manufacturing facility.

2.7.4 Potential Exposure Pathways – On-Site

Current Conditions

Historic fill/soil below site cover is contaminated with VOCs, SVOCs and metals. The site footprint is covered by an impervious concrete and/or asphalt-paved lot. Exposure to contaminated soil/fill is possible during subsurface investigations or via cracks or holes in asphalt or concrete through dermal absorption, inhalation, and ingestion pathways.

Groundwater at the site is contaminated with VOCs and has natural occurring dissolved metals present. Groundwater in this area of New York City is not used as a potable water source. There is a potential exposure pathway through dermal absorption, inhalation, and ingestion during groundwater sampling associated with site investigation.

Soil vapor at the site is impacted with VOCs. There are no structures currently on-site and, therefore, there is no exposure risk through vapor intrusion.

Construction/Remediation Condition

Construction and remediation includes the excavation and off-site disposal of contaminated soil and historic fill, importing of soil and fill material, and construction of a SMDS and a capping system. During construction and remediation, points of exposure will include disturbed and exposed historic fill/soil and dust and organic vapors generated during excavation. Groundwater is not expected to be encountered during remedial excavation and foundation construction because the design elevation for the foundation is above the groundwater table. Potential routes of exposure will include ingestion, dermal absorption and inhalation (dust) of historic fill/soil and

inhalation of organic vapors arising from contaminated soil. The receptor population includes construction and remediation workers.

Proposed Future Use Condition

For the planned future use condition, residual contamination will likely remain on-site in soil, groundwater and soil vapor. In the absence of EC/ICs, exposure risk would exist through ingestion, inhalation and dermal contact with residual contaminants.

2.7.5 Potential Exposure Pathways – Off-Site

Currently the site is covered with impervious, concrete and/or asphalt surface cover and fenced, limiting community exposure to dust, vapors or odors that may emanate from the site with the current asphalt/concrete are disturbed. Groundwater is not potable in this part of New York City.

Soil has the potential to be transported off-site by wind in the form of dust or on the tires of vehicles or equipment leaving the site during site remediation and construction. During construction, soil vapor may migrate vertically through the subsurface and dissipate and dilute with ambient air in instances where the surface cover is compromised or removed during construction.

After site remediation and redevelopment, the site will be completely covered with a combination of building foundations, pavement, at least 2 feet of fill material (i.e., soil meeting the lower of RURR or PGW SCOs) and an active SMDS, mitigating off-site exposure to residual contamination that will remain in soil, groundwater and soil vapor after site remediation is complete. Complete off-site exposure pathways to human receptors may exist and, if necessary, engineering controls should be implemented by others to prevent complete exposure pathways.

2.7.6 Evaluation of Human Health Exposure

Based on the CSM and the review of environmental data, complete on-site and off-site exposure pathways are present, in the absence of implementation of CAMP and HASP/Construction Health and Safety Plans (CHASP) and institutional and engineering controls, under current, construction and remediation, and future conditions. The complete exposure pathways indicate there is a risk of exposure to humans from site contaminants via exposure to soil, groundwater, and soil vapor in the absence of CAMP and HASP/CHASPs and institutional and engineering controls.

Complete exposure pathways have the following five elements: 1) a contaminant source; 2) a contaminant release and transport mechanism; 3) a point of exposure; 4) a route of exposure; and 5) a receptor population. A discussion of the five elements comprising a complete pathway as they pertain to the site is provided below.

Current Conditions

Contaminant sources include 1) historic fill with varying levels of SVOCs and metals, including detections of hazardous lead concentrations; 2) petroleum contamination in soil, groundwater and soil vapor; and 3) VOCs in groundwater and soil vapor.

Contaminant release and transport mechanisms and routes of exposure include contaminated soil transported as dust (dermal, ingestion, inhalation), contaminated groundwater flow (dermal contact), and volatilization of contaminants from the soil and groundwater matrices to the soil vapor phase (inhalation).

Under current conditions, the likelihood of soil, groundwater or soil vapor exposure to on-site and off-site human receptors is limited, as the site is capped with impervious surface cover, the site is mostly vacant except for use by few construction workers, and no buildings are currently present on-site. Exposure to contaminants in soil, groundwater and soil vapor via dermal contact, ingestion or inhalation during site investigation is low, as these activities occur under a Health and Safety Plan (HASP) with CAMP to limit exposure to site workers and the community. In addition, groundwater is not used as potable water source, precluding any complete exposure pathway to impacted groundwater.

Construction/Remediation Activities

During construction and remediation, points of exposure will include disturbed and exposed historic fill/soil and dust and organic vapors generated during excavation. Groundwater is not expected to be encountered during remedial excavation and foundation construction because the design elevation for the foundation is above the groundwater table. Potential routes of exposure will include ingestion, dermal absorption and inhalation (dust) of historic fill/soil and inhalation of organic vapors arising from contaminated soil. The receptor population includes construction and remediation workers and, to a lesser extent, the public adjacent to the site.

The potential for a complete exposure pathways is present since all five elements exist; however, the risk will be minimized by the implementation of appropriate health and safety measures in accordance with a RAWP, which will include a CHASP, an SMMP and a CAMP. These measures include conducting an air-monitoring program, donning the appropriate PPE, covering soil stockpiles, altering work sequencing, maintaining a secure construction entrance, cleaning truck undercarriages before the leave the site, proper housekeeping, and applying vapor and dust suppression measures to prevent off-site migration of contaminants during construction. These measures will be implemented to prevent completion of exposure pathways.

Proposed Future Conditions

For the proposed future condition, residual contamination will remain on-site based on the remedy and development plans. If residual impacts exist and institutional and/or engineering controls are not implemented, points of exposure would include potential cracks in the foundation or slab of the proposed development and exposure during any future soil-disturbing activities. The receptor population includes the building occupants and employees, visitors, and workers. Complete exposure pathways can be avoided or mitigated by the remediation of historic fill, construction and maintenance of the site capping system (i.e., concrete or at least 2 feet of soil) and an active SMDS, and implementation of a SMP (required by an easement placed on the site).

Human Health Exposure Assessment Conclusions

1. Under current conditions, there is a marginal risk for human exposure to site contaminants. The primary exposure pathways are for dermal contact, ingestion, and/or inhalation of soil, soil vapor, and/or groundwater by occasional construction workers and site investigation workers, and to a much lesser extent to the community in the vicinity of the site. The exposure risks can be avoided or minimized by implementing the site-specific HASP and CAMP during investigation activities.
2. In the absence of a CHASP and CAMP, there is a moderate risk of exposure during construction and remediation activities. The primary exposure pathways are:
   a. Dermal contact, ingestion, and inhalation of historic fill/soil by construction workers.
   b. Inhalation of historic fill (airborne dust and vapors) by the community in the vicinity of the site.

   These exposure risks can be avoided or minimized by implementing the site-specific CHASP and CAMP.
3. The existence of a complete exposure pathway for site contaminants to human receptors (both on- and off-site) during proposed future use conditions is unlikely, as sources of contamination will be partially removed during the construction/remediation phase and residual contamination will be managed with an engineered composite cover system, an active SMDS, and an easement and Site Management Plan.
4. Regional groundwater is not used as a potable water in Kings County so there is no potential exposure to site-specific or regional groundwater contaminants. r.

2.8 Remedial Action Objectives

Based on the results of previous investigations and the RI, the following Remedial Action Objectives (RAO) were identified:

2.8.1 Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Remove the source of groundwater contamination.

2.8.2 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.

- Prevent inhalation exposure to contaminants volatilizing from soil.

RAOs for Environmental Protection

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

2.8.3 Soil Vapor

RAOs for Public Health Protection

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

3.0 DESCRIPTION OF REMEDIAL ACTION

This section presents an evaluation of the proposed remedial alternatives. The proposed SCOs will be UU SCOs for Alternative I and site-specific SCOs for Alternative II.

This section is organized as follows:

- Sections 3.1 and 3.2 provide technical descriptions of:
  - Alternative I, a Track 1/Unrestricted Use remedy
  - Alternative II, a Track 4/Restricted Use – Restricted Residential remedy
- Section 3.3 evaluates the remedial alternatives based on the BCP Remedy Selection Evaluation Criteria
- Section 3.4 summarizes the recommended remedial alternative

3.1 Alternative I – Technical Description

Summary of Alternative I – Track 1 Remedy

Alternative I, a Track 1 remedy, would include implementation of the following remedial elements:

1. Development and implementation of a CHASP and CAMP for the protection of on-site workers, visitors, and the environment during remediation and construction activities;
2. Screening of soil for indications of contamination source areas, by visual, olfactory, or instrumental methods, during any intrusive site work - During removal of surface cover in contact with site soil, observation of C&D material and site soil segregation to document that site soil was not comingled with the contractor's C&D material will be completed.
3. Screening for indications of contamination source areas, by visual, olfactory, or instrumental methods, of excavated soil during any intrusive site work;
4. Excavation and removal of all historic fill and/or soil exceeding the UU SCOs from across the site (estimated to depths of about 13 to 20 feet bgs);
5. Decommissioning and removal of discovered USTs in accordance with NYSDEC DER-10 5.4(b)(5);
6. Appropriate off-site disposal of soil and historic fill removed from the site in accordance with federal, state, and local rules and regulations for handling, transport, and disposal;
7. Construction of a support of excavation (SOE) system and design, construction, and operation of a dewatering system to facilitate remedial excavation;
8. Collection and analysis of confirmation soil samples in accordance with DER-10 to evaluate the performance of the remedy with respect to attainment of UU SCOs; and
9. Backfilling of remediated areas to design grade with certified-clean granular fill material (i.e., soil meeting UU SCOs), virgin quarry stone, or recycled concrete aggregate (RCA).

The requirements for each of the Track 1 tasks are described below. Estimated costs for this are shown in Table 2.

On-Site Worker, Public Health and Environmental Protection

A site-specific CHASP is required to protect on-site workers from accidents and acute and chronic exposures from the identified contaminated media. Each contractor performing RAWP operations on the site will have and enforce a HASP that, at a minimum, meets the CHASP criteria. Public health will be protected by implementing and enforcing dust, odor, and organic vapor control as specified in the CAMP. The CAMP would include continuous perimeter monitoring of dust and organic vapors utilizing DustTrak aerosol monitors and PIDs capable of recording data and calculating 15-minute averages. Field personnel, supervised by the Remedial Engineer (RE), will monitor site perimeters for visible dust and odors. The environment will be protected by implementing and enforcing the appropriate soil erosion prevention measures.

Excavation, SOE, and Fill Removal

To achieve Track 1, the existing site cover will be removed to facilitate remedial excavation. Remedial excavation will include the removal of historic fill exceeding the UU SCOs across the site. The estimated volume of soil and historic fill requiring removal and off-site disposal for a Track 1 cleanup is about 28,000 cubic yards, 50 cubic yards of hazardous lead-impacted soil, and 20 cubic yards of SVOC-impacted soil. To accommodate removal of soil that exceeds UU SCOs, an SOE system would be constructed. This estimate is based on the complete removal of historic fill exceeding UU and PGW SCOs across the site. The extent of the Track 1 remedial excavation is shown on Figure 8.

UST System Removal

There are no known USTs identified on the site. Any USTs encountered during remedial and/or foundation excavation will be decommissioned in accordance with 6 NYCRR Part 613.9, NYSDEC Commissioner's Policy (CP)-51, and other applicable NYSDEC tank closure requirements including DER-10 Section 5.5. Any petroleum-contaminated soil will be characterized and removed in accordance with state guidance. USTs will be registered with the NYSDEC petroleum bulk storage (PBS) unit, as necessary.

Excavation Dewatering

Dewatering of groundwater will be required to reach the proposed excavation depths. Prior to dewatering, a temporary pre-treatment system will be implemented, as necessary, and a SPDES permit equivalent will be obtained to discharge dewatered groundwater into the storm sewer under Bell Slip, which drains to the East River.

Confirmation Soil Sampling

Confirmation soil samples will be collected from the excavation base at a frequency of one per 900 square feet. Sidewall samples will be collected unless SOE measures (e.g., sheeting, lagging or sloping) preclude access to soil sidewalls. Based on these criteria, about 48 confirmation endpoint soil samples, plus QA/QC samples, will be collected to confirm remedial performance and will be analyzed for the 6 NYCRR Part 375 VOCs, SVOCs (including 1,4-dioxane), pesticides/herbicides, PCBs, metals, and PFAS. Over-excavation may be required as necessary to remove soil that does not comply with the SCOs. If over-excavation is completed, additional confirmation samples will be required.

Excavation Backfill

After the remedial excavation, the site will be backfilled to design grade. Backfill material will consist of soil/fill meeting the UU SCOs or other acceptable fill material such as virgin quarry stone or RCA. All imported fill material must be sourced from appropriately licensed facilities with no history of environmental contamination. If sampling of the proposed soil/fill is required, qualified environmental personnel will collect representative samples at a frequency consistent with DER-10. The samples will be analyzed for 6 NYCRR Part 375 VOCs, SVOCs (including 1,4-dioxane), pesticides/herbicides, PCBs, metals, and PFAS, by a NYSDOH ELAP-certified laboratory. No sampling of virgin quarry stone or RCA is anticipated unless the quarry stone or RCA is a blended-product or contains fines in excess of 10% by weight passing through a No. 80 sieve. The estimated quantity of soil to be imported to the site for cover soil and backfill material is about 30,800 cubic yards.

3.2 Alternative II – Technical Description

Alternative II, a Track 4 remedy, would include implementation of the following remedial elements:

1. Development and implementation of a CHASP and CAMP for the protection of on-site workers, visitors, and the environment during remediation activities;
2. Screening of soil for indications of contamination source areas, by visual, olfactory, or instrumental methods, during any intrusive site work - During removal of surface cover in contact with site soil, observation of C&D material and site soil segregation to document that site soil was not comingled with the contractor's C&D material will be completed.
3. Screening for soil for indications of contamination source areas, by visual, olfactory, or instrumental methods, of excavated soil during any intrusive site work;
4. Construction of a support of excavation (SOE) system to facilitate hotspot soil excavations, as necessary;
5. Excavation, stockpiling, off-site transport, and disposal of historic fill to achieve a Track 4 cleanup. Soil exceeding the following site-specific SCOs will be removed to achieve a Track 4 cleanup:

a. Soil exceeding the RURR SCOs within the 0- to 2-foot bgs interval across the site.

b. Soil exceeding the 6 NYCRR Part 371 hazardous criteria for lead.

c. Soil containing total SVOCs exceeding 500 ppm.

d. Soil with evidence of petroleum or chemical-like (visual, olfactory, and/or PID above background) encountered during excavation of deeper foundation components (mats, pile caps, elevator pits).

6. Collection of endpoint soil samples from the base and sidewalls of hotspot excavations after soil is removed to confirm the Track 4 site-specific SCOs are met. Hotspots include areas with hazardous concentrations of lead and SVOCs exceeding 500 ppm.
7. Decommissioning and removal of any discovered USTs in accordance with NYSDEC DER-10 5.4(b)(5).
8. Appropriate off-site disposal of historic fill and soil from the site in accordance with federal, state, and local rules and regulations for handling, transport, and disposal.
9. Collection and analysis of documentation soil samples in accordance with DER-10 at the completion of the general 2-foot remedial excavation across the site to document post-remediation soil quality.
10. Demarcation of residual (existing) soil and historic fill outside of the proposed building footprint by survey or by a high-visibility demarcation barrier for visual reference.
11. Import of materials for composite cover and backfill, where required, in compliance with RURR or PGW SCOs (whichever is more stringent), 6 NYCRR Part 360 regulations, NYSDEC DER-10, NYSDEC 2021 PFAS Guidance, and federal, state, and local rules and regulations for handling and transport of imported soil/fill material.
12. Installation and operation of an active SMDS that includes a vapor barrier membrane (20-millimeter (mil) minimum thickness), below the foundation of the proposed building to mitigate soil vapor intrusion from VOCs in the subsurface.
13. Construction of a composite cover system consisting of concrete pavement, manufactured paving stones or bricks, asphalt pavement or, a minimum of 2 feet of soil that meets the lower of the RURR and PGW SCOs or virgin quarry stone (in landscaped areas).
14. Recording of ICs in an Environmental Easement.
15. Preparation of a Site Management Plan (SMP) that describes management of the ECs and ICs – Implementation of the SMP following completion of the remedy will be required by the Environmental Easement.
16. Overall performance of the remedial action including permitting requirements, in accordance with applicable federal, state, and local rules and regulations with NYSDEC approval.

The requirements for each of the Track 4 tasks are described below.

On-Site Worker, Public Health and Environmental Protection

A site-specific CHASP will be enforced to protect on-site workers from accidents and acute and chronic exposures from the identified contaminated media. The site CHASP is included as Appendix C. Each contractor performing RAWP operations on the site will have and enforce a HASP that, at a minimum, meets the CHASP criteria. Public health will be protected by implementing and enforcing dust, odor, and organic vapor control as specified in the CAMP (Appendix D). The CAMP includes continuous perimeter monitoring of dust and organic vapors utilizing DustTrak aerosol monitors and PIDs capable of recording data and calculating 15-minute averages. Field personnel, supervised by the RE, will monitor site perimeters for visible dust and odors. The environment will be protected by implementing and enforcing the appropriate soil erosion prevention measures.

Excavation and Fill Removal

To achieve Track 4, the existing site cover will be removed to facilitate remedial excavation. Anticipated excavation depths are as follows:

- The entire site will be excavated to 2 feet bgs (el. 10 feet) for remedial purposes.
- Remedial hotspot excavations to remove hazardous concentrations of lead will extend to at least 1 foot below the depth of sample collection depths, including to about 4 feet bgs (el. 8 feet) around RI boring LB17, 7 feet bgs (el. 5 feet) around LB18, and 7 feet bgs (el. 5 feet) around LB22.Although PFOA is not a contaminant of concern, the hotspot excavation at LB18 will also serve to remove soil from 4 to 6 feet bgs containing PFOA at a concentration above the NYSDEC screening level. Each hotspot excavation will be about 10 feet long and 10 feet wide. Endpoint samples will be collected from the base and four sidewalls of the hotspot excavations and analyzed for TAL metals. The sample with the highest concentration of total lead will also be analyzed for TCLP lead. The hazardous lead excavation will extend to the point where TCLP endpoint samples indicate that soil is non-hazardous. Endpoint samples collected at the LB18 hotspot will be analyzed for PFAS in addition to TAL metals.
- A remedial hotspot excavation to remove soil with total SVOC concentrations above 500 ppm will extend to about 9 feet bgs (el. 2 feet) around RI boring LB16. The hotspot excavation at LB16 (advanced in the same location as LB11) will also serve to remove soil from 6 to 8 feet bgs containing arsenic at an elevated concentration. Each hotspot excavation will be about 10 feet long and 10 feet wide. Endpoint samples will be collected from the base and four sidewalls of the hotspot excavations and analyzed for SVOCs and TAL metals. The SVOC hotspot excavation will extend to the point where endpoint samples indicate that total SVOCs are below 500 ppm. Excavation areas are shown on

Figure 9. Any additional source material encountered during remedial excavation will be excavated and disposed of off-site,. The estimated volume of soil and historic fill requiring removal and off-site disposal for this Track 4 cleanup includes about 3,400 cubic yards of historic fill, 50 cubic yards of hazardous lead-impacted soil, and 20 cubic yards of SVOC-impacted soil.

- If encountered, soil with evidence of petroleum or chemical-like (visual, olfactory, and/or PID above background) encountered during excavation of deeper foundation components (mats, pile caps, elevator pits) as described in 4.2.7.

UST System Removal

There are no known USTs at the site. Any USTs encountered during remedial and/or foundation excavation will be decommissioned in accordance with 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC tank closure requirements including DER-10 Section 5.5. Documentation soil samples will be collected in accordance with DER-10. Any petroleum-contaminated soil will be characterized and removed in accordance with state guidance. USTs will be registered with the NYSDEC PBS unit, as necessary.

Documentation Soil Sampling

Documentation soil samples will be collected from the excavation base at a frequency of one per 900 square feet. Sidewall samples will be collected unless SOE measures (e.g., sheeting or lagging) preclude access to soil sidewalls; sidewall samples will be collected if SOE measures consist of sloping. Based on these criteria, about 48 documentation soil samples, plus QA/QC samples, will be collected to confirm remedial performance and will be analyzed for the Part 375 list of VOCs, SVOCs (including 1,4-dioxane), PCBs, pesticides/herbicides, metals, PFAS. The proposed documentation soil sampling plan is shown on Figure 10.

Demarcation

After excavation and soil/fill removal activities are complete and before backfilling with imported soil or fill material and placing the composite cover system, the top elevation of residual contaminated soil or historic fill will be surveyed by a New York State-licensed surveyor (except under the new building footprint) and a physical high-visibility demarcation layer, consisting of orange snow fencing material or equivalent material will be placed on this surface to provide a visual reference for demarcation. The survey will constitute the written record of the top of the remaining contamination zone that requires adherence to special conditions for disturbance of contaminated residual soil defined in the SMP. The demarcation survey or map showing the location and extents of the high-visibility demarcation barrier will be included in the Final Engineering Report (FER) and the SMP.

Excavation Backfill

After the remedial excavation, the site will be backfilled to design grade. Backfill material will consist of soil/fill meeting the lower of RURR and PGW SCOs or other acceptable fill material such as virgin quarry stone or RCA from a NYSDEC registered facility. All imported fill material must be sourced from appropriately licensed facilities with no history of environmental contamination. If sampling of the proposed soil/fill is required, qualified environmental personnel will collect representative samples at a frequency consistent with DER-10 Section 5.4(e). The samples will be analyzed for 6 NYCRR Part 375 VOCs, SVOCs (including 1,4-dioxane), pesticides/herbicides, PCBs, metals, PFAS, by a NYSDOH ELAP-certified laboratory. No sampling of virgin quarry stone or RCA is anticipated unless the quarry stone or RCA is a blended-product or contains fines in excess of 10% by weight passing through a No. 80 sieve. Documentation of the source of fill must be provided to the NYSDEC for approval before it is used on site. The estimated quantity of soil to be imported to the site for cover soil and backfill material is about 3,800 cubic yards.

Vapor Mitigation System

The vapor mitigation system will consist of an active SMD system beneath a vapor barrier. The vapor barrier membrane will be installed under the new building slab and on foundation sidewalls. The vapor barrier will consist of GCP Applied Technologies Florprufe® 120 (21-mil [thousandth of an inch] thickness) membrane (or approved alternate). The vapor barrier membrane will be installed under horizontal surfaces and vertical surfaces (i.e., elevator pit walls and subgrade foundation walls to surface grade). Welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration.

An active SMDS will be installed under the new vapor barrier membrane and building slab to mitigate soil vapor intrusion into the building from VOCs in the subsurface. SMDS create depressurized (low vacuum) fields beneath the floor slabs by extracting the sub-slab air with a ventilator fan mounted on the roof of the building. These low vacuum fields reverse the natural pressure gradient and divert potentially-impacted vapors from the subsurface of the building to the atmosphere above the rooftop of the building, thereby reducing the potential for vapor intrusion. The design for the SMDS will be in-part based on the USEPA document EPA/625/R-92/016 for the sub-slab depressurization of large buildings and schools and the NYSDOH's "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006).

The system will include a network of horizontal piping set in the middle of a gas permeable gravel layer immediately beneath the building slab and vapor barrier membrane; the horizontal piping will consist of 4-inch-diameter, slotted, PVC vapor collection piping wrapped with polyester filter sleeve. The sub-membrane piping will be connected to 4-inch steel riser piping that will penetrate the slab and travel through the building to the roof. The gas permeable layer will consist of a minimum 8-inch-thick layer of 3/4-inch gravel. The piping will be finished above the roof line with blowers and fittings to prevent rain infiltration. The active SMDS will be hardwired and will

include an AirTech® 3BA1300 or 3BA1400 series blower or an approved alternative installed at roof level. The system will include riser pressure gauges and alarm located in accessible building areas.

The vapor mitigation system will serve as an EC for the protection of human health by mitigation of soil vapor intrusion and potential inhalation exposures. As-built construction layout and details will be included in the FER. The vapor mitigation system will be inspected and maintained and its performance certified at specified intervals as required by the SMP.

The SMDS design set is included as Appendix E.

Composite Cover System

A composite cover system will be installed to allow for mixed-use commercial and residential use of the site. The composite cover system will consist of the concrete foundation slab, pavers, asphalt or a minimum of 2 feet of soil that meets the lower of RURR or PGW SCOs or virgin quarry stone in landscaped areas. Any soil that is imported to the site will require sampling and approval from the NYSDEC. The composite cover system will serve as an EC for the protection of human health by preventing direct contact with and ingestion and inhalation of contaminated soil.

Engineering Controls and Institutional Control

The ECs for the Track 4 remedy are the vapor mitigation system (active SMDS with vapor barrier membrane) and composite cover system. An Environmental Easement will be recorded referencing ECs/ICs that are part of the selected remedy, which will be binding upon all subsequent owners and occupants of the property. The Track 4 cleanup will require ICs that will restrict the use of the site to restricted-residential uses; the easement will allow less restrictive uses such as commercial use and will require implementation of an SMP. The SMP will identify EC/IC monitoring, maintenance, and certification requirements.

3.3 Evaluation of Remedial Alternatives

The following is an evaluation of the proposed remedy based on the NYSDEC BCP remedy evaluation criteria listed below. The first two criteria are considered "threshold criteria" and the remaining criteria are "balancing criteria". A remedial alternative must meet the threshold criteria to be considered and evaluated further under the balancing criteria.

A. Protection of human health and the environment

B. Compliance with standards, criteria, and guidance

C. Short-term effectiveness and impacts

D. Long-term effectiveness and permanence

E. Reduction of toxicity, mobility, or volume of contaminated media

F. Implementability

G. Cost effectiveness

H. Community acceptance

I. Land use

3.3.1 Protection of Public Health and the Environment

Alternative I – The remedy will mitigate remove pathways to on-site contaminated media. Remediating the site to Track 1 standards will result in the removal of on-site soil exceeding UU SCOs. The RAOs for public health and environmental protection will be met through the removal of contaminated soil, which will eliminate any possibility for ingestion and inhalation of or dermal contact with contaminated soil particles, groundwater, and soil vapor.

Alternative II – The remedy will mitigate exposure pathways to on-site contaminated media. Under Alternative II, soil and historic fill exceeding the site-specific SCOs will be removed and disposed of off-site. A composite cover system will preclude direct contact, ingestion and inhalation of contaminated soil particles. The vapor intrusion risk will be mitigated by the installation of vapor mitigation system (active SMDS with vapor barrier membrane).

Public health will be protected during remediation activities under both remedial alternatives by implementing the CAMP, and dust, odor, and organic vapor control and mitigation procedures when needed. The environment will be protected by implementing and enforcing a Stormwater Pollution Prevention Plan (SWPPP).

3.3.2 Compliance with Standards, Criteria, and Guidance

Alternative I – Remediating the site to Track 1 cleanup standards will comply with all applicable SCGs due to the removal of all impacted on-site soil and historic fill.

Alternative II – Alternative II complies with the SCGs by removing approximately two feet of soil from across the site plus additional soil in hazardous lead and total SVOC hotspots. Residual soil exceeding the UU SCOs will be mitigated with ECs and ICs.

Both remedial alternatives will also comply with SCGs that involve protection of the public health and environment during the remedial action by implementing and enforcing a site-specific CHASP and CAMP.

3.3.3 Short-Term Effectiveness and Impacts

Alternatives I and II – The most significant short-term adverse impacts and risk to the community will be through the migration of contaminants carried in dewatering fluid (Alternative I only), vapor and dust generated during construction. Additional short-term adverse impacts include potential obstructions on roadways, and pedestrian traffic associated with construction.

Both Alternatives I and II will require 25-cubic-yard capacity truck trips to haul excavated soil and historic fill and imported backfill required for the remediation and construction program. A Track 1 remedy will require a substantial increase in the number of 25-cubic yard truck trips over the Track 4 remedy and generation of dewatering fluid due to the site-wide excavation depth. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at site entrances and exits under both alternatives. The effects of these potential adverse impacts to the community, workers and the environment will be minimized by implementing appropriate control plans (including the CHASP, CAMP, and dust, odor and vapor control measures).

3.3.4 Long-Term Effectiveness and Impacts

Alternative I – The Track I remedy will remove all historic fill and soil exceeding the UU SCOs from the site. Because an Environmental Easement and SMP are not required as part of the Track 1 remedy, Article 141 of the NYSDOH code will be relied upon to prevent ingestion of groundwater, which prohibits potable use of groundwater without prior approval. Future site use will be unrestricted; therefore, the long-term effectiveness of this remedy will eliminate known environmental risks and satisfy the objectives of this criterion.

Alternative II - Residual soil contamination left in place under a Track 4 remedy will be addressed with the composite site cover system in perpetuity. Potential exposure pathways for soil vapor that may migrate onto the site will be minimized through the construction of vapor mitigation system (active SMDS with vapor barrier membrane). Long-term management of these ECs will be accomplished through adherence to the SMP and Environmental Easement and other ICs that restrict groundwater use. The long-term effectiveness of the Track 4 remedy will mitigate risks to the extent needed to protect human health and the environment and satisfy the objectives of this criterion.

3.3.5 Reduction of Toxicity, Mobility, or Volume of Contaminated Media

Alternative I – The Track I remedy will permanently and significantly reduce the toxicity, mobility, and volume of contamination through excavation and removal of all on-site historic fill exceeding the UU SCOs. Therefore, Alternative I provides the greatest reduction of the toxicity, mobility, and volume of contaminated soil and historic fill.

Alternative II - The Track 4 remedy will also reduce the toxicity, mobility, and volume of soil contamination across the site through the excavation of approximately two feet of soil from across the site plus additional soil in hazardous lead and total SVOC hotspots. The Track 4 remedy will also mitigate the potential for soil vapor intrusion into the site building through the installation of vapor mitigation system (active SMDS with vapor barrier membrane) below the building foundation.

3.3.6 Implementability

Alternative I – Implementing the Track 1 remedy is less feasible because of the substantial increase in excavation volume and backfill required for the site-wide remedial excavation, and significant dewatering and support of excavation to reach the excavation depths required to meet Track 1 standards. Track 1 remedial activities will significantly increase remediation costs and duration of remediation activity, thereby making this remedy more difficult to implement.

Alternative II - Implementing the Track 4 remedy is feasible and more easily implementable because the depth of remedial excavation is more easily achieved with conventional construction and earthmoving methods and equipment, including the use of standard bucket excavators, and dewatering will not be necessary. Track 4 remedial activities will be significantly less expensive and faster than the Track 1 remedy, thereby making this remedy easier to implement.

Contractors experienced in implementing the described remedies are readily available in the area of the site.

3.3.7 Cost Effectiveness

The estimated remediation cost of each cleanup track is as follows:

- Track 1 remedy: about $11.6 million
- Track 4 remedy: about $4.5 million

Tables 2 (Track 1) and 3 (Track 4) detail the estimated costs needed to achieve each remedy.

Based on the assumptions detailed for Alternative I, including removal of all historic fill exceeding UU SCOs, and dewatering across the site, the estimated remediation cost of a Track 1 cleanup is $11.6 million. As the site would be remediated to an unrestricted use designation, there would not be any long-term operations, maintenance, or monitoring costs associated with the proposed remedy.

Based on the assumptions detailed for Alternative II, including removal of the top 2 feet of historic fill across the site and up to 9 feet bgs for SVOC and lead-impacted hotspot locations, construction of an engineered composite cover system, vapor mitigation system (active SMDS with vapor barrier membrane), and implementation of ICs, the estimated remediation cost of a Track 4 cleanup is $4.6 million. In this scenario, long-term operations, maintenance, or monitoring costs associated with ECs and ICs are required.

3.3.8 Community Acceptance

The Track 1 remedy will be acceptable to the community because the potential exposure pathways from residual contamination to site occupants will be mitigated upon completion of the remedial actions. The Track 4 remedy will also be acceptable to the community, as RAOs will be met through removal of contaminated fill and the use of ECs and ICs to prevent exposure to residual impacted soil and historic fill and/or off-site contamination. The Track 1 remedy will be less acceptable to the community due to the increased truck traffic, construction noise and longer construction time associated with complete removal of soils above Track 1 SCOs.

3.3.9 Land Use

The current, intended, and reasonably anticipated future land use of the site and its surroundings are compatible with the selected remedy. The future proposed development is one mixed-use commercial and residential building with affordable housing. Review of previous environmental and public documents for the site led to the following conclusions:

1. The proposed use of the site and its surroundings will be compatible with the selected remedy.
2. The proposed site use conforms to applicable zoning laws and maps.
3. The proposed site use conforms to historical and/or recent development patterns in the area.
4. The site does not fall within the boundaries of an existing Brownfield Opportunity Area (BOA) or New York State Environmental Zone (En-Zone).
5. The site is located in an urban area characterized by mixed-use residential, commercial, light industrial, and institutional uses.
6. The site does not fall within a potential environmental justice area.
7. There are no federal or state land designations.
8. The population growth patterns and projections support the proposed land use.
9. The site is accessible to existing infrastructure.
10. The site is not in close proximity to important cultural resources, including federal or state historic or heritage sites or Native American religious sites.
11. No NYSDEC-regulated wetlands or ecological receptors are located on the site.
12. Groundwater is not used as a potable water source in New York City. Potable water provided to the City of New York is derived from surface impoundments in the Croton, Catskill, and Delaware watersheds.
13. According to the Preliminary National Flood Insurance Program Firm map titled "City of New York New York, Bronx, Richmond, New York, Queens, And Kings Counties", Panel 202 of 457, map number 3604970202G, dated December 5, 2013, a portion of the subject property lies within Zone AE (El. 11 NAVD88), an area where the base flood elevation is determined and a portion of the subject property lies within Zone X (shaded), areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

3.4 Summary of the Selected Remedy

The Track 4 (Alternative II) remedy is the selected remedy for this site. The Track 4 remedy achieves the remedial action objectives established for the project, and is effective in the short- and long-terms. The selected remedy effectively reduces mobility, toxicity, and volume of contaminants. The exposure pathways to residual soil contaminants will be controlled through the use of an engineered composite cover system and vapor mitigation system (active SMDS with vapor barrier membrane), will protect against potential vapor intrusion from VOCs in the

subsurface. ICs are designed to make the remedy protective of human health and the environment in the future. The remedy is considered feasible and cost effective because the excavation depths do not present significant hardship or increased risk. Alternative II can be feasibly and practically implemented, while providing protection to human health and the environment. For these reasons, Alternative II is the recommended remedial alternative for this site.

4.0 REMEDIAL ACTION PROGRAM

4.1 Governing Documents

The primary documents governing the remedial action are summarized in this section. Where indicated, copies of the full plans are provided in the appendices.

4.1.1 Standards, Criteria and Guidance

The following standards, criteria, and guidance are typically applicable to Remedial Action projects in New York State, and will be consulted and adhered to as applicable:

4.1.2 Standards and criteria typically applicable to UST closures

- 6 NYCRR Part 613 - Petroleum Bulk Storage
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes
- 6 NYCRR Subpart 374-2 - Standards for the Management of Used Oil
- 6 NYCRR Parts 700-706 - Water Quality Standards
- 40 CFR Part 280 - Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks

4.1.3 Guidance typically applicable to UST closures

- STARS #1 - Petroleum-Contaminated Soil Guidance Policy (1992) (Sections III and IV have been replaced CP-51)
- STARS #2 - Biocell and Biopile Designs for Small-Scale Petroleum-Contaminated Soil Projects (1996)
- CP-51- Soil Cleanup Guidance (2010)
- Spill Response Guidance Manual (1995)
- Permanent Closure of Petroleum Storage Tanks (2003)
- TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
- TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations (1998, Addenda 2000 and 2004)
- DAR-1 (formerly Air Guide 1) (1997) - Guidelines for the Control of Toxic Ambient Air Contaminants
- NYSDOH Environmental Health Manual CSFP-530 - "Individual Water Supplies - Activated Carbon Treatment Systems"

4.1.4 Standards and Criteria Typically Applicable to Remedial Actions

- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
- 40 CFR Part 144 - Underground Injection Control Program

- 10 NYCRR Part 67 – Lead Poisoning Prevention and Control
- 12 NYCRR Part 56 - Industrial Code Rule 56 (Asbestos)
- 6 NYCRR Part 175 - Special Licenses and Permits--Definitions and Uniform Procedures
- 6 NYCRR Part 360 - Solid waste Management Facilities General Requirements
- 6 NYCRR Part 361 - Material Recovery Facilities
- 6 NYCRR Part 364 - Waste Transporters
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes
- 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities
- 6 NYCRR Subpart 373-4 - Facility Standards for the Collection of Household Hazardous Waste and Hazardous Waste from Conditionally Exempt Small Quantity Generators
- 6 NYCRR Subpart 374-1 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
- 6 NYCRR Subpart 374-3 - Standards for Universal Waste
- 6 NYCRR Part 375 - Environmental Remediation Programs
- 6 NYCRR Part 376 - Land Disposal Restrictions
- 19 NYCRR Part 600-603 - Waterfront Revitalization of Coastal Areas and Inland Waterways
- 6 NYCRR Part 608 - Use and Protection of Waters
- 6 NYCRR Part 661 - Tidal Wetlands - Land Use Regulations
- 6 NYCRR Part 663 - Freshwater Wetlands - Permit Requirements
- 6 NYCRR Parts 700-706 – Classifications and Standards of Quality and Purity
- 6 NYCRR Part 750 - SPDES Permits
- Screening and Assessment of Contaminated Sediment (Division of Fish, Wildlife and Marine Resources, June 2014)

4.1.5 Guidance Typically Applicable to Remedial Actions

- Analysis and Assessment of Per-and Polyfluoroalkyl substances (PFAS) (January, 2021)
- CP-51 – Soil Cleanup Guidance (2010)
- DER-2 - Making Changes To Selected Remedies (Revised April, 2008)
- STARS #1 - Petroleum-Contaminated Soil Guidance Policy (1992) (Sections III and IV have been replaced CP-51)
- STARS #2 - Biocell and Biopile Designs for Small-Scale Petroleum-Contaminated Soil Projects

- TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
- DER-10 - Technical Guidance for Site Investigation and Remediation (May 3, 2010)
- DER-23 – Citizen Participation Handbook for Remedial Programs (March, 2010)
- TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and 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
- DAR-1 (formerly Air Guide 1) - Guidelines for the Control of Toxic Ambient Air Contaminants (1997)
- NYSDOS State Coastal Management Program
- U.S. EPA OSWER Directive 9200.4-17 - Use of Monitored Natural Attenuation at Superfund, Resource Conservation and Recovery Act (RCRA) Corrective Action, and Underground Storage Tank Sites (December 1997)
- NYSDOH Environmental Health Manual CSFP-530 - "Individual Water Supplies - Activated Carbon Treatment Systems"
- CP-43 – Commissioner Policy on Groundwater Monitoring Well Decommissioning (December 2009)

4.1.6 Site-Specific Construction Health & Safety Plan (CHASP)

The RE prepared a site-specific CHASP (Appendix C). The CHASP will apply to all remedial and construction-related work on site. The CHASP provides a mechanism for establishing a site safety office, on-site safe working conditions, safety organization, procedures, and PPE requirements. The CHASP meets the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65). The CHASP includes, but is not limited to, the following components:

- Organization and identification of key personnel;
- Training requirements;
- Medical surveillance requirements;
- List of site hazards;
- Excavation safety;
- Work zone descriptions;
- Personal safety equipment and protective clothing requirements;
- Decontamination requirements;
- Standard operating procedures;

- Protective measure plan;
- CAMP; and
- Safety Data Sheets (SDS).

Remedial work performed under this plan will be in full compliance with governmental requirements, including site and worker safety requirements mandated by the Occupational Safety and Health Administration (OSHA).

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 CHASP and for the appropriate performance of work according to the CHASP and applicable laws. All contractors performing work on the site must prepare their own CHASP that, at a minimum, meets the requirements of the CHASP in Appendix C.

The CHASP and requirements defined in this RAWP pertain to all remedial and invasive work performed at the site until the issuance of a Certificate of Completion. Confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gases.

4.1.7 Quality Assurance Project Plan

The RE prepared a Quality Assurance Project Plan (QAPP) that describes the quality control components employed so that the proposed remedy accomplishes the remedial goals, remedial action objectives, and is completed in accordance with the design specifications. The QAPP is provided as Appendix F and includes:

- Responsibilities of key personnel and their organizations for the proposed remedy;
- Qualifications of the quality assurance officer;
- Sampling requirements including methodologies, quantity, volume, locations, frequency, and acceptance and rejection criteria; and
- Description of the reporting requirements for quality assurance activities including weekly quality assurance review reports, periodic quality assurance and quality control audits, and other report and data submissions.

4.1.8 Construction Quality Assurance Plan

The RE prepared a Construction Quality Assurance Plan (CQAP) that describes the quality control components employed so that the proposed remedy accomplishes the remedial goals and RAOs and is completed in accordance with the design specifications. A list of personnel involved in implementation of the CQAP and procedures that will be carried out by the remedial team are identified below.

The RE will directly supervise field personnel that will be on-site during the remedial action to monitor particulates and organic vapor in accordance with the CAMP. Daily reports will be

submitted to the NYSDEC and NYSDOH and will include reporting of any CAMP results that exceed the specified action levels.

The RE will directly supervise field personnel that will meet with the Construction Superintendent on a daily basis to discuss the plans for that day and schedule upcoming activities. The field personnel will document all remedial activities in daily reports. This document will be forwarded to the Field Team Leader on a daily basis and to the Project Manager and the RE on a weekly basis.

The RE will directly supervise field personnel that will screen the excavation with a PID during intrusive activities. PIDs readings will be recorded in the project field book. Elevated readings will be reported to NYSDEC and NYSDOH in the daily reports. The field personnel will collect the excavation documentation samples in accordance with this RAWP.

A photo log will be kept to document construction activities by still photos. The photo log may also be used to record activities recorded in the daily report.

The project field book will be used to document all sampling activities and how they correspond to the RAWP. Field observations and field and laboratory tests will be recorded in the project field book or on separate logs. Recorded field observations may take the form of notes, charts, sketches or photographs.

The Field Team Leader will maintain the project field book and original field paperwork during the implementation of the remedy. The Project Manager will maintain the field paperwork after completion and will maintain submittal document files.

4.1.9 Soil/Materials Management Plan

The RE prepared a SMMP that includes detailed plans for managing soils/materials that are disturbed at the site, including excavation, handling, storage, transport and disposal. It also includes controls that will be applied to these efforts to facilitate effective, nuisance-free performance in compliance with applicable federal, state and local laws and regulations (see Section 5.4).

4.1.10 Erosion and Sediment Control Plan

Erosion and sediment controls will be in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. Erosion and sediment controls will be implemented as necessary. Best Management Practices (BMP) for soil erosion will be selected to minimize erosion and sedimentation off site from the start of the remediation to the completion of development. Erosion and sediment control measures will be implemented as described in Section 5.4.9. A SWPPP will be prepared and implemented to mitigate the discharge of sediment to Newtown Creek, the East River and to the New York City sewer system. Dewatering is not anticipated; however, if needed, dewatering fluids will be discharged to a New York City sewer in accordance with a New York City Department of Environmental

Protection (NYCDEP) permit or to the East River in accordance with a NYSDEC SPDES permit. Prior to discharge into a New York City sewer or into the East River, dewatering fluids will be treated as necessary.

4.1.11 Community Air Monitoring Plan

When ground intrusive work is being performed within 20 feet of the sidewalk, a CAMP station (including particulate and organic vapor monitoring equipment) will be situated between the work zone and the sidewalk. Community air monitoring will be conducted in compliance with the NYSDOH Generic CAMP included in Appendix D.

4.1.12 Contractors Site Operations Plan

The RE will review plans and submittals for this remedial project (including those listed above as well as submittals from the contractor and subcontractor) and document their compliance with this RAWP. The RE is responsible for documenting that contractor and subcontractor document submittals are in compliance with this RAWP. Remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and before the start of work.

4.1.13 Citizen Participation Plan

A certification of mailing was 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 all of the applicable project documents.

No changes will be made to the approved Fact Sheets authorized for release by NYSDEC without written consent from 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 included as Appendix G.

Document repositories were established at the following locations and contain project documents and can also be accessed using the following link: https://gisservices.dec.ny.gov/gis/dil/

Leonard Library
81 Devoe St at Leonard St
Brooklyn, NY 11211
(718) 486-6006

Brooklyn Community Board 1
Dealice Fuller, Chairwoman
Gerald Esposito - District Manager
Trina McKeever - Environmental Committee Chairwoman

435 Graham Avenue
Brooklyn, NY 11211
(718) 389-0009

4.2 General Remedial Construction Information

4.2.1 Project Organization

This section presents the anticipated project organization and associated roles, including key personnel, descriptions of duties and lines of authority in the management of the RAWP. Information regarding the organization/personnel and their associated responsibilities is provided below:

Remediation Engineer (RE):	Jason J. Hayes, P.E.
Project Leader:	Mimi S. Raygorodetsky
Project Manager:	Gregory Wyka, PG
Langan Health & Safety Officer:	Tony Moffa, CHMM
Site Safety Coordinator:	William Bohrer, PG
Quality Assurance Officer:	Michael Burke, PG, CHMM
Field Team Leader:	Julia Leung, P.E.

Project personnel resumes are provided in Appendix H.

4.2.2 Remedial Engineer

The RE for this project will be Jason J. Hayes, P.E. The RE is a registered Professional Engineer licensed by the State of New York who will have primary direct responsibility for implementation of the remedial program. The RE will certify in the FER that the remedial activities were observed by personnel under his supervision and that the remediation requirements set forth in the RAWP and any other relevant provisions of ECL 27-1419 were achieved in full conformance with that plan. Other RE certification requirements are listed later in this RAWP.

The RE will direct field personnel to document the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, dewatering, air monitoring, emergency spill response services, import of backfill material, and management of waste transport and disposal. The RE will be responsible for appropriate communication with the NYSDEC and NYSDOH.

The RE will review pre-remedial plans submitted by contractors for compliance with this RAWP and will certify compliance in the FER.

In the FER, the RE will provide the certifications listed in Section 8.1.

4.2.3 Project/Remediation Schedule

The anticipated project/remediation construction schedule is provided in Appendix I. Proposed changes, delays or deviations will be promptly communicated to the NYSDEC. To obtain a Certificate of Completion, the following document deadlines have been established by the NYSDEC for the calendar year in which the Certificate of Completion is expected.

Submission of Draft Environmental Easement – June

Completion of Construction – October

Submission of the Draft Site Management Plan – October

Submission of the Draft Final Engineering Report - October

Submission of the Final Site Management Plan - December

Submission of the Final Engineering Report – December

4.2.4 Work Hours

The hours of operation for remedial construction will either conform to the requirements of the New York City Department of Buildings (NYCDOB) construction code or to a site-specific variance issued by the NYCDOB. The NYSDEC will be notified by the Volunteer of any variances issued by the NYCDOB. The NYSDEC reserves the right to deny alternate remedial construction hours.

4.2.5 Site Security

The site perimeter will be secured with gated, signed, plywood fencing with points of entry in accordance with the NYCDOB and New York City Department of Transportation (NYCDOT) permits and requirements. The purpose of the fencing is to limit site access to authorized personnel, protect pedestrians from site activities, and maintain site security.

4.2.6 Traffic Control

Site traffic will be controlled through designated points of access along Commercial Street. Access points will be continuously monitored and if necessary, a flagging system will be used to protect workers, pedestrians, and authorized guests. Traffic will also adhere to applicable local, state, and federal laws. Proposed in-bound and out-bound truck routes to the site are discussed in Section 5.4 and are shown on Figure 11.

4.2.7 Contingency Plan

Contingency plans, as described below, were developed to effectively deal with unexpected discoveries of additional contaminated media or unexpected USTs.

Discovery of Additional Contaminated Soil and Source Areas

During remediation and construction activities, the soil will be continuously monitored by the RE's field representatives using a PID as well as visual and olfactory field screening techniques

to identify additional source areas and soil that may not be suitable for the selected disposal facility(ies). Additional source areas include the following:

- Grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u)
- Soil exceeding the 6 NYCRR Part 371 hazardous criteria for lead
- Concentrated solid or semi-solid hazardous substances per 6 NYCRR Part 375-1.2(au)(1)
- Non-aqueous phase liquids
- Soil with visual waste material or non-aqueous phase liquid
- Soil containing total SVOCs exceeding 500 ppm
- Soils which exceed the PGW SCOs, as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards
- Soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G

This material will be segregated and sampled for lab analysis in accordance with disposal facility requirements. If the facility is not permitted to receive the waste, the waste will be disposed off-site at a permitted facility able to receive it based on the characterization data. Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone and email to the NYSDEC Project Manager within 48 hours. These findings will be detailed in daily reports and subsequent monthly BCP progress reports.

Discovery of USTs

Previously unidentified USTs may be discovered during site-wide excavation. Unexpected USTs encountered during remedial and/or construction activities will be decommissioned in accordance with 6 NYCRR Parts 612.2 and 613.9 and NYSDEC DER-10 Section 5.5. After the tank, its contents, and associated piping are removed, post-excavation endpoint soil samples will be collected per the requirements of NYSDEC DER-10. If encountered, petroleum-impacted soils will be excavated, stockpiled separately, and disposed of off-site at a permitted disposal facility in accordance with applicable regulations. UST closure documentation, including contractor affidavits, waste manifests, and tank disposal receipts, will be included as appendices to the FER. USTs will be registered with the NYSDEC PBS unit, as necessary.

If USTs are encountered during invasive site work, the findings will be promptly communicated by phone to the NYSDEC's Project Manager and detailed in daily reports and subsequent monthly BCP progress reports.

4.2.8 Worker Training and Monitoring

Worker training and monitoring will be conducted in accordance with the CHASP (Appendix C).

4.2.9 Agency Approvals

The Volunteer addressed all State Environmental Quality Review Act (SEQRA) requirements for this site. Permits or government approvals required for remediation activities will be obtained prior to the start of remedial construction. The planned end use for the site conforms to current zoning for the property as determined by New York City Department of City Planning. A Certificate of Completion will not be issued for the project unless conformance with the zoning designation is demonstrated. Local, regional, and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work will be acquired prior to the start of remediation.

A list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remediation activities is provided below:

- NYCOER Notice to Proceed or Notice of No Objection
- NYCDOB Foundation, Support of Excavation and New Building Permits

This list will be updated in the FER.

4.2.10 Pre-Construction Meeting with the NYSDEC

Prior to the start of remedial construction, a meeting will be conducted with the RE, Volunteer, Construction Manager, remediation contractor and the NYSDEC to discuss project roles, responsibilities, and expectations associated with this RAWP.

4.2.11 Emergency Contact Information

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

4.2.12 Remedial Action Costs

The estimated engineer and contractor cost of the preferred Track 4 remedy is about $4.6 million. An itemized and detailed summary of estimated costs for remedial activity is provided as Table 2. This estimate will be revised based on actual costs and submitted as an appendix to the FER.

4.3 Site Preparation

The RE will work with the Volunteer and its contractors so that site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this RAWP.

4.3.1 Mobilization

Before commencing site remediation, the remediation contractor will mobilize to the site and prepare for remedial activities. Mobilization and site preparation activities may include the following:

- Identifying the location of all aboveground and underground utilities (e.g., power, gas, water, sewer, telephone), equipment, and structures (as necessary to implement the remediation);
- Mobilizing necessary remediation personnel, equipment, and materials to the site;
- Constructing one or more stabilized construction entrances consisting of virgin quarry stone or RCA at or near the site exit, which takes into consideration the site setting and site perimeter;
- Constructing a decontamination pad for trucks, equipment, and personnel that come into contact with impacted materials during remedial activities;
- Installing erosion and sedimentation control measures, as necessary; and
- Installing temporary fencing or other temporary barriers to limit unauthorized access to areas where remediation activities will be conducted.

4.3.2 Monitoring Well Decommissioning

Existing groundwater monitoring wells will be properly decommissioned in accordance with NYSDEC CP-43,. The only exception to this is if the full length of the well is to be removed or excavated during remediation activities. Well decommissioning will be performed by an experienced driller and logged by Langan field personnel. Decommissioning documentation will be provided in the FER.

4.3.3 Stabilized Construction Entrance(s)

Stabilized entrance areas will be constructed to prevent decontaminated trucks from being re-contaminated by site soil before exiting. The areas will be covered with virgin quarry stone or RCA and graded so that runoff water will be directed onto the site. The contractor will protect and maintain the existing sidewalks and roadway at site entrance points.

4.3.4 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 this RAWP; the implementation of required, appropriate or necessary health and safety measures during performance of work under this RAWP; and the safe execution of invasive and other work performed under this RAWP. The Volunteer and its contractors must obtain local, state or federal permits and/or approvals that may be required to perform work under this RAWP. Approval of this RAWP by the NYSDEC does not constitute satisfaction of these requirements.

The presence of utilities and easements on the site will be investigated by the Volunteer and its contractors. No impediments to the planned work under this RAWP are expected by known utilities or easements on the site.

4.3.5 Equipment and Material Staging

The contractor will notify the RE and the Volunteer in writing with receipt confirmed, of pending site work mobilization at least 30 calendar days in advance. During mobilization, construction equipment will be delivered to the site, temporary facilities constructed, and temporary utilities installed. The contractor will place and maintain temporary toilet facilities within the work areas for usage by all site personnel.

4.3.6 Decontamination Area

The contractor will construct decontamination pads at each site entrance/exit planned for construction vehicle usage. The location of decontamination pads may change periodically to accommodate the contractor's sequencing of work. Where required, the pads will be constructed by the contractor to collect wastewater for off-site disposal or treatment and discharge, if generated during decontamination activities. The design will consider adequate space to decontaminate equipment and vehicles, and sloping and liners to facilitate collection of wastewater. Collected decontamination wastewater shall be either discharged in accordance with the contractor's NYCDEP permit or tested and transported to an off-site disposal facility that is permitted to accept this waste, in accordance with applicable local, state and federal regulations. The contractor will maintain the decontamination pad(s) throughout the duration of site work. Prior to demobilization, the contractor will deconstruct the pads and dispose of materials as required.

If the contractor uses high pressure washing methods, the contractor shall provide splash protection around the vehicle decontamination facility to prevent splatter and mist migrating off-site during the vehicle decontamination process. Splash protection shall be temporary and stable and capable of being dismantled in the event of high winds.

4.3.7 Site Fencing

The site perimeter will be secured with gated, signed, plywood fencing. The purpose of the fencing is to limit site access to authorized personnel, protect pedestrians from site activities and maintain site security.

4.3.8 Demobilization

The contractor will be responsible for demobilizing all labor, equipment and materials not designated for off-site disposal. The RE will be required to document that the remediation contractor has decontaminated all equipment and materials before removal from the site. The RE will document performance by the contractor of any follow-up coordination and maintenance for the following activities: removal of sediment and erosion control measures and disposal of materials in accordance with acceptable rules and regulations; removal of residual contaminated soil/historic fill or other wastes; equipment decontamination; and general refuse disposal.

4.4 Reporting

Daily and monthly reports and an FER will be required to document the remedial action. The RE responsible for certifying the FER will be an individual licensed to practice engineering in the State of New York; Jason Hayes, P.E., of Langan, will have this responsibility. Should Mr. Hayes become unable to fulfill this responsibility, another suitably qualified New York State professional engineer will take his place. All daily and monthly reports will be included in the FER. In addition to the periodic reports and the FER, copies of all relevant contractor documents will be submitted to the NYSDEC.

4.4.1 Daily Reports

Daily reports will be submitted to the NYSDEC and NYSDOH Project Managers by the end of each week, or at a frequency acceptable to them, following the reporting period and will include:

- An update of progress made during the reporting day, including a photographic log;
- Locations of work and quantities of soil and fill material imported to and soil and historic fill exported from the site;
- Draft analytical sampling results received;
- References to alpha-numeric map for site activities;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP findings, including excursions and actions taken to address any excursion;
- An explanation of notable site conditions;
- A description of anticipated site activities; and
- The NYSDEC-assigned project number will appear on all reports.

Daily progress will be detailed on a site map. Daily reports are not intended to be the primary mode of communication when notifying 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 the NYSDEC Project Manager via personal communication.

4.4.2 Monthly Reports

Monthly reports will be submitted to the NYSDEC and NYSDOH Project Managers by the tenth of the following month of the reporting period and will include the following information, as well as the information required in the BCA:

- 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 soil and fill material exported and/or imported, etc.);

- Description of approved activity modifications, including changes to the scope of work and/or schedule;
- Sampling results received following internal data review and validation, as applicable; 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.

4.4.3 Other Reporting

Photographs will be taken of remedial activities and submitted to the NYSDEC in digital (JPEG) format. Photographs will illustrate the remedial program elements and will be of acceptable quality. Representative photographs of the site before any remedial actions and of each contaminant source area and site structures before, during and after remediation will be provided. Photographs will be submitted to NYSDEC in digital format (e.g. jpeg files). A photograph log keyed to photo file ID numbers will be prepared to provide explanation for all representative photos.

Site records for remedial work will be appropriately documented and maintained on-site at all times during the project and be available for inspection by NYSDEC and NYSDOH staff.

4.4.4 Complaint Management Plan

The management plan for documenting complaints is detailed below.

Item	**Description**
Approach	Complaints regarding remediation or construction activities/operations will be minimized and mitigation measures will be implemented to reduce the incidence of complaints.
Objective	To manage environmental complaints from the community regarding construction or remediation.
Implementation Strategy/Mitigation Measures	All complaints will be documented on a complaint register. The register will be maintained as an ongoing record. Each entry will include the following information: • Time, date and nature of complaint; • Type of communication (telephone, letter, personal, etc.); • Name, contact address and contact number; and • Response and investigation undertaken as a result of the complaint and action taken with the signature of the responsible person. Each complaint will be investigated as soon as practicable in relation to the requirements.
Monitoring	A representative from the Volunteer or the RE will follow up on the complaint within two weeks of receipt to ensure it has been resolved.
Reporting	Upon receipt, the NYSDEC will be notified. Complaints and resolutions will be documented in the daily reports.

Item	Description
Corrective Action	Should an incident or failure to comply occur in relation to the management of environmental complaints, one or more of the following corrective actions will be undertaken as appropriate: • Conduct additional training of staff to handle environmental complaints; • Investigate why the environmental complaint was not addressed within the specified time frame; and • Investigate the complaint and action follow-up according to the investigation results.

4.4.5 Deviations from the RAWP

Necessary deviations from the RAWP will be coordinated with the NYSDEC in advance. Notification will be provided to the NYSDEC by telephone/email for conditions requiring immediate action (e.g., conditions judged to be a danger to the surrounding community). Addendums to the RAWP will be prepared, as necessary and will include:

- Reasons for deviating from the approved RAWP;
- Approval process to be followed for changes/editions to the RAWP; and
- Effect of the deviations on the overall remedy.

5.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

5.1 Soil Cleanup Objectives

A Track 4 remediation is proposed, utilizing site-specific SCOs that include the NYSDEC RURR SCOs listed in 6 NYCRR Part 375-6.8(b), with the exception of total SVOCs, TCLP lead, and the guidance value for PFOA (1.1 ppb for protection of groundwater) as set forth in Table 1.

Soil and materials management on- and off-site will be conducted in accordance with the SMMP described below (Section 5.4). If encountered, UST closures will conform to the criteria defined in 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements including DER-10 Chapter 5.5.

5.2 Remedial Performance Evaluation (Documentation Sampling)

Soil

Documentation soil samples will be collected from the final bottom of excavation at a frequency of one per 900 square feet.

Documentation samples will be transported under standard chain-of-custody protocol to an NYSDOH ELAP-approved laboratory for 6 NYCRR Part 375 VOCs, SVOCs, pesticides/herbicides, PCBs, metals, PFAS, and 1,4-dioxane analysis. Laboratory analyses will be conducted in accordance with EPA SW-846 methods and NYSDEC ASP Category B deliverable format. QA/QC procedures required by the NYSDEC ASP and SW-846 methods will be followed, including instrument calibration, standard compound spikes, surrogate compound spikes, and analysis of quality control samples. The laboratory will provide sample bottles, which are pre-cleaned and preserved. Where there are differences in the SW-846 and NYSDEC ASP requirements, the NYSDEC ASP shall take precedence.

Laboratory Analysis and Reporting

A data usability summary report (DUSR) will be included in the FER. Quality control procedures for the sampling are included in the QAPP (Appendix F). Documentation sample results will be provided in NYSDEC electronic data deliverable (EDD) format for EQuIS™. Guidance on sampling frequency is presented in Section 5.4 of DER-10.

The FER will provide a tabular and map summary of all documentation sample results.

5.3 Estimated Material Removal Quantities

As a pre-requisite to commencement of site remediation, the contractor will remove asphalt and concrete surface cover and manage it as construction and demolition (C&D) debris in accordance with Part 360 and 361 regulations. The estimated quantity of soil/historic fill to be removed from the site for a Track 4 cleanup is about 3,400 cubic yards of historic fill, 50 cubic yards of hazardous lead-impacted soil, and 20 cubic yards of SVOC-impacted soil. Over-excavated areas will require backfill meeting the lower of the RURR or PGW SCOs, RCA, or virgin quarry stone. The

estimated quantity of soil to be imported to the site for cover soil and backfill material is about 3,800 cubic yards. The Track 4 remedial excavation extents are shown on Figure 9.

5.4 Soils/Materials Management Plan

This section presents the approach to management and disposal of soil and historic fill excavated from the site. Reuse of on-site soil is not anticipated for this site. This plan is based on the current knowledge of site conditions, and will be augmented with the additional data collected during remediation. Langan field personnel, under the direction of the RE, will monitor and document the handling and transport of contaminated soil and historic fill removed from the site for disposal as a regulated solid waste. Field personnel, under the direction of the RE, will assist the remedial contractor in identifying impacted soil and historic fill during excavation, determining soil and historic fill suitable for direct load-out versus temporary on-site stockpiling, selection of samples for waste characterization, and determining the proper off-site disposal facility. Separate stockpile areas will be constructed as needed to stage various excavated soil and historic fill with the intent to more efficiently manage and characterize the soil and historic fill and to avoid comingling of impacted soil and historic fill with non-impacted soil.

5.4.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by Langan field personnel under the direct supervision of the RE during remedial and development excavations into known or potentially contaminated soil and historic fill. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed after the removal of asphalt and concrete surface cover and during the remedy and during the development phase, such as excavations for foundations and utility work before issuance of the Certificate or Completion.

Hotspot locations will be marked by a surveyor licensed to practice in the State of New York. Additional hotspots are not anticipated; however, as indicated in 4.2.7, additional hotspots identified during remedial and development excavation, upon consultation with NYDSEC, will be removed.

5.4.2 Stockpile Methods

Soil stockpile areas, if needed for different soil and fill materials, will be constructed for staging of site soil, pending loading or waste characterization testing. Separate stockpile areas will be constructed to avoid comingling soil and historic fill of differing waste types. Stockpile areas will meet the following minimum requirements:

- The excavated soil will be placed onto an impermeable surface or on minimum thickness of 6-mil low-permeability plastic sheeting or tarps of sufficient strength to prevent puncture during use; separate stockpiles will be created where material types are

different (e.g., historic fill on areas where historic fill is present.). The use of multiple layers of thinner liners is permissible.

- Equipment and procedures will be used to place and remove the soil so as to minimize the potential to jeopardize the integrity of the liner.
- Stockpiles will be covered at the designated times (see below) with minimum 6-mil plastic sheeting or tarps, which will be securely anchored to the ground. Stockpiles will be routinely inspected and broken sheeting covers will be promptly replaced.
- Stockpiles that have reached their capacity will be appropriately covered until they ready for loading for off-site transport.
- Active stockpiles (e.g. stockpiles that have not reached their capacity) will be covered at the end of each workday.
- Each stockpile area will be encircled with silt fences and hay bales, as needed, to contain and filter particulates from rainwater that has drained off the soils, and to mitigate the potential for surface water run-off off-site.
- Stockpiles will be inspected at a minimum once each day and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

5.4.3 Soil Characterization, Excavation and Loading

Excavated soil and historic fill will be characterized 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 data will be reported in the FER. Data available for soil or historic fill to be disposed at a given facility must be submitted to the disposal facility for review and approval before shipment and receipt.

The Volunteer and its contractors are solely responsible for safe execution of invasive work, the structural integrity of excavations, structures that may be affected by excavations, and other work performed under this RAWP. Sheeting, shoring, or sloping (1:1 slope) will be used for deeper excavations. Sheeting or shoring will be used where sloping is not practical (i.e., at the perimeter of the site). Field personnel under the direct supervision of the RE will observe and document all invasive work and the excavation and loading of excavated soil and historic fill. Remediation areas will be excavated and post-excavation documentation sampling completed before excavations related to site development can move forward in the remediated area of the site. Historic fill identified during construction 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 FER. Additional source areas, as outlined in Section 4.2.7, will be segregated and sampled for lab analysis in accordance with disposal facility requirements. If the facility is not permitted to receive these soils, the soil will be disposed off-site at a permitted facility able to receive the soil based on the characterization data. Development-related grading cuts and filling activity will not be performed without NYSDEC approval of the RAWP, and the RE will assist with the

coordination of site development activities so that they do not interfere with, or otherwise impair or compromise, remedial activities proposed in this RAWP.

The RE's field personnel will be responsible for monitoring egress points for truck and equipment transport from the site and ensuring that the Contractor is notified of their obligation to immediately clean the sidewalks and streets of dirt and other materials derived from the site during site remediation and development. Non-compliance will be reported to the NYSDEC. Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site sediment tracking. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials. Loaded vehicles leaving the site will be appropriately lined, securely covered, manifested, and placarded in accordance with appropriate federal, state, and local requirements, and all other applicable transportation requirements. Trucks hauling historic fill will not be lined unless the material exhibits free liquids or is grossly contaminated. On-site, mechanical processing of historic fill and contaminated soil is prohibited unless otherwise approved by the NYSDEC.

5.4.4 Soil Transport Off-Site

Transport of soil and historic will be performed by licensed haulers in accordance with appropriate local, state and federal regulations, including 6 NYCRR Part 364 and NYC's Business Integrity Commission (BIC) Trade Waste Hauler requirements. Haulers will be appropriately licensed and trucks properly placarded. Trucks will enter and exit the site using dedicated ingress/egress points. Trucks loaded with soil and historic fill will exit the vicinity of the site using only approved truck routes. Trucks will be prohibited from stopping and idling unnecessarily in the neighborhood outside the site. To the extent possible, queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be minimized. Trucks entering or leaving the site will be securely covered with tight fitting covers.

Proposed in-bound and out-bound truck routes to the site are shown on Figure 11. This is the most appropriate route and takes into account:

- Limiting transport through residential areas and past sensitive sites;
- Prohibiting off-site queuing of trucks entering the facility;
- Limiting total distance to major highways;
- Promoting safety in access to highways;
- Overall safety in transport; and
- Community input (where necessary).

A truck wash/cleaning area will be operated on-site. The RE will be responsible for documenting that outbound trucks are washed and cleaned at the truck wash before leaving the site until the remedial construction is complete. Locations where vehicles enter or exit the site will be inspected daily (at a minimum) for evidence of off-site sediment tracking.

The RE will be responsible for documenting that egress points for truck and equipment transport from the site are free of dirt and other solid waste derived from the site during remediation and development. Cleaning of the adjacent streets will be performed by the remediation contractor as needed to maintain a clean condition with respect to site-derived solid waste.

5.4.5 Soil Disposal Off-Site

Excavated soil/historic fill removed from the site will be handled, transported and disposed of in accordance with local, state (including 6 NYCRR Parts 360, 361, 370, 371, and 372) and federal regulations. If disposal of soil/historic fill is proposed for unregulated disposal (i.e., clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC's Project Manager. Unregulated off-site management of soil/historic fill from this site is prohibited without formal NYSDEC approval.

Excavated soil/historic fill must be disposed of at an in-state or out-of-state facility licensed to accept it. Non-hazardous fill material can be sent to a construction and demolition debris handling and recovery facility only with written approval from the NYSDEC. Hazardous waste is prohibited from being sent to a construction and demolition debris handling and recovery facility (6 NYCRR Part 361-5). Hazardous wastes derived from the site will be managed, transported and disposed of in full compliance with applicable local, state and federal regulations.

The following documentation will be obtained and reported by the RE for each off-site disposal location used in this project to fully demonstrate and document that the disposal of soil and historic fill material derived from the site conforms to applicable laws:

1) A letter from the RE 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 soil and historic fill to be disposed of is a contaminated waste generated at an environmental remediation site in New York State. The letter will provide the project identity and the name and phone number of the RE. The letter will include, as an attachment, a summary of all chemical data for the waste being transported (including site characterization data); and
2) A letter from each receiving facility stating it is in receipt of the correspondence (above) and is approved to accept the waste. These documents will be included in the FER.

The FER will include an account of the destination of all solid wastes removed from the site during the remedy, including excavated soil, contaminated soil, historic fill, hazardous waste, and fluids. Documentation associated with disposal of waste must also include records (i.e., manifests and scale tickets) and approvals for receipt of the waste by the facilities. This information will also be presented in the FER.

5.4.6 Soil Reuse On-Site

Soil excavated during the remedy is not anticipated to be reused on this site under the proposed remedy. If soil reuse is considered, it will be reused only if the requirements in this section and

6 NYCRR Part 360 are met. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review. Grossly contaminated soil or soil with petroleum staining or odor will not be reused on-site. Soil acceptable for reuse must be non-hazardous and meet the lower of the RURR and PGW SCOs.

Soil removed during implementation of the remedy or 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. Soil deemed unfit for reuse will be transported for off-site disposal.

5.4.7 Fluids Management

Dewatering is not anticipated. If required, liquids to be removed from the site, including dewatering fluids, will be handled, transported, and disposed of in accordance with applicable local, state, and federal regulations. Dewatering fluids discharged into the New York City sewer system will be addressed through approval by NYCDEP. Dewatering fluids discharged in to the East River will be addressed pursuant to a SPDES permit approved by the NYSDEC.

5.4.8 Backfill from Off-Site Sources

Materials proposed for import to the site will be approved by the RE based upon documentation that the materials are in compliance with provisions in this RAWP before they are shipped to the site. Imported backfill will consist of fill meeting the lower of RURR or PGW SCOs or other acceptable fill material such as virgin quarry stone or RCA. Soil and fill material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the site. Solid waste will not be imported onto the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review. Trucks entering the site with imported soil will be securely covered with tight fitting covers.

Composite samples (with the exception of VOCs) of imported soil/fill will be taken at a frequency in accordance with CP-51 Soil Cleanup Guidance Table 4, , depending on the proposed source material. The samples will be analyzed for TCL/TAL VOCs, SVOCs, metals, pesticides and PCBs (including compounds listed in Table 375-6.8 of 6 NYCRR Part 375), and emerging contaminants including PFAS and 1,4-dioxane by a NYSDOH ELAP-certified laboratory. Emerging contaminant sampling will be performed in accordance with the NYSDEC January 2021 Guidelines for Sampling and Analysis of PFAS. Once it is determined that the fill material meets imported backfill SCOs, the fill material will be loaded onto trucks with secure covers for delivery.

RCA will be imported from facilities permitted or registered by the NYSDEC or by the appropriate authority in another state or jurisdiction. Facilities will be identified in the FER. The RE will certify that the facilities have 6 NYCRR Part 360 registration and permitting for the period of acquisition of RCA. RCA imported from DEC-registered or DEC-permitted facilities and virgin gravel, rock or

stone from mines, quarries or facilities permitted or registered by the NYSDEC or the applicable state of origin and have no more than 10% by weight passing through a No. 80 sieve will not require additional testing unless required by NYSDEC under its terms for operation of the facility. Additional exemptions from testing requirements may be approved by NYSDEC Project Manager based on their review of requests by the RE. RCA imported to the site must be derived from recognizable and uncontaminated concrete and will not be used within as surface cover (i.e., within the top two feet).

Demarcation must be performed in all areas of the site outside of the building footprint before backfilling and installation of the composite cover system. After the completion of soil removal and any other invasive remedial activities and before backfilling, a land survey may be performed by a New York State licensed surveyor or a physical barrier may be placed. A physical demarcation barrier, consisting of orange snow fencing material or equivalent material may 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 SMP. The survey will define the top elevation of residual contaminated soil before the placement of cover soils, pavement and sub-soils, structures, or other materials. The demarcation at this grade surface will constitute the physical and written record of the upper surface of the Residuals Management Zone in the SMP.

Imported material documentation, including import and material reuse request forms, and the demarcation survey or map showing the location and extents of the high-visibility demarcation barrier will be included in the FER and SMP.

The FER will include the following certification by the RE: "I certify that to the best of my knowledge all import of soils from off-site, including source evaluation, approval and sampling, was performed in a manner that is consistent with the methodology defined in the RAWP."

5.4.9 Stormwater Pollution Prevention

Silt fencing or hay bales will be installed around the perimeter of the remedial construction area, as required. Barriers and hay bale checks will be installed and inspected once a week and after every storm event; necessary repairs shall be made immediately. Results of inspections will be recorded in a logbook maintained at the site and available for inspection by the NYSDEC. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fence damaged due to weathering. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Implementation of the SWPPP will mitigate the discharge of erosional sediment to Newtown Creek, the East River and to the New York City sewer system.

5.4.10 Community Air Monitoring Plan

Community air monitoring will be conducted in compliance with the NYSDOH Generic CAMP outlined below and included in Appendix D.

The CAMP includes real-time monitoring for VOCs and particulates at the downwind perimeter of each designated work area when certain activities are in progress. Continuous monitoring is required for all ground intrusive activities and during demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, advancement of trenches and test pits, and the installation of soil borings or monitoring wells. When ground intrusive work is being performed within 20 feet of a sidewalk, a CAMP station (including particulate and organic vapor monitoring equipment) will be situated between the work zone and the sidewalk. Periodic monitoring for VOCs is required during non-intrusive activities such as the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading before leaving a sample location.

Prior to implementation of CAMP, upwind/background concentrations of particulates and VOCs will be measured at the start of each workday. CAMP monitoring for VOC levels will be conducted with PIDs, and monitoring for dust/particulates will be conducted with particulate sensors equipped with filters to detect particulates less than 10 microns in diameter (PM10). Monitoring for particulates and odors will be conducted during all ground intrusive activities by the RE's field personnel. The work zone is defined as the general area in which machinery is operating in support of remediation activities. A portable PID will be used to monitor the work zone and for periodic monitoring of VOCs during activities such as soil sampling. The site perimeter will be visually monitored for fugitive dust emissions.

The following actions will be taken based on VOC levels measured:

- If total VOC levels exceed 5 ppm above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the work zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the work zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet, is below 5 ppm above background for the 15-minute average.

- If the total VOC level is above 25 ppm at the perimeter of the work zone, activities will be shut down.

The following actions will be taken based on visual dust observations:

- If the downwind particulate level is 100 micrograms per cubic meter (µg/m³) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work zone, then dust suppression must be employed. Work may continue with dust suppression techniques provided that downwind PM10 levels do not exceed 150 µg/m³ above the background level and provided that no visible dust is migrating from the work zone.
- If, after implementation of dust suppression techniques, downwind PM10 levels are greater than 150 µg/m³ above the background level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM10 concentration to within 150 µg/m³ of the upwind level and in preventing visible dust migration.

CAMP data summary tables and data logs will be provided to the NYSDEC and NYSDOH on a daily basis. Exceedances observed in the CAMP will be reported to the NYSDEC and NYSDOH Project Managers within 24 hours and will be included in the daily report.

5.4.11 Odor, Dust and Nuisance Control Plan

Dust, odor and nuisance control will be accomplished by the contractor as described in this section. The FER will include the following certification by the RE: "I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the RAWP."

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 application of foam suppressants or tarps over the odorous or VOC source areas. 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 are abated. The NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of odor monitoring, including the halt of work, will be the responsibility of the RE, who is responsible for certifying the FER. Application of odor controls is the responsibility of the contractor.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, procedures may 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:

(a) direct load-out of soils to trucks for off-site disposal; (b) use of chemical odorants in spray or misting systems; and (c) use of staff to monitor odors in surrounding neighborhoods.

Although not anticipated, where odor nuisances develop during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided because of 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.

Dust Control Plan

Dust suppression plan that addresses dust management during ground-intrusive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated water distribution system, on-site water trucks, or an alternate source with suitable supply and pressure for use in dust control.
- Gravel will be used for on-site roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water spraying.

Other Nuisances

A plan for rodent control will be developed and utilized by the contractor before and during site clearing and grubbing, and during all remedial work.

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

6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

Since residual contaminated soil, groundwater, and soil vapor will exist beneath the site after the Track 4 remedy is complete, ECs and ICs are required to protect human health and the environment. These ECs and ICs are described hereafter. Long-term management of EC/ICs and of residual contamination will be executed under a site-specific SMP that will be developed and included in the FER.

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination. The site's primary EC systems are a vapor mitigation system (active SMDS with vapor barrier membrane), and composite cover system consisting of concrete building slabs and/or at least two feet of cover soil over any landscaped areas.

The SMP and FER will provide tables and figures documenting residual contamination at the site. This will include presentation of concentrations exceeding both UU SCOs and RURR SCOs..

7.0 ENGINEERING AND INSTITUTIONAL CONTROLS

Following completion of the remedy, contamination above the site-specific SCOs may remain in place; therefore, ECs and ICs will be required as part of the remedial action. An SMP will be implemented to manage and monitor the ECs and define use restrictions of the site.

7.1 Site Cover System

The engineered composite cover will consist of an at least 12-inch-thick concrete slab across the footprint of the building, asphalt pavement, manufactured paving stones or bricks, or concrete pavement in exterior areas, and a minimum of two feet of cover soil will be placed over any landscaped area with no impervious material below it. The top elevation of residual (existing) soil and historic fill in landscaped areas will be surveyed by a New York State-licensed surveyor and marked with a physical, high-visibility demarcation barrier consisting of orange snow fencing or equivalent material for visual reference.

The composite cover system will serve as an EC for the protection of human health by preventing direct contact with residual contamination remaining at the site. As-built construction layout and details of the composite cover system will be included in the FER, as necessary. The composite cover will be inspected and its performance certified at specified intervals as required by the SMP. The SMP will outline the inspection and maintenance procedures to be followed in the event that the vapor barrier membrane is disturbed after the remedial action is complete.

7.2 Vapor Mitigation System

The vapor mitigation system will consist of an active SMD system beneath a vapor barrier. The vapor barrier membrane system will be installed under the new building slab and on foundation sidewalls. The vapor barrier will consist of GCP Applied Technologies Florprufe® 120 (21-mil [thousandth of an inch] thickness) membrane (or approved alternate). The vapor barrier membrane will be installed under horizontal surfaces and vertical surfaces (i.e., elevator pit walls and subgrade foundation walls to surface grade). Welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration.

An active SMDS will be installed under the new vapor barrier membrane and building slab to mitigate soil vapor intrusion into the building from VOCs in the subsurface. SMDS create depressurized (low vacuum) fields beneath the floor slabs by extracting the sub-slab air with a ventilator fan mounted on the roof of the building. These low vacuum fields reverse the natural pressure gradient and divert impacted vapors from the subsurface of the building to the atmosphere above the rooftop of the building, thereby reducing vapor intrusion. The design for the SMDS will be in-part based on the USEPA document EPA/625/R-92/016 for the sub-slab depressurization of large buildings and schools and the NYSDOH's "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006).

The system will include a network of horizontal piping set in the middle of a gas permeable gravel layer immediately beneath the building slab and vapor barrier membrane; the horizontal piping

will consist of 4-inch-diameter, slotted, PVC vapor collection piping wrapped with polyester filter sleeve. The sub-membrane piping will be connected to 4-inch steel riser piping that will penetrate the slab and travel through the building to the roof. The gas permeable layer will consist of a minimum 8-inch-thick layer of 3/4-inch gravel. The piping will be finished above the roof line with blowers and fittings to prevent rain infiltration. The active SMDS will be hardwired and will include an AirTech® 3BA1300 or 3BA1400 series blower or an approved alternative installed at roof level. The system will include riser pressure gauges and alarm located in an accessible building areas. The vapor mitigation system will serve as an EC for the protection of human health by mitigating soil vapor intrusion and potential inhalation exposures. As-built construction layout and details will be included in the FER. The vapor mitigation system will be inspected and maintained and its performance certified at specified intervals as required by the SMP.

7.3 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 remedy is complete. A Track 4 cleanup requires that an environmental easement approved by the NYSDEC will be recorded with the Kings County Office before the Certificate of Completion can be issued by the NYSDEC. The environmental easement will be submitted as part of the FER.

The environmental easement renders the site a Controlled Property. The easement will list the ECs and ICs required under this remedy to prevent future exposure to residual contamination, including controlling disturbances of the subsurface residual contamination and restricting the use of the site to restricted residential, commercial, and industrial uses only. The ICs are generally subdivided between controls that support ECs and those that place general restrictions on site usage or other requirements. ICs in both of these groups are closely integrated with the SMP, which provides the methods and procedures to be followed to comply with this remedy.

The ICs that support ECs are:

- Compliance with the environmental easement by the grantor and the grantor's successors and adherence of all elements of the SMP is required;
- ECs must be operated and maintained as specified in the SMP;
- ECs on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner defined in the SMP; and
- ECs may not be discontinued without an amendment or extinguishment of the environmental easement.

Adherence to these ICs for the site is mandated by the environmental easement and will be implemented under the SMP (discussed in the next section). The use restrictions that apply to the site are:

- Vegetable gardens and farming in residual site soil on the site are prohibited;
- Use of groundwater underlying the site is prohibited without treatment rendering it safe for the intended purpose;
- All future activities on the site that will disturb residual contaminated soil and historic fill are prohibited unless they are conducted in accordance with the soil management provisions in the SMP;
- The site may be used for restricted-residential, commercial, and industrial uses use only, provided the long-term ECs and ICs included in the SMP are employed; and
- The site may not be used for a higher level of use without an amendment or extinguishment of the environmental easement.

Grantor agrees to submit to the NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the site are unchanged from the previous certification or that any 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. This certification shall be submitted annually, or at a specified frequency allowed by the NYSDEC. The NYSDEC retains the right to access the site at any time in order to evaluate the continued maintenance of any and all controls.

7.4 Site Management Plan

A Track 4 cleanup requires an SMP. Site management is the last phase of remediation and begins with the approval of the FER and issuance of the Certificate of Completion for the remedy. The finalized SMP is included 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 the NYSDEC. The property owner is responsible for all site management responsibilities defined in the environmental easement and performance of the SMP.

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 remedy in accordance with the NYSDEC BCA. This includes: (1) development, implementation, and management of all ECs and ICs; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, recovery or other mechanical 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 the NYSDEC; and (5) defining criteria for termination of treatment or other mechanical system operation.

To address these needs, this SMP will include four plans: (1) an EC and IC 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 the SMDS, and any 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 and the guidelines provided by the NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a periodic basis, and are submitted in a Periodic Review Report. The certification period will be determined by NYSDEC and the initial submittal will be 15 months after issuance of the COC.

No exclusions for handling of residual contaminated soils will be provided in the SMP. All handling of residual contaminated soil and historic fill will be subject to provisions contained in the SMP.

8.0 FINAL ENGINEERING REPORT

An FER, prepared in accordance with DER-10, will be submitted to the NYSDEC following completion of the remedial action defined in this RAWP. The FER will provide documentation that the remedial work required under this RAWP was completed and was performed in compliance with this plan. The FER will include the following documentation:

1. Written and photographic documentation (via daily field reports) of the completed remedy;
2. A description of any deviations from the RAWP;
3. An account of soil and historic fill exported from the site, including waste types and volumes, waste characterization documentation, facility-signed manifests and scale tickets, facility approvals and other waste disposal documentation;
4. An account of soil and fill materials imported to the site;
5. A tabular summary of post-excavation documentation sampling results and other sampling and laboratory analysis completed as part of the remedial action;
6. As-built drawings for ECs and commissioning test results; and
7. An itemized description of actual costs incurred during the remedy.

Before approval of a FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (PDF).

8.1 Certification

The following certification will appear in front of the Executive Summary of the FER. The certification will be signed by the RE, Jason Hayes, 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 _____certify that I am currently a NYS registered professional engineer, I had primary direct responsibility for the implementation of the subject construction program, and I certify that the Remedial Action Work Plan (or Remedial Design or Plans and Specifications) was implemented and that all construction activities were completed in substantial conformance with the DER-approved Remedial Action Work Plan (or Remedial Design or Plans and Specifications).

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 or Plans and Specifications) and all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established in the work plan (or Remedial Design or Plans and Specifications).

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 to ECL 71-3605 and that any affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

I certify that an SMP has been submitted for the continual and proper operation, maintenance and monitoring of any engineering controls employed at the site including the proper maintenance of any remaining monitoring wells, and that such plan has been approved by DER.

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. I, [name], of [business address], am certifying as Owner's Designated Site Representative (and if the site consists of multiple properties): [and I have been authorized and designated by all site owners to sign this certification] for the site.

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.

9.0 SCHEDULE

Mobilization will commence before remedial activities at the site and is expected to take about two weeks. Once mobilization is complete, the remedial activities will commence. The first phase is anticipated to take about three months and includes, but not limited to, removal of existing surface cover, excavation, stockpiling, and transport of historic fill, import of materials for the composite cover system and backfilling, and collection of documentation and endpoint samples. The second phase is anticipated to take about one month and includes the installation of the vapor mitigation system. The FER will be submitted to the NYSDEC as detailed in Section 8.0 after the remedial activities are completed at the site. A detailed project schedule including deadlines for remedial activities is included in Appendix I.

FIGURES

NOTES

1. BASE MAP SOURCE: USGS (2016) 7.5–MINUTE BROOKLYN, N.Y., TOPOGRAPHIC QUADRANGLES
2. NORTH ARROW SHOWS TRUE NORTH.

LEGEND

— — APPROXIMATE SITE BOUNDARY

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project
45 COMMERCIAL STREET
BLOCK No. 2472, LOT No. 70
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
SITE LOCATION MAP

Project No.	170229024
Date	03/26/2020
Drawn By	DC
Checked By	WK

Figure No. 1

Filename: \\langan.com\data\NYC\data0\170229024\Project Data\CAD\24\SheetFiles\Environmental\BCP RIR\Figure 1 - Site Location Map.dwg Date: 5/26/2020 Time: 13:31 User: rbalkind Style Table: Langan.stb Layout: ANSIA-BP

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE TAX LOT BOUNDARY

NOTES:

1. BASE MAP SOURCES: TOPOGRAPHIC BOUNDARY & UTILITY SURVEY DRAWING, DATED MAY 25, 2018, PREPARED BY LANGAN.
2. NORTH ARROW SHOWS TRUE NORTH.
3. ELEVATIONS SHOWN IN THE FIGURE ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS APPROXIMATELY 1.1 FEET ABOVE MEAN SEA LEVEL DATUM AT SANDY HOOK, NEW JERSEY AS DEFINED BY THE UNITED STATES GEOLOGIC SURVEY (USGS NGVD 1929).

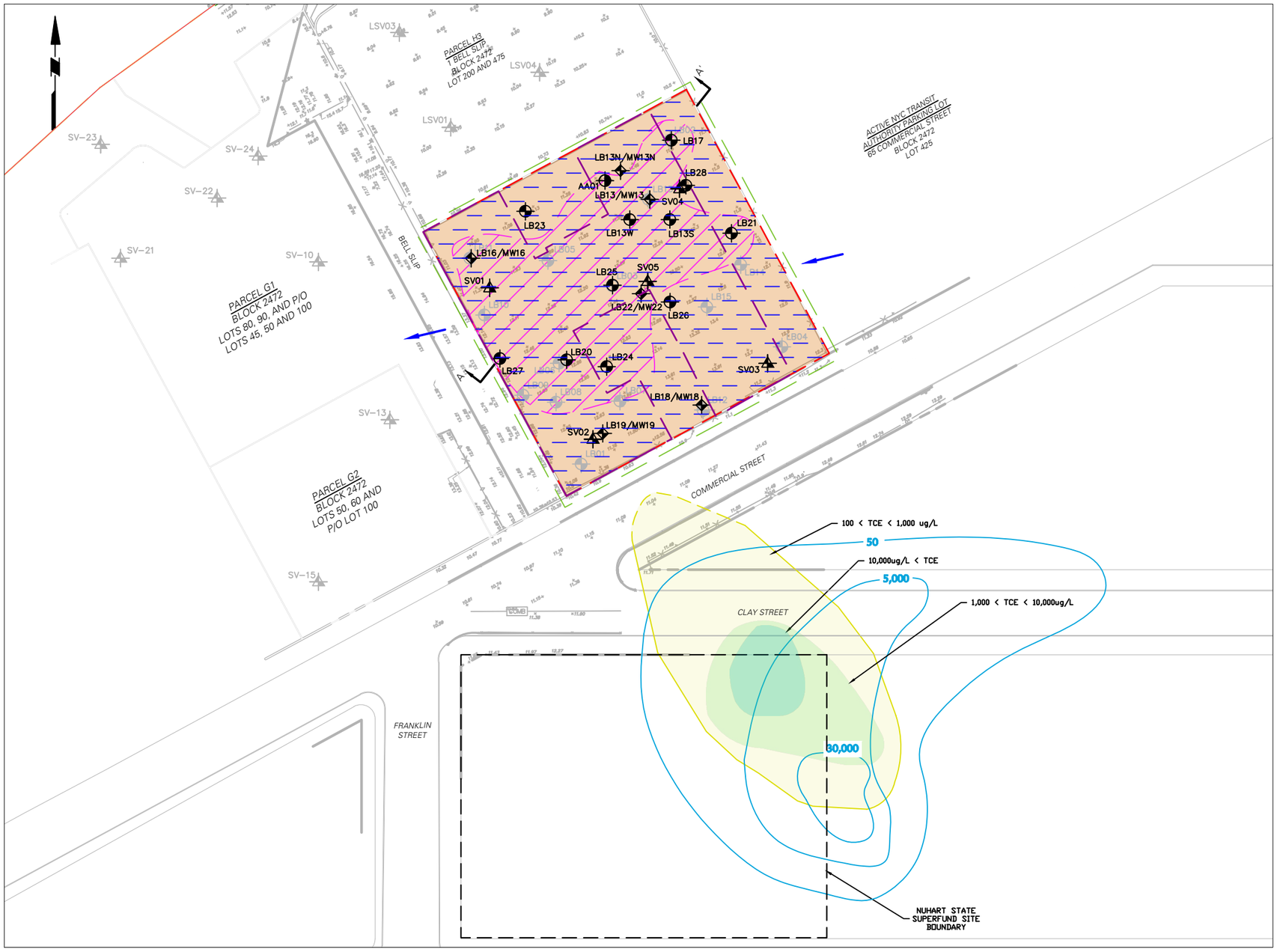
WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

50 0 25 50
SCALE IN FEET

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project	45 COMMERCIAL STREET BLOCK No. 2472, LOT No. 70 BROOKLYN KINGS COUNTY NEW YORK
Figure Title	SITE PLAN
Project No.	170229024
Date	04/01/2020
Drawn By	DC
Checked By	WK
Figure No.	2

Filename: \\langan.com\data\NYC\data0\170229024\Project Data\CAD\24\SheetFiles\Environmental\BCP RAWP\Figure 2 - Site Plan.dwg Date: 10/2/2020 Time: 08:32 User: wkim Style Table: Langan.stb Layout: ANSIB-BL



LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE TAX LOT BOUNDARY
- APPROXIMATE PROPOSED BUILDING BOUNDARY
- AOC 1: PRIOR SITE USE
- AOC 2: PETROLEUM-IMPACTED FILL
- AOC 3: HISTORIC FILL
- AOC 4: HISTORICAL USE OF SURROUNDING PROPERTIES
- LB13/MW13 — SOIL BORING AND MONITORING WELL LOCATION AND ID
- LB14 — RI SOIL BORING LOCATION AND ID
- SV05 — RI SOIL VAPOR SAMPLING POINT LOCATION AND ID
- AA01 — RI AMBIENT AIR SAMPLING POINT LOCATION AND ID
- LB01 — PREVIOUS SOIL BORING LOCATION AND ID (LANGAN 2019)
- LSV01 — PREVIOUS OFF-SITE SOIL VAPOR LOCATION AND ID (LANGAN 2014, LANGAN 2018)
- INFERRED GROUNDWATER FLOW DIRECTION
- APPROXIMATE AREA AND EXTENT OF NUHART TCE PLUME IN GROUNDWATER (AS OF JULY 2015)
- 50 — APPROXIMATE AREA AND EXTENT OF NUHART TCE PLUME IN SOIL VAPOR [ug/m^3] (AS OF JULY 2015)

NOTES:

1. BASE MAP SOURCES: TOPOGRAPHIC BOUNDARY & UTILITY SURVEY DRAWING, DATED MAY 25, 2018, PREPARED BY LANGAN.
2. NORTH ARROW SHOWS TRUE NORTH.
3. ELEVATIONS SHOWN IN THE FIGURE ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS APPROXIMATELY 1.1 FEET ABOVE MEAN SEA LEVEL DATUM AT SANDY HOOK, NEW JERSEY AS DEFINED BY THE UNITED STATES GEOLOGIC SURVEY (USGS NGVD 1929).
4. ALL SAMPLE LOCATIONS ARE APPROXIMATE.
5. TCE = TRICHLOROETHYLENE
6. RI = REMEDIAL INVESTIGATION
7. LOCATIONS AND EXTENTS OF TCE PLUME ARE REFERENCED FROM THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION RECORD OF DECISION FOR THE FORMER NUHART PLASTIC MANUFACTURING SITE, DATED MARCH 2019.
8. LOCATIONS OF PREVIOUS OFF-SITE SOIL VAPOR SAMPLES ARE REFERENCED FROM SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT - PARCEL G1, DATED OCTOBER 2014, SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT - GREENPOINT LANDING PARCEL G2, DATED JUNE 2014, AND SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT - PARCEL H3, DATED FEBRUARY 2019.

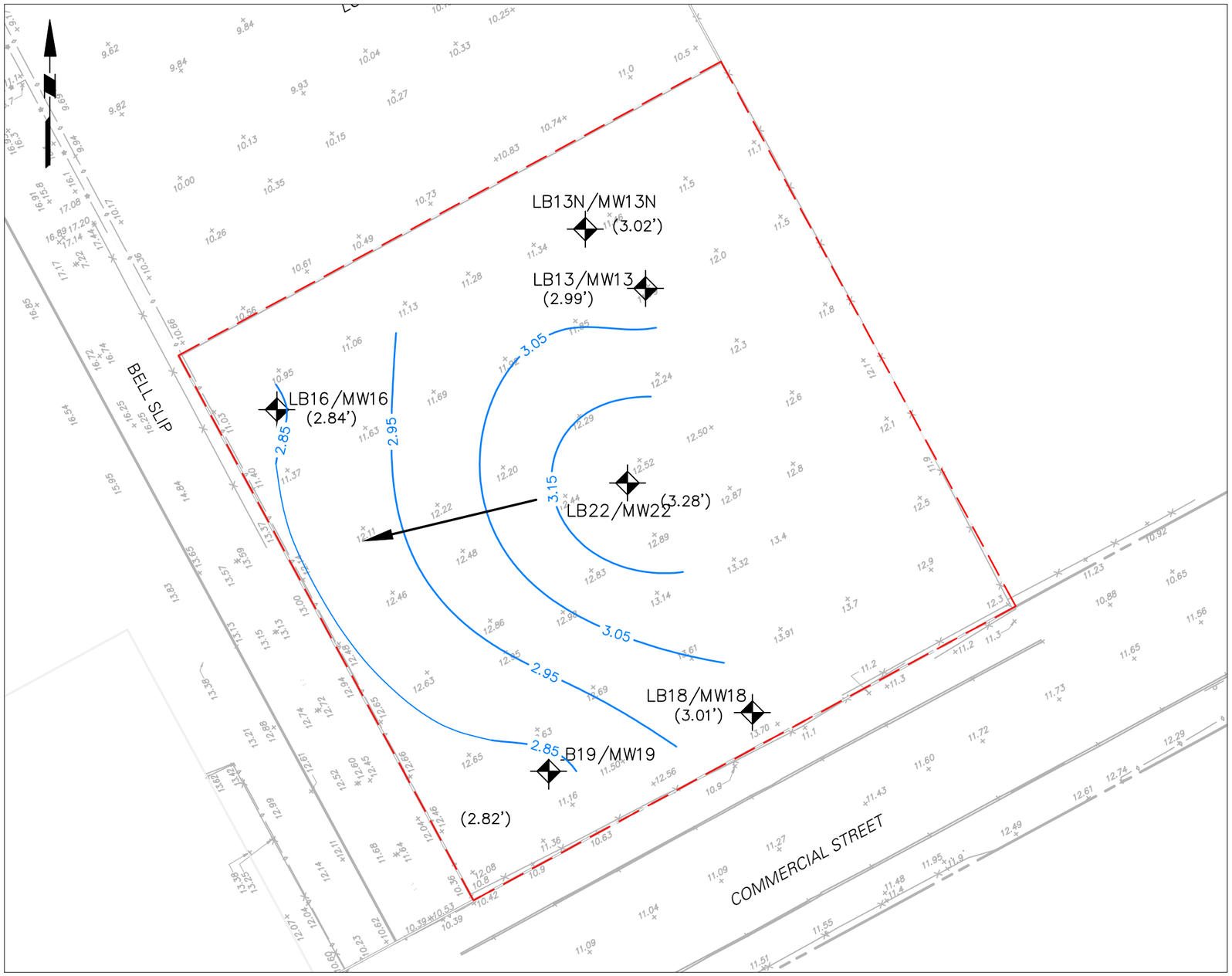
WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

80 0 40 80
SCALE IN FEET

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project	45 COMMERCIAL STREET BLOCK No. 2472, LOT No. 70 BROOKLYN KINGS COUNTY NEW YORK
Figure Title	AREAS OF CONCERN AND CONCEPTUAL SITE MODEL MAP
Project No.	170229024
Date	05/29/2020
Drawn By	RB
Checked By	JL
Figure No.	3

Filename: \\langan.com\data\NYC\data0\170229024\Project Data\CAD\24\SheetFiles\Environmental\BCP RAWP\Figure 3 - Area of Concern and Conceptual Site Model Map.dwg Date: 10/12/2020 Time: 14:09 User: rbalkind Style Table: Langan.stb Layout: ANSIB-BL



LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE TAX LOT BOUNDARY
- LB13/MW13 (2.99') — SOIL BORING AND MONITORING WELL LOCATION AND ID (GROUNDWATER ELEVATION)
- 2.95 — GROUNDWATER CONTOUR ELEVATION
- INFERRED GROUNDWATER FLOW DIRECTION

NOTES:

1. BASE MAP SOURCES: TOPOGRAPHIC BOUNDARY & UTILITY SURVEY DRAWING, DATED MAY 25, 2018, PREPARED BY LANGAN.
2. NORTH ARROW SHOWS TRUE NORTH.
3. ELEVATIONS SHOWN IN THE FIGURE ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS APPROXIMATELY 1.1 FEET ABOVE MEAN SEA LEVEL DATUM AT SANDY HOOK, NEW JERSEY AS DEFINED BY THE UNITED STATES GEOLOGIC SURVEY (USGS NGVD 1929).
4. MONITORING WELL TOP OF CASING ELEVATIONS WERE SURVEYED BY LANGAN ON MAY 18, 2020.
5. ALL SAMPLE LOCATIONS ARE APPROXIMATE.
6. GROUNDWATER ELEVATIONS ARE BASED ON A SYNOPTIC GROUNDWATER GAUGING ON MAY 20, 2020
7. GROUNDWATER CONTOUR INTERVAL IS 0.1 FOOT

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

40 0 10 25 40
SCALE IN FEET

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

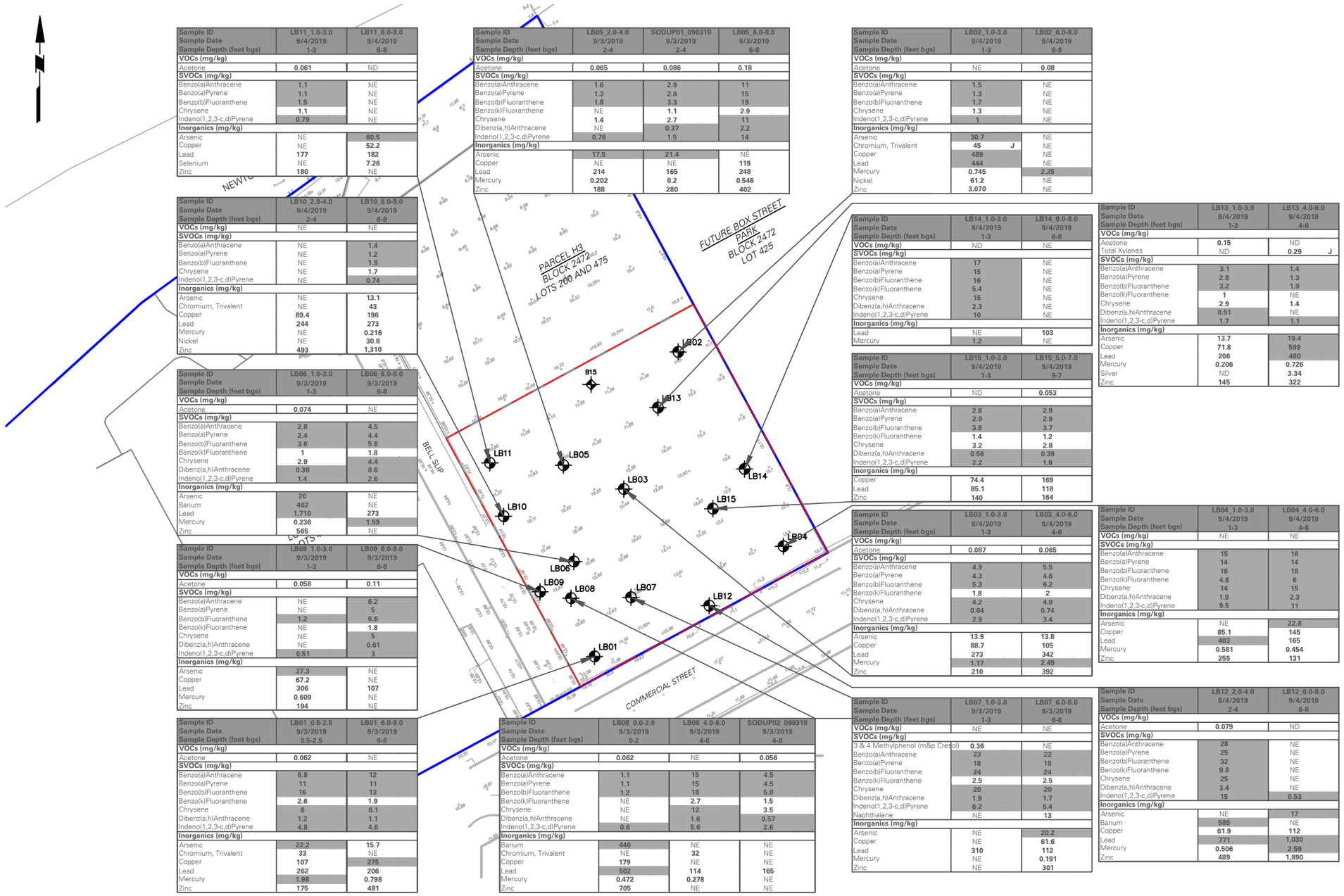
Project
45 COMMERCIAL STREET
BLOCK No. 2472, LOT No. 70
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
GROUNDWATER ELEVATION CONTOUR MAP

Project No.	170229024
Date	05/29/2020
Drawn By	JFY
Checked By	WK

Figure No. 4

Filename: \\langan.com\data\NYC\data0\170229024\Project Data\CAD\24\SheetFiles\Environmental\BCP RIR\Figure 4 - Groundwater Elevation Contour Map.dwg Date: 10/2/2020 Time: 08:42 User: wkim Style Table: Langan.stb Layout: ANSIB-BL



Sample ID	LB11_1.0-3.0	LB11_6.0-8.0
Sample Date	9/4/2019	9/4/2019
Sample Depth (feet bgs)	1-3	6-8
VOCs (mg/kg)		
Acetone	0.061	ND
SVOCs (mg/kg)		
Benzo(a)Anthracene	1.1	NE
Benzo(a)Pyrene	1.1	NE
Benzo(b)Fluoranthene	1.5	NE
Chrysene	1.1	NE
Indeno(1,2,3-c,d)Pyrene	0.79	NE
Inorganics (mg/kg)		
Arsenic	NE	60.5
Copper	NE	52.2
Lead	177	182
Selenium	NE	7.26
Zinc	180	NE

Sample ID	LB10_2.0-4.0	LB10_6.0-8.0
Sample Date	9/4/2019	9/4/2019
Sample Depth (feet bgs)	2-4	6-8
VOCs (mg/kg)	NE	NE
SVOCs (mg/kg)		
Benzo(a)Anthracene	NE	1.4
Benzo(a)Pyrene	NE	1.2
Benzo(b)Fluoranthene	NE	1.8
Chrysene	NE	1.7
Indeno(1,2,3-c,d)Pyrene	NE	0.74
Inorganics (mg/kg)		
Arsenic	NE	13.1
Chromium, Trivalent	NE	43
Copper	89.4	196
Lead	244	273
Mercury	NE	0.216
Nickel	NE	30.8
Zinc	493	1,310

Sample ID	LB06_1.0-3.0	LB06_6.0-8.0
Sample Date	9/3/2019	9/3/2019
Sample Depth (feet bgs)	1-3	6-8
VOCs (mg/kg)		
Acetone	0.074	NE
SVOCs (mg/kg)		
Benzo(a)Anthracene	2.8	4.5
Benzo(a)Pyrene	2.4	4.4
Benzo(b)Fluoranthene	3.6	5.6
Benzo(k)Fluoranthene	1	1.8
Chrysene	2.9	4.4
Dibenz(a,h)Anthracene	0.38	0.6
Indeno(1,2,3-c,d)Pyrene	1.4	2.6
Inorganics (mg/kg)		
Arsenic	20	NE
Barium	462	NE
Lead	1,710	273
Mercury	0.236	1.59
Zinc	565	NE

Sample ID	LB09_1.0-3.0	LB09_6.0-8.0
Sample Date	9/3/2019	9/3/2019
Sample Depth (feet bgs)	1-3	6-8
VOCs (mg/kg)		
Acetone	0.058	0.11
SVOCs (mg/kg)		
Benzo(a)Anthracene	NE	6.2
Benzo(a)Pyrene	NE	5
Benzo(b)Fluoranthene	1.2	6.6
Benzo(k)Fluoranthene	NE	1.8
Chrysene	NE	5
Dibenz(a,h)Anthracene	NE	0.61
Indeno(1,2,3-c,d)Pyrene	0.51	3
Inorganics (mg/kg)		
Arsenic	37.3	NE
Copper	67.2	NE
Lead	306	107
Mercury	0.609	NE
Zinc	194	NE

Sample ID	LB01_0.5-2.5	LB01_6.0-8.0
Sample Date	9/3/2019	9/3/2019
Sample Depth (feet bgs)	0.5-2.5	6-8
VOCs (mg/kg)		
Acetone	0.062	NE
SVOCs (mg/kg)		
Benzo(a)Anthracene	6.8	12
Benzo(a)Pyrene	11	11
Benzo(b)Fluoranthene	16	13
Benzo(k)Fluoranthene	2.6	1.9
Chrysene	6	6.1
Dibenz(a,h)Anthracene	1.2	1.1
Indeno(1,2,3-c,d)Pyrene	4.8	4.6
Inorganics (mg/kg)		
Arsenic	22.2	15.7
Chromium, Trivalent	33	NE
Copper	107	275
Lead	262	206
Mercury	1.98	0.798
Zinc	175	481

Sample ID	LB05_2.0-4.0	SODUP01_090319	LB05_6.0-8.0
Sample Date	9/3/2019	9/3/2019	9/3/2019
Sample Depth (feet bgs)	2-4	2-4	6-8
VOCs (mg/kg)			
Acetone	0.065	0.086	0.18
SVOCs (mg/kg)			
Benzo(a)Anthracene	1.6	2.9	11
Benzo(a)Pyrene	1.3	2.6	15
Benzo(b)Fluoranthene	1.8	3.3	19
Benzo(k)Fluoranthene	NE	1.1	2.9
Chrysene	1.4	2.7	11
Dibenz(a,h)Anthracene	NE	0.37	2.2
Indeno(1,2,3-c,d)Pyrene	0.76	1.5	14
Inorganics (mg/kg)			
Arsenic	17.5	21.4	NE
Copper	NE	NE	119
Lead	214	165	248
Mercury	0.202	0.2	0.546
Zinc	188	280	402

Sample ID	LB08_0.0-2.0	LB08_4.0-6.0	SODUP02_090319
Sample Date	9/3/2019	9/3/2019	9/3/2019
Sample Depth (feet bgs)	0-2	4-6	4-6
VOCs (mg/kg)			
Acetone	0.062	NE	0.056
SVOCs (mg/kg)			
Benzo(a)Anthracene	1.1	15	4.5
Benzo(a)Pyrene	1.1	15	4.5
Benzo(b)Fluoranthene	1.2	18	5.8
Benzo(k)Fluoranthene	NE	2.7	1.5
Chrysene	NE	12	3.5
Dibenz(a,h)Anthracene	NE	1.6	0.57
Indeno(1,2,3-c,d)Pyrene	0.6	5.6	2.6
Inorganics (mg/kg)			
Barium	440	NE	NE
Chromium, Trivalent	NE	32	NE
Copper	179	NE	NE
Lead	502	114	165
Mercury	0.472	0.278	NE
Zinc	705	NE	NE

Sample ID	LB02_1.0-3.0	LB02_6.0-8.0
Sample Date	9/4/2019	9/4/2019
Sample Depth (feet bgs)	1-3	6-8
VOCs (mg/kg)		
Acetone	NE	0.08
SVOCs (mg/kg)		
Benzo(a)Anthracene	1.5	NE
Benzo(a)Pyrene	1.3	NE
Benzo(b)Fluoranthene	1.7	NE
Chrysene	1.3	NE
Indeno(1,2,3-c,d)Pyrene	1	NE
Inorganics (mg/kg)		
Arsenic	30.7	NE
Chromium, Trivalent	45 J	NE
Copper	489	NE
Lead	444	NE
Mercury	0.745	2.25
Nickel	61.2	NE
Zinc	3,070	NE

Sample ID	LB14_1.0-3.0	LB14_6.0-8.0
Sample Date	9/4/2019	9/4/2019
Sample Depth (feet bgs)	1-3	6-8
VOCs (mg/kg)	ND	NE
SVOCs (mg/kg)		
Benzo(a)Anthracene	17	NE
Benzo(a)Pyrene	15	NE
Benzo(b)Fluoranthene	16	NE
Benzo(k)Fluoranthene	5.4	NE
Chrysene	15	NE
Dibenz(a,h)Anthracene	2.3	NE
Indeno(1,2,3-c,d)Pyrene	10	NE
Inorganics (mg/kg)		
Lead	NE	103
Mercury	1.2	NE

Sample ID	LB15_1.0-3.0	LB15_5.0-7.0
Sample Date	9/4/2019	9/4/2019
Sample Depth (feet bgs)	1-3	5-7
VOCs (mg/kg)		
Acetone	ND	0.053
SVOCs (mg/kg)		
Benzo(a)Anthracene	2.8	2.9
Benzo(a)Pyrene	2.9	2.9
Benzo(b)Fluoranthene	3.6	3.7
Benzo(k)Fluoranthene	1.4	1.2
Chrysene	3.2	2.8
Dibenz(a,h)Anthracene	0.56	0.39
Indeno(1,2,3-c,d)Pyrene	2.2	1.8
Inorganics (mg/kg)		
Copper	74.4	169
Lead	85.1	118
Zinc	140	164

Sample ID	LB03_1.0-3.0	LB03_4.0-6.0
Sample Date	9/4/2019	9/4/2019
Sample Depth (feet bgs)	1-3	4-6
VOCs (mg/kg)		
Acetone	0.087	0.065
SVOCs (mg/kg)		
Benzo(a)Anthracene	4.9	5.5
Benzo(a)Pyrene	4.3	4.6
Benzo(b)Fluoranthene	5.3	6.2
Benzo(k)Fluoranthene	1.8	2
Chrysene	4.2	4.9
Dibenz(a,h)Anthracene	0.64	0.74
Indeno(1,2,3-c,d)Pyrene	2.9	3.4
Inorganics (mg/kg)		
Arsenic	13.9	13.8
Copper	88.7	105
Lead	273	342
Mercury	1.17	2.49
Zinc	210	392

Sample ID	LB07_1.0-3.0	LB07_6.0-8.0
Sample Date	9/3/2019	9/3/2019
Sample Depth (feet bgs)	1-3	6-8
VOCs (mg/kg)	NE	NE
SVOCs (mg/kg)		
3 & 4 Methylphenol (m&p Cresol)	0.36	NE
Benzo(a)Anthracene	23	22
Benzo(a)Pyrene	18	18
Benzo(b)Fluoranthene	24	24
Benzo(k)Fluoranthene	2.5	2.5
Chrysene	20	20
Dibenz(a,h)Anthracene	1.9	1.7
Indeno(1,2,3-c,d)Pyrene	6.2	6.4
Naphthalene	NE	13
Inorganics (mg/kg)		
Arsenic	NE	20.2
Copper	NE	61.6
Lead	310	112
Mercury	NE	0.191
Zinc	NE	301

Sample ID	LB13_1.0-3.0	LB13_4.0-6.0
Sample Date	9/4/2019	9/4/2019
Sample Depth (feet bgs)	1-3	4-6
VOCs (mg/kg)		
Acetone	0.15	ND
Total Xylenes	ND	0.29 J
SVOCs (mg/kg)		
Benzo(a)Anthracene	3.1	1.4
Benzo(a)Pyrene	2.6	1.3
Benzo(b)Fluoranthene	3.2	1.9
Benzo(k)Fluoranthene	1	NE
Chrysene	2.9	1.4
Dibenz(a,h)Anthracene	0.51	NE
Indeno(1,2,3-c,d)Pyrene	1.7	1.1
Inorganics (mg/kg)		
Arsenic	13.7	19.4
Copper	71.8	599
Lead	206	480
Mercury	0.206	0.726
Silver	ND	3.34
Zinc	145	322

Sample ID	LB04_1.0-3.0	LB04_4.0-6.0
Sample Date	9/4/2019	9/4/2019
Sample Depth (feet bgs)	1-3	4-6
VOCs (mg/kg)	NE	NE
SVOCs (mg/kg)		
Benzo(a)Anthracene	15	16
Benzo(a)Pyrene	14	14
Benzo(b)Fluoranthene	16	18
Benzo(k)Fluoranthene	4.6	6
Chrysene	14	15
Dibenz(a,h)Anthracene	1.9	2.3
Indeno(1,2,3-c,d)Pyrene	9.5	11
Inorganics (mg/kg)		
Arsenic	NE	22.8
Copper	85.1	145
Lead	403	165
Mercury	0.581	0.454
Zinc	255	131

Sample ID	LB12_2.0-4.0	LB12_6.0-8.0
Sample Date	9/4/2019	9/4/2019
Sample Depth (feet bgs)	2-4	6-8
VOCs (mg/kg)		
Acetone	0.079	ND
SVOCs (mg/kg)		
Benzo(a)Anthracene	28	NE
Benzo(a)Pyrene	25	NE
Benzo(b)Fluoranthene	32	NE
Benzo(k)Fluoranthene	9.8	NE
Chrysene	25	NE
Dibenz(a,h)Anthracene	3.4	NE
Indeno(1,2,3-c,d)Pyrene	15	0.53
Inorganics (mg/kg)		
Arsenic	NE	17
Barium	585	NE
Copper	61.9	112
Lead	771	1,030
Mercury	0.506	2.59
Zinc	489	1,890

LEGEND:

- APPROXIMATE DEVELOPMENT PROPERTY BOUNDARY
- APPROXIMATE SITE BOUNDARY
- APPROXIMATE TAX LOT BOUNDARY
- LB01 — SOIL BORING LOCATION AND ID (LANGAN 2019)
- B15 — SOIL BORING AND MONITORING WELL LOCATION AND ID (AKRF)

Analyte	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs
VOCs (mg/kg)		
Acetone	0.05	100
Total Xylenes	0.26	100
SVOCs (mg/kg)		
3 & 4 Methylphenol (m&p Cresol)	0.33	100
Benzo(a)Anthracene	1	1
Benzo(a)Pyrene	1	1
Benzo(b)Fluoranthene	1	1
Benzo(k)Fluoranthene	0.8	3.9
Chrysene	1	3.9
Dibenz(a,h)Anthracene	0.33	0.33
Indeno(1,2,3-c,d)Pyrene	0.5	0.5
Naphthalene	12	100
Inorganics (mg/kg)		
Arsenic	13	16
Barium	350	400
Chromium, Trivalent	30	180
Copper	50	270
Lead	63	400
Mercury	0.18	0.81
Nickel	30	310
Selenium	3.9	180
Silver	2	180
Zinc	109	10,000

NOTES:

1. BASE MAP SOURCES: TOPOGRAPHIC BOUNDARY & UTILITY SURVEY DRAWING, DATED MAY 25, 2018, PREPARED BY LANGAN.
2. NORTH ARROW SHOWS TRUE NORTH.
3. ELEVATIONS SHOWN IN THE FIGURE ARE BASED IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS APPROXIMATELY 1.1 FEET ABOVE MEAN SEA LEVEL DATUM AT SANDY HOOK, NEW JERSEY AS DEFINED BY THE UNITED STATES GEOLOGIC SURVEY (USGS NGVD 1929).
4. AKRF SOIL SAMPLE RESULTS ARE NOT INCLUDED BECAUSE THEY NO LONGER REPRESENT SITE CONDITIONS.
5. GRAB SOIL SAMPLE ANALYTICAL RESULTS ARE COMPARED TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TITLE 6 OF THE OFFICIAL COMPILATION OF NEW YORK CODES, RULES, AND REGULATIONS (NYCRR) PART 375 UNRESTRICTED USE AND RESTRICTED USE RESTRICTED-RESIDENTIAL USE SOIL CLEANUP OBJECTIVES (SCO).
6. ONLY ANALYTES WITH CONCENTRATIONS ABOVE PART 375 UNRESTRICTED USE AND RESTRICTED USE RESTRICTED-RESIDENTIAL USE SCOs ARE SHOWN.
7. ANALYTES WITH CONCENTRATIONS ABOVE THE NYSDEC PART 375 UNRESTRICTED USE SCOs ARE IN BOLD.
8. ANALYTES WITH CONCENTRATIONS ABOVE THE NYSDEC PART 375 RESTRICTED USE RESTRICTED-RESIDENTIAL SCOs ARE SHADED AND IN BOLD.
9. BGS = BELOW GROUND SURFACE
10. VOC = VOLATILE ORGANIC COMPOUND
11. SVOC = SEMIVOLATILE ORGANIC COMPOUND
12. mg/kg = MILLIGRAMS PER KILOGRAM
13. NE = NOT EXCEEDED
14. ND = NOT DETECTED
15. J = THE ANALYTE WAS DETECTED ABOVE THE METHOD DETECTION LIMIT (MDL), BUT BELOW THE REPORTING LIMIT (RL); THEREFORE, THE RESULT IS AN ESTIMATED CONCENTRATION.

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

60 0 20 40 60
SCALE IN FEET

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project: 45 COMMERCIAL STREET
BLOCK No. 2472, LOT No. 70
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title: PREVIOUS SOIL SAMPLE ANALYTICAL RESULTS MAP

Project No. 170229024
Date 09/17/2019
Drawn By DC
Checked By JL

Figure No. 5A

Filename: \\langan.com\data\NYC\data0\170229024\Project Data\CAD\24\SheetFiles\Environmental\BCP RAWP\Figure 5A - Previous Soil Sample Analytical Results Map.dwg Date: 10/2/2020 Time: 08:46 User: wkim Style Table: Langan.stb Layout: ANSIB-BL

Sample ID	LB16_3-5	LB16_6-8	LB16_8-10	LB16_15-17	LB16_18-20
Sample Date	5/13/2020	5/13/2020	5/13/2020	5/13/2020	5/13/2020
Sample Depth (feet bgs)	3-5	6-8	8-10	15-17	18-20
VOCs (mg/kg)					
Acetone	NE	NA	0.077 J	0.084	0.072
SVOCs (mg/kg)					
Benzo(a)Anthracene	45	NA	1.9	NE	ND
Benzo(a)Pyrene	45	NA	1.7	NE	NE
Benzo(b)Fluoranthene	53	NA	2.5	NE	NE
Benzo(k)Fluoranthene	23	NA	0.86	NE	NE
Chrysene	43	NA	1.8	NE	NE
Dibenz(a,h)Anthracene	7.5	NA	NE	NE	ND
Dibenzofuran	14	NA	NE	NE	ND
Fluoranthene	140	NA	NE	NE	NE
Indeno(1,2,3-c,d)Pyrene	26	NA	1.1	NE	NE
Phenanthrene	160	NA	NE	NE	NE
Pesticides (mg/kg)					
4,4'-DDD	ND	NA	0.028 J	ND	ND
Herbicides (mg/kg)	ND	NA	ND	ND	ND
PCBs (mg/kg)	NE	NA	NE	ND	ND
Inorganics (mg/kg)					
Chromium, Hexavalent	1.1	NA	2.4	ND	ND
Copper	NE	NA	136	NE	NE
Lead	NE	269	232	NE	NE
Mercury	ND	0.282	ND	1.99	ND
Nickel	NE	NA	NE	43.8	NE
Zinc	NE	NA	502	173	NE
PFAS (ng/kg)					
Perfluorooctanesulfonic acid	ND	NA	590 J	ND	ND

Sample ID	LB13N_15-17
Sample Date	5/7/2020
Sample Depth (feet bgs)	15-17
VOCs (mg/kg)	
Acetone	0.11
SVOCs (mg/kg)	
2-Methylphenol (o-Cresol)	0.57
4-Methylphenol (P-Cresol)	1.3
Benzo(a)Anthracene	12
Benzo(a)Pyrene	9.9
Benzo(b)Fluoranthene	12
Benzo(k)Fluoranthene	4.5
Chrysene	11
Dibenz(a,h)Anthracene	1.7
Indeno(1,2,3-c,d)Pyrene	4.4
Phenol	0.76

Sample ID	LB17_1-3	LB17_3-5	SODUP01_05062020	LB17_6-8	LB17_8-10	LB17_15-16
Sample Date	5/6/2020	5/6/2020	5/6/2020	5/6/2020	5/7/2020	5/7/2020
Sample Depth (feet bgs)	1-3	3-5	3-5	6-8	8-10	15-16
VOCs (mg/kg)						
Acetone	NA	NE	0.066	NA	NA	NE
SVOCs (mg/kg)						
Benzo(a)Anthracene	NA	1.4 J	25 J	NA	NA	11
Benzo(a)Pyrene	NA	1.2 J	14 J	NA	NA	9.1
Benzo(b)Fluoranthene	NA	1.6 J	20 J	NA	NA	9.4
Benzo(k)Fluoranthene	NA	NE	8.3 J	NA	NA	3.9
Chrysene	NA	1.4 J	22 J	NA	NA	9.7
Dibenz(a,h)Anthracene	NA	NE	2.1 J	NA	NA	1.5
Dibenzofuran	NA	NE	9.5 J	NA	NA	NE
Indeno(1,2,3-c,d)Pyrene	NA	0.68 J	5.5 J	NA	NA	4.4
Pesticides (mg/kg)	NA	NE	NE	NA	NA	NE
Herbicides (mg/kg)	NA	ND	ND	NA	NA	ND
PCBs (mg/kg)	NA	ND	ND	NA	NA	ND
Inorganics (mg/kg)						
Arsenic	NA	15.7 J	NE	NA	16	NE
Copper	NA	164	124 J	NA	NA	68.1
Lead	8,960	278	211	174	766	1,490
Mercury	0.672	1.2	1.57	1.52	4.97	0.458
Nickel	NA	NE	NE	NA	NA	34
Zinc	NA	312	230 J	NA	NA	531
PFAS (ng/kg)	NA	ND	ND	NA	NA	ND

Sample ID	LB28_14.5-15.5
Sample Date	5/16/2020
Sample Depth (feet bgs)	14.5-15.5
VOCs (mg/kg)	NE
SVOCs (mg/kg)	
Benzo(a)Anthracene	1.3
Benzo(a)Pyrene	1.3
Benzo(b)Fluoranthene	1.5
Chrysene	1.1
Indeno(1,2,3-c,d)Pyrene	0.67

Sample ID	LB23_10-12
Sample Date	5/13/2020
Sample Depth (feet bgs)	10-12
VOCs (mg/kg)	NA
SVOCs (mg/kg)	
Benzo(a)Anthracene	1.6
Benzo(a)Pyrene	7.1
Benzo(b)Fluoranthene	8.1
Benzo(k)Fluoranthene	3.2
Chrysene	1.6
Dibenz(a,h)Anthracene	3
Indeno(1,2,3-c,d)Pyrene	19

Sample ID	LB13_15.5-17.5	LB13_18-20
Sample Date	5/6/2020	5/6/2020
Sample Depth (feet bgs)	15.5-17.5	18-20
VOCs (mg/kg)		
Acetone	ND	0.064
Total Xylenes	0.4 J	ND
SVOCs (mg/kg)		
Benzo(a)Anthracene	3.9	ND
Benzo(a)Pyrene	3.1	ND
Benzo(b)Fluoranthene	2.2	ND
Chrysene	3.6	ND
Dibenz(a,h)Anthracene	0.78	ND
Indeno(1,2,3-c,d)Pyrene	1.4	ND

Sample ID	LB13W_15-17
Sample Date	5/7/2020
Sample Depth (feet bgs)	15-17
VOCs (mg/kg)	NE
SVOCs (mg/kg)	
2-Methylphenol (o-Cresol)	0.5
4-Methylphenol (P-Cresol)	1.2
Benzo(a)Anthracene	19
Benzo(a)Pyrene	16
Benzo(b)Fluoranthene	19
Benzo(k)Fluoranthene	6.2
Chrysene	17
Dibenz(a,h)Anthracene	2.5
Dibenzofuran	11
Indeno(1,2,3-c,d)Pyrene	7.7
Naphthalene	16
Phenol	0.7

Sample ID	LB21_1-3	LB21_15-17
Sample Date	5/7/2020	5/7/2020
Sample Depth (feet bgs)	1-3	15-17
VOCs (mg/kg)		
Acetone	NE	0.071
SVOCs (mg/kg)		
Benzo(a)Anthracene	30	NE
Benzo(a)Pyrene	27	NE
Benzo(b)Fluoranthene	33	NE
Chrysene	27	NE
Dibenz(a,h)Anthracene	3.2	NE
Indeno(1,2,3-c,d)Pyrene	15	NE
Pesticides (mg/kg)	ND	ND
Herbicides (mg/kg)	ND	ND
PCBs (mg/kg)	ND	ND
Inorganics (mg/kg)		
Arsenic	NE	13.9
Chromium, Hexavalent	1.5	ND
Copper	114	NE
Lead	141	154
Mercury	0.733	0.398
Nickel	NE	32.8
Zinc	194	115
PFAS (ng/kg)		
Perfluorooctanesulfonic acid	490 J	ND

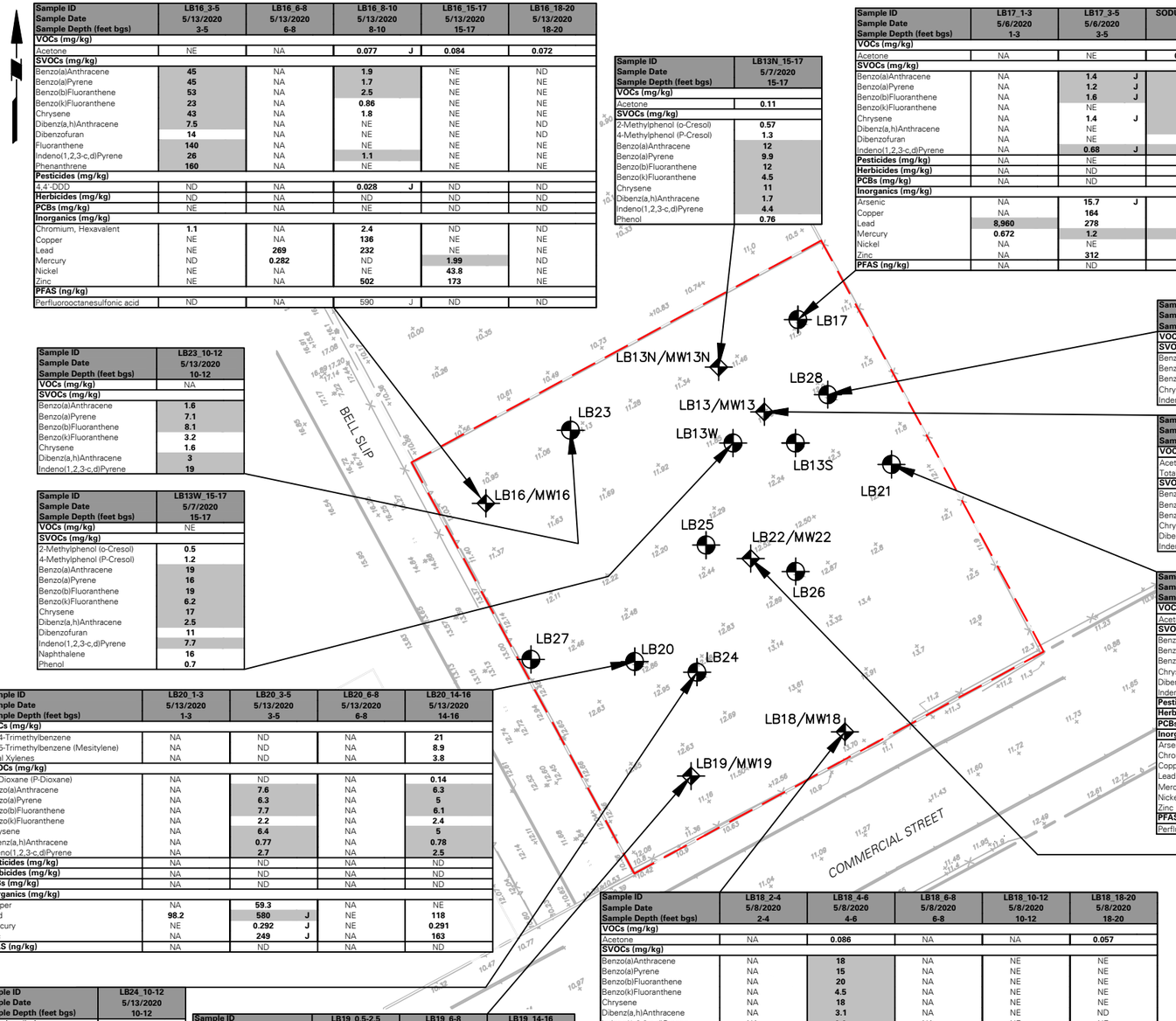
Sample ID	LB20_1-3	LB20_3-5	LB20_6-8	LB20_14-16
Sample Date	5/13/2020	5/13/2020	5/13/2020	5/13/2020
Sample Depth (feet bgs)	1-3	3-5	6-8	14-16
VOCs (mg/kg)				
1,2,4-Trimethylbenzene	NA	ND	NA	21
1,3,5-Trimethylbenzene (Mesitylene)	NA	ND	NA	8.9
Total Xylenes	NA	ND	NA	3.8
SVOCs (mg/kg)				
1,4-Dioxane (P-Dioxane)	NA	ND	NA	0.14
Benzo(a)Anthracene	NA	7.6	NA	6.3
Benzo(a)Pyrene	NA	6.3	NA	5
Benzo(b)Fluoranthene	NA	7.7	NA	6.1
Benzo(k)Fluoranthene	NA	2.2	NA	2.4
Chrysene	NA	6.4	NA	5
Dibenz(a,h)Anthracene	NA	0.77	NA	0.78
Indeno(1,2,3-c,d)Pyrene	NA	2.7	NA	2.5
Pesticides (mg/kg)	NA	ND	NA	ND
Herbicides (mg/kg)	NA	ND	NA	ND
PCBs (mg/kg)	NA	ND	NA	ND
Inorganics (mg/kg)				
Copper	NA	59.3	NA	NE
Lead	98.2	580 J	NE	118
Mercury	NE	0.292 J	NE	0.291
Zinc	NA	249 J	NA	163
PFAS (ng/kg)	NA	ND	NA	ND

Sample ID	LB18_2-4	LB18_4-6	LB18_6-8	LB18_10-12	LB18_18-20
Sample Date	5/8/2020	5/8/2020	5/8/2020	5/8/2020	5/8/2020
Sample Depth (feet bgs)	2-4	4-6	6-8	10-12	18-20
VOCs (mg/kg)					
Acetone	NA	0.086	NA	NA	0.057
SVOCs (mg/kg)					
Benzo(a)Anthracene	NA	18	NA	NE	NE
Benzo(a)Pyrene	NA	15	NA	NE	NE
Benzo(b)Fluoranthene	NA	20	NA	NE	NE
Benzo(k)Fluoranthene	NA	4.5	NA	NE	NE
Chrysene	NA	18	NA	NE	NE
Dibenz(a,h)Anthracene	NA	3.1	NA	NE	ND
Indeno(1,2,3-c,d)Pyrene	NA	9.2	NA	NE	NE
Pesticides (mg/kg)	NA	ND	NA	NA	NE
Herbicides (mg/kg)	NA	ND	NA	NA	ND
PCBs (mg/kg)	NA	ND	NA	NA	ND
Inorganics (mg/kg)					
Arsenic	NA	16.5	NA	NA	NE
Barium	NA	484	NA	NA	NE
Chromium, Hexavalent	NA	NE	NA	NA	2.4
Copper	NA	54.9	NA	NA	NE
Lead	10,900	591	75.2	NA	NE
Mercury	0.373	1.15	NE	NA	ND
Zinc	NA	152	NA	NA	167
PFAS (ng/kg)					
Perfluorooctanoic Acid	NA	1,700	NA	NA	ND

Sample ID	LB22_2-4	LB22_4-6	LB22_12-14	LB22_18-20
Sample Date	5/8/2020	5/8/2020	5/8/2020	5/8/2020
Sample Depth (feet bgs)	2-4	4-6	12-14	18-20
VOCs (mg/kg)				
Acetone	0.09	NA	0.18	NE
SVOCs (mg/kg)				
Benzo(a)Anthracene	2.5	NA	NE	NE
Benzo(a)Pyrene	2.8	NA	NE	NE
Benzo(b)Fluoranthene	3.1	NA	NE	NE
Benzo(k)Fluoranthene	1.3	NA	NE	NE
Chrysene	2.4	NA	NE	NE
Dibenz(a,h)Anthracene	0.56	NA	ND	ND
Indeno(1,2,3-c,d)Pyrene	1.8	NA	NE	NE
Pesticides (mg/kg)	NE	NA	ND	ND
Herbicides (mg/kg)	ND	NA	ND	ND
PCBs (mg/kg)	ND	NA	ND	ND
Inorganics (mg/kg)				
Arsenic	14.3	NA	NE	NE
Copper	108	NA	NE	NE
Lead	325	409	155	NE
Mercury	0.588	1.91 J	NE	NE
Selenium	NE	NA	4.27	NE
Zinc	275	NA	180	NE
PFAS (ng/kg)	ND	NA	ND	ND

Sample ID	LB24_10-12
Sample Date	5/13/2020
Sample Depth (feet bgs)	10-12
VOCs (mg/kg)	NA
SVOCs (mg/kg)	
Benzo(a)Anthracene	2.9
Benzo(a)Pyrene	2.6
Benzo(b)Fluoranthene	3.1
Benzo(k)Fluoranthene	1.3
Chrysene	2.6
Dibenz(a,h)Anthracene	0.46
Indeno(1,2,3-c,d)Pyrene	1.6

Sample ID	LB19_0.5-2.5	LB19_6-8	LB19_14-16
Sample Date	5/13/2020	5/13/2020	5/13/2020
Sample Depth (feet bgs)	0.5-2.5	6-8	14-16
VOCs (mg/kg)			
Acetone	NA	ND	0.079
SVOCs (mg/kg)			
Benzo(a)Anthracene	NA	14	NE
Benzo(a)Pyrene	NA	9.6	NE
Benzo(b)Fluoranthene	NA	12	NE
Benzo(k)Fluoranthene	NA	2.8	NE
Chrysene	NA	12	NE
Dibenz(a,h)Anthracene	NA	0.99	NE
Indeno(1,2,3-c,d)Pyrene	NA	3.1	NE
Pesticides (mg/kg)	NA	ND	ND
Herbicides (mg/kg)	NA	ND	ND
PCBs (mg/kg)	NA	ND	ND
Inorganics (mg/kg)			
Copper	NA	50.7	NE
Lead	NE	71.5	NE
PFAS (ng/kg)	NA	ND	ND



50 0 25 50

SCALE IN FEET

LEGEND:

APPROXIMATE SITE BOUNDARY

APPROXIMATE TAX LOT BOUNDARY

LB13/MW13 — SOIL BORING AND MONITORING WELL LOCATION AND ID

LB14 — SOIL BORING LOCATION AND ID

Analyte	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs
VOCs (mg/kg)		
1,2,4-Trimethylbenzene	3.6	52
1,3,5-Trimethylbenzene (Mesitylene)	8.4	52
Acetone	0.05	100
Total Xylenes	0.26	100
SVOCs (mg/kg)		
1,4-Dioxane (P-Dioxane)	0.1	13
2-Methylphenol (o-Cresol)	0.33	100
4-Methylphenol (P-Cresol)	0.33	100
Benzo(a)Anthracene	1	1
Benzo(a)Pyrene	1	1
Benzo(b)Fluoranthene	1	1
Benzo(k)Fluoranthene	0.8	3.9
Chrysene	1	3.9
Dibenz(a,h)Anthracene	0.33	0.33
Dibenzofuran	7	59
Fluoranthene	100	100
Indeno(1,2,3-c,d)Pyrene	0.5	0.5
Naphthalene	12	100
Phenanthrene	100	100
Phenol	0.33	100
Pesticides (mg/kg)		
4,4'-DDD	0.0033	13
Inorganics (mg/kg)		
Arsenic	13	16
Barium	350	400
Chromium, Hexavalent	1	110
Copper	50	270
Lead	63	400
Mercury	0.18	0.81
Nickel	30	310
Selenium	3.9	180
Zinc	109	10,000

NOTES:

1. BASE MAP SOURCES: TOPOGRAPHIC BOUNDARY & UTILITY SURVEY DRAWING, DATED MAY 25, 2018, PREPARED BY LANGAN.
2. NORTH ARROW SHOWS TRUE NORTH.
3. ELEVATIONS SHOWN IN THE FIGURE ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. ALL SAMPLE LOCATIONS ARE APPROXIMATE.
5. SOIL SAMPLE ANALYTICAL RESULTS ARE COMPARED TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TITLE 6 OF THE OFFICIAL COMPILATION OF NEW YORK CODES, RULES, AND REGULATIONS (NYCRR) PART 375 UNRESTRICTED USE (UU), AND RESTRICTED USE RESTRICTED-RESIDENTIAL (RURR) SOIL CLEANUP OBJECTIVES (SCO).
6. DETECTED PER- AND POLYFLUOROALKYL SUBSTANCES ARE SHOWN IN TABLES.
7. DETECTED ANALYTICAL RESULTS ABOVE UU SCOS ARE BOLDED.
8. DETECTED ANALYTICAL RESULTS ABOVE RURR SCOS ARE SHADED.
9. ANALYTICAL RESULTS WITH REPORTING LIMITS (RL) ABOVE THE LOWEST APPLICABLE CRITERIA ARE ITALICIZED.
10. SAMPLE SODUP01_05062020 IS A DUPLICATE SAMPLE OF LB17_3-5.
11. SOIL BORINGS LB25, LB26, AND LB27 WERE ADVANCED TO VISUALLY DELINEATE PETROLEUM IMPACTS. SAMPLES WERE NOT COLLECTED FROM THESE BORINGS.
12. mg/kg = MILLIGRAMS PER KILOGRAM
13. ng/kg = NANOGRAMS PER KILOGRAM
14. ~ = REGULATORY LIMIT FOR THIS ANALYTE DOES NOT EXIST
15. bgs = BELOW GRADE SURFACE
16. NA = NOT ANALYZED
17. ND = NOT DETECTED
18. NE = NOT EXCEEDED
19. RI = REMEDIAL INVESTIGATION

QUALIFIERS:

J = THE ANALYTE WAS DETECTED ABOVE THE METHOD DETECTION LIMIT (MDL), BUT BELOW THE RL; THEREFORE, THE RESULT IS AN ESTIMATED CONCENTRATION.

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

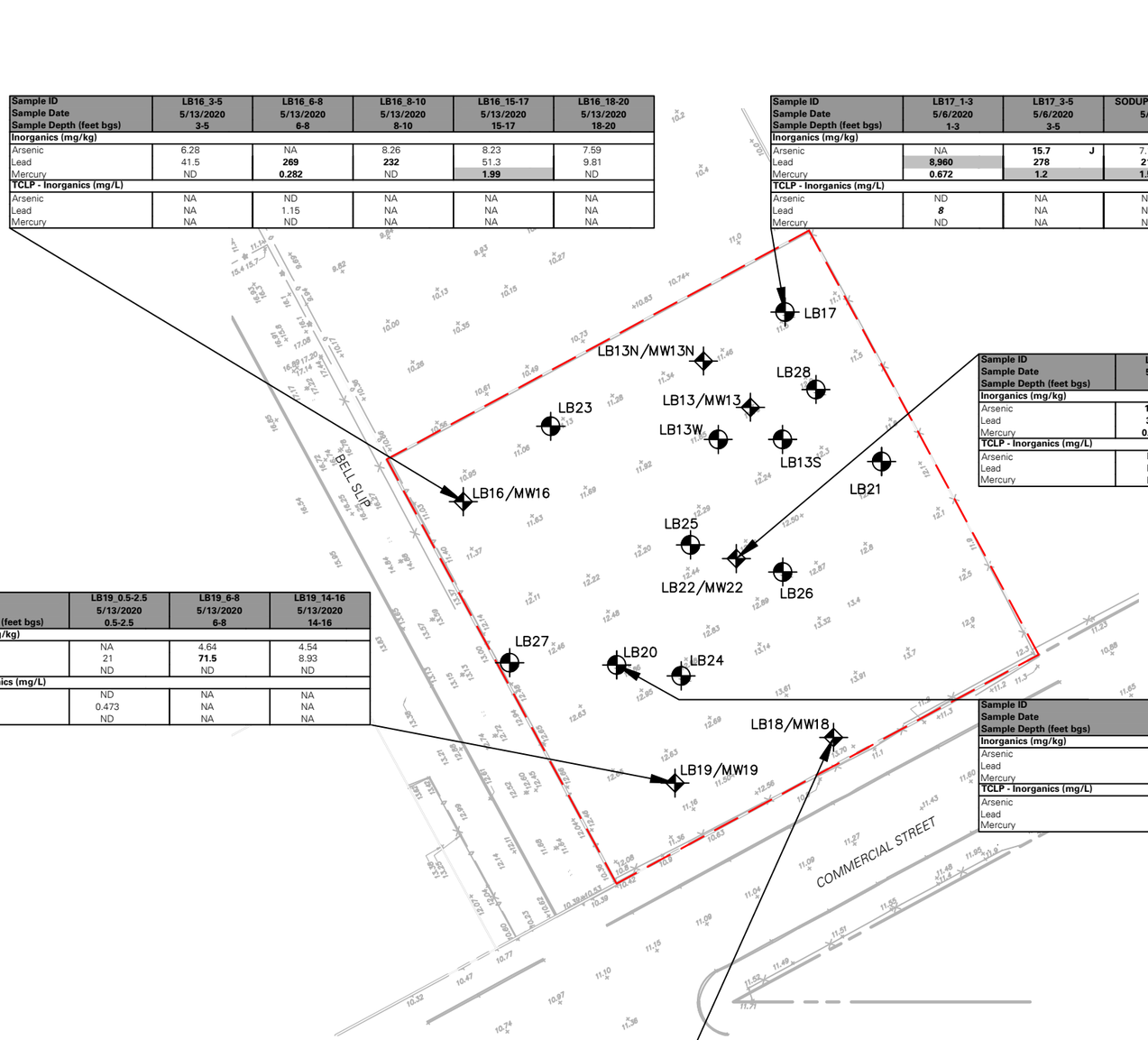
Project
45 COMMERCIAL STREET
BLOCK No. 2472, LOT No. 70
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
RI SOIL SAMPLE ANALYTICAL RESULTS MAP

Project No.	170229024
Date	10/20/2020
Drawn By	RB
Checked By	JL

Figure No. 5B

Filename: \\langan.com\data\NYC\data0\170229024\Project Data\CAD\24\SheetFiles\Environmental\BCP RAWP\Figure 5B - RI Soil Sample Analytical Results Map.dwg Date: 11/3/2020 Time: 13:47 User: rbalkind Style Table: Langan.stb Layout: ANSIB-BL



Sample ID	LB16_3-5	LB16_6-8	LB16_8-10	LB16_15-17	LB16_18-20
Sample Date	5/13/2020	5/13/2020	5/13/2020	5/13/2020	5/13/2020
Sample Depth (feet bgs)	3-5	6-8	8-10	15-17	18-20
Inorganics (mg/kg)					
Arsenic	6.28	NA	8.26	8.23	7.59
Lead	41.5	**269**	**232**	51.3	9.81
Mercury	ND	**0.282**	ND	**1.99**	ND
TCLP - Inorganics (mg/L)					
Arsenic	NA	ND	NA	NA	NA
Lead	NA	1.15	NA	NA	NA
Mercury	NA	ND	NA	NA	NA

Sample ID	LB17_1-3	LB17_3-5	SODUP01_05062020	LB17_6-8	LB17_8-10	LB17_15-16
Sample Date	5/6/2020	5/6/2020	5/6/2020	5/6/2020	5/7/2020	5/7/2020
Sample Depth (feet bgs)	1-3	3-5	3-5	6-8	8-10	15-16
Inorganics (mg/kg)						
Arsenic	NA	**15.7** J	7.18 J	NA	**16**	10.4
Lead	**8,960**	**278**	**211**	**174**	**766**	**1,490**
Mercury	**0.672**	**1.2**	**1.57**	**1.52**	**4.97**	**0.458**
TCLP - Inorganics (mg/L)						
Arsenic	ND	NA	NA	ND	NA	NA
Lead	***8***	NA	NA	0.0673	NA	NA
Mercury	ND	NA	NA	ND	NA	NA

Sample ID	LB22_2-4	LB22_4-6	LB22_12-14	LB22_18-20
Sample Date	5/8/2020	5/8/2020	5/8/2020	5/8/2020
Sample Depth (feet bgs)	2-4	4-6	12-14	18-20
Inorganics (mg/kg)				
Arsenic	**14.3**	NA	9.55	7.27
Lead	**325**	**409**	**155**	7.91
Mercury	**0.588**	**1.91** J	ND	ND
TCLP - Inorganics (mg/L)				
Arsenic	NA	ND	NA	NA
Lead	NA	***9.01***	NA	NA
Mercury	NA	ND	NA	NA

Sample ID	LB19_0.5-2.5	LB19_6-8	LB19_14-16
Sample Date	5/13/2020	5/13/2020	5/13/2020
Sample Depth (feet bgs)	0.5-2.5	6-8	14-16
Inorganics (mg/kg)			
Arsenic	NA	4.64	4.54
Lead	21	**71.5**	8.93
Mercury	ND	ND	ND
TCLP - Inorganics (mg/L)			
Arsenic	ND	NA	NA
Lead	0.473	NA	NA
Mercury	ND	NA	NA

Sample ID	LB20_1-3	LB20_3-5	LB20_6-8	LB20_14-16
Sample Date	5/13/2020	5/13/2020	5/13/2020	5/13/2020
Sample Depth (feet bgs)	1-3	3-5	6-8	14-16
Inorganics (mg/kg)				
Arsenic	NA	10.4	NA	3.73
Lead	**98.2**	**580** J	4.57	**118**
Mercury	ND	**0.292** J	ND	**0.291**
TCLP - Inorganics (mg/L)				
Arsenic	ND	NA	ND	NA
Lead	0.247	NA	ND	NA
Mercury	ND	NA	ND	NA

Sample ID	LB18_2-4	LB18_4-6	LB18_6-8	LB18_18-20
Sample Date	5/8/2020	5/8/2020	5/8/2020	5/8/2020
Sample Depth (feet bgs)	2-4	4-6	6-8	18-20
Inorganics (mg/kg)				
Arsenic	NA	**16.5**	NA	5.37
Lead	**10,900**	**591**	**75.2**	10.9
Mercury	**0.373**	**1.15**	0.0217 J	ND
TCLP - Inorganics (mg/L)				
Arsenic	ND	NA	ND	NA
Lead	***8.17***	NA	0.0083 J	NA
Mercury	ND	NA	ND	NA

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE TAX LOT BOUNDARY
- LB13/MW13 — SOIL BORING AND MONITORING WELL LOCATION AND ID
- LB14 — SOIL BORING LOCATION AND ID

Analyte	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	RCRA Characteristics for Hazardous Waste
Inorganics (mg/kg)			
Arsenic	13	16	~
Lead	63	400	~
Mercury	0.18	0.81	~
TCLP - Inorganics (mg/L)			
Arsenic	~	~	5
Lead	~	~	5
Mercury	~	~	0.2

NOTES:

1. BASE MAP SOURCES: TOPOGRAPHIC BOUNDARY & UTILITY SURVEY DRAWING, DATED MAY 25, 2018, PREPARED BY LANGAN.
2. NORTH ARROW SHOWS TRUE NORTH.
3. ELEVATIONS SHOWN IN THE FIGURE ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. ALL SAMPLE LOCATIONS ARE APPROXIMATE.
5. SOIL SAMPLE ANALYTICAL RESULTS ARE COMPARED TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TITLE 6 OF THE OFFICIAL COMPILATION OF NEW YORK CODES, RULES, AND REGULATIONS (NYCRR) PART 375 UNRESTRICTED USE (UU), RESTRICTED USE RESTRICTED-RESIDENTIAL (RURR) SOIL CLEANUP OBJECTIVES (SCO), AND THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA) RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) CODE OF FEDERAL REGULATIONS (CFR) PART 261 MAXIMUM CONCENTRATION OF CONTAMINANTS FOR TOXICITY CHARACTERISTIC.
6. DETECTED ANALYTICAL RESULTS ABOVE UU SCOS ARE BOLDED.
7. DETECTED ANALYTICAL RESULTS ABOVE RURR SCOS ARE SHADED.
8. DETECTED ANALYTICAL RESULTS ABOVE USEPA RCRA CFR PART 261 MAXIMUM CONCENTRATIONS OF CONTAMINANTS FOR TOXICITY CHARACTERISTIC ARE BOLDED AND ITALICIZED.
9. ANALYTICAL RESULTS WITH REPORTING LIMITS (RL) ABOVE THE LOWEST APPLICABLE CRITERIA ARE ITALICIZED.
10. SAMPLE SODUP01_05062020 IS A DUPLICATE SAMPLE OF LB17_3-5.
11. SOIL BORINGS LB25, LB26, AND LB27 WERE ADVANCED TO VISUALLY DELINEATE PETROLEUM IMPACTS. SAMPLES WERE NOT COLLECTED FROM THESE BORINGS.
12. ONLY ANALYTICAL RESULTS FOR BORINGS WITH SAMPLES THAT WERE ANALYZED FOR TCLP ARSENIC, LEAD, AND MERCURY ARE SHOWN.
13. mg/kg = MILLIGRAMS PER KILOGRAM
14. mg/L = MILLIGRAMS PER LITER
15. ~ = REGULATORY LIMIT FOR THIS ANALYTE DOES NOT EXIST
16. bgs = BELOW GRADE SURFACE
17. NA = NOT ANALYZED
18. ND = NOT DETECTED
19. NE = NOT EXCEEDED
20. TCLP = TOXICITY CHARACTERISTICS LEACHATE PROCEDURE
21. RI = REMEDIAL INVESTIGATION

QUALIFIERS:

J = THE ANALYTE WAS DETECTED ABOVE THE METHOD DETECTION LIMIT (MDL), BUT BELOW THE RL; THEREFORE, THE RESULT IS AN ESTIMATED CONCENTRATION.

50 0 25 50
SCALE IN FEET

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

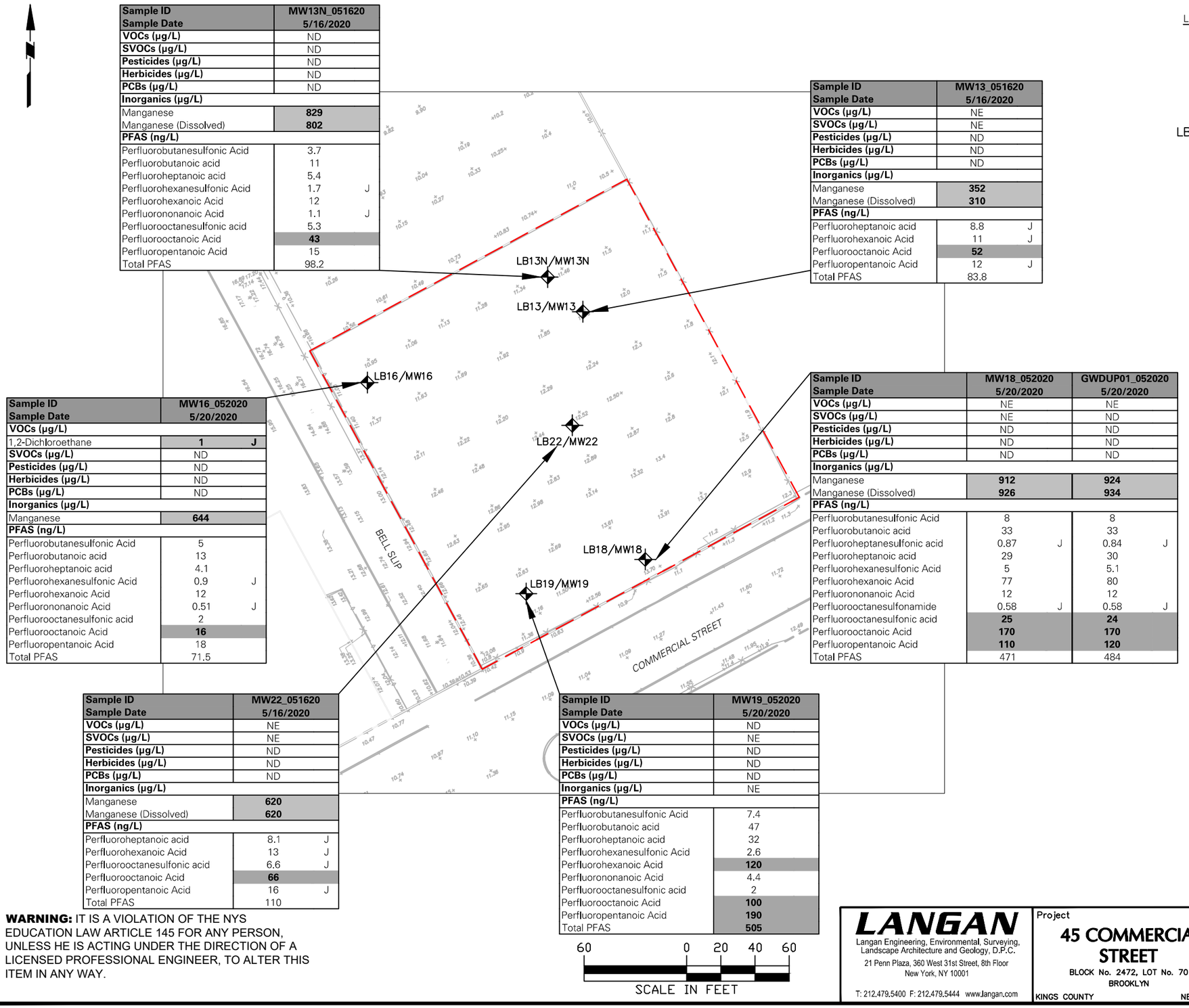
Project: 45 COMMERCIAL STREET
BLOCK No. 2472, LOT No. 70
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title: RI SOIL SAMPLE ANALYTICAL RESULTS MAP
TCLP METALS

Project No. 170229024
Date 10/29/2020
Drawn By RB
Checked By JL

Figure No. 5C

Filename: \\langan.com\data\NYC\data0\170229024\Project Data\CAD\24\SheetFiles\Environmental\BCP RAWP\Figure 5C - RI Soil Sample Analytical Results Map - TCLP Metals.dwg Date: 11/3/2020 Time: 13:51 User: rbalkind Style Table: Langan.stb Layout: ANSIB-BL



Sample ID Sample Date	MW13N_051620 5/16/2020	
VOCs (µg/L)	ND	
SVOCs (µg/L)	ND	
Pesticides (µg/L)	ND	
Herbicides (µg/L)	ND	
PCBs (µg/L)	ND	
Inorganics (µg/L)		
Manganese	**829**	
Manganese (Dissolved)	**802**	
PFAS (ng/L)		
Perfluorobutanesulfonic Acid	3.7	
Perfluorobutanoic acid	11	
Perfluoroheptanoic acid	5.4	
Perfluorohexanesulfonic Acid	1.7	J
Perfluorohexanoic Acid	12	
Perfluorononanoic Acid	1.1	J
Perfluorooctanesulfonic acid	5.3	
Perfluorooctanoic Acid	**43**	
Perfluoropentanoic Acid	15	
Total PFAS	98.2	

Sample ID Sample Date	MW13_051620 5/16/2020	
VOCs (µg/L)	NE	
SVOCs (µg/L)	NE	
Pesticides (µg/L)	ND	
Herbicides (µg/L)	ND	
PCBs (µg/L)	ND	
Inorganics (µg/L)		
Manganese	**352**	
Manganese (Dissolved)	**310**	
PFAS (ng/L)		
Perfluoroheptanoic acid	8.8	J
Perfluorohexanoic Acid	11	J
Perfluorooctanoic Acid	**52**	
Perfluoropentanoic Acid	12	J
Total PFAS	83.8	

Sample ID Sample Date	MW16_052020 5/20/2020	
VOCs (µg/L)		
1,2-Dichloroethane	**1**	**J**
SVOCs (µg/L)	ND	
Pesticides (µg/L)	ND	
Herbicides (µg/L)	ND	
PCBs (µg/L)	ND	
Inorganics (µg/L)		
Manganese	**644**	
PFAS (ng/L)		
Perfluorobutanesulfonic Acid	5	
Perfluorobutanoic acid	13	
Perfluoroheptanoic acid	4.1	
Perfluorohexanesulfonic Acid	0.9	J
Perfluorohexanoic Acid	12	
Perfluorononanoic Acid	0.51	J
Perfluorooctanesulfonic acid	2	
Perfluorooctanoic Acid	**16**	
Perfluoropentanoic Acid	18	
Total PFAS	71.5	

Sample ID Sample Date	MW18_052020 5/20/2020		GWDUP01_052020 5/20/2020	
VOCs (µg/L)	NE		NE	
SVOCs (µg/L)	NE		ND	
Pesticides (µg/L)	ND		ND	
Herbicides (µg/L)	ND		ND	
PCBs (µg/L)	ND		ND	
Inorganics (µg/L)				
Manganese	**912**		**924**	
Manganese (Dissolved)	**926**		**934**	
PFAS (ng/L)				
Perfluorobutanesulfonic Acid	8		8	
Perfluorobutanoic acid	33		33	
Perfluoroheptanesulfonic acid	0.87	J	0.84	J
Perfluoroheptanoic acid	29		30	
Perfluorohexanesulfonic Acid	5		5.1	
Perfluorohexanoic Acid	77		80	
Perfluorononanoic Acid	12		12	
Perfluorooctanesulfonamide	0.58	J	0.58	J
Perfluorooctanesulfonic acid	**25**		**24**	
Perfluorooctanoic Acid	**170**		**170**	
Perfluoropentanoic Acid	**110**		**120**	
Total PFAS	471		484	

Sample ID Sample Date	MW22_051620 5/16/2020	
VOCs (µg/L)	NE	
SVOCs (µg/L)	NE	
Pesticides (µg/L)	ND	
Herbicides (µg/L)	ND	
PCBs (µg/L)	ND	
Inorganics (µg/L)		
Manganese	**620**	
Manganese (Dissolved)	**620**	
PFAS (ng/L)		
Perfluoroheptanoic acid	8.1	J
Perfluorohexanoic Acid	13	J
Perfluorooctanesulfonic acid	6.6	J
Perfluorooctanoic Acid	**66**	
Perfluoropentanoic Acid	16	J
Total PFAS	110	

Sample ID Sample Date	MW19_052020 5/20/2020	
VOCs (µg/L)	ND	
SVOCs (µg/L)	NE	
Pesticides (µg/L)	ND	
Herbicides (µg/L)	ND	
PCBs (µg/L)	ND	
Inorganics (µg/L)	NE	
PFAS (ng/L)		
Perfluorobutanesulfonic Acid	7.4	
Perfluorobutanoic acid	47	
Perfluoroheptanoic acid	32	
Perfluorohexanesulfonic Acid	2.6	
Perfluorohexanoic Acid	**120**	
Perfluorononanoic Acid	4.4	
Perfluorooctanesulfonic acid	2	
Perfluorooctanoic Acid	**100**	
Perfluoropentanoic Acid	**190**	
Total PFAS	**505**	

LEGEND:

APPROXIMATE SITE BOUNDARY

APPROXIMATE TAX LOT BOUNDARY

LB13/MW13 SOIL BORING AND MONITORING WELL LOCATION AND ID

Analyte	NYSDEC SGVs	NYSDEC January 2020 Guidance for Sampling and Analysis of PFAS
VOCs (µg/L)		
1,2-Dichloroethane	0.6	~
Inorganics (µg/L)		
Manganese	300	~
PFAS (ng/L)		
Perfluorohexanoic Acid	~	100
Perfluorooctanesulfonic Acid	~	10
Perfluorooctanoic Acid	~	10
Perfluoropentanoic Acid	~	100
Total PFAS	~	500

NOTES:

1. BASE MAP SOURCES: TOPOGRAPHIC BOUNDARY & UTILITY SURVEY DRAWING, DATED MAY 25, 2018, PREPARED BY LANGAN.
2. NORTH ARROW SHOWS TRUE NORTH.
3. ELEVATIONS SHOWN IN THE FIGURE ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS APPROXIMATELY 1.1 FEET ABOVE MEAN SEA LEVEL DATUM AT SANDY HOOK, NEW JERSEY AS DEFINED BY THE UNITED STATES GEOLOGIC SURVEY (USGS NGVD 1929).
4. ALL SAMPLE LOCATIONS ARE APPROXIMATE.
5. GROUNDWATER SAMPLE ANALYTICAL RESULTS ARE COMPARED TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TITLE 6 OF THE OFFICIAL COMPILATION OF NEW YORK CODES, RULES, AND REGULATIONS (NYCRR) PART 703.5 AND THE NYSDEC TECHNICAL AND OPERATIONAL GUIDANCE SERIES (TOGS) 1.1.1 AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES FOR CLASS GA WATER AND THE NYSDEC JANUARY 2020 GUIDANCE FOR SAMPLING AND ANALYSIS OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS).
6. DETECTED PFAS AND ANALYTES EXCEEDING NYSDEC SGVs ARE SHOWN IN TABLES
7. DETECTED ANALYTES ABOVE NYSDEC SGVs AND THE NYSDEC JANUARY 2020 GUIDANCE FOR SAMPLING AND ANALYSIS OF PFAS ARE BOLDED AND SHADED.
8. SAMPLE GWDUP01_052020 IS A DUPLICATE SAMPLE OF MW18_052020.
9. SAMPLE MW13N_051620 WAS REANALYZED FOR PCBS AFTER LAB FILTRATION.
10. µg/L = MICROGRAMS PER LITER
11. ng/L = NANOGRAMS PER LITER
12. NE = NO EXCEEDANCES
13. ND = NO DETECTIONS

QUALIFIERS:

J = THE ANALYTE WAS DETECTED ABOVE THE METHOD DETECTION LIMIT (MDL), BUT BELOW THE RL; THEREFORE, THE RESULT IS AN ESTIMATED CONCENTRATION.

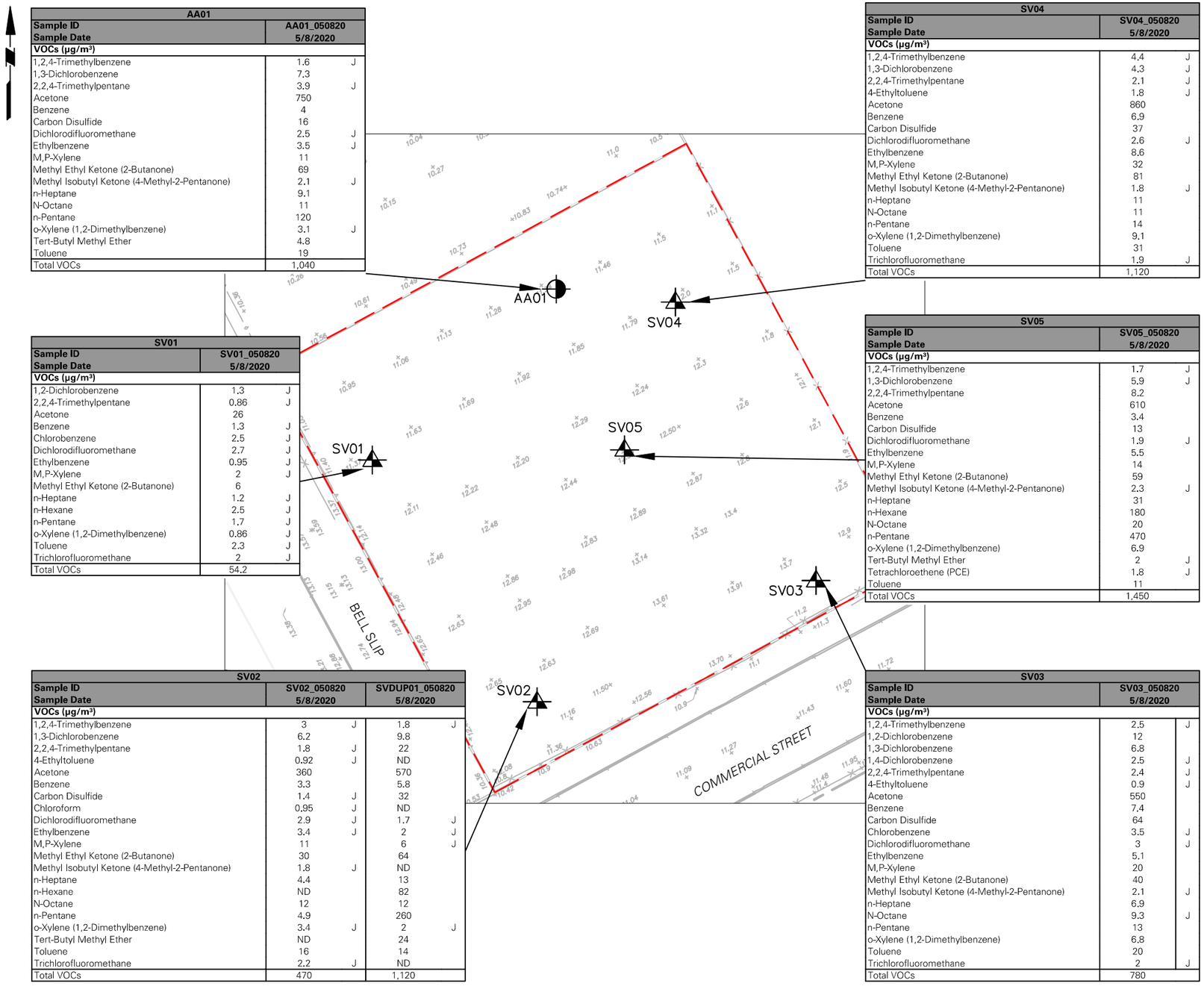
LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project
45 COMMERCIAL STREET
BLOCK No. 2472, LOT No. 70
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
GROUNDWATER SAMPLE ANALYTICAL RESULTS MAP

Project No.	170229024
Date	05/26/2020
Drawn By	RB
Checked By	WK

Figure No. **6**



AA01		
Sample ID	**AA01_050820**	
Sample Date	**5/8/2020**	
VOCs (µg/m³)		
1,2,4-Trimethylbenzene	1.6	J
1,3-Dichlorobenzene	7.3	
2,2,4-Trimethylpentane	3.9	J
Acetone	750	
Benzene	4	
Carbon Disulfide	16	
Dichlorodifluoromethane	2.5	J
Ethylbenzene	3.5	J
M,P-Xylene	11	
Methyl Ethyl Ketone (2-Butanone)	69	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	2.1	J
n-Heptane	9.1	
N-Octane	11	
n-Pentane	120	
o-Xylene (1,2-Dimethylbenzene)	3.1	J
Tert-Butyl Methyl Ether	4.8	
Toluene	19	
Total VOCs	1,040	

SV04		
Sample ID	**SV04_050820**	
Sample Date	**5/8/2020**	
VOCs (µg/m³)		
1,2,4-Trimethylbenzene	4.4	J
1,3-Dichlorobenzene	4.3	J
2,2,4-Trimethylpentane	2.1	J
4-Ethyltoluene	1.8	J
Acetone	860	
Benzene	6.9	
Carbon Disulfide	37	
Dichlorodifluoromethane	2.6	J
Ethylbenzene	8.6	
M,P-Xylene	32	
Methyl Ethyl Ketone (2-Butanone)	81	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	1.8	J
n-Heptane	11	
N-Octane	11	
n-Pentane	14	
o-Xylene (1,2-Dimethylbenzene)	9.1	
Toluene	31	
Trichlorofluoromethane	1.9	J
Total VOCs	1,120	

SV01		
Sample ID	**SV01_050820**	
Sample Date	**5/8/2020**	
VOCs (µg/m³)		
1,2-Dichlorobenzene	1.3	J
2,2,4-Trimethylpentane	0.86	J
Acetone	26	
Benzene	1.3	J
Chlorobenzene	2.5	J
Dichlorodifluoromethane	2.7	J
Ethylbenzene	0.95	J
M,P-Xylene	2	J
Methyl Ethyl Ketone (2-Butanone)	6	
n-Heptane	1.2	J
n-Hexane	2.5	J
n-Pentane	1.7	J
o-Xylene (1,2-Dimethylbenzene)	0.86	J
Toluene	2.3	J
Trichlorofluoromethane	2	J
Total VOCs	54.2	

SV05		
Sample ID	**SV05_050820**	
Sample Date	**5/8/2020**	
VOCs (µg/m³)		
1,2,4-Trimethylbenzene	1.7	J
1,3-Dichlorobenzene	5.9	J
2,2,4-Trimethylpentane	8.2	
Acetone	610	
Benzene	3.4	
Carbon Disulfide	13	
Dichlorodifluoromethane	1.9	J
Ethylbenzene	5.5	
M,P-Xylene	14	
Methyl Ethyl Ketone (2-Butanone)	59	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	2.3	J
n-Heptane	31	
n-Hexane	180	
N-Octane	20	
n-Pentane	470	
o-Xylene (1,2-Dimethylbenzene)	6.9	
Tert-Butyl Methyl Ether	2	J
Tetrachloroethene (PCE)	1.8	J
Toluene	11	
Total VOCs	1,450	

SV02				
Sample ID	**SV02_050820**		**SVDUP01_050820**	
Sample Date	**5/8/2020**		**5/8/2020**	
VOCs (µg/m³)				
1,2,4-Trimethylbenzene	3	J	1.8	J
1,3-Dichlorobenzene	6.2		9.8	
2,2,4-Trimethylpentane	1.8	J	22	
4-Ethyltoluene	0.92	J	ND	
Acetone	360		570	
Benzene	3.3		5.8	
Carbon Disulfide	1.4	J	32	
Chloroform	0.95	J	ND	
Dichlorodifluoromethane	2.9	J	1.7	J
Ethylbenzene	3.4	J	2	J
M,P-Xylene	11		6	J
Methyl Ethyl Ketone (2-Butanone)	30		64	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	1.8	J	ND	
n-Heptane	4.4		13	
n-Hexane	ND		82	
N-Octane	12		12	
n-Pentane	4.9		260	
o-Xylene (1,2-Dimethylbenzene)	3.4	J	2	J
Tert-Butyl Methyl Ether	ND		24	
Toluene	16		14	
Trichlorofluoromethane	2.2	J	ND	
Total VOCs	470		1,120	

SV03		
Sample ID	**SV03_050820**	
Sample Date	**5/8/2020**	
VOCs (µg/m³)		
1,2,4-Trimethylbenzene	2.5	J
1,2-Dichlorobenzene	12	
1,3-Dichlorobenzene	6.8	
1,4-Dichlorobenzene	2.5	J
2,2,4-Trimethylpentane	2.4	J
4-Ethyltoluene	0.9	J
Acetone	550	
Benzene	7.4	
Carbon Disulfide	64	
Chlorobenzene	3.5	J
Dichlorodifluoromethane	3	J
Ethylbenzene	5.1	
M,P-Xylene	20	
Methyl Ethyl Ketone (2-Butanone)	40	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	2.1	J
n-Heptane	6.9	
N-Octane	9.3	J
n-Pentane	13	
o-Xylene (1,2-Dimethylbenzene)	6.8	
Toluene	20	
Trichlorofluoromethane	2	J
Total VOCs	780	

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE TAX LOT BOUNDARY
- SV01 — SOIL VAPOR SAMPLE LOCATION AND ID
- AA01 — AMBIENT AIR SAMPLE LOCATION AND ID

Analyte	NYSDOH Decision Matrices Minimum Concentrations	NYSDOH AGVs
VOCs (µg/m³)		
1,2,4-Trimethylbenzene	~	~
1,2-Dichlorobenzene	~	~
1,3-Dichlorobenzene	~	~
1,4-Dichlorobenzene	~	~
2,2,4-Trimethylpentane	~	~
4-Ethyltoluene	~	~
Acetone	~	~
Benzene	~	~
Carbon Disulfide	~	~
Chlorobenzene	~	~
Chloroform	~	~
Dichlorodifluoromethane	~	~
Ethylbenzene	~	~
M,P-Xylene	~	~
Methyl Ethyl Ketone (2-Butanone)	~	~
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	~	~
n-Heptane	~	~
n-Hexane	~	~
N-Octane	~	~
n-Pentane	~	~
o-Xylene (1,2-Dimethylbenzene)	~	~
Tert-Butyl Methyl Ether	~	~
Tetrachloroethene (PCE)	100	30
Toluene	~	~
Trichlorofluoromethane	~	~

NOTES:

1. BASE MAP SOURCES: TOPOGRAPHIC BOUNDARY & UTILITY SURVEY DRAWING, DATED MAY 25, 2018, PREPARED BY LANGAN.
2. NORTH ARROW SHOWS TRUE NORTH.
3. ELEVATIONS SHOWN IN THE FIGURE ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS APPROXIMATELY 1.1 FEET ABOVE MEAN SEA LEVEL DATUM AT SANDY HOOK, NEW JERSEY AS DEFINED BY THE UNITED STATES GEOLOGIC SURVEY (USGS NGVD 1929).
4. ALL SAMPLE LOCATIONS ARE APPROXIMATE.
5. SOIL VAPOR SAMPLE ANALYTICAL RESULTS ARE COMPARED TO THE MINIMUM SOIL VAPOR CONCENTRATIONS RECOMMENDING MITIGATION AS SET FORTH IN THE NEW YORK STATE DEPARTMENT OF HEALTH (NYSDOH) OCTOBER 2006 GUIDANCE FOR EVALUATING SOIL VAPOR INTRUSION IN THE STATE OF NEW YORK DECISION MATRICES FOR SUB-SLAB VAPOR AND INDOOR AIR AND SUBSEQUENT UPDATES (2017).
6. THE NYSDOH AIR GUIDELINE VALUES (AGVS) AS SET FORTH IN THE NYSDOH OCTOBER 2006 GUIDANCE FOR EVALUATING SOIL VAPOR INTRUSION IN THE STATE OF NEW YORK AND SUBSEQUENT UPDATES (2013, 2015) ARE SHOWN FOR REFERENCE ONLY.
7. AMBIENT AIR SAMPLE ANALYTICAL RESULTS ARE SHOWN FOR REFERENCE ONLY.
8. ONLY DETECTED ANALYTES ARE SHOWN IN THE TABLES.
9. SAMPLE SVDUP01_050820 IS A DUPLCATE OF PARENT SAMPLE SV02_050820.
10. ALL CONCENTRATIONS ARE REPORTED IN MICROGRAMS PER CUBIC METER
11. VOCs = VOLATILE ORGANIC COMPOUNDS
12. µg/m³ = MICROGRAMS PER CUBIC METER
13. NE = NOT EXCEEDED
14. ND = NOT DETECTED
15. J = THE ANALYTE WAS DETECTED ABOVE THE METHOD DETECTION LIMIT (MDL), BUT BELOW THE REPORTING LIMIT (RL); THEREFORE, THE RESULT IS AN ESTIMATED CONCENTRATION.

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

50 0 25 50
SCALE IN FEET

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project
45 COMMERCIAL STREET
BLOCK No. 2472, LOT No. 70
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
SOIL VAPOR SAMPLE ANALYTICAL RESULTS MAP

Project No.	Figure No.
170229024	7
Date: 05/26/2020	
Drawn By: RB	
Checked By: WK	

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE TAX LOT BOUNDARY
- PROPOSED TRACK 1 EXCAVATION EXTENTS TO 13 FEET TO 20 FEET BELOW GRADE SURFACE

NOTES:

1. BASE MAP SOURCES: TOPOGRAPHIC BOUNDARY & UTILITY SURVEY DRAWING, DATED MAY 25, 2018, PREPARED BY LANGAN.
2. NORTH ARROW SHOWS TRUE NORTH.
3. ELEVATIONS SHOWN IN THE FIGURE ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS APPROXIMATELY 1.1 FEET ABOVE MEAN SEA LEVEL DATUM AT SANDY HOOK, NEW JERSEY AS DEFINED BY THE UNITED STATES GEOLOGIC SURVEY (USGS NGVD 1929).

50 0 25 50
SCALE IN FEET

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project	45 COMMERCIAL STREET BLOCK No. 2472, LOT No. 70 BROOKLYN KINGS COUNTY NEW YORK
Figure Title	TRACK 1 CLEANUP PLAN
Project No.	170229024
Date	06/11/2020
Drawn By	RB
Checked By	JL
Figure No.	8

Filename: \\langan.com\data\NYC\data0\170229024\Project Data\CAD\24\SheetFiles\Environmental\BCP RAWP\Figure 8 - Track 1 Cleanup Plan.dwg Date: 10/2/2020 Time: 08:53 User: wkim Style Table: Langan.stb Layout: ANSIB-BL

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE TAX LOT BOUNDARY
- PROPOSED TRACK 4 EXCAVATION EXTENTS TO 2 FEET BGS
- PROPOSED HOTSPOT EXCAVATION TO REMOVE HAZARDOUS CONCENTRATIONS OF LEAD TO ABOUT 4 FEET BGS (ABOUT EL. +8 FEET) AROUND RI BORING LB17 AND ABOUT 7 FEET BGS (ABOUT EL. +5 FEET) AROUND RI BORING LB22
- PROPOSED HOTSPOT EXCAVATION TO REMOVE SVOC AND ARSENIC-IMPACTED SOIL TO ABOUT 9 FEET BELOW BGS (ABOUT EL. +2 FEET) AROUND RI BORING LB16 AND SI BORING LB11
- PROPOSED HOTSPOT EXCAVATION TO REMOVE SOIL CONTAINING A HAZARDOUS CONCENTRATION OF LEAD AND PFOA AT A CONCENTRATION ABOVE ITS MCL TO ABOUT 7 FEET BGS (ABOUT EL. +5 FEET) AROUND RI BORING LB18
- PROPOSED ENDPOINT SAMPLE LOCATION

NOTES:

1. BASE MAP SOURCES: TOPOGRAPHIC BOUNDARY & UTILITY SURVEY DRAWING, DATED MAY 25, 2018, PREPARED BY LANGAN.
2. NORTH ARROW SHOWS TRUE NORTH.
3. ELEVATIONS SHOWN IN THE FIGURE ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS APPROXIMATELY 1.1 FEET ABOVE MEAN SEA LEVEL DATUM AT SANDY HOOK, NEW JERSEY AS DEFINED BY THE UNITED STATES GEOLOGIC SURVEY (USGS NGVD 1929).
4. ALL LOCATIONS ARE APPROXIMATE.
5. A TOTAL OF FIVE ENDPOINT SAMPLES (FOUR SIDEWALL SAMPLES AND ONE BASE SAMPLE) WILL BE COLLECTED AT EACH HOTSPOT EXCAVATION.
6. PFOA = PERFLUOROOCTANIC ACID
7. NYSDEC = NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
8. SVOC = SEMIVOLATILE ORGANIC COMPOUND
9. BGS = BELOW GRADE SURFACE
10. RI = REMEDIAL INVESTIGATION
11. SI = SUBSURFACE INVESTIGATION
12. MCL = MAXIMUM CONTAMINANT LEVEL

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

50 0 25 50
SCALE IN FEET

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project	45 COMMERCIAL STREET BLOCK No. 2472, LOT No. 70 BROOKLYN KINGS COUNTY NEW YORK
Figure Title	TRACK 4 CLEANUP PLAN
Project No.	170229024
Date	10/21/2020
Drawn By	RB
Checked By	JL
Figure No.	9

Filename: \\langan.com\data\NYC\data0\170229024\Project Data\CAD\24\SheetFiles\Environmental\BCP RAWP\Figure 9 - Track 4 Cleanup Plan.dwg Date: 2/19/2021 Time: 12:21 User: esmith Style Table: Langan.stb Layout: ANSIB-BL

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE TAX LOT BOUNDARY
- PROPOSED DOCUMENTATION SAMPLE LOCATION

NOTES:

1. BASE MAP SOURCES: TOPOGRAPHIC BOUNDARY & UTILITY SURVEY DRAWING, DATED MAY 25, 2018, PREPARED BY LANGAN.
2. NORTH ARROW SHOWS TRUE NORTH.
3. ELEVATIONS SHOWN IN THE FIGURE ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS APPROXIMATELY 1.1 FEET ABOVE MEAN SEA LEVEL DATUM AT SANDY HOOK, NEW JERSEY AS DEFINED BY THE UNITED STATES GEOLOGIC SURVEY (USGS NGVD 1929).
4. DOCUMENTATION SAMPLE FREQUENCY = 900 SQUARE FEET PER SAMPLE.

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

50 0 25 50
SCALE IN FEET

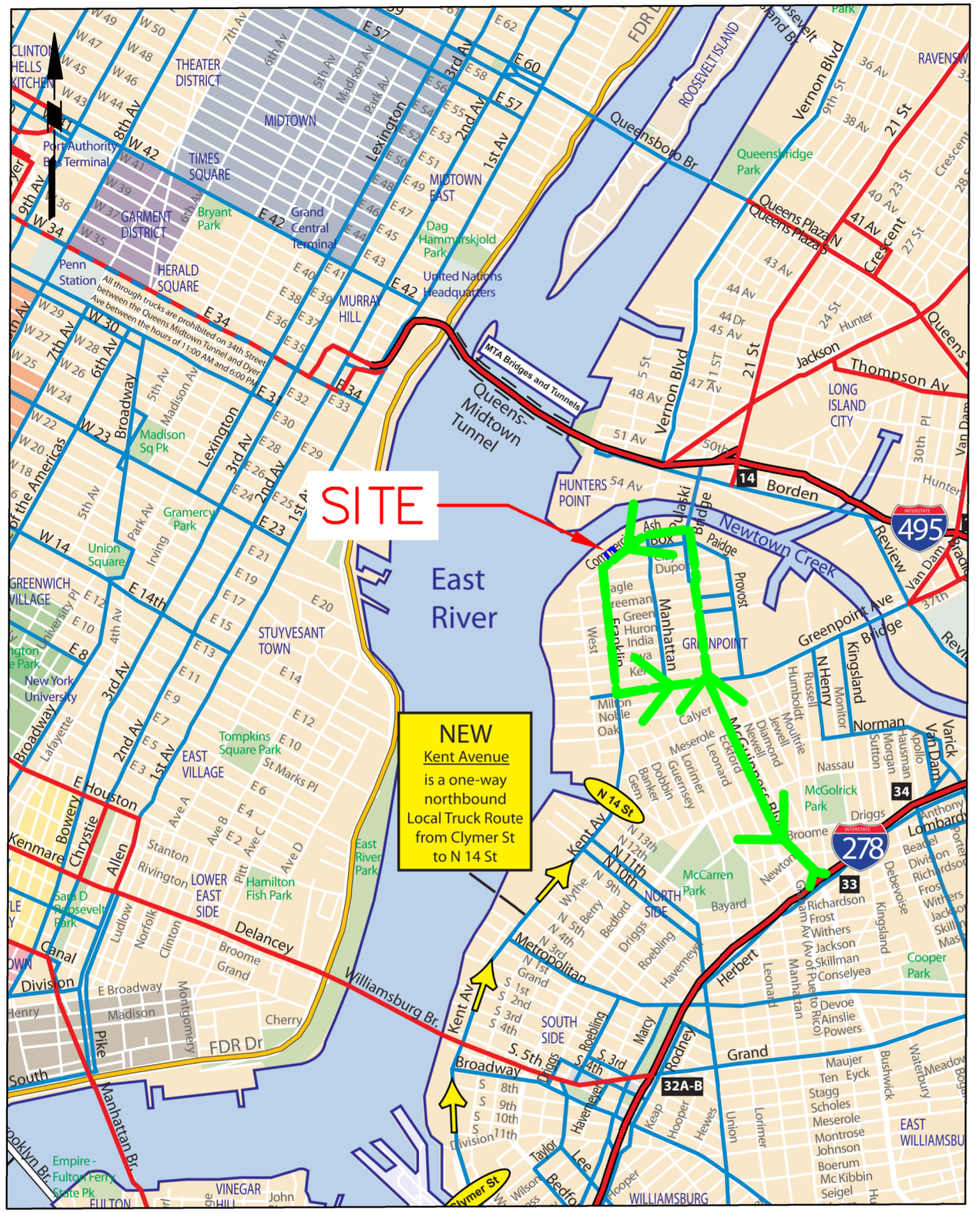
LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project
45 COMMERCIAL STREET
BLOCK No. 2472, LOT No. 70
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
PROPOSED DOCUMENTATION SAMPLE LOCATION PLAN

Project No.	Figure No.
170229024	10
Date: 06/18/2020	
Drawn By: WK	
Checked By: JL	

Filename: \\langan.com\data\NYC\data0\170229024\Project Data\CAD\24\SheetFiles\Environmental\BCP RAWP\Figure 10 - Proposed Documentation Sample Location Map.dwg Date: 2/16/2021 Time: 19:15 User: esmith Style Table: Langan.stb Layout: ANSIB-BL



PREFERRED NEIGHBORHOOD TRUCK ROUTE

LEGEND:

- APPROXIMATE SITE BOUNDARY
- PREFERRED TRUCK ROUTE
- THROUGH TRUCK ROUTE
- LOCAL TRUCK ROUTE

GENERAL NOTES

1. BASE MAP TAKEN FROM THE 2011–2012 NEW YORK CITY DEPARTMENT OF TRANSPORTATION "NEW YORK CITY TRUCK ROUTE MAP."

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project	45 COMMERCIAL STREET BLOCK No. 2472, LOT No. 70 BROOKLYN KINGS COUNTY NEW YORK
Figure Title	TRUCK ROUTE MAP
Project No.	170229024
Date	06/12/2020
Drawn By	RB
Checked By	JL
Figure No.	11

Filename: \\langan.com\data\NYC\data0\170229024\Project Data\CAD\24\SheetFiles\Environmental\BCP RAWP\Figure 11 - Truck Route Map.dwg Date: 2/19/2021 Time: 13:32 User: esmith Style Table: Langan.stb Layout: ANSIB-BL

TABLES

Table 1
Site-Specific SCOs for Track 4 Cleanup
Remedial Action Work Plan

45 Commercial Street
Brooklyn, New York
BCP Site No.: C224304
Langan Project No.: 170229024

VOCs (mg/kg)	
1,1,1-Trichloroethane	100
1,1-Dichloroethane	26
1,1-Dichloroethene	100
1,2-Dichlorobenzene	100
1,2-Dichloroethane	3.1
cis-1,2-Dichloroethene	100
trans-1,2-Dichloroethene	100
1,3-Dichlorobenzene	49
1,4-Dichlorobenzene	13
1,4-Dioxane	13
Acetone	100
Benzene	4.8
Butylbenzene	100
Carbon tetrachloride	2.4
Chlorobenzene	100
Chloroform	49
Ethylbenzene	41
Hexachlorobenzene	1.2
Methyl ethyl ketone	100
Methyl tert-butyl ether	100
Methylene chloride	100
n-Propylbenzene	100
sec-Butylbenzene	100
tert-Butylbenzene	100
Tetrachloroethene	19
Toluene	100
Trichloroethene	21
1,2,4-Trimethylbenzene	52
1,3,5- Trimethylbenzene	52
Vinyl chloride	0.9
Xylene (mixed)	100
Inorganics (mg/kg)	
Arsenic	16
Barium	400
Beryllium	72
Cadmium	4.3
Chromium, hexavalent	110
Chromium, trivalent	180
Copper	270
Total Cyanide	27
Lead	400
Manganese	2,000
Total Mercury	0.81
Nickel	310
Selenium	180
Silver	180
Zinc	10000

SVOCs (mg/kg)	
Acenaphthene	100
Acenaphthylene	100
Anthracene	100
Benzo(a)anthracene	1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	1
Benzo(g,h,i)perylene	100
Benzo(k)fluoranthene	3.9
Chrysene	3.9
Dibenzo(a,h)anthracene	0.33
Dibenzofuran	59
Fluoranthene	100
Fluorene	100
Indeno(1,2,3-cd)pyrene	0.5
m-Cresol	100
Naphthalene	100
o-Cresol	100
p-Cresol	100
Pentachlorophenol	6.7
Phenanthrene	100
Phenol	100
Pyrene	100
Total SVOCs	500
PCBs/Pesticides (mg/kg)	
2,4,5-TP Acid (Silvex)	100
4,4'-DDE	8.9
4,4'-DDT	7.9
4,4'-DDD	13
Aldrin	0.097
alpha-BHC	0.48
beta-BHC	0.36
Chlordane (alpha)	4.2
delta-BHC	100
Dibenzofuran	59
Dieldrin	0.2
Endosulfan I	24
Endosulfan II	24
Endosulfan sulfate	24
Endrin	11
Heptachlor	2.1
Lindane	1.3
Polychlorinated biphenyls	1
TCLP Inorganics (mg/L)	
Lead	5

Notes:

1. The Site-Specific SCOs for a Track 4 Cleanup are generally New York State Department of Environmental Conservation Title 6 of the official compilation of New York Codes, Rules, and Regulations Part 375 Restricted Use Restricted -Residential Soil Cleanup Objectives (SCO) for VOCs, SVOCs, PCBs, pesticides, herbicides, and metals (with the exception of total SVOCs,TCLP lead and the guidance value for PFOA).
2. VOC = volatile organic compound
3. SVOC = semivolatile organic compound
4. PCB = polychlorinated biphenyl
5. TCLP = toxicity characteristic leaching procedure
6. mg/kg = milligram per kilogram
7. mg/L = milligrams per liter

Table 2
Track 1 Remedial Cost Estimate
Remedial Action Work Plan
45 Commercial Street
Brooklyn, New York
BCP Site No.: C224304
Langan Project No.: 170299024

Item No.	Description of Environmental Item	Quantity		Environmental Incremental Unit Cost		Estimated Premium
REMEDIAL ACTION CONTRACTOR FEES						
1	Remediation Facilities, Equipment, Mobilization, Demobilization, Permits, and Site Maintenance - Remediation and decontamination facilities include trailer, truck cleaning facilities, etc.	–		Allowance		$480,000
2	Removal of Surface Cover - Includes demolition of existing surface cover, cutting/removing existing subsurface SOE/foundation components, transport vehicles, and disposal of demolition debris at a permitted facility.	–		Allowance		$440,000
3	Soil Excavation, Stockpile and Loading of Material - Accounts for excavation of material containing concentrations exceeding Unrestricted Use Soil Cleanup Objectives and/or to depth of the terminus of historic fill.	28,000	CY	$50	per CY	$1,400,000
4	Transport and Disposal of Historic Fill - Includes transport vehicles and disposal of soil exceeding Unrestricted Use Soil Cleanup Objectives at a permitted facility.	43,000	Tons	$46	per Ton	$1,978,000
5	Transport and Disposal of SVOC-Impacted Soil - Includes transport vehicles and disposal of petroleum contaminated soil at a permitted facility. (10' x 10' hotspot areas of SVOC impacts)	30	Tons	$110	per Ton	$3,300
6	Transport and Disposal of Hazardous Lead-Impacted Soil - Includes transport vehicles and disposal of hazardous lead contaminated soil at a permitted facility. (10' x 10' hotspot areas of hazardous lead-impacts)	75	Tons	$175	per Ton	$13,125
7	SOE - Secant wall, support of excavation	444	LF	$350	per LF	$155,400
8	Truck Wash - Outbound trucks will be washed and cleaned at the truck wash before leaving the site until the remedial construction is completed.	6	Months	$10,000	per Month	$60,000
9	Dewatering and Groundwater System - Installation and operation	–		Allowance		$500,000
10	Dust, Odor and Vapor Control - Includes odor, dust, and organic vapor control during remediation of the site. Assumes control measures will include, but not be limited to application of odor suppressant, foam or water.	6	Months	30,000	per Month	$180,000
11	Backfill - Import and placement of fill material, RCA, stone, or topsoil (meeting the lower of UU and PGW SCOs) to bring site to development grade. An additional 10% of material is included to account for compaction.	30,800	CY	$100	CY	$3,080,000
12	Composite Cover System - Accounts for installation of the composite cover system including surveying, landscaping, and placement and/or compaction of stone, topsoil, or fill material.	–		Allowance		$820,000
						$9,110,000
ENGINEERING FEES						
1	Waste characterization - To classify material to be excavated for off-site disposal.	–		Allowance		$60,000
2	Confirmation Sampling - To confirm source material removal (assumes analysis for VOCs, SVOCs, PCBs, pesticides, metals, PFAS, and 1-4 Dioxane for each sample).	50	Samples	$1,150	per Sample	$57,500
3	Remediation Oversight - This cost includes full time field oversight and office support.	6	Months	$40,000	per Month	$240,000
4	Site safety - Site safety manager and precautions throughout the site.	–		Allowance		$175,000
5	Community Air Monitoring - This cost includes equipment rental fees associated with implementation of CAMP, which will be performed during excavation, backfill, and concrete slab installation.	6	Months	$3,000	per Month	$18,000
6	BCP Engineering Services - Legal Fees, RIWP/CPP/RIR/RAWP Preparation, Construcion Documents/Bid Support, FER , Construction Meetings and Construction Administration, Brownfield Cleanup Program Consultation, Regulatory Agency Reporting, and Technical Support	–		Allowance		$700,000
					ENGINEERING FEES SUBTOTAL	**$1,133,000**
					Remediation Contingency (15% of Engineering and Contractor Fee Subtotal)	**$1,367,000**
					Total Estimated Cost	**$11,610,000**
					ESTIMATED REMEDIATION COST - ALTERNATIVE I	**$11.6 MM**

Table 2
Track 1 Remedial Cost Estimate
Remedial Action Work Plan
45 Commercial Street
Brooklyn, New York
BCP Site No.: C224304
Langan Project No.: 170299024

General Assumptions and Conditions:

1. The development area is about 44,600 square feet and includes the proposed building footprint.
2. The conversion factor from cubic yards (CY) to tons is 1.5 tons per cubic yards
3. SOE = Support of excavation
4. VOC = Volatile organic compound
5. SVOC = semivolatile organic compound
6. PFAS = Perflouryl Alkylated Substances
7. PCB = polychlorinated biphenyls
8. CAMP = Community Air Monitoring Plan
9. FER = Final Engineering Report

Contractor Cost Assumptions:

Item No. 1 - This allowance includes items to support earthwork, i.e. temporary site fencing, installation of gates, mobilization, monitoring.

Item No. 3 through 6 - This estimate assumes excavation of all historic fill material across the site. Management and handling of contaminated soil assumes an increase in labor costs at $15/ton.

Item No. 7 - This estimate assumes that installation of a secant pile wall at $350/linear foot.

Item No. 8 - This estimate includes construction of a truck wash.

Item No. 10 - Dust, odor and vapor control may be required during soil excavation. Equipment and material necessary to monitor and mitigate vapor/odor emission. Cost estimate includes application

Engineering Cost Assumptions:

Item No. 1 - A waste characterization investigation to classify material to be excavated for off-site disposal will be required. Excavated material will include subsurface material up to native soil across the site. The waste characterization was completed in May 2020.

Item No. 2 - This estimate assumes 50 confirmation endpoint samples ($1,150/sample) collected from the development area and esplanade at a frequency of 1 sampler per 900 square feet. A lower frequency may be negotiated with DEC. Confirmation endpoint samples would be analyzed for the NYSDEC Part 375 VOCs, SVOCs, metals, PCBs, pesticides, PFAS, and 1,4-Dioxane.

Item No. 3 - This estimate includes full-time engineering oversight to observe and document the remedy at about $1,500/day over the duration of the remediation/construction period.

Item No. 5 - The assumed duration of the community air monitoring program (CAMP) is 6 months. CAMP costs include full-time equipment rental to facilitate perimeter dust and VOC monitoring.

Item No. 6 -The remedial investigation is complete. A Remedial Investigation Report (RIR) and Remedial Action Work Plan (RAWP) are being drafted. After the remedy is completed, and a Final Engineering Report (FER) will be completed.

Table 3
Track 4 Remedial Cost Estimate
Remedial Action Work Plan
45 Commercial Street
Brooklyn, New York
BCP Site No.: C224304
Langan Project No.: 170229024

Item No.	Description of Environmental Item	Quantity		Environmental Incremental Unit Cost		Estimated Premium
REMEDIAL ACTION CONTRACTOR FEES						
1	Remediation Facilities, Equipment, Mobilization, Demobilization, Permits, and Site Maintenance - Remediation and decontamination facilities include trailer, truck cleaning facilities, etc.	--		Allowance		$500,000
2	Removal of Surface Cover - Includes demolition of existing surface cover, cutting/removing existing subsurface SOE/foundation components, transport vehicles, and disposal of demolition debris at a permitted facility.	--		Allowance		$440,000
3	Soil Excavation, Stockpile and Loading of Material - Accounts for remedial excavation of material containing concentrations exceeding Track 4 Soil Cleanup Objectives to the extent presented in the RAWP.	3,400	CY	$50	per CY	$170,000
4	Transport and Disposal of Historic Fill - Includes transport vehicles and disposal of soil exceeding Track 4 Soil Cleanup Objectives from top 2 feet across site at a permitted facility.	5,000	Tons	$46	per Ton	$230,000
5	Transport and Disposal of SVOC-Impacted Soil - Includes transport vehicles and disposal of petroleum contaminated soil at a permitted facility. (10' x 10' hotspot area of SVOC impacts)	30	Tons	$110	per Ton	$3,300
6	Transport and Disposal of Hazardous Lead-Impacted Soil - Includes transport vehicles and disposal of hazardous lead contaminated soil at a permitted facility. (Three 10' x 10' hotspot areas of hazardous lead-impacts)	75	Tons	$175	per Ton	$13,125
7	Truck Wash - Outbound trucks will be washed and cleaned at the truck wash before leaving the site until the remedial construction is completed,	3	Months	$10,000	per Month	$30,000
8	Waterproofing/Vapor Barrier - The waterproofing/vapor barrier will be a minimum 20 mil thickness and installed as a continuous subslab membrane under slabs, elevator pits, and subgrade foundation walls.	32,000	SF	$9	per SF	$300,000
9	Sub-membrane Depressurization System (SMD) - Installation of SMD system underneath the building footprint.	--		Allowance		$165,000
10	Dust, Odor and Vapor Control - Includes odor, dust, and organic vapor control during remediation of the site. Assumes control measures will include, but not be limited to application of odor suppressant, foam or water.	3	Months	10,000	per Month	$30,000
11	Demarcation Layer - Placement of a demarcation layer after excavation is complete.	--		Allowance		$5,000
12	Backfill - Import of RCA, stone, topsoil, or fill material (meeting the lower of RURR and PGW SCOs) to bring site to development grade. An additional 10% of material is included to account for compaction.	3,800	CY	$100	per CY	$380,000
13	Composite Cover System - Accounts for installation of the composite cover system including surveying, landscaping, and placement and/or compaction of stone, topsoil, or fill material.	--		Allowance		$820,000
				REMEDIAL ACTION CONTRACTOR FEES SUBTOTAL		**$3,087,000**
ENGINEERING FEES						
1	Waste characterization - To classify material to be excavated for off-site disposal.	--		Allowance		$25,000
2	SVOC and Arsenic-Impacted Hotspot Removal Endpoint Sampling - To confirm source material removal (assumes analysis of 4 sidewall and 1 base SVOC and TAL metals sample.)	1	Hotspot	$1,750	per Sample	$1,750
3	Lead-Impacted Hotspot Removal Endpoint Sampling - To confirm source material removal (assumes analysis of 4 sidewall and 1 base samples for TAL Metals and 1 TCLP lead sample per hotspot)	2	Hotspots	$850	per Hotspot	$1,700
4	Lead and PFOA Impacted Hotspot Removal Endpoint Sampling - To confirm source material removal (assumes analysis of 4 sidewall and 1 base samples for total PFAS and TAL Metals and 1 TCLP lead sample per hotspot)	1	Hotspot	$2,725	per Sample	$2,725
5	Documentation Sampling - To confirm source material removal (assumes analysis for VOCs, SVOCs, PCBs, pesticides, metals, PFAS, and 1,4-Dioxane for each sample).	48	Samples	$1,150	per Sample	$55,200
6	Remediation Oversight - This cost includes full time field oversight and office support (includes community air monitoring program [CAMP] equipment rental).	3	Months	$40,000	per Month	$120,000
7	BCP Engineering Services - Legal Fees, RIWP/CPP/RIR/RAWP Preparation, Construcion Documents/Bid Support, SMD Design, FER and SMP, SMP Monitoring, agency/team coordination, Construction Meetings and Construction Administration, Brownfield Cleanup Program Consultation, Regulatory Agency Reporting, and Technical Support	--		Allowance		$800,000
				ENGINEERING FEES SUBTOTAL		**$1,007,000**
				Remediation Contingency (15% of Engineering and Contractor Fee Subtotal)		**$464,000**
				Total Estimated Cost		**$4,558,000**
				ESTIMATED REMEDIATION COST - ALTERNATIVE II		**$4.6 MM**

Table 3
Track 4 Remedial Cost Estimate
Remedial Action Work Plan
45 Commercial Street
Brooklyn, New York
BCP Site No.: C224304
Langan Project No.: 170229024

General Assumptions and Conditions:

1. The development area is about 44,600 square feet and includes the proposed building footprint which is about 32,000 square feet.
2. The conversion factor from cubic yards (CY) to tons is 1.5 tons per cubic yards
3. SOE = Support of excavation
4. VOC = Volatile organic compound
5. SVOC = semivolatile organic compound
6. PCB = polychlorinated biphenyls
7. PFAS = Per- and Polyfluoroalkyl Substances
8. TAL = Target Analyte List
8. TCLP = Toxicity Characteristic Leachate Procedure
9. CAMP = Community Air Monitoring Plan
10. FER = Final Engineering Report

Contractor Cost Assumptions:

Item No. 1 - This allowance includes items to support earthwork, i.e. temporary site fencing, installation of gates, mobilization, monitoring.

Item No. 3 through 6 - This estimate assumes excavation historic fill material to two feet below grade surface and excavation of petroleum-impacted and hazardous lead-impacted hotspot areas. Management and handling of contaminated soil assumes an increase in labor costs at $15/ton.

Item No. 7 - This estimate includes construction of a truck wash.

Item No. 10 - Dust, odor and vapor control may be required during soil excavation. Equipment and material necessary to monitor and mitigate vapor/odor emission. Cost estimate includes application of vapor/odor suppressing foam and/or water.

Item No. 12 - This estimate assumes that the equivalent of a 2-foot soil cover will be placed across the site and hotspot areas will be backfilled to grade.

Engineering Cost Assumptions:

Item No. 2 - This estimate assumes 5 endpoint samples ($350/sample) collected from each sidewall and the base of the SVOC and Arsenic hotspot excavation. Endpoint samples would be analyzed for the NYSDEC Part 375 SVOCs and TAL metals.

Item No. 3 - This estimate assumes 5 endpoint samples ($150/sample) collected from each sidewall and the base of each of the 2 lead-impacted hotspot excavations. Endpoint samples would be analyzed for TAL metals. The sample with the highest total lead concentration from each hotspot will also be analyzed for TCLP lead ($100/sample).

Item No. 4 - This estimate assumes 5 endpoint samples ($525/sample) collected from each sidewall and the base of the PFOA and lead-impacted hotspot excavations. Endpoint samples would be analyzed for TAL metals and PFAS. The sample with the highest total lead concentration from each hotspot will also be analyzed for TCLP lead ($100/sample).

Item No. 5 - This estimate assumes 48 documentation samples ($1,150/sample) collected from the development area and esplanade at a frequency of 1 sample per 900 square feet. Documentation samples would be analyzed for the NYSDEC Part 375 VOCs, SVOCs, metals, PCBs, pesticides, PFAS, and 1,4-Dioxane.

Item No. 6 - This estimate includes full-time engineering oversight to observe and document the remedy at about $1,500/day over the duration of the remediation/construction period.

Item No. 6 - The assumed duration of the community air monitoring program (CAMP) is 3 months. CAMP costs include full-time equipment rental to facilitate perimeter dust and VOC monitoring.

Item No. 7 -The remedial investigation is complete. A Remedial Investigation Report (RIR) and Remedial Action Work Plan (RAWP) are being drafted. After the remedy is completed, a Final Engineering Report (FER) and Site Management Plan (SMP) will be completed.