SITE MANAGEMENT PLAN

for

SILVERCUP WEST – PARCEL C
Block 477, Lot 15
Long Island City, Queens County, New York
NYSDEC BCP No. C241100

Prepared For:

Terra Cotta, LLC
42-22 22nd Road
Long Island City, New York 11101

Prepared By:

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

OCTOBER 2017

CERTIFICATION STATEMENT

I Jason J. Hayes certify that I am currently a New York State registered professional engineer as in defined in 6 New York Codes, Rules and Regulations (NYCRR) Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

[P.E.]

9/20/17
DATE

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LIST OF ACRONYMS

AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BGS	Below Grade Surface
CAMP	Community Air Monitoring Plan
COC	Certificate of Completion
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
EL	Elevation
ELAP	Environmental Laboratory Approval Program
ERL	Effects Range Low
ERM	Effects Range Median
EWP	Excavation Work Plan
ESA	Environmental Site Assessment
HASP	Health and Safety Plan
IC	Institutional Control
IRM	Interim Remedial Measure
LBP	Lead-Based Paint
MDL	Method Detection Limit
MHW	Mean High Water
NAVD88	North American Vertical Datum of 1988
NFA	No Further Action
NYPA	New York Power Authority
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
PAOC	Potential Area of Concern
PAH	Polycyclic Aromatic Hydrocarbon
PID	Photoionization Detector
PPM	Parts Per Million
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCA	Recycled Concrete Aggregate
REC	Recognized Environmental Condition
RI	Remedial Investigation
RIWP	Remedial Investigation Work Plan
ROD	Record of Decision

RP	Responsible Party
RSCO	Recommended Soil Cleanup Objectives
RSO	Remedial System Optimization
RR SCO	Restricted Residential Soil Cleanup Objective
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SRI	Supplemental Remedial Investigation
SSD	Sub-slab Depressurization
STARS	Spill Technology and Remediation Series
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
SVOC	Semivolatile Organic Compound
TAGM	Technical and Administrative Guidance Manual
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
UST	Underground Storage Tank
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan (SMP):

Site Identification: C241100 Silvercup West — Parcel C

42-02 Vernon Blvd., Long Island City, NY 11101

Institutional Controls:	1. The property may be used for Restricted Residential, Commercial, and Industrial uses provided that the long-term Engineering Controls/ Institutional Controls (EC/IC) included in this SMP are employed.
	2. The property may not be used for a higher level of use, such as Residential (single family housing) or Unrestricted Use, without additional remediation and amendment of the Environmental Easement, as approved by the New York State Department of Environmental Conservation (NYSDEC or the "Department").
	3. All ECs must be operated and maintained as specified in this SMP.
	4. All ECs on the Controlled Property must be inspected at a frequency and in a manner defined in the SMP.
	5. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the New York State Department of Health (NYSDOH) to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
	6. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP.
	7. Data and information pertinent to site management the Controlled Property must be reported at the frequency and in a manner as defined in this SMP.

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Institutional Controls (continued):	8. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP.
	9. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.
	10. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP.
	11. Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.
	12. Vegetable gardens and farming in remaining soil on the Site are prohibited.
Engineering Controls:	1. Site Cover System

Inspections:	**Frequency:**
1. Site-Wide Inspection	Annually
2. Site Cover Inspection	Annually
Monitoring:	
1. Soil Vapor Intrusion Monitoring	For any new building(s) constructed on the Site
Maintenance:	
1. Site Cover System	As needed

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Reporting:	**Frequency:**
1. Site Management Report	Included in Periodic Review Report
2. Periodic Review Report	Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 GENERAL

This Site Management Plan (SMP) is a required element of the remedial program for the Silvercup West – Parcel C located in Long Island City, New York (hereinafter referred to as the "Site"). See Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP) as Site No. C241100 which is administered by New York State Department of Environmental Conservation (NYSDEC).

Terra Cotta, LLC (the "Volunteer") entered into a Brownfield Cleanup Agreement (BCA) on November 16, 2006 with the NYSDEC to remediate the Site. A figure showing the Site location and boundaries is provided as Figure 1. The boundaries of the Site are more fully described in the metes and bounds description that is part of the Environmental Easement provided in Appendix A.

After completion of the remedial work, some contamination was left at this Site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (IC and EC) have been incorporated into the Site remedy to control exposure to remaining contamination and to ensure to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the New York City Register's Office, requires compliance with this SMP and all engineering controls and institutional controls placed on the Site.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with Environmental Conservation Law (ECL) Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC); and
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, Title 6 New York Codes, Rules and Regulations (NYCRR) Part 375 and the BCA (Index #A2-0560-0806; Site #C241100) for the Site, and thereby subject to applicable penalties.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in Appendix B of this SMP.

This SMP was prepared by Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C (Langan), on behalf of Terra Cotta, LLC, in accordance with the requirements of the NYSDEC Division of Environmental Remediation ([DER-10] "Technical Guidance for Site Investigation and Remediation"), dated May 3, 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the Site.

1.2 REVISIONS

Revisions to this plan will be proposed, as necessary, in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements upgrades to or shut-down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the Site conditions. In accordance with the Environmental Easement for the Site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 NOTIFICATIONS

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in Site use that are required under the terms of the BCA, 6 NYCRR Part 375 and/or Environmental Conservation Law
- 7-day advance notice of any field activity associated with the remedial program
- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan (EWP)
- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect
- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public

- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the BCA, and all approved work plans and reports, including this SMP.
- Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

The following table includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B. Note that contract parties are subject to change and will be updated as necessary.

Notification Contact Information:

Name	**Contact Information**
Program Manager: Jason Hayes, P.E.	(212) 479-5427, jhayes@langan.com
Project Manager: Joseph Good, P.E.	(212) 479-5448, jgood@langan.com
NYSDOH Project Manager: Anthony Perretta	(518) 402-7860, BEEI@health.state.ny.gov
NYSDEC Project Manager: Shaun Bollers	(718) 482-4096, shaun.bollers@dec.ny.gov
Owner Representative: Mark Gold	(718) 906-2000, mgold@silvercupstudios.com

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 SITE LOCATION AND DESCRIPTION

The Site is located in Long Island City, Queens County, New York and is identified as Block 477 and Lot 15 on the Queens Borough Tax Map (see Figure 2). The Site is an approximately 0.58-acre area and is bounded by the Silvercup West – Parcel B (BCP Site No. C241086) to the north, the Silvercup West – Parcel A (BCP site no. C241099) to the west, Silvercup West - Parcel D (BCP site no. C241101) to the east, and the New York Power Authority Power Generation site (NYPA – BCP Site No. C241109) to the south (see Figure 2 – Site Layout Map). The boundaries of the Site are more fully described in Appendix A – Environmental Easement. The owner of the Site parcel at the time of issuance of this SMP is Terra Cotta, LLC.

2.2 PHYSICAL SETTING

2.2.1 Land Use

The Site consists of the following:

- A site-wide cap consisting of a combination of two feet of gravel, recycled concrete aggregate (RCA) or clean material meeting the soil quality requirements in Part 375-6.7(d)(ii)(b) (i.e., lower of Protection of Groundwater Soil Cleanup Objectives [SCO] or Restricted Residential SCOs).

The Site is zoned for mixed manufacturing (M1-5) with a residential overlay (R10) according to New York City Zoning Map 9b and is currently used for parking and storage.

The Site is located in an urban area of historical industrial usage that has recently undergone residential and commercial development due to rezoning. The properties adjoining the Site and in the neighborhood surrounding the Site primarily include industrial, commercial, residential and mixed used properties. The properties immediately south, north, east, and west of the Site include industrial and commercial uses.

2.2.2 Geology

The sidewalk elevation (el) along Vernon Boulevard (east side of the Site) is approximately el 16 North American Vertical Datum (NAVD88)[1]. Pre-development Site cover included discontinuous concrete slabs, asphalt, gravel and vegetation.

[1] Elevations are in North American Vertical Datum of 1988 (NAVD88), which is 1.625 feet above the Borough President Queens Datum (BPQD).

Urban fill extended from beneath the pre-development surface cover to depths of approximately 5 to 20 feet below grade surface (bgs), where it is underlain by native soil. Urban fill generally consisted of a brown, dark brown, fine to medium sand layer containing some silt, gravel, brick, concrete fragments, wood, metal, and ash. A natural sand deposit varying in thickness from 0 to 30 feet across the Site containing silt and fine gravel is located below the fill. Gneiss bedrock underlies the surficial fill and natural sand. An up to 5 to 10 foot thick layer of weathered to decomposed rock is located in portions of the Site. The Gneiss rock has weathered into grayish-brown coarse sand with cobbles, gravel, silt and mica. Gneiss bedrock underlies the surficial fill and potentially natural sand. The depth of competent rock ranges from about 45 to 60 feet bgs on the western edge and slopes up to about 10 to 25 bgs in the central portion and then slopes down to 20 to 25 feet bgs on the eastern edge of the Site.

Site specific boring logs from previous reports are provided in Appendix C.

2.2.3 Hydrogeology

During the Remedial Investigation (RI), performed by Langan from June 25, 2007 through August 2, 2007, groundwater at the Site was observed from about el -0.4 to el 8.6 NAVD88. Groundwater elevation observations during the Supplemental Remedial Investigation (SRI), performed by Langan on May 4, 2016, were consistent with the RI observations (groundwater between el 1.2 and 2.56 NAVD88). Based on groundwater depths recorded during the RI and SRI, groundwater elevations were generally higher in the eastern portion of the Site and lower in the western portion of the Site near the East River.

There are no wetlands on or immediately adjacent to the Site. Groundwater in this area of New York City is not used as a potable (drinking) water source. New York City residents receive their drinking water supply from surface reservoirs located in upstate New York.

A groundwater contour map is provided as Figure 3. Groundwater elevation data is provided in Table 2.

2.3 INVESTIGATION AND REMEDIAL HISTORY

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

2.3.1 Site History

The Site is located in an area of historical industrial usage and has been developed since as early as 1898. The area is still heavily populated with industrial uses with some

commercial and residential properties. The Site was occupied by the New York Architectural Terra Cotta Company, from before 1898 (earliest records reviewed) to sometime after 1915, for the manufacture of terra cotta, a construction material consisting of cast and fired clay units. In 1932, the New York Architectural Terra Cotta company went bankrupt, and it was taken over by the Eastern Terra Cotta Company. By 1947, the Eastern Terra Cotta Company no longer existed but the Site was being used for "plastic products manufacture" and "electronics operations". Sanborn maps also indicate that, between 1947 and 1950, at least a portion of the Site may have been used for manufacture of wood products and wood posts, waste paper sorting and rag processing. Circa 1980, a Pepsi Cola Company facility occupied the Site (distribution warehouse). Sanborn maps after 1990 show that the Site is vacant. The Site was purchased by Terra Cotta, LLC in September 1999.

Adjacent and surrounding properties were historically used for industrial and manufacturing purposes. Sanborn maps indicate surrounding properties were used for light industrial buildings, warehouses, ice cream company, and low-income housing complexes.

2.3.2 Previous Environmental Reports

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References. Copies of these reports are provided in Appendix C.

2.3.2.1 May 1994, Environmental Liabilities Assessment, prepared by Roy F. Weston, Inc.

An Environmental Liabilities Assessment for 41-98 through 42-02 Vernon Boulevard was performed by Roy F. Weston, Inc. on behalf of Citibank. Roy F. Weston, Inc. generated this report based on document review and two site inspections conducted on February 18, 1994 and April 8, 1994. The report reviews and documents prior uses, petroleum use, storage tanks, hazardous waste storage, spills or releases, surface water and groundwater, fill and land disposal, enforcement and litigation, contamination, asbestos, indoor air quality, and provides conclusions and recommendations based on an analysis of the data. Relevant findings and conclusions included the following:

A vacant building adjoins the Site on 42-16 Vernon Boulevard (Terra Cotta Parcel D BCP No. C241101). The building is estimated to be approximately 100 years old (the New York Architectural Terra Cotta Company building).

- Soil and groundwater contamination is likely present as a result of historic operations and spills on the adjacent property (the former Royal Petroleum Company oil terminal-NYPA site). An NYSDEC file review found that the former

oil terminal contained an 80,000-barrel tank with four compartments, including two compartments containing 2,015,290 gallons of No.2 fuel oil, a 385,429-gallon No. 2 diesel fuel compartment, and a 572,451-gallon No. 6 Fuel Oil compartment. Approximately two-thirds of the tank was noted as being below ground. As a result of a three-foot subsurface crack in a tank wall, observed in 1980, 41 monitoring wells and three recovery wells were installed on the Terra Cotta Site and approximately 39 monitoring wells and one recovery well were installed on the NYPA site. Between the three Site recovery wells and one NYPA site recovery well, 1,200 gallons of spilled oil was recovered in 1980 and 1981. Groundwater monitoring in 1986 showed a presence of an oil film in some of the monitoring wells. Royal Petroleum ceased operations in 1986 or 1987, demolished the buildings, removed the tanks, and engaged in remedial activities.

- Piles of debris, believed to include tires, bricks, metals and bottles, were observed on the Site.
- A fill pipe and associated piping was observed in the northeast corner of the adjacent New York Architectural Terra Cotta Company building (Terra Cotta Parcel D BCP No. C241101), indicating a possible underground storage tank (UST).
- The report recommended that further subsurface soil and groundwater sampling be conducted to address the possibility of contamination on the Site migrating from the NYPA site.

2.3.2.2 September 1996, Summary of UST Closure Site Assessment, prepared by ERD Environmental, Inc.

A UST Closure Site Assessment was conducted at the Site by ERD Environmental, Inc. in September 1996. This report documents the closure of three adjacent USTs approximately three feet below grade in the northwestern portion of the Site. Two of the USTs each had a capacity of 10,000-gallons, apparently stored No.6 fuel oil, and were oriented parallel to the East River. The third UST had a capacity of 10,000 to 12,000 gallons, was vertically orientated, and located on the east side of the two other USTs. During the removal, petroleum-contaminated soil and free product in the groundwater were observed. A spill was reported to the NYSDEC on June 7, 1995 (Spill No. 95-02890). In total, 723 cubic yards of contaminated material, approximately 573 cubic yards of contaminated soil and 150 cubic yards of sawdust and sludge mixture (resulting from the free product cleanup) were removed and disposed.

Delineation of the contaminated soil was not completed because of complications due to the 1980 petroleum spill in the former Royal Petroleum Terminal on the NYPA Site.

Endpoint soil samples were collected from the north, west and south sidewalls of the tank removal excavation. The samples contained semivolatile organic compounds (SVOC) and metals exceedances based on the NYSDEC Technical and Administrative Guidance Manual 4046 (TAGM 4046) Recommended Soil Cleanup Objectives (RSCO). Through gas chromatography fingerprinting of petroleum samples collected from the UST excavation, two types of petroleum were identified. One type was associated with the tanks removed, and the other was attributed to off-site petroleum product migration from the adjacent NYPA site. In light of the fingerprinting results, a meeting was held with the NYSDEC and the responsible party (RP) for the NYPA site spill; the former Royal Petroleum Terminal owner decided that the RP will continue the investigation by installing test pits, delineating the contaminated area, sampling, and removing free product where necessary.

2.3.2.3 September 1997, UST Closure Additional Soil Removal Report, prepared by ERD Environmental, Inc.

A UST Closure Additional Soil Removal Report was produced by ERD Environmental, Inc. in September 1997. This report provides an update of the remedial activities performed in response to the contaminated soil and groundwater observed during the closure of the three USTs in the northwest portion of the Site. The initial closure activities for the tanks are documented in the September 1996 Closure Site Assessment report previously summarized. The report documents activities since September 1996, which included the delineation and remediation of soil contaminated by the three previously removed tanks (two 10,000-gallon USTs and one 10,000-to 12,000-gallon UST). Between July 1, 1997 and August 2, 1997, the previous tank removal excavation, which was 7 feet deep, 25 feet wide and 37 feet long, was over-excavated on all sidewalls to 7 feet deep, 60 feet wide and 60 feet long. The total quantity of petroleum contaminated soil removed from the excavation was approximately 558 tons.

Soil and groundwater endpoint samples were collected on the bottom and sides of the final excavation. The report stated that NYSDEC Spill Technology and Remediation Series (STARS) regulatory guidelines were met at the limits of the current excavation. Based on the sample results and excavation observations, the report concluded that no additional soil removal was required in the vicinity of the excavation and recommended that the NYSDEC issue a No Further Action (NFA) designation for the location and NYSDEC Spill No. 95-02890. The spill case was closed by the NYSDEC on March 25, 1999.

2.3.2.4 September 1997, 550-gallon Storage Tank Excavation Report, prepared by ERD Environmental, Inc.

This report by ERD Environmental, Inc. documented the removal of two adjacent 550-gallon gasoline USTs on June 30, 1997. The USTs were located in the southeast portion of the Site, to the southwest of the New York Architectural Terra Cotta Company building. Upon excavation, both tanks were found to be filled with concrete and located within a concrete vault. No evidence of a petroleum release was observed. The removal of the USTs and concrete vault was completed on July 1, 1997. Endpoint samples were collected from the base and sidewalls of the excavation and submitted for laboratory analysis of the NYSDEC STARS SVOCs and volatile organic compounds (VOC) parameters. Results indicated no exceedances of the NYSDEC STARS guidelines. The report considered the tanks properly closed with no further remedial action necessary. However, a review of the report finds that the appropriate endpoint samples were not collected per the requirements of NYSDEC Draft DER-10, Technical Guidance for Site Investigation and Remediation, December 25, 2002 and some analytical Method Detection Limits (MDL) were too high to evaluate exceedances of regulating limits on the soil. Therefore, the area of the former USTs location was considered a Potential Area of Concern (PAOC) during the RI and was included in the investigation program.

2.3.2.5 January 1999, Phase I Environmental Site Assessment, prepared by IVI Environmental, Inc.

A Phase I Environmental Site Assessment (Phase I ESA) was performed at the Site on January 11, 1999 by IVI Environmental, Inc. The Phase I ESA identified the following recognized environmental conditions (REC):

- Historical Site Use: Subsequent to the Site's use as a terra cotta manufacturing facility (until approximately 1947), portions of the Site were used for unidentified plastics manufacturing and electronics operations. The Phase I stated that a potential for VOCs, SVOCs and metals contamination at the Site as a result of these operations. The Phase I recommended that soil and groundwater be sampled for VOCs, SVOCs and metals and that groundwater samples be collected from the three existing wells and analyzed for VOCs, SVOCs, and metals.
- USTs: Two 10,000-gallon and one 10,000 to 12,000-gallon USTs containing No. 6 Fuel Oil and two 550-gallon gasoline USTs were reportedly removed from the Site in 1997. Soil and groundwater in the vicinity of the fuel oil USTs were visually observed to be impacted. Contaminated soil was removed until NYSDEC STARS regulatory guidelines at the limits of the excavation were met. A NFA Designation was requested from the NYSDEC Case Manager, and the

Phase I recommended that a copy of the NFA letter be obtained when issued. There was no specific information pertaining to the presence of either a 15,000-gallon or a 30,000-gallon fuel oil UST, provided in the Phase I ESA. However, common indicators of USTs such as vent and fill pipes were observed on the north and east sides of the adjoining Terra Cotta building. The Phase I recommended inspection of the Terra Cotta building basement to confirm or deny the presence of a tank.

- Adjoining or Surrounding Properties with Recognized Environmental Conditions: Historic releases of petroleum products from the southern adjoining former Royal Petroleum Corp. site (NYPA site) have contaminated soil and groundwater on both the NYPA site and the subject Site. Although cleanup activities have been taking place, the Phase I recommended reviewing the NYSDEC files pertaining to the NYPA site to determine the extent of impact to the subject property and to evaluate the proposed plan for remediation.
- On-Site Fill: Based on the Site's variations in topography and Site observations, it appeared that fill has been imported onto the Site in order to fill in low-lying areas and wetlands. The Phase I recommended the fill be screened for contaminants.

Due to the proximity to Queensboro Bridge, there is a possibility that Site soils have been contaminated by lead based paint (LBP) peeling or flaking from the bridge or from historical sanding operations. The Phase I recommended the soils be sampled for lead.

2.3.2.6 August 9, 1999, Phase II Environmental Site Assessment, prepared by IVI Environmental, Inc.

This Phase II ESA dated August 9, 1999 was produced by IVI Environmental, Inc. The Phase II details work performed to investigate the findings of the Phase I dated January 11, 1999. The investigation was performed between July 20 and August 5, 1999 and included a geophysical survey, eight test pits, three groundwater samples, and an inspection of the adjoining New York Architectural Terra Cotta Company building (Parcel D).

A geophysical survey, comprised of a magnetometer survey, a metal detector survey and a ground penetrating radar survey, was performed on all accessible parts of the Site. The Phase II concluded that no subsurface anomalies indicative of USTs were discovered in the surveyed areas. The completion of eight test pits found the following:

- Petroleum contaminated material was observed in two test pits on the western side of the Site, south of the 1995 UST grave. Petroleum contaminated material was observed at depths of 7 to 9 feet bgs in the test pit closest to the UST removal area and at 11 feet bgs in the test pit closer to the southern border of

the Site. Analysis of soil samples from these test pits found no exceedance of the NYSDEC STARS parameters. Fingerprint analysis of the samples indicated that the petroleum was No. 4 or 6 fuel oil, similar to the sample results of material tested in the UST removal area. The report recommended that if future development required excavation of the petroleum-contaminated soil, the soil should be disposed as petroleum-contaminated waste.

- The remaining test pits were located across the eastern half of the Site. Analysis of soil samples collected from these pits, sometimes shallow due to underground obstructions, found SVOC and metal exceedances of the NYSDEC TAGM 4046 RSCOs. The report concluded that the exceedances were typical of the fill in the area and recommended proper testing for waste characterization purposes if the soils were to be disturbed. The report also recommended that the exceedances be reported to NYSDEC. No record of this reporting was located.
- Groundwater samples were collected from three existing wells: one in the western side of the Site, northeast of the New York Architectural Terra Cotta building (MW-1), and two in the southeast section of the Site (MW-2 and MW-3). MW-1 and MW-3 were found to contain metals exceedances of the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS). The metal exceedances were attributed to the fill constituents and a recommendation was made to report the exceedances to NYSDEC. No record of this reporting was located.

The Phase II further recommended that development of the property be monitored to document the condition of any excavated soil. It was also recommended that any future excavated soil be handled in accordance with applicable United States Environmental Protection Agency (USEPA) and NYSDEC regulations and guidelines.

2.3.2.7 December 19 2002, Preliminary Geotechnical Report, prepared by Langan

This preliminary geotechnical report dated December 19, 2002 was prepared by Langan. The subsurface investigation included four test borings completed between December 2 and 4, 2002. The investigation found the generalized stratigraphy underlying the Site to be composed of a surficial layer of fill overlying natural sand deposits followed by gneiss bedrock. During the field investigation, petroleum odors and soil staining were detected in three of the four borings located in the center and western half of the Site. Photoionization Detector (PID) readings for petroleum-associated VOCs of 4 parts per million (ppm) to 80 ppm were recorded. The report recommended additional soil sampling and environmental testing to characterize the potential contamination.

2.3.2.8 September 5, 2007, Remedial Investigation Report, prepared by Langan

Langan conducted an RI throughout Parcels A, B, C, and D between June 25 and August 2, 2007. The subsurface investigation was conducted to obtain qualitative data on the potential areas of concern detailed in the January 2007 Remedial Investigation Work Plan (RIWP), which was approved by the NYSDEC on April 27, 2007. The investigation consisted of collecting samples from 35 soil borings, 15 test pits, 9 monitoring wells, and 13 soil vapor points across Parcels A, B, C, and D. Findings and conclusions are as follows:

- Overburden at the Site consists of a fill layer beneath the surface cover (asphalt, concrete, gravel, vegetation), with thicknesses ranging from approximately 5 to 20 feet. The fill layer is comprised of brown, dark brown, fine to medium sand containing silt, gravel, brick, concrete fragments, wood, metal, and ash. Underlying the fill are discontinuous natural formations. Nearly all samples of this fill layer contained concentrations of SVOCs and metals above Part 375 Track 1 SCOs.
- A fine to medium natural sand deposit ranging in thickness from approximately 0 to 30 feet is located below the fill. Gneiss bedrock underlies the surficial fill and natural sand. The depth to competent bedrock ranges from about 45 to 60 feet bgs on the eastern edge and slopes up to 10-25 feet bgs in the central portion and then slopes down to 20 to 25 feet bgs on the western edge. The native soils beneath the fill in the western portion of the Site appear to be the only significant mass of soil that meets the Part 375 Track 1 SCOs.
- An elevated concentration of lead was detected in one of the surface historic fill soil samples located along the northern boundary of the Site near the Queensboro Bridge.
- Petroleum staining and odor, and elevated organic vapor readings were observed throughout the western portion of the Site at varying depths, in most locations where samples could be collected and in two isolated locations on the eastern portion of the Site.
- A sheen and petroleum odor was observed on the groundwater table in monitoring well MW-10 located in the central portion of the Site (Parcel B). Free No. 6 Fuel Oil product was observed at the groundwater table in MW-1, and a sheen was observed at MW-2. MW-1 and MW-2 are located in the northwestern portion of the Site (Parcel A).
- Soil vapor sampling results indicated the presence of VOCs in subsurface soil, the indoor air (basement) of the Terra Cotta Building and in the ambient outdoor air.

- Localized areas of soil impacted with VOCs, polycyclic aromatic hydrocarbons (PAH), pesticides, arsenic and lead were identified.
- Groundwater underlying the Site ranges from approximately el. -0.4 to el. 8.6 NAVD88. Groundwater elevations were generally higher along the eastern side of the Site (toward Vernon Boulevard) and lower to the west along the East River. Groundwater generally flows from east to west toward the East River. Groundwater on the western portion of the site is impacted with petroleum and VOCs.

Considering the planned development of the Site, sufficient analytical data was gathered during the RI to establish site-specific soil cleanup levels and to develop a remedy for the Site. The remedy for the Site will address free petroleum product, soil impacted with petroleum, metals, VOCs, SVOCs, PAHs, pesticides and the potential for vapor intrusion.

2.3.2.9 September 19, 2007, Geotechnical Investigation Report, prepared by Langan

Langan conducted a limited geotechnical investigation between September 13 and September 26, 2006 to obtain data related to the depth of rock and the character of the overburden in the 40 foot zone along the bulkhead line. Combined findings (Preliminary Geotechnical Report, December 2002 and Limited Geotechnical Report, September 2006) indicated that the rock generally dips west toward the East River. The depth to rock varies from about 15 feet in the center of the Site to roughly 45 to 55 feet along the westerly property line. The report suggested that borings will be needed along the bulkhead line (drilled from the water side) for use by the waterfront consultant. Additional borings will also be needed upland to satisfy the Building Code and facilitate the design development of the project. During the field investigation, petroleum odors were detected in two out of the three borings. PID readings did not exceed 34 ppm.

2.3.2.10 May 30, 2008, East River Sediment Sampling Report, prepared by Langan

The East River Sediment Sampling Report was prepared by Langan, dated May 30, 2008. The sediment sampling was conducted below the East River Mean High Water (MHW) Line at (el. -0.06 feet or 1.56 NAVD 88) between the MHW line and the Terra Cotta Site boundary. The scope of the sampling included the collection and analysis of five sediment samples and comparison with the NYSDEC Technical Guidance for Screening Contaminated Sediments (1999).

Sediment samples were visually classified and screened for visual, olfactory, and anthropogenic and VOC impacts. Samples were composed of historic fill with brick and ash components. The fill was generally described as brown, fine to medium sand, with

some silt, trace organic material, and brick and ash components. Petroleum odor and sheen was observed at each of the five sampling locations. PID readings ranged from 0 to 1.5 ppm.

Sample analytical results indicated SVOC and metal exceedances of the Effects Range Low (ERL) criteria used in evaluating contaminants in marine and estuarine sediments, which applies to East River Sediments. Three of the samples contained metals above the Effects Range Median (ERM) criteria. Petroleum hydrocarbons were detected in all five sediment samples.

2.3.2.11 May 20, 2013, Interim Remedial Measure Work Plan – For Silvercup West, prepared by Langan

In May 2013, Langan submitted an Interim Remedial Measure (IRM) Work Plan to the NYSDEC for the Silvercup West BCP site, including the Terra Cotta (Parcel A), and the NYPA site. The IRM Work Plan described the environmental need, design and installation procedures for a proposed waterfront cutoff wall to be constructed along the western perimeter of the NYPA and Terra Cotta sites. The purpose of the cutoff wall is to prevent the migration of petroleum product into the East River. In addition, the cutoff wall will allow the excavation and off-site disposal of petroleum product and petroleum-impacted soil landward of the cutoff wall, during implementation of the final Site remedy, by holding back the East River. On November 21, 2013, NYSDEC approved the IRM Work Plan. A detailed description of this supplemental investigation is provided in Section 2.7 of the October 2016 Remedial Action Work Plan (RAWP) provided in Appendix C.

2.3.2.12 December 8, 2015, Geotechnical Engineering Report, prepared by Langan

This report summarized a geotechnical engineering study conducted between September 15 and 24, 2015 to investigate the subsurface soil conditions and to develop recommendations for a new bulkhead. Subsurface exploration included six borings in the vicinity of the proposed bulkhead alignment. The borings were drilled to depths from 40 to 72 feet below the existing river mudline. The generalized subsurface profile consists of successive layers of uncontrolled fill, organic silt and clay, sand, weathered rock, and competent bedrock.

2.3.2.13 May 4, 2016, Remedial Investigation Report – Addendum 1, prepared by Langan

The SRI was implemented between September 21, 2015 and March 7, 2016 to: 1) evaluate the potential presence and extent of mobile grossly contaminated material/product along the west side of the shared border between the NYPA property and the Site; 2) delineate three elevated metals areas identified in the Terra Cotta RIR

(centered on previous investigation locations TP-4, SB-23, SS-2); and further delineate the grossly contaminated material on the Site. A preliminary waste classification study was completed between March 8 and 10, 2016 to support future off-site disposal of impacted Site soil and fill; waste classification borings also assisted in further delineating grossly contaminated material. Findings and conclusions are as follows:

- Stratigraphy: Overburden at the Site consists of a historic fill layer beneath the Site surface cover (asphalt, concrete, building, gravel, and vegetation), extending to depths of approximately 3 to 20 feet below grade. The fill was composed of a brown, grayish brown, fine to medium sand layer containing some silt, gravel, brick, concrete fragments, coal, slag, wood, metal, glass, root fibers, and ash. Underlying the historic fill are native sand deposits.
- Groundwater underlying the Site ranges from approximately el. -0.4 to el. 8.6 NAVD88. Groundwater elevations were generally higher along the eastern side of the Site (toward Vernon Boulevard) and lower to the west along the East River. Groundwater generally flows from east to west toward the East River.
- Soil Impacts:
    - Petroleum-Impacted Soil: Grossly contaminated material was identified in the western portion of the Site along the East River (Parcel A) and extends approximately 80 to 230 feet east of the shoreline with the greatest impacts along the northern and southern property boundaries. Vertically, the impacts ranged from approximately 8 to 24 feet bgs.
    - Metal-Impacted Soil: Lead and arsenic were identified as soil contaminants of concern. Elevated lead areas were delineated to approximately 10-foot diameter areas around investigation locations SS-2, TP-4 and SB-23 from surface grade to 2 to 3 feet bgs. Deep metals impacts at SB-2 (lead) and TP-1 (arsenic) are below the groundwater table; however, dissolved-phase lead and arsenic were not identified above regulatory standards in groundwater and additional delineation was not conducted. Hazardous lead was not detected in the vertical or horizontal delineation soil samples.
- Groundwater Impacts: Free product was observed in two of 14 monitoring wells, both located in the northwestern portion of Parcel A (MW-1 and MW-6) with product thickness ranging from 0.02 feet (MW-1) to 0.54 feet (MW-6). There are no dissolved-groundwater contaminants of concern.
- Vapor Impacts: VOCs were identified in subsurface soil vapor samples at concentrations above the ambient air sample.

2.4 REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAO) for the Site as listed in the Decision Document dated October 28, 2016 are as follows:

2.4.1 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

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

2.4.2 Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

2.4.3 Soil Vapor

RAOs for Public Health Protection

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

2.5 REMAINING CONTAMINATION

2.5.1 Soil

Per the October 2016 RAWP, grossly contaminated media was excavated to one foot below the observed water table. In areas throughout Parcel C with observed gross contamination, the remedial excavation extended to about el -1 NAVD88 to el -6. Hot spot metal excavation extended to about el 15 (SB-23). After completion of soil removal

remedial activities, a demarcation layer consisting of woven geotextile fabric was placed along the base of the remedial excavation to provide a visual reference, where the surface is capped with clean soil. This demarcation layer constitutes the top of the 'Residuals Management Zone', the zone that requires adherence to special conditions for disturbance of potentially contaminated residual soils defined in the SMP.

Following the placement of the filter fabric demarcation layer at the base of the remedial excavation, ¾-inch virgin crushed stone was used as backfill to bring the remedial excavation from below the water table to approximately one foot above the water table (minimum 2-foot-thick layer of ¾-inch stone). The filter fabric was wrapped around the ¾-inch stone to prevent future wash-out, and the excavation was backfilled with reused Site fill material. The upper two feet of the Site was backfilled with the 2-foot-thick (minimum) Site Cover System (or Cap) to final grade. The Site Cover System consists of a combination of two feet of gravel, RCA, and/or clean imported material meeting the soil quality requirements in Part 375-6.7(d)(ii)(b) (i.e., lower of Protection of Groundwater SCOs or RR SCOs). A land survey was performed by a New York State licensed surveyor to define the top elevation of residual contaminated soil on Site, and is provided in Appendix D.

Following excavation and disposal of approximately 3,043 tons of non-hazardous grossly-impacted and petroleum contaminated soil/ fill to one foot below the observed water table and approximately 173 tons of non-hazardous historic fill, documentation samples were collected from the base and sidewall of the remedial excavation at a frequency consistent with the requirements of DER-10 and the approved RAWP. In addition, approximately 14 tons of non-hazardous elevated metals impacted soil/ fill were excavated to about el 15 in Parcel C as identified and delineated in previous investigations around SB-23. An excavation and documentation sample location plan is included as Figure 4.

Documentation soil samples collected from the remedial excavation were analyzed for NYSDEC CP-51 Table 3 VOCs and SVOCs by an NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory. Results were compared to NYSDEC Part 375 Restricted Residential soil cleanup objectives (RR SCOs). The remaining contamination is summarized as follows:

- The following constituents were detected in soil from post-remedy endpoint samples and RI samples in areas outside of the remedial excavation extent at concentrations that exceed RR SCOs:
    - Four SVOCs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene
    - One metal: copper

The SVOCs and metals detected at concentrations above the RR SCOs are typical of historic fill throughout New York City, and the concentrations were consistent with the results of previous investigations. Groundwater sampling conducted during previous investigations demonstrated that SVOCs in Site soil have not impacted groundwater. A documentation sample detection summary is shown in Table 2A, remaining contamination from RI samples collected is shown in Table 2B, and a map showing sample locations and results that exceeded the RR SCOs is presented as Figures 6A and 6B.

Exposure to remaining soil contamination is prevented by the Site Cover system, consisting of a combination of two feet of gravel, RCA, and/or clean imported material meeting the soil quality requirements in Part 375-6.7(d)(ii)(b) (i.e., lower of Protection of Groundwater SCOs or RR SCOs). In addition, as described above, a physical demarcation layer was placed along the base of the remedial excavation and wrapped around ¾-inch crushed virgin stone backfilled to one foot above the water table. The engineering controls plan and cross-sections of cover type are provided as Figures 5A and 5B.

2.5.2 Groundwater

Groundwater was encountered during the remedial excavation in the western portion of Parcel C. Construction dewatering was not implemented during remedial excavation activities. As part of the remedy, grossly contaminated media was excavated to one foot below the observed water table.

- The following groundwater contaminants were identified above Class GA TOGS AWQS during the RI:
    - Three metals: antimony, manganese, and thallium

Table 3 identifies remaining groundwater contamination at the site after completion of the remedial action. Groundwater analytical results are shown in Figure 7.

2.5.3 Soil Vapor

For all future buildings constructed at the site, a SVI evaluation will be completed prior to construction. The evaluation will include a provision for implementing actions recommended to address exposures related to SVI, as required.

During the RI, two soil vapor samples were collected between July 16 and July 20, 2007 to evaluate the presence of volatile constituents on the Site.

- The following VOCs detected in soil vapor sample in areas outside of the remedial excavation included:

- Sixteen VOCs: 1,2,4-Trimethylbenzene, 1,3,5 Trimethylbenzene, 2-butanone, 2-hexanone, 4-ethyltoluene, acetone, ethanol, ethylbenzene, isopropyl alcohol, p/m-Xylene, n-heptane, o-xylene, propene, tetrachloroethene, tetrahydrofuran, and toluene.

Table 4 identifies remaining soil vapor contamination at the Site after completion of the remedial action. Soil vapor analytical results are shown in Figure 8.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 GENERAL

Since remaining contamination exists at the Site, ICs and ECs are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix E) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the Site remedy, as determined by the NYSDEC.

3.2 INSTITUTIONAL CONTROLS

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor EC systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the Site to Restricted Residential, Commercial or Industrial uses only. Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are presented in Appendix A. These ICs are:

- The property may be used for: Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-

1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv), subject to applicable zoning restrictions;

- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 5A, and any potential impacts that are identified must be monitored or mitigated.
- Vegetable gardens and farming in remaining soil on the Site are prohibited; and
- The Site shall not be used for Residential (single family housing) purposes as defined in 6 NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

3.3 ENGINEERING CONTROLS

Engineering controls installed at the Site include a Site Cover system to prevent contact with remaining subsurface soil contamination. Locations of all ECs are shown on Figure 5A. Cross-sections of cover types are shown on Figure 5B.

3.3.1 Site Cover System (or Cap)

Exposure to remaining contamination at the Site is prevented by a Site Cover system placed over the Site. This cover system is comprised of a combination of a minimum of two feet of gravel, RCA, and/or clean imported material meeting the soil quality requirements in Part 375-6.7(d)(ii)(b) (i.e., lower of Protection of Groundwater SCOs or RR SCOs). Figure 5A presents the location of the cover system and applicable demarcation layers. The EWP provided in Appendix E outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the Site and provided in Appendix F and G, respectively.

Procedures for operating and maintaining the Site Cover system are documented in the Monitoring Plan (Section 4.0 of this SMP). As built drawings, signed and sealed by a professional engineer, are included in Appendix D. Figure 5A shows the location of the ECs for the Site. Cross-sections of cover types are shown on Figure 5B.

3.3.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

3.3.3.1 Site Cover System (or Cap)

The Site Cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

4.0 MONITORING PLAN

4.1 GENERAL

This Monitoring Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling/ monitoring procedures, data quality usability objectives, analytical methods, etc. for all samples collected, as necessary, as part of site management for the Site are included in the Quality Assurance Project Plan (QAPP) provided in Appendix H.

This Monitoring Plan describes the methods to be used for evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.

To adequately address these issues, this Monitoring Plan provides information on:

- Monitoring locations, protocol and frequency; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 SITE-WIDE INSPECTION

Site-wide inspections will be performed annually. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs. During these inspections, an inspection form will be completed as provided in Appendix I – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that Site records are up to date.

Inspections of all remedial components installed at the Site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;

- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If Site records are complete and up to date; and
- Reporting requirements as outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the Site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 POST-REMEDIATION MEDIA MONITORING

4.3.1 Soil Vapor Intrusion Evaluation

A soil vapor intrusion evaluation will be performed if buildings are constructed on the Site to assess the performance of the remedy. Modification to the frequency or sampling requirements, if needed, will require approval from the NYSDEC.

The evaluation will include a provision for implementing actions recommended to address exposures related to SVI, as required. The network of on-site SVI sample locations will be designed based on the following criteria:

- Proximity to former soil vapor samples collected during the RI with elevated concentrations of VOCs,
- Presence of residual contamination below the remedial excavation depth of one foot below the observed water table.

Soil vapor samples will be collected in accordance with the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH October 2006). Sample points will be installed using a Geoprobe® direct-push drill rig to a depth comparable to the depth of foundation footings or at least two feet above the groundwater table, whichever is shallower. Sample collection points will consist of a stainless-steel-screened probe and inert sampling tubing (i.e. polyethylene or Teflon). The annulus around the probe will be backfilled with coarse sand to approximately six inches above

the top of the probe. A three-foot hydrated bentonite seal will be installed above the sampling zone. The annulus around the inert sampling tube will be filled with sand or hydrated bentonite up to a cement-bentonite surface seal. Soil vapor samples will be analyzed for TO-15 VOCs.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

Deliverables for the SVI sampling program are specified in Section 7.0 – Reporting Requirements.

4.4 ENGINEERING CONTROL MONITORING

Monitoring programs are summarized in the following table and outlined in detail below.

Monitoring/Inspection Schedule

Monitoring Program	Frequency*	Analysis
Site Cover System Inspections	Annually	Visual inspection of Site Cover system components
Site-Wide Inspections	Annually	Visual inspection of general Site conditions and ECs
Soil Vapor Intrusion Evaluation	If buildings are constructed at the Site	Visual inspection of building foundation components

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH

4.4.1 Site Cover System Monitoring

A Site Cover system, comprised of a minimum of two feet of gravel, RCA, or clean imported material, serves as a protective barrier mitigating the risk of exposure to the remaining contamination. The Site Cover system plan is shown on Figure 5A. Inspection of the Site Cover system by an engineer, scientist or geologist under the direction of a professional engineer, is required on a regular schedule at a minimum of once per year and following any severe weather or other conditions that could affect the cover. During these inspections, a Site Cover inspection form will be completed (Appendix I). The inspection requires sufficient information to certify the integrity of all elements of the cover system described above and should document any cover system disturbances. Any damage to the Site Cover system identified during the inspection will be repaired in kind and in compliance with this SMP.

4.4.2 Site-Wide Inspections

Site-wide inspections will be performed annually and after all severe weather conditions that may affect ECs or monitoring devices. Inspections of all remedial components installed at the Site will be conducted. Results of the annual inspection will be reported in the annual SMP report and subsequent Periodic Review Reports (PRR) reports. Additional details regarding the Site-wide inspections are provided in Section 4.2 of the SMP.

4.4.3 Soil Vapor Intrusion Evaluation

A soil vapor intrusion evaluation will be performed if buildings are constructed on the Site to assess the performance of the remedy. The evaluation will include a provision for implementing actions recommended to address exposures related to SVI, as required. As necessary, results of the SVI sampling events, if required based on the evaluation, will be reported to NYSDEC and included in the annual PRR reports. Additional details regarding the SVI sampling are provided in Section 4.0 of the SMP.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 GENERAL

The Site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization (SSD) systems or air sparge/soil vapor extraction (SVE) systems to protect public health and the environment. Therefore, the operation and maintenance (O&M) of such components is not included in this SMP. The Excavation and Management Plan in Appendix E outlines the procedure for handling soil excavated below the current Site cover, which is to be implemented during future redevelopment of the Site.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 CLIMATE CHANGE VULNERABILITY ASSESSMENT

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given Site and associated remedial systems. Vulnerability assessments provide information so that the Site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the Site during periodic assessments, and briefly summarizes the vulnerability of the Site and/or engineering controls to severe storms/weather events and associated flooding.

As stated in Section 4.2, site-wide inspections, including inspections of all ECs, will be performed after severe weather events. The Site is located within Zone AE special flood hazard areas subject to inundation by 1 percent annual chance flood (i.e., the 100-year storm). The Site cover system is protected from flooding events by the bulkhead cutoff wall and storm water outfall constructed in the west-adjacent Parcel A.

6.2 GREEN REMEDIATION EVALUATION

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the Site during site management, and as reported in the PRR.

As discussed in Section 3.3, the Site Cover system is a permanent control and will operate in perpetuity, and will not be removed without the approval of NYSDEC and NYSDOH.

6.2.1 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site and use of consumables in relation to visiting the Site in order to conduct system checks and or conduct annual inspections have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

6.2.2 Metrics and Reporting

As discussed in Section 7.0 and as shown in Appendix I – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits; a set of metrics has been developed.

6.3 REMEDIAL SYSTEM OPTIMIZATION

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a Site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the Site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

7.0. REPORTING REQUIREMENTS

7.1 SITE MANAGEMENT REPORT

All Site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in Appendix I. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of the table below and summarized in the Periodic Review Report.

Schedule of Monitoring/Inspection Reports

Task/Report	**Reporting Frequency***
Site Cover System Inspections	Annually, included in Periodic Review Report
Site Management Report	Annually, included in the Periodic Review Report
Periodic Review Report	Annually, or as otherwise determined by the Department

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC.

All monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected, as necessary (e.g., sub-slab vapor, indoor air, outdoor air, etc.);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria (if applicable);

- A figure illustrating sample type and sampling locations (if applicable);
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (if applicable, to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html

7.2 PERIODIC REVIEW REPORT

A PRR will be submitted to the Department beginning sixteen (16) months after the Certificate of Completion is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the Department or at another frequency as may be required by the Department. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix A - Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. If applicable, media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site;
- Results of the required annual site inspections and severe condition inspections, if applicable;
- All applicable site management forms and other records generated for the Site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted;
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions;
- If applicable, data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted - These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period, if applicable, will be submitted in digital format as determined by the NYSDEC - Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html; and
- A site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the site-specific RAWP, Record of Decision (ROD) or Decision Document;
    - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;

- Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;
- Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
- Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document.
- The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the Site, I certify that all of the following statements are true:*

- *The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the Site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*

- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

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, Jason Hayes, P.E., of Langan, have been authorized and designated by the Site owner to sign this certification for the Site."

Every five years the following certification will be added:

- *"The assumptions made in the qualitative exposure assessment remain valid.*
- *The information presented in this report is accurate and complete."*

The signed certification will be included in the Periodic Review Report. The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the Site is located and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic Review Report may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

7.3 CORRECTIVE MEASURES PLAN

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

7.4 REMEDIAL SITE OPTIMIZATION REPORT

In the event that an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the Department for approval. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the Site is located, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

8.0 REFERENCES

1. 6NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.
2. NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".
3. NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water TOGS 1.1.1. June 1998 (April 2000 addendum).
4. Roy F. Weston, Inc., "Environmental Liabilities Assessment for 41-98 and 42-02 through 42-16 Vernon Boulevard", dated May 1994.
5. ERD Environmental Inc., "Summary of UST Closure Site Assessment – Terra Cotta Facility", dated September 1996.
6. ERD Environmental Inc., "550-gallon Storage Tank Excavation Report", dated September 1997.
7. ERD Environmental Inc., "UST Closure Additional Soil Removal Report", dated September 1997.
8. IVI Environmental, Inc., "Phase I Environmental Site Assessment – Former New York Terra Cotta Architectural Terra Cotta Company", dated January 1999.
9. IVI Environmental, Inc., "Phase II Environmental Site Assessment – Former Terra Cotta Company", dated August 9, 1999.
10. Langan Engineering, Environmental, Surveying, and Landscape Architecture, D.P.C., "Preliminary Geotechnical Report – Silvercup Studios West", dated December 19, 2002.
11. Langan Engineering, Environmental, Surveying, and Landscape Architecture, D.P.C., "Geotechnical Investigation Report", dated September 19, 2007.
12. Langan Engineering, Environmental, Surveying, and Landscape Architecture, D.P.C., "Remedial Investigation Report – For Silvercup West Terra Cotta Site Parcels A, B, C, and D", dated September 2007.
13. Langan Engineering, Environmental, Surveying, and Landscape Architecture, D.P.C., "East River Sediment Sampling Report", dated May 30, 2008.
14. Langan Engineering, Environmental, Surveying, and Landscape Architecture, D.P.C., "Interim Remedial Measure Work Plan – For Silvercup West", dated May 20, 2013.
15. Langan Engineering, Environmental, Surveying, and Landscape Architecture, D.P.C., "Geotechnical Engineering Report", dated December 8, 2015.

16. Langan Engineering, Environmental, Surveying, and Landscape Architecture, D.P.C., "Remedial Investigation Report – Addendum 1", dated May 4, 2016.

17. Langan Engineering, Environmental, Surveying, and Landscape Architecture, D.P.C., "Remedial Action Work Plan", dated October, 2016.

TABLES

Table 1
Groundwater Elevation Data Summary
Silvercup West Parcel C
Long Island City, New York
Langan Project No. 5635005

Well ID	Date	Depth to Water (feet bgs)	Top of Casing Elevation[(1)] (NAVD88)	Water Elevation[(1)] (NAVD88)
MW-3	7/9/2007	12.11	13.13	1.02
	7/10/2007	11.87		1.26
	7/11/2007	12.96		0.17
	7/12/2007	12.48		0.65
	7/13/2007	12.26		0.87
	7/17/2007	12.56		0.57
	7/18/2007	12.29		0.84
	7/19/2007	12.69		0.44
	7/20/2007	12.71		0.42
	7/24/2007	12.35		0.78
MW-5	7/13/2007	16.19	18.44	2.25
	7/17/2007	16.13		2.31
	7/18/2007	15.71		2.73
	7/19/2007	15.91		2.53
	7/20/2007	15.80		2.64
	7/24/2007	15.49		2.95
PMB-MW-05	10/9/2015	10.44	13*	2.56
	11/13/2015	11.06		1.94
PMB-MW-06	10/9/2015	12.08	14*	1.92
	11/13/2015	12.78		1.22

Notes:

1. Elevations are relative to the North American Vertical Datum of 1988 (NAVD88).
2. Water Elevation = Top of Casing Elevation - Depth to Water.
3. bgs = Below ground surface
4. * = Top of well casing was not surveyed; therefore the elevation is approximate.
5. Monitoring Wells MW-3, and MW-5 installed by Langan in July 2007.
6. Monitoring Wells PMB-MW-05 AND PMB-MW-06 installed by Langan in August 2015.

Table 2A
Documentation Soil Sample Analytical Results Summary
Silvercup West Parcel C
Long Island City New York
Langan Project No. 5635005

Sample ID Laboratory ID Sampling Date Sample Elevation (NAVD88)	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Restricted-Residential Soil Cleanup Objectives	DUPLICATES BEP06_030117 L1706343-02 3/1/2017 -2		DUPLICATES DUP01_030117 L1706343-05 3/1/2017 -2		SW04_030117 L1706343-04 3/1/2017 2		SW05_032917 L1709798-03 3/29/2017 -2		DUPLICATES BEP07_032917 L1709798-02 3/29/2017 -3		DUP01_032917 L1709798-01 3/29/2017 -3		SW-06 L1710077-01 4/3/2017 6	
Volatile Organic Compounds (mg/kg)																
1,2,4-Trimethylbenzene	3.6	52	0.071	J	0.015	J	0.035	J	3.1	U	3	U	0.98	U	0.0051	U
1,3,5-Trimethylbenzene	8.4	52	0.022	J	0.52	U	0.014	J	3.1	U	3	U	0.98	U	0.0051	U
Benzene	0.06	4.8	0.15	U	0.1	U	0.072	U	0.63	U	0.6	U	0.2	U	0.001	U
Ethylbenzene	1	41	0.029	J	0.1	U	0.018	J	0.63	U	0.6	U	0.2	U	0.00017	J
Isopropylbenzene	~	~	0.15	U	0.1	U	0.011	J	0.14	J	0.74		0.63		0.00045	J
Methyl tert butyl ether	~	100	0.3	U	0.21	U	0.14	U	1.2	U	1.2	U	0.39	U	0.002	U
n-Butylbenzene	12	100	0.15	U	0.1	U	0.072	U	0.26	J	1		0.88		0.001	U
n-Propylbenzene	3.9	100	0.15	U	0.1	U	0.072	U	0.15	J	0.97		0.8		0.001	U
o-Xylene	~	~	0.3	U	0.21	U	0.14	U	1.2	U	1.2	U	0.39	U	0.002	U
p-Isopropyltoluene	~	~	0.15	U	0.1	U	0.072	U	0.63	U	0.6	U	0.2	U	0.001	U
p/m-Xylene	~	~	0.3	U	0.21	U	0.14	U	1.2	U	1.2	U	0.39	U	0.002	U
sec-Butylbenzene	11	100	0.15	U	0.1	U	0.019	J	0.78		1.1		0.9		0.0011	
tert-Butylbenzene	5.9	100	0.75	U	0.52	U	0.36	U	0.38	J	0.31	J	0.24	J	0.012	
Toluene	0.7	100	0.23	U	0.16	U	0.11	U	0.94	U	0.9	U	0.3	U	0.00035	J
Xylenes, Total	0.26	100	0.3	U	0.21	U	0.14	U	1.2	U	1.2	U	0.39	U	0.002	U
Semivolatile Organic Compounds (mg/kg)																
Acenaphthene	20	100	0.26	U	0.15	J	0.16	U	0.16	U	0.16	U	0.15	U	0.15	U
Acenaphthylene	100	100	0.39		0.69		0.16	U	0.16	U	0.16	U	0.15	U	0.15	U
Anthracene	100	100	0.64		0.78		0.12	U	0.23		0.25		0.21		0.12	U
Benzo(a)anthracene	1	1	**1.8**		**1.4**		0.048	J	0.064	J	0.06	J	0.056	J	0.12	U
Benzo(a)pyrene	1	1	**1.6**		0.98		0.16	U	0.16	U	0.16	U	0.15	U	0.15	U
Benzo(b)fluoranthene	1	1	**1.9**		**1.2**		0.047	J	0.036	J	0.12	U	0.11	U	0.12	U
Benzo(ghi)perylene	100	100	0.95		0.64		0.026	J	0.16	U	0.16	U	0.15	U	0.15	U
Benzo(k)fluoranthene	0.8	3.9	0.66		0.42		0.12	U	0.12	U	0.12	U	0.11	U	0.12	U
Chrysene	1	3.9	**1.5**		**1.3**		0.041	J	0.061	J	0.055	J	0.055	J	0.026	J
Dibenzo(a,h)anthracene	0.33	0.33	0.23		0.18		0.12	U	0.12	U	0.12	U	0.11	U	0.12	U
Fluoranthene	100	100	3.3		2.5		0.078	J	0.13		0.13		0.12		0.12	U
Fluorene	30	100	0.14	J	0.29		0.21	U	0.41		0.58		0.18	U	0.19	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	**0.98**		**0.62**		0.16	U	0.16	U	0.16	U	0.15	U	0.15	U
Naphthalene	12	100	0.21	J	0.19	J	0.21	U	0.2	U	0.2	U	0.18	U	0.19	U
Phenanthrene	100	100	1.3		1.9		0.055	J	0.05	J	0.84		0.97		0.12	U
Pyrene	100	100	3.3		2.2		0.079	J	0.25		0.24		0.22		0.025	J
General Chemistry																
Solids, Total	~	~	52		72.5		79.6		80.1		82.2		89.7		85.5	

Notes and Qualifiers:

1. Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Restricted Use Restricted-Residential Soil Cleanup Objectives (SCO).
2. Analytes detected above NYSDEC Part 375 Restricted Use Restricted-Residential SCOs are shaded and bolded.
3. Only analytes with detections are shown.
4. mg/kg = Milligram per Kilogram
5. ~ = Criterion does not exist
6. J = The analyte was detected above the Method Detection Limit (MDL), but below the Reporting Limit (RL); therefore, the result is an estimated concentration.
7. U = The analyte was analyzed for, but was not detected at a level greater than or equal to the RL; the value shown in the table is the RL.
8. All elevations are shown in the North American Vertican Datum of 1988 (NAVD88). All elevations are approximate.
9. DUP01_030117 is a duplicate sample of BEP06_030117.
10. DUP01_032917 is a duplicate sample of BEP07_032917.

Table 2B
Remaining RIR Soil Analytical Results Summary
VOCs and SVOCs
Silvercup West Parcel C
Long Island City, New York
Langan Project No. 5635005

Sample ID Lab Sample ID Date Sampled Sample Depth (feet)	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Restricted Residential Soil Cleanup Objectives	TP-11-12-14 SA64967-08RE1 9-Jul-07 12-14	
Volatile Organic Compounds (mg/kg)				
Methylene chloride	0.05	100	0.0067	J
Total VOCs	~	~	0.0067	
Semivolatile Organic Compounds (mg/kg)				
Anthracene	100	100	0.582	D^2
Benzo (a) anthracene	1	1	**1.12**	D^2
Benzo (a) pyrene	1	1	0.947	D^2
Benzo (b) fluoranthene	1	1	0.9	D^2
Benzo (g,h,i) perylene	100	100	0.39	JD^2
Benzo (k) fluoranthene	1	3.9	**1.09**	D^2
Carbazole	~	~	0.125	JD^2
Chrysene	1	3.9	**1.13**	D^2
Fluoranthene	100	100	2.48	D^2
Fluorene	30	100	0.12	JD^2
Indeno (1,2,3-cd) pyrene	0.5	0.5	0.414	JD^2
Phenanthrene	100	100	1.85	D^2
Pyrene	100	100	3.25	D^2
Total SVOCs	~	~	14.398	
Total PAHs	~	~	5.601	

Notes and Qualifiers:

1. Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Unrestricted Use Restricted-Residential Soil Cleanup Objectives (SCO) and Restricted use Restricted - Residential SCOs.
2. Analytes detected above NYSDEC Part 375 Unestricted Use SCOs are bolded.
3. Analytes detected above NYSDEC Part 375 Restricted use Restricted - Residential SCOs are shaded and bolded.
4. mg/kg = Milligram per Kilogram
5. ~ = Criterion does not exist
6. J = The analyte was detected above the Method Detection Limit (MDL), but below the Reporting Limit (RL); therefore, the result is an estimated concentration.
7. D^x= Indicates Dilution (dilution factor indicated by ^{x})
8. PAH = Polycyclic Aromatic Hydrocarbon
9. VOC = Volatile Organic Compound
10. SVOC = Semivolatile Organic Compound
11. Only analytes with detections are shown.

Table 2B
Remaining RIR Soil Analytical Results Summary
Metals, PCBs, Herbicides and Pesticides
Silvercup West Parcel C
Long Island City, New York
Langan Project No. 5635005

Sample ID Laboratory ID Sampling Date Sample Depth (feet)	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Restricted - Residential Soil Cleanup Objectives	SB-11-4-6 SA64309-17 27-Jun-07 4-6		SB-11-9-11 SA64309-18 27-Jun-07 9-11		SB-11-14-16 SA64309-06 27-Jun-07 14-16		TP-11-12-14 SA64967-08 09-Jul-07 12-14	
Metals (mg/kg)										
Mercury	0.18	0.81	**0.195**		0.0081	U	0.0076	U	0.221	
Aluminum	~	~	16,900		9,070		13,200	D[10]	6,150	
Antimony	~	~	7.3		0.835	J	1.66	J	0.985	J
Arsenic	13	16	9.94		3.4		0.739	J	10.8	
Barium	350	400	315		35.8		127		160	
Beryllium	7.2	72	0.353	J	0.337	J	0.237	J	0.352	J
Cadmium	3	4.3	1.12		0.342	J	0.446	J	0.622	
Calcium	~	~	36,000		731		1,030		2,750	
Chromium	30	180	23.4		12.2		19.4		12.5	
Cobalt	~	~	5.65		5.17		10.3		6.51	
Copper	50	270	**521**		9.44		29.6		**60.8**	
Iron	~	~	14,800	D[10]	15,600	D[10]	18,500	D[10]	16,400	
Lead	63	400	**369**		7.24		8.45		**186**	
Magnesium	~	~	5,630		2,510		3,720		1,810	
Manganese	1,600	2,000	415		186		175		208	
Nickel	30	310	24.5		7.38		13.8		9.85	
Potassium	~	~	1,110		948		2,930		734	
Selenium	3.9	180	1.67		0.704	J	1.82		0.739	J
Sodium	~	~	354		44.5		102		95.2	
Vanadium	~	~	25.9		20.8		28.8		20.4	
Zinc	109	10,000	**240**		21.1		32.4		117	
PCBs (mg/kg)										
Total PCBs	0.1	~	BRL		BRL		BRL		BRL	
Herbicides (mg/kg)										
Total Herbicides	~	~	BRL		BRL		BRL		BRL	
Pesticides (mg/kg)										
Total Pesticides	~	~	NA		NA		NA		NA	

Notes and Qualifiers:

1. Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Unrestricted Use Restricted-Residential Soil Cleanup Objectives (SCO) and Restricted use Restricted - Residential SCOs.
2. Analytes detected above NYSDEC Part 375 Unestricted Use SCOs are bolded.
3. Analytes detected above NYSDEC Part 375 Restricted use Restricted - Residential SCOs are shaded and bolded.
4. mg/kg = Milligram per Kilogram
5. ~ = Criterion does not exist
6. J = The analyte was detected above the Method Detection Limit (MDL), but below the Reporting Limit (RL); therefore, the result is an estimated concentration.
7. U = The analyte was analyzed for, but was not detected at a level greater than or equal to the RL; the value shown in the table is the RL.
8. D^X = Indicates Dilution (dilution factor indicated by ^{X})
9. BRL = Below Reporting Limit
10. NA = Not Analyzed
11. PCB = Polychlorinated Biphenyl

Table 3
Remaining Groundwater Analytical Results Summary
Silvercup West Parcel C
Long Island City, New York
Langan Project No. 5635005

Sample ID Laboratory ID Sampling Date	NYSDEC TOGS 1.1.1 AWQS	MW-5 SA65586-04 20-Jul-07	
Volatile Organic Compounds (µg/L)			
Isopropylbenzene	5	1.4	
Methyl tert-butyl ether	~	0.8	J
Naphthalene	10	0.8	J
n-Propylbenzene	5	0.8	J
sec-Butylbenzene	5	1.4	
tert-Butylbenzene	5	0.6	J
Total Xylenes	~	BRL	
Total VOCs	~	5.8	
Semivolatile Organic Compounds (µg/L)			
Acenaphthene	20	2.2	J
Fluorene	50	1.4	J
Total SVOCs	~	3.6	
Metals (mg/L)			
Aluminum	~	0.01	J
Antimony	0.003	**0.0061**	
Barium	1	0.2	
Cadmium	0.005	0.0005	J
Calcium	~	351	
Chromium	0.05	0.0036	J
Iron	0.3	0.222	
Magnesium	35	12.8	
Manganese	0.3	**3.75**	
Nickel	0.1	0.0009	J
Potassium	~	14.7	
Silver	0.05	0.0031	J
Sodium	20	13.7	
Thallium	0.0005	**0.0074**	
Vanadium	~	0.0162	
Zinc	2	0.0038	J
Polychlorinated Biphenyls (µg/L)			
Total PCBs	0.09	BRL	

Notes and Qualifiers:
1. Groundwater analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values (SGVs) for Class GA Water.
2. Compounds detected above their respective NYSDEC TOGS 1.1.1 SGVs are bolded and highlighted.
3. J = The analyte was detected above the Method Detection Limit (MDL), but below the Reporting Limit (RL); therefore the result is an estimated concentration.
4. BRL = Below Reporting Limit
5. ~ = Criterion does not exist
6. µg/L = Microgram per Liter
7. VOC = Volatile Organic Compound
8. SVOC = Semivolatile Organic Compound

Table 4
Remaining Soil Vapor Sample Results Summary
Silvercup West Parcel C
Long Island City, New York
Langan Project No. 5635005

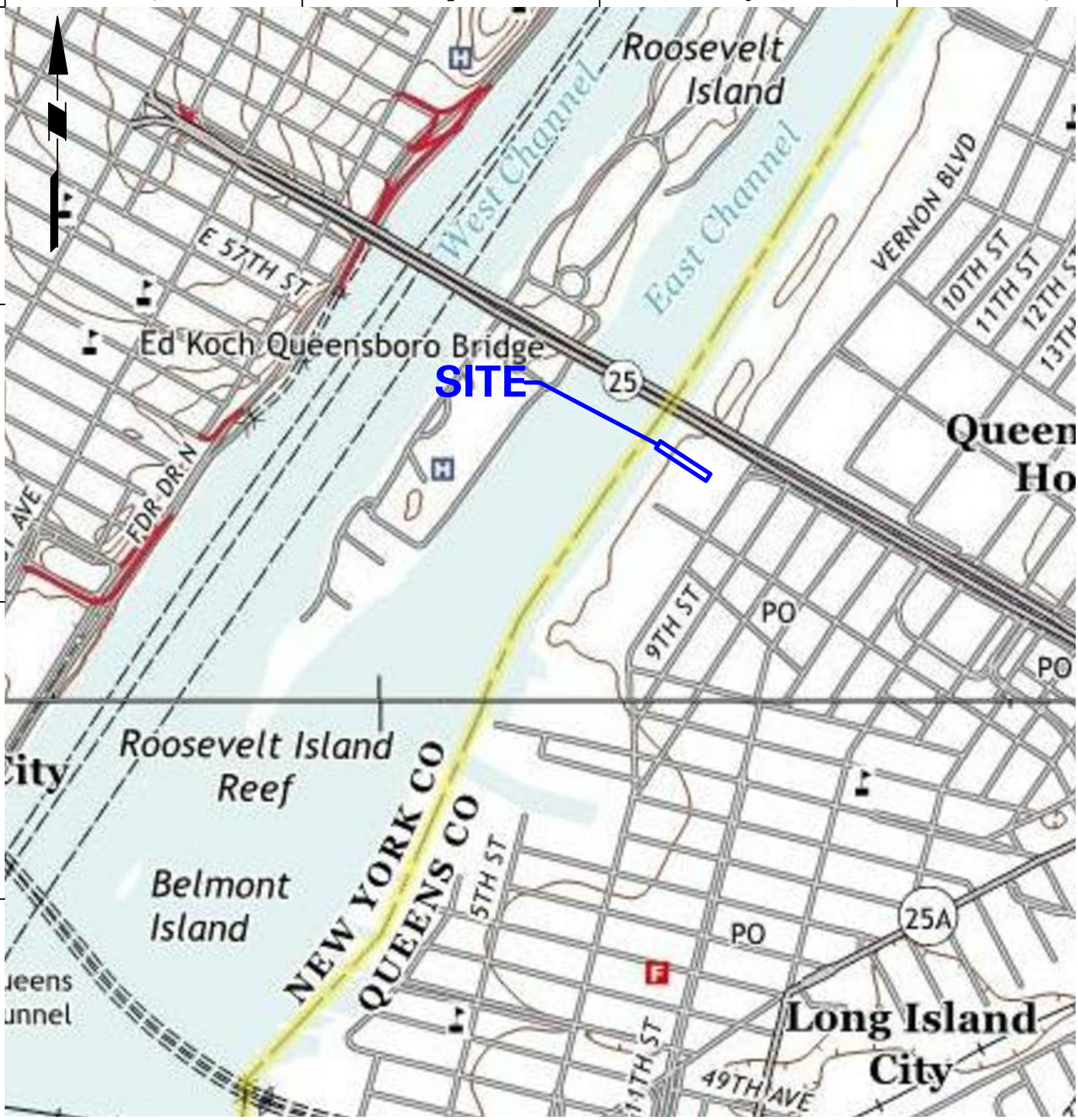
Sample ID	**SG-11**	
Laboratory ID	**SA65213-06**	
Sampling Date	**17-Jul-07**	
Matrix	**Soil Vapor**	
Volatile Organic Compounds (µg/m3)		
1,2,4-Trimethylbenzene	131.8	D^{10}
1,3,5-Trimethylbenzene	37.4	D^{10}
2-Butanone (MEK)	153.9	D^{10}
2-Hexanone (MBK)	61.5	D^{10}
4-Ethyltoluene	40.3	D^{10}
Acetone	1,860.9	D^{10}
Ethanol	77.1	D^{10}
Ethylbenzene	49.4	D^{10}
Isopropyl alcohol	28	D^{10}
m,p-Xylene	169.1	D^{10}
n-Heptane	19.3	JD^{10}
o-Xylene	78.9	D^{10}
Propene	23.2	D^{10}
Tetrachloroethene	21.7	JD^{10}
Tetrahydrofuran	9.1	JD^{10}
Toluene	103.9	D^{10}
Total VOCs	1,004.6	

Notes and Qualifiers:
1. J = The analyte was detected above the Method Detection Limit (MDL), but below the Reporting Limit (RL); therefore the result is an estimated concentration.
2. D^x = Indicates Dilution (dilution factor indicated by ^{x})
3. VOC = Volatile Organic Compound
4. $\mu g/m^3$ = Microgram per Cubic Meter
5. No criteria currently exists for soil vapor quality in New York State.
6. Acetone was not included when calculating total detected VOCs since it is a common lab contaminant.

Table 5
Contact List
Silvercup West Parcel C
Long Island City, New York
Langan Project No. 5635005

Title	Name	Phone Contact	Email Contact
Program Manager	Jason Hayes, P.E.	(212) 479-5427	jhayes@langan.com
Project Manager	Joseph Good, P.E.	(212) 479-5448	jgood@langan.com
NYSDOH Project Manager	Anthony Perretta	(518) 402-7860	BEEI@health.state.ny.gov
NYSDEC Project Manager	Shaun Bollers	(718) 482-4096	shaun.bollers@dec.ny.gov
Owner Representative	Mark Gold	(718) 906-2000	mgold@silvercupstudios.com

FIGURES



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.

NOTES:

1. BASE MAP TAKEN FROM UNITED STATES GEOLOGICAL SURVEY 7.5-MINUTE SERIES CENTRAL PARK AND BROOKLYN QUADRANGLE, DATED JULY 2011.
2. SITE BOUNDARY IS APPROXIMATE.

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Langan Engineering and Environmental Services, Inc.
Langan International LLC
Collectively known as Langan

Project	SILVERCUP WEST PARCEL C BLOCK 477 LOT 15 LONG ISLAND CITY QUEENS NEW YORK
Figure Title	SITE LOCATION MAP
Project No.	5635005
Figure No.	1
Date	04/28/2017
Scale	NTS
Drawn By	NEK
Submission Date	09/19/2017
Sheet	1 of 8

Filename: \\langan.com\data\NYC\data0\5635005\Cadd Data - 5635005\Dwg\SMP\Parcel C\Figure 1 - Site Location Map.dwg Date: 10/18/2017 Time: 16:16 User: nkung Style Table: Langan.stb Layout: ANSIA-BP

QUEENSBORO BRIDGE

EAST RIVER

VERNON BOULEVARD

NYPA SITE

PARCEL A
(TAX LOT 13 AND P/O TAX LOT 15)

PARCEL B
(P/O TAX LOT 15)

PARCEL C
(P/O TAX LOT 15)

PARCEL D
(TAX LOT 20 AND P/O TAX LOT 15)

BROKEN CONCRETE

12" I BEAM

WALL 2.15' S

RIP RAP

CRIBBING

DEAD MEN

STEEL TIE ROD (TYPICAL)

2.22' N

2.50' N
1.63' W

0.29' S

7.35'

BRICK WALL 0.10' E

CONC. WALL 1.46' W

FENCE 1.32' N, 2.39' W

NOTES:

1. SILVERCUP WEST – TERRA COTTA SITE BASE PLAN TAKEN FROM '41–98 VERNON BOULEVARD SURVEY' DATED DECEMBER 22, 2015, REVISED FEBRUARY 10, 2016, CERTIFIED BY ROBERT FEHRINGER, NYS LAND SURVEYOR.
2. ALL ELEVATIONS SHOWN ARE IN THE USGS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND REPRESENT PRE–REMEDIATION CONDITIONS.
3. GRADE SURFACE ELEVATION SHOWN BY GRAY CONTOUR LINES.

LEGEND:

- SILVERCUP WEST PROPERTY LINE
- SILVERCUP WEST PARCEL C BOUNDARY
- TERRA COTTA PARCEL BOUNDARY
- SITE AREA – PARCEL C

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.

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Project	SILVERCUP WEST PARCEL C BLOCK 477, LOT 15 QUEENS NEW YORK
Figure Title	SITE LAYOUT PLAN
Project No.	5635005
Date	04/28/2017
Scale	1" = 20'
Drawn By	NEK
Checked By	ELS
Submission Date	09/19/2017
Figure No.	2
Sheet	2 of 8

Filename: \\langan.com\data\NYC\data0\5635005\Cadd Data – 5635005\Dwg\SMP\Figure 2 – Site Layout Plan [BY PARCEL].dwg Date: 10/20/2017 Time: 14:20 User: nkung Style Table: Langan.stb Layout: Figure 1C – Site Plan

QUEENSBORO BRIDGE

EAST RIVER

VERNON BOULEVARD

NYPA SITE

PARCEL A
(TAX LOT 13 AND P/O TAX LOT 15)

PARCEL B
(P/O TAX LOT 15)

PARCEL C
(P/O TAX LOT 15)

PARCEL D
(TAX LOT 20 AND P/O TAX LOT 15)

MW-1
MW-2
MW-2D
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
PMB-MW-01
PMB-MW-05
PMB-MW-06

-1.375
-0.375
0.625
1.625
2.625
3.625
4.625
5.625
6.625
7.625

BROKEN CONCRETE
BRICK WALL 0.10' E
CONC. WALL 1.46' W
FENCE 1.32' N, 2.39' W

NOTES:

1. SILVERCUP WEST – TERRA COTTA SITE BASE PLAN TAKEN FROM '41–98 VERNON BOULEVARD SURVEY' DATED DECEMBER 22, 2015, REVISED FEBRUARY 10, 2016, CERTIFIED BY ROBERT FEHRINGER, NYS LAND SURVEYOR.
2. ALL ELEVATIONS SHOWN ARE IN THE USGS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND REPRESENT PRE–REMEDIATION CONDITIONS.
3. GRADE SURFACE ELEVATION SHOWN BY GRAY CONTOUR LINES.
4. GROUNDWATER ELEVATION CONTOURS ARE PREPARED USING A SOFTWARE AND ENGINEERING INTERPOLATION OF THE GROUNDWATER MEASUREMENTS MADE DURING FIELD INVESTIGATION ON JUNE 1ST AND JULY 19TH, 2007.
5. MONITORING WELLS PMB–MW–01, PMB–MW–05, AND PMB–MW–06 WERE NOT INCLUDED IN THE GROUNDWATER CONTOUR MAP.

LEGEND:

- SILVERCUP WEST PROPERTY LINE
- SILVERCUP WEST PARCEL C BOUNDARY
- TERRA COTTA PARCEL BOUNDARY
- 1.625 GROUNDWATER ELEVATION CONTOUR (NAVD88)
- MW–1 LOCATION OF PREVIOUSLY INSTALLED SHALLOW OVERBURDEN MONITORING WELL
- MW–1 LOCATION OF PREVIOUSLY INSTALLED DEEP OVERBURDEN MONITORING WELL

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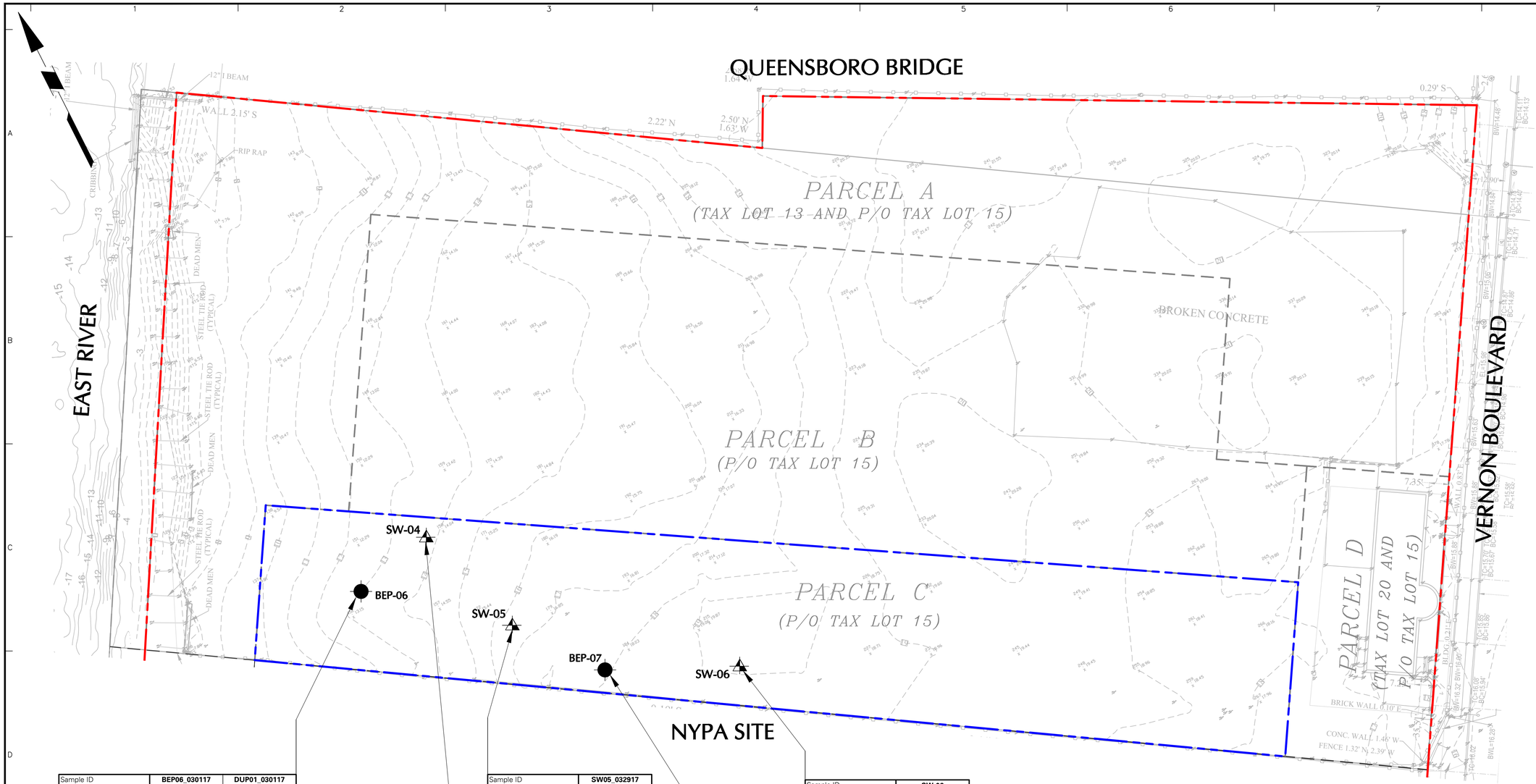
Project
SILVERCUP WEST
PARCEL C
BLOCK 477, LOT 15
QUEENS NEW YORK

Figure Title
GROUNDWATER CONTOUR MAP

Project No.	Figure No.
5635005	3
Date: 04/28/2017	
Scale: 1" = 20'	
Drawn By: NEK / Checked By: ELS	
Submission Date: 09/19/2017	Sheet 3 of 8

Filename: \\langan.com\data\NYC\data0\5635005\Cadd Data – 5635005\Dwg\SMP\Figure 3 – Groundwater Contour Map.dwg Date: 10/18/2017 Time: 14:57 User: nkung Style Table: Langan.stb Layout: Figure 1C – GW Contour Map



NOTES:

1. SILVERCUP WEST – TERRA COTTA SITE BASE PLAN TAKEN FROM '41–98 VERNON BOULEVARD SURVEY' DATED DECEMBER 22, 2015, REVISED FEBRUARY 10, 2016, CERTIFIED BY ROBERT FEHRINGER, NYS LAND SURVEYOR.
2. ALL ELEVATIONS SHOWN ARE IN THE USGS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND REPRESENT PRE–REMEDIATION CONDITIONS.
3. GRADE SURFACE ELEVATION SHOWN BY GRAY CONTOUR LINES.
4. THE DEMARCATION LAYER PLACED AT THE TOP OF THE RESIDUAL MATERIAL LEFT IN–PLACE CONSTITUTES THE TOP OF THE "RESIDUALS MANAGEMENT ZONE", THE ZONE THAT REQUIRES ADHERENCE TO SPECIAL CONDITIONS FOR DISTURBANCE OF POTENTIALLY CONTAMINATED RESIDUAL SOILS DEFINED IN THE SITE MANAGEMENT PLAN (SMP).
5. DOCUMENTATION SAMPLE RESULTS WERE COMPARED TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TITLE 6 OF THE COMPILATION OF NEW YORK CODES, RULES, AND REGULATIONS (NYCRR) PART 375 RESTRICTED USE RESTRICTED–RESIDENTIAL SOIL CLEANUP OBJECTIVES (SCO).
6. ONLY DOCUMENTATION SAMPLE RESULTS THAT EXCEEDED THE RESTRICTED–RESIDENTIAL USE SCOs ARE SHOWN.
7. VOC = VOLATILE ORGANIC COMPOUND
8. SVOC = SEMIVOLATILE ORGANIC COMPOUND
9. mg/kg = MILLIGRAM PER KILOGRAM
10. NE = NO EXCEEDENCE
11. Conc. = CONCENTRATION

LEGEND:

- SILVERCUP WEST PROPERTY LINE
- SILVERCUP WEST PARCEL C BOUNDARY
- TERRA COTTA PARCEL BOUNDARY
- BEP-01 BOTTOM DOCUMENTATION SAMPLE LOCATION
- SW-01 SIDEWALL DOCUMENTATION SAMPLE LOCATION

Sample ID	BEP06_030117	DUP01_030117
Date Sampled	3/1/2017	3/1/2017
Elevation (NAVD88)	-2	-2
VOCs (mg/kg)	NE	NE
SVOCs (mg/kg)	Conc.	Conc.
Benzo(a)anthracene	1.8	1.4
Benzo(a)pyrene	1.6	NE
Benzo(b)fluoranthene	1.9	1.2
Indeno(1,2,3-cd)pyrene	0.98	0.62

Sample ID	SW05_032917
Date Sampled	3/2/2017
Elevation (NAVD88)	-2
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE

Sample ID	SW-06
Date Sampled	3/2/2017
Elevation (NAVD88)	6
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE

Sample ID	SW04_030117
Date Sampled	3/2/2017
Elevation (NAVD88)	2
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE

Sample ID	BEP07_032917	DUP01_032917
Date Sampled	3/2/2017	3/2/2017
Elevation (NAVD88)	-3	-3
VOCs (mg/kg)	NE	NE
SVOCs (mg/kg)	NE	NE

Compound	NYSDEC Part 375 Restricted Use Restricted-Residential Soil Cleanup Objectives
Semivolatile Organic Compounds (mg/kg)	
Benzo(a)anthracene	1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	1
Indeno(1,2,3-cd)pyrene	0.5

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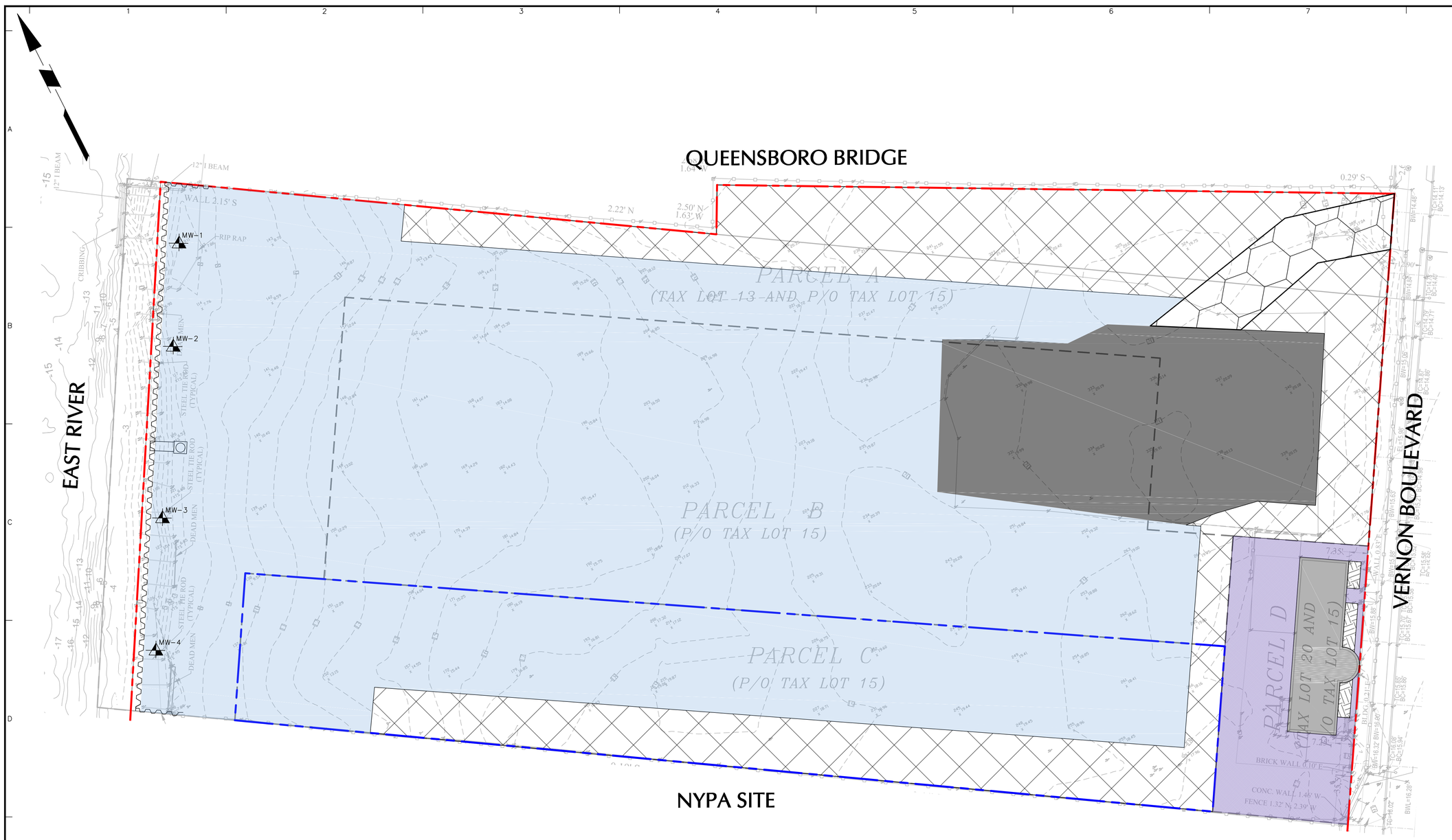
Project: SILVERCUP WEST
PARCEL C
BLOCK 477, LOT 15
QUEENS NEW YORK

Figure Title: DOCUMENTATION SAMPLE LOCATION AND RESULTS MAP

Project No.	Figure No.
5635005	4
Date: 04/28/2017	
Scale: 1" = 20'	
Drawn By: NEK / Checked By: ELS	
Submission Date: 09/19/2017	Sheet 4 of 8

Filename: \\langan.com\data\NYC\data0\5635005\Cadd Data – 5635005\Dwg\SMP\Figure 4 – Endpoint Sample Results and Remaining Contamination Plan.dwg Date: 10/19/2017 Time: 14:48 User: nkung Style Table: Langan.stb Layout: PARCEL C



NOTES:

1. SILVERCUP WEST – TERRA COTTA SITE BASE PLAN TAKEN FROM '41–98 VERNON BOULEVARD SURVEY' DATED DECEMBER 22, 2015, REVISED FEBRUARY 10, 2016, CERTIFIED BY ROBERT FEHRINGER, NYS LAND SURVEYOR.
2. ALL ELEVATIONS SHOWN ARE IN THE USGS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND REPRESENT PRE–REMEDIATION CONDITIONS.
3. GRADE SURFACE ELEVATION SHOWN BY GRAY CONTOUR LINES.
4. RCA = RECYCLED CONCRETE AGGREGATE

LEGEND:

- SILVERCUP WEST PROPERTY LINE
- TERRA COTTA PARCEL C BOUNDARY
- TERRA COTTA PARCEL BOUNDARY
- CONCRETE OVERLAIN WITH 4 INCHES OF ASPHALT BINDER
- CONCRETE
- ENGINEERED GRAVEL DRIVEWAY (COMPACTED SUBGRADE, OVERLAID BY NONWOVEN GEOTEXTILE FABRIC, OVERLAIN BY 10 INCHES OF RCA, OVERLAIN BY TENSAR GEOGRID TX5, OVERLAID BY 8 INCHES OF #3 STONE, AND COVERED WITH 6 INCHES OF ⅜ INCH CLEAN STONE)
- PERMANENT STABILIZED SLOPE (COMPACTED SUBGRADE, OVERLAID BY NONWOVEN GEOTEXTILE FABRIC, OVERLAID BY 2 FEET OF RCA, OVERLAID BY 6 INCHES OF TOPSOIL)
- GRAVEL COVER (COMPACTED SUBGRADE, OVERLAIN BY NONWOVEN GEOTEXTILE FABRIC, OVERLAID BY 1.5 FEET OF RCA, OVERLAID BY 6 INCHES OF COMPACTED ⅜ INCH CLEAN STONE)
- IMPERVIOUS COVER (IMPERVIOUS PAVERS SET IN CONCRETE)
- TOPSOIL LANDSCAPED AREA (MINIMUM 12 INCHES OF TOPSOIL UNDERLAIN BY 24 INCHES OF RCA UNERLAIN BY NON–WOVEN GEOTEXTILE FABRIC AND COMPACTED SUBGRADE)
- OUTFALL
- SHEETPILE BULKHEAD
- MW–1 LOCATION OF SHALLOW OVERBURDEN POST–REMEDY MONITORING WELL

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.

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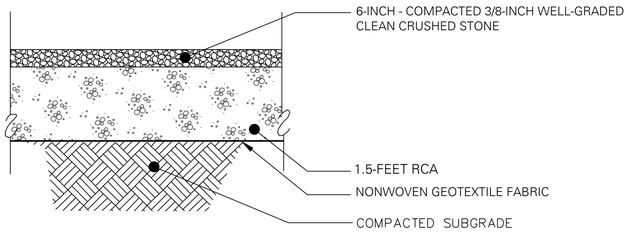
Project	SILVERCUP WEST PARCEL C BLOCK 477, LOT 15 QUEENS NEW YORK
Figure Title	ENGINEERING CONTROLS PLAN
Project No.	5635005
Date	04/28/2017
Scale	1" = 20'
Drawn By	NEK
Checked By	ELS
Submission Date	09/19/2017
Figure No.	5A
Sheet	5A of 8

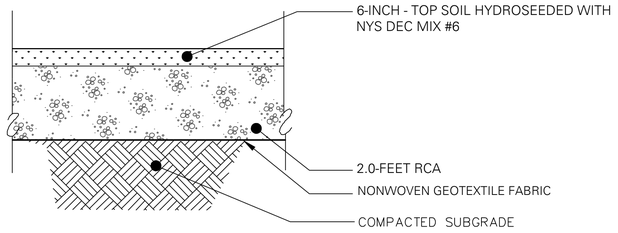
Filename: \\langan.com\data\NYC\data0\5635005\Cadd Data – 5635005\Dwg\SMP\Figure 5 – Engineering Controls Plan.dwg Date: 10/18/2017 Time: 16:09 User: nkung Style Table: Langan.stb Layout: C



NOTES:

1. RCA CLEAN STRUCTURAL FILL CONTAINS LESS THAT 10% BY WEIGHT MATERIAL WHICH WOULD PASS THROUGH A SIZE 80 SIEVE.

1 GRAVEL COVER
N.T.S.



NOTES:

1. RCA CLEAN STRUCTURAL FILL CONTAINS LESS THAT 10% BY WEIGHT MATERIAL WHICH WOULD PASS THROUGH A SIZE 80 SIEVE.

2 PERMANENT STABILIZED SLOPE
N.T.S.

NOTES:
1. DETAILS ARE REFERENCED FROM DRAWING C-501.00 – SITE DETAILS FROM THE SILVERCUP WEST DEVELOPMENT BULKHEAD DRAWING SET, PREPARED BY LANGAN, DATED 04/19/2016.
2. REFER TO DRAWING C-200.00 OF THE SILVERCUP WEST DEVELOPMENT BULKHEAD DRAWING SET FOR SITE PLAN.
3. RCA = RECYCLED CONCRETE AGREGATE
4. N.T.S. = NOT TO SCALE

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Langan CT, Inc.
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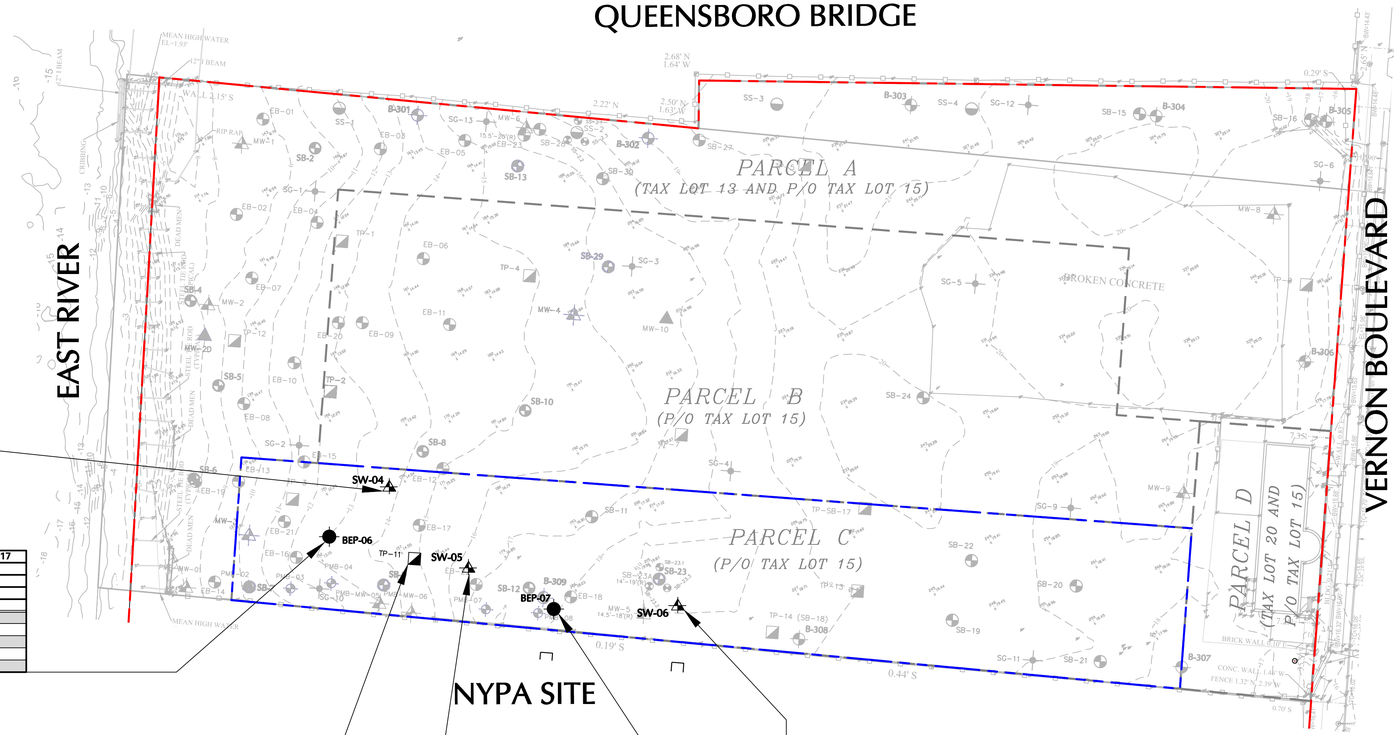
Collectively known as Langan

Project
SILVERCUP WEST
PARCEL C
BLOCK 477, LOT 15
QUEENS NEW YORK

Figure Title
ENGINEERING CONTROLS CROSS-SECTIONS

Project No.	Figure No.
005635005	5B
Date: 06/30/2017	
Scale: N.T.S.	
Drawn By: NEK / Checked By: ELS	
Submission Date: 09/19/2017	Sheet 5B of 8

Filename: \\langan.com\data\NY\C\data0\5635005\Cadd Data - 5635005\Dwg\SMP\Figure 5B - Engineering Controls Cross Sections.dwg Date: 10/18/2017 Time: 16:12 User: nkung Style Table: Langan.stb Layout: Parcel C



Sample ID	SW04_030117
Date Sampled	3/2/2017
Elevation (NAVD88)	2
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE

Sample ID	BEP06_030117	DUP01_030117
Date Sampled	3/1/2017	3/1/2017
Elevation (NAVD88)	-2	-2
VOCs (mg/kg)	NE	NE
SVOCs (mg/kg)	Conc.	Conc.
Benzo (a) anthracene	**1.8**	**1.4**
Benzo (a) pyrene	**1.6**	NE
Benzo (b) fluoranthene	**1.9**	**1.2**
Chrysene	**1.5**	**1.3**
Ideno (1,2,3-cd) pyrene	**0.98**	**0.62**

Sample ID	SW06
Date Sampled	3/2/2017
Elevation (NAVD88)	6
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE

Sample ID	TP-11-12-14
Date Sampled	7/9/2007
VOCs (mg/kg)	NE
SVOCs (mg/kg)	Conc.
Benzo (a) anthracene	**1.12**
Benzo (k) fluoranthene	**1.09**
Chrysene	**1.13**

Sample ID	SW05_032917
Date Sampled	3/2/2017
Elevation (NAVD88)	-2
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE

Sample ID	BEP07_032917	DUP01_032917
Date Sampled	3/2/2017	3/2/2017
Elevation (NAVD88)	-3	-3
VOCs (mg/kg)	NE	NE
SVOCs (mg/kg)	NE	NE

NOTES:

1. BASE PLAN TAKEN FROM '41–98 VERNON BOULEVARD SURVEY' DATED DECEMBER 22, 2015, CERTIFIED BY ROBERT FEHRINGER, NYS LAND SURVEYOR.
2. ALL ELEVATIONS SHOWN ARE IN THE USGS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND REPRESENT PRE–REMEDIATION CONDITIONS.
3. GRADE SURFACE ELEVATION SHOWN BY GRAY CONTOUR LINES.
4. SOIL SAMPLE ANALYTICAL RESULTS ARE COMPARED TO NYDEC PART 375 UNRESTRICTED USE SCOs (UU SCOs) AND RESTRICTED USE RESTRICTED–RESIDENTIAL SCOs (RURR USCOs). ANALYTE DETECTIONS BELOW UUSCOs ARE DENOTED AS NON–EXCEEDANCE (NE).
5. RESULTS THAT EXCEED UU SCOs ARE BOLDED. RESULTS THAT EXCEED RURR SCOs ARE BOLDED AND SHADED GRAY.
6. ALL ANALYTICAL RESULTS ARE PRESENTED IN MILLIGRAMS PER KILOGRAM (mg/kg).
7. VOC = VOLATILE ORGANIC COMPOUND
8. SVOC = SEMIVOLATILE ORGANIC COMPOUND
9. SOIL ANALYTICAL RESULTS SHOWN ARE REFERENCED FROM THE OCTOBER 2016 NYSDEC APPROVED RAWP FIGURE 4 – SOIL ANALYTICAL RESULTS MAP – VOCs AND SVOCs.

LEGEND:

- SILVERCUP WEST PROPERTY LINE
- TERRA COTTA PARCEL C BOUNDARY
- TERRA COTTA PARCEL BOUNDARY
- MW–1: LOCATION OF FORMER SHALLOW OVERBURDEN MONITORING WELL
- MW–1: LOCATION OF FORMER DEEP OVERBURDEN OR BEDROCK MONITORING WELL
- SB–1: LOCATION OF FORMER SOIL BORING
- SG–1: LOCATION OF FORMER SOIL VAPOR PROBE
- SS–1: LOCATION OF FORMER SURFACE SOIL SAMPLE
- TP–11: LOCATION OF FORMER TEST PIT
- B-301: LOCATION OF FORMER MUD ROTARY BORING
- TP–4A: LOCATION OF ELEVATED METALS VERTICAL DELINEATION SOIL BORING (MARCH 2016)
- TP–4.1: LOCATION OF ELEVATED METALS HORIZONTAL DELINEATION SOIL BORING (MARCH 2016)
- PMB–08: LOCATION OF PETROLEUM DELINEATION SOIL BORING (SEPTEMBER 2015)
- PMB–OW–01: LOCATION OF PETROLEUM DELINEATION SOIL BORING AND MONITORING WELL (SEPTEMBER 2015)
- EB–01: LOCATION OF WASTE CHARACTERIZATION SOIL BORING (MARCH 2016)
- BEP-06: BOTTOM DOCUMENTATION SAMPLE LOCATION
- SW-05: SIDEWALL DOCUMENTATION SAMPLE LOCATION

Sample Compound	Part 375 Unrestricted Use Soil Cleanup Objectives	Part 375 Restricted Use Restricted-Residential Soil Cleanup Objectives
SVOCs	mg/kg	mg/kg
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
Ideno (1,2,3-cd) pyrene	0.5	0.5

NE = No Exceedances

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.

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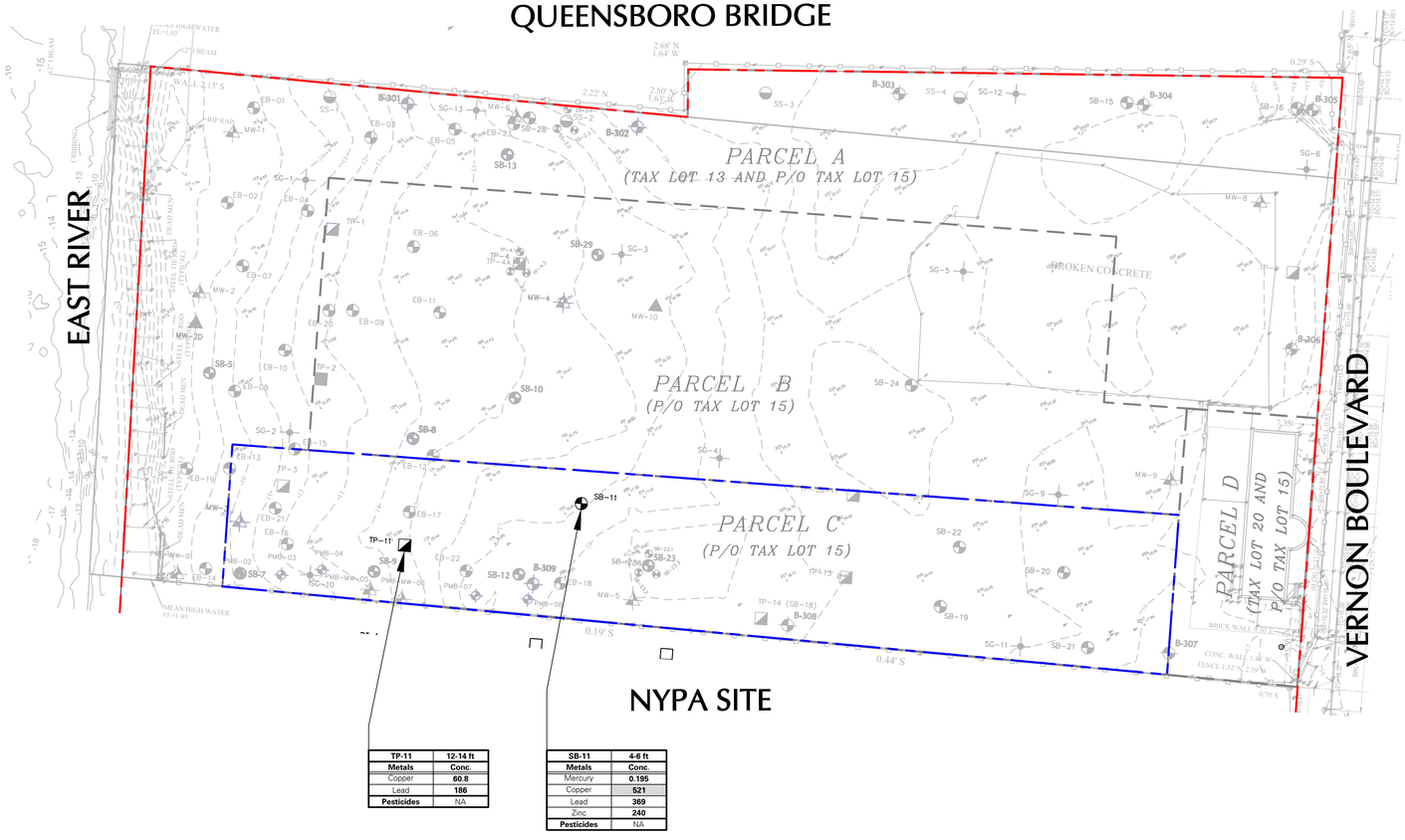
Collectively known as Langan

Project: SILVERCUP WEST
PARCEL C
BLOCK 477, LOT 15
QUEENS NEW YORK

Figure Title: REMAINING SOIL ANALYTICAL RESULTS MAP - VOCs & SVOCs

Project No.	Figure No.
5635005	6A
Date: 07/12/2017	
Scale: 1" = 30'	
Drawn By: ELS / Checked By: JG	
Submission Date: 09/19/2017	Sheet 6A of 8

Filename: \\langan.com\data\NYC\data0\5635005\Cadd Data – 5635005\Dwg\Terra Cotta RAWP Figures\REVISED RAWP Parcels A, B, C\07.12.2017 – SCW SMP Figure 6A – Remaining Soil Analytical Results Map – VOCs and SVOCs.dwg Date: 10/20/2017 Time: 14:23 User: nkung Style Table: Langan.stb Layout: Parcel C



TP-11	12-14 ft
Metals	**Conc.**
Copper	**60.8**
Lead	**186**
Pesticides	NA

SB-11	4-6 ft
Metals	**Conc.**
Mercury	**0.195**
Copper	**521**
Lead	**369**
Zinc	**240**
Pesticides	NA

NOTES:

1. BASE PLAN TAKEN FROM '41-98 VERNON BOULEVARD SURVEY' DATED DECEMBER 22, 2015, CERTIFIED BY ROBERT FEHRINGER, NYS LAND SURVEYOR.
2. ALL ELEVATIONS SHOWN ARE IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND REPRESENT PRE-EXACATION CONDITIONS.
3. GRADE SURFACE ELEVATION SHOWN BY GRAY CONTOUR LINES.
4. SOIL SAMPLE ANALYTICAL RESULTS ARE COMPARED TO NYDEC PART 375 UNRESTRICTED USE SCOs (UU SCOs) AND RESTRICTED USE RESTRICTED-RESIDENTIAL SCOs (RURR SCOs). ANALYTE DETECTIONS BELOW UU SCOs ARE DENOTED AS NON-EXCEEDANCE (NE). ANALYTES NOT SAMPLED ARE DENOTED AS NOT-ANALYZED (NA).
5. RESULTS THAT EXCEED UU SCOs ARE BOLDED. RESULTS THAT EXCEED RURR SCOs ARE BOLDED AND SHADED GRAY.
6. ALL ANALYTICAL RESULTS ARE PRESENTED IN MILLIGRAMS PER KILOGRAM (mg/kg).
7. SOIL ANALYTICAL RESULTS SHOWN ARE REFERENCED FROM THE OCTOBER 2016 NYSDEC APPROVED REMEDIAL ACTION WORK PLAN (RAWP) FIGURE 5 – SOIL ANALYTICAL RESULTS MAP – METALS AND PESTICIDES.

LEGEND:

- SILVERCUP WEST PROPERTY LINE
- TERRA COTTA PARCEL C BOUNDARY
- TERRA COTTA PARCEL BOUNDARY
- MW-1 / MW-1: LOCATION OF FORMER SHALLOW OVERBURDEN MONITORING WELL
- MW-1: LOCATION OF FORMER DEEP OVERBURDEN OR BEDROCK MONITORING WELL
- SB-11: LOCATION OF FORMER SOIL BORING
- SG-1: LOCATION OF FORMER SOIL VAPOR PROBE
- SS-1: LOCATION OF FORMER SURFACE SOIL SAMPLE
- TP-1: LOCATION OF FORMER TEST PIT
- B-301: LOCATION OF FORMER MUD ROTARY BORING
- SS-2A: LOCATION OF ELEVATED METALS VERTICAL DELINEATION SOIL BORING (MARCH 2016)
- SS-2A.1: LOCATION OF ELEVATED METALS HORIZONTAL DELINEATION SOIL BORING (MARCH 2016)
- PMB-08: LOCATION OF PETROLEUM DELINEATION SOIL BORING (SEPTEMBER 2015)
- PMB-OW-01: LOCATION OF PETROLEUM DELINEATION SOIL BORING AND MONITORING WELL (SEPTEMBER 2015)
- EB-01: LOCATION OF WASTE CHARACTERIZATION SOIL BORING (MARCH 2016)

Sample Compound	Part 375 Unrestricted Use Soil Cleanup Objectives	Part 375 Restricted Use Restricted-Residential Soil Cleanup Objectives
Metals	mg/kg	mg/kg
Copper	50	270
Lead	63	400
Mercury	0.18	0.81
Zinc	109	10,000

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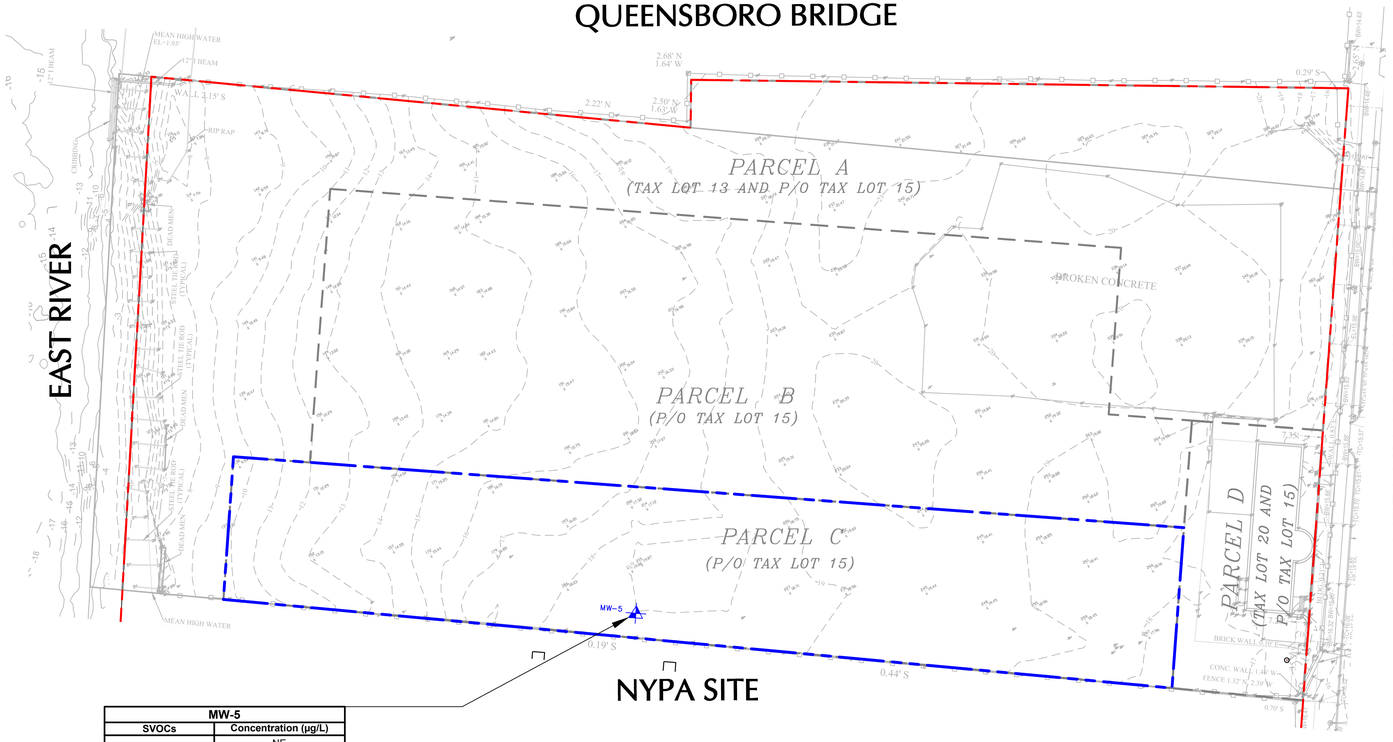
Collectively known as Langan

Project: SILVERCUP WEST
PARCEL C
BLOCK 477, LOT 15
QUEENS NEW YORK

Figure Title: REMAINING SOIL ANALYTICAL RESULTS MAP - METALS + PESTICIDES

Project No.	Figure No.
5635005	6B
Date: 07/13/2017	
Scale: 1" = 30'	
Drawn By: ELS / Checked By: JG	
Submission Date: 09/19/2017	Sheet 6B of 8



MW-5	
SVOCs	**Concentration (µg/L)**
	NE
VOCs	**Concentration (µg/L)**
	NE
Metals	**Concentration (mg/L)**
Antimony	0.0061
Manganese	3.75
Thallium	0.0074
PCBs	**Concentration (µg/L)**
	NE

NOTES:

1. BASE PLAN TAKEN FROM '41–98 VERNON BOULEVARD SURVEY' DATED DECEMBER 22, 2015, CERTIFIED BY ROBERT FEHRINGER, NYS LAND SURVEYOR.
2. ALL ELEVATIONS SHOWN ARE IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND REPRESENT PRE–REMEDIATION CONDITIONS.
3. GRADE SURFACE SHOWN BY GRAY CONTOUR LINES.
4. GROUNDWATER ANALYTICAL RESULTS ARE REFERENCED FROM THE REMEDIAL INVESTIGATION REPORT, DATED SEPTEMBER 2007, PREPARED BY LANGAN.
5. GROUNDWATER MONITORING WELLS WERE DECOMMISSIONED PER THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) POLICY CP–43 DURING IMPLEMENTATION OF THE NYSDEC APPROVED REMEDIAL ACTION WORK PLAN, DATED OCTOBER 2016.
6. GROUNDWATER ANALYTICAL RESULTS ARE COMPARED TO NYSDEC TECHNICAL AND OPERATIONAL GUIDANCE SERIES (TOGS) 1.1.1 AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES (SGVs) FOR CLASS GA WATER.
7. COMPOUNDS DETECTED ABOVE THEIR RESPECTIVE NYSDEC TOGS 1.1.1 SGVs ARE SHOWN.
8. mg/L = MILLIGRAMS PER LITER
9. µg/L = MICROGRAMS PER LITER
10. VOC = VOLATILE ORGANIC COMPOUND
11. SVOC = SEMIVOLATILE ORGANIC COMPOUND
12. PCB = POLYCHLORINATED BIPHENYL
13. NE = NO EXCEEDANCE

LEGEND:

- MW–5 — LOCATION OF FORMERSHALLOW OVERBURDEN MONITORING WELL
- PROPERTY BOUNDARY
- TERRA COTTA PARCEL C BOUNDARY
- TERRA COTTA PARCEL BOUNDARY

NYSDEC REFERENCE STANDARD FOR GROUNDWATER

NYSDEC TOGs 1.1.1 AWQS for Metals	
Metal	**Standard (mg/L)**
Antimony	0.003
Manganese	0.3
Thallium	0.0005

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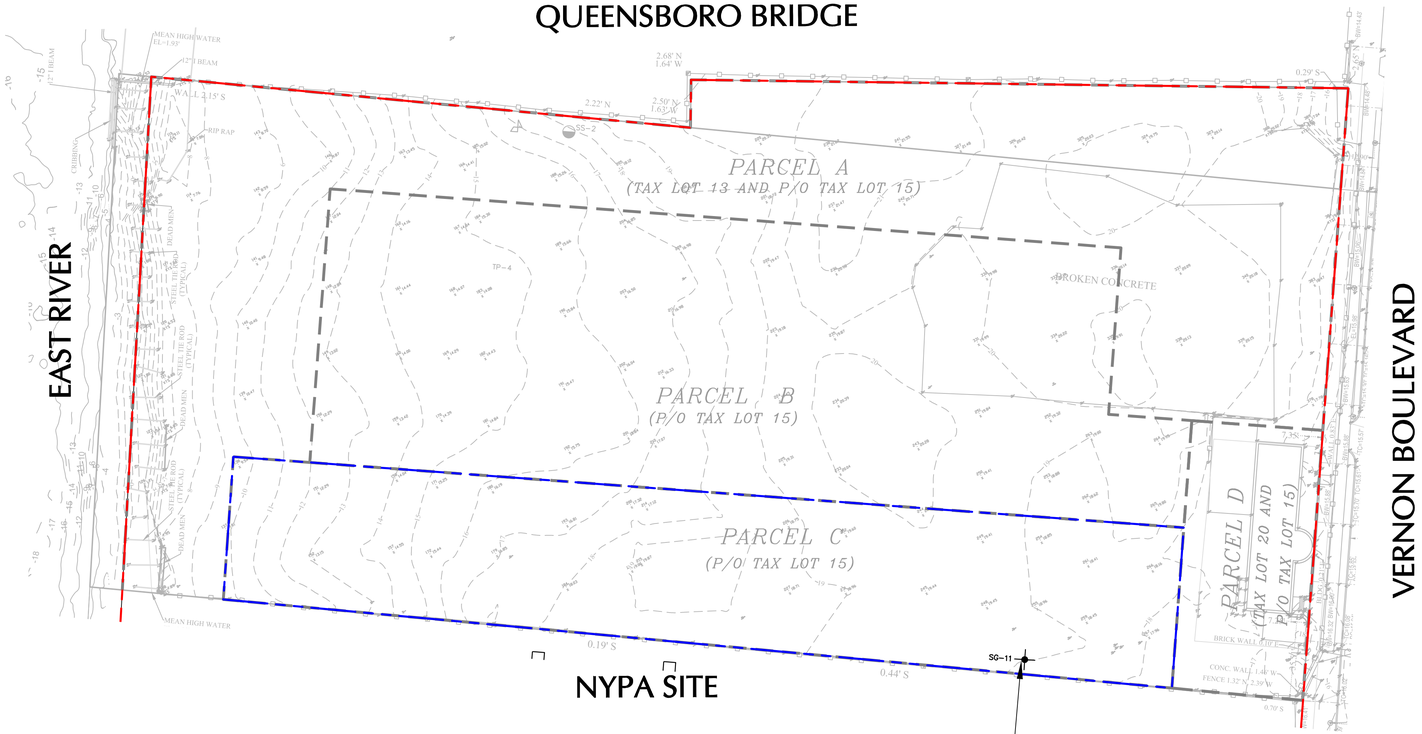
Project
SILVERCUP WEST
PARCEL C
BLOCK 477, LOT 15
QUEENS NEW YORK

Figure Title
REMAINING GROUNDWATER ANALYTICAL RESULTS MAP

Project No.	Figure No.
5635005	7
Date: 07/12/2017	
Scale: 1" = 30'	
Drawn By: ELS / Checked By: JG	
Submission Date: 09/19/2017	Sheet 7 of 8

Filename: \\langan.com\data\NYC\data0\5635005\Cadd Data – 5635005\Dwg\Terra Cotta RAWP Figures\REVISED RAWP Parcels A, B, C\07.28.2017 – SCW SMP Figure 7 – Remaining Groundwater Analytical Results Map.dwg Date: 10/18/2017 Time: 14:50 User: nkung Style Table: Langan.stb Layout: Parcel C



NOTES:

1. BASE PLAN TAKEN FROM '41–98 VERNON BOULEVARD SURVEY' DATED DECEMBER 22, 2015, CERTIFIED BY ROBERT FEHRINGER, NYS LAND SURVEYOR.
2. ALL ELEVATIONS SHOWN ARE IN THE USGS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND REPRESENT PRE–REMEDIATION CONDITIONS.
3. GRADE SURFACE SHOWN BY GRAY CONTOUR LINES.
4. SOIL VAPOR ANALYTICAL RESULTS ARE REFERENCED FROM THE REMEDIAL INVESTIGATION REPORT, DATED SEPTEMBER 2007, PREPARED BY LANGAN.
5. RESULTS SHOWN ARE DETECTIONS AND DO NOT REPRESENT EXCEEDANCES OF ANY REGULATORY REQUIREMENTS. NO REGULATORY REQUIREMENTS EXIST FOR SOIL VAPOR SAMPLES.
6. VOC = VOLATILE ORGANIC COMPOUND
7. $\mu g/m^3$ = MICROGRAM PER CUBIC METER

LEGEND:

- SG–11 — FORMER SOIL VAPOR SAMPLING LOCATION
- PROPERTY BOUNDARY
- TERRA COTTA PARCEL C BOUNDARY
- TERRA COTTA PARCEL BOUNDARY

SG-11	
Soil Vapor VOCs	**Concentration (ug/m^3)**
1,2,4-Trimethylbenzene	131.8
1,3,5-Trimethylbenzene	37.4
2-Butanone (MEK)	153.9
2-Hexanone (MBK)	61.5
4-Ethyltoluene	40.3
Acetone	1,860.9
Ethanol	77.1
Ethylbenzene	49.4
Isopropyl alcohol	28
m,p-Xylene	169.1
n-Heptane	19.3
o-Xylene	78.9
Propene	23.2
Tetrachloroethene	21.7
Tetrahydrofuran	9.1
Toluene	103.9

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Project	SILVERCUP WEST PARCEL C BLOCK 477, LOT 15 QUEENS NEW YORK
Figure Title	REMAINING SOIL VAPOR ANALYTICAL RESULTS MAP
Project No.	5635005
Figure No.	8
Date	07/12/2017
Scale	1" = 30'
Drawn By	ELS
Checked By	JG
Submission Date	09/19/2017
Sheet	8 of 8

Filename: \\langan.com\data\NYC\data0\5635005\Cadd Data – 5635005\Dwg\Terra Cotta RAWP Figures\REVISED RAWP Parcels A, B, C\08.02.2017 – SCW SMP Figure 8 – Remaining Soil Vapor Analytical Results Map.dwg Date: 10/18/2017 Time: 14:44 User: nkung Style Table: Langan.stb Layout: Parcel C

APPENDIX A
ENVIRONMENTAL EASEMENT

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

This page is part of the instrument. The City Register will rely on the information provided by you on this page for purposes of indexing this instrument.The information on this page will control for indexing purposes in the event of any conflict with the rest of the document.

2017092600026002001EA6BB

RECORDING AND ENDORSEMENT COVER PAGE **PAGE 1 OF 10**

Document ID: 2017092600026002 Document Date: 08-24-2017 Preparation Date: 10-03-2017
Document Type: EASEMENT
Document Page Count: 9

PRESENTER:
FIRST AMERICAN TITLE INSURANCE COMPANY
666 THIRD AVENUE-5TH FLOOR
3020-870924-CQ
NEW YORK, NY 10017
212-850-0670
CQUARTARARO@FIRSTAM.COM

RETURN TO:
SIVE, PAGET & RIESEL P.C.
560 LEXINGTON AVENUE
NEW YORK, NY 10022
ZACHARY KATZ

PROPERTY DATA

Borough	Block	Lot	Unit	Address
QUEENS	477	15	Entire Lot	42-02 VERNON BOULEVARD

Property Type: COMMERCIAL REAL ESTATE

CROSS REFERENCE DATA

CRFN_____ *or* DocumentID_____ *or* _____ Year_____ Reel____ Page_____ *or* File Number_____

PARTIES

GRANTOR/SELLER:
TERRA COTTA, LLC
42-22 22ND STREET
LONG ISLAND CITY , NY 11101

GRANTEE/BUYER:
PEOPLE OF THE STATE OF NEW YORK BY COMMISSIONER
DEPT OF ENVIRONMENTAL CONSERVATION , 625 BROADWAY
ALBANY , NY 12233

FEES AND TAXES

Mortgage :

Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	82.00
Affidavit Fee:	$	0.00

Filing Fee: $ 100.00
NYC Real Property Transfer Tax: $ 0.00
NYS Real Estate Transfer Tax: $ 0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 10-12-2017 14:32
City Register File No.(CRFN): **2017000376570**

City Register Official Signature

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 24th day of August, 2017, between Owner(s) Terra Cotta, LLC, having an office at 42-22 22nd Street, Long Island City, New York 11101, County of Queens, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 42-02 Vernon Boulevard in the City of New York, County of Queens and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 477 part of Lot 15 being a portion of the property conveyed to Grantor by deed dated September 15, 1999 and recorded in the Queens County Clerk's Office in Reel 5402, Page 2387. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.5843 +/- acres, and is hereinafter more fully described in the Land Title Survey dated March 23, 2017 prepared by Robert J. Fehringer, L.L.S. of Fehringer Surveying, P.C., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation

established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: A2-0560-0806 as amended May 12, 2017, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement")

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled

Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held

by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved b the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C241100
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Terra Cotta, LLC:

By: _____

Print Name: STUART M. SUNA

Title: MANAGING Member Date: 7/26/17

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Queens)

On the 20th day of July, in the year 20 17, before me, the undersigned, personally appeared Stuart M. Suna, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Carmen Villalona
Notary Public - State of New York

CARMEN VILLALONA NOTARY PUBLIC 01VI6336178 Westchester County COMMISSION EXPIRES JANUARY 25, 2020 STATE OF NEW YORK

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 24th day of August, in the year 2017, before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

COMMENCING at a point on the westerly side of Vernon Boulevard, distant 275.81 feet from the corner forming by the intersection of westerly side of Boulevard and northerly side of 43rd Avenue;

THENCE westerly along the line forming exterior angle of 88 degrees 55 minutes 35 seconds with westerly side of Vernon Boulevard 55.05 feet to the point or place of BEGINNING;

THENCE westerly along the line keeping same direction with last mentioned course 399.45 feet to a point;

THENCE northerly along the line forming an interior angle 91 degrees 17 minutes 2 seconds with last mentioned course 59.97 feet to a point;

THENCE easterly along the line forming an interior angle 89 degrees 47 minutes 23 seconds to 399.60 feet to a point;

THENCE southerly at right angles to the last mentioned course 67.46 feet to the point or place of BEGINNING.

Containing 25,451 square feet (0.5843 acres)

APPENDIX B
SITE CONTACT LIST

APPENDIX B – SITE CONTACT LIST

Project Contacts
For information about the Site, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):
Shaun Bollers
NYSDEC Region 2
Division of Environmental Remediation
47-20 21st Street
Long Island City, NY 11101
(718) 482-4096
shaun.bollers@dec.ny.gov

New York State Department of Health (NYSDOH):
Anthony Perretta
NYSDOH - BEEI
Empire State Plaza
Coming Tower, ESP Rm. 1787
Albany, New York 12237
(518) 402-7860
Email: beei@health.state.ny.gov

Program Manager:
Jason Hayes, P.E.
(212) 479-5427
jhayes@langan.com

Project Manager:
Joseph Good, P.E.
(212) 479-5448
jgood@langan.com

Owner Representative:
Mark Gold
(718) 906-2000
mgold@silvercupstudios.com

Document Repositories:

The document repositories identified below have been established to provide the public with convenient access to important project documents:

Queens Library - Court Square Branch
25-01 Jackson Avenue,
Long Island City
NY, 11101
Phone: 718-937-2790

Hours: Monday: 12 pm -7 pm
Tuesday: 1 pm -6 pm
Wednesday: 10 am to 6 pm
Thursday: 11 pm to 7 pm
Friday: 10 am to 6 pm
Saturday: closed.
Sunday: closed.

NYSDEC Region 2
47-20 21st Street
Long Island City, NY 11101
(718) 482-4608
Attn: Shaun Bollers

Queens Community Board 2
43-22 50th Street, Suite 2B
Woodside, NY 11377
(718) 533-8773
qn02@cb.nyc.gov

APPENDIX C
PREVIOUS ENVIRONMENTAL REPORTS

(CD)

APPENDIX D
AS BUILT DRAWINGS
AND SITE SURVEY

ALTA/NSPS LAND TITLE SURVEY

BLOCK: 477
LOT: 13, 15 & 20

LOT 13 AREA:
SQ. FT.: 8,572.5258
ACRES: 0.1960

LOT 15 & 20 AREA:
SQ. FT.: 110,281.812
ACRES: 2.532

TITLE NO. ST16-26830
EFFECTIVE DATE: MARCH 25, 2016

NOTES:

THERE ARE "0" MARKED PARKING STALLS ON THIS SITE.

THE ABOVE CAPTIONED PREMISES LIES WITHIN FLOOD ZONE "AE 10"
PANEL: 0089F COMMUNITY: 360497
EFFECTIVE DATE: SEPTEMBER 5, 2007

THE ABOVE CAPTIONED PREMISES HAS A "M1-5/R10" ZONING CLASSIFICATION

SITE HAS RECENTLY BEEN REGRADED , CONSTRUCTION ON SITE IN PROGRESS

NO OBSERVED WETLANDS DELINEATION MARKERS

BATHYMETRIC SURVEY OF EAST RIVER PROVIDED BY SEAVISION UNDERWATER SOLUTIONS, INC.

ALL ELEVATIONS ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

SURVEYOR'S CERTIFICATE

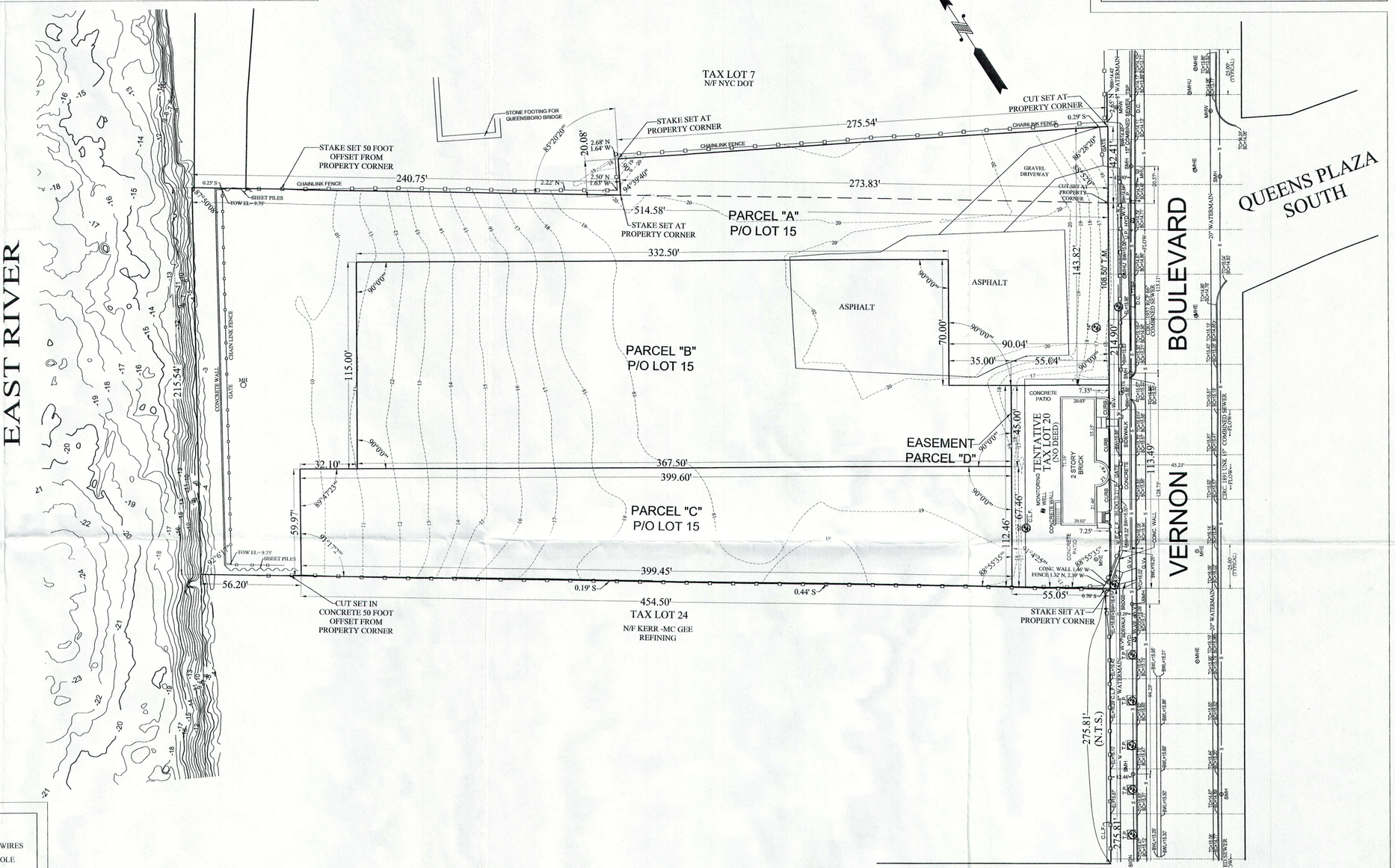
To:

1. Stewart Title Insurance Company
2. Terra Cotta, LLC
3. Wells Fargo Bank, National Association, its successors and/or assigns

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2016 Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes items 1, 2, 3, 4, 7(a), 7(b), 7(c), 8, 9, 10(a), 11, 13, 14, 16, 17, and 19 of Table A thereof. The field work was completed on June 26, 2017.

Date of Plat or Map: June 30, 2017

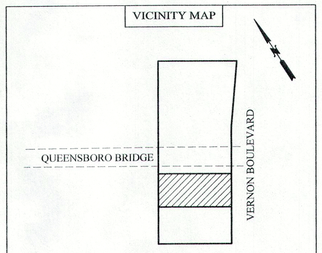
Robert Fehringer
New York State Licensed Land Surveyor
License No. 050001



LEGEND

P.A.	PLANTED AREA		TAX LOT
CON ED	CON ED MANHOLE COVER	OHW	OVERHEAD UTILITY WIRES
E	ELECTRIC MANHOLE COVER	U.P.	UTILITY COMPANY POLE
E E	UNDERGROUND ELECTRIC DUCTS		STREET LIGHT
W	DEPARTMENT OF WATER SUPPLY MANHOLE COVER	M.L.P.	METAL LIGHT POLE
		M.T.L.P.	METAL TRAFFIC LIGHT POLE
W W	WATER MAIN	T.S.P.	TRAFFIC SIGN POLE
S	SEWER MANHOLE COVER	HYD.	FIRE HYDRANT
S S	SANITARY SEWER	P.M.	PARKING METER
ST ST	STEAM MAIN		CATCH BASIN
W.G.	DEPARTMENT OF WATER SUPPLY WATER GATE	O.F.	OIL FILL
W.V.	WATER VALVE	T.P.	TREE PIT
G G	GAS MAIN	D/C	DROP CURB
G	GAS CO. MANHOLE	S.P.	STAND PIPE
G.V.	GAS VALVE	C.L.F.	CHAIN LINK FENCE
C.O.	CLEAN OUT MANHOLE COVER	W.I.F.	WROUGHT IRON FENCE
T	TELEPHONE MANHOLE COVER	W.S.F.	WOOD STOCKADE FENCE
T T	TELEPHONE LINES	P.R.F.	POST AND RAIL FENCE

VICINITY MAP



LEGAL DESCRIPTION

LOT 13
ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough and County of Queens, City and State of New York, bounded and described as follows:

BEGINNING at a point on the Northwesterly side of Vernon Boulevard distant 490.61 feet Northeasterly from the corner formed by the intersection of the Northwesterly side of Vernon Boulevard and the Northeasterly side of 43 Avenue:

RUNNING THENCE Northwesterly along an exterior angle of 91 degrees 08 minutes 00 seconds a distance of 273.83 feet;

THENCE Northeasterly along an interior angle of 94 degrees 39 minutes 40 seconds a distance of 20.08 feet;

THENCE Southeasterly at right angles to the last mentioned course 275.54 feet to the Northwesterly side of Vernon Boulevard;

THENCE Southwesterly along an interior angle of 86 degrees 28 minutes 20 seconds on the Northwesterly side of Vernon Boulevard 42.41 feet to the point or place of BEGINNING.

LOT 15 & 20
BEGINNING at a point on the westerly side of Vernon Boulevard distant 275.71 feet northerly from the corner formed by the intersection of the westerly side of Vernon Boulevard with the northerly side of 43rd Avenue

RUNNING THENCE westerly along a line forming an interior angle of 88 degrees 55 minutes 35 seconds with the westerly side of Vernon Boulevard 510.70 feet to the United States Pierhead and Bulkhead line approved June 1, 1893, and re-approved November 7, 1917

RUNNING THENCE northerly along said line which forms an interior angle of 92 degrees 06 minutes 17 seconds with the last mentioned course 215 feet to land now or formerly of Rogers;

RUNNING THENCE easterly along said land along a line forming an interior angle of 87 degrees 50 minutes 08 seconds with the last mentioned course 514.58 feet to the westerly side of Vernon Boulevard;

RUNNING THENCE southerly along the westerly side of Vernon Boulevard 214.90 feet to the point or place of BEGINNING.

UPDATED: JULY 25, 2017
UPDATED: JUNE 27, 2017

15.00' 30.00' 45.00' 90.00'
0 15 45 90 180

SCALE: 1 " = 30'

SURVEYED: APRIL 22, 2016

FS5-PC

SURVEY OF PROPERTY SITUATED IN:
41-98 VERNON BOULEVARD
BOROUGH OF QUEENS
COUNTY OF QUEENS
CITY OF NEW YORK
STATE OF NEW YORK

FEHRINGER SURVEYING, P.C.
ROBERT FEHRINGER
LICENSED LAND SURVEYOR
2200 JACKSON AVENUE
SEAFORD, N.Y. 11783
(516) 763 - 5515 FAX NO. (516) 763 - 5525

APPENDIX E
EXCAVATION WORK PLAN

APPENDIX E – EXCAVATION WORK PLAN

E-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the Site owner or their representative will notify the New York State Department of Environmental Conservation (NYSDEC). Currently, this notification will be made to:

Shaun Bollers
NYSDEC Project Manager
(718) 482-4608
shaun.bollers@dec.ny.gov

Jane O'Connell
NYSDEC Regional Office
(718) 482-4599
Jane.oconnell@dec.ny.gov

This notification will include:

- A detailed description of the proposed work. The description should include the location and aerial extent of the proposed work, plans for Site regrading, intrusive elements or utilities to be installed below the cover system, estimated volumes of contaminated soil to be excavated, and any work that may impact an engineering control;
- A summary of environmental conditions anticipated in the work areas, including the nature and anticipated concentration of contaminants of concern, potential presence of grossly-contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this Excavation Work Plan (EWP);
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
- The contractor's Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) will be updated and re-submitted, in electronic format, if it differs from the HASP provided in Appendix F of the Site Management Plan (SMP);
- Identification of disposal facilities for potential waste streams; and

- Identification of sources of any anticipated backfill, along with all required chemical testing results.

E-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based soil screening will be performed by a field engineer, scientist or geologist under the direct supervision of a New York State Professional Engineer (PE) or Qualified Environmental Professional (QEP) during all remedial and development excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the Certificate of Completion.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal, material that requires testing, material that can be returned to the subsurface, and material that can be used as cover soil.

E-3 SOIL STAGING METHODS

Soil stockpile areas, if needed for the different soil materials, will be constructed for staging of Site soil, pending loading or characterization testing. Separate stockpile areas will be constructed to avoid co-mingling materials of differing types. The excavated soil will be appropriately lined and securely covered. Stockpiles will be routinely inspected and broken sheeting covers will be promptly replaced.

Stockpiles will be covered upon reaching their capacity of approximately 1,000 cubic yards until ready for loading. Stockpiles that have not reached their capacity will be covered at the end of each workday. Active stockpiles will be covered at the end of each workday. Individual stockpiles will not exceed 1,000 cubic yards.

Each stockpile area will be encircled with silt fences and hay bales, as needed to contain and filter particulates from any rainwater that has drained off the soils, and to mitigate the potential for surface water run-off. Hay bales will be used as needed near catch basins and other discharge points. The stockpile areas will be inspected daily and after every storm event, and noted deficiencies will be promptly addressed.

E-4 MATERIALS EXCAVATION AND LOAD OUT

A field engineer, scientist or geologist under the direct supervision of a NYS PE or QEP will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and its contractors are solely responsible for safe execution of all invasive and other work performed under this EWP.

The presence of utilities and easements on the Site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements.

Loaded vehicles leaving the Site will be appropriately lined, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and New York State Department of Transportation (NYSDOT) requirements (and all other applicable transportation requirements). A truck wash will be operated on-site. The engineer, scientist or geologist will be responsible for documenting that all outbound truck tires and exterior carriage will be free from dirt and debris. Trucks will be cleaned or washed as required before leaving the Site until the activities performed under this section are complete. Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-site soil tracking.

The engineer, scientist or geologist will be responsible for documenting that all egress points for truck and equipment transport from the Site are clean of dirt and other materials derived from the Site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

E-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 New York Codes, Rules and Regulations (NYCRR) Part 360. Haulers will be appropriately licensed and trucks properly placarded.

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

All trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-site in accordance with appropriate local, State, and Federal regulations.

Truck traffic would be routed on the most direct course using major thoroughfares where possible and flaggers would be used to protect pedestrians at Site entrances and exits. Truck routes will take into account:

(a) limiting transport through residential areas and past sensitive sites;
(b) use of city mapped truck routes;
(c) prohibiting off-site queuing of trucks entering the facility, to the extent possible;
(d) limiting total distance to major highways;
(e) promoting safety in access to highways;
(f) overall safety in transport; and
(g) community input [where necessary].

Trucks will be prohibited from stopping and idling in the neighborhood outside of the Site. Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials. Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited to the extent possible.

E-6 MATERIALS DISPOSAL OFF-SITE

All soil/fill/solid waste excavated from below the clean backfill layer and removed from the Site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6 NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC for approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, concrete recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6 NYCRR Part 360-1.2. Material that does not meet Track 1 Unrestricted Use Soil Cleanup Objectives (SCO) is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

E-7 MATERIALS REUSE ON-SITE

Materials reuse on-site will not be permitted without NYSDEC approval. Pending NYSDEC approval, reused soil must be nonhazardous and meet the lower of 6 NYCRR 375-6(b) Restricted Residential or Protection of Groundwater SCOs in accordance with the predetermined beneficial use determination listed in 6 NYCRR § 360-1.15(b). The

Protection of Groundwater SCOs apply only to compounds or analytes detected in groundwater at concentrations that exceeded the Class GA Ambient Water Quality Standards (AWQS). If any of the waste materials specified are used by the Owner for an end use specified in Section 360-1.15(b), it will not be considered a solid waste. Material will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. Reuse of soil will be coordinated in advance with the NYSDEC case manager. Material deemed unfit for reuse will be transported for off-site disposal.

E-8 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including excavation dewatering and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface, but will be managed off-site, unless prior approval is obtained from the NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a State Pollution Discharge Elimination System permit.

E-9 COVER SYSTEM RESTORATION

After the completion of any invasive activities, the cover system will be restored in a manner that complies with the Remedial Action Work Plan (RAWP) and decision document. The demarcation layer, consisting of filter fabric material, will be replaced to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the Site Management Plan.

E-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the Site will be approved by the PE or QEP and will be in compliance with provisions in this SMP prior to receipt at 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. For soil sources, an environmental professional under the oversight of a QEP will collect representative samples at a frequency consistent with CP-51 / Soil Cleanup Guidance (Table 4). The samples would be analyzed for Part 375 volatile organic compounds ([VOC] EPA Method 8260), semivolatile organic compounds ([SVOC] EPA Method 8270), pesticides/ polychlorinated biphenyls ([PCB] EPA Method 8082/8081) and metals by an New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the Site.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, all imported soils will meet the soil quality standards listed in Table 1. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

E-11 STORMWATER POLLUTION PREVENTION

Erosion and sediment controls will be in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. A Stormwater Pollution Prevention Plan (SWPPP) is not necessary because stormwater discharge, as required, will be to a combined sewer in accordance with the New York City generic stormwater pollution discharge elimination system permit. Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. All 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 fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. 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. Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

E-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (Part 375 VOCs, SVOCs, metals, pesticides and PCBs), unless the Site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the periodic reports prepared pursuant to Section 7 of the SMP.

E-13 DUST, ODOR, AND VAPOR CONTROL/MONITORING PLAN

This dust, odor, and organic vapor control and monitoring plan was developed in accordance with the NYSDOH Generic Community Air Monitoring Plan (CAMP) and Occupation Safety and Health Administration (OSHA) standards for construction (29 CFR 1926). Continuous monitoring on the perimeter of the work zones for odor, VOCs, and dust will be required for all ground intrusive activities that involve contaminated materials such as Site remediation operations and handling activities. Two stationary air-monitoring stations will be set up at Site perimeters (one upwind and one downwind) during intrusive Site work for continuous monitoring. Each station will include a photoionization detector (PID) and a DustTrak aerosol monitor or equivalent. A PID will be used to monitor the work zone and for periodic monitoring for VOCs during activities such as soil sampling. Action levels for the protection of the community and visitors are set forth in the CAMP, which is included in the HASP (Appendix G to the SMP).

Work practices to minimize odors and vapors will be used during all intrusive activities. Offending odor and organic vapor controls may include the application of foam suppressants or tarps over the odor or VOC source areas. Foam suppressants may include biodegradable foams applied over the source material for short-term control of the odor and VOCs.

If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include the use of chemical odorants in spray or misting systems and the use of staff to monitor odors in surrounding neighborhoods.

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

APPENDIX F
HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

FOR

SILVERCUP WEST – PARCEL C
42-02 Vernon Boulevard
Long Island City, New York
Queens Tax Block 477, Lot 15

NYSDEC BCP No. C241100

Prepared For

Terra Cotta, LLC
42-22 22nd Road
Long Island City, New York 11101

Prepared By:

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

October 2017
Langan Project No. 5635005

LANGAN

TABLE OF CONTENTS

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LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

***** Items to be posted prominently on site, or made readily available to personnel.

1.0 INTRODUCTION

1.1 General

This Health and Safety Plan (HASP) was developed to address disturbance of known and reasonably anticipated subsurface contaminants and comply with Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.120(b) (4), *Hazardous Waste Operations and Emergency Response* during anticipated construction activities at the Silvercup West - Parcel C site, Block 477, Lot 15 ("Site"), in Long Island City, New York. This HASP provides the minimum requirements for implementing site operations during future construction and/ or monitoring activities. All contractors performing work on this Site shall implement their own health and safety plans that, at a minimum, adhere to this HASP. The contractor is solely responsible for their own health and safety and that of their subcontractors. Langan personnel will implement this HASP while on-site.

The management of the day-to-day site activities and implementation of this HASP in the field is the responsibility of the site Langan Field Team Leader (FTL). Assistance in the implementation of this HASP can also be obtained from the site Langan Health and Safety Officer (HSO) and the Langan Health and Safety Manager (HSM). Contractors operating on the Site shall designate their own FTL, HSO and HSM. The content of this HASP may change or undergo revision based upon additional information made available to health and safety personnel, monitoring results, or changes in the work plan.

1.2 Site Location and Background

The Site is located at 42-02 Vernon Boulevard (Block 477, Lot 15). The Site is bounded by the Silvercup West Parcel B (BCP Site No C241086) to the north, the Silvercup West Parcel A (BCP Site No. C241099) to the west, Silvercup West Parcel D (BCP Site No. C241101) to the east, and the New York Power Authority Power Generation site (NYPA – BCP Site No. C241109) to the south. The Site Location Map is included as Figure 1.

Based on available historical information, the Site was formerly occupied by several commercial/light industrial facilities, including the New York Architectural Terra Cotta Company Facility (from at least 1898 to sometime between 1915 and 1936), the Eastern Terra Cotta Company (1932), undefined plastic products manufacturing and electronics operations (1947), a warehouse (1970), and Pepsi Cola Company (1980).

The Site has been the subject of several investigations since a petroleum spill was observed from the Former Royal Petroleum Company oil terminal (the adjacent property to the south). Based on these previous investigations, on-site soil and groundwater have been impacted with petroleum, semi-volatile organic compounds (SVOCs), and metals. Remedial activities conducted at the Site have included removal of five underground storage tanks (USTs), removal

of approximately 1,200 gallons of spilled oil via recovery wells, and removal of approximately 1,800 tons of petroleum impacted material.

The objective of the Remedial Action (RA) was to remediate the Site in accordance with the NYSDEC approved Remedial Action Work Plan (RAWP). The remedial work included the following tasks and is discussed in more detail in the October 2016 RAWP:

- Excavation of grossly contaminated media and soil impacted with elevated levels of lead (as identified and delineated in previous investigations around boring SB-23) – Grossly contaminated media was excavated to one foot below the observed water table.
- Removal of underground storage tanks (UST), if encountered.
- Backfilling of excavated areas to development grade with Site material (excluding the targeted grossly contaminated media and elevated metals material), clean imported material meeting the soil quality requirements in Part 375-6.7(d)(ii)(b) (i.e., lower of Protection of Groundwater Soil Cleanup Objectives (SCO) or Restricted Residential SCOs), RCA or virgin crushed stone.
- Constructing Engineering Controls, which will include installation of a two-foot cap.
- Groundwater sampling for post-remediation monitoring purposes.

Following remediation of the Site, Institutional and Engineering (IC/EC) controls were implemented to prevent future contact with remaining subsurface soil contamination. A Site Management Plan (SMP) has been established to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. Any future work conducted pursuant to the SMP, including annual inspections, sampling (as necessary), and construction will be conducted in accordance with the procedures defined in this HASP.

1.3 Summary of Work Tasks

The general categories of work tasks being performed during implementation of the SMP may include:

1.3.3 Excavation and Soil Screening

Langan personnel will screen excavated material for visual, olfactory, and instrumental indicators suggestive of a potential chemical or petroleum release. Instrument screening for the presence of volatile organic compounds (VOCs) may be performed with a calibrated photoionization detector (PID). Contractors will excavate for utilities, foundation components and potential grading using heavy equipment and hand tools. Contractors will notify Langan personnel if they identify indications suggestive of a potential chemical or petroleum release. Contaminated material shall be handled and property disposed in accordance with federal, state and city regulations, criteria and guidelines.

1.3.4 Stockpiling

Potentially impacted soil may be stockpiled on-site prior to off-site disposal at a facility permitted to accept the material. Visibly contaminated soil, if encountered, shall be segregated and stockpiled on at least 10 millimeters of plastic sheeting; reusable soil and fill shall be segregated and stockpiled separately from unusable fill, concrete and other debris; the stockpiles shall be kept covered with 6 millimeters thick plastic sheeting; the plastic sheeting covering the stockpiles shall be anchored firmly in place by weights, stakes, or both; the Contractor shall maintain the plastic sheeting. If stockpile soil sampling is required from above ground level, suitable excavation equipment (i.e., excavator, front end loader) should be used to collect the sample.

1.3.5 Soil Sampling

Soil samples (waste characterization, excavation endpoint, delineation, or quality assurance/quality control [QA/QC]) will be collected during future construction, as required. Samples will be placed into laboratory-supplied batch-certified clean glassware and submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-certified laboratory.

1.3.6 Drum Sampling

Excess or impacted soil and water are to be drummed separately in approved 55-gallon sealed drums, as required. Each drum must be labeled in accordance with the Langan Drum Labeling Standard Operating Procedure (SOP-#9). Langan field personnel will collect drum samples, as required, during construction prior to off-site drum disposal. Samples will be placed into laboratory-supplied batch-certified clean glassware and submitted to a NYSDOH ELAP-certified laboratory.

1.3.7 Removal of Underground Storage Tanks

If encountered, the contractor shall furnish all labor and materials, equipment and incidentals required for the proper decontamination, removal and closure of any UST in accordance with federal, state and local regulations. Langan personnel will monitor VOCs with a calibrated PID downwind from the UST excavation and record the PID readings.

1.3.8 Groundwater Sampling

Groundwater samples (fingerprint analysis, water quality analysis, characterization, or quality assurance/quality control [QA/QC]) will be collected during future SMP activities, as required. Samples will be placed into laboratory-supplied batch-certified clean glassware and submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-certified laboratory.

2.0 IDENTIFICATION OF KEY PERSONNEL/HEALTH AND SAFETY PERSONNEL

The following briefly describes the health and safety (H&S) designations and general responsibilities that may be employed for this site. The titles have been established to accommodate the project needs and requirements and ensure the safe conduct of site activities. The H&S personnel requirements for a given work location are based upon the proposed site activities.

2.1 Langan Project Manager

The Langan Project Manager (PM) is Joseph Good. His responsibilities include:

- Ensuring that this HASP is developed and approved prior to on-site activities.
- Ensuring that all the tasks in the project are performed in a manner consistent with Langan's comprehensive *Health and Safety Program for Hazardous Waste Operations* and this HASP.

2.2 Langan Corporate Health and Safety Manager

The Langan Corporate Health and Safety Manager (HSM) is Tony Moffa. His responsibilities include:

- Updating the *Health and Safety Program for Hazardous Waste Operations*.
- Assisting the site Health and Safety Officer (HSO) with development of the HASP, updating HASP as dictated by changing conditions, jobsite inspection results, etc. and approving changes to this HASP.
- Assisting the HSO in the implementation of this HASP and conducting Jobsite Safety Inspections and assisting with communication of results and correction of shortcomings found.
- Maintaining records on personnel (medical evaluation results, training and certifications, accident investigation results, etc.).

2.3 Langan Site Health & Safety Officer

The Langan site HSO is William Bohrer. His responsibilities include:

- Participating in the development and implementation of this HASP.
- When on-site, assisting the Langan Field Team Leader in conducting Tailgate Safety Meetings and Jobsite Safety Inspections and correcting any shortcomings in a timely manner.
- Ensuring that proper personal protective equipment (PPE) is available, worn by employees and properly stored and maintained.

- Controlling entry into and exit from the site contaminated areas or zones.
- Monitoring employees for signs of stress, such as heat stress, fatigue, and cold exposure.
- Monitoring site hazards and conditions.
- Knowing (and ensuring that all site personnel also know) emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.
- Resolving conflicts that may arise concerning safety requirements and working conditions.
- Reporting all incidents, injuries and near misses to the Langan Incident/Injury Hotline immediately and the client representative.

2.4 Langan Field Team Leader Responsibilities

The Langan Field Team Leader (FTL) is to be determined prior to the start of construction activities. The Field Team Leader's responsibilities include:

- The management of the day-to-day site activities and implementation of this HASP in the field.
- Participating in and/or conducting Tailgate Safety Meetings and Jobsite Safety Inspections and correcting any shortcomings in a timely manner.
- When a Community Air Monitoring Operating Program (CAMP) is part of the scope, the FTL will set up and maintaining community air monitoring activities and instructing the responsible contractor to implement organic vapor or dust mitigation when necessary.
- Overseeing the implementation of activities specified in the work plan.

2.5 Contractor Responsibilities

The contractor shall develop and implement their own HASP for their employees, lower-tier subcontractors, and consultants. The contractor is solely responsible for their own health and safety and that of their subcontractors. Contractors operating on the Site shall designate their own FTL, HSO and HSM. The contractor's HASP will be at least as stringent as this Langan HASP. The contractor must be familiar with and abide by the requirements outlined in their own HASP. A contractor may elect to adopt Langan's HASP as its own provided that it has given written notification to Langan, but where Langan's HASP excludes provisions pertinent to the contractor's work (i.e., confined space entry); the contractor must provide written addendums to this HASP. Additionally, the contractor must:

- Ensure their employees are trained in the use of all appropriate PPE for the tasks

involved;

- Notify Langan of any hazardous material brought onto the job site or site related area, the hazards associated with the material, and must provide a material safety data sheet (MSDS) or safety data sheet (SDS) for the material;
- Have knowledge of, understand, and abide by all current federal, state, and local health and safety regulations pertinent to the work;
- Ensure their employees handling hazardous materials, if identified at the Site, have received current training in the appropriate levels of 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response* (HAZWOPER) if hazardous waste is identified at the Site;
- Ensure their employees handling hazardous materials, if identified at the Site, have been fit-tested within the year on the type respirator they will wear; and
- Ensure all air monitoring is in place pertaining to the health and safety of their employees as required by OSHA 1910.120; and
- All contractors must adherer to all federal, state, and local regulatory requirements.

3.0 TASK/OPERATION SAFETY AND HEALTH RISK ANALYSES

A Task-Hazard Analysis (Table 1) was completed for general construction hazards that may be encountered at the Site. Known and suspected chemical contaminant hazards that could be encountered during site operations are included in Table 2. A complete inventory of MSDS/SDS for chemical products used on site is included as Attachment E.

3.1 Specific Task Safety Analysis

3.1.1 Stockpiling

The stockpile should be graded to insure slope stability. When covering the stockpile, the cover installation should be completed without necessitating someone scaling the pile.

3.1.2 Soil Sampling

Sampling the pile requires the donning of chemical resistant gloves in addition to the standard PPE.

3.1.3 Drum Sampling

Langan personnel and contractors are not to move or opened any orphaned (unlabeled) drum found on the site without approval of the project manager.

3.1.4 Removal of Underground Storage Tank

If UST excavation and removal activity is initiated, Langan personnel will conduct air monitoring

for lower explosion limit (LEL) conditions within the UST excavation itself. This task is to be performed using calibrated air monitoring equipment designed to sound an audio alarm when atmospheric concentrations of VOC are within 10% of the LEL. In normal atmospheric oxygen concentrations, the LEL monitoring may be done with a Wheatstone bridge/catalytic bead type sensor (i.e. MultiRAE). However in oxygen depleted atmospheres (confined space), only an LEL designed to work in low oxygen environments may be used. Best practices require that the LEL monitoring unit be equipped with a long sniffer tube to allow the LEL unit to remain outside the UST excavation. Langan personnel are not to enter the UST excavation nor enter an excavated UST.

In addition to monitoring LEL, Langan personnel will monitor atmospheric VOC concentrations directly downwind of the UST excavation in accordance with standard CAMP procedures using calibrated air monitoring equipment.

3.1.5 Dewatering Treatment System

When required by a future work plan to sample water treatment discharge effluent, the Langan field staffer will don additional PPE including nitrile gloves and if necessary, facial and body splash protection. Samples should be collected from a ground level discharge point. A sample discharge point that is at an elevation above six feet must be accessible from a platform that meets OSHA fall protection standards (i.e. guardrail and toe rail). When fall protection is inadequate, Langan personnel must be don fall protection and be certified in its proper use.

3.2 Radiation Hazards

No radiation hazards are known or expected at the Site.

3.3 Physical Hazards

Physical hazards, which may be encountered during site operations for this project, are detailed in Table 1.

3.3.1 Explosion

No explosion hazards are expected for the scope of work at this site.

3.3.2 Heat Stress

The use of Level C protective equipment, or greater, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is 72^{O}F or above. Table 6 presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Refer to the Table 7 to assist in assessing when the risk for heat related illness is likely. To use this table, the ambient temperature and relative humidity must be obtained (a regional weather report should suffice). Heat stress monitoring should be

performed by the HSO or the FTL, who shall be able to recognize symptoms related to heat stress.

To monitor the workers, be familiar with the following heat-related disorders and their symptoms:

- **Heat Cramps:** Painful spasm of arm, leg or abdominal muscles, during or after work
- **Heat Exhaustion:** Headache, nausea, dizziness; cool, clammy, moist skin; heavy sweating; weak, fast pulse; shallow respiration, normal temperature
- **Heat Stroke**: Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. *This is a life threatening condition***.**

Do not permit a worker to wear a semi-permeable or impermeable garment when they are showing signs or symptoms of heat-related illness.

To monitor the worker, measure:

- **Heart rate:** Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same. If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third. A worker cannot return to work after a rest period until their heart rate is below 100 beats per minute.
- **Oral temperature:** Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking). If oral temperature exceeds 99.6^{o}F (37.6^{o}C), shorten the next work cycle by one-third without changing the rest period. A worker cannot return to work after a rest period until their oral temperature is below 99.6^{o}F. If oral temperature still exceeds 99.6^{o}F (37.6^{o}C) at the beginning of the next rest period, shorten the following cycle by one-third. Do not permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6^{o}F (38.1^{o}C).

Prevention of Heat Stress - Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules.
- Mandate work slowdowns as needed.

- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, id., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
    - Maintain water temperature 50^{o} to 60^{o}F (10^{o} to 16.6^{o}C).
    - Provide small disposal cups that hold about four ounces (0.1 liter).
    - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
    - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
    - Train workers to recognize the symptoms of heat related illness.

3.3.3 Cold-Related Illness

If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally called frostbite.

- **Hypothermia -** Hypothermia is defined as a decrease in the patient core temperature below 96^{o}F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interference with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include: shivering, apathy, listlessness, sleepiness, and unconsciousness.
- **Frostbite -** Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20^{o}F. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

Prevention of Cold-Related Illness - To prevent cold-related illness:

- Educate workers to recognize the symptoms of frostbite and hypothermia
- Identify and limit known risk factors:
- Assure the availability of enclosed, heated environment on or adjacent to the site.
- Assure the availability of dry changes of clothing.
- Assure the availability of warm drinks.
- Start (oral) temperature recording at the job site:
- At the FSO or Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status.
- At a worker's request.
- As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20^{O}F, or wind-chill less than 30^{O}F with precipitation).
- As a screening measure whenever anyone worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92^{O}F) cannot return to work for 48 hours.

3.3.4 Noise

Work activities during the proposed activities may be conducted at locations with high noise levels from the operation of equipment. Hearing protection will be used as necessary.

3.3.5 Hand and Power Tools

The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. All hand and power tools should be inspected for health and safety hazards prior to use. If deemed unserviceable/un-operable, notify supervisor and tag equipment out of service. Ground Fault Circuit Interrupters (GFCIs) are required for all power tools requiring direct electrical service.

3.3.6 Slips, Trips and Fall Hazards

Care should be exercised when walking at the site, especially when carrying equipment. The presence of surface debris, uneven surfaces, pits, facility equipment, and soil piles contribute to tripping hazards and fall hazards. To the extent possible, all hazards should be identified and marked on the Site, with hazards communicated to all workers in the area.

3.3.7 Utilities (Electrocution and Fire Hazards)

The possibility of encountering underground utilities poses fire, explosion, and electrocution hazards. All excavation work will be preceded by review of available utility drawings and by

notification of the subsurface work to the N.Y. One –Call–Center. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.

3.4 Biological Hazards

3.4.1 Animals

No animals are expected to be encountered during site operations.

3.4.2 Insects

Insects are not expected to be encountered during site operations.

3.5 Additional Safety Analysis

3.5.1 Presence of Non-Aqueous Phase Liquids (NAPL)

There is potential for exposure to NAPL at this site. Special care and PPE should be considered when NAPL is observed as NAPL is a typically flammable fluid and releases VOCs known to be toxic and/or carcinogenic. If NAPL is present in a monitoring well, vapors from the well casing may contaminate the work area breathing zone with concentrations of VOCs potentially exceeding health and safety action levels. In addition, all equipment used to monitor or sample NAPL (or ground water from wells containing NAPL) must be intrinsically safe. Equipment that directly contacts NAPL must also be resistant to organic solvents.

At a minimum, a PID should be used to monitor for VOCs when NAPL is observed. If NAPL is expected to be observed in an excavation or enclosed area, air monitoring must be started using calibrated air monitoring equipment designed to sound an audio alarm when atmospheric concentrations of VOC are within 10% of the LEL. In normal atmospheric oxygen concentrations, the LEL monitoring may be done with a Wheatstone bridge/catalytic bead type sensor (i.e. MultiRAE). However in oxygen depleted atmospheres (confined space), only an LEL designed to work in low oxygen environments may be used. Best practices require that the LEL monitoring unit be equipped with a long sniffer tube to allow the LEL unit to remain outside the UST excavation.

When NAPL is present, Langan field staffers are required to use disposable nitrile gloves at all times to prevent skin contact with contaminated materials. They should also consider having available a respirator and protective clothing (Tyvek® overalls), especially if NAPL is in abundance and there are high concentrations of VOCs.

All contaminated disposables including PPE and sampling equipment must be properly disposed of in labeled 55-gallong drums.

3.6 Job Safety Analysis

A Job Safety Analysis (JSA) is a process to identify existing and potential hazards associated

with each job or task so these hazards can be eliminated, controlled or minimized. A JSA will be performed at the beginning of each work day, and additionally whenever an employee begins a new task or moves to a new location. All JSAs must be developed and reviewed by all parties involved. A blank JSA form and documentation of completed JSAs are in Attachment G.

4.0 PERSONNEL TRAINING

4.1 Basic Training

Completion of an initial 40-hour HAZWOPER training program as detailed in OSHA's 29 CFR 1910.120(e) is required for all employees working on a site engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances, health hazards, or safety hazards as defined by 29 CFR 1910.120(a). Annual 8-hour refresher training is also required to maintain competencies to ensure a safe work environment. In addition to these training requirements, all employees must complete the OSHA 10 hour Construction Safety and Health training and supervisory personnel must also receive eight additional hours of specialized management training. Training records are maintained by the HSM.

4.2 Initial Site-Specific Training

Training will be provided to specifically address the activities, procedures, monitoring, and equipment for site operations at the beginning of each field mobilization and the beginning of each discrete phase of work. The training will include the site and facility layout, hazards, and emergency services at the site, and will detail all the provisions contained within this HASP. For a HAZWOPER operation, training on the site must be for a minimum of 3 days. Specific issues that will be addressed include the hazards described in Section 3.0.

4.3 Tailgate Safety Briefings

Before starting work each day or as needed, the Langan HSO will conduct a brief tailgate safety meeting to assist site personnel in conducting their activities safely. Tailgate meetings will be documented in Attachment H. Briefings will include the following:

- Work plan for the day;
- Review of safety information relevant to planned tasks and environmental conditions;
- New activities/task being conducted;
- Results of Jobsite Safety Inspection Checklist;
- Changes in work practices;
- Safe work practices; and

- Discussion and remedies for noted or observed deficiencies.

5.0 MEDICAL SURVEILLANCE

All personnel who will be performing field work involving potential exposure to toxic and hazardous substances (defined by 29 CFR 1910.120(a)) will be required to have passed an initial baseline medical examination, with follow-up medical exams thereafter, consistent with 29 CFR 1910.120(f). Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine.

Additionally, personnel who may be required to perform work while wearing a respirator must receive medical clearance as required under CFR 1910.134(e), *Respiratory Protection*. Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine. Results of medical evaluations are maintained by the HSM.

6.0 COMMUNITY AIR MONITORING PROGRAM

Community air monitoring may be conducted in compliance with the NYSDOH Generic CAMP outlined below:

Monitoring for dust and odors will be conducted during all ground intrusive activities by the FTL. Continuous monitoring on the perimeter of the work zones for odor, VOCs, and dust may be required for all ground intrusive activities such as soil excavation and handling activities. 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 for VOCs during activities such as soil and groundwater sampling and .soil excavation. The site perimeter will be monitored for fugitive dust emissions by visual observations as well as instrumentation measurements (if required). When required, particulate or dust will be monitored continuously with real-time field instrumentation that will meet, at a minimum, the performance standards from DER-10 Appendix 1B.

If VOC monitoring is required, the following actions will be taken based on VOC levels measured:

- If total VOC levels exceed 5 parts per million (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 hot 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 hot 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 hot zone, activities will be shutdown.

If dust monitoring with field instrumentation is required, the following actions will be taken based on instrumentation measurements:

- 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 area, 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 area.
- 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.

6.1 Vapor Emission Response Plan

This section applies if VOC monitoring is required. If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the hot zone, boring and well installation, and excavation activities will be halted or odor controls will be employed, and monitoring continued. When work shut-down occurs, downwind air monitoring as directed by the HSO or FTL will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

If the organic vapor level decreases below 5 ppm above background, sampling and boring and well installation can resume, provided:

- The organic vapor level 200 feet downwind of the hot zone or half the distance to the nearest residential or commercial structure, whichever is less, is below 1 ppm over background, and
- More frequent intervals of monitoring, as directed by the HSO or FTL, are conducted.

6.2 Major Vapor Emission

This section applies if VOC monitoring is required. If any organic levels greater than 5 ppm over

background are identified 200 feet downwind from the work site, or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted or odor controls must be implemented.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the hot zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If either of the following criteria is exceeded in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be implemented.

- Sustained organic vapor levels approaching 5 ppm above background for a period of more than 30 minutes, or
- Organic vapor levels greater than 5 ppm above background for any time period.

6.3 Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

- The local police authorities will immediately be contacted by the HSO or FTL and advised of the situation;
- Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the HSO or FTL; and
- All Emergency contacts will go into effect as appropriate.

6.4 Dust Suppression Techniques

Preventative measures for dust generation may include wetting site fill and soil, construction of an engineered construction entrance with gravel pad, a truck wash area, covering soils with tarps, and limiting vehicle speeds to five miles per hour.

Work practices to minimize odors and vapors include limiting the time that the excavations remain open, minimizing stockpiling of contaminated-source soil, and minimizing the handling of contaminated material. Offending odor and organic vapor controls may include the application of foam suppressants or tarps over the odor or VOC source areas. Foam suppressants may include biodegradable foams applied over the source material for short-term control of the odor and VOCs.

If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: direct load-out of soils to trucks for off-Site disposal; use of chemical

odorants in spray or misting systems; and, use of staff to monitor odors in surrounding neighborhoods.

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

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 Levels of Protection

Langan will provide PPE to Langan employees to protect them from the specific hazards they are likely to encounter on-site. Direct hired contractors will provide their employees with equivalent PPE to protect them from the specific hazards likely to be encountered on-site. Selection of the appropriate PPE must take into consideration: (1) identification of the hazards or suspected hazards; (2) potential exposure routes; and, (3) the performance of the PPE construction (materials and seams) in providing a barrier to these hazards.

Based on anticipated site conditions and the proposed work activities to be performed at the site, Level D protection will be used. The upgrading/downgrading of the level of protection will be based on continuous air monitoring results as described in Section 6.0 (when applicable). The decision to modify standard PPE will be made by the site HSO or FTL after conferring with the PM. The levels of protection are described below.

Level D Protection (as needed)

- Safety glasses with side shields or chemical splash goggles
- Safety boots/shoes
- Coveralls (Tyvek® or equivalent)
- Hard hat
- Long sleeve work shirt and work pants
- Nitrile gloves
- Hearing protection
- Reflective safety vest

Level C Protection (as needed)

- Full or Half face, air-purifying respirator, with NIOSH approved HEPA filter
- Inner (latex) and outer (nitrile) chemical-resistant gloves
- Safety glasses with side shields or chemical splash goggles
- Chemical-resistant safety boots/shoes
- Hard hat
- Long sleeve work shirt and work pants
- Coveralls (Tyvek® or equivalent)
- Hearing protection (as needed)
- Reflective safety vest

The action levels used in determining the necessary levels of respiratory protection and upgrading to Level C are summarized in Table 4. The written Respiratory Protection Program is maintained by the HSM and is available if needed. The monitoring procedures and equipment are outlined in Section 6.0 (when applicable).

7.2 Respirator Fit-Test

All Langan employees who may be exposed to hazardous substances at the work site are in possession of a full or half face-piece, air-purifying respirator and have been successfully fit-tested within the past year. Fit-test records are maintained by the HSM.

8.0 SITE CONTROL

8.1 Site Communications Plan

Verbal communications will be the primary method of communication used at the site during the remedial action/remedial investigation and routine groundwater monitoring work. Cell phones shall be used to the extent practical. In the instances where verbal communication cannot be used, such as when working in respiratory protective equipment, hand signals will be used. Hand signals will be covered during site-specific training. Hand signals and their messages:

Hand Signal	Meaning
Hand gripping throat	Out of air; cannot breathe
Grip partners wrists or place both hands around waist	Leave immediately without debate
Hands on top of head	Need assistance
Thumbs up	OK; I'm alright; I understand

Thumbs down	No; negative
Simulated "stick" break with fists	Take a break; stop work

8.2 Work Zones

The need to formally establish specific work zones (Support, Contamination Reduction, and Exclusion Zones) during site activities will be determined by the HSO or FTL. It is important for the safety of all concerned that appropriate barriers (cones, wooden horses, plastic fencing etc.) are in place to keep vehicles and pedestrians away from the Work Zone.

8.2.1 Exclusion Zone

Exclusion zone or hot zones will be established within a 25 foot radius around drilling and sampling activities involving hazardous materials, where applicable and feasible. All personnel within the hot zone must don the appropriate levels of personal protection as set forth by the HSO. It is not anticipated that Level C or higher will be required for this site.

All personnel within the hot zone will be required to use the specified level of protection. No food, drink, or smoking will be allowed in the hot or warm zones.

8.2.2 Contamination Reduction Zone

If PID VOC concentration action levels are exceeded or obvious indications of contamination (by sight or odor) are encountered, a contamination reduction zone or warm zone will be established and utilized during the field activities. This zone will be established between the hot zone and the cold zone (discussed below), and will include the personnel and equipment necessary for decontamination of equipment and personnel exiting the hot zone. Personnel and equipment in the hot zone must pass through this zone before entering the cold zone. This zone should always be located upwind of the hot zone.

8.2.3 Support Zone

The support zone or cold zone will include the remaining areas of the job site. Break areas and support facilities (include equipment storage and maintenance areas) will be located in this zone. No equipment or personnel will be permitted to enter the cold zone from the hot zone without passing through the decontamination station in the warm zone (if necessitated). Eating, smoking, and drinking will be allowed only in this area.

8.3 The Buddy System

When working in teams of two or more, workers will use the "buddy system" for all work activities to ensure that rapid assistance can be provided in the event of an emergency. This requires work groups to be organized such that workers can remain close together and maintain visual contact with one another. Workers using the "buddy system" have the following responsibilities:

- Provide his/her partner with assistance.
- Observe his/her partner for signs of chemical or heat exposure.
- Periodically check the integrity of his/her partner's PPE.
- Notify the HSO or other site personnel if emergency service is needed.

9.0 NEAREST MEDICAL ASSISTANCE

The address and telephone number of the nearest hospital:

Mount Sinai Hospital

25-10 30th Avenue

Long Island City, NY

718-932-1000

Map with directions to the hospital are shown in Figure 2. This information will either be posted prominently at the site or will be available to all personnel all of the time. Further, all field personnel, including the HSO & FTL, will know the directions to the hospital.

10.0 STANDING ORDERS/SAFE WORK PRACTICES

The standing orders, which consist of a description of safe work practices that must always be followed while on-site by Langan employees and contractors, are shown in Attachment A. The site HSO and FTL each have the responsibility for enforcing these practices. The standing orders will be posted prominently at the site, or are made available to all personnel at all times. Those who do not abide by these safe work practices will be removed from the site.

11.0 SITE SECURITY

No unauthorized personnel shall be permitted access to the work areas.

12.0 UNDERGROUND UTILITIES

As provided in Langan's Underground Utility Clearance Guidelines, the following safe work practices should be followed by Langan personnel and the contractor before and during subsurface work in accordance with federal, state and local regulations:

- Obtain available utility drawings from the property owner/client or operator.
- Provide utility drawings to the project team.
- In the field, mark the proposed area of subsurface disturbance (when possible).
- Ensure that the utility clearance system has been notified.
- Ensure that utilities are marked before beginning subsurface work.

- Discuss subsurface work locations with the owner/client and contractors.
- Obtain approval from the owner/client and operators for proposed subsurface work locations.
- Use safe digging procedures when applicable.
- Stay at least 10 feet from all equipment performing subsurface work.

13.0 SITE SAFETY INSPECTION

The Langan HSO or alternate will check the work area daily, at the beginning and end of each work shift or more frequently to ensure safe work conditions. The HSO or alternate must complete the Jobsite Safety Inspection Checklist, found in Attachment F. Any deficiencies shall be shared with the FTL, HSM and PM and will be discussed at the daily tailgate meeting.

14.0 HAND AND POWER TOOLS

All hand- and electric-power tools and similar equipment shall be maintained in a safe operating condition. All electric-power tools must be inspected before initial use. Damaged tools shall be removed immediately from service or repaired. Tools shall be used only for the purpose for which they were designed. All users must be properly trained in their safe operation.

15.0 DECONTAMINATION PLAN

15.1 General

All personnel, equipment, and samples leaving the contaminated area of the site must be decontaminated. Decontamination for this operation is achieved through physical removal and chemical detoxification/disinfection/sterilization. The first step in decontamination, however, is prevention and standard operating procedures have been established meant to minimize contact with wastes:

- Work habits that minimize contact with wastes are stressed.
- Disposable equipment, where appropriate, will be used.

15.2 Decontamination Procedures

Standard decontamination procedures will be used as described in Attachment B.

15.3 Disposal of Decontamination Wastes

Waste solutions generated during decontamination procedures shall be contained, collected, and stored in drums or other appropriate containers and labeled for proper off-site disposal.

16.0 EMERGENCY RESPONSE

16.1 General

Due to hazards that may be present at the site and the conditions under which operations are conducted, it is possible that an emergency situation may develop. Emergency situations can be characterized as injury or acute chemical exposure to personnel, fire or explosion, environmental release, or hazardous weather conditions.

16.2 Responsibilities

Site Emergency Coordinator - The HSO, or his/her alternate, will serve as the Site Emergency Coordinator and shall implement emergency procedures whenever conditions warrant such action. The Site Emergency Coordinator will be responsible for assuring the evacuation, emergency treatment, emergency transport of site personnel, and notification of emergency units and the appropriate management staff. Emergency response instructions will be provided by the HSO as part of every employee's training prior to the start of work.

Employees - All employees at the site will be familiar with emergency response procedures for this work location.

16.3 Evacuation

In the event of an emergency situation, an air horn or vehicle horn will be sounded three times indicating the initiation of evacuation procedures. Loud voice command, if appropriate, can be used. All personnel will evacuate and assemble at the site entrance. No one, except the emergency responders, will be allowed to proceed into the area once the emergency signal has been given. The Site Emergency Coordinator will ensure that access for emergency equipment is provided and that all sources of combustion (e.g., operating machinery, etc.) have been shut down once the alarm has been sounded. Wind direction will be taken into consideration for evacuation plans. Evacuation plans will be discussed at the initial Site-Specific Training and as needed at the regular safety briefings.

In all situations, when an on-site emergency results in an evacuation, personnel shall not re-enter until:

- The conditions resulting in the emergency have been corrected.
- The hazards have been reassessed.
- This HASP has been reviewed.
- Site personnel have been briefed on any changes to this HASP.

16.4 Emergency Contacts/Notification System

The fire department and other emergency response groups will be notified by telephone of the emergency as soon as possible. An emergency telephone numbers list is presented as Table 5

in this HASP. This list will either be posted prominently at the site or will be made readily available to all personnel all of the time.

16.5 Emergency Medical Treatment

Personnel Injury - In case of injury to personnel, the HSO or his/her alternate will immediately administer emergency first aid. The ambulance/rescue squad will also be contacted as necessary. Some situations may require transport of the injured parties by automobile. Therefore, maps/directions to the nearest hospital are provided as Figure 2. Figure 2 will either be posted at the site, or will be made readily available to all personnel all of the time.

Personnel Exposure – Emergency first aid procedures to be followed are:

- **Skin Contact:** Use copious amounts of soap and water. Wash/rinse affected areas thoroughly, and then provide appropriate medical attention. Rinse eyes with water for at least 15 minutes.
- **Inhalation:** Move to fresh air and/or, if necessary decontaminate and transport to emergency medical facility.
- **Ingestion:** Decontaminate and transport to emergency medical facility.
- **Puncture/Laceration**: Decontaminate, if possible, and transport to emergency medical facility.

16.6 Fire or Explosion

Appropriate fire extinguishers will be made available at the site for trained personnel to use on insipient stage fires without endangering the safety and health of those nearby. If the use of fire extinguishers will not extinguish the fire, immediately notify the fire department, sound the evacuation signal, and then evacuate the area, assembling at the site entrance to be accounted for and to receive further instruction.

16.7 Spills/Leaks

Control or stop the spread of minor chemical spills or contamination by utilizing the appropriate materials (absorbents, etc.), if possible. If the release is significant, or highly hazardous, immediately notify the appropriate response groups, sound the evacuation signal, evacuate the area, and assemble at the site entrance to be accounted for and to receive further instruction.

16.8 Adverse Weather Conditions

In the event of severe weather (rain, snow, sleet, heat, etc.), conditions will be assessed on site to determine if the work can proceed safely. If it is determined that the weather poses a significant hazard, site operations will be stopped and rescheduled. Some of the items to be considered prior to determining if work should continue include:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions including thunder storms. When thunderstorms do occur, work is to cease immediately while personnel seek shelter. Work cannot resume until 30 minutes after the last thunder clap.
- Limited visibility.

16.9 Underground Utilities

In the event a utility is encountered or disturbed during subsurface work, follow these procedures:

- Immediately stop work;
- Leave the work area and retreat to a safe area;
- Call 911, if necessary;
- Contact the client representative and owner and operator of the property; and
- Immediately notify the Langan PM, HSC and Langan Incident/Injury Hotline.

16.10 Documentation

Immediately following an incident or near miss, unless emergency medical treatment is required, either the employee or a coworker must contact the Langan Incident/Injury Hotline at 1-(800)-9-LANGAN (ext. #4699) and the client representative to report the incident or near miss. For emergencies involving personnel injury and/or exposure, the HSO and affected employee will complete and submit an Employee Exposure/Injury Incident Report (Attachment C) to the Langan Corporate Health and Safety Manager as soon as possible following the incident.

17.0 CONFINED SPACE ENTRY

Confined spaces are not anticipated at the Site during planned construction activities. If confined spaces are identified, the contractor must implement their own confined space program that all applicable federal, state and local regulations. Confined spaces **will not** be entered by Langan personnel.

18.0 HASP ACKNOWLEDGEMENT FORM

All Langan field personnel and contractors will sign this HASP Compliance Agreement indicating that they have become familiar with this HASP and that they understand it and agree to abide by it.

Printed Name	Signature	Company	Date

TABLES

TABLE 1
TASK HAZARD ANALYSES

Task	Hazard	Description	Control Measures	First Aid
1.3.1 – 1.3.7	Contaminated Soil or Groundwater-Dermal Contact	Contaminated water spills on skin, splashes in eyes; contact with contaminated soil/fill during construction activities or sampling.	Wear proper PPE; follow safe practices, maintain safe distance from construction activities	See Table 2, seek medical attention as required
1.3.1 – 1.3.7	Lacerations, abrasions, punctures	Cutting bailer twine, pump tubing, acetate liners, etc. with knife; cuts from sharp site objects or previously cut piles, tanks, etc.; Using tools in tight spaces	Wear proper PPE; follow safe practices	Clean wound, apply pressure and/or bandages; seek medical attention as required.
1.3.1 – 1.3.7	Contaminated Media Inhalation	Opening drums, tanks, wells; vapors for non-aqueous phase liquids or other contaminated site media; dust inhalation during excavation; vapor accumulation in excavation	Follow air monitoring plan; have quick access to respirator, do not move or open unlabeled drums found at the site, maintain safe distance from construction activities	See Table 2, seek medical attention as required
1.3.1 – 1.3.7	Lifting	Improper lifting/carrying of equipment and materials causing strains	Follow safe lifting techniques; Langan employees are not to carry contractor equipment or materials	Rest, ice, compression, elevation; seek medical attention as required
1.3.1 – 1.3.7	Slips, trips, and falls	Slips, trips and falls due to uneven surfaces, cords, steep slopes, debris and equipment in work areas	Good housekeeping at site; constant awareness and focus on the task; avoid climbing on stockpiles; maintain safe distance from construction activities and excavations; avoid elevated areas over six feet unless fully accredited in fall protection and wearing an approved fall protection safety apparatus	Rest, ice, compression, elevation; seek medical attention as required
1.3.1 – 1.3.7	Noise	Excavation equipment, hand tools, drilling equipment.	Wear hearing protection; maintain safe distance from construction activities	Seek medical attention as required
1.3.1 – 1.3.7	Falling objects	Soil material, tools, etc. dropping from drill rigs, front-end loaders, etc.	Hard hats to be worn at all times while in work zones; maintain safe distance from construction activities and excavations	Seek medical attention as required

Task	Hazard	Description	Control Measures	First Aid
1.3.1 – 1.3.6	Underground/ overhead utilities	Excavation equipment, drill rig auger makes contact with underground object; boom touches overhead utility	"One Call" before dig; follow safe practices; confirm utility locations with contractor; wear proper PPE; maintain safe distance from construction activities and excavations	Seek medical attention as required
1.3.1 – 1.3.7	Insects (bees, wasps, hornet, mosquitoes, and spider)	Sings, bites	Insect Repellent; wear proper protective clothing (work boots, socks and light colored pants);field personnel who may have insect allergies (e.g., bee sting) should provide this information to the HSO or FSO prior to commencing work, and will have allergy medication on Site.	Seek medical attention as required
1.3.1 – 1.3.7	Vehicle traffic / Heavy Equipment Operation	Vehicles unable to see workers on site, operation of heavy equipment in tight spaces, equipment failure, malfunctioning alarms	Wear proper PPE, especially visibility vest; use a buddy system to look for traffic; rope off area of work with cones and caution tape or devices at points of hazard, maintain safe distance from construction activities and equipment	Seek medical attention as required

TABLE 2
CONTAMINANT HAZARDS OF CONCERN

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	1,2,4-Trimethylbenzene	95-63-6	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	1,1-Dichloroethane Asymmetrical dichloroethane Ethylidene chloride 1,1-Ethylidene dichloride	75-34-3	PID	100 ppm 3000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the skin; central nervous system depression; liver, kidney, lung damage	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	1,2-Dichlorobenzene	95-50-1	PID	50 ppm 200 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eye, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	p-Diethylbenzene 1,4-Diethyl benzene	105-05-5	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, respiratory system; skin burns; in animals: central nervous system depression	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	2-Butanone, Ethyl methyl ketone MEK Methyl acetone Methyl ethyl ketone	78-93-3	PID	200 ppm 3000 ppm	Soil Groundwater Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.6	2-Methylnaphthalene β-methylnaphthalene	91-57-6	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion or skin absorption, eye contact	irritation to the skin, eyes, mucous membranes and upper respiratory tract. It may also cause headaches, nausea, vomiting, diarrhea, anemia, jaundice, euphoria, dermatitis, visual disturbances, convulsions and comatose	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Acenaphthene 1,2-Dihydroacenaphthylene 1,8-Ethylenenaphthalene peri-Ethylenenaphthalene Naphthyleneethylene Tricyclododecapentaene	83-32-9	PID	NA NA	Soil	inhalation, ingestion, skin and/or eye contact,	irritation to the skin, eyes, mucous membranes and upper respiratory tract; If ingested, it can cause vomiting	Eye: Irrigate immediately Skin: Soap wash immediately, if redness or irritation develop, seek medical attention immediately Breathing: Move to fresh air Swallow: do not induce vomiting, seek medical attention immediately
1.3.1 – 1.3.6	Acenaphthylene Cycopental(de)naphthalene, Acenaphthalene	208-96-8	PID	NA NA	Soil	inhalation, ingestion, skin and/or eye contact	irritation to the skin, eyes, mucous membranes and upper respiratory tract	Eye: Irrigate immediately, seek medical attention immediately, Skin: Soap wash immediately, if redness or irritation develop, seek medical attention immediately Breathing: Move to fresh air Swallow: do not induce vomiting, seek medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Acetone Dimethyl ketone Ketone propane 2-Propanone	67-64-1	PID	1000 ppm 2500 ppm	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Anthracene	120-12-7	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to the skin, eyes, mucous membranes and upper respiratory tract, abdominal pain if ingested.	Eye: Irrigate immediately, seek medical attention immediately, Skin: Soap wash immediately, Breathing: Move to fresh air, refer to medical attention; Swallow: refer to medical attention
1.3.1 – 1.3.6	Benzene Benzol Phenyl hydride	71-43-2	PID	3.19 mg/m^3 1,595 mg/mg^3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; lassitude (weakness, exhaustion) [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Benzo(a)anthracene Benzanthracene Benzanthrene 1,2-Benzanthracene Benzo[b]phenanthrene Tetraphene	56-55-3	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	dermatitis, bronchitis, [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Benzo(a)pyrene	50-32-8	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	dermatitis, bronchitis, [potential occupational carcinogen]	Eye: Irrigate immediately, seek medical attention Skin: Soap wash immediately; Breathing: move to fresh air; Swallow: Induce vomiting if conscious, seek medical attention immediately
1.3.1 – 1.3.6	Benzo(b)fluoranthene	205-99-2	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Benzo(ghi)perylene	191-24-2	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	NA	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.6	Benzo(k)fluoranthene	207-08-9	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.6	Carbon disulfide Carbon bisulfide	75-15-0	PID	20 ppm 500 ppm	Soil Groundwater Vapor	inhalation, skin or eye contact, ingestion	irritation to the eyes, skin, respiratory system	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Chloroform Methane trichloride Trichloromethane	67-66-3	None	50 ppm 500 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Chrysene Benzo[a]phenanthrene 1,2-Benzphenanthrene	218-01-9	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eye, skin, and respiratory, gastrointestinal irritation nausea, vomit, diarrhea [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	1,2-Dichloroethylene 1,2-DCE mixture of cis and trans Acetylene dichloride cis-Acetylene dichloride trans-Acetylene dichloride sym-Dichloroethylene cis- 1,2-Dichloroethene	540-59-0	PID	200 ppm 1000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, respiratory system; central nervous system depression	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Dioxane Diethylene dioxide Diethylene ether Dioxan p-Dioxane 1,4-Dioxane	123-91-1	PID	100 ppm 500 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; drowsiness, headache; nausea, vomiting; liver damage; kidney failure; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Water wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	m-Cresol 3-methylphenol meta-Cresol 3-Cresol m-Cresylic acid 1-Hydroxy-3-methylbenzene 3-Hydroxytoluene 3-Methyl phenol	108-39-4	PID	5 ppm 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irreg rapid resp, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	o-Cresol ortho-Cresol 2-Cresol o-Cresylic acid 1-Hydroxy-2-methylbenzene 2-Hydroxytoluene 2-Methyl phenol	95-48-7	PID	5 ppm 250 pppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, respiratory failure; dyspnea (breathing difficulty), irregular rapid respiration, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Cyclohexane Benzene hexahydride Hexahydrobenzene Hexamethylene Hexanaphthene	110-82-7	PID	300 ppm 1300 ppm	Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, respiratory system; drowsiness; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Dibenzo(a,h)anthracene	53-70-3	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eyes, skin, respiratory, and digestion [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support PID Swallow: Medical attention immediately
1.3.1 – 1.3.6	Dibenzofuran	132-64-9	None	NA NA	Soil	inhalation, absorption	irritation to eyes, and skin	Eyes: Irrigate immediately Skin: Soap wash promptly.
1.3.1 – 1.3.6	DDT 4,4-DDT p,p'-DDT Dichlorodiphenyltrichloroethane 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane	50-29-3	None	1 mg/m^3 500 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Ethylbenzene Ethylbenzol Phenylethane	100-40-4	PID	435 mg/m^3 3,472 mg/m^3	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Ethylene dichloride 1,2-Dichloroethane Ethylene chloride Glycol dichloride	107-06-2	PID	1 ppm 50 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin absorption, skin and/or eye contact	irritation to the eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Fluoranthene Benzo(j, k)fluorene	206-44-0	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Fluorene	86-73-7	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.6	Hexachlorobenzene Perchlorobenzene Pentachlorophenylchloride Benzene hexachloride Phenyl perchloryl HCB BHC	118-74-1	NA	NA NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	Irritating to eyes, skin and mucous membranes Prolonged periods of ingestion may cause cutaneous porphyria	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Indeno[1,2,3-cd]pyrene	193-39-5	None	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eyes, skin, respiratory, and digestion [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support Swallow: Medical attention immediately, wash mouth with water

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Methyl cyclohexane Hexahydrotoluene Cyclohexylmethane Toluene hexahydride	108-87-2	PID	500 ppm 1200 ppm	Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, drowsiness; in animals: narcosis	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Naphthalene Naphthalin Tar camphor White tar	91-20-3	PID	50 mg/m^3 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; hematuria (blood in the urine); dermatitis, optical neuritis	Eye: Irrigate immediately Skin: Molten flush immediately/solid-liquid soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Phenanthrene	85-01-8	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Pyrene benzo[def]phenanthrene	129-00-0	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.6	Phenol Carbolic acid Hydroxybenzene, Monohydroxybenzene Phenyl alcohol Phenyl hydroxide	108-95-2	PID	5 ppm 250 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; anorexia, weight loss; lassitude (weakness, exhaustion), muscle ache, pain; dark urine, skin burns; dermatitis; tremor, convulsions, twitching	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Pentachlorophenol PCP; Penta; 2,3,4,5,6-Pentachlorophenol	87-86-5	PID	0.5 mg/m^3 2.5 mg/m^3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; sneezing, cough; lassitude (weakness, exhaustion), anorexia, weight loss; sweating; headache, dizziness; nausea, vomiting; dyspnea (breathing difficulty), chest pain; high fever; dermatitis	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	1,1′-Biphenyl, Biphenyl, Phenyl benzene Diphenyl	92-52-4	None	1 mg/m^3 100 mg/m^3	Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, throat; headache, nausea, lassitude (weakness, exhaustion), numb limbs; liver damage	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	sec Butylbenzene	135-98-8	PID	10 ppm 100 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; inhalation: nausea or vomiting	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Toluene Methyl benzene Methyl benzol Phenyl methane Toluol	108-88-3	PID	200 ppm 500 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, paresthesia; dermatitis	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Vinyl Chloride Chloroethene Chloroethylen Ethylene monochloride Monochloroethene Monochloroethylene VC Vinyl chloride monomer (VCM)	75-01-4	PID	1 ppm NA	Groundwater Soil Vapor	inhalation, skin and/or eye contact (liquid)	lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
1.3.1 – 1.3.6	1,2-Dichloroethylene Acetylene dichloride cis-Acetylene dichloride trans-Acetylene dichloride sym-Dichloroethylene trans-1, 2-Dichlorethene	540-59-0	PID	200 ppm 1000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, respiratory system; central nervous system depression	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Vinylidene chloride 1,1-DCE 1,1-Dichloroethene 1,1-Dichloroethylene VDC Vinylidene chloride monomer Vinylidene dichloride	75-35-4	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Total PCBs Chlorodiphenyl (42% chlorine) Aroclor® 1242 PCB Polychlorinated biphenyl	53469-21-9	None	0.5 mg/m^3 5 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, chloracne	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	o-Xylene 1,2-Dimethylbenzene ortho-Xylene o-Xylol	95-47-6	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	m-Xylene 1,3-Dimethylbenzene m-Xylol Metaxylene	108-38-3	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	p-Xylene 1,4-Dimethylbenzene para-Xylene p-Xylol	106-42-3	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Xylenes Dimethylbenzene Xylol	1330-20-7	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Gasoline	8006-61-9	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Fuel Oil No. 2	68476-30-2	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Diesel Fuel automotive diesel fuel oil No. 2 distillate diesoline diesel oil diesel oil light diesel oil No. 1-D summer diesel	68334-30-5	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Fuel Oil No. 4	68476-31-3	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Fuel Oil 6	64741-62-4	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Aluminum	7429-90-5	None	0.5 mg/m3 50 mg/m3	Soil	inhalation, skin and/or eye contact	irritation to the eyes, skin, respiratory system	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.6	Antimony	7440-36-0	None	0.5 mg/m^3 50 mg/m^3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation skin, possible dermatitis; respirtory distress; diarrhea; muscle tremor, convulsions; possible gastrointestinal tract	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Arsenic	NA	None	0.5 mg/m^3 NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation skin, possible dermatitis; respiratory distress; diarrhea; muscle tremor, convulsions; possible gastrointestinal tract	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Barium	10022-31-8	None	0.5 mg/m^3 50 mg/m^3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Beryllium	7440-41-7	None	0.002 mg/m^3 4 mg/m^3	Soil	inhalation, skin and/or eye contact	berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation to the eyes; dermatitis; [potential occupational carcinogen]	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.6	Calcium	7440-70-2	None	NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, upper respiratory tract; ulcer, perforation nasal septum; pneumonitis; dermatitis	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Chromium Hexavalent- Trivalent-	7440-47-3	None	1.0 mg/m^3 250 mg/m^3	Groundwater Soil	inhalation absorption ingestion	irritation to eye, skin, and respiratory	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Cobalt	7440-48-4	None	0.1mg/m^3 20 mg/m^3	Soil	inhalation, ingestion, skin and/or eye contact	Cough, dyspnea (breathing difficulty), wheezing, decreased pulmonary function; weight loss; dermatitis; diffuse nodular fibrosis; respiratory hypersensitivity, asthma	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Copper	7440-50-8	None	1.0 mg/m^3 100 mg/m^3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, nose, metallic taste; dermatitis; anemia	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Cyanide	57-12-5	None	5 mg/m^3 25 mg/m^3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	Exposure to cyanide can cause weakness, headaches, confusion, dizziness, fatigue, anxiety, sleepiness, nausea and vomiting. Breathing can speed up then become slow and gasping. Coma and convulsions also occur. If large amounts of cyanide have been absorbed by the body, the person usually collapses and death can occur very quickly. Long-term exposure to lower levels of cyanide can cause skin and nose irritation, itching, rashes and thyroid changes.	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Iron	7439-89-6	None	10 mg/m^3 NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; abdominal pain, diarrhea, vomiting	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Lead	7439-92-1	None	0.050 mg/m^3 100 mg/m^3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation to the eyes; hypertension	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Manganese	7439-96-5	None	5 mg/m^3 500 mg/m^3	Groundwater Soil	inhalation, ingestion	aerosol is irritating to the respiratory tract	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Magnesium	7439-95-4	None	15 mg/m^3 NA	Soil	inhalation, skin and/or eye contact	irritation to the eyes, skin, respiratory system; cough	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.6	Mercury	7439-97-6	None	0.1 mg/m^3 10 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Nickel	7440-02-0	None	NA 10 mg/m^3	Groundwater Soil	ion, ingestion, skin and/or eye contact	sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Potassium	7440-09-7	None	NA NA	Soil	inhalation, skin absorption, ingestion, skin and/or eye contact inhalation, ingestion, skin and/or eye contact	eye: Causes eye burns. Skin: Causes skin burns. Reacts with moisture in the skin to form potassium hydroxide and hydrogen with much heat. ingestion: Causes gastrointestinal tract burns. inhalation: May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Causes chemical burns to the respiratory tract; inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema.	Eyes: Get medical aid immediately Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. ingestion: If victim is conscious and alert, give 2-4 full cups of milk or water. Get medical aid immediately. inhalation: Get medical aid immediately.

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Selenium	7782-49-2	None	1 mg/m^3 0.2 mg/m^3	Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; in animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Sodium	7440-23-5	None	NA NA	Groundwater Soil	ion, ingestion, skin and/or eye contact	sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.6	Vanadium	7440-62-2	None	0.1 mg/m3 15 mg/m3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri-neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.6	Zinc	7440-62-2	None	15 mg/m^3 500 mg/m^3	Groundwater Soil	inhalation	chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function	Breathing: Respiratory support
1.3.1 – 1.3.6	Non-Flammable Gas Mixture CALGAS (Equipment Calibration Gas : Oxygen Methane Hydrogen Sulfide Carbon Monoxide Nitrogen	 7782-44-7 74-82-8 7783-08-4 830-08-0 7727-37-9	Multi-Gas PID	 NA/NA NA/NA 10/100 ppm 50/1200 ppm NA/NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support
1.3.1 – 1.3.6	Helium	7440-59-7	Helium Detector	NA NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support
1.3.1 – 1.3.6	Potassium hydrogen phthalate	877-24-7	NA	NA NA	NA	skin absorption, ingestion, skin and/or eye contact	nausea, diarrhea, abdominal pain, vomiting;	Skin: Water flush promptly Swallow: Medical attention immediately
1.3.1 – 1.3.6	Non-Flammable Gas Mixture CALGAS (Equipment Calibration Gas : Oxygen Isobutylene Nitrogen	 7782-44-7 115-11-7 7727-37-9	PID	 NA/NA NA/NA NA/NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support

EXPLANATION OF ABBREVIATIONS

PID = Photoionization Detector
PEL = Permissible Exposure Limit (8-hour Time Weighted Average)
IDLH = Immediately Dangerous to Life and Health
ppm = part per million
mg/m^3 = milligrams per cubic meter
500 mg/m3

TABLE 3
Summary of Monitoring Equipment

Instrument	Operation Parameters
Photoionization Detector (PID)	**Hazard Monitored:** Many organic and some inorganic gases and vapors. **Application:** Detects total concentration of many organic and some inorganic gases and vapors. Some identification of compounds is possible if more than one probe is measured. **Detection Method:** Ionizes molecules using UV radiation; produces a current that is proportional to the number of ions. **General Care/Maintenance:** Recharge or replace battery. Regularly clean lamp window. Regularly clean and maintain the instrument and accessories. **Typical Operating Time:** 10 hours. 5 hours with strip chart recorder.
Oxygen Meter	**Hazard Monitored:** Oxygen (O_2). **Application:** Measures the percentage of O_2 in the air. **Detection Method:** Uses an electrochemical sensor to measure the partial pressure of O_2 in the air, and converts the reading to O_2 concentration. **General Care/Maintenance:** Replace detector cell according to manufacturer's recommendations. Recharge or replace batteries prior to explanation of the specified interval. If the ambient air is less than 0.5% C O_2, replace the detector cell frequently. **Typical Operating Time:** 8 – 12 hours.
Additional equipment (if needed, based on site conditions)	
Combustible Gas Indicator (CGI)	**Hazard Monitored:** Combustible gases and vapors. **Application:** Measures the concentration of combustible gas or vapor. **Detection Method:** A filament, usually made of platinum, is heated by burning the combustible gas or vapor. The increase in heat is measured. Gases and vapors are ionized in a flame. A current is produced in proportion to the number of carbon atoms present. **General Care/Maintenance:** Recharge or replace battery. Calibrate immediately before use. **Typical Operating Time:** Can be used for as long as the battery lasts, or for the recommended interval between calibrations, whichever is less.
Flame Ionization Detector (FID) with Gas Chromatography Option *(i.e., Foxboro Organic Vapor Analyzer (OVA))*	**Hazard Monitored:** Many organic gases and vapors (approved areas only). **Application:** In survey mode, detects the concentration of many organic gases and vapors. In gas chromatography (GC) mode, identifies and measures specific compounds. In survey mode, all the organic compounds are ionized and detected at the same time. In GC mode, volatile species are separated. **General Care/Maintenance:** Recharge or replace battery. Monitor fuel and/or combustion air supply gauges. Perform routine maintenance as described in the manual. Check for leaks. **Typical Operating Time:** 8 hours; 3 hours with strip chart recorder.

Instrument	Operation Parameters
Potable Infrared (IR) Spectrophotometer	**Hazard Monitored:** Many gases and vapors. **Application:** Measures concentration of many gases and vapors in air. Designed to quantify one or two component mixtures. **Detection Method:** Passes different frequencies of IR through the sample. The frequencies absorbed are specific for each compound. **General Care/Maintenance:** As specified by the manufacturer.
Direct Reading Colorimetric Indicator Tube	**Hazard Monitored:** Specific gas and vapors. **Application:** Measures concentration of specific gases and vapors. **Detection Method:** The compound reacts with the indicator chemical in the tube, producing a stain whose length or color change is proportional to the compound's concentration. **General Care/Maintenance:** Do not use a previously opened tube even if the indicator chemical is not stained. Check pump for leaks before and after use. Refrigerate before use to maintain a shelf life of about 2 years. Check expiration dates of tubes. Calibrate pump volume at least quarterly. Avoid rough handling which may cause channeling.
Aerosol Monitor	**Hazard Monitored:** Airborne particulate (dust, mist, fume) concentrations **Application:** Measures total concentration of semi-volatile organic compounds, PCBs, and metals. **Detection Method:** Based on light-scattering properties of particulate matter. Using an internal pump, air sample is drawn into the sensing volume where near infrared light scattering is used to detect particles. **General Care/Maintenance:** As specified by the mfr. Also, the instrument must be calibrated with particulates of a size and refractive index similar to those to be measured in the ambient air.
Monitox	**Hazard Monitored:** Gases and vapors. **Application:** Measures specific gases and vapors. **Detection Method:** Electrochemical sensor relatively specific for the chemical species in question. **General Care/Maintenance:** Moisten sponge before use; check the function switch; change the battery when needed.
Gamma Radiation Survey Instrument	**Hazard Monitored:** Gamma Radiation. **Application:** Environmental radiation monitor. **Detection Method:** Scintillation detector. **General Care/Maintenance:** Must be calibrated annually at a specialized facility. **Typical Operating Time:** Can be used for as long as the battery lasts, or for the recommended interval between calibrations, whichever is less.

TABLE 4
INSTRUMENTATION ACTION LEVELS

Photoionization Detector Action Levels	**Action Required**
Background to 5 ppm	No respirator; no further action required
> 1 ppm but < 5 ppm for > 5 minutes	1. Temporarily discontinue all activities and evaluate potential causes of the excessive readings. If these levels persist and cannot be mitigated (i.e., by slowing drilling or excavation activities), contact HSO to review conditions and determine source and appropriate response action. 2. If PID readings remain above 1 ppm, temporarily discontinue work and upgrade to Level C protection. 3. If sustained PID readings fall below 1 ppm, downgrading to Level D protection may be permitted.
> 5 ppm but < 150 ppm for > 5 minutes	1. Discontinue all work; all workers shall move to an area upwind of the jobsite. 2. Evaluate potential causes of the excessive readings and allow work area to vent until VOC concentrations fall below 5 ppm. 3. Level C protection will continue to be used until PID readings fall below 1 ppm.
> 150 ppm	Evacuate the work area

Notes:
1. 1 ppm level based on OSHA Permissible Exposure Limit (PEL) for benzene.
2. 5 ppm level based on OSHA Short Term Exposure Limit (STEL) maximum exposure for benzene for any 15 minute period.
3. 150 ppm level based on NIOSH Immediately Dangerous to Life and Health (IDLH) for tetrachloroethylene.

TABLE 5
EMERGENCY NOTIFICATION LIST

ORGANIZATION	CONTACT	TELEPHONE
Local Police Department	NYPD	911
Local Fire Department	NYFD	911
Ambulance/Rescue Squad	NYFD	911
Hospital	Mount Sinai Hospital	911 or 718-932-1000
Langan Incident / Injury Hotline		800-952-6426 ex 4699
Langan Project Manager	Joseph Good	847-971-1972 (cell)
Langan Health and Safety Manager (HSM)	Tony Moffa	215-756-2523 (cell)
Langan Health & Safety Officer (HSO)	William Bohrer	410-984-3068 (cell)
Langan Field Team Leader (FTL)	To Be Determined	
Client	Josh Sager	516-661-6906 (cell)
National Response Center (NRC)		800-424-8802
Chemical Transportation Emergency Center (Chemtrec)		800-424-9300
Center for Disease Control (CDC)		404-639-3534
EPA (RCRA Superfund Hotline)		800-424-9346
TSCA Hotline		202-554-1404
Poison Control Center		800-222-1222

Immediately following an incident or near miss, unless emergency medical treatment is required, either the employee or a coworker must contact the Langan Incident/Injury Hotline at 1-(800)-9-LANGAN (ext. #4699).

TABLE 6
SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING
FOR FIT AND ACCLIMATED WORKERS[A]

Adjusted Temperature[b]	Normal Work Ensemble[c]	Impermeable Ensemble
90°F or above (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°F (30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

a For work levels of 250 kilocalories/hour.

b Calculate the adjusted air temperature (ta adj) by using this equation: ta adj ^{o}F = ta ^{o}F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

c A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

TABLE 7

HEAT INDEX

	ENVIRONMENTAL TEMPERATURE (Fahrenheit)										
	70	**75**	**80**	**85**	**90**	**95**	**100**	**105**	**110**	**115**	**120**
RELATIVE HUMIDITY	**APPARENT TEMPERATURE***										
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	**130**
30%	67	73	78	84	90	96	104	113	123	**135**	**148**
40%	68	74	79	86	93	101	110	123	**137**	**151**	
50%	69	75	81	88	96	107	120	**135**	**150**		
60%	70	76	82	90	100	114	**132**	**149**			
70%	70	77	85	93	106	124	**144**				
80%	71	78	86	97	113	**136**					
90%	71	79	88	102	122						
100%	72	80	91	108							

*Combined Index of Heat and Humidity...what it "feels like" to the body
Source: National Oceanic and Atmospheric Administration

How to use Heat Index:
1. Across top locate Environmental Temperature
2. Down left side locate Relative Humidity
3. Follow across and down to find Apparent Temperature
4. Determine Heat Stress Risk on chart at right

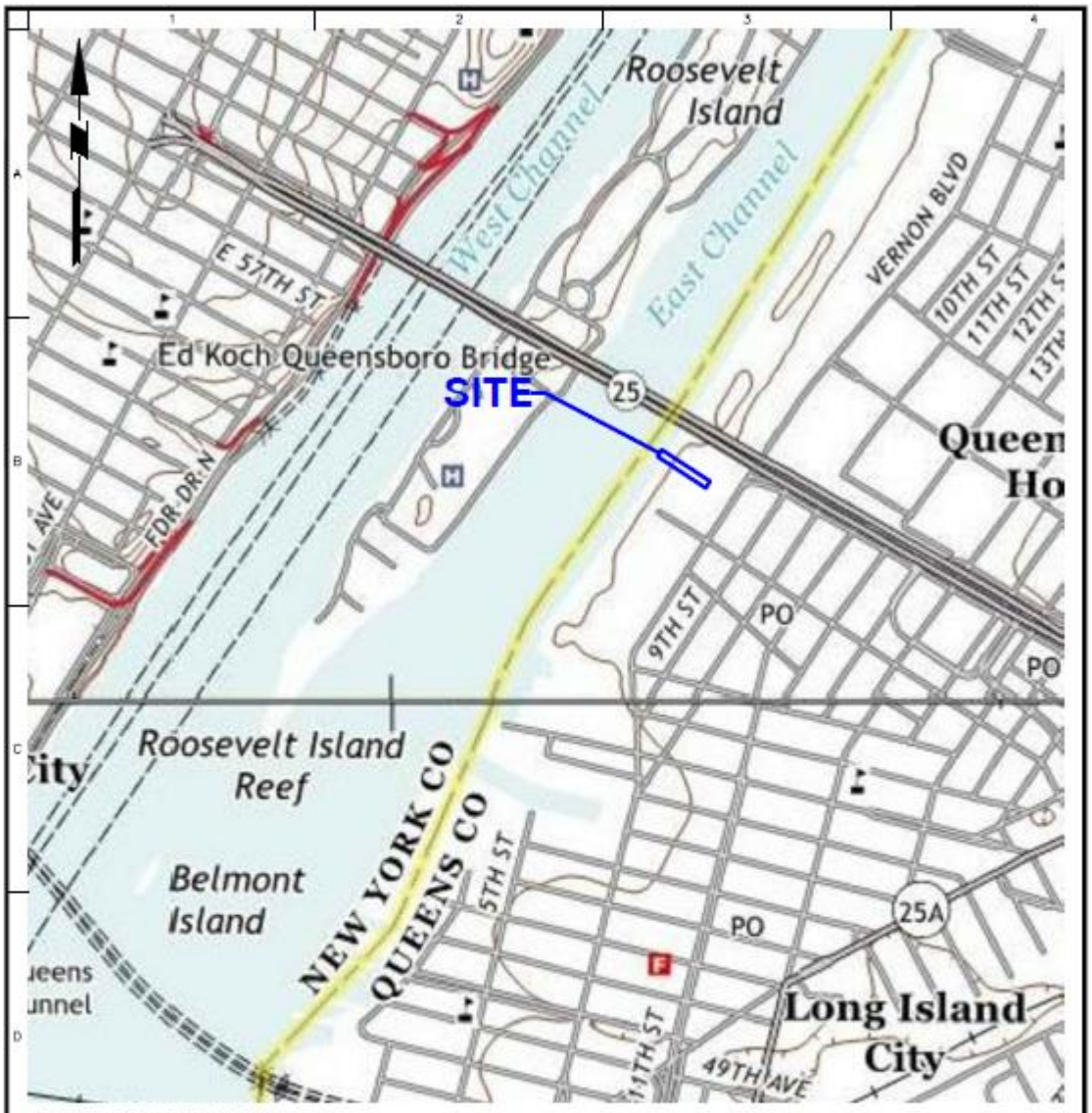
Note: Exposure to full sunshine can increase Heat Index values by up to 15 degrees F.

Apparent Temperature	**Heat Stress Risk with Physical Activity and/or Prolonged Exposure**
90-105	Heat Cramps or Heat Exhaustion Possible
105-130	Heat Cramps or Heat Exhaustion Likely, Heat Stroke Possible
>130	Heatstroke Highly Likely

FIGURES

FIGURE 1

Site Location 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.

NOTES:

BASE MAP TAKEN FROM UNITED STATES GEOLOGICAL SURVEY 7.5-MINUTE SERIES CENTRAL PARK QUADRANGLE AND BROOKLYN QUADRANGLE, DATED JULY 2011.

LANGAN

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Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan Engineering and Environmental Services, Inc.
Langan International LLC
Collectively known as Langan

Project: SILVERCUP WEST
TERRA COTTA SITE
PARCEL C
BLOCK 477 LOT 15
LONG ISLAND CITY
QUEENS NEW YORK

Figure Title: SITE LOCATION MAP

Project No.	5635005
Date	04/28/2017
Scale	NTS
Drawn By	NEK
Submission Date	—
Figure No.	1
Sheet	1 of 6

FIGURE 2

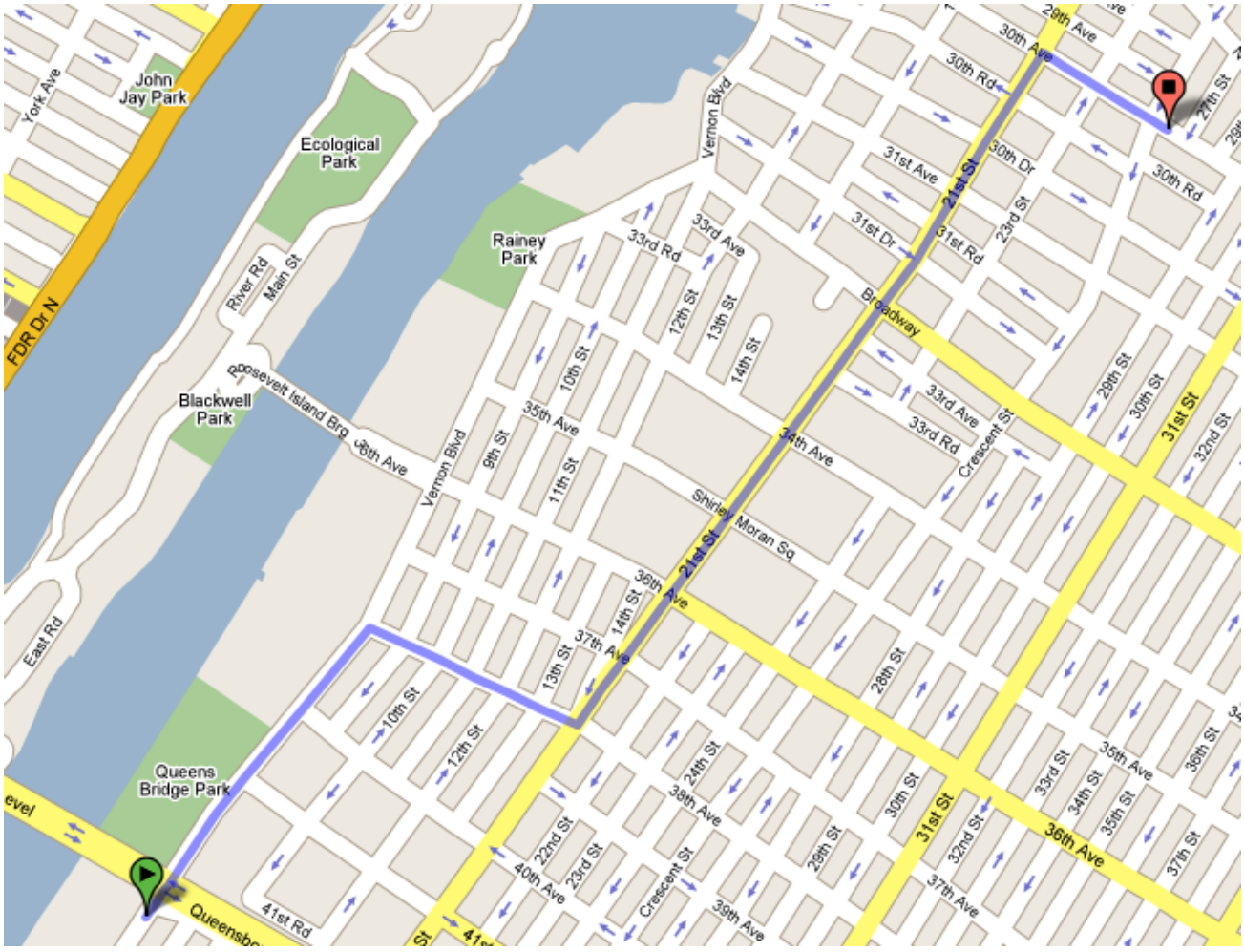
HOSPITAL ROUTE PLAN

Hospital Location: **Mount Sinai Hospital**
25-10 30th Avenue
Long Island City, New York
718-932-1000

START: 42-02 Vernon Boulevard, Long Island City, NY

1. Head northeast from Vernon Boulevard
2. Turn right at 38th Avenue
3. Turn left at 21st Street
4. Turn right at 30th Avenue

END: Mount Sinai Hospital, 255-10 30th Avenue, Long Island City, New York



ATTACHMENT A

STANDING ORDERS

STANDING ORDERS

GENERAL

- No smoking, eating, or drinking in this work zone.
- Upon leaving the work zone, personnel will thoroughly wash their hands and face.
- Minimize contact with contaminated materials through proper planning of work areas and decontamination areas, and by following proper procedures. Do not place equipment on the ground. Do not sit on contaminated materials.
- No open flames in the work zone.
- Only properly trained and equipped personnel are permitted to work in potentially contaminated areas.
- Always use the appropriate level of personal protective equipment (PPE).
- Maintain close contact with your buddy in the work zone
- Contaminated material will be contained in the Exclusion Zone (EZ).
- Report any unusual conditions.
- Work areas will be kept clear and uncluttered. Debris and other slip, trip, and fall hazards will be removed as frequently as possible.
- The number of personnel and equipment in the work zone will be kept to an essential minimum.
- Be alert to the symptoms of fatigue and heat/cold stress, and their effects on the normal caution and judgment of personnel.
- Conflicting situations which may arise concerning safety requirements and working conditions must be addressed and resolved quickly by the site HSO.

TOOLS AND HEAVY EQUIPMENT

- Do not, under any circumstances, enter or ride in or on any backhoe bucket, materials hoist, or any other device not specifically designed to carrying passengers.
- Loose-fitting clothing or loose long hair is prohibited around moving machinery.
- Ensure that heavy equipment operators and all other personnel in the work zone are using the same hand signals to communicate.
- Drilling/excavating within 10 feet in any direction of overhead power lines is prohibited.
- The locations of all underground utilities must be identified and marked out prior to initiating any subsurface activities.
- Check to insure that the equipment operator has lowered all blades and buckets to the ground before shutting off the vehicle.
- If the equipment has an emergency stop device, have the operator show all personnel its location and how to activate it.
- Help the operator ensure adequate clearances when the equipment must negotiate in tight quarters; serve as a signalman to direct backing as necessary.
- Ensure that all heavy equipment that is used in the Exclusion Zone is kept in that zone until the job is done, and that such equipment is completely decontaminated before moving it into the clean area of the work zone.
- Samplers must not reach into or get near rotating equipment such as the drill rig. If personnel must work near any tools that could rotate, the equipment operator must completely shut down the rig prior to initiating such work. It may be necessary to use a remote sampling device.

ATTACHMENT B

DECONTAMINATION PROCEDURES

PERSONNEL DECONTAMINATION

LEVEL C DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Canister or Mask Change	4. If worker leaves Exclusion Zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	Face piece Removal	6. Face piece is removed (avoid touching face with fingers). Face piece deposited on plastic sheets.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

LEVEL D DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Boot, Gloves and Outer Garment Removal	4. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 5:	Field Wash	5. Hands and face are thoroughly washed. Shower as soon as possible.

EQUIPMENT DECONTAMINATION

GENERAL:

Equipment to be decontaminated during the project may include tools, monitoring equipment, respirators, sampling containers, laboratory equipment and drilling equipment.

All decontamination will be done by personnel in protective gear, appropriate for the level of decontamination, as determined by the site HSO. The decontamination work tasks will be split or rotated among support and work crews.

Depending on site conditions, backhoe and pumps may be decontaminated over a portable decontamination pad to contain wash water; or, wash water may be allowed to run off into a storm sewer system. Equipment needed may include a steam generator with high-pressure water, empty drums, screens, screen support structures, and shovels. Drums will be used to hold contaminated wash water pumped from the lined pit. These drums will be labeled as such.

Miscellaneous tools and equipment will be dropped into a plastic pail, tub, or other container. They will be brushed off and rinsed with a detergent solution, and finally rinsed with clean water.

MONITORING EQUIPMENT:

Monitoring equipment will be protected as much as possible from contamination by draping, masking, or otherwise covering as much of the instruments as possible with plastic without hindering the operation of the unit. The PID, HNu or OVA meter, for example, can be placed in a clear plastic bag, which allows reading of the scale and operation of knobs. The probes can be partially wrapped keeping the sensor tip and discharge port clear.

The contaminated equipment will be taken from the drop area and the protective coverings removed and disposed in the appropriate containers. Any dirt or obvious contamination will be brushed or wiped with a disposable paper wipe.

RESPIRATORS:

Respirators will be cleaned and disinfected after every use. Taken from the drop area, the masks (with the cartridges removed and disposed of with other used disposable gear) will be immersed in a cleaning solution and scrubbed gently with a soft brush, followed by a rinse in plain warm water, and then allowed to air dry. In the morning, new cartridges will be installed. Personnel will inspect their own masks for serviceability prior to donning them. And, once the mask is on, the wearer will check the respirator for leakage using the negative and positive pressure fit check techniques.

ATTACHMENT C

EMPLOYEE EXPOSURE/ INJURY INCIDENT REPORT

EMPLOYEE INCIDENT/INJURY REPORT
LANGAN ENGINEERING & ENVIRONMENTAL SERVICES

(Complete and return to Tony Moffa in the Doylestown Office)

Affected Employee Name: _____ Date: _____

Incident type: ☐ Injury ☐ Report Only/No Injury
☐ Near Miss ☐ Other: _____

EMPLOYEE INFORMATION (Person completing Form)

Employee Name: _____ Employee No: _____

Title: _____ Office Location: _____

Length of time employed or date of hire: _____

Mailing address: _____

_____

Sex: M ☐ F ☐ Birth date: _____

Business phone & extension: _____ Residence/cell phone: _____

ACCIDENT INFORMATION

Project: _____ Project #: _____

Date & time of incident: _____ Time work started & ended: _____

Site location: _____

Incident Type: Possible Exposure ☐ Exposure ☐ Physical Injury ☐

Names of person(s) who witnessed the incident: _____

_____

Exact location incident occurred: _____

_____

Describe work being done: _____

Describe what affected employee was doing prior to the incident occurring: _____

Describe in detail how the incident occurred: _____

Nature of the incident (List the parts of the body affected): _____

Person(s) to whom incident was reported (Time and Date): _____

List the names of other persons affected during this incident: _____

Possible causes of the incident (equipment, unsafe work practices, lack of PPE, etc.): _____

Weather conditions during incident: _____

MEDICAL CARE INFORMATION

Did affected employee receive medical care? Yes ☐ No ☐

If Yes, when and where was medical care received: _____

Provide name of facility (hospital, clinic, etc.): _____

Length of stay at the facility? _____

Did the employee miss any work time? Yes ☐ No ☐ Undetermined ☐

Date employee last worked: _____ Date employee returned to work: _____

Has the employee returned to work? Yes ☐ No ☐

Does the employee have any work limitations or restrictions from the injury? : Yes ☐ No ☐

If Yes, please describe: _____

_____

Did the exposure/injury result in permanent disability? Yes ☐ No ☐ Unknown ☐

If Yes, please describe: _____

HEALTH & SAFETY INFORMATION

Was the operation being conducted under an established site specific Construction Health and Safety Plan?
Yes ☐ No ☐ Not Applicable: ☐

Describe protective equipment and clothing used by the employee:

_____

_____

_____

Did any limitations in safety equipment or protective clothing contribute to or affect exposure / injury? If so, explain:

_____

_____

_____

_____ _____

Employee Signature Date

_____ _____

Langan Representative Date

ATTACHMENT D

CALIBRATION LOG

DATE:________________ **PROJECT:____________________**

CALIBRATION LOG

Date & Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calibrat. Reading	Performed By:

ATTACHMENT E

MATERIAL SAFETY DATA SHEETS

SAFETY DATA SHEETS

All Langan Field Personnel Completing This Work Plan Are To Have Real Time Accessibility To Material Safety Data Sheet (MSDs) or Safety Data Sheet (SDSs) Through Their Smart Phone. If They Are Unable To Use the Smart Phone App, They Are To Bring Printed Copies of the MSDs/SDSs to The Site

ATTACHMENT F

JOBSITE SAFETY INSPECTION CHECKLIST

Jobsite Safety Inspection Checklist

Date: _____ **Inspected By:** _____

Location: _____ **Project #:** _____

Check one of the following: **A:** Acceptable **NA**: Not Applicable **D**: Deficiency

	A	NA	D	Remark
1. HASP available onsite for inspection?				
2. Health & Safety Compliance agreement (in HASP) appropriately signed by Langan employees and contractors?				
3. Hospital route map with directions posted on site?				
4. Emergency Notification List posted on site?				
5. First Aid kit available and properly stocked?				
6. Personnel trained in CPR/First Aid on site?				
7. MSDSs readily available, and all workers knowledgeable about the specific chemicals and compounds to which they may be exposed?				
8 Appropriate PPE being worn by Langan employees and contractors?				
9. Project site safe practices ("Standing Orders") posted?				
10. Project staff have 40-hr./8-hr./Supervisor HAZWOPER training?				
11. Project staff medically cleared to work in hazardous waste sites and fit-tested to wear respirators, if needed?				
12. Respiratory protection readily available?				
13. Health & Safety Incident Report forms available?				
14. Air monitoring instruments calibrated daily and results recorded on the Daily Instrument Calibration check sheet?				
15. Air monitoring readings recorded on the air monitoring data sheet/field log book?				
16. Subcontract workers have received 40-hr./8-hr./Spvsr. HAZWOPER training, as appropriate?				
17. Subcontract workers medically cleared to work on site, and fit-tested for respirator wear?				
18. Subcontract workers have respirators readily available?				
19. Mark outs of underground utilities done prior to initiating any subsurface activities?				
20. Decontamination procedures being followed as outlined in HASP?				
21. Are tools in good condition and properly used?				
22. Drilling performed in areas free from underground objects including utilities?				

23. Adequate size/type fire extinguisher supplied?				
24. Equipment at least 20 feet from overhead powerlines?				
25. Evidence that drilling operator is responsible for the safety of his rig.				
26. Trench sides shored, layer back, or boxed?				
27. Underground utilities located and authorities contacted before digging?				
28. Ladders in trench (25-foot spacing)?				
29. Excavated material placed more than 2 feet away from excavation edge?				
30. Public protected from exposure to open excavation?				
31. People entering the excavation regarding it as a permit-required confined space and following appropriate procedures?				
32. Confined space entry permit is completed and posted?				
33. All persons knowledgeable about the conditions and characteristics of the confined space?				
34. All persons engaged in confined space operations have been trained in safe entry and rescue (non-entry)?				
35. Full body harnesses, lifelines, and hoisting apparatus available for rescue needs?				
36. Attendant and/or supervisor certified in basic first aid and CPR?				
37. Confined space atmosphere checked before entry and continuously while the work is going on?				
38. Results of confined space atmosphere testing recorded?				
39. Evidence of coordination with off-site rescue services to perform entry rescue, if needed?				
40. Are extension cords rated for this work being used and are they properly maintained?				
41. Are GFCIs provided and being used?				

Unsafe Acts:

Notes:

ATTACHMENT G

JOB SAFETY ANALYSIS FORM

LANGAN	Job Safety Analysis (JSA) Health and Safety
JSA TITLE: **JSA NUMBER:**	**DATE CREATED:** **CREATED BY**: **REVISION DATE:** **REVISED BY:**
Langan employees must review and revise the Job Safety Analysis (JSA) as needed to address the any site specific hazards not identified. Employees must provide their signatures on the last page of the JSA indicating they have review the JSA and are aware the potential hazards associated with this work and will follow the provided preventive or corrective measures.	

PERSONAL PROTECTIVE EQUIPMENT REQUIRED: (PPE): ■ Required ☒ As Needed		
☐ Steel-toed boots	☐ Nitrile gloves	☐ Dermal Protection (Specify)
☐ Long-sleeved shirt	☐ Leather/ Cut-resistant gloves	☐ High visibility vest/clothing
☐ Safety glasses	☐ Face Shield	☐ Hard hat
ADDITIONAL PERSONAL PROTECTIVE EQUIPMENT NEEDED (Provide specific type(s) or descriptions)		
☐ Air Monitoring:	☐ Respirators:	☐ Other:
☐ Dermal Protection:	☐ Cartridges:	☐ Other:

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE OR CORRECTIVE ACTION
1.	1. 2.	1a. 1b. 2a. 2b.
2.	1.	1
Additional items identified in the field.		
Additional Items.		

If additional items are identified during daily work activities, please notify all relevant personnel about the change and document on this JSA.

ATTACHMENT H

TAILGATE SAFETY BRIEFING FORM

LANGAN TAILGATE SAFETY BRIEFING

Date:_____ Time: _____

Leader:_____ Location:_____

Work Task: _____

SAFETY TOPICS (*provide some detail of discussion points*)

Chemical Exposure Hazards and Control:_____
_____

Physical Hazards and Control: _____

Air Monitoring: _____

PPE: _____
_____

Communications:_____

Safe Work Practices: _____
_____

Emergency Response: _____

Hospital/Medical Center Location: _____

Phone Nos.: _____

Other: _____

FOR FOLLOW-UP (the issues, responsibilities, due dates, etc.**)**

_____
_____
_____

ATTENDEES

PRINT NAME	COMPANY	SIGNATURE

APPENDIX G
COMMUNITY AIR MONITORING PLAN

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or 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 baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion 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 over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind 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 PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

APPENDIX H
QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

For

SILVERCUP WEST – PARCEL C
42-02 Vernon Boulevard
Long Island City, New York
Queens Tax Block 477, Lot 15
NYSDEC BCP No. C241100

Prepared For:

Terra Cotta, LLC
42-22 22nd Road
Long Island City, New York 11101

Prepared By:

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

October 2017
5635005

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1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is for the 0.58-acre property at 42-02 Vernon Boulevard in Long Island City, New York (the Site). The Site entered into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) by Terra Cotta, LLC (the owner) as a Volunteer in November 2006. BCP Site No. C241100 was assigned to the Site by NYSDEC. Additional Site information and data collected previously by Langan and others is provided in the Site Management Plan (SMP).

This QAPP specifies analytical methods to be used to ensure that data collected during Site management are precise, accurate, representative, comparable, complete, and meet the sensitivity requirements of the project.

1.2 PROJECT OBJECTIVES

The SMP does not mandate the collection of soil, groundwater, or soil vapor samples in the future. Future building renovations and improvements or new construction requiring the disturbance, excavation, and/or off-site removal of soil or groundwater may warrant the collection and analysis of soil or groundwater samples in accordance with the Excavation Work Plan (EWP) included in Appendix F of the SMP, and NYSDEC Division of Environmental Remediation (DER)-10: Technical Guidance for Site Investigation and Remediation. In addition, groundwater sampling may be required. Accordingly, this QAPP addresses sampling and analytical methods that may be necessary in support of future Site improvements or proposed modifications to the SMP. These objectives have been established in order to meet standards that will protect public health and the environment for the Site.

1.3 SCOPE OF WORK

The specific scope of work covered in this QAPP includes any future intrusive work at the Site that may be conducted beneath the Site cap and any Site activities covered under the SMP. The SMP does not require sample collection; however, the SMP governs future activities relative to the Site which may include soil or groundwater sampling.

2.0 DATA QUALITY OBJECTIVES AND PROCESS

Data Quality Objectives (DQOs) are qualitative and quantitative statements to help ensure that data of known and appropriate quality are obtained during the project. The overall objective is to evaluate the performance of future soil, groundwater, and soil vapor sampling performed at the Site. DQOs for sampling activities are determined by evaluating five factors:

- Data needs and uses: The types of data required and how the data will be used after it is obtained.
- Parameters of Interest: The types of chemical or physical parameters required for the intended use.
- Level of Concern: Levels of constituents, which may require remedial actions or further investigations.
- Required Analytical Level: The level of data quality, data precision, and quality assurance/quality control (QA/QC) documentation required for chemical analysis.
- Required Detection Limits: The detection limits necessary based on the above information.

The quality assurance and quality control objectives for all measurement data include:

- **Precision** – an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will be determined by analyzing internal QC duplicates and/or matrix spike duplicates.
- **Accuracy** – a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. For soil and groundwater samples, accuracy will be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), internal standards, laboratory method blanks, instrument calibration, and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks. For soil vapor or air samples, analytical accuracy will be assessed by examining the percent recoveries that are added to each sample, internal standards, laboratory method blanks, and instrument calibration.
- **Representativeness** – expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a

sampling point, or an environmental condition. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is accomplished by following all applicable methods, laboratory-issued standard operating procedures (SOPs), the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

- **Completeness** – the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.
- **Comparability** – expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for sampling and analysis as documented in the QAPP, using standard reporting units and reporting formats, and data validation.
- **Sensitivity –** the ability of the instrument or method to detect target analytes at the levels of interest. The project manager will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection.

3.0 PROJECT ORGANIZATION

Any future remedial activities and investigations will be overseen by Langan or another environmental consultant for Terra Cotta, LLC or a future owner. The environmental consultant will also arrange data analysis and reporting tasks. The analytical services will be performed by an Environmental Laboratory Approval Program (ELAP)-certified laboratory. Data validation services will be performed by approved data validation contractor(s).

As needed, analytical services will be performed by Alpha Analytical Laboratories, Inc. of Mansfield, MA, NYSDOH ELAP certification number 11148. Data validation services will be performed by Emily Strake; resume attached (Attachment A).

Key contacts for this project are as follows:

Terra Cotta, LLC:	Mr. Mark Gold Telephone: (718) 906-2400
Langan Project Manager:	Mr. Joseph Good Telephone: (212) 479-5448
Langan Quality Assurance Officer (QAO):	Mr. Michael Burke, CHMM Telephone: (212) 479-5413
Program Quality Assurance Monitor:	Ms. Emily Snead Telephone: (212) 479-5432
Data Validator:	Ms. Emily Strake Telephone: (215) 491-6526
Laboratory Representatives:	Alpha Analytical Laboratories, Inc. Kevin Hoogerhyde Telephone: (201) 847-2951

4.0 QUALITY ASSURANCE/QUALITY CONTROL OBJECTIVES FOR MEASUREMENT OF DATA

4.1 INTRODUCTION

The quality assurance and quality control objectives for all measurement data include precision, accuracy, representativeness, completeness, and comparability. These objectives are defined in following subsections. They are formulated to meet the requirements of the United States Environmental Protection Agency (USEPA) SW-846. The analytical methods and their Contract Required Quantification Limits (CRQLs) are given in Section 7.

4.2 PRECISION

Precision is an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Specifically, it is a quantitative measurement of the variability of a group of measurements compared to their average value (USEPA, 1987). Precision is usually stated in terms of standard deviation, but other estimates such as the coefficient of variation (relative standard deviation), range (maximum value minus minimum value), relative range, and relative percent difference (RPD) are common.

For this project, field sampling precision will be determined by analyzing coded duplicate samples (labeled so that the laboratory does not recognize them as duplicates) for the same parameters, and then, during data validation (Section 8), calculating the RPD for duplicate sample results.

Analytical precision will be determined by the laboratory by calculating the RPD for the results of the analysis of internal QC duplicates and matrix spike duplicates. The formula for calculating RPD is as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where:

RPD	=	Relative Percent Difference.
V1, V2	=	The two values to be compared.
$\|V1 - V2\|$	=	The absolute value of the difference between the two values.
$(V1 + V2)/2$	=	The average of the two values.

The data quality objectives for analytical precision, calculated as the RPD between duplicate analyses, are presented in Tables 3.1 and 3.2.

TABLE 3.1
QUALITY CONTROL LIMITS FOR WATER SAMPLES

			Laboratory Accuracy and Precision				
Analytical Parameters	**Analytical Method (a)**	**Matrix Spike (MS) Compounds**	**MS/MSD (b) % Recovery**	**MS/MSD RPD l**	**LCS (d) % Recovery**	**Surrogate Compounds**	**Surrogate % Recovery**
VOCs (e)	8260	1,1-Dichloroethane	61-145	-	NA	Toluene-d8	88-110
		Trichloroethene	71-120	-	NA	Bromofluorobenzene	86-115
		Benzene	76-127	-	NA	1,2-Dichloroethane-d4	76-114
		Toluene	76-125	-	NA		
		Chlorobenzene	75-130	-	NA		
SVOCs (f)	8270	Phenol	12-110	-	NA	Nitrobenzene-d5	35-114
		2-Chlorophenol	27-123	-	NA	2-Fluorobiphenyl	43-116
		1,4-Dichlorobenzene	36-97	-	NA	Terphenyl-d14	33-141
		N-Nitroso-di-n-propylamine	41-116	-	NA	Phenol-d5	10-110
		1,2,4-Trichlorobenzene	39-98	-	NA	2-Fluorophenol	21-110
		4-Chloro-3-methylphenol	23-97	-	NA	2,4,6-Tribromophenol	10-123
		Acenaphthene	46-118	-	NA	2-Chlorophenol-d4	33-110 (g)
		4-Nitrophenol	10-80	-	NA	1,2-Dichlorobenzene-d4	16-110 (g)
		2,4-Dinitrotoluene	24-96	-	NA		
		Pentachlorophenol	9-103	-	NA		
		Pyrene	26-127	-	NA		
Inorganics (i)	6010,7470/7471 ,7841,9010, OIA-1677	Inorganic Analyte	75-125 (j)	- (k)	80-120	NA	NA

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990; any subsequent revisions shall supersede this information
(b) Matrix Spike/Matrix Spike Duplicate
(c) Relative Percent Difference
(d) Laboratory Control Sample
(e) Target Compound List Volatile Organic Compounds plus library search
(f) Target Compound List Semivolatile Organic Compounds plus library search
(g) Limits are advisory only
(h) Polychlorinated Biphenyls
(i) Target Analyte List Inorganics (metals)
(j) Matrix spike only
(k) Laboratory duplicate RPD
NA - Not Applicable

TABLE 3.2
QUALITY CONTROL LIMITS FOR SOIL SAMPLES

Laboratory Accuracy and Precision

Analytical Parameter	Analytical Method (a)	Matrix Spike (MS) Compounds	MS/MSD (b) % Recovery	MS/MSD RPD (c)	LCS (d) % Recovery	Surrogate Compounds	Surrogate % Recovery
VOCs (e)	8260	1,1-Dichloroethane	59-172	22	NA	Toluene-d8	84-138
		Trichloroethene	62-137	24	NA	Bromofluorobenzene	59-113
		Benzene	66-142	21	NA	1,2-Dichloroethane-d4	70-121
		Toluene	59-139	21	NA		
		Chlorobenzene	60-133	21	NA		
SVOCs (f)	8270	Phenol	26-90	35	NA	Nitrobenzene-d5	23-120
		2-Chlorophenol	25-102	50	NA	2-Fluorobiphenyl	30-115
		1,4-Dichlorobenzene	28-104	27	NA	Terphenyl-d14	18-137
		N-Nitroso-di-n-propylamine	41-126	38	NA	Phenol-d5	24-113
		1,2,4-Trichlorobenzene	38-107	23	NA	2-Fluorophenol	25-121
		4-Chloro-3-methylphenol	26-103	33	NA	2,4,6-Tribromophenol	19-122
		Acenaphthene	31-137	19	NA	2-Chlorophenol-d4	20-130 (g)
		4-Nitrophenol	11-114	50	NA	1,2-Dichlorobenzene-d4	20-130 (g)
		2,4-Dinitrotoluene	28-89	47	NA		
		Pentachlorophenol	17-109	47	NA		
		Pyrene	35-142	36	NA		
Inorganics (i)	6010, 7470/7471, 7841, 9010	Inorganic Analyte	75-125 (j)	20 (k)	80-120	NA	NA
PCBs	8082	PCB (Aroclor 1260)	50-128	50	NA	Tetrachlorometaxylene Decachlorobiphenyl	24-154 25-159

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990, any subsequent revisions shall supersede this information
(b) Matrix Spike/Matrix Spike Duplicate
(c) Relative Percent Difference
(d) Laboratory Control Sample
(e) Target Compound List Volatile Organic Compounds
(f) Target Compound List Semivolatile Organic Compounds
(g) Limits are advisory only
(h) Polychlorinated Biphenyls
(i) Target Analyte List Inorganics (metals and cyanide)
(j) Matrix spike only
(k) Laboratory duplicate RPD
NA - Not Applicable

4.3 ACCURACY

Accuracy is a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern (Taylor, 1987), or the difference between a measured value and the true or accepted reference value. The accuracy of an analytical procedure is best determined by the analysis of a sample containing a known quantity of material, and is expressed as the percent of the known quantity, which is recovered or measured. The recovery of a given analyte is dependent upon the sample matrix, method of analysis, and the specific compound or element being determined. The concentration of the analyte relative to the detection limit of the analytical method is also a major factor in determining the accuracy of the measurement. Concentrations of analytes, which are close to the detection limits are less accurate because they are more affected by such factors as instrument "noise". Higher concentrations will not be as affected by instrument noise or other variables and thus will be more accurate.

Sampling accuracy may be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy is typically assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks. Additionally, initial and continuing calibrations must be performed and accomplished within the established method control limits to define the instrument accuracy before analytical accuracy can be determined for any sample set.

Accuracy is normally measured as the percent recovery (%R) of a known amount of analyte, called a spike, added to a sample (matrix spike) or to a blank (blank spike). The %R is calculated as follows:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where:

%R = Percent recovery.

SSR = Spike sample result: concentration of analyte obtained by analyzing the sample with the spike added.

SR = Sample result: the background value, i.e., the concentration of the analyte obtained by analyzing the sample.

SA = Spiked analyte: concentration of the analyte spike added to the sample.

The acceptance limits for accuracy for each parameter are presented in Tables 3.1 and 3.2.

4.4 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter, which is most concerned with the proper design of the sampling program (USEPA, 1987). Samples must be representative of the environmental media being sampled. Selection of sample locations and sampling procedures will incorporate consideration of obtaining the most representative sample possible.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree that is technically possible, that the data derived represents the in-place quality of the material sampled. Every effort will be made to ensure chemical compounds will not be introduced into the sample via sample containers, handling, and analysis. Decontamination of sampling devices and digging equipment will be performed between samples as outlined in the Field Sampling Plan. Analysis of field blanks, trip blanks, and method blanks will also be performed to monitor for potential sample contamination from field and laboratory procedures.

The assessment of representativeness also must consider the degree of heterogeneity in the material from which the samples are collected. Sampling heterogeneity will be evaluated during data validation through the analysis of coded field duplicate samples. The analytical laboratory will also follow acceptable procedures to assure the samples are adequately homogenized prior to taking aliquots for analysis, so the reported results are representative of the sample received.

Chain-of-custody procedures will be followed to document that contamination of samples has not occurred during container preparation, shipment, and sampling. Details of blank, duplicate and Chain-of-custody procedures are presented in Sections 4 and 5.

4.5 COMPLETENESS

Completeness is defined as the percentage of measurements made which are judged to be valid (USEPA, 1987). The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested. Completeness is defined as follows for all sample measurements:

$$\%C = \frac{V}{T} \times 100$$

where:

%C = Percent completeness.

V = Number of measurements judged valid.

T = Total number of measurements.

4.6 COMPARABILITY

Comparability expresses the degree of confidence with which one data set can be compared to another (USEPA, 1987). The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project;
- Requiring traceability of all analytical standards and/or source materials to the USEPA or National Institute of Standards and Technology (NIST);
- Requiring that all calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable);
- Using standard reporting units and reporting formats including the reporting of QC data;
- Performing a complete data validation on a representative fraction of the analytical results, including the use of data qualifiers in all cases where appropriate; and
- Requiring that all validation qualifiers be used any time an analytical result is used for any purpose.

These steps will ensure all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

5.0 SAMPLE COLLECTION AND FIELD DATA ACQUISITION PROCEDURES

5.1 INTRODUCTION

Although not a requirement of the SMP, future soil, air and/ or groundwater samples may be required by NYSDEC. Soil, air and groundwater sampling, if necessary, will be conducted in accordance with the established NYSDEC protocols contained in DER-10/Technical Guidance for Site Investigation and Remediation (May 2010). The following sections describe procedures to be followed for specific tasks.

Air samples

Prior to sample collection, a pre-sampling inspection will be conducted to document chemicals and potential subsurface pathways at the Site. The pre-sampling inspection will assess the potential for impacts from chemical storage within the building. Air samples will be collected into laboratory-supplied, batch certified-clean Summa® canisters calibrated for a sampling rate of two hours. The pressure gauges on each calibrated flow controller should be monitored throughout sample collection. Sample collection should be stopped when the pressure reading reaches -4 mmHg.

Soil Samples

Soil samples will be visually classified and field screened using a photoionization detector (PID) to assess potential impacts from volatile organic compounds (VOCs) and for health and safety monitoring. Soil samples collected for analysis of VOCs will be collected using either EnCore® or Terra Core® sampling equipment. For analysis of non-volatile parameters, samples will be homogenized and placed into glass jars. After collection, all sample jars will be capped and securely tightened, and placed in iced coolers and maintained at 4°C ±2°C until they are transferred to the laboratory for analysis, in accordance with the procedures outlined in Section 5.4. Analysis and/or extraction and digestion of collected soil samples will meet the holding times required for each analyte as specified in Tables 4.1 and 4.2. In addition, analysis of collected soil sample will meet all quality assurance criteria set forth by this QAPP and DER-10.

Groundwater Samples

Groundwater sampling will be conducted using low-flow sampling procedures following USEPA guidance ("Low Stress [low flow] Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells", EQASOP-GW 001, January 19, 2010).

During purging, field parameters should be measured, including: water level drawdown, purge rate, pH, specific conductance, temperature, dissolved oxygen, turbidity and

oxidation-reduction-potential (ORP), every ten minutes using a water quality meter (YSI 6820 or similar) and a depth-to-water interface probe that should be decontaminated between wells. Samples should generally not be collected until the field parameters have stabilized. Field parameters will be considered stable once three sets of measurements are within ±0.1 standard units for pH, ±3% for conductivity and temperature, ±10 millivolts for ORP, and ±10% for turbidity and dissolved oxygen. Purge rates should be adjusted to keep the drawdown in the well to less than 0.3 feet, as practical. Additionally, an attempt should be made to achieve a stable turbidity reading of less than 10 Nephelometric Turbidity Units (NTU) prior to sampling. If the turbidity reading does not stabilize at reading of less than 10 NTU for a given well, then both filtered and unfiltered samples should be collected from that well. If necessary, field filtration should be performed using a 0.45 micron disposable in-line filter. Groundwater samples should be collected after parameters have stabilized as noted above or the readings are within the precision of the meter. Deviations from the stabilization and drawdown criteria, if any, should be noted on the sampling logs.

Samples should be collected directly into laboratory-supplied jars. After collection, all sample jars will be capped and securely tightened, and placed in iced coolers and maintained at 4°C ±2°C until they are transferred to the laboratory for analysis, in accordance with the procedures outlined in Section 5.4. Analysis and/or extraction and digestion of collected groundwater samples will meet the holding times required for each analyte as specified in Tables 4.1 and 4.2. In addition, analysis of collected groundwater sample will meet all quality assurance criteria set forth by this QAPP and DER-10.

Sample Field Blanks and Duplicates

Field blanks will be collected for quality assurance purposes at a rate of one per 20 investigative samples per matrix (soil and groundwater only). Field blanks will be obtained by pouring laboratory-demonstrated analyte-free water on or through a decontaminated sampling device following use and implementation of decontamination protocols. The water will be collected off of the sampling device into a laboratory-provided sample container for analysis. Field blank samples will be analyzed for the complete list of analytes on the day of sampling. Trip blanks will be collected at a rate of one per day if soil samples are analyzed for VOCs during that day.

Duplicate soil samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative samples per matrix and will be submitted to the laboratory as "blind" samples. If less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected.

5.1 FIELD DOCUMENTATION PROCEDURES

Field documentation procedures will include summarizing field data in field books, filling out applicable Site inspection forms and checklists contained in Appendix I of the SMP, and proper sample labeling. These procedures are described in the following sections.

5.1.1 Field Data and Notes

Field notebooks contain the documentary evidence regarding procedures conducted by field personnel. Hard cover, bound field notebooks will be used because of their compact size, durability, and secure page binding. The pages of the notebook will not be removed.

Entries will be made in waterproof, permanent blue or black ink. No erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark and the change initialed and dated by the team member making the change. Each entry will be dated. Entries will be legible and contain accurate and complete documentation of the individual or sampling team's activities or observations made. The level of detail will be sufficient to explain and reconstruct the activity conducted. Each entry will be signed by the person(s) making the entry.

The following types of information will be provided for each sampling task, as appropriate:

- Project name and number
- Reasons for being on-site or taking the sample
- Date and time of activity
- Sample identification numbers
- Geographical location of sampling points with references to the site, other facilities or a map coordinate system. Sketches will be made in the field logbook when appropriate
- Physical location of sampling locations such as depth below ground surface
- Description of the method of sampling including procedures followed, equipment used and any departure from the specified procedures
- Description of the sample including physical characteristics, odor, etc.
- Readings obtained from health and safety equipment
- Weather conditions at the time of sampling and previous meteorological events that may affect the representative nature of a sample

- Photographic information including a brief description of what was photographed, the date and time, the compass direction of the picture and the number of the picture on the camera
- Other pertinent observations such as the presence of other persons on the site, actions by others that may affect performance of site tasks, etc.
- Names of sampling personnel and signature of persons making entries

Field records will also be collected on field data sheets including boring logs, which will be used for geologic and drilling data during soil boring activities. Field data sheets will include the project-specific number and stored in the field project files when not in use. At the completion of the field activities, the field data sheets will be maintained in the central project file.

5.1.3 Site Inspection Forms

Periodic Site inspections are a requirement of the SMP and are discussed in Section 4.2 of the SMP. It is required that all engineering controls be periodically inspected to ensure that (1) the ECs are in place and effective; (2) the SMP is being implemented; (3) the operation and maintenance of the cellar ventilation system is being implemented; and (4) the Site remedy continues to be protective of public health and the environment and is performing as designed. If sampling conducted at the Site includes intrusive activities that affect an engineering control, the relevant Site inspection form(s) should be completed.

5.2 SAMPLE NOMENCLATURE

The sample nomenclature system has been devised such that the following objectives can be attained:

- Sorting of data by matrix;
- Sorting of data by depth;
- Maintenance of consistency (filed, laboratory, and database sample numbers);
- Accommodation of all project-specific requirements; and
- Accommodation of laboratory sample number length constraints (maximum 20 characters).

5.3 SAMPLE CONTAINER PREPARATION AND SAMPLE PRESERVATION

Sample containers will be properly washed and decontaminated prior to their use by either the analytical laboratory or the container vendor to the specifications required by

the USEPA. Copies of the sample container QC analyses will be provided by the laboratory for each container lot used to obtain samples. The containers will be labeled and the appropriate preservatives will be added. The types of containers are shown in Tables 4.1, 4.2.

Samples shall be preserved according to the preservation techniques given in Tables 4.1 and 4.2. Preservatives will be added to the sample bottles by the laboratory prior to their shipment in sufficient quantities to ensure that proper sample pH is met. Following sample collection, the sample bottles should be placed on ice in the shipping cooler, cooled to 4°C with ice or "blue ice", and delivered to the laboratory within 48 hours of collection. Chain-of-custody procedures are described in Section 7.

5.4 SAMPLE HOLDING TIMES

The sample holding times for organic and inorganic parameters are given in Tables 4.1 and 4.2 and must be in accordance with the NYSDEC ASP requirements. The NYSDEC ASP holding times must be strictly adhered to by the laboratory. Any holding time exceedances must be reported to Langan.

5.5 FIELD QC SAMPLES

To assess field sampling and decontamination performance, two types of "blanks" will be collected and submitted to the laboratory for analyses. In addition, the precision of field sampling procedures will be assessed by collecting coded field duplicates and matrix spike/matrix spike duplicates (MS/MSDs). The blanks will include:

a. Trip Blanks - A trip blank will be prepared before the sample containers are sent by the laboratory. The trip blank will consist of a 40-ml VOA vial containing distilled, deionized water, which accompanies the other water sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of water samples for Part 375 volatiles analysis. The Trip Blank will be analyzed for volatile organic compounds to assess any contamination from sampling and transport, and internal laboratory procedures.

b. Field Blanks - Field blanks will be taken at a minimum frequency of one per 20 field samples per sample matrix. Field blanks are used to determine the effectiveness of the decontamination procedures for sampling equipment. The field blank will consist of a sample of deionized, distilled water provided by the laboratory that has passed through a decontaminated bailer, tubing or other sampling apparatus. It is usually collected as a last step in the decontamination procedure, prior to taking an environmental sample. The field blank may be analyzed for all or some of the parameters of interest.

The duplicates will include:

a. Coded Field Duplicate - To determine the representativeness of the sampling methods, coded field duplicates will be collected at a minimum frequency of one per 20 field samples. The samples are termed "coded" because they will be labeled in such a manner that the laboratory will not be able to determine that they are a duplicate sample. This will eliminate any possible bias that could arise.

b. Matrix Spike/Matrix Spike Duplicate (MS/MSD) - MS/MSD samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes. The percent recoveries and RPDs are given in Tables 3.1 and 3.2.

TABLE 4.1
WATER SAMPLE CONTAINERIZATION, PRESERVATION, AND HOLDING TIMES

Analysis	Bottle Type	Preservation (a)	Holding Time (b)
Volatile Organic Compounds (VOCs)	2-40 mL glass vial w/ Teflon septum	Cool to 4^{O}C, HCL pH<2	7 days
Semi-volatile Organics Compounds (SVOCs)	1000 mL glass w/ Teflon lined cap	Cool to 4^{O}C	7 days*
Metals	1000 mL plastic bottle	Nitric Acid to pH < 2 Cool to 4^{O}C	6 months, except mercury (28 days)

(a) All samples to be preserved in ice during collection and transport.

(b) Days from validated time of sample receipt (VTSR).

* Continuous liquid-liquid extraction is the required extraction for water samples for SVOCs. Continuous liquid-liquid extraction and concentration of water samples for SVOCs analysis completed within 7 days of VTSR. Extracts of water samples must be analyzed within 40 days of extraction.

TABLE 4.2
SOIL SAMPLE
CONTAINERIZATION, PRESERVATION AND HOLDING TIMES

Analysis	Bottle Type	Preservation [a]	Holding Time [b]
Volatile Organic Compounds (VOCs)	Wide-mouth glass w/ Teflon lined cap	Cool to 4°C	14 days
Other Organic Compounds [c]	Wide-mouth glass w/ Teflon lined cap	Cool to 4°C	14 days*
Metals	Wide-mouth plastic or glass	Cool to 4°C	6 months, except mercury (28 days)
PCBs	Wide-mouth glass w/ Teflon-lined cap	Cool to 4°C	14 days**

(a) All samples to be preserved in ice during collection and transport.
(b) Days from date of sample collection.
(c) Semi-volatile organic compounds or PCBs.

* Soxhlet or sonication procedures for extraction and concentration of soil/waste samples for SVOCs must be completed within 10 days of VTSR. Extracts of soil samples must be analyzed within 40 days of extraction.

** Procedures for extraction and concentration of soil/waste samples for PCBs must be completed within 14 days of VTSR. Extracts of soil samples must be analyzed within 40 days of extraction.

TABLE 4.3
SOIL VAPOR, INDOOR AIR, AND AMBIENT AIR SAMPLES
CONTAINERIZATION PRESENTATION AND HOLDING TIMES

Analysis	Bottle Type	Preservation	Holding Time [(a)]
Volatile Organic Compounds (VOCs)	6- Liter Summa Canister	None	30 days

(a) Days from date of sample collection.

* Summa canisters will be batch certified by the laboratory.

6.0 SAMPLE TRACKING AND CUSTODY

6.1 INTRODUCTION

This section presents sample custody procedures for both the field and laboratory. Implementation of proper custody procedures for samples generated in the field is the responsibility of field personnel. Both laboratory and field personnel involved in the Chain-of-custody (COC) and transfer of samples will be trained as to the purpose and procedures prior to implementation.

Evidence of sample traceability and integrity is provided by COC procedures. These procedures document the sample traceability from the selection and preparation of the sample containers by the laboratory, to sample collection, to sample shipment, to laboratory receipt and analysis. The sample custody flowchart is shown in Figure 5.1. A sample is considered to be in a person's custody if the sample is:

- In a person's possession;
- Maintained in view after possession is accepted and documented;
- Locked and tagged with Custody Seals so that no one can tamper with it after having been in physical custody; or
- In a secured area which is restricted to authorized personnel.

6.2 FIELD SAMPLE CUSTODY

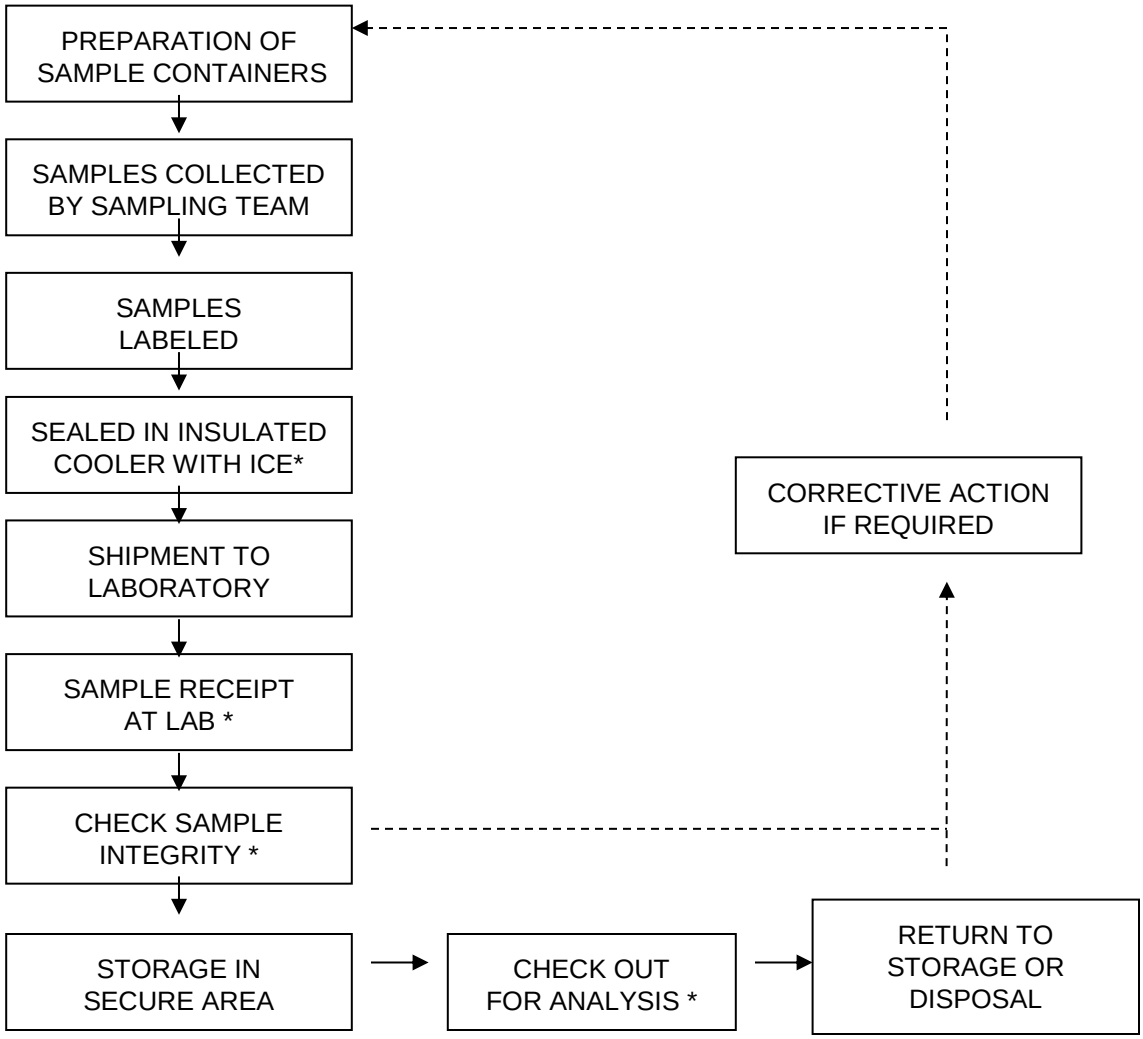
A COC record (Figure 5.2 or similar) accompanies the sample containers from selection and preparation at the laboratory, during shipment to the field for sample containment and preservation, and during return to the laboratory. Triplicate copies of the COC must be completed for each sample set collected.

The COC lists the field personnel responsible for taking samples, the project name and number, the name of the analytical laboratory to which the samples are sent, and the method of sample shipment. The COC also lists a unique description of every sample bottle in the set. If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample.

The REMARKS space on the COC is used to indicate if the sample is a matrix spike, matrix spike duplicate, or any other sample information for the laboratory. Since they are not specific to any one sample point, trip and field blanks are indicated on separate rows. Once all bottles are properly accounted for on the form, a sampler will write his or her signature and the date and time on the first RELINQUISHED BY space. The

sampler will also write the method of shipment, the shipping cooler identification number, and the shipper airbill number on the top of the COC.

Figure 5.1 Sample Custody



* REQUIRES SIGN-OFF ON CHAIN-OF-CUSTODY FORM

Figure 5.2 Sample Chain-of-Custody Form

NEW YORK CHAIN OF CUSTODY

Page of

Date Rec'd in Lab

ALPHA Job #

ALPHA
ANALYTICAL

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Client Information

Client:
Address:
Phone:
Fax:
Email:

Project Information

Project Name:
Project Location:
Project #
(Use Project name as Project #) ☐
Project Manager:
ALPHAQuote #:

Turn-Around Time

Standard ☐ Due Date:
Rush (only if pre approved) ☐ # of Days:

Deliverables

☐ ASP-A ☐ ASP-B
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other

Regulatory Requirement

☐ NY TOGS ☐ NY Part 375
☐ AWQ Standards ☐ NY CP-51
☐ NY Restricted Use ☐ Other
☐ NY Unrestricted Use
☐ NYC Sewer Discharge

Billing Information

☐ Same as Client Info
PO #

Disposal Site Information

Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Please specify Metals or TAL.

ANALYSIS

Sample Filtration

☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

Total
Bottle

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Time	Collection Date	Sample Matrix	Sampler's Initials											Sample Specific Comments

Container Type
Preservative

Relinquished By:	Date/Time	Received By:	Date/Time

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-25 HC (rev. 30-Sept-2013)

Mistakes will be crossed out with a single line in ink and initialed by the author.
One copy of the COC is retained by sampling personnel (notations identifying blind duplicate samples will be added to this copy of the COC but not the others that will go to the laboratory) and the other two copies are put into a sealable plastic bag and taped inside the lid of the shipping cooler. The cooler lid is closed, custody seals provided by the laboratory are affixed to the latch and across the back and front lids of the cooler, and the person relinquishing the samples signs their name across the seal. The seal is taped, and the cooler is wrapped tightly with clear packing tape. It is then relinquished by field personnel to personnel responsible for shipment, typically an overnight carrier. The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager, and the sample will not be analyzed.

6.3 LABORATORY SAMPLE CUSTODY

The Project Manager or Field Team Leader will notify the laboratory of upcoming field sampling activities, and the subsequent shipment of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The following laboratory sample custody procedures will be used:

- The laboratory will designate a sample custodian who will be responsible for maintaining custody of the samples, and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check cooler temperature, and check the original COC documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian will sign the COC record and record the date and time received.
- Care will be exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the Project Manager or Field Team Leader as part of the corrective action process. A qualitative assessment of each sample container will be performed to note any anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming chain-of-custody procedure.
- The samples will be stored in a secured area at a temperature of approximately 4°C until analyses commence.

- A laboratory tracking record will accompany the sample or sample fraction through final analysis for control.
- A copy of the tracking record will accompany the laboratory report and will become a permanent part of the project records.

7.0 CALIBRATION PROCEDURES

7.1 FIELD INSTRUMENTS

All field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures will conform to manufacturer's standard instructions. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. Records of all instrument calibration will be maintained by the Field Team Leader. Copies of all the instrument manuals will be maintained on-site by the Field Team Leader.

Calibration procedures for instruments used for monitoring health and safety hazards (e.g., photoionization detector and explosimeter) are provided in the Health and Safety Plan.

7.2 LABORATORY INSTRUMENTS

The laboratory will follow all calibration procedures and schedules as specified in the sections of the USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods given in Section 7.

8.0 ANALYTICAL PROCEDURES

8.1 INTRODUCTION

Samples will be analyzed according to the USEPA SW-846 "Test Methods for Evaluating Solid Waste," November 1986, 3rd edition and subsequent updates. The methods to be used for the laboratory analysis of water and soil samples are presented in Table 7.1. These methods were selected because they attain the desired quantitation limits, which are compiled on Table 7.1.

TABLE 7.1
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits RL (mg/L)	MDL(mg/kg)
	Volatile Organics			
1	Methylene Chloride	SW8260B	0.034	0.0028
2	1,1-Dichloroethane	SW8260B	0.0051	0.001
3	Chloroform	SW8260B	0.0051	0.0011
4	Carbon Tetrachloride	SW8260B	0.0034	0.00072
5	1,2-Dichloropropane	SW8260B	0.012	0.00087
6	Dibromochloromethane	SW8260B	0.0034	0.001
7	1,1,2-Trichloroethane	SW8260B	0.0051	0.0013
8	Tetrachloroethene	SW8260B	0.0034	0.001
9	Chlorobenzene	SW8260B	0.0034	0.00064
10	Trichloroflouromethane	SW8260B	0.017	0.0013
11	1,2-Dichloroethane	SW8260B	0.0034	0.00078
12	1,1,1-Trichloroethane	SW8260B	0.0034	0.00092
13	Bromodichloromethane	SW8260B	0.0034	0.0016
14	Trans-1,3-Dichloropropene	SW8260B	0.0034	0.0017
15	Cis-1,3-Dichloropropene	SW8260B	0.0034	0.00082
16	1,1-Dichloropropene	SW8260B	0.017	0.001
17	Bromoform	SW8260B	0.014	0.00083
18	1,1,2,2-Tetrachloroethane	SW8260B	0.0034	0.00076
19	Benzene	SW8260B	0.0034	0.0027
20	Toluene	SW8260B	0.0051	0.0022
21	Ethylbenzene	SW8260B	0.0034	0.0026
f22	Chloromethane	SW8260B	0.017	0.0015
23	Bromomethane	SW8260B	0.0068	0.00089
24	Vinyl Chloride	SW8260B	0.0068	0.0013
25	Chloromethane	SW8260B	0.0068	0.00077
26	1,1-Dichloroethene	SW8260B	0.0034	0.0012
27	Trans-1,2-Dichloroethene	SW8260B	0.0051	0.0014
28	Trichloroethene	SW8260B	0.0034	0.0014
29	1,2-Dichlorobenzene	SW8260B	0.017	0.0017
30	1,3-Dichlorobenzene	SW8260B	0.017	0.0015
31	1,4-Dichlorobenzene	SW8260B	0.017	0.0014
32	Methyl tert butyl ether	SW8260B	0.0068	0.001

33	p/m-Xylene	SW8260B	0.0068	0.0015

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Water (mg/L)	Soil (mg/kg)
	Volatile Organics (cont.)			
34	o-xylene	SW8260B	0.0068	0.0014
35	Cis-1,2-Dichloroethene	SW8260B	0.0034	0.001
36	Dibromomethane	SW8260B	0.034	0.0015
37	Styrene	SW8260B	0.0068	0.0025
38	Dichlorodiflouromethane	SW8260B	0.034	0.0013
39	Acetone	SW8260B	0.034	0.011
40	Carbon disulfide	SW8260B	0.034	0.0013
41	2-Butanone	SW8260B	0.034	0.013
42	Vinyl acetate	SW8260B	0.034	0.0026
43	4-Methyl-2pentanone	SW8260B	0.034	0.0028
44	1,2,3-Trichloropropane	SW8260B	0.034	0.0013
45	2-Hexanone	SW8260B	0.034	0.0014
46	Bromochloromethane	SW8260B	0.017	0.001
47	2,2-Dichloropropane	SW8260B	0.017	0.0027
48	1,2-Dibromoethane	SW8260B	0.014	0.0014
49	1,3-Dichloropropane	SW8260B	0.017	0.0019
50	1,1,1,2-Tetrachloroethane	SW8260B	0.0034	0.0011
51	Bromobenzene	SW8260B	0.017	0.00075
52	n-Butylbenzene	SW8260B	0.0034	0.0011
53	Sec-Butylbenzene	SW8260B	0.0034	0.00094
54	Tert-Butylbenzene	SW8260B	0.017	0.0021
55	0-chlorotoluene	SW8260B	0.017	0.0011
56	p-chlorotoluene	SW8260B	0.017	0.0012
57	1,2-Dibromo-3-chloropropane	SW8260B	0.017	0.0029
58	Hexachlorobutadiene	SW8260B	0.017	0.0016
59	Isopropylbenzene	SW8260B	0.0034	0.00061
60	p-Isopropylbenzene	SW8260B	0.0034	0.00094
61	Naphthalene	SW8260B	0.017	0.0026
62	Acrylonitrile	SW8260B	0.034	0.0013
63	n-Propylbenzene	SW8260B	0.0034	0.00097
64	1,2,3-Trichlorobenzene	SW8260B	0.017	0.0014

65	1,2,4-Trimethylbenzene	SW8260B	0.017	0.0027
66	1,3,5-Trimethylbenzene	SW8260B	0.017	0.0021
67	1,2,4-Trimethylbenzene	SW8260B	0.017	0.002

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits RL (ug/L)	MDL (ug/kg)
	Volatile Organics (cont.)			
68	1,4-Diethylbenzene	SW8260B	0.014	0.00068
69	4-Ethyltoulene	SW8260B	0.014	0.00033
70	1,2,4,5-Tetramethylbenzene	SW8260B	0.014	0.00062
71	Ethyl ether	SW8260B	0.017	0.0013
72	Trans-1,4-Dichloro-2-butene	SW8260B	0.017	0.0051
	Semivolatile Organics			
1	Acenahpthalene	SW8270C	0.18	0.042
2	1,2,4-Trichlorobenzene	SW8270C	0.22	0.037
3	Hexachlorobenzene	SW8270C	0.14	0.035
4	Bis(2-chloroethyl)ether	SW8270C	0.2	0.043
5	2-Chloronaphthalene	SW8270C	0.22	0.068
6	1,2-Dichlorobenzene	SW8270C	0.22	0.066
7	1,3-Dichlorobenzene	SW8270C	0.22	0.07
8	1,4-Dichlorobenzene	SW8270C	0.22	0.064
9	3,3'-Dichlorobenzidine	SW8270C	0.22	0.081
10	2,4-Dinitrotoluene	SW8270C	0.22	0.06
11	2,6-Dinitrotoluene	SW8270C	0.22	0.074
12	Fluoranthene	SW8270C	0.14	0.029
13	4-Chlorophenyl phenyl ether	SW8270C	0.22	0.031
14	4-Bromophenyl phenyl ether	SW8270C	0.22	0.036
15	Bis(2-chloroisopropyl)ether	SW8270C	0.27	0.072
16	Bis(2-chloroethoxy)methane	SW8270C	0.24	0.051
17	Hexachlorobutadiene	SW8270C	0.22	0.042
18	Hexachlorocyclopentadiene	SW8270C	0.65	0.18
19	Hexachloroethane	SW8270C	0.18	0.032

20	Isophorone	SW8270C	0.2	0.036
21	Naphthalene	SW8270C	0.22	0.072
22	Nitrobenzene	SW8270C	0.2	0.066
23	NitrosoDiPhenylAmine(NDPA/DPA)	SW8270C	0.18	0.056
24	n-Nitrosodi-n-propylamine	SW8270C	0.22	0.063
25	Bis(2-Ethylhexyl)phthalate	SW8270C	0.22	0.047

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

			Estimated Quantitation Limits	
	Analysis/Compound	**Method**	**RL (mg/L)**	**MDL (mg/kg)**
	Semivolatile Organics (cont.)			
26	Butyl benzyl phthalate	SW8270C	0.22	0.063
27	Di-n-butylphthalate	SW8270C	0.22	0.038
28	Di-n-octylphthalate	SW8270C	0.22	0.061
29	Diethyl phthalate	SW8270C	0.22	0.039
30	Dimethyl phthalate	SW8270C	0.22	0.037
31	Benzo(a)anthracene	SW8270C	0.14	0.045
32	Benzo(a)pyrene	SW8270C	0.18	0.054
33	Benzo(b)fluoranthene	SW8270C	0.14	0.036
34	Benzo(k)fluoranthene	SW8270C	0.14	0.035
35	Chrysene	SW8270C	0.14	0.029
36	Acenaphthylene	SW8270C	0.18	0.058
37	Anthracene	SW8270C	0.14	0.03
38	Benzo(ghi)perylene	SW8270C	0.18	0.057
39	Fluorene	SW8270C	0.22	0.041
40	Phananthrene	SW8270C	0.14	0.038
41	Dibenzo(a,h)anthracene	SW8270C	0.14	0.042
42	Indeno(1,2,3-cd)Pyrene	SW8270C	0.18	0.055
43	Pyrene	SW8270C	0.14	0.037
44	Biphenyl	SW8270C	0.51	0.016
45	4-Chloroaniline	SW8270C	0.22	0.024
46	2-Nitroaniline	SW8270C	0.22	0.041
47	3-Nitroaniline	SW8270C	0.22	0.023
48	4-Nitroaniline	SW8270C	0.22	0.051

49	Dibenzofuran	SW8270C	0.22	0.036
50	2-Methylnaphthalene	SW8270C	0.27	0.089
51	1,2,4-Tetrachlorobenzene	SW8270C	0.22	0.066
52	Acetophenone	SW8270C	0.22	0.072
53	2,4,6-Trichlorophenol	SW8270C	0.14	0.041
54	P-chloro-M-Cresol	SW8270C	0.22	0.046
55	2-Chlorophenol	SW8270C	0.22	0.07

TABLE 7.1 (Continued)

PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits RL (mg/L)	MDL (mg/kg)
	Semivolatile Organics (cont.)			
56	2,4-Dinitrophenol	SW8270C	0.2	0.066
57	2,4-Dimethylphenol	SW8270C	0.22	0.034
58	2-Nitrophenol	SW8270C	0.2	0.16
59	4-Nitrophenol	SW8270C	0.49	0.096
60	2,4-Dinitro	SW8270C	0.32	0.35
61	4,6-Dinitro-o-cresol	SW8270C	1.1	0.21
62	Pentachlorophenol	SW8270C	0.59	0.053
63	Phenol	SW8270C	0.18	0.066
64	2-Methylphenol	SW8270C	0.22	0.056
65	3-Methylphenol/4-Methylphenol	SW8270C	0.22	0.097
66	2,4,5-Trichlorophenol	SW8270C	0.32	0.052
67	Benzoic Acid	SW8270C	0.22	0.19
68	Benzyl Alcohol	SW8270C	0.73	0.052
69	Carbazole	SW8270C	0.22	0.032
	PCBs			
1	Aroclor-1016	SW8082	0.0469	0.009
2	Aroclor-1221	SW8082	0.0469	0.014
3	Aroclor-1232	SW8082	0.0469	0.01
4	Aroclor-1242	SW8082	0.0469	0.009
5	Aroclor-1248	SW8082	0.0469	0.006
6	Aroclor-1254	SW8082	0.0469	0.007

7	Aroclor-1260	SW8082	0.0469	0.008
	Metals			
1	Aluminum	SW6010B	10	2.3
2	Antimony	SW6010B	5.2	1
3	Arsenic	SW6010B	1	0.36
4	Barium	SW6010B	1	0.09
5	Beryllium	SW6010B	0.52	0.04
6	Cadmium	SW6010B	1	0.07

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits RL (mg/L)	MDL (mg/kg)
	Metals (cont.)			
7	Calcium	SW6010B	10	2.3
8	Chromium	SW6010B	1	0.21
9	Cobalt	SW6010B	2.1	0.22
10	Copper	SW6010B	1	1
11	Iron	SW6010B	5.2	1.8
12	Lead	SW6010B	5.2	0.29
13	Magnesium	SW6010B	10	4.7
14	Manganese	SW6010B	1	0.11
15	Mercury	SW7471A	0.1	0.02
16	Nickel	SW6010B	2.6	0.29
17	Potassium	SW6010B	260	84
18	Selenium	SW6010B	2.1	0.34
19	Silver	SW6010B	1	0.17
20	Sodium	SW6010B	210	83
21	Thallium	SW6010B	2.1	0.65
22	Vanadium	SW6010B	1	0.23
23	Zinc	SW6010B	5.2	0.57

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

	Analysis/Compound	Method	Estimated Quantitation Limits RL (mg/L)	MDL (mg/kg)
	Pesticides			
1	Delta-BHC	SW8081A	0.0029	0.000448
2	Lindane	SW8081A	0.000954	0.000426
3	Alpha-BHC	SW8081A	0.000954	0.000271
4	Beta-BHC	SW8081A	0.00229	0.000868
5	Heptachlor	SW8081A	0.00114	0.000513
6	Aldrin	SW8081A	0.00429	0.000806
7	Heptachlor epoxide	SW8081A	0.00429	0.00129
8	Endrin	SW8081A	0.000954	0.000391
9	Endrin Ketone	SW8081A	0.00229	0.00059
10	Dieldrin	SW8081A	0.00143	0.000715
11	4,4'-DDE	SW8081A	0.00229	0.000529
12	4,4'-DDD	SW8081A	0.00229	0.000816
13	4,4'-DDT	SW8081A	0.0033	0.00184
14	Endosulfan I	SW8081A	0.00229	0.000541
15	Endosulfan II	SW8081A	0.00229	0.000765
16	Endosulfan sulfate	SW8081A	0.000954	0.000436
17	Methoxychlor	SW8081A	0.00429	0.00134
18	Toxaphene	SW8081A	0.0429	0.012
19	Trans-Chlordane	SW8081A	0.00286	0.000756
20	Chlordane	SW8081A	0.0186	0.00758

Notes:

(1) - = No Standard
(2) RL = Reporting Limit
(3) MDL = Minimum Detection Limit
(4) RL and MDL values are taken from representative laboratory reports issued by Alpha Analytical Laboratories
(5) RL and MDL values are estimated and may vary depending on instruments

9.0 DATA REDUCTION, VALIDATION, AND REPORTING

9.1 INTRODUCTION

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed, and be reported in standard format.

The completed copies of the chain-of-custody records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

9.2 DATA REDUCTION

The Analytical Services Protocol (ASP) Category B data packages and an electronic data deliverable (EDD) will be provided by the laboratory after receipt of a complete sample delivery group. The Project Manager will immediately arrange for archiving the results and preparation of result tables. These tables will form the database for assessment of the site contamination condition.

Each EDD deliverable must be formatted using a Microsoft Windows operating system and the NYSDEC data deliverable format for EQuIS. To avoid transcription errors, data will be loaded directly into the ASCII format from the laboratory information management system (LIMS). If this cannot be accomplished, the consultant should be notified via letter of transmittal indicating that manual entry of data is required for a particular method of analysis. All EDDs must also undergo a QC check by the laboratory before delivery. The original data, tabulations, and electronic media are stored in a secure and retrievable fashion.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA review has been completed, the Project Manager may direct the Team Leaders or others to initiate and finalize the analytical data assessment.

9.3 DATA VALIDATION

Data validation will be performed in accordance with the USEPA validation guidelines for organic and inorganic data review. Validation will include the following:

- Verification of the QC sample results,
- Verification of the identification of sample results (both positive hits and non-detects),
- Recalculation of 10% of all investigative sample results, and
- Preparation of Data Usability Summary Reports (DUSR).

A DUSR will be prepared and reviewed by the QAO before issuance. The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and COC procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each SDG will follow. For each of the organic analytical methods, the following will be assessed:

- Holding times;
- Instrument tuning;
- Instrument calibrations;
- Blank results;
- System monitoring compounds or surrogate recovery compounds (as applicable);
- Internal standard recovery results;
- MS and MSD results;
- Target compound identification;
- Chromatogram quality;
- Pesticide cleanup (if applicable);
- Compound quantitation and reported detection limits;
- System performance; and
- Results verification.

For each of the inorganic compounds, the following will be assessed:

- Holding times;
- Calibrations;
- Blank results;
- Interference check sample;
- Laboratory check samples;
- Duplicates;
- Matrix Spike;
- Furnace atomic absorption analysis QC;
- ICP serial dilutions; and
- Results verification and reported detection limits.

Based on the results of data validation, the validated analytical results reported by the laboratory will be assigned one of the following usability flags:

- "U" - Not detected. The associated number indicates the approximate sample concentration necessary to be detected significantly greater than the level of the highest associated blank;
- "UJ" - Not detected. Quantitation limit may be inaccurate or imprecise;
- "J" - Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the analytical method
- "N" – Tentative identification. Analyte is considered present in the sample;
- "R" – Unreliable result; data is rejected or unusable. Analyte may or may not be present in the sample; and
- No Flag - Result accepted without qualification.

10.0 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

10.1 QUALITY ASSURANCE BATCHING

Each set of samples will be analyzed concurrently with calibration standards, method blanks, matrix spikes (MS), matrix spike duplicates (MSD) or laboratory duplicates, and QC check samples (if required by the protocol). The MS/MSD samples will be designated by the field personnel. If no MS/MSD samples have been designated, the laboratory will contact the Langan Project Manager for corrective action.

10.2 CALIBRATION STANDARDS AND SURROGATES

All organic standard and surrogate compounds are checked by the method of mass spectrometry for correct identification and gas chromatography for degree of purity and concentration. All standards are traceable to a source of known quality certified by the USEPA or NIST, or other similar program. When the compounds pass the identity and purity tests, they are certified for use in standard and surrogate solutions. Concentrations of the solutions are checked for accuracy before release for laboratory use. Standard solutions are replaced monthly or more frequently, based upon data indicating deterioration.

10.3 ORGANIC BLANKS AND MATRIX SPIKE

Analysis of blank samples verifies that the analytical method does not introduce contaminants or detect "false positives". The blank water can be generated by reverse osmosis and Super-Q filtration systems, or distillation of water containing $KMnO_4$. The matrix spike is generated by addition of surrogate standard to each sample.

10.4 TRIP AND FIELD BLANKS

Trip blanks and field blanks will be utilized in accordance with the specifications in Section 4. These blanks will be analyzed to provide a check on sample bottle preparation and to evaluate the possibility of atmospheric or cross contamination of the samples.

11.0 QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

11.1 INTRODUCTION

Quality assurance audits may be performed by the project quality assurance group under the direction and approval of the QAO. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). Functioning as an independent body and reporting directly to corporate quality assurance management, the QAO may plan, schedule, and approve system and performance audits based upon procedures customized to the project requirements. At times, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

11.2 SYSTEM AUDITS

System audits may be performed by the QAO or designated auditors, and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may occur.

11.3 PERFORMANCE AUDITS

The laboratory may be required to conduct an analysis of Performance Evaluation samples or provide proof that Performance Evaluation samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

11.4 FORMAL AUDITS

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Non-compliances will be logged, and documented through audit findings, which are attached to and are a part of the integral audit report. These audit-finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

12.0 PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

12.1 PREVENTIVE MAINTENANCE PROCEDURES

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedure developed by the operators.

A list of critical spare parts will be established by the operator. These spare parts will be available for use in order to reduce the downtime. A service contract for rapid instrument repair or backup instruments may be substituted for the spare part inventory.

12.2 SCHEDULES

Written procedures will establish the schedule for servicing critical items in order to minimize the downtime of the measurement system. The laboratory will adhere to the maintenance schedule, and arrange any necessary and prompt service. Required service will be performed by qualified personnel.

12.3 RECORDS

Logs shall be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced shall be reviewed, maintained, and filed by the operators at the laboratories. The QAO may audit these records to verify complete adherence to these procedures.

13.0 CORRECTIVE ACTION

13.1 INTRODUCTION

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

13.2 PROCEDURE DESCRIPTION

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories,

or contractor locations. Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 12.1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

FIGURE 12.1

CORRECTIVE ACTION REQUEST
Number: _____ Date: _____
TO: _____ You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by _____
CONDITION:
REFERENCE DOCUMENTS:
RECOMMENDED CORRECTIVE ACTIONS:
_____ _____ _____ _____ _____ _____ Originator Date Approval Date Approval Date
RESPONSE
CAUSE OF CONDITION
CORRECTIVE ACTION (A) RESOLUTION (B) PREVENTION (C) AFFECTED DOCUMENTS
C.A. FOLLOWUP: CORRECTIVE ACTION VERIFIED BY: _____ DATE:_____

14.0 REFERENCES

USEPA. Validating Volatile Organic Compounds By Gas Chromatography/Mass Spectrometry. SOP No. HW-24, Revision 4, dated October 2014. USEPA Region II.

USEPA. Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15. SOP No. HW-31, Revision 6, dated June 2014. USEPA Region II.

USEPA. Polychlorinated Biphenyl (PCB) Aroclor Data Validation. SOP No. HW-37, Revision 3, dated May 2013. USEPA Region II.

USEPA. Pesticide Data Validation. SOP No. HW-36, Revision 4, dated May 2013. USEPA Region II.

USEPA. Semivolatile Data Validation. SOP No. HW-35, Revision 2, dated March 2013. USEPA Region II.

USEPA. Tetro-through Octa-chlorinated Dioxins and Furans by Isotope Dilution (HRGC/HRMS). SOP For EPA Method 1613, Revision B, dated December 2010. USEPA Region II.

USEPA. PCDDs/PCDFs using HRGC/HRMS. SOP for SW-846 Method 8290 HW-19, Revision 1.1, dated December 2010. USEPA Region II.

USEPA, Polychlorinated Dibenzodioxins/Polychlorinated Dibenzofurans. SW-846 Method 8280 HW-11, Revision 3, dated December 2010. USEPA Region II.

USEPA. Low/Medium Volatile Data Validation. SOP No. HW-33, Revision 3, dated March 2013. USEPA Region II.

USEPA. ICP-AES Data Validation. SOP No. HW-2a, Revision 15, dated December 2012. USEPA Region II.

USEPA. ICP-MS Data Validation. SOP No. HW-2b, Revision 15, dated December 2012. USEPA Region II.

USEPA. Mercury and Cyanide Data Validation. SOP No. HW-2c, Revision 15, dated December 2012, USEPA Region II.

USEPA. Trace Volatile Data Validation. SOP No. HW-34, Revision 3, dated February 2013, USEPA Region II.

Emily G. Strake, CEP
Senior Project Chemist/ Risk Assessor

Human Health Risk Assessment
Chemical Data Validation

17 years in the industry ~ 4 years with Langan

Ms. Strake has seventeen years of environmental chemistry, risk assessment, auditing, and quality assurance experience. Most recently, she has focused her efforts on human health risk assessment, and has been the primary author or key contributor of risk assessment reports and screening evaluations for projects governed under RCRA, CERCLA, PADEP, DNREC, SWRCB, DTSC, NJDEP, CTDEEP, ODEQ, NYSDEC and MDE. She has experience in site-specific strategy development, which has enabled her to perform assessments to focus areas of investigation and identify risk-based alternatives for reducing remediation costs. Ms. Strake is a member of the Interstate Technology and Regulatory Council Risk Assessment Team responsible for the development and review of organizational risk assessment guidance documents and serves as a National Trainer in risk assessment for the organization.

Ms. Strake has extensive experience assessing potential adverse health effect to humans from exposure to hazardous contaminants in soil, sediment, groundwater, surface water, ambient and indoor air, and various types of animal, fish, and plant materials. She understands and applies environmental cleanup guidance and policies associated with multiple federal and state agencies. Additionally, she has broad experience in the development of preliminary remediation goals and site-specific action levels. She is proficient with the USEPA and Cal/EPA Johnson and Ettinger Model for Subsurface Vapor Intrusion into Buildings, USEPA's Adult Lead Methodology, DTSC's Leadspread 7 and 8, evaluation of aerobic biodegradation potential using API's BioVapor, and statistical evaluation of data using USEPA's ProUCL software. In addition, Ms. Strake is experienced in presentation of risk information at public meetings.

Ms. Strake has extensive experience in environmental data validation, focused on ensuring laboratory deliverables follow specific guidelines as described by regulatory agencies and the analytical methods employed. In addition, she has experience in EQuIS chemical database management. She also has a broad range of environmental field experience and maintains current OSHA HAZWOPER certification.

Ms. Strake is experienced in auditing laboratory and field-sampling activities for compliance with Quality Assurance Project Plans (QAPPs), the National Environmental Laboratory Accreditation Conference Standards Quality Systems manual, and applicable USEPA Guidance. Ms. Strake has also audited on-site laboratories in support of groundwater treatment operations and implemented corrective actions. Her responsibilities include writing reports on the value of laboratory work, writing/editing QAPPs for clients and project-specific sites, peer reviewing colleague's work, and mentoring staff within the office. She has also served as the Quality Assurance officer for several long-term projects, responsible for the achievement of all forms of Quality Control/Quality Assurance by onsite personnel relating to sampling, analysis, and data evaluation.

Education

M.B.A., Business Administration
The University of Scranton

B.S., Chemistry
Cedar Crest College

Certification

Board Certified Environmental Professional (CEP)

Memberships

Interstate Technology and Regulatory Council

Montgomery Township Environmental Advisory Committee Member, Term ending 1/1/2019.

Society for Risk Analysis

Training

40 hr. OSHA HAZWOPER Training/Nov 2002

8 hr. HAZWOPER Supervisor/June 2004

8 hr. OSHA HAZWOPER Refresher/Oct 2012

Publications/Presentations

Decision Making at Contaminated Sites: Issues and Options in Human Health Risk Assessment. Interstate Technology and Regulatory Council

Alternate Approaches for Act 2 Risk Assessments Using Site-Specific Information. Pennsylvania Brownfields Conference

EPA Region IX Vapor Intrusion Policy for Silicon Valley
2014 Environmental Workshop

LANGAN

Ms. Strake has several years' experience analyzing investigative samples, writing laboratory Standard Operating Procedures (SOPs), and managing all aspects of procedures and analyses for Optical Emission Spectrometry, X-Ray Fluorescence, Ignition analysis, and Atomic Absorption. Her experience also includes operating and performing routine instrument maintenance for GC/MS and IR. Ms. Strake has worked extensively on developing rapid soil characterization programs for PCB and pesticide analyses utilizing enzyme-linked immunosorbent assays, and was also involved in efforts to develop new instrumentation to quantify microbial nitrification of ammonium.

Selected Project Experience

Human Health Risk Assessment

- Performed a baseline risk assessment for hypothetical future residents at a CERCLA site in Hagerstown, Maryland. The evaluation included evaluation of ingestion, dermal contact, and inhalation of chemicals in groundwater. Linear low dose cancer risk was assessed as well as one-hit cancer risk.
- Delaware City Refinery - Performed comprehensive human health risk assessment for a petroleum refinery in Delaware City, Delaware. The risk assessment was the basis for a thorough characterization and assessment of potential risks posed by site-specific conditions. Developed various human exposure scenarios by using both Federal and State-Specific guidance for soil, groundwater, and surface water exposure.
- Major League Soccer's San Jose Earthquakes Stadium – Utilized heuristic soil gas model to calculate risk and hazard associated with inhalation of chlorinated solvents for the redevelopment of a public soccer stadium. Soil gas data was modeled assuming three soil stratum and site-specific soil, building, and exposure parameters. The Earthquakes' stadium is set to open in 2015.
- Texas Instruments – Participated in a collaboration with Robert Ettinger and Geosyntec Consulting to develop comments to USEPA Region IX and the San Francisco Regional Water Quality Control Board regarding vapor intrusion at South Bay Superfund Sites. The focus of the response was to outline scientific and policy objections to EPA's recommended TCE interim short-term indoor air response action levels and guidelines, and to clarify the use of California-modified indoor air screening levels for assessing and responding to TCE and PCE subsurface vapor intrusion into indoor air.
- DuPont - Worked as a key participant in the human health risk evaluation of mercury associated with legacy contamination of the South River located in Waynesboro, Virginia.
- Veteran's Affairs - Completed a human health risk evaluation of the potential future risk associated with inhalation of indoor air for the Veteran's Administration. Soil, soil gas, and groundwater samples were collected as part of the site characterization. Achieved DTSC approval of the risk assessment approach and conclusions.
- Santa Clara Landfill – Developed a human health risk assessment to characterize risk associated with exposure to landfill gas at the Santa Clara All Purpose Landfill. The risk assessment evaluated specific compounds in landfill gas, their concentrations, spatial patterns, and extent throughout the site, and assessed the

potential for vapor intrusion associated with a proposed future redevelopment.

- Occidental Chemical - Completed multiple AOC-specific risk assessments utilizing and applying the guidance set forth by the DTSC's Human Health Risk Assessment Note 1 (Default Exposure Factors for Use in Risk Assessment), Note 3 (Recommended Methodology for Use of USEPA Regional Screening Levels), and Note 4 (Screening Level Human Health Risk Assessments).
- Exelon - Developed a human health risk assessment for a utility-owned former Manufactured Gas Plant (MGP) site in Pennsylvania, under Pennsylvania's Act 2 Program. Used ProUCL statistical software to determine upper limits for full data sets and non-detect data. Conducted vapor intrusion modeling (via the Johnson & Ettinger model) and prepared vapor intrusion reports showing that risks to volatile organic compounds in soils and groundwater were not impacting indoor air quality.
- Avon - Completed a human health risk assessment for a redevelopment property located in Rye, New York. The objective of the evaluation was to characterize the risks associated with potential future human exposures to soil and groundwater affected by a release from the Site's former No. 2 fuel oil UST. The intended future use of the Site was a playground to be utilized by the general public for open play on commercial recreational equipment.
- Golden Gate National Parks Conservancy – Peer reviewed a Preliminary Endangerment Assessment Report for the Battery East Trail. The assessment included a human health risk evaluation that estimated carcinogenic risk from exposure to PAHs and dioxin/furans in soil using toxic equivalency to benzo(a)pyrene and 2,3,7,8-TCDD.
- Sunoco Refineries – Derived site-specific soil PRGs for lead using the EPA's adult lead model for two former Sunoco refineries. Achieved PADEP approval in May 2015. Completed receptor evaluations in accordance with USEPA risk assessment guidance to develop exposure parameters under current and reasonably anticipated future land use scenarios.
- Honeywell - Completed a focused human health risk evaluation of PAH contaminants for under NJDEP's Site Remediation Program. Applied a blended approach of qualitative risk characterization and quantitative risk calculation to propose closure of AOCs following the remedial investigation.
- Floreffe Terminal - Performed human health risk assessment for contamination resulting from a 3.9 million gallon diesel oil tank collapse along the Monongahela River. Evaluated potential impacts to human health via exposure to soil, groundwater, and surface water. Calculated site-specific standards for soil remediation.
- DOW Chemical - Calculated Medium Specific Concentrations for unregulated contaminants using the PADEP protocols to assist in the clean-up of a monomer tank explosion in Bristol, Pennsylvania. Selected appropriate surrogate toxicity data and evaluated novel on-site constituents by analogy.
- Ryder – Developed Alternative Direct Exposure Criteria for PAH-impacted fill material at a commercial facility. Site-specific soil

screening levels for incidental ingestion of soil were calculated following a forward risk evaluation for current on-site receptors.

- Rohm and Haas - Prepared an Act 2 site-specific human health risk assessment for the oldest industrial facility in the United States, located in southeast Philadelphia. The objective of the risk assessment was to determine achievable possible future land-use options under Pennsylvania's Land Recycling Program. The risk assessment included evolution of multiple site-COPCs and constituent suites: VOCs, SVOCs, PCBs, pesticides, and metals (including lead). Evaluated the potential for indoor air inhalation through J&E modeling of soil gas and groundwater.
- Regency - Conducted vapor intrusion modeling for a dry cleaning facility in the Philadelphia area. Predictive modeling using the Johnson and Ettinger approach indicated that estimated contaminant levels would not adversely affect human receptors.

Chemical Data Quality

- Participated in a CERCLA site investigation; assessed the usability of sample results for numerous matrices including dust, sediment, soils, and various aqueous matrices for a remedial investigation under the Contract Laboratory Program. Implemented an on-site pesticide immunoassay program to delineate soil contamination in real-time.
- Coordinated the collection of fish tissue samples and determined the validity of the analytical results associated with CERCLA and RCRA site characterizations. Assessed duck blood analytical results for the Connecticut Department of Energy and Environmental Protection Bureau of Natural Resources.
- Audited multiple accredited laboratories in New Jersey and Pennsylvania on behalf of clients using USEPA Guidance on Technical Audits and Related Assessments for Environmental Data Operations. The audits included full-suite USEPA and SW-846 methodology; and included reviewing staff experience and training records, equipment and facilities, policies, practices, procedures, and documentation for sample receipt, analysis, instrument maintenance, standard preparation, calibration and traceability, control charting, corrective actions, data reduction and review, report generation, and waste disposal.
- Reviewed and validated data packages for RCRA Facilities Investigation at a Philadelphia-area chemical site; issued data validation reports to project personnel and regulatory agencies. The reviews included evaluation of quarterly groundwater, soil, and soil vapor matrices. Participated in RCRA groundwater sampling, developed and executed the investigation's QAPP, and coordinated with the laboratory to schedule and perform field-sampling events.
- Completed Data Usability Summary Reports in accordance with NYSDEC DER-10 guidance for soil, groundwater, sediment surface water, soil gas, ambient air and indoor air analytical results.
- Acted as the Quality Assurance Officer for several long-term projects in Pennsylvania, Maryland, and New Jersey, Delaware, responsible for the achievement of all forms of QA/QC as it related to sampling, analysis, and data evaluation.

- EQuIS data manager for database migration of historical groundwater results associated with remediation activities; assisted with natural attenuation data evaluation and gained experience in geochemical trends associated with intrinsic biodegradation.

APPENDIX I
SITE INSPECTION FORMS

SITE WIDE INSPECTION CHECKLIST

Site Name: _Silvercup West_____ Location: ___Long Island City, Queens, NY_____ Project Number: __005635005_____

Inspector Name: _____ Date: _____ Weather Conditions: _____

Reason for Inspection (i.e., routine, maintenance, severe condition, etc.): _____

Check one of the following: **Y:** Yes **N:** No **NA**: Not Applicable

		Y	N	NA	Normal Situation	Remarks
	General					
1	What are the current site conditions?				--	
2	Are all applicable site records (e.g., documentation of construction activity, SSD or AS/SVE system maintenance and repair, most current easement, etc.) complete and up to date?				Y	
	Easement					
3	Has site use (restricted residential) remained the same?				Y	
4	Does it appear that all environmental easement restrictions have been followed?				Y	
	Site Cover System					
5	Are there any indications of a breach in the capping system at the time of this inspection?				N	
6	Is there any construction activity, or indication of any construction activity within the past certification year (including any tenant improvements), that included the breaching of the capping system, on-site at the time of this inspection?				N	
7	If YES to number 7, is there documentation that the Soil Management Plan, HASP, and CAMP for the site was/is being followed?				NA if N to 6/ Y if Y to 6	

If the answer to any of the above questions indicate non-compliance with any IC/ECs for the site, additional remarks must be provided and, where applicable, documentation attached to this checklist detailing additional inspection and repair activities.

Additional remarks: _____
_____
_____
_____
_____
_____
_____
_____

Minimum Inspection Schedule: Site-wide inspections will be conducted annually, per certification year, at a minimum. Additional inspections will also be conducted at times of severe condition events. All inspection events will utilize this checklist.